



**DIGBY WELLS**  
ENVIRONMENTAL

**PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT**

**FOR THE PROPOSED TEMO COAL MINE**

**(ON AFFECTED FARMS VERLOREN VALEY 246 LQ, DUKERPAN 249 LQ,  
PORTION 1 OF KLEINBERG 252 LQ, AND AREAS OF THE FARMS JAPIE 714  
LQ AND HANS 713 LQ)**


**LEPHALALE LOCAL MUNICIPALITY,**

**WATERBERG DISTRICT, LIMPOPO PROVINCE**

**22 APRIL 2011**



This document has been prepared by **Digby Wells Environmental**

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### EXECUTIVE SUMMARY

A total of eleven cultural heritage resources sites were recorded, of which only two were rated as highly significant. The following table below briefly describes the identified cultural resources and the significance and impact ratings. The threshold limits for the impact assessment column are rated between Low <38 (green) and High >114 (orange). The impact assessment methodology ratings are described in more detail in Appendix A

SITE ID	DESCRIPTION	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
RSV689/001	Stone foundation remains of building, probably living quarters or house. Structure size $\pm$ 10 m x 10 m with at least two rooms visible. Possibility of nearby midden. Structure is at least 100 m north of burial site RSV689/003	4	109
RSV689/002	Four burials at least 100 m south of structure RSV689/003. Burials consist of old red clay brick dressing, of which three have headstones. Only one headstone legible: David PJ Harmse, born 9-2-1862, died 23-7-1936.	4	123
RSV689/003	Possible burial located $\pm$ 40 m south-southwest of structure RSV689/003. A corrugated metal plate placed in position of headstone, scattered clay bricks in general vicinity may have served as dressing.	4	123
RSV689/004	Single red burnished potsherd located next to track and cattle water trough. No visible evidence of any deposit due to cattle activity.	1	71
RSV689/005	A single potsherd and two MSA/LSA flakes found next to non-perennial watercourse. No deposit visible. Probable that the finds are associated with large site around Duikerpan (RSV689/006).	1	45
RSV689/006	Large scatter of LSA lithics around perimeter of Duikerpan. Various lithics identified, such as scrapers, flakes, blades, cores, chunks. Possible LSA open-air manufacturing site. Several isolated undiagnostic potsherds also found. No evidence of deposit visible.	4	48
RSV689/007	Burial site identified through PPP on farm Kleinberg 252 LQ, location and age must be verified.	4	109
RSV689/008	A small concentration of undiagnostic potsherds exposed by animal burrowing and erosion. No deposit visible in burrows, but may exist. Some potsherds display red burnish, that may indicate Sotho-Tswana or Letaba type ceramic facies. No visible structures or other material culture present.	2	46
RSV689/009	Single undiagnostic potsherd. No visible deposit, features or other material culture present.	1	45
RSV689/010	Single flake found. Possible association with site RSV689/006	1	45
RSV689/011	Single undiagnostic potsherd. No visible deposit, features or other material culture present.	1	45

Potential impacts and recommended mitigation on the identified cultural resources are summarised in the following table:

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
RSV689/001	C	Removal of topsoil will destroy site	Phase 2 mapping and documentation of site, STP or test pits to determine existence of midden deposit.	4	109	48
RSV689/002	C	Removal of topsoil will destroy site	Site must be fenced; where possible relatives must be consulted regarding future of site; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	4	123	48
RSV689/003	C	Removal of topsoil will destroy site	Possibility of the burial must be confirmed, either through consultation or archaeological mitigation. If it is a burial, the site must be fenced and relatives consulted; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	4	123	48
RSV689/004	C	Removal of topsoil will destroy site	None	1	71	16
RSV689/005	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	None	1	45	4
RSV689/006	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	Phase 2 mapping and documentation of site and surface sampling by appropriate specialists, i.e. Stone Age specialist; create a buffer zone of at least 200 m around site.	4	48	7
RSV689/007	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	Site must be fenced; where possible relatives must be consulted regarding future of site; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	4	109	48
RSV689/008	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	A watching brief must be implemented to monitor for any subsurface deposit or features.	2	46	5

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RSV689/009	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	Must be incorporated into the Phase 2 mapping and documentation of site RSV689/006.	1	45	4
RSV689/010	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	Must be incorporated into the Phase 2 mapping and documentation of site RSV689/006.	1	45	4
RSV689/011	C,O, D	Secondary impacts resulting from increased traffic and infrastructure development may damage site	Must be incorporated into the Phase 2 mapping and documentation of site RSV689/006.	1	45	4

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### ACRONYMS

<b>AIA</b>	Archaeological Impact Assessment
<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>CRM</b>	Cultural Resources Management
<b>Digby Wells</b>	Digby Wells Environmental
<b>DRC</b>	Democratic Republic of the Congo
<b>EIA</b>	Environmental Impact Assessment
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>EMP</b>	Environmental Management Plan
<b>Ha</b>	Hectare
<b>HIA</b>	Heritage Impact Assessment
<b>HSMP</b>	Heritage Site Management Plan
<b>IFC</b>	International Finance Corporation
<b>I&amp;AP</b>	Interested and Affected Parties
<b>NHRA</b>	National Heritage Resources Act 25 of 1999 (South Africa)
<b>Pedestrian survey</b>	Physical survey on foot to identify and record potential heritage resources
<b>PPP</b>	Public Participation Process
<b>ROM</b>	Run of Mine
<b>SIA</b>	Social Impact Assessment
<b>SAHRA</b>	South African Heritage Resources Agency
<b>Watching brief</b>	The process where a qualified archaeologist is present on-site during any activity in, near or at a heritage resource site that may be impacted, or where there is potential for exposing heritage resources during construction or other activities.

## **1 INTRODUCTION**

### **1.1 Project Overview**

The proposed Temo Coal project is located in the Waterberg District within the Lephalale Local Municipality. The proposed project sites are located off the D175 district road which runs from Steenbokpan to Stockpoort. It is located 45 km west northwest of the town of Lephalale (Ellisras) and 18 km south of Stockpoort in the Limpopo Province.

The mining right application covers the following farms/ portions:

1. The farm Verloren Valey 246LQ
2. The farm Duikerpan 249LQ
3. Portion 1 of the farm Kleinberg 252LQ
4. An area of the farm Japie 714LQ
5. An area of the farm Hans 713LQ

Initial mining will take place on the farm Verloren Valey and Run of Mine (ROM) coal will be transported by coal haulers along a dedicated private road to a coal processing facility on the farm Duikerpan. After processing, coal from the Temo Project mine will be stockpiled separately as Eskom and export coal, for subsequent sale and delivery.

### **1.2 Project Description**

The total coal resource is approximately 1.5 billion tonnes in situ. The initial mine development will take place on the farm Verloren Valey, where a resource of 582 million tonnes gross in situ, or 490 million ROM has been demonstrated. It is the intention that coal produced at the Temo Mine will be sold both to Eskom and on the export market. At optimal production 14.5 ROM million tonnes per annum (Mt/a) will be mined which will result in 5 Mt/a of Eskom product and 2 Mt/a for export. The production from the farm Verloren Valey will exceed 30 years.

The coal deposit in the Waterberg that is in consideration for the project will be mined by conventional open pit mining methods due to the shallow depths and the thick coal horizons that exist. With the thick coal and shallow depth to the coal a very low strip ratio is expected to be achieved. A conventional open pit mining method utilizing trucks and shovels to excavate the pit will be utilized. The pit will be started by establishing a box cut and then creating mining benches of various widths and ramps to extend the mine deeper and wider. The excavation is started by stripping off the topsoil and stockpiling it for future reclamation and then rehabilitation. The hard overburden is next to be stripped. This is also stored on a second stockpile and is also used for rehabilitation purposes at the appropriate time. Once the overburden is stripped the various coal seams are exposed and then the individual coal benches can be created. The bench widths will be dependent on the width of the individual coal seams.

The various coal seams will be mined and then loaded onto coal haul trucks that will haul the coal up the ramps and transport it to the wash plant.

### 1.3 Client details

<b>Company name:</b>	Temo Coal Mining (Pty) Ltd
<b>Registration number:</b>	2005/005101/07
<b>Postal address:</b>	Private Bag X2001, Menlyn, 1063
<b>Contact person:</b>	Mr. Jan Britz
<b>Telephone number:</b>	+27(0)12 361 0515
<b>Fax number:</b>	+27(0)12 361 2207
<b>Email address:</b>	<a href="mailto:jan@namaneresources.com">jan@namaneresources.com</a>

## 2 STUDY AREA

### 2.1 Regional setting

The proposed Temo Coal Mine is located on five farms approximately 45 km west-northwest of Lephalale (Ellisras) and 18 km west of Stockpoort in the Limpopo Province, as indicated in Figure 2-1 and Figure 2-2. A summary of the location data of the proposed development and cultural resources is provided in Table 2-1 below. The physical locations of the farms are illustrated in Figure 2-3.

**Table 2-1: Summary of Location Data**

<b>Province</b>	Limpopo		
<b>Local Authority</b>	Lephalale Local Municipality		
<b>Magisterial district</b>	Waterberg Magisterial District		
<b>Property</b>	Verloren Valey 246LQ Duikerpan 249LQ Portion 1 of the farm Kleinberg 252LQ An area of the farm Japie 714LQ An area of the farm Hans 713LQ		
<b>Closest town</b>	Lephalale (Ellisras)	<b>1:50000 map no.</b>	2327 CA Hardekraaltjie 2327 CB Steenbokpan
<b>Datum</b>	WGS 84	<b>Average accuracy</b>	5 meter
<b>Site name</b>	<b>Description</b>	<b>GPS co-ordinates (Garmin Etrex Legend Cx)</b>	
2327/RSV689/001	Historical settlement site	S23 34 58.4 E27 13 20.3	
2327/RSV689/002	Historical burial site	S23 35 01.8 E27 13 20.0	

2327/RSV689/003	Possible historical burial site	S23 34 59.7 E27 13 19.5
2327/RSV689/004	Iron Age find spot	S23 34 56.9 E27 15 56.7
2327/RSV689/005	Stone and Iron Age find spot	S23 36 45.6 E27 16 55.1
2327/RSV689/006	Stone Age site	S23 36 38.6 E27 17 08.8
2327/RSV689/007	Unverified burial site	Unrecorded
2327/RSV689/008	Iron Age site	S23 36 49.3 E27 17 02.0
2327/RSV689/009	Iron Age find spot	S23 36 53.1 E27 17 01.2
2327/RSV689/010	Stone Age find spot	S23 36 34.4 E27 17 07.1
2327/RSV689/011	Iron Age find spot	S23 36 33.9 E27 16 52.7

## 2.2 Physical and Natural Environment

The study area of is located within the Savannah biome – also generally known as thornveld and broadleaved woodland – it falls within the Kalahari thornveld and the transition to Zambebian broad-leaved woodland (White 1983 cited in Digby Wells 2011). The vegetation type is characterized by wooded grassland falling on the transition between the Zambebian Regional Centre of Plant Endemism (also referred to as the Zambebian Region) and the Kalahari-Highveld Regional Transitional Zone as described by White (1983). The area of the proposed development shows strong similarities to Vegetation Type 17, namely the Sweet Bushveld, as described by Van Rooyen & Bredenkamp (Low and Rebelo, 1996), the Arid Sweet Bushveld (Veld Type 14) as described by Acocks (1988) and the Limpopo sweet Bushveld according to Mucina and Rutherford (2006). The Sweet Bushveld, Arid Sweet Bushveld and Limpopo sweet bushveld show similarities and correspond in vegetation composition, dominant trees, shrubs, climate and soils. The Limpopo sweet bushveld vegetation in Limpopo represents 94.4% of the vegetation type's occurrence, 23% of it has been modified, furthermore, nationally as well as provincially 0.59% of it is officially protected.

A more complete description of the natural environment may be found in the fauna and flora specialist report prepared for the Temo Coal Mine ESIA.



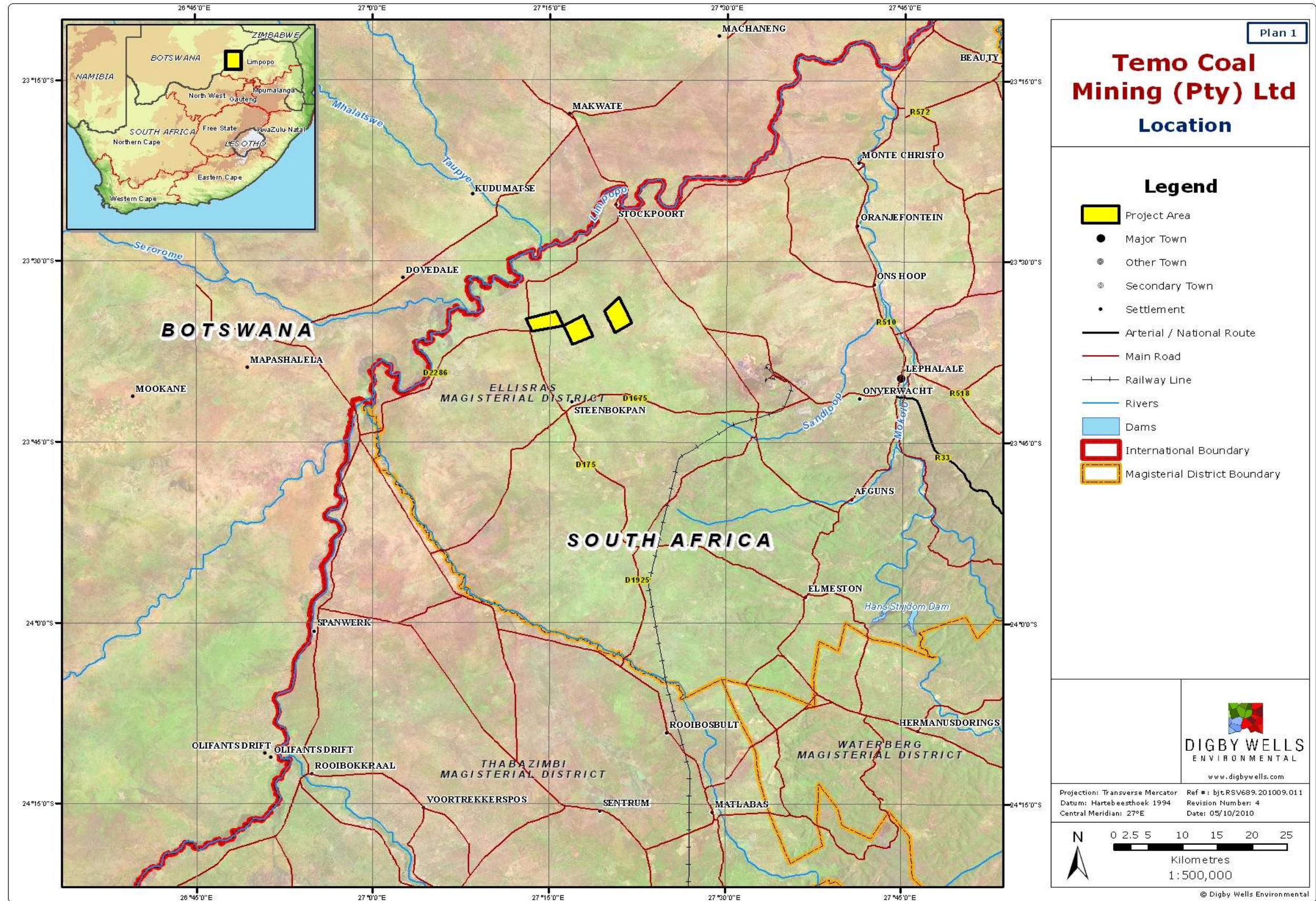


Figure 2-1: Regional location of proposed Temo Coal Mine



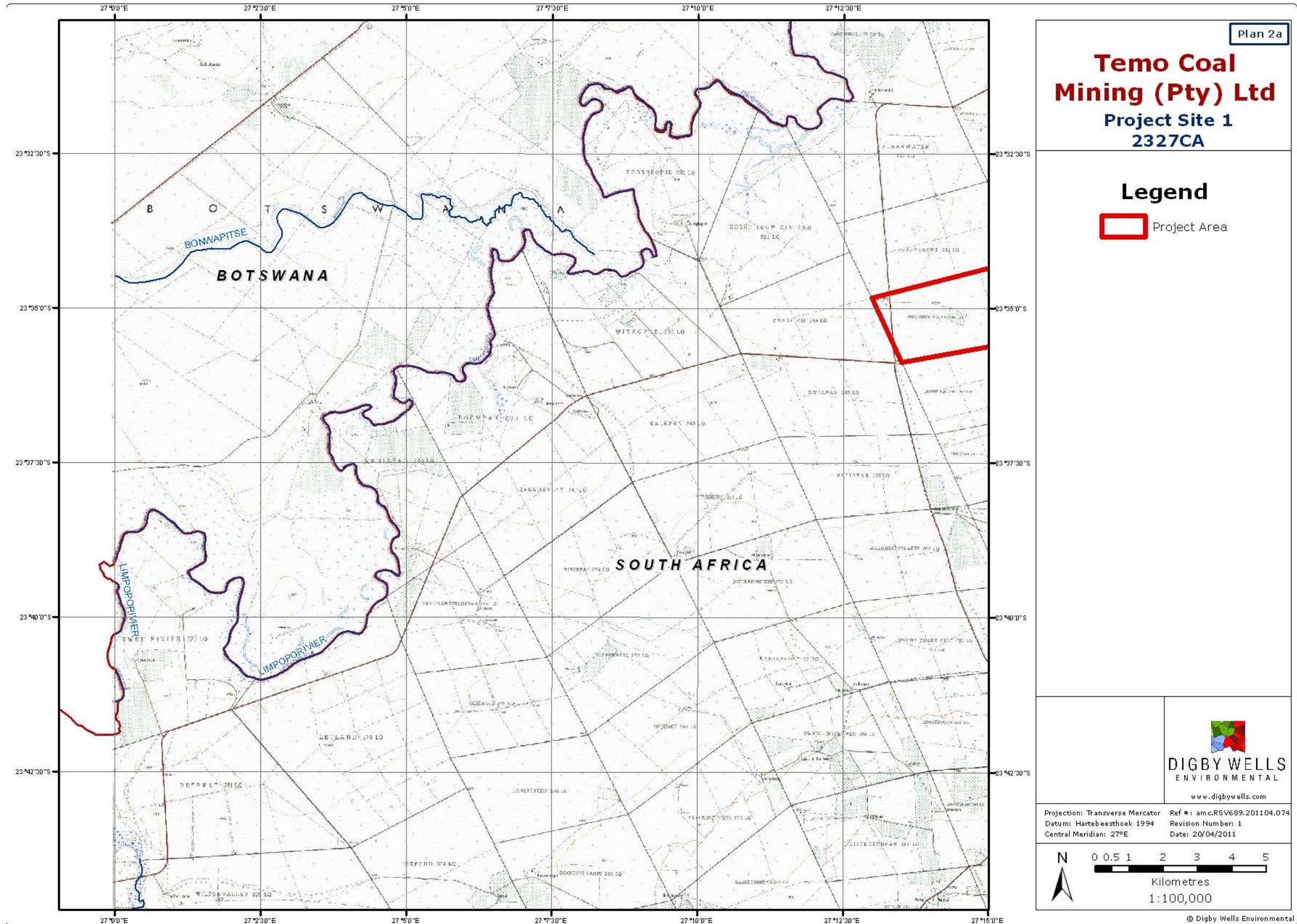


Figure 2-2: Location of Verloren Valey on 1:50 000 map sheet 2327 CA Hardekraaltjie



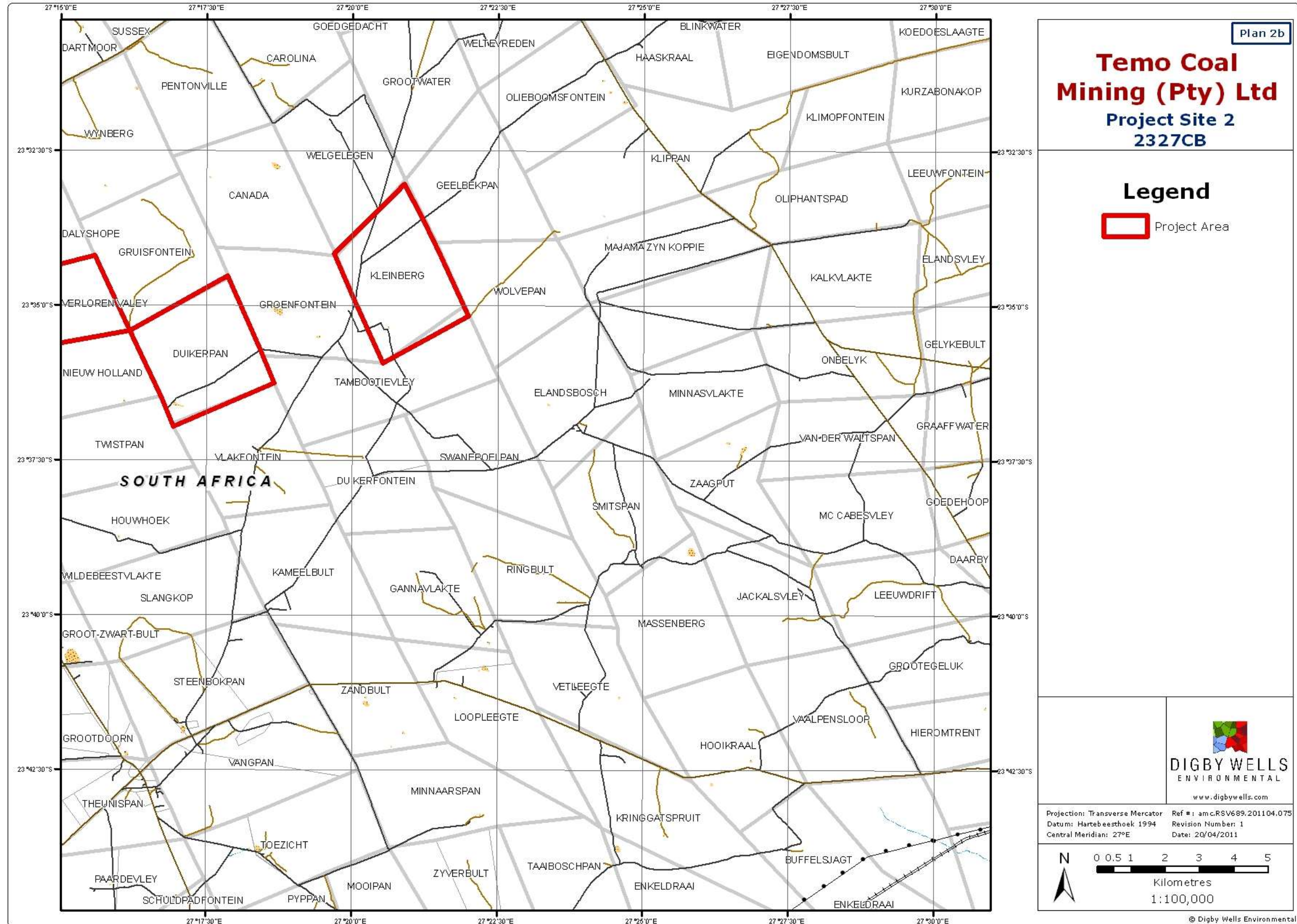


Figure 2-3: Location of Duikerpan, Kleinberg, Japie and Hans on 1: 50 000 mapsheet 2327 CB Steenbokpan



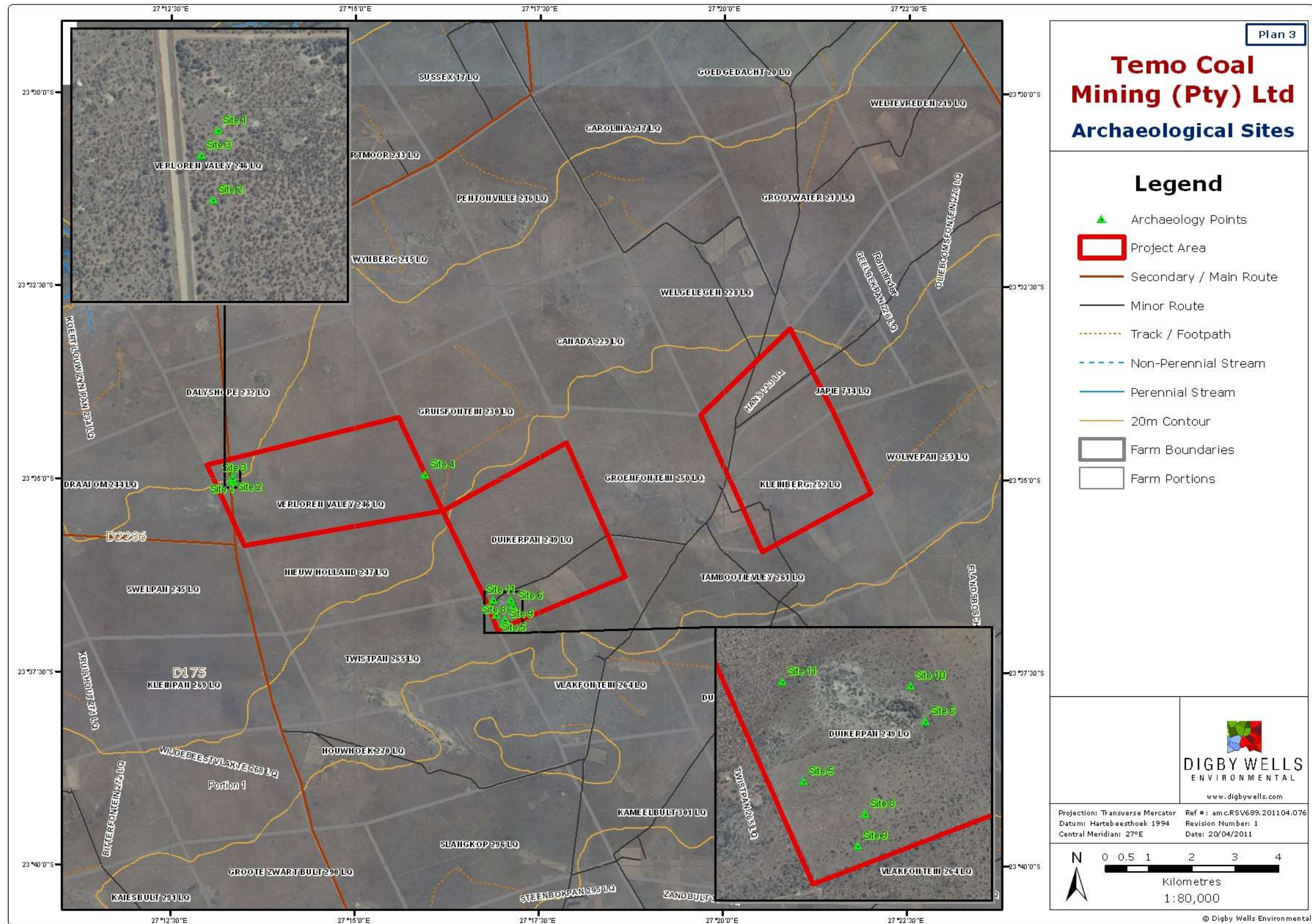


Figure 2-4: Location of identified cultural resources on aerial photo



### 3 TERMS OF REFERENCE

The Archaeological Impact Assessment (AIA) included desktop research, field-based studies and documentation of cultural heritage resources. The AIA complied with legal requirements as described in Section 38 of the National Heritage Resources Agency (NHRA), as well as the archaeological aspects of the SAHRA Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports (2007). It furthermore complied with International Finance Corporation (IFC) Performance Standard 8: Cultural Heritage (2006).

The components of the Phase 1 archaeological and heritage impact assessment included the following:

- The gathering and reviewing of information relating to known archaeological and heritage resources within and surrounding the proposed development area. This included a desktop study that the reviewed published literature and existing baseline information and integration of local legislation and regulations;
- A physical survey on foot through the proposed development area by a qualified archaeologist, aimed at locating heritage resources falling within and adjacent to the proposed development footprints. The recording of significant archaeological and heritage sites and assessment of potential environmental impacts on such resources.

#### 3.1 Legislation

The IFC’s Performance Standards form part of the Equator Principles and aims to manage social and environmental risks (and impacts) to enhance development opportunities in its private sector financing in its member countries eligible for financing (IFC, 2006). The main focus of the risk assessment of a proposed development is primarily on the potential impacts associate with the project activities during construction, operation, and decommissioning and closure phases. Table 3-1 outlines the performance standards assisting the developer to manage risks and impacts associated with archaeological, heritage and cultural risks related to the project.

**Table 3-1: Summary of IFC Performance Standards with reference to the ESIA document**

<b>PERFORMANCE STANDARD 8: CULTURAL HERITAGE</b>	
<p>1) <i>Internationally recognised practices:</i> In addition to complying with relevant South African law that implements the host country’s obligations under the Convention Concerning the Protection of World Cultural and Natural Heritage, the client will protect and support cultural heritage by undertaking internationally recognized practices for the protection, field-based study, and documentation of cultural heritage</p>	<p>1. In accordance with Section 1 of the IFC Performance Standard 8 Guidelines, an accredited archaeologist and heritage specialists was appointed for this project to investigation archaeological and heritage sites in the project area. An archaeological site visit was undertaken by Johan Nel from 28 February to 4 March 2011 for the identification of significant archaeological and heritage sites, as well as the documentation and assessment of the significant sites.</p>

<p>2) <i>Chance Find Procedures:</i> The client is responsible for designing a project that avoids significant damage to cultural and natural heritage. When the proposed location of a project is in areas where cultural heritage is expected to be found, either during construction or operations, the client will implement chance find procedures established through the Social and Environmental Impact Assessment. The client will not disturb any chance finds further until an Assessment by a competent specialist is made and actions consistent with the requirements of this Performance Standard are identified.</p>	<p>2. In accordance with Section 2 of the IFC Performance Standard 8 Guidelines, the accredited archaeologist and heritage specialist assessed the findings in the project area and made constructive recommendations for the mitigation of sites that may be impacted by construction and operations activities. Archaeological and heritage monitoring and management measures will be implemented as part of environmental and social management plans to ensure sites of archaeological and heritage significance are protected during all phases of development.</p>
<p>3) <i>Consultation:</i> Where a project may affect cultural heritage, the client will consult with affected communities within the host country who use, or have used within living memory, the cultural heritage for longstanding cultural purposes to identify cultural heritage of importance, and to incorporate into the client’s decision-making process the views of the affected communities on such cultural heritage.</p>	<p>3. In accordance with Section 3 of the IFC Performance Standard 8, the accredited archaeologist consulted relevant community authorities during the site visit. In cooperation with the social and public consultation process, the archaeologist will ensure all affected community members are informed and consulted within the appropriate cultural context before any site of archaeological or heritage significance is affected.</p>
<p>4) <i>Removal of Cultural Heritage:</i> Most cultural heritage is best protected by preservation in its place, since removal is likely to result in irreparable damage or destruction of the cultural heritage. The client will not remove any cultural heritage, unless:</p> <ul style="list-style-type: none"> <li>• There are no technically or financially feasible alternatives to removal;</li> <li>• The overall benefits of the project outweigh the anticipated cultural heritage loss from removal; and/or any removal of cultural heritage is conducted by best available technique.</li> </ul>	<p>4. In accordance with Section 4 of the IFC Performance Standard 8 Guidelines, the following conditions will be considered:</p> <ul style="list-style-type: none"> <li>• There are no technically or financially feasible alternatives to removal;</li> <li>• The overall benefits of the project outweigh the anticipated cultural heritage loss from removal; and/or</li> <li>• Any removal of cultural heritage is conducted by the best available technique.</li> </ul>
<p>5) <i>Critical Cultural Heritage:</i> Critical cultural heritage consists of:</p> <ul style="list-style-type: none"> <li>(i) Internationally recognized heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; and</li> <li>(ii) Legally protected cultural heritage areas, including those proposed by host governments for such designation.</li> </ul>	<p>5. In accordance with Section 5 of the IFC Performance Standard 8 Guidelines, the client will not significantly alter, damage, or remove any critical cultural heritage or any sites of international value e.g. World Heritage Sites.</p>

<p>6) <i>Legally protected cultural heritage areas:</i> In circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage cited above, will meet the following requirements:</p> <ul style="list-style-type: none"> <li>• Comply with defined national or local cultural heritage regulations or the protected area management plans;</li> <li>• Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project.</li> </ul>	<p>6. In accordance with Section 6 of the IFC Performance Standard 8 Guidelines, the archaeologist will ensure that the proposed project area is not located within a legally protected area or a legally defined buffer zone. As part of the environmental and social impact assessment, all relevant national and local environmental and social policies, plans and guidelines are implemented for all development activities associated with the project.</p>
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#### **4 AIMS AND OBJECTIVES**

The aim of this archaeological impact assessment was to assist the client in identifying, documenting and managing archaeological and heritage resources found in the proposed project area in a responsible manner. This assessment also aimed to protect, preserve and develop resources within relevant legislative frameworks. In essence, this study aimed to:

- Identify, record and document significance archaeological, cultural and historic sites, including graves and cemeteries, within the proposed development area;
- Evaluate whether proposed mining activities will have any negative impacts on these archaeological, cultural, historical and natural heritage resources during construction, operation and decommissioning phases;
- Recommend mitigation and management measures to avoid or ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and
- Promote the overall conservation and protection of natural and cultural resources in the proposed project area and its surroundings.

#### **5 METHODOLOGY**

The following methodology was employed to determine the potential occurrence of archaeological and heritage sites and the significance of identified sites.

This archaeological impact assessment consisted of literature reviews, desktop based studies and pedestrian surveys. The primary aim of the site visit was to identify record and rate cultural resources, as required by the NHRA and SAHRA minimum standards. IFC Performance Standard 8: Cultural Heritage was also complied with.

The integrated archaeological impact assessment process consisted of the following three steps:

### **5.1 Literature Review/Desktop Study:**

This step was aimed at information gathering relating to known archaeological and heritage resources within and surrounding the proposed development area. Project information and data was obtained through intensive research, data gathering and consultation, including a variety of primary and secondary sources such as journals, textbooks and records, national and provincial websites, archaeological field guides, national and international guidelines, maps, photographs and plans. The literature survey undertaken prior to the field visit was updated during the report to address any possible gaps and assist in drawing inferences on significance of sites where information was lacking. Topographical maps and aerial photos aided the physical survey. Natural features such as perennial and non-perennial streams and natural water bodies were used to inform the subsequent field survey.

### **5.2 Interviews and inferred information findings**

As part of the PPP and SIA process, questions pertaining to living and intangible heritage were included. These questions were designed to determine the potential existence of any sites of significance in terms of criteria described by various standards (see Terms of Reference above).

### **5.3 Field visit and survey:**

A physical survey and site visit was undertaken from 27 February to 4 March 2011 by a qualified archaeologist and two students in the project area. This survey was aimed at locating and documenting potential sites of archaeological and heritage significance located within the project boundaries. General site conditions and features on site were recorded by means of photos, GPS location, and description.

Due to the size of the study area and the limited time available, the pedestrian survey focussed on perennial and non-perennial streams and natural water bodies such as pans, where these occur. In areas where no evidence of water bodies or streams were known to exist, based on topographical information, random surveys were undertaken using a transect grid pattern that enabled the survey to be quantified to an extent. These transect surveys were done using a grid generated on a GIS platform over each farm. North-south transects were randomly selected and surveyed at approximately 50 m intervals by three persons. The total approximate coverage of the farms where no water bodies existed was estimated to at least 50%.

### **5.4 Data Interpretation: Assessment of Significance and Impacts**

The identified archaeological and heritage resources were assessed to determine their significance in terms of the information potential and heritage value. Potential impacts on the heritage resources were assessed in terms of Digby Wells' standard EIA methodology, as well as in terms of the impact assessment criteria and ratings as detailed in the Association of South African Professional Archaeologist (ASAPA) guidelines and the South African Heritage

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Resources Agency (SAHRA) guidelines (see Appendix A). The site significance and impact assessment were integrated into the final ESIA report.

### 5.4.1 Site Significance Rating

Site significance is determined by grading the site against following four criteria:

#### A) Context of site:

This provides nine categories whereby heritage resources' significance may be measured against, namely:

- (a) its importance in the community, or pattern of country's history;
- (b) its possession of uncommon, rare or endangered aspects of country's natural or cultural heritage;
- (c) its potential to yield information that will contribute to an understanding of country's natural or cultural heritage;
- (d) its importance in demonstrating the principle characteristics of a particular class of country's natural or cultural places or objects;
- (e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- (f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- (g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- (h) its strong or special association with the life or work of a person, group or organisation of importance in the history of the country; and
- (i) sites of significance relating to the history of slavery in country.

#### B) Site integrity:

This considers whether the site can be interpreted in primary context or if there is an amount of damage or disturbance to a site.

#### C) Site extent:

This refers to the size and nature of site, e.g. single artefact, concentration of artefacts, amount of deposit, and complexity of site.

#### D) Uniqueness:

Considers whether the site is unique, common place or rare in a specific area.

The total rating determines in part the potential of any given site to provide information regarding the history of a particular area and time period and so forth. A detailed explanation of the site significance assessment methodology and archaeological impact assessment criteria and ratings is provided in Appendix A.

#### 5.4.2 Environmental Impact Assessment Rating and Criteria

IFC Performance Standard 1 requires that the ESIA take into account the risks and impacts in the context of the project’s area of influence (IFC, 2006). Details of the impact assessment methodology used to determine the significance of physical, socio-economic and heritage impacts are provided below. The significance rating process follows the established impact/risk assessment formula, adapted to specifically address impacts on heritage resources:

Where	$\text{Significance} = (\text{Consequence} \times \text{Probability}) + \text{Site significance}$
And	$\text{Consequence} = \text{Severity} + \text{Spatial Scale} + \text{Duration}$
	$\text{Probability} = \text{Likelihood of an impact occurring}$

The impact matrix describing impacts on the cultural and heritage environment thus calculates the rating out of 154 instead of the standard 147 which is used in the Temo Coal ESIA, whereby Severity, Spatial Scale, Duration, Probability and Site significance are rated out of seven. Calculation of Site significance is explained in Appendix A.

### 5.5 Report Compilation

The compilation of this specialist AIA report included the records of archaeological and heritage resources identified the affected area, as well as an assessment of the significance of such resources in terms of the heritage assessment criteria. Potential impacts of the development on such resources were furthermore assessed using an established impact assessment matrix that was adapted to include site significance ratings. The consideration of alternatives and proposed mitigation of any adverse effects during and after the completion of the development were also included.

## 6 EXPERTISE OF THE SPECIALIST

A Curriculum Vitae (CV) and declaration of independence is attached in Appendix B.

## 7 FINDINGS AND SURVEY RESULTS

### 7.1 Desktop research

In general the archaeological record of the Waterberg district can be divided into three broad phases, namely the Stone Age, Iron Age and Historical. Each of these phases represent specific time periods. In terms of the study area, the most important of these may be the Later Stone Age, Late Iron Age and Historical Period.



### 7.1.1 Summary of archaeological periods

The Stone Age is divided into three periods, starting at approximately 2 million years ago (mya) with the appearance of early *Homo* species, specifically *H habilis*. This Early Stone Age (ESA) is characterised by simple stone tools – known as Oldowan – made by striking rough flakes off larger pebbles, producing choppers, scrapers, . The ESA represents a long period that continued relatively unchanged for more than 1.5 million years, until the transition to the Middle Stone Age (MSA). This transition was accompanied with the appearance of the more evolved and familiar-looking *H.ergaster* and *erectus* approximately 1.7 mya. According to current accepted theory these species originated in Africa and migrated as far as Southeast Asia from approximately 1.5 mya. This also resulted in the gradual development of Oldowan tools to Acheulian, indicating the material cultural transition between the ESA and MSA. Tools are usually identified as being more refined and complex than ESA Oldowan industry.

The MSA worldwide dates from about 300,000 to 50,000 years ago. This period is characterised by significant changes in the lithic industries and fossil record, when compared to the ESA and Acheulian types. The MSA is associated with the appearance of anatomically modern *Homo sapiens* in Africa. These early humans spread out of Africa by approximately 80,000 to 50,000 years ago, in what is currently thought to have been small groups. However, around 30,000 BP they replaced both *H. erectus* and *H. sapiens neandertalensis* – Neanderthal man – in Europe and Asia. In South Africa, the MSA appears 70,000 BP at Blombos, southern Cape, and continues for about 50,000 years until the Later Stone Age (LSA).

The LSA in South Africa begins at around 20,000 to 10,000 BP. Massive technological innovation is evident when compared to the ESA and MSA. The LSA is associated only with modern *Homo sapiens sapiens*, and in South Africa it is thought that the indigenous hunter-gatherer societies such as the San are direct descendants of these early LSA people. In general, contact with Iron Age agro-pastoral communities during the early 1<sup>st</sup> millennium CE resulted in the gradual decline of the LSA, until the almost total disappearance of LSA industries by the mid-2<sup>nd</sup> millennium CE. However, evidence of the LSA occurred as late as the 17<sup>th</sup> century in the southern Cape, and remnants remained in the northern interior until the 18<sup>th</sup> century.

All three periods of the Southern African Stone Age occurs in the Waterberg area. The earliest accounts of Stone Age sites identified are 19<sup>th</sup> century reports by Andrew Anderson (1845-1896) and Henry Christy (1810-1865), both describing a Stone Age sit – significantly in Steenbokpan<sup>1</sup>. However, the LSA is best represented in research. According to Deacon & Deacon (1999:135) the Waterberg area was only occupied sporadically by LSA. Evidence of this is found in a regional study undertaken by Van der Ryst (1996) at Olieboomspoort in the western Waterberg, south of the Limpopo. This site is a large rock shelter located in the drainage basin of the Mokolo River in Limpopo Province. The research here assisted in expanding data on the LSA occupation of the Waterberg.

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<sup>1</sup> Unfortunately, no further information regarding the location, site type and age could be found.

Results showed that, in contrast with LSA dates for the adjacent Waterberg Plateau indicating intensive utilization after 1200 CE, the uppermost layers indicated that that the shelter was occupied by LSA hunter-gatherers at least over the past 2000 years. The Mokolo River Basin seems to have been more densely occupied by LSA hunter-gathered groups over a longer period, than on the Waterberg Plateau. This area was sparsely occupation before the arrival by Iron Age farming communities in the 2<sup>nd</sup> millennium CE. Recent work on the southern banks of the Limpopo River further to the east in the Mapungubwe Cultural Landscape showed that significant deposits of Stone Age material – mainly MSA – occur deep below the characteristic red sand, exceeding depths of 2 m (Baron, Kuman and Grab 2011).

The Iron Age is characterised by several aspects, the primary being the introduction of metalworking technologies. However, the most common aspect is the occurrence of low-fired ceramic wares or pottery and evidence of farming and animal husbandry. Greater social stratification is also evident in settlement sites when compared to hunter-gatherer sites.

The South African Iron Age is usually divided into two phases namely an Early (EIA) and Later (LIA) phase. Some academics introduced a Middle Iron Age period, but this is mainly only applicable to the areas surrounding and influenced by the Mapungubwe Cultural Landscape and will not be discussed. In general, the EIA dates from about 1800 to 1000 BP, and the LIA from 1000 BP to contact with European settlers, usually dated to 1850 CE. However, it is being argued that an Historic period from dating from the last 500 years should be considered. This historic period thus includes 16<sup>th</sup> century pre-contact period sites up to early 20<sup>th</sup> century sites and events.

The EIA in South Africa starts in the 3<sup>rd</sup> century CE, discerned by the Kalundu pottery tradition. The Bambata facies – a ceramic facies of the Kalundu's Benfica sub-branch – is the earliest expression currently described. There is some debate however regarding Bambata, as it may represent a form of Southern African 'neolithic' rather than Iron Age. Nonetheless, Bambata is dated to circa 150-650 CE (Bambata A at Jubilee Shelter) and 350-650 CE (Bambabta B at Great Zimbabwe). The majority of EIA sites however date from the 5<sup>th</sup> century and and belong to the Happy Rest sub-branch of Kalundu. The facies represented include Happy Rest (c. 500-750 CE, Klein Afrika site) and Diamant (c. 750-1000, Diamant site).

EIA sites are commonly located close to water sources such as perennial and semi-perennial streams. There is usually no evidence of stone as a building material, and it is generally accepted that the structures were similar to the well-known Nguni beehive huts. Most EIA sites also represent very low stratification, and short-term occupation seen in mostly single event deposits. A definite interaction between EIA communities and San hunter-gatherer societies can also be seen at many sites. A transition between the EIA and LIA occurred roughly at the turn of the 1<sup>st</sup> millennium CE. This brought significant changes in settlement patterns, material culture and socio-political organisation. Unlike EIA sites, LIA sites occupy a very broad range of environments, ranging from Lowveld valleys and plains to Highveld hills and inaccessible mountain tops. Another distinguishing feature is the common use of stone as building material at most LIA sites. LIA pottery is also more varied than EIA pottery. The South African LIA incorporates both the Kalundu and Urewe ceramic traditions.



### 7.1.2 Literature review of the study area

The first systematic archaeological survey of the Waterberg that included the current study area was undertaken by Jan Aukema in the 1970s. He first concentrated on the Motlhabatsi drainage basin in the western Waterberg, and later surveyed the Laphalala River basin with assistance from UNISA. Aukema's Motlhabatsi findings included EIA settlements at the base of the Waterberg. The earliest site, Diamant, dates to 570 CE with ceramics similar in style to Happy Rest and Klein Afrika (Huffman 1990: 117). An Eiland site dated to 990 CE was located on the Farm Wentzel near the Motlhabatsi-Limpopo Rivers confluence. However, the majority of Eiland sites were located in higher Sourveld river valleys (Aukema 1989). This research showed in part that the Lowveld area – in which the current study is located – was characterized by an open tree savannah 1500 BP.

The Motlhabatsi survey further indicated that agro-pastoralists returned to the lowveld during the LIA (c. 1600 CE onwards). Several Moloko settlements were identified next to the Motlhabatsi River. One of these, Leamington 1 was carbon dated 1650 CE. At the same time, other societies occupied stonewalled hilltop settlements in the Waterberg, such as on the farm Buffelsfontein (c. 1550 CE) in the west and Malore Hill (1700 CE) in the Lapalala Wilderness. These and other sites were defensive locations and often included perimeter walls along the cliff edge for further protection. Stonewalls were constructed using upright slabs, somewhat like monoliths, creating complex arrangements of lanes, arcs and oval enclosures. At Buffelsfontein small circles of carbonized withies (thin, supple branches) supported by thin slabs of stone were found, all slanting towards the centre forming beehive-shaped huts. These structures were placed towards the back of the residential areas, rather than in the middle in the bilobial pattern characteristic of Sotho-Tswana speakers. Significantly, ceramics from these sites do not belong to the Moloko facies, but were simple undecorated globular pots. The settlement layout, building technique and pottery indicated that the occupants here were probably related to Nguni speakers.

Aukema's work in the Laphalala River basin area led to sites being found on the farms Schurfpoort and Boschpoort. On the former, a stone cairn was built in the mouth of a shelter and the clay pots were buried inside the deposit created within the cairn. On Boschpoort, a shelter was found – more than 3 km away from the nearest Iron Age settlement – that contained a clay pot purposely buried upside down with an overturned grindstone right next to it. A second pot and grindstone were found towards the centre of the cave mouth. Both these sites are considered to have some ritual significance, probably related to rain control.

Partly from Aukema's work and later research (Evers & Van der Merwe 1987) it has been shown that the ceramic sequence in the area is discontinuous, and that the earlier occupation group comprised two ceramic styles, namely the Moloko facies and Kgopolwe – a proposed new style belonging to the Letaba facies. This tentatively showed that at least two possibly distinct societies occupied the area during the earlier periods, the former being associated with Sotho-Tswana speakers and the latter with Venda speakers.

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Although much archaeological research has been done in the wider Waterberg region, little work has been done in the general project area. Known sites lie are located more northerly as well as towards Thabazimbi.

The map in Figure 7-1 below indicates the known heritage sites in the Waterberg District. Note the absence of known archaeological sites in the Steenbokpan area. The most recent work undertaken as part of environmental and archaeological impact assessments further substantiated the above findings. Archaeological surveys commissioned by Digby Wells Environmental in 2006, 2008, and 2009 (Matakoma 2006; Lentswe 2008, 2009; PGS Heritage Unit 2009) showed similar trends both north and south of the Limpopo River. However, it seems as if more dense settlement occurred north of the Limpopo in Botswana, than south. Ceramics found during Phase 2 archaeological mitigation of the sites in Botswana indicated the presence of Letsibogo and Toutswe ceramic facies from the Moloko and Nkope Branch respectively. Another significant result of these surveys showed that all identified archaeological sites were located close to water bodies. This has been confirmed in the recent field work undertaken by Digby Wells in the general region (Digby Wells Environmental CRM unit 2011).

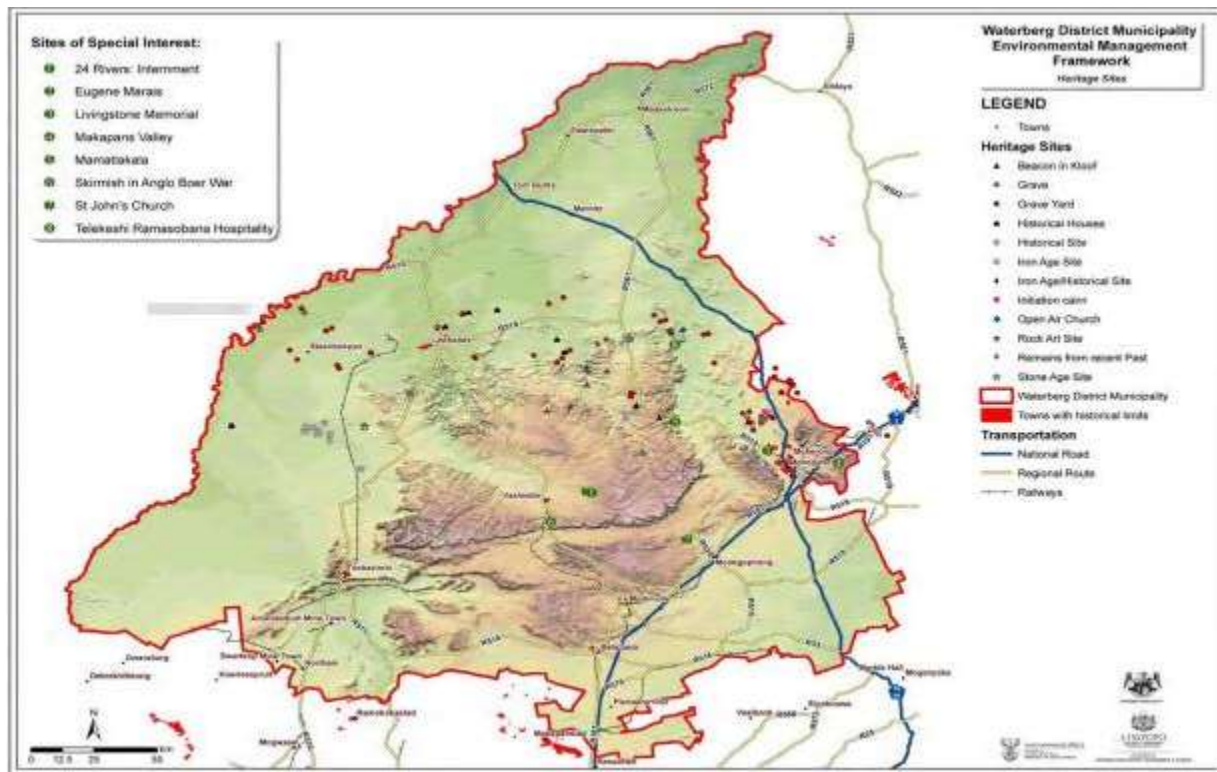
CRM surveys and assessments that have been undertaken in the wider environment and that have been reviewed or may be important in terms of broader information are summarised in Table 7-1 below.

**Table 7-1: Summary of CRM reports based on surveys and assessments on map sheets 2327CB**

Report Name	Author/s	SAHRA report number	Report reviewed
<i>A Report on a Cultural Heritage Impact Assessment for the Proposed Housing Development at Erf 1522 Ellisras on the Farm Onverwacht 503 LQ, Lephale, Limpopo Province</i>	Van Vollenhoven, A.C.	2008-SAHRA-0658	Only summary
<i>A Report on a Cultural Heritage Impact Assessment for the Proposed Housing Development at Extension 88 and 90 Ellisras on the Farm Onverwacht 503 LQ, Lephale, Limpopo Province</i>	Van Vollenhoven, A.C.	2008-SAHRA-0659	Only summary
<i>A Report on a Cultural Heritage Impact Assessment for the Proposed Housing Development at Extension 89 Ellisras on the Farm Onverwacht 503 LQ, Lephale, Limpopo Province</i>	Van Vollenhoven, A.C.	2008-SAHRA-0660	Only summary
<i>A Report on a Cultural Heritage Impact Assessment for the Proposed Housing Development at Extension 86 Ellisras on the Farm Onverwacht 503 LQ, Lephale, Limpopo Province</i>	Van Vollenhoven, A.C.	2008-SAHRA-0661	Only summary
<i>Proposed Development of a Cellular Base Station-Kauletsi-Northern Province</i>	Hutten, M. & Gaigher, S.	2000-SAHRA-0081	Report not found

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<i>Archaeological Impact Assessment Proposed Heavy Industrial Area on Portion 5 of the Farm Grootestryd 465 LQ Ellisras</i>	Roodt, F.	2001-SAHRA-0026	Report not found
<i>Heritage Impact Assessment Scoping for the Proposed Matimba- Witkop Power Line</i>	Gaigher, S.	2002-SAHRA-0074	Report not found
<i>Heritage Impact Survey Report for the Proposed Development of Four Borrow Pits for the Medupi Power Station, Lephalale Area, Limpopo Province</i>	Van Schalkwyk, J.A.	2008-SAHRA-0577	Report not found
<i>A Phase I Heritage Impact Assessment (HIA) Study for Eskom's Proposed New 400 kV Power Line Route Between the Matimba B Power Station and the Marang Substation near Rustenburg</i>	Pistorius, J.C.C.	2007-SAHRA-0048	Yes
<i>Environmental Scoping Report for the Proposed Establishment of a New Coal-Fired Power Station in the Lephalale Area, Limpopo Province</i>	Van Schalkwyk, J.A.	2006-SAHRA-0096	Yes
<i>Heritage Impact Scoping Report for the Proposed New Matimba B Power Station. Lephalale District, Limpopo Province</i>	Van Schalkwyk, J.A.	2005-SAHRA-0106	Yes



**Figure 7-1: Map indicating known cultural resources in Waterberg District (© Waterberg District Municipality)**

## 7.2 Inferred information findings

Community engagement and public participation is an on-going process involving the client's disclosure of information (IFC, 2006). Where local communities are affected by risks or adverse impacts from a project, the engagement process include consultation with them. The consultation process was initiated with ESIA and continues throughout the project. This will ensure that legislative requirements and project standards are met, stakeholder concerns are addressed and that all sources of existing information and expertise are identified.

The SIA covered aspects of intangible heritage such as sacred, historical and burial sites. In order to avoid duplication of information, this will not be included here. The results were reported on in the SIA report and in an overview of the consultation programme described in the main ESIA report

## 7.3 Survey

Eleven places were identified that could be considered to have heritage potential. Of these, five were considered to have medium heritage significance. These sites<sup>2</sup> are summarised in Table 7-2 and their locations illustrated in Figure 2-4 above.

**Table 7-2: A summary of the sites recorded for the study**

SITE ID	DESCRIPTION	SIGNIFICANCE ASSESSMENT
RSV689/001	Stone foundation remains of building, probably living quarters or house. Structure size $\pm$ 10 m x 10 m with at least two rooms visible. Possibility of nearby midden. Structure is at least 100 m north of burial site RSV689/003	4
RSV689/002	Four burials at least 100 m south of structure RSV689/003. Burials consist of old red clay brick dressing, of which three have headstones. Only one headstone legible: David PJ Harmse, born 9-2-1862, died 23-7-1936.	4
RSV689/003	Possible burial located $\pm$ 40 m south-southwest of structure RSV689/003. A corrugated metal plate placed in position of headstone, scattered clay bricks in general vicinity may have served as dressing.	4
RSV689/004	Single red burnished potsherd located next to track and cattle water trough. No visible evidence of any deposit due to cattle activity.	1
RSV689/005	A single potsherd and two MSA/LSA flakes found next to non-perennial watercourse. No deposit visible. Probable that the finds are associated with large site around Duikerpan (RSV689/006).	1
RSV689/006	Large scatter of LSA lithics around perimeter of Duikerpan. Various lithics identified, such as scrapers, flakes, blades, cores, chunks. Possible LSA open-air manufacturing site. Several isolated undiagnostic potsherds also found. No evidence of deposit visible.	4

<sup>2</sup> All photographic records have unfortunately been lost due to software failure. If these records are recovered, they will be included as a separate Addendum to this report.

<b>RSV689/007</b>	Burial site identified through PPP on farm Kleinberg 252 LQ, location and age must be verified.	4
<b>RSV689/008</b>	A small concentration of undiagnostic potsherds exposed by animal burrowing and erosion. No deposit visible in burrows, but may exist. Some potsherds display red burnish that may indicate Sotho-Tswana or Letaba type ceramic facies. No visible structures or other material culture present.	2
<b>RSV689/009</b>	Single undiagnostic potsherd. No visible deposit, features or other material culture present.	1
<b>RSV689/010</b>	Single flake found. Possible association with site RSV689/006	1
<b>RSV689/011</b>	Single undiagnostic potsherd. No visible deposit, features or other material culture present.	1

## 8 CULTURAL RESOURCES DESCRIPTIONS AND IMPACT ASSESSMENT

### 8.1 Identified environmental impacts on sites

This section aims to assess the significance of the potential impacts (threats or sources of risk) on archaeological and heritage resources in the proposed project area. The following impact assessment was completed in compliance with the impact assessment criteria implemented for the environmental impact assessment report, as well as in accordance with significance ratings and archaeological impact assessment criteria established by the ASAPA and applicable international best practice guidelines. More information on the archaeological impact assessment criteria and ratings used in this study and details on the weight assigned to the various parameters for positive and negative impacts in the formula are presented in Appendix A.

**Table 8-1: Summary of heritage site significance ratings per site**

Site number	(a) Importance	(b) Uncommon aspects	(c) Information potential	(d) Principle characteristics	(e) Aesthetic characteristics	(f) Technical / creative skill	(g) Social, cultural or spiritual association	(h) Association with life or work of a person, group or organisation	(i) Slavery	(A) Context	(B) Site integrity	(C) Extent	(D) Uniqueness	Rating (sum of A to D)
RSV689/001	4	3	3	2	2	3	4	3	1	3	3	4	5	4
RSV689/002	4	1	3	2	2	1	7	3	1	3	7	5	2	4
RSV689/003	4	1	3	2	2	1	7	3	1	3	7	5	2	4
RSV689/004	1	1	1	1	1	1	2	1	1	1	1	1	1	1
RSV689/005	1	1	1	1	1	1	2	1	1	1	1	1	1	1
RSV689/006	7	5	4	3	3	3	2	1	1	3	4	5	5	4
RSV689/007	4	1	3	3	2	1	7	3	1	3	7	5	2	4
RSV689/008	2	1	2	2	2	1	3	1	1	2	2	3	1	2
RSV689/009	1	1	1	1	1	1	2	1	1	1	1	1	1	1
RSV689/010	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RSV689/011	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 8-2: Summary of impact assessment on heritage resources

Activity, Phase and Impact				Impact Rating (before mitigation)										Impact Rating (after mitigation)							
Impacted Environment	Phase impact occurs (C, O, D, PC)	Activity No.	Activity	Summary of Impact	Reference in ESIA	Nature of Impact (positive / Negative)	Spatial Scale (7)	Duration (7)	Severity (7)	Consequence	Probability (7)	Site significance (7)	Significance (154)	Nature of Impact (positive / Negative)	Spatial Scale (7)	Duration (7)	Severity (7)	Consequence	Probability (7)	Site significance (7)	Significance (154)
RSV689/001	C			Removal of topsoil will destroy site		N	3	7	5	15	7	4	109	P	3	7	1	11	4	4	48
RSV689/002	C			Removal of topsoil will destroy site		N	3	7	7	17	7	4	123	P	3	7	1	11	4	4	48
RSV689/003	C			Removal of topsoil will destroy site		N	3	7	7	17	7	4	123	P	3	7	1	11	4	4	48
RSV689/004	C			Removal of topsoil will destroy site		N	2	7	1	10	7	1	71	P	1	7	7	15	1	1	16
RSV689/005	C, O, D			Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	1	45	P	1	1	1	3	1	1	4
RSV689/006	C, O, D			Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	4	48	P	1	1	1	3	1	4	7



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RSV689/007	C		Removal of topsoil will destroy site		N	3	7	5	15	7	4	109	P	3	7	1	11	4	4	48
RSV689/008	C, O, D		Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	2	46	P	1	1	1	3	1	2	5
RSV689/009	C, O, D		Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	1	45	P	1	1	1	3	1	1	4
RSV689/010	C, O, D		Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	1	45	P	1	1	1	3	1	1	4
RSV689/011	C, O, D		Accidental secondary impact resulting in damage to site		N	2	5	4	11	4	1	45	P	1	1	1	3	1	1	4

## 8.2 Construction Phase

8.2.1 RSV689/001 Historical settlement site (S23°34'58.4" E27°13'20.3")

### Impacted environment:

Historical cultural landscape.

### Description:

The remains of stone foundations were found closely associated with the burial site RSV689/003 (100 m south of site). The approximate size of the structure was 10 m x 10 m with at least two rooms visible, indicating possible living quarters or household. Surface deposit included fragments of porcelain, glass and cast iron, as well as mud bricks. There is a high likelihood that a midden or refuse dump exists nearby.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	<ul style="list-style-type: none"> <li>a) Site may potentially contribute to understanding of historical occupation on a district level.</li> <li>b) Historical occupation occurs at this locality, but the presence of potentially informative remains are not widespread.</li> <li>c) The remains may contribute averagely to the understanding of early European occupation, settlement and possible land use.</li> <li>d) The remains are incomplete and thus may not display all principle characteristics of built environment and history in this period.</li> <li>e) The remains are incomplete and thus may not display significant aesthetic characteristics of built environment and history in this period.</li> <li>f) The site may represent an average degree of skill for the period.</li> <li>g) Site may have above average socio-cultural significance to members of the local community in terms of sense of place or social reasons.</li> <li>h) Site probably has average association with local community in terms of historical persons or events in the area.</li> <li>i) Site is unlikely to have any significance related to the history of slavery.</li> </ul>	3
<b>Integrity</b>	The site is less than 50% intact, but displays significant primary spatial context.	3
<b>Extent</b>	The visible parts of the site are less than 50 m <sup>2</sup> , however, features are present and a strong likelihood of deposit exists.	4
<b>Uniqueness</b>	The site represents a useable example of historic European occupation with the potential to provide information.	5
<b>Significance</b>	<b>Medium</b>	4



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### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Site contains information potential that can contribute to understanding of regional history	3
<b>Duration</b>	Site will be permanently destroyed	7
<b>Severity</b>	Destruction of site will result in permanent loss of cultural resources	5
<b>Probability</b>	Construction of open cast pit will definitely affect site	7
<b>Significance</b>	<b>Average</b>	109

### 8.2.2 RSV689/002 Historical burial site (S23°35'01.8" E27°13'20.0")

#### Impacted environment:

Historical cultural landscape.

#### Description:

A small burial site with at least four visible burials was located approximately 100 m south of RSV689/003. All burials were orientated east-west, while the burial site extended north-south. Remains of an old wire fence and wooden fence poles were noted that probably served to demarcate the cemetery in the past. The grave dressings consisted of old red clay brick dressing. Three burials had headstones, of which only one was legible. The inscription identified the deceased as David PJ Harmse who was born on 9 February 1862 and died on 23 July 1936.

#### Site significance:

Parameter	Description	Rating
<b>Context</b>	a. Burials are generally important to communities, both local and descendent. b. Informal family or farm burial sites occur widespread throughout the country and does not usually represent any uncommon aspects. c. Burials and physical remains - when present - may provide average information regarding health status of historic communities. d. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist. e. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist. f. The burials represent common skills. g. Burial sites may have exceptionally high significance to communities in terms of spiritual or cultural reasons. h. The deceased may have average association in terms of local history. i. Site is unlikely to have any significance related to the history of slavery.	3

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<b>Integrity</b>	The burial site is more than 80% intact (identified burials still exist) and in primary context.	7
<b>Extent</b>	Although the site is <50 m <sup>2</sup> , it may relate to the building foundations at RSV689/001, thus representing fairly high site complexity.	5
<b>Uniqueness</b>	The site is a fair example of commonly found burial sites in the area.	2
<b>Significance</b>	<b>Medium</b>	<b>4</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Impact on site is local and may affect local community's relationship with mine	3
<b>Duration</b>	Relocation of burials will be permanent, other impacts will remain for the LoM	7
<b>Severity</b>	Legal implications and community dissent if burial site is destroyed without consultation or permission	7
<b>Probability</b>	Construction of open cast pit will definitely affect site	7
<b>Significance</b>	<b>Medium</b>	<b>123</b>

### 8.2.3 RSV689/003 Possible historical burial site (S23°34'59.7" E27°13'19.5")

#### Impacted environment:

Historical cultural landscape.

#### Description:

A possible burial was located approximately 40 m south-southwest of RSV689/003. A corrugated metal plate was placed upright in the ground, possibly as an informal headstone. Scattered clay bricks, similar to the ones used as grave dressing at RSV689/002, may have served as dressing at this site.

#### Site significance:

Parameter	Description	Rating
<b>Context</b>	a. Burials are generally important to communities, both local and descendent. b. Informal family or farm burial sites occur widespread throughout the country and do not usually represent any uncommon aspects. c. Burials and physical remains - when present - may provide average information regarding health status of historic communities. d. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist. e. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist. f. The burials represent common skills.	3

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	g. Burial sites may have exceptionally high significance to communities in terms of spiritual or cultural reasons. h. The deceased may have average association in terms of local history. i. Site is unlikely to have any significance related to the history of slavery.	
<b>Integrity</b>	The burial site is more than 80% intact (identified burials still exist) and in primary context.	7
<b>Extent</b>	Although the site is <50 m <sup>2</sup> , it may relate to the building foundations at RSV689/001, thus representing fairly high site complexity.	5
<b>Uniqueness</b>	The site is a fair example of commonly found burial sites in the area.	2
<b>Significance</b>	<b>Medium</b>	<b>4</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Impact on site is local and may affect local community's relationship with mine	3
<b>Duration</b>	Relocation of burials will be permanent, other impacts will remain for the LoM	7
<b>Severity</b>	Legal implications and community dissent if burial site is destroyed without consultation or permission	7
<b>Probability</b>	Construction of open cast pit will definitely affect site	7
<b>Significance</b>	<b>Medium</b>	<b>123</b>

### 8.2.4 RSV689/004 Iron Age find spot (S23°34'56.9" E27°15'56.7")

#### Impacted environment:

Archaeological landscape.

#### Description:

A single red-burnished potsherd was found on the surface next to a water trough used by cattle and game, next to a jeep track. As a result, the area has been much disturbed. No visible evidence of any deposit was noted, nor were any features or other material culture found. Furthermore, no indicator plant species were noted that may indicate any significant subsurface deposit.

#### Site significance:

Parameter	Description	Rating
<b>Context</b>	a. The site may have some importance to the pattern of history in the area. b. The find is common throughout the region. c. A single isolated find has no viable information potential. d. The find does not display any principle characteristics of any archaeological period known in the area.	1

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	<p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p> <p>f. The find represents a very common and widespread skill for the period and area.</p> <p>g. The find may have low significance in terms of local community identity or ancestry.</p> <p>h. It is unlikely that the find has any association of importance.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
<b>Integrity</b>	The find represents an isolated find with no context.	1
<b>Extent</b>	The find represents an isolated find with no context.	1
<b>Uniqueness</b>	Commonly found in region, with no viable information potential.	1
<b>Significance</b>	<b>Low</b>	<b>1</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	7
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	1
<b>Probability</b>	Impacts most likely affect the site	7
<b>Significance</b>	<b>Average</b>	<b>71</b>

### 8.2.5 RSV689/005 Stone and Iron Age find spot (S23°36'45.6" E27°16'55.1")

#### Impacted environment:

Archaeological landscape.

#### Description:

A single potsherd and two Stone Age flakes were found on the surface next to a non-perennial watercourse. No deposit or other archaeological features or indicators were noted. These finds may probably have been associated with, or transported from, the large Stone Age site around the pan (RSV689/006).

#### Site significance:

Parameter	Description	Rating
<b>Context</b>	<p>a. The site may have some importance to the pattern of history in the area.</p> <p>b. The find is common throughout the region.</p> <p>c. A single isolated find has no viable information potential.</p> <p>d. The find does not display any principle characteristics of any archaeological period known in the area.</p> <p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p>	1

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	f. The find represents a very common and widespread skill for the period and area. g. The find may have low significance in terms of local community identity or ancestry. h. It is unlikely that the find has any association of importance. i. Site is unlikely to have any significance related to the history of slavery.	
<b>Integrity</b>	The find represents an isolated find with no context.	1
<b>Extent</b>	The find represents an isolated find with no context.	1
<b>Uniqueness</b>	Commonly found in region, with no viably information potential.	1
<b>Significance</b>	<b>Low</b>	<b>1</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	5
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	4
<b>Probability</b>	Impacts most likely affect the site	4
<b>Significance</b>	<b>Average</b>	<b>45</b>

8.2.6 RSV689/006 Stone Age site (S23°36'38.6" E27°17'08.8")

### Impacted environment:

Archaeological landscape.

### Description:

A very large scatter of Stone Age material, and to a lesser extent Iron Age pottery, was found around the perimeter of a pan. The lithics that could be identified included as scrapers, flakes, blades, cores, chunks. The artefacts may illustrate both MSA and early LSA lithics. This site could possibly represent an open-air manufacturing site or *in situ* deposit eroding from the calcrete layer around the pan. Several isolated undiagnostic potsherds also found. No evidence of visible deposit or other significant features were noted. Although find spots RSV689/009 to 011 were assessed individually as low heritage significance, they must be considered to form part of this site.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	a. The site may be highly significant in terms of early human occupation and pattern of history in the area. b. Large concentrations of Stone Age material such as this is localised to only some landscape types in the region. c. The site has a significantly viable information potential regarding the Stone	3

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	Age in the area. d. The site and artefacts may represent good examples of Stone Age lithic technology and industries in the region. e. The site and artefacts may represent have good aesthetic value in terms of Stone Age lithic technology and industries in the region. e. The site and artefacts may represent have fairly average skills in terms of Stone Age lithic technology and industries in the region. g. The find may have low significance in terms of local community identity or ancestry. h. It highly unlikely that the find has any association of importance. i. Site is unlikely to have any significance related to the history of slavery.	
<b>Integrity</b>	As an open air site, it is most likely more than 80% intact.	4
<b>Extent</b>	Potential site complexity may be visible and the site covers more than 0.5 ha.	5
<b>Uniqueness</b>	Site represents an extensive open air LSA site not often encountered.	5
<b>Significance</b>	<b>Medium</b>	<b>4</b>

Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts associated with mining and related activities will cease after LoM	5
<b>Severity</b>	Potential exists that significant damage to site may occur if mitigation measures are not followed	4
<b>Probability</b>	Potential impacts could easily occur if mitigation measures are not followed	4
<b>Significance</b>	<b>Average</b>	<b>48</b>

8.2.7 RSV689/007 Unverified burial site (unrecorded)

Impacted environment:

Historical cultural landscape.

Description:

A burial site was reported to exist on the farm Kleinberg 252 LQ. This site was not found during the survey and its location and age must be verified.

Site significance:

Parameter	Description	Rating
<b>Context</b>	a. Burials are generally important to communities, both local and descendent. b. Informal family or farm burial sites occur widespread throughout the country and do not usually represent any uncommon aspects. c. Burials and physical remains - when present - may provide average information regarding health status of historic communities.	3

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	<p>d. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist.</p> <p>e. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist.</p> <p>f. The burials represent common skills.</p> <p>g. Burial sites may have exceptionally high significance to communities in terms of spiritual or cultural reasons.</p> <p>h. The deceased may have average association in terms of local history.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
<b>Integrity</b>	The burial site is more than 80% intact (identified burials still exist) and in primary context.	7
<b>Extent</b>	Although the site is <50 m <sup>2</sup> , it may relate to the building foundations at RSV689/001, thus representing fairly high site complexity.	5
<b>Uniqueness</b>	The site is a fair example of commonly found burial sites in the area.	2
<b>Significance</b>	<b>Medium</b>	<b>4</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Impact on site is local and may affect local community's relationship with mine	3
<b>Duration</b>	Relocation of burials will be permanent, other impacts will remain for the LoM	7
<b>Severity</b>	Legal implications and community dissent if burial site is destroyed without consultation or permission	7
<b>Probability</b>	Construction of open cast pit will definitely affect site	7
<b>Significance</b>	<b>Medium</b>	<b>123</b>

8.2.8 RSV689/008 Iron Age site S23 36 49.3 E27 17 02.0

### Impacted environment:

Archaeological landscape.

### Description:

A small concentration of undiagnostic potsherds was exposed in abandoned and eroded animal burrows. Although no deposit was visible in the burrows and erosion walls, there is a strong likelihood that deposit may exist. A few potsherds displayed red burnish, tentatively indicating possible Sotho-Tswana or Letaba type ceramic facies. No visible structures or other material culture were noted.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	<p>a. The site may have some importance to the pattern of history in the area.</p> <p>b. The site is commonly found throughout the region.</p>	2

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	c. May have low information potential. d. Site may represent a common, incomplete example. e. Site may represent a common, incomplete example. f. The site represents a very common and widespread skill for the period and area. g. The site may have average significance in terms of local community identity or ancestry. h. It is unlikely that the find has any association of importance. i. Site is unlikely to have any significance related to the history of slavery.	
<b>Integrity</b>	The site may be partly intact, but mainly secondary context due to animal burrowing activity and erosion.	2
<b>Extent</b>	No site complexity was visible, no deposit noted but may be present.	2
<b>Uniqueness</b>	Commonly found in region, with no viably information potential.	1
<b>Significance</b>	<b>Average</b>	<b>2</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	5
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	4
<b>Probability</b>	Impacts most likely affect the site	4
<b>Significance</b>	<b>Average</b>	<b>46</b>

8.2.9 RSV689/009 Iron Age find spot S23 36 53.1 E27 17 01.2

### Impacted environment:

Archaeological landscape.

### Description:

A single undiagnostic potsherd was found on the surface. No visible deposit, features or other material culture were noted. This find spot was assessed individually but may have some connection to site RSV689/008.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	a. The site may have some importance to the pattern of history in the area. b. The find is common throughout the region. c. A single isolated find has no viable information potential. d. The find does not display any principle characteristics of any archaeological period known in the area.	1



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	<p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p> <p>f. The find represents a very common and widespread skill for the period and area.</p> <p>g. The find may have low significance in terms of local community identity or ancestry.</p> <p>h. It is unlikely that the find has any association of importance.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
<b>Integrity</b>	The find represents an isolated find with no context.	1
<b>Extent</b>	The find represents an isolated find with no context.	1
<b>Uniqueness</b>	Commonly found in region, with no viable information potential.	1
<b>Significance</b>	<b>Low</b>	<b>1</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	5
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	4
<b>Probability</b>	Impacts most likely affect the site	4
<b>Significance</b>	<b>Average</b>	<b>45</b>

8.2.10 RSV689/010 Stone Age find spot S23 36 34.4 E27 17 07.1

### Impacted environment:

Archaeological landscape.

### Description:

A single Stone Age flake was found on the surface north of the pan (RSV689/006), but with no other artefacts nearby. This find spot was assessed individually due to the relative distance and perceived isolation from the larger site (RSV689/006) around the pan. However, even though an individual low heritage significance rating was provided, it must be considered to form part of the larger site, together with find spots RSV689/009 and 011.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	<p>a. The site may have some importance to the pattern of history in the area.</p> <p>b. The find is common throughout the region.</p> <p>c. A single isolated find has no viable information potential.</p> <p>d. The find does not display any principle characteristics of any archaeological period known in the area.</p>	1

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	<p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p> <p>f. The find represents a very common and widespread skill for the period and area.</p> <p>g. The find may have low significance in terms of local community identity or ancestry.</p> <p>h. It is unlikely that the find has any association of importance.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
<b>Integrity</b>	The find represents an isolated find with no context.	1
<b>Extent</b>	The find represents an isolated find with no context.	1
<b>Uniqueness</b>	Commonly found in region, with no viable information potential.	1
<b>Significance</b>	<b>Low</b>	<b>1</b>

### Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	5
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	4
<b>Probability</b>	Impacts most likely affect the site	4
<b>Significance</b>	<b>Average</b>	<b>45</b>

8.2.11 RSV689/011 Iron Age find spot S23 36 33.9 E27 16 52.7

### Impacted environment:

Archaeological landscape.

### Description:

A single undiagnostic potsherd was found on the surface with no visible deposit, features or other material culture noted. A single undiagnostic potsherd was found on the surface. No visible deposit, features or other material culture were noted. As with the other find spots above, this find was assessed individually due to the relative distance from the larger site (RSV689/006) around the pan. However, even though a low heritage significance rating was provided, it must be considered to form part of the larger site, together with find spots RSV689/009 and 010.

### Site significance:

Parameter	Description	Rating
<b>Context</b>	<p>a. The site may have some importance to the pattern of history in the area.</p> <p>b. The find is common throughout the region.</p> <p>c. A single isolated find has no viable information potential.</p>	1

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	<p>d. The find does not display any principle characteristics of any archaeological period known in the area.</p> <p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p> <p>f. The find represents a very common and widespread skill for the period and area.</p> <p>g. The find may have low significance in terms of local community identity or ancestry.</p> <p>h. It is unlikely that the find has any association of importance.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
<b>Integrity</b>	The find represents an isolated find with no context.	1
<b>Extent</b>	The find represents an isolated find with no context.	1
<b>Uniqueness</b>	Commonly found in region, with no viably information potential.	1
<b>Significance</b>	<b>Low</b>	<b>1</b>

Impact assessment:

Parameter	Description	Rating
<b>Spatial</b>	Any potential impact should be limited to the site itself	2
<b>Duration</b>	Potential impacts will be permanent	5
<b>Severity</b>	No severe repercussions as site itself is rated low heritage significance	4
<b>Probability</b>	Impacts most likely affect the site	4
<b>Significance</b>	<b>Average</b>	<b>45</b>

### 8.3 Operational and Decommissioning Phases

All sites may potentially be impacted on during both the operational and decommissioning phases as infrastructure is either maintained, additionally added or removed and areas rehabilitated. However, site and impact significance will not change and all ratings and recommendations given above will still apply.

## 9 CUMULATIVE IMPACTS

Potential cumulative impacts may include the following:

- Increased human traffic that will impact on the environment will increase the potential of exposing or damaging known and additional unknown heritage resources;
- Informal or smaller infrastructure developments undertaken within the larger development, but that fall outside the scope of an ESIA, may impact or expose further heritage resources;
- Unintentional possible damage or destruction of cultural resources, such as San rock art, that occur outside the project area, as described under Fatal flaws (page 33 above).

## 10 DISCUSSION

### 10.1.1 Literature review

The review indicated that the broader Waterberg environment has been inhabited or occupied by humans for at least the past 300 000 years. However, it also showed that very little published information for the study area specifically exists. Inferences that could thus be made from the available work show that similar archaeological remains could occur, but are probably limited to comparable landscapes as those described in the reviewed publications.

Recent work undertaken as part of ESIA studies, however, identified Middle Stone Age and Later Iron Age to occur in the general area — as well as to a lesser degree Later Stone Age and Historical occupation. However, most archaeological resources identified were located very near or in water bodies, especially perennial and non-perennial streams and pans. The potential occurrence of Stone Age material below the sand has been illustrated by Baron, Kuman and Grab's (2011) work, albeit further northeast of the study area.

### 10.1.2 Burial sites

Three burial sites have been identified. Sites RSV689/002 and 003 are both located within the opencast pit footprint. As such, these sites will definitely need to be mitigated should mining continue, unless the footprint can be adjusted to preserve these sites. This will include a formal grave relocation process in accordance with applicable legislative requirements. However, site 003 may not be a burial and will need to be tested. Site RSV689/007 was not found during the field survey, but identified as a result of the PPP. This site is located on the farm Kleinberg 252 LQ, but the exact location is unknown and must be verified.

### 10.1.3 Historical homestead

Foundations of an historical homestead are situated in the north-western corner of the farm Verloren Valey 246 LQ. The site is probably related to the burial sites RSV689/002 and 003 found nearby. Although there are no existing walls, the foundations seem fairly well preserved. There is also potential for midden deposit to exist. While this could not be positively identified as a European settlement, sites such as these are nonetheless important sources of historic information regarding early European settlement and influence in the area. Although the exact age (date of construction) of this homestead is currently not known, it should be noted that all man-made structures older than 60 years are protected in terms of the NHRA.

### 10.1.4 Stone Age site

Site RSV689/006 is located on the farm Duikerpan 249 LQ around the perimeter of the pan in the south western corner of the farm. The site possibly represents a manufacturing and settlement area where lithic implements were manufactured. Although no deposit was noted, the extent and quantity of the lithics scattered around and in the pan are indicative of a fairly extensive and possible long term use of the site. There is thus a likelihood that subsurface *in*

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*situ* deposit could occur in the area. So-called ‘sealed’ sites are rare and have high latent information potential that could assist in reconstructing palaeo-environments and establishing past occupation or human origins.

### 10.1.5 Iron Age site

Potsherds were recorded at site RSV689/008 in abandoned and eroded animal burrows. While no deposit was noted and no diagnostic features were present to place the site within a chronological context, the site may be more extensive than is visible. The fact that no obvious above ground structures were present could indicate that the site predates 1700 CE, as from this period onwards, most sites in the region display some form of stone walling.

### 10.1.6 Stone and Iron Age find spots

Find spots in general represent single, isolated occurrences of archaeological artefacts that cannot be placed in any temporal or spatial context. Notwithstanding the fact that they provide evidence of past occupation, they are considered to be of negligible heritage significance. However, with the exception of RSV689/004, all find spots referred to in this report occur within 400 m of the pan on Duikerpan. As such, they should be regarded as part of the larger cultural landscape and environment of which the pan may be considered the central focus.

## 11 KNOWLEDGE GAPS

Although this report has been written as comprehensively and inclusive as possible, it should be noted that some archaeological and heritage sites may be located on sub-surface level, or some areas may have been inaccessible for personal safety reasons or covered by dense vegetation. Inaccessibility is the greatest restriction to detailed archaeological surveys. There is therefore always a risk of accidentally exposing heritage resources, including burials, during construction. Management plans and mitigation measures will have to be drafted to deal with situations as they arise. Chance find procedures may form part of the environmental monitoring programme. Such archaeological and heritage features and/or objects may not be disturbed or removed in any way until such time that the specialist has been able to do an assessment of the site (or object).

This report may therefore not give a full perspective of archaeological and heritage sites found in the project area and consequently chance find procedures must be implemented. This implies that an archaeologist or heritage specialist must immediately be contacted should any archaeological or heritage features be uncovered during the construction or operational phase.

## 12 FATAL FLAWS

Possible fatal flaws that will result from the proposed development include the systematic destruction of archaeological resources during mining and potential damage to sites outside the project area due to blasting.

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Cultural resources, specifically archaeological sites, are wholly un-renewable resources. This implies that these resources cannot be recreated or rehabilitated when compared to natural resources such as wetlands or faunal and floral communities. This may lead to future difficulties both in an academic and CRM sense when sites are found and significance ratings given. The importance and significance of archaeological sites are usually closely associated with knowledge of sites and past environments in the wider landscape. By destroying archaeological sites, especially without mitigation, gaps in understanding and reconstruction of the historical record is created.

Based on inferred knowledge obtained from local communities during various archaeological surveys in the region, it has been suggested that blasting from existing mining operations have a negative impact on important archaeological sites much further afield. For instance, rock shelters in the soft Clarens formation sandstone hills on the banks of the Limpopo where San rock art occurs have been reported to collapse or flake off. Although these claims must still be substantiated, it should be noted that secondary impacts such as this are not usually included in the scope of work of an AIA. The damage to such sites must be considered as major cumulative impacts.

### 13 RECOMMENDED MITIGATION MEASURES AND MANAGEMENT PLAN

The Environmental Management Plan (EMP) has been described according to the project activities in order to provide an understanding of what objectives and recommended management measures are required to minimise the environmental impacts arising from these activities.

#### 13.1 Cultural Resources Management plan

SAHRA, as well as IFC Performance Standard 8, requires the client to establish and maintain a Cultural Resources Management system appropriate to the nature and scale of the project and commensurate with the level of social and environmental risks and impacts. As part of the ESIA management system, specific mitigation measures are required for certain environmental and social aspects (IFC, 2006).

##### 13.1.1 General archaeological and heritage sites mitigation and management measures

- i. *Site conservation*: Conservation is essentially a 'no development recommendation'. Depending on the importance of the resource and the economic viability of mitigation, site conservation may be the only recommendation or option to the developer or client. A separate Heritage Site Management Plan (HSMP) must be compiled that will describe management plans and actions.
- ii. *Site mitigation and part conservation*: Parts of a site can be mitigated through sampling, shovel test pits, test excavations, detailed documentation and mapping. The remainder, especially parts that display attributes that may display significant characteristics of the resource, must be conserved. A separate HSMP must be

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compiled for the part that will be conserved, that will describe management plans and actions.

- iii. *Site mitigation*: The entire site must be mitigated before destruction;
- iv. *Site monitoring*: The site can be left in situ with no mitigation, but periodic site monitoring must be implemented to evaluate and assess any secondary or cumulative impacts on the site. Site monitoring could also form part of an HSMP;
- v. *Site destruction*: If a particular identified resource is of little archaeological or cultural heritage significance, a recommendation of site destruction will be made by an accredited archaeologist/ specialist. A permit application for such destruction may be necessary. Where this is the case, the application must be completed and submitted to SAHRA. Only upon receipt of the permit can a site then be destroyed, under supervision of an archaeologist or other heritage specialist; and
- vi. *Watching brief*: No mitigation of a site is needed, but during initial earthworks or other large-scale disturbances of an archaeologist must be onsite to determine whether any subsurface cultural heritage is exposed.

### 13.1.2 Mitigation and management of burial sites

Two options can be considered in the mitigation and management of burial sites. *In situ* conservation is the preferred course, however, where it is not practically or economically viable, grave relocation is an option.

- i. *In situ* preservation entails the conservation and protection of burial sites in their original location:
  - a. The site must be fenced and clearly marked to prevent accidental damage;
  - b. Access must be given to relatives to allow visits to the site. Access may be controlled if the burial site is located in a risk area, e.g. blast zone or inside mine project area;
  - c. A site management plan must be compiled that will outline management and conservation measures for the burial site during the Construction, Operational and possibly also Decommissioning phases. The management plan would address aspects such as site monitoring and the cleaning of the cemetery;
  - d. Site monitoring during the life of the project must be undertaken. The frequency of monitoring visits will be outlined in the site management plan; and
  - e. Affected families must be consulted and provide input into the management plan.
- ii. Grave relocation is the process whereby a burial site is exhumed and relocated to a different, safer and appropriate site, usually within an existing cemetery administered by the local authority. This process should be undertaken in compliance with international and national legislation:



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- a. A comprehensive Public Consultation and Disclosure Process (PCDP) must be initiated, aimed at identifying relatives of deceased, and obtaining permission from the family to relocate the grave. This process may also include archival research;
- b. The PPP must include a period of advertising, including legal notices, as required in national, local and municipal legislation and by-laws;
- c. Liaison with all stakeholders, including Interested and Affected Parties (I&APs), developer and relevant authorities must be undertaken and documented;
- d. Relevant permits must be applied for – and obtained - as stated in the legislation and guidelines (or equivalent) for the exhumation and reburial of the affected human remains from the authorities following the conclusion of the public participation process
- e. Physical anthropological analyses may be necessary in certain cases to determine sex, age, race, physical characteristics and possible causes of death. This may only be required where disputes arise from I&APs, or where remains are unknown.

### 13.2 Monitoring Programme

Ideally, site monitoring should be conducted by an experience and qualified archaeologist or heritage specialist. However, due to human resource and often budget constraints, this may not be a viable option. The following may be implemented to ensure an adequate degree of competence in site monitoring by Environmental Officers or other responsible persons takes place.

- i. Induction training: Responsible staff identified by Temo Coal should attend a short course on heritage management and identification of heritage resources. It is assumed that this person/s will be the Environmental Officer/s (EO);
- ii. Site monitoring and watching brief: as most heritage resources occur subsurface, all earth moving activities must be monitored to record any resources accidentally exposed. The largest environmental impact on heritage resources is the initial soil stripping or earthworks associated during construction. The EO should monitor all such activities on a daily basis. In the event that any heritage resources are found, all work should be immediately suspended in that area. The EO must contact the relevant authorities, archaeologist or heritage specialist and where possible, the local museum. In the event of human remains being exposed, the local police department must be informed immediately; and
- iii. An archaeological assessment must be conducted on the affected site by a qualified archaeologist. This may include analyses by relevant specialists. Sites of significance will be assessed and documented for records. Recommendations may be made for further studies.

### **13.3 Site specific recommendations**

#### 13.3.1 Burial sites: RSV689/002, 003 and 007

- All the burial sites must be fenced. This will enable the sites to be clearly demarcated in order to prevent accidental damage.
- A PPP process should be initiated where relatives or descendants may be identified and consulted regarding future of site, as well as to arrange access to the burials.
- The burial sites must be monitored bi-monthly as long as *in situ* preservation is possible to assess potential impacts.
- Should *in situ* preservation not be possible or viable, grave relocation may be necessary as last resort. A separate Grave Relocation Action Plan (GRAP) must then be implemented. Digby Wells can be contacted to assist in this regard.

#### 13.3.2 RSV689/002: Historical site

- An extensive Phase 2 archaeological mitigation process should be implemented before construction commences. The objective is to map, record and document the site in such a manner to obtain as much viable information as possible. This information will be submitted to an appropriate repository – such as a museum or university.
- The Phase 2 mitigation may include STPs or test pits to determine the existence of subsurface deposits.

#### 13.3.3 RSV689/006: Stone Age site

- An extensive Phase 2 archaeological mitigation process undertaken by a Stone Age specialist should be implemented before construction commences. The objective is to map surface distribution of Stone Age material, collect representative artefact samples and record and document the site in such a manner to obtain as much viable information as possible. The information and collected samples will be submitted to an appropriate repository – such as a museum or university – for curation.
- As secondary impacts may potentially affect the site, a buffer zone of at least 200 m around the perimeter of the pan should be created to preserve potentially intact cultural resources that may still occur subsurface.

#### 13.3.4 RSV689/008: Iron Age site

- In the event that potential primary impacts, such as removal of topsoil, will be undertaken in the area of this site, a watching brief must be implemented.
- The watching brief may be undertaken during activities by a qualified archaeologist to monitor for any subsurface deposit or features. Should significant subsurface deposits or features be identified, all operations in the vicinity of the site should temporarily cease in order that further assessments and recommendations can be made. Possible features and deposit may include remains of hut floors, ash, dung and grain deposits, and burials.

Table 13-1: Summary of Cultural Resource Management in ESIA

Site	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Estimated Cost	Responsible Person	Significance after mitigation
RSV689/001	To retrieve as much viable archaeological information from site before further damage and/or destruction occurs.	Phase 2 mapping and documentation of site, STP or test pits to determine existence of midden deposit.	Once-off.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	C	±R50,000.00	Archaeologist	Low
RSV689/002	To preserve burials <i>in situ</i> and prevent damage and/or destruction.	Site must be fenced; where possible relatives must be consulted regarding future of site; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	Fencing once-off; site monitoring monthly; grave relocation once-off.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	C	In situ preservation: ±R30,000.00; Relocation: ±R80,000.00	Environmental officer, PPP specialist, Archaeologist	Low
RSV689/003	To determine / confirm existence of burial and preserve burial <i>in situ</i> and prevent damage and/or destruction.	Possibility of burial must be confirmed, either through consultation or archaeological mitigation; if it is a burial, site must be fenced and relatives consulted; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	Testing once-off: if true - site monitoring monthly; grave relocation once-off.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Test burial's existence; Apply for applicable SAHRA permits: if true - fence site, locate and consult with family/descendants; initiate grave relocation process.	C	Testing: ±R50,000.00	Archaeologist, Environmental Officer, PPP specialist.	Low
RSV689/004		None		NHRA Sections 34, 35, 36, 38; SAHRA Regulations.					Low
RSV689/005		None		NHRA Sections 34, 35, 36, 38; SAHRA Regulations.					Low
RSV689/006	To retrieve as much viable archaeological information from site before further damage and/or destruction occurs.	A Phase 2 mapping and documentation of site and surface sampling by appropriate specialists, i.e. Stone Age specialist; create a buffer zone of at least 200 m around site.	Once-off before construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	C	±R200,000.00	Archaeologist	Low

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RSV689/007	To preserve burials <i>in situ</i> and prevent damage and/or destruction.	Site must be fenced; where possible relatives must be consulted regarding future of site; impact on site monitored bi-monthly for duration of surrounding impacts; grave relocation may be necessary as last resort.	Fencing once-off; site monitoring monthly; grave relocation once-off.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	C	In situ preservation: ±R30,000.00; Relocation: ±R80,000.00	Environmental officer, PPP specialist, Archaeologist	Low
RSV689/008	To monitor for significant subsurface deposits and/or features during construction phase.	A watching brief must be implemented to monitor for any subsurface deposit or features.	Once-off during construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Digby Wells CRM unit informed of any earthworks to take place at site; watching brief undertaken during initial earthworks.	C	±R50, 000.00	Archaeologist	Low
RSV689/009		None	Once-off during construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.				Low
RSV689/010		Must be incorporated into the Phase 2 mapping and documentation of site RSV689/006.	Once-off during construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	C	Included under site RSV689/007	Archaeologist	Low
RSV689/011		Must be incorporated into the Phase 2 mapping and documentation of site RSV689/006.	Once-off during construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	C	Included under site RSV689/008	Archaeologist	

## 14 CONCLUSION

In order to be able to assess the significance of the identified sites, a literature review was undertaken. Conclusions that were drawn from this review were that few archaeological sites are known in the project area, and that most archaeological resources are located close to water bodies. Subsequently, a site visit was undertaken, aimed at locating and documenting potential sites of archaeological and heritage significance located within the project boundaries. During the fieldwork 11 occurrences of cultural resources were identified and recorded. All identified resources will be impacted by the proposed development of the Temo Coal Mine. Site significance and potential impacts on these sites were determined through assessment methodology aimed at objectively quantifying potential impacts. The assessment methodology used attempted to provide a comprehensible and user friendly system to minimise and manage the identified potential impacts on the heritage resources.

The identified heritage resources included:

- Two documented burial sites and one unconfirmed burial site;
- One historical settlement;
- A large open-air site, mainly Stone Age;
- An Iron Age site that is potentially larger than currently visible, and thus more significant;
- Four mainly Iron Age find spots, where isolated artefacts were found on the surface.

In general, site significance and potential impacts were assessed as ranging from low to medium. Recommendations included *in situ* preservation of the burial sites, Phase 2 archaeological mapping, sampling and documentation of the Stone Age site, and a watching brief on the Iron Age site.

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## APPENDIX A: ARCHAEOLOGICAL AND ENVIRONMENTAL IMPACT ASSESSMENT

### 1.1 EIA Methodology

In order to clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental impacts. Even though Digby Wells, and the majority of environmental impact assessment practitioners, propose a numerical methodology for impact assessment, one has to accept that the process of environmental significance determination is inherently subjective. The weight assigned to the each factor of a potential impact, and also the design of the rating process itself, is based on the values and perception of risk of members of the assessment team, as well as that of the I&AP's and authorities who provide input into the process. Whereas the determination of the spatial scale and the duration of impacts are to some extent amenable to scientific enquiry, the severity value assigned to impacts is highly dependent on the perceptions and values of all involved.

It is for this reason that it is crucial that all EIA's make reference to the environmental and socio-economic context of the proposed activity in order to reach an acceptable rating of the significance of impacts. Similarly, the perception of the probability of an impact occurring is dependent on perceptions, aversion to risk and availability of information.

It has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defensible methodology of rating the relative significance of impacts in a specific context. The methodology employed for environmental impact assessment is divided into two distinct phases, namely, impact identification and impact assessment.

#### 1.1.1 Impact identification

Impact identification is performed by use of an Input-Output model which serves to guide the assessor in assessing all the potential instances of ecological and socio-economic change, pollution and resource consumption that may be associated with the activities required during the construction, operational, closure and post-closure phases of the project.

Outputs may generally be described as any changes to the biophysical and socio-economic environments, both positive and negative in nature, and also include the product and waste produced by the activity. Negative impacts could include gases, effluents, dust, noise, vibration, other pollution and changes to the bio-physical environment such as damage to habitats or reduction in surface water quantity. Positive impacts may include the removal of invasive vegetation, construction of infrastructure, skills transfer or benefits to the socio-economic environment. During the determination of outputs, the effect of outputs on the various components of the environment (e.g. topography, water quality, etc.) is considered.

During consultation with I&APs perceived impacts were identified. These perceived impacts will become part of the impact assessment and significance rating in order to differentiate between probable impacts and perceived impacts.

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### 1.1.2 Impact rating

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model. As discussed above, it has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defensible methodology of rating the relative significance of impacts in a specific context. This gives the project proponent a greater understanding of the impacts of his project and the issues which need to be addressed by mitigation and also give the regulators information on which to base their decisions.

The equations and calculations were deviated using Aucamp (2009).

The standard EIA significance rating process follows the established impact/risk assessment formula. However, this matrix has been adapted to reflect heritage resources' Site significance:

$$\text{Significance} = (\text{Consequence} \times \text{Probability}) + \text{Site significance}$$

Where  $\text{Consequence} = \text{Severity} + \text{Spatial Scale} + \text{Duration}$

And  $\text{Probability} = \text{Likelihood of an impact occurring}$

The impact matrix describing impacts on the cultural and heritage environment thus calculates the rating out of 154 instead of the standard 147, whereby Severity, Spatial Scale, Duration, Probability and Site significance are rated out of seven. Calculation of Site significance is explained in 1.2 below.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in the EMP. The significance of an impact is then determined and categorised into one of four categories, as indicated in Table 1-15-1. In accordance with Regulation 51 of the MPRDA and Section 38 of the NHRA, management actions will be assigned for all identified impacts.

**Table 1-15-1: Significance threshold limits**

Significance		
High	>114	
Medium-High	77 - 114	
Medium-Low	38 - 76	
Low	<38	

Table 115-2: Impact assessment parameter ratings

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	<u>International</u> The effect will occur across international borders	<u>Permanent: No Mitigation</u> No mitigation measures of natural process will reduce the impact after implementation.	<u>Certain/ Definite.</u> The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	<u>National</u> Will affect the entire country	<u>Permanent: Mitigation</u> Mitigation measures of natural process will reduce the impact.	<u>Almost certain/Highly probable</u> It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items	<u>Province/ Region</u> Will affect the entire province or region	<u>Project Life</u> The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
4	Serious medium term environmental effects. Environmental damage	On-going serious social issues. Significant damage to structures / items of	<u>Municipal Area</u> Will affect the whole municipal	<u>Long term</u> 6-15 years	<u>Probable</u> Has occurred here or elsewhere

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Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
	can be reversed in less than a year	cultural significance	area		and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem functions. Rehabilitation requires intervention of external specialists and can be done in less than a month.	On-going social issues. Damage to items of cultural significance.	<u>Local</u> Local extending only as far as the development site area	<u>Medium term</u> 1-5 years	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	<u>Limited</u> Limited to the site and its immediate surroundings	<u>Short term</u> Less than 1 year	<u>Rare/ improbable</u> Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Limited damage to minimal area of low significance, (eg ad hoc spills within plant area). Will have no impact on the environment.	Low-level repairable damage to commonplace structures.	<u>Very limited</u> Limited to specific isolated parts of the site.	<u>Immediate</u> Less than 1 month	<u>Highly unlikely/None</u> Expected never to happen.

## 1.2 AIA and HIA methodology

Unlike the natural environment, the cultural environment or landscape is often localised. The impact is therefore limited to identified sites or heritage resources. However, it must be noted that heritage resources are not independent of the natural environment, nor can they be viewed in isolation of other heritage resources that may occur in the immediate environment or in the general landscape. It is thus necessary to determine the context of any identified heritage resource in relation to:

- Known heritage resources; and
- The potential of the identified resource to provide additional or new information regarding past environments and history.

In this regard, SAHRA has published minimum standards that must be complied with when undertaking Heritage and Archaeological Impact Assessments. The specialist is also required to rate identified heritage resources according to these minimum standards, which are based on criteria described in the NHRA. Although the NHRA is specifically South African legislation, it is based on international standards such as the Burra Charter, Unesco guidelines and various other international heritage and cultural organisations that define significance of cultural heritage resources. The site significance rating is thus determined using certain parameters described in international standards and South African legislation, as well as the professional minimum standards of ASAPA and SAHRA.

### 1.2.1 Site significance identification

Site significance identification is determined by rating a heritage resource mainly in terms of its potential to supply or add information to an existing body of research. The heritage specialist is thus guided in assessing attributes that may influence a heritage resource's significance. The attributes generally describe qualities that can be attached to a heritage resource based on prior knowledge (obtained through baseline studies and literature reviews) of potential heritage resources that may occur in any given area. There are no impacts associated with determining site significance. In contrast to the EIA model, these attributes are unaffected by any environmental impact.

A total of thirteen attributes are used, divided into nine 'aspects' and four 'parameters'. The nine aspects provide a rating for the 'Context' parameter. The four parameters – Context, Integrity, Extent and Uniqueness – provide a site significance rating out of seven. All ratings follow a seven tier system in an attempt to remain consistent with the EIA methodology and ratings used where one is lowest and 7 highest. Descriptions of these aspects and parameters are provided in Table 1-15-3.

Appropriate mitigation recommendations are made based on the Site significance rating and the potential impacts identified in the EIA impact rating. However, it must be noted that mitigation measures are based primarily on the significance of resources and not necessarily the potential environmental impacts on those resources. For instance, where environmental impacts rated



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high on heritage resources rated low, may need no mitigation. Conversely, low environmental impacts on a high rated significant may have major mitigation implications or no-go options.

### 1.2.2 Site significance rating

These criteria have been adapted and incorporated into a Site significance matrix where significance is determined based on nine aspects and four parameters. The aim is that any identified heritage resource can be objectively measured against the aspects and parameters included in the matrix. A site's significance should ideally reflect an unbiased, objective and quantified rating, based on sound research and knowledge of heritage resources in any given area. The rating is the sum of four parameters:

$$\text{Site significance} = (\text{sum of Context} + \text{Integrity} + \text{Extent} + \text{Uniqueness}) \div 4$$

$$\text{Where Context} = (\text{sum of aspects } a \text{ to } i) \div 9$$

Each aspect and parameter is calculated out of seven to remain consistent with the standard EIA matrix used. The sum of the aspects making up Context is 63. The total is reduced to seven ( $63 \div 9 = 7$ ) and added to Integrity, Extent and Uniqueness.

The Site significance matrix calculates the rating out of 28 and is reduced to a rating out of seven ( $28 \div 4 = 7$ ). This rating is then added to the EIA matrix to reflect a site's significance in terms of heritage value. Therefore, high environmental impacts on a low significant site may be considered low; conversely, low environmental impacts on a high significant site may be high.

Table 1-15-3: Description of attributes determining significance of heritage resources.

ASPECTS DETERMINING CONTEXT									
Value	a. Importance to community or pattern in country's history	b. Possession of uncommon, rare or endangered natural or cultural heritage aspects	c. Information potential	d. Importance in demonstrating principle characteristics	e. Importance in aesthetic characteristics	f. Degree of technical / creative skill at a particular period	g. Association to community or cultural group for social, cultural or spiritual reasons	h. Association with life or work of a person, group or organisation of importance in the history of the country	i. Site of significance relating to history of slavery
7	Extremely important to the country's community or to the country's history on a national level.	Endemic / exclusive to very specific localities / other occurrences unknown	Extremely high information potential: national and international	Exceptional example, complete, unique	Exceptional example, complete, unique	Uncommon / unique skill for period	Exceptional high socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Exceptional high association	Exceptionally important site, great significance on national and international slavery
6	Extremely important to the country's community or to the country's history on a provincial level.	Endemic / exclusive to specific localities / other occurrence infrequent	Extremely high information potential: national	Exceptional example, mostly complete, rare	Exceptional example, mostly complete, rare	Exception degree of skill for period	Very high socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Very high association	Very important site, high significance on national and international slavery
5	Extremely important to the community or to the history on a regional level.	Localised to only few specific localities	High information potential: national	Exceptional example, incomplete, rare	Exceptional example, incomplete, rare	High degree of skill for period	High socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	High association	Important site, high significance on national slavery
4	Very important to the community or to the history on a district level.	Rarely occurs at this locality	High information potential	Exceptional example, common	Exceptional example, common	Above average degree of skill for period	Above average socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Above average association	Important site, areas may have significance on national slavery
3	Important to the community or to the history on a municipal level.	Occurs at this locality, but occurrence unusual	Average Information potential	Good example, incomplete, common	Good example, incomplete, common	Average degree of skill for period	Average socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Average association	Site has a high likelihood of being associated with slavery
2	Important to the community or to the history on a local level.	Occurs at this locality, but not widespread	Low information potential	Common example, incomplete	Common example, incomplete	Limited degree of skill for period	Low socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Lesser association	Possible slavery site, but unlikely
1	Little importance to the community or to the history on any level.	Occurs widespread	No information potential	Damaged, destroyed, altered to extent where example is useless	Damaged, destroyed, altered to extent where example is useless	Common skill for period	No socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	No association	No significance

Value	A. CONTEXT	B. INTEGRITY	C. EXTENT	D. UNIQUENESS	SIGNIFICANCE RATING	DESCRIPTION	SAHRA RATING (RSA only)	RECOMMENDED MITIGATION
7	Exceptional context and information potential.	Resource more than 80% intact, primary spatial context	Extensive resource: high site complexity, deep and various deposits, 5 or more features present, large surface area >1 ha	Unique in present environment / landscape; no other examples known.	7	High	Grade 1	Conservation: National Site Nomination
6	High context and information potential	Resource more than 60% intact, primary spatial context	Extensive resource: potential high site complexity, deep and various deposits, 3-5 features present, large surface area >0.5 ha	Unique in present environment / landscape; few examples known elsewhere.	6	High	Grade 2	Conservation: Provincial Site Nomination
5	Medium context and information potential.	Resource more than 50% intact, primary spatial context.	Extensive resource: potential complex site, shallow deposit present, at least 1 or more features present, large surface area >0.5 ha	Good example of uncommon resource in present environment / landscape; limited distribution / occurrence in other places.	5	High	Grade 3A	Conservation: Regional Site Nomination
4	Good context and information potential.	Resource ±50% intact, primary spatial context	Good resource: site complexity exists, shallow deposit, possible features present, large surface <0.5 ha	Good example of resource in present environment / landscape; occurs fairly commonly in other places.	4	Medium	Grade 3B	Mitigation and partly conserved
3	Average context and information potential	Resource less than 50% intact, primary spatial context.	Average resource: average site complexity, deposit present, possible features present, large surface >50 m2	Good examples of common resource in present environment / landscape; also occurs commonly in other places.	3	Average	Grade 4A	Mitigation before destruction
2	Low but significant context and information potential.	Resource partly intact, mostly secondary spatial context	Little to no site complexity, little to no deposit present, no features present, surface area <50 m2	Fair example of common resource in present environment / landscape; also occurs commonly in other places.	2	Average	Grade 4B	Record before destruction
1	No significant context or information potential.	Resource completely altered, damaged or destroyed OR in tertiary spatial context.	Single, isolated find; find spot	Very common or poor example of resource occurring throughout different environments; many similar and better examples exists elsewhere.	1	Low	Grade C	Destruction / none

## APPENDIX B: CURRICULUM VITAE AND DECLARATION OF INDEPENDENCE

**Johan Nel**

Archaeologist

Digby Wells Environmental

### PERSONAL INFORMATION

Date of Birth: 07/01/1980

Languages: English, Afrikaans

Motor Vehicle License: code 08

Tel: (011) 504 1404 / 072 288 5496

Email: johan.nel@digbywells.co.za

### EDUCATION

1997 Hoërskool Brandwag Matric Exemption

2001 University of Pretoria, BA: Anthropology & Archaeology majors

2002 University of Pretoria, BA Honours in Archaeology

Current University of Pretoria, MA Archaeology.

### EMPLOYMENT

- 2010 – present: Archaeologist and CRM specialist, Digby Wells Environmental
- 2005 – 2010: Co-owner and manager of Archaic Heritage Project Management, Cultural Heritage Resources Management consultancy company;
- 2004 – 2005: Resident, professional archaeologist, Rock Art Mapping Project based at Didima / Cathedral Peak, Ukhahlamba-Drakensberg World Heritage Site, Department of Geomatics, University of KwaZulu-Natal;
- 2003 – 2004: Freelance, professional archaeologist;
- 2002 – 2003: Special Assistant, Physical Anthropology Unit, Department of Anatomy, University of Pretoria;
- 2000 – 2002: Technical Assistant, Physical Anthropology Unit, Department of Anatomy, University of Pretoria;
- 1999 – 2000: Assistant in Mapungubwe Project, Department of Anthropology and Archaeology, University of Pretoria;
- 1998 - 1999: Volunteer at National Cultural History Museum, Pretoria, Writer for BAT ('By About Town) arts section in Perdeby, official University of Pretoria student newspaper.

### PROFESSIONAL MEMBERSHIPS

- Association of Southern African Professional Archaeologists (ASAPA): Professional Member
- ASAPA Cultural Resources Management (CRM) section: Accreditation in:
  - Grave Relocation – Field Director
  - Iron Age – Field Supervisor
  - Rock Art – Field Supervisor

## **Temo Coal Mining (Pty) Ltd – Phase 1 AIA for the proposed Temo Coal Mine**

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- International Association of Impact Assessors (South Africa)
- Society for Africanist Archaeologists (SAfA)

### **DIGBY WELLS PROJECT EXPERIENCE:**

#### Phase 1 Archaeological Impact Assessments:

- Koidu Holdings, Koidu, Sierra Leone;
- Temo Coal, Limpopo, South Africa;
- Galaxy Gold Agnes Mine, Barberton, South Africa;
- HCI Khusela Palesa Extension, Bronkhorstspuit, South Africa
- Randgold Kibali Gold Project, Environmental and Social Impact Assessment, Kibali, Democratic Republic of the Congo;
- Nzoro Hydropower Station, Environmental and Social Impact Assessment, DRC;
- Resources Generation Railway Link, Limpopo, South Africa.

#### Mitigation projects:

- Mitigation of Iron Age archaeological site: Kibali Gold Project, DRC;
- Mitigation of Iron Age archaeological sites: Boikarabelo Coal Mine, Limpopo, South Africa.

#### Grave relocation

- Randgold Kibali Mine, Relocation Action Plan, Kibali, DRC;

#### Other Heritage assessments and reviews:

- Heritage Scoping Report on historical landscape and buildings in Port Elizabeth: ERM South Africa;
- Review of Archaeological Assessment: Resources Generation, Coal Mine Project in the Waterberg area, Limpopo Province.