PHASE 1 HERITAGE IMPACT ASSESSMENT OF THE PROPOSED GELUKSDAL TAILINGS STORAGE FACILITY AND PIPELINE INFRASTRUCTURE

FOR

GOLD ONE INTERNATIONAL LIMITED

MAY 2012

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EXECUTIVE SUMMARY

A Phase 1 Heritage Impact Assessment (HIA) was undertaken for Gold One International Limited (Gold One) as part of the Environmental and Social Impact Assessment (Environmental Impact Assessment and Environmental Management Plan (EIA/EMP)) processes completed for the development of the Geluksdal Tailings Storage Facility and Pipeline Project. Gold One wishes to re-mine existing tailings facilities and create a new Tailings Storage Facility (TSF) for the residual tailings from the re-mining process. This report presents the results for the heritage assessment of the proposed project.

A total of 13 cultural resources were identified and recorded. In terms of heritage significance, five were rated as medium and eight as average. The following table briefly describes the identified cultural resource, its significance and impact rating.

SITE ID	DESCRIPTION	SAHRA GRADING	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
GY01	Two graves on Raatskraal 524 (Pistorius)	Grade 3B	4	112
GY02	Approximately 25 graves on Geluksdal 196 (Pistorius)	Grade 3B	4	112
GY03	Approximately 3 graves on Cardolville 364 (Pistorius)	Grade 3B	4	10
GY04	Approximately 15 graves on Geluksdal 196 (Pistorius)	Grade 3B	4	112
RAN1386/DW001	30 graves located in 350m away from proposed line.	Grade 3B	4	10
RAN1386/DW024	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW025	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW026	Built environment - Farm house and associated infrastructure	Grade 4A	3	87

SITE ID	DESCRIPTION	SAHRA GRADING	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
RAN1386/DW027	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW028	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW029	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW030	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW031	Built environment - Farm house and associated infrastructure	Grade 4A	3	87

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)
GY01	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort, relocation of the graves.	4	112	40
GY02	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort,	4	112	40

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
			relocation of the graves.			
GY03	C	Site clearing and construction, access routes, servitude	No mitigation required	4	10	10
GY04	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort, relocation of the graves.	4	112	40
RAN1386/DW001	C	Site clearing and construction, access routes, servitude	No mitigation required	4	10	10
RAN1386/DW024	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW025	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW026	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
RAN1386/DW027	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW028	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW029	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW030	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW031	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25

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GLOSSERY OF ABBREVIATIONS AND TERMS

ASAPA	Association of South African Professional Archaeologists
BP	Before Present
CE	Common Era
CRM	Cultural Resources Management
CRP	Cultural Resources Pre-Assessment
EIA	Early Iron Age- 300-900 AD. Farmers with domestic stock and agriculture settle at permanent points and produce pottery, as well as trade with other groups. Metal artefacts such as iron and ivory are present. Communities were divided by status or rank.
EMP	Environmental Management Plan
ESA	Early Stone Age- ± 2 Million years and 250 000 years BP. Large hand axes and cleavers present within deposit.
ESIA	Environmental and Social Impact Assessment
HIA	Heritage Impact Assessment
IFC	International Finance Corperation
KYA	Thousand years ago
LIA	Later Iron Age- 1300-1840 AD. Interaction with colonialists and the movement of groups with the landscapes.
LSA	Later Stone Age- ±20 000 BP to present. Artefacts include microliths such as scrapers, flakes and bladelets. Art in the form of paintings and engravings occur, and domesticated stock and early pottery are present.
MYA	Million years ago
MIA	Middle Iron Age- 900-1300 AD. Kingdom or capitals emerge with communities divided by class. Pottery, iron and agriculture are still present, with the addition of copper, gold and beads as trade items and the construction of stone walls.
MSA	Middle Stone Age- ±250 000 -20 000 BP. Stone tools such as blades and points, and other artefacts include shell beads, pendants and the use of ochre.
SAHRA	South Africa Heritage Resources Agency
TSF	Tailings Storage Facility

1 INTRODUCTION

1.1 Project Background

Rand Uranium, now a wholly owned subsidiary of Gold One International Limited (Gold One), commenced with the authorisation process for the Cooke Uranium Project during 2009. Since the project commenced various environmental permits were applied for and are currently being approved by the various relevant authorities.

During this process, Golder Associates Africa (GAA) was appointed by Rand Uranium as the Environmental Assessment Practitioner (EAP) to undertake the environmental authorisation processes for the whole project including the Tailings Storage Facility (TSF) and pipeline project. With the takeover by Gold One of Rand Uranium the preference was to separate the functions of engineering and the duties of the EAP and as a result Digby Wells Environmental (Digby Wells) has been appointed to complete the Geluksdal facility (TSF) and pipeline project authorisation process and have appointed their own EAP going forward.

An application for environmental authorisation for the TSF and pipeline in terms of the National Environmental Managements Act, Act No. 107 of 1998 (NEMA) was submitted to and accepted by the Gauteng Department of Agriculture and Rural Development (GDARD) during March 2010 (Ref: GAUT 002/09-10/N0736). As part of this process a Public Participation Process (PPP) was undertaken and various environmental studies commenced on the preferred TSF site. These focused on the Geluksdal site (site 35) and alternate pipe line routes to access this site. Site 35 had been selected after a comprehensive site selection process fully supported by a PPP.

Due to unforeseen economic circumstances it was decided by Rand Uranium to put the project on hold during the third quarter of 2010. At that stage the draft Scoping Report was in preparation and will now be continued by Digby Wells.

1.2 Project Description

Gold One wishes to re-mine the existing tailings facilities in Westonaria, Randfontein, Mogale City and Johannesburg regions and to establish a single large new TSF for the residual tailings from the re-mining process at Geluksdal in the Westonaria area. In addition, the construction of pipelines connecting the proposed Cooke Uranium Project, a proposed permitted uranium plant near Toekomsrus (Randfontein area) and the TSF are also planned.

The objectives of the project are to:

- Re-mine the old tailings dams;
- Re-process the tailings to extract gold, sulphur and uranium; and
- Consolidate the residue tailings from the processing plant onto one large modern TSF.

There are a number of historic tailings dams in the Randfontein area that are being considered as part of this project. The size of the proposed operations in the Randfontein area will initially measure about 150 million tons (Mt) which will be ultimately extendable to 350/400 Mt of tailings from these existing tailings dams. The re-mining of tailings presents an opportunity to consolidate tailings facilities spread across a wide urbanised region into a single large TSF located away from highly populated areas. This will allow for the application of state of the art engineering of the new facility, better management of the facility and the

implementation of stricter control on environmental management, which historical facilities may not have been taken into account.

1.2.1 Description of Alternatives

Site Selection of the TSF

A thorough and extensive site selection process was undertaken by GAA and involved the screening of over 80 sites. The site selection process identified potential areas that were of a suitable size to accommodate the proposed TSF, within a 50 km radius of the Cooke Gold Plant and proposed adjacent uranium plant. This process yielded 22 candidate sites/areas, mostly grouped south of the project centroid area, which were evaluated further. Based on the results of the final site selection process that was carried out, two remaining sites were considered and evaluated in more detail. The Geluksdal site was selected as the optimal site predominantly because of its distance from the urban edge.

Alternative Pipeline Routes

Table 1-1: Pipeline Alternatives

Consideration	Northern Section	Southern section Route 1 (West)	Southern section Route 2 (East)
Description	• Runs from the proposed uranium plant to the R28 road • Largely on existing pipe routes • Traverses mine-owned land • Will cross under the N12 and R559 via existing culvert	• Preferred route • Travels along the servitude of an existing road and crosses underneath via existing culverts • Slightly longer and less direct • Fewer anticipated impacts • ±8 km along existing pipeline routes	• Alternative route • Traverses several smallholdings • Landowners could be impacted

1.3 Contact Details of Client

The contact details of the client are summarised in Table 1-2.

Table 1-2: Contact Details of Client

ITEM	DETAILS
Company:	Gold One International Limited
Contact person:	Rex Zorab
Tel. no:	0117076914
Fax no:	0862733327
E-mail address:	rex.zorab@gold1.co.za

Postal address:	Private Bag X9, Randfontein, 1760, South Africa

1.4 Contact Details of Consultant

The contact details of the consultant are summarised in Table 1-3.

Table 1-3: Contact Details of Consultant

ITEM	DETAILS
Company:	Digby Wells Environmental
Contact person:	Danie Otto
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Fax no:	011 789 9498
E-mail address:	danie.otto@digbywells.com
Postal address:	Private BagX10046, Randburg, 2125, South Africa

2 TERMS OF REFERENCE

Gold One requested Digby Wells to undertake a Heritage Impact Assessment (HIA) as part of the EIA/EMP) processes completed for the development of the Geluksdal Tailings Storage Facility and Pipeline Project.

3 LEGAL REQUIREMENTS

The HIA is governed by national legislation and standards; and International Best Practise. These include:

- South African Legislation
  - National Heritage Resources Act, No. 25 of 1999 (NHRA);
  - Notice of Intent to Develop, Section 38 of the National Heritage Resources Act (Act No. 25, 1999) (NID)
  - Mineral and Petroleum Resources Development Act, 28 of 2002 (MPRDA);
  - National Environmental Management Act, Act No. 107 of 1998 (NEMA); and
  - National Water Act, 36 of 1998 (NWA).
- Standards and Regulations
  - South African Heritage Resources Agency (SAHRA) Minimum Standards;
  - Guideline for involving Heritage Specialists in the Environmental Impact Assessment Process (Heritage Western Cape);
  - Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics.
- International Best Practise and Guidelines

- Equator Principles (Drafted 2003, Updated 2006)
- ICOMOS Standards (Guidance on Heritage Impact Assessments for Cultural World Heritage Properties); and
- The UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972)

4 EXPERTISE OF THE SPECIALIST

Curriculum Vitae's of specialists and declaration of independence is attached in Appendix C.

5 AIMS AND OBJECTIVES

The aim of this Phase 1 HIA 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 significant archaeological, cultural and historic sites, including graves and cemeteries, within the proposed development area;
- Evaluate whether proposed 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.

6 METHODOLOGY

This HIA consists of a Heritage Statement – primarily a desktop study including background literature reviews, aerial and historical map surveys and a review of relevant impact assessment reports, inferred information – and a vehicle and pedestrian site survey. A heritage site visit was undertaken by a qualified and accredited archaeologist for the identification and documentation of potential heritage resources, as stipulated in the NHRA (1999) and SAHRA Minimum Standards (2006). Fieldwork took place 9 May and 17 May 2012. The integrated Phase 1 HIA process consisted of the following steps.

6.1 Desktop study

The first step was aimed at information gathering relating to known heritage resources within and surrounding the proposed area for development. Project information and data was obtained through intensive research, data gathering and consultation, including a variety of primary and secondary sources such as academic journals, textbooks and records, national and provincial websites, archaeological field guides, national guidelines, maps, photographs and plans. Surveys of aerial photographs, topographical maps, satellite imagery and other cartographic material was undertaken to plot potential sites. Some older maps such as the major Jackson series of early 20th century topographical maps were also consulted and integrated into the HIA where applicable. These are invaluable resources, as they often include features and information not recorded on later maps.

6.2 Field Visit and Survey

A vehicle and pedestrian survey was undertaken on 9 May and 17 May 2012 by a qualified and accredited archaeologist along the proposed pipeline routes and TSF area. This survey was aimed at locating and documenting potential sites of heritage significance located within the project boundaries and its immediate surrounds. General site conditions and features on site were recorded by means of photographs, GPS location, and description. A physical, pedestrian survey was done to identify and record any sites found *in situ*.

6.3 Data Interpretation: Assessment of Significance and Impacts

The identified heritage resources were assessed to determine their significance in context of the National Estate in terms of Section 3 of the NHRA. Potential impacts on the heritage resources were assessed in terms of Digby Wells' standard Environmental Impact Assessment (EIA) methodology, as well as in terms of the impact assessment criteria and ratings as detailed in the ASAPA and SAHRA guidelines. The site significance and impact assessment were integrated into the final EIA report.

6.4 Report Compilation: Report Writing and Documentation

Once the relevant field surveys and report compilation was completed, an HIA report was submitted to the relevant heritage/environmental authority for their perusal. This included:

- The identification and mapping of all heritage resources in the affected area;
- An assessment of their significance of such resources in terms of the assessment criteria provided in the NHRA, Section 3;
- An assessment of the impact of the development on such resources and the consideration of alternatives; and
- Proposed recommendations – based on the site significance and impact assessment – towards mitigation of any adverse effects during and after the completion of the development.

Subsequent to the completion of these steps, it was determined whether a Phase 2 HIA would be required (e.g. grave relocation, and/or the excavation of specific archaeological sites, and/or detailed mapping of site/s, and/or detailed collection of artefacts at sites of significance that may be adversely affected by the proposed development).

6.5 Interviews and Inferred Information

As part of the PPP, 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 section 3 of the NHRA. The results were reported on in the Social Impact Assessment (SIA) report.

7 STUDY AREA

7.1 Regional Setting

The Cooke Uranium Project (the Project) entails the reclamation and re-processing of existing tailings dams in the Westonaria, Randfontein, Mogale City and Johannesburg regions. In addition some underground ore is being mined from the various Cooke shafts. The Project is located in the West Rand District Municipality and Johannesburg Municipality

in the Gauteng Province. As illustrated in the Regional Setting Plan 1 Fochville, Cardoville, Sebokeng and Westonaria are some of the towns and residential suburbs closest to the proposed project (Figure 7-1).

Table 7-1: Geographic Details of the Project Area

Province	Municipal District	Map Sheet
Gauteng	West Rand District Municipality Johannesburg Municipality	2627BA Randfontein 2627BC Westonaria 2627DA Lindequesdrift

Plan 1

Gold One TSF & Pipeline

Regional Setting

Legend

- Cooke Plant
- Proposed Pipeline Route
- Alternative Pipeline Route 1
- Alternative Pipeline Route 2
- Proposed TSF Site
- City
- Major Town
- Secondary Town
- Other Town
- Settlement
- Arterial / National Route
- Main Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake

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Projection: Transverse Mercator	Ref #: scc.RAN1386.201204.030
Datum: Hartebeesthoek 1994	Revision Number: 1
Central Meridian: 27°E	Date: 05/04/2012

N

0 2.5 5 10 15

Kilometres

1:300 000

7.2 Cultural Landscapes

7.2.1 Literature Review

7.2.1.1 The Stone Age

The Stone Age in southern Africa is divided into three periods, the Early, Middle and Late Stone Age. As our ancestors advanced physically, socially, and mentally, the use of stone tools allowed them to exploit the natural resources, access high protein foodstuff, and ultimately increase brain development. The Early Stone Age (ESA), dating from 2.5 million years ago to 200 000 years ago, is marked by the use of large, fairly unsophisticated stone tool assemblages: the Oldowan (coarse simple flaked pebbles used as choppers) and the Acheulean (classic tear-drop shaped, bifacial flaked hand axes and cleavers) (Mitchell 2002). In Gauteng, approximately 45 km north of the project area lay the Cradle of Humankind (CoH), declared a World Heritage Site in 1999. As a complex system of dolomitic caves, this area has produced evidence for occupation dating back to at least 2.3 mya, and yielding the largest collection of fossil remains pertaining to the evolution of modern man. It is here, at sites such as Sterkfontein and Swartkrans that stone tools dating to the ESA and MSA and hominid remains such as *Australopithecus*, *Paranthropus* and *Homo habilis* have been studied since the 1940's (Brodie 2008).

The MSA is marked by a significant trend in the manufacture of the tools to smaller dimensions and increasing variety. In Southern Africa the earliest MSA industries are characterised by high proportions of minimally modified blades with the Levallois technique present. Regional traditions became more varied with a greater degree of local differentiation, making the Southern African MSA difficult to interpret (Clark, 1982). LSA tool technology is highly sophisticated when compared to ESA and MSA industries, with specific tools being created for specific purposes, and the inclusion of bone tools into the assemblages (Mitchell, 2002).

7.2.1.2 The Iron Age

The Iron Age in South Africa emerges in the archaeological record at around 2 000 years ago. A migration of Bantu-speakers arrived in southern Africa around this time bringing with them several technological and social innovations. These included metal working, ceramic production, domesticated animals (specifically cattle), agriculture and eventually certain settlement pattern motifs. The Iron Age has been studied by classifying the different ceramic styles into various facies. These facies track the migration of different groups of people, as well as the shifting and dynamic identities within these various groups and time periods of the Iron Age (Hall 1987).

Using ceramic facies distributions outlined by Huffman (2007), five different ceramic styles may occur within the project area.

Table 7-2: Possible ceramic facies occurring in the project area (Huffman 2007)

Ceramic facies	Period
Mzonjani	AD 450 – 750
Ntsuanatsatsi	AD 1450 – 1650
Olifantspoort	AD 1500 – 1700
Uitkomst	AD 1650 – 1820

Buispoort	AD 1700 - 1840

Stone walls identified by Huffman, Hall and Steel (1991) share affinities with Klipriviersberg walling to the east. This type of walling belongs to the Ntsuanatsatsi cluster and is commonly associated with the *Uitkomst facies*. Historically, the Kwena moved southeast across the Vaal to find the Fokeng cluster at Ntsuanatsatsi Hill. Through a process of intermarriage with the Fokeng, the Kwena legitimised their takeover and became the Kwena-Fokeng where they moved north across the Vaal River (Huffman 2007:429).

Ethnographic research conducted by Vorster (1993) and Breutz (1956) indicated a cultural sequence of the Late Iron Age pertaining to the Bakwena-ba Mare-a-Phogole. The origins of this group can be traced to an area close to the Zeerust area on the border of Botswana. It is here where Phogole I, a son of Kwena-a-Malope, lived. A large famine dating to AD 1470 - 1500 drove Phogole I away from the area into parts of Rustenburg and the Free State to the last known settlement associated with the group around Fochville. Studies in surrounding areas (Fourie and Van der Walt 2005) have identified stone walled settlements associated with this group.

7.2.1.3 Historical Period

This period covers the emergence of South Africa as a modern state, through the colonial period, to the Anglo-Boer war and into the 20th century, with the creation of the Union of South Africa, and the eventual creation of the Republic of South Africa following the Second World War. The History of the Apartheid system and freedom struggle is also considered to be part of this period.

The project area was first settled by Europeans with the arrival of the Voortrekkers in 1838, attracted by the well watered shallow valleys and strong dolomitic fountains. Several homesteads were erected pre-Boer War. These homestead were primarily associated with 'bywoners', a name given to poor white families (Huffman, Hall & Steel, 1991). The structures were simple stone walled houses with one or two rooms. In what is today known as Westonaria, four farms were demarcated, namely Venterspost, Gemsbokfontein, Libanon and Uitval and distributed amongst the families that arrived with Andires Hendrik Potgieter.

In 1886 gold was discovered on the Witwatersrand and the town of Johannesburg was established. It was originally thought that the gold bearing reef ending abruptly at a rupture known as the Witpoortjie Fault. Two prospectors, David and Edward Pullinger did not believe this to be true and established the company West Rand Estates that bought the mining rights for the four farms originally demarcated by the Voortrekkers. It was around this time that the British were occupying the area and burning down the houses of the Boers (Huffman *et al* 1991). From their prospecting, they demonstrated that the gold reef continued in the west and sank a shaft to mine for gold in 1902. Unfortunately, due to the lack of technology to pump the large quantity of water from the shaft while keeping operations economically viable, the mining operations were abandoned.

After a 24 year hiatus from mining in and around West Rand, Colonel James Donaldson and Mr Caliss bought up the mining rights for the four farms Venterspost, Gemsbokfontein, Libanon and Uitval and several other surrounding farms in 1926. They established the company Western Areas Limited and began the development of the area. In 1930, with the renewed interest in the far West Rand, there was a drive to determine whether the gold bearing reef was economically viable to mine. Goldfields of South Africa was the first group to invest in the region, taking over the Pullingers brothers firm and establishing West Witwatersrand Limited in 1932. In 1934, production at its first mine situated on Venterspost began, driving the need to establish associated infrastructure, including a town.

1937 marked the establishment of the suburb called Venterspost, administered by the company Western Areas Limited. Westonaria also came into existence with the establishment of Venterpost, but its name would only be given to it the following year. With the rapid expansion of the town driven by the mining industry, Westonaria acquired town status in October 1948, being one of the first to be directly upgraded from the status of health committee to a town council (westonaria.gov.za).

At the same time as the major developments were happening in Westonaria, developments toward the east, in what would later become known as Soweto, began. In 1905, the town of Klipspruit was established directly to the east of the project area and was one of the first African townships. The first residents here were African miners that moved to Johannesburg with the discovery of gold on the Witwatersrand. Originally confined to live on the mining properties in tightly controlled single-sex barracks, and in interracial slums of the inner city as the population grew, government established Klipspruit 13 km from Johannesburg city centre.

A few years later to address the increasing populations in the Johannesburg slums, the Johannesburg City Council bought land on the farm Klipspruit Number 8 in 1930 to establish Orlando, or what they termed the 'biggest and finest township in the Union of South Africa'. Though this was the official stance, the conditions in Orlando were poor and there was a lack of facilities that could only be found in the city. By 1936 12 000 people lived in Orlando and with the 'slum clearance programme' initiated by the Johannesburg City Council, the numbers were growing resulting in squatters (Bonner & Segal 1998). By 1946, squatters from Orlando forcibly occupied the construction site of the new Orlando West township as a protest to what was said to be housing for black resident from areas the government wanted to declare 'white areas'. By 28 January 1947, the council conceded that the housing shortage and squatters was a serious problem that could no longer be controlled by force and established a new emergency camp called Moroko.

With the establishment of the Apartheid Government, Soweto became the centre of political resistance for African communities. At the centre were grievances against the pass laws, with forced removals and unaffordable rents also at the forefront of contention, instigating the defiance campaign. Meadowlands was established in 1953 as the site for the relocation of Sophiatown residents and in 1955 the forced removals were carried out. A second major event in the history of Soweto in 1955 was the Congress of the People held at Kliptown between 26 and 27 June. The congress was a culmination of a two year campaign aimed at drawing up a charter of demands on behalf of the disenfranchised black population (Bonner & Segal 1998).

During the height of Apartheid developed the 'black consciousness' movement where it had been decided that the time had come to challenge the status quo rejecting passive acceptance of white dominance. Figures, such as Steve Biko, were pivotal in this movement, but actualisation of 'black consciousness' in the minds of the population would only firmly take hold in 1976 with the events surrounding the Soweto Uprising. As resistance against the 'Afrikaans Medium Decree' in which it was declared that Afrikaans be the official medium in which schools were to teach students, school groups from around Soweto assembled on 16 June 1976 to conduct a peaceful march. The students were met by excessive force from police, in which tear gas was released and shots were fired without warning into the crowd. The official death toll was 23, though some estimate it to be around 200 with many more injured.

7.2.2 Archival and Database Survey Results

A total of 22 sites around the project area were identified during the reports, archive and database survey (See Table 1 in Appendix A). The South African Archives website was surveyed and no information was gathered.

The South African Genealogical Database was surveyed. All known cemeteries recorded on the South African Genealogical Database occurred outside of the proposed footprint of the project and will not be impacted upon.

The Wits Archaeological Site Database was consulted and no sites were identified within the project area, or in the immediate surrounds.

7.2.3 Inferred Information Results

No inferred information was collected. The PPP will attempt to address any further information that can be collected with the use of surveys and interviews. This will form part of the SIA report.

7.2.4 Land Claims

Based on limited information, there are currently no known land claims on any of the properties for the proposed project.

7.2.5 Baseline Study Survey Results

Seven Cultural Resource Management (CRM) reports were reviewed as baseline information locating identified cultural resources within or near the project area. These are discussed separately below.

Huffman, Kruger, Steel and Hall (1991) identified several sites pertaining to the Stone Age. Stone Tools associated with the ESA, MSA and LSA were noted along the proposed road development, but all of these were found in disturbed contexts, such as graded roads and quarries, and rated with low significance. Four historic structures, including the homes of 'bywoners', a group of poor whites dating to AD 1840 – 1890, African labourers and associated kraals were identified. Additionally, one standing building older than 60 years was also identified. No geographic (GPS) reference was given for the recorded sites in the report.

Huffman, Hall and Steel (1991) identified ten Stone Age sites, eight Late Iron Age cattle posts and a series of historic buildings dating to the 19th and 18th century for the Rietfontein Housing Scheme survey. ESA, MSA and LSA stone tools were identified, and with the exception of one MSA deposit and one MSA / LSA complex found *in situ*, the remainder were out of context in disturbed areas and rated with low significance. Several Late Iron Age (LIA) sites were identified, primarily along the crest and tops of hills. The stone walling, though not extensive, seems to have an affinity with Klipriviersberg type, and is suggested to be cattle posts for the larger settlements to the east of the project area. Historic structures were also identified; these include stone foundations of 'bywoner' homesteads and a blockhouse built by the British during the 2nd Anglo-Boer War of 1898 – 1902. No GPS reference was given for the recorded sites in the report.

Van Schalkwyk (1997) conducted a survey of the Sebokeng area to the south east of the proposed TSF. In the report mention was made to Stone Age surface scatters found during the survey. These finds were rated with a low significance because they were found on the surface and thus out of context. Several historical structures were identified relating to homesteads or old farm houses but deemed with a low significance. It must be noted that reference to living heritage was made, where rituals and initiations were still being conducted in the area. It was recommended that communities be consulted to ascertain the intangible

heritage significance of the landscape. No GPS reference was given for the recorded sites in the report.

Fourie and Van der Walt (2005) conducted a heritage assessment on Waterpan 292IQ and identified 16 sites of cultural heritage significance related to cemeteries, historic structures and cultural practice as well as LIA sites. The identified cemeteries and LIA sites were given a high significance rating. It was also noted that pertaining to the living heritage of the area were also present in the project area.

Pistorius (2009a) conducted a survey north of the proposed pipeline. A memorial to Bernard Daniel de Beer dated to 21 September 1939, a graveyard and a historical townscape were identified as heritage resources. The memorial and graveyard were within the project area, given a high significance rating and recommended that they remain *in situ*. The historical townscape lies outside of the project area, but it is noted that the greater area is characterised by mining villages with buildings and associated mining infrastructure older than 60 years. No GPS reference was given for the recorded sites in the report.

Pistorius (2009b) conducted a survey for a proposed pit deposition project near Randfontein. A historical structure associated with the mining history of the area was identified. It is described as a formidable concrete structure with lesser impressive structures surrounding it. It was given a medium significance rating, and as it fell outside of any impacts, no mitigation was recommended.

Pistorius (2009c) conducted a survey for the proposed pyrite project near the Cooke Gold Plant. Only a single graveyard was identified. This heritage resource is given a high significance rating and is recommended to remain *in situ*.

8 RESULTS AND DISCUSSIONS

The physical survey was conducted by foot and vehicle survey. A review of previously identified sites was also completed, to verify sites and determine extent of sites. Identified sites are summarised in Table 8-1. For SAHRA grading see Appendix D.

Table 8-1: Summary of Identified Heritage Resources (See Appendix A for site details)

SITE ID	DESCRIPTION	SAHRA GRADING	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
GY01	Two graves on Raatskraal 524 (Pistorius)	Grade 3B	4	112
GY02	Approximately 25 graves on Geluksdal 196 (Pistorius)	Grade 3B	4	112
GY03	Approximately 3 graves on Cardolville 364 (Pistorius)	Grade 3B	4	10

SITE ID	DESCRIPTION	SAHRA GRADING	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
GY04	Approximately 15 graves on Geluksdal 196 (Pistorius)	Grade 3B	4	112
RAN1386/DW001	30 graves located in 350m away from proposed line.	Grade 3B	4	10
RAN1386/DW024	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW025	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW026	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW027	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW028	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW029	Built environment - Farm house and associated infrastructure	Grade 4A	3	87
RAN1386/DW030	Built environment - Farm house and associated infrastructure	Grade 4A	3	87

SITE ID	DESCRIPTION	SAHRA GRADING	SIGNIFICANCE ASSESSMENT	IMPACT ASSESSMENT
RAN1386/DW031	Built environment - Farm house and associated infrastructure	Grade 4A	3	87

Pipeline Route

The proposed pipeline runs from the Cooke Gold Plant in the north in 2 alternative routes to the selected Geluksdal TSF site in the south (See Plan 8-1). The proposed pipeline routes are currently projected to run within existing pipeline servitudes. As a result, the impact area has been highly disturbed and no impacts to heritage resources were identified during the survey. Alternative Pipeline Route 2 runs along underground pipeline servitude in close proximity to residential complexes (See Table 1 in Appendix A). As an existing servitude is present, potential impacts to these sites are minimal and unlikely. A Title Deed search of the property on which these structures lie indicated that the majority fall outside of the 60 year period as stipulated by the NHRA (No 25 of 1999) and therefore not within the scope of this HIA.

Plan 1

Gold One TSF & Pipeline

Heritage Photo Sites

008: Northern view of pipeline route

004: Northern view of pipeline route

017: North-westerly view of Kgoole Family Cemetery approx. 350m away from pipeline route

014: North-easterly view of pipeline route

046: Northern view of pipeline route

027: Abandoned home east of pipeline route

041: Eastern view of propsed TSF area

Legend

- 150 Mt TSF Footprint
- Study Area
- Photo Sites
- Proposed Pipeline Route
- Alternative Pipeline Route 1
- Alternative Pipeline Route 2
- Arterial / National Route
- Main Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake

GOLD ONE INTERNATIONAL LIMITED

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Projection: Transverse Mercator	Ref #: amc.RAN1386.201205.094
Datum: Hartebeesthoek 1994	Revision Number: 1
Central Meridian: 29°E	Date: 24/05/2012

N

0 2.5 5 10

Kilometres

1:200 000

One cemetery (RAN1386/DW001) was found during the survey. Thirty (30) graves were identified at the site, with only a few having formal headstones with inscriptions (See Table 8-2). The remainder had stone surface dressing with no headstone. The site was burnt during a recent veld fire, but it was evident that it is no longer tended, suggesting that relatives of the deceased do not frequent the site. Inscriptions on some of the headstones suggest that the cemetery belongs to the Kgaole family or relatives thereof. The cemetery lies approximately 350 m away from the proposed pipeline and an existing TSF, and will not be impacted upon.

Table 8-2: Visible Inscriptions on Headstones from RAN1386/DW001

Inscription
1. Koos Motlhakule – 1952
2. Mathew Kgaole – 1949
3. Selopolgo Paul Kgaole Born 2-3-1936 Died 28-10-1945
4. Ben Kgaole
5. Abasai Kgaole 1-9-1942
6. Ms Christina Khadle 1858 Mak 1960
7. Elias Kgaole Shot April 18 1959
8. Aolos Kgaole

TSF Area

The proposed TSF area is currently used for agricultural purposed. As a result, the area is highly disturbed. Several built structures, consisting of farm houses and associated infrastructure, were identified within the extent of the proposed TSF area, namely RAN1386/DW024 – 31. As illustrated in figure 8-2, RAN1386/DW025 is an unutilised complex on Doornfontein 522IQ 5 dating to 1946. Records indicate that it was originally owned by the De Bruyn family. The structures are in good condition but will require an in-depth assessment if they are to be impacted upon.

Figure 8-1: Photograph of structure (RAN1386/DW025)

Pistorius identified four graveyards within and around the proposed TSF area. GY01 consists of two graves and is located on Raatskraal 524, GY02 and GY04 are located on Geluksdal 196 and consist of 25 and 15 graves respectively. GY03 lies outside the boundary of the proposed TSF (option 35) area on Cardoville 364 and will not be impacted upon.

9 STATEMENT OF SIGNIFICANCE

Site significance is determined by Section 3 of the NHRA. This act provides nine categories whereby heritage resources' significance may be measured against, namely:

- Its importance in the community, or pattern in South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principles characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;

- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- Sites of significance relating to the history of slavery in South Africa.

Each heritage resource's significance is measured against the above parameters, based on whether such an object, feature or structure conforms to the following criteria:

- Site integrity (i.e. primary vs. secondary context);
- Amount of deposit, range of features (e.g. stone walling, enclosures and stone tools);
- Uniqueness; and
- Potential to answer present research questions.

A detailed explanation of the site significance assessment methodology and archaeological impact assessment criteria and ratings is provided in Appendix D.

Table 9-1: Summary of Heritage Significance Ratings per Site

	PARAMETER													SIGNIFICANCE
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)**
GY01	4	2	4	2	4	1	7	3	1	3	7	4	1	4
GY02	4	2	4	2	4	1	7	3	1	3	7	4	1	4
GY03	4	2	4	2	4	1	7	3	1	3	7	4	1	4
GY04	4	2	4	2	4	1	7	3	1	3	7	4	1	4
RAN1386/DW001	4	2	4	2	4	1	7	3	1	3	7	4	1	4
RAN1386/DW024	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW025	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW026	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW027	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW028	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW029	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW030	2	1	2	2	2	1	1	1	1	1	7	2	1	3
RAN1386/DW031	2	1	2	2	2	1	1	1	1	1	7	2	1	3

10 IMPACT ASSESSMENT

This section aims to assess the significance of the potential impacts (threats or sources of risk) on 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 the significance ratings and archaeological impact assessment criteria established by the ASAPA and applicable international best practise guidelines. More information on the archaeological impact assessment criteria and rating 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 D.

Table 10-1: Impact Assessment for Identified Heritage Resources

Environmental Impact Significance Determination

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 EIA	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)
Heritage																					
GY01	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	4	7	7	18	6	4	112	P	4	6	2	12	3	4	40
GY02	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	4	7	7	18	6	4	112	P	4	6	2	12	3	4	40
GY03	C		Site clearing and construction, access routes, servitude	No impact will occur		N	4	1	1	6	1	4	10	P	4	1	1	6	1	4	10
GY04	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	4	7	7	18	6	4	112	P	4	6	2	12	3	4	40
RAN1386/DW001	C, O, D,PC		Site clearing and construction, access routes, servitude	No impact will occur		N	4	1	1	6	1	4	10	P	4	1	1	6	1	4	10
RAN1386/DW024	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW025	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW026	C		Site clearing and construction, access routes, servitude	No impact will occur		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25

RAN1386/DW027	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW028	C		Site clearing and construction, access routes, servitude	No impact will occur		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW029	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW030	C		Site clearing and construction, access routes, servitude	Site will be destroyed by proposed TSF		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25
RAN1386/DW031	C		Site clearing and construction, access routes, servitude	No impact will occur		N	3	7	2	12	7	3	87	P	3	6	2	11	2	3	25

11 CUMULATIVE IMPACTS

As the impacts upon the heritage resources will occur in the preceding phases, no cumulative impacts are expected. However, if an increase in development occurs within and around the project area, cumulative impacts include the increase of destructive impacts on heritage resources.

12 MITIGATION MEASURES AND MANAGEMENT PLAN

In the event of identified archaeological and cultural heritage resources situated within or in close proximity to proposed development areas, the specialist has identify, document and make recommendations based on the particular resources' significance, which may include recommendations of:

- *Site preservation*: Conservation is essentially a no development recommendation;
- *Site mitigation*: Site conservation (no development in the particular area) or Phase 2 mitigation (Shovel Test Pits [STP's]) after which development may legally proceed in the area; and
- *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 site destruction recommendation essentially implies that the site may be destroyed during the course of development without the developer having to comply with any archaeological or cultural heritage requirements.

In terms of the NHRA (no 25 of 1999), man-made structures older than 60 years are protected as heritage sites of significance and a permit is required for any structural changes and/or demolition.

Table 12-1: Recommended Mitigation Measures

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
GY01	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort, relocation of the graves.	4	112	40
GY02	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort, relocation of the graves.	4	112	40
GY03	C	Site clearing and construction, access routes, servitude	No mitigation required	4	10	10
GY04	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve graves *in situ*, demarcate area so it is clearly visible. As a last resort, relocation of the graves.	4	112	40

Site number, development phase and activity			Recommended mitigation	Site significance	Impact significance	Impact significance (post-mitigation)
RAN1386/DW001	C	Site clearing and construction, access routes, servitude	No mitigation required	4	10	10
RAN1386/DW024	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint if possible to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW025	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW026	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW027	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW028	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW029	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW030	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25
RAN1386/DW031	C	Site clearing and construction, access routes, servitude	Adjust TSF footprint to preserve structure *in situ*, establish a buffer zone, demarcate are so it is clearly visible. If impacted upon, Phase 2 Built Heritage Impact Assessment.	3	87	25

13 MONITORING PROGRAMME

The purpose of this monitoring program is to provide general information to the developer with regards to management recommendations for the archaeological component of the EIA/EMP. Such a monitoring programme is planned for observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be

within a specified area or site on land where there is a possibility that an archaeological deposit may be disturbed or destroyed. In essence, the main purpose of a management and monitoring programme is:

- To allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works;
- To provide an opportunity, if required, for the monitoring archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the monitoring programme itself are not sufficient to support treatment to a satisfactory and proper standard;
- To emphasise the requirement for excavation and/or preservation of known or inferred deposits and guide any requirement for contingent excavation or preservation of possible deposits; and
- To establish and disclose information about the archaeological resource existing on a site.

14 RECOMMENDATIONS AND 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 a sub-surface level. Site access was also hampered by restrictions in access to sites at the time of the survey.

This report may therefore not give a full perspective of the heritage sites found within 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 additional archaeological or heritage features be uncovered during the construction or operational phase (i.e. environmental monitoring). Such 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/object.

In general, due to the linear nature of the proposed pipeline, potential impacts to heritage resources can be minimised if the following recommendations are followed:

- Existing roads, power-lines and pipeline servitudes, and disturbed areas must be used for access roads and construction as far as possible; and
- Monitoring Programmes / Watching Briefs should be implemented within 100 m of identified heritage resources or where at least 50 m^2 of soil will be excavated or displaced.

Identified impacts are currently limited to heritage resources identified within the TSF area. Due to the lack of detailed description of the TSF footprint, it is recommended that as far as it is feasible, the impact footprint should adjusted to preserve identified resources *in situ* with a buffer of at least 50 m. Where this is not possible, for the built structures it is recommended that a Phase 2 Built Heritage Impact Assessment be conducted where the structures are assessed, recorded via detailed mapping, and where applicable, an application for a destruction permit can be made for the structures that it is legally required.

With regard to the graves, *in situ* conservation is the preferred course, however, where it is not practically or economically viable, grave relocation is an option.

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, i.e. any area where health and/or safety risks exists to visitors;
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.

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:

a) A comprehensive PPP 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 PPP; and
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.

15 CONCLUSION

This HIA was undertaken with the aim of locating and identifying heritage resources along the proposed pipeline and TSF site, assess their significance and recommend appropriate mitigations. A site visit was completed to accomplish these aims.

The proposed pipeline routes lay within existing servitudes and potential impacts on heritage resources are not expected. One cemetery (RAN1386/DW001) and several built complexes occur in close proximity to the proposed pipeline routes, but potential impacts to these structures are either negligible or minimal. Within the proposed TSF area, three graveyards and eight built complexes were identified. Without detailed descriptions of the TSF footprint, all of these heritage resources have a high potential to be impacted upon. An assessment methodology aimed at objectively quantifying potential impacts and site significance was used to determine impact significance and site significance.

The identified heritage resources include:

- Three graveyards; and
- Eight built complexes consisting of farm houses and associated infrastructure, with RAN1386/DW025 possibly dating to older than 60 years.

In general, site significance and potential impacts were assessed as ranging from low to medium. Recommendations included *in situ* preservation of the burial sites and built complexes, Phase 2 mapping, sampling and documentation of the built complexes, as well as watching briefs where necessary.

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Appendix A: Site Table for Identified Heritage Resources

Source	Site Name	Longitude	Latitude	Description
Fourie & van der Walt (2005)	2627BD-MHC001	-26.3594038	27.7414066	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC002	-26.3603426	27.7439654	Cemetery
Fourie & van der Walt (2005)	2627BD-MHC003	-26.3624937	27.7460521	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC004	-26.3630516	27.7417177	Cultural Place
Fourie & van der Walt (2005)	2627BD-MHC005	-26.3622577	27.7432841	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC006	-26.3619090	27.7407521	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC007	-26.3616783	27.7395397	Historic Extended Settlement
Fourie & van der Walt (2005)	2627BD-MHC008	-26.3592751	27.7326787	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC009	-26.3585348	27.7305382	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC010	-26.3617373	27.7371418	Late Iron Age Structure
Fourie & van der Walt (2005)	2627BD-MHC011	-26.3624508	27.7394968	Late Iron Age Structure
Fourie & van der Walt (2005)	2627BD-MHC012	-26.3625098	27.7406609	Late Iron Age Structure

Fourie & van der Walt (2005)	2627BD-MHC013	-26.3630409	27.7416211	Late Iron Age Structure
Fourie & van der Walt (2005)	2627BD-MHC014	-26.3638670	27.7375656	Historic Structure
Fourie & van der Walt (2005)	2627BD-MHC015	-26.3601602	27.7186507	Cemetery
Fourie & van der Walt (2005)	2627BD-MHC016	-26.3815267	27.7079540	Cemetery
Pistorius	GY01	-26.540100	27.6395800	2 Graves
Pistorius	GY02	-26.535900	27.6334200	Cemetery
Pistorius	GY03	-26.530600	27.6158800	Cemetery
Pistorius	GY04	-26.531600	27.6071300	Cemetery
Pistorius (2009b)	MHR01	-26.158100	27.7332300	Mining Heritage Remains
Pistorius (2009c)	GY05	-26.216200	27.7238700	Cemetery
Digby Wells	RAN1386/DW001	-26.381533	-27.7079528	Cemetery

Built Structures

Source	Site Name	Longitude	Latitude	Portion	Earliest Date on Title Deed
Digby Wells	RAN1386/DW002	-26.24165833	27.73528889	Luipaardsvlei 243IQ 134	1961
Digby Wells	RAN1386/DW003	-26.26949167	27.71876389	Luipaardsvlei 243IQ 59	1976
Digby Wells	RAN1386/DW004	-26.40318056	27.70597778	Modderfontein 345IQ 60	1951*
Digby Wells	RAN1386/DW005	-26.41169444	27.71180278	Modderfontein 345IQ 25	1954
Digby Wells	RAN1386/DW006	-26.87302778	27.69575000		
Digby Wells	RAN1386/DW007	-26.42504167	27.69471667	Modderfontein 345IQ 38	1944*
Digby Wells	RAN1386/DW008	-26.42731944	27.69339722	Modderfontein 345IQ 53	1974
Digby Wells	RAN1386/DW009	-26.47083333	27.69314722	Kalbasfontein 365IQ 80	1963
Digby Wells	RAN1386/DW010	-26.47391111	27.68886389	Kalbasfontein 365IQ 7	1973
Digby Wells	RAN1386/DW011	-26.48526111	27.68886111	Kalbasfontein 365IQ 48	1970
Digby Wells	RAN1386/DW012	-26.49552778	27.68498889	Kalbasfontein 365IQ 32	1966

Digby Wells	RAN1386/DW013	-26.49719444	27.68441667	Kalbasfontein 365IQ 54	1982
Digby Wells	RAN1386/DW014	-26.49941667	27.68415278	Kalbasfontein 365IQ 54	1982
Digby Wells	RAN1386/DW015	-26.50188056	27.68325000	Kalbasfontein 365IQ 55	1978
Digby Wells	RAN1386/DW016	-26.50369444	27.68280556	Kalbasfontein 365IQ 56	1970
Digby Wells	RAN1386/DW017	-26.50713889	27.68197222	Kalbasfontein 365IQ 19	1909*
Digby Wells	RAN1386/DW018	-26.50975000	27.68144444	Kalbasfontein 365IQ 57	1975
Digby Wells	RAN1386/DW019	-26.51269444	27.67994444	Kalbasfontein 365IQ 58	1964
Digby Wells	RAN1386/DW020	-26.51369444	27.68016667	Kalbasfontein 365IQ 59	1975
Digby Wells	RAN1386/DW021	-26.51516667	27.67955556	Kalbasfontein 365IQ 60	1975
Digby Wells	RAN1386/DW022	-26.51693056	27.67911111	Kalbasfontein 365IQ 61	1955
Digby Wells	RAN1386/DW023	-26.52019444	27.67800000	Kalbasfontein 365IQ 52	1982
Digby Wells	RAN1386/DW024	-26.52072222	27.59772222	Droogheuvel 521IQ 2	1974
Digby Wells	RAN1386/DW025	-26.53280556	27.60080000	Doornfontein 522IQ 5	1946*
Digby Wells	RAN1386/DW026	-26.53919444	27.59086111	Doornfontein 522IQ 24	1954

Digby Wells	RAN1386/DW027	-26.54616667	27.59886111	Doornfontein 522IQ 23	1975
Digby Wells	RAN1386/DW028	-26.54747222	27.60140556	Doornfontein 522IQ 12	1967
Digby Wells	RAN1386/DW029	-26.54697222	27.60669444	Doornfontein 522IQ 11	1969
Digby Wells	RAN1386/DW030	-26.54955556	27.61963889	Raatskraal 524IQ 1	1964
Digby Wells	RAN1386/DW031	-26.54911111	27.62405556	Raatskraal 524IQ 8	

Appendix B: Project Plans

Plan 1

Gold One TSF & Pipeline

Regional Setting

Legend

- Cooke Plant
- Proposed Pipeline Route
- Alternative Pipeline Route 1
- Alternative Pipeline Route 2
- Proposed TSF Site
- City
- Major Town
- Secondary Town
- Other Town
- Settlement
- Arterial / National Route
- Main Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake

GOLD ONE INTERNATIONAL LIMITED

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Projection: Transverse Mercator	Ref #: scc.RAN1386.201204.030
Datum: Hartebeesthoek 1994	Revision Number: 1
Central Meridian: 27°E	Date: 05/04/2012

N

0 2.5 5 10 15

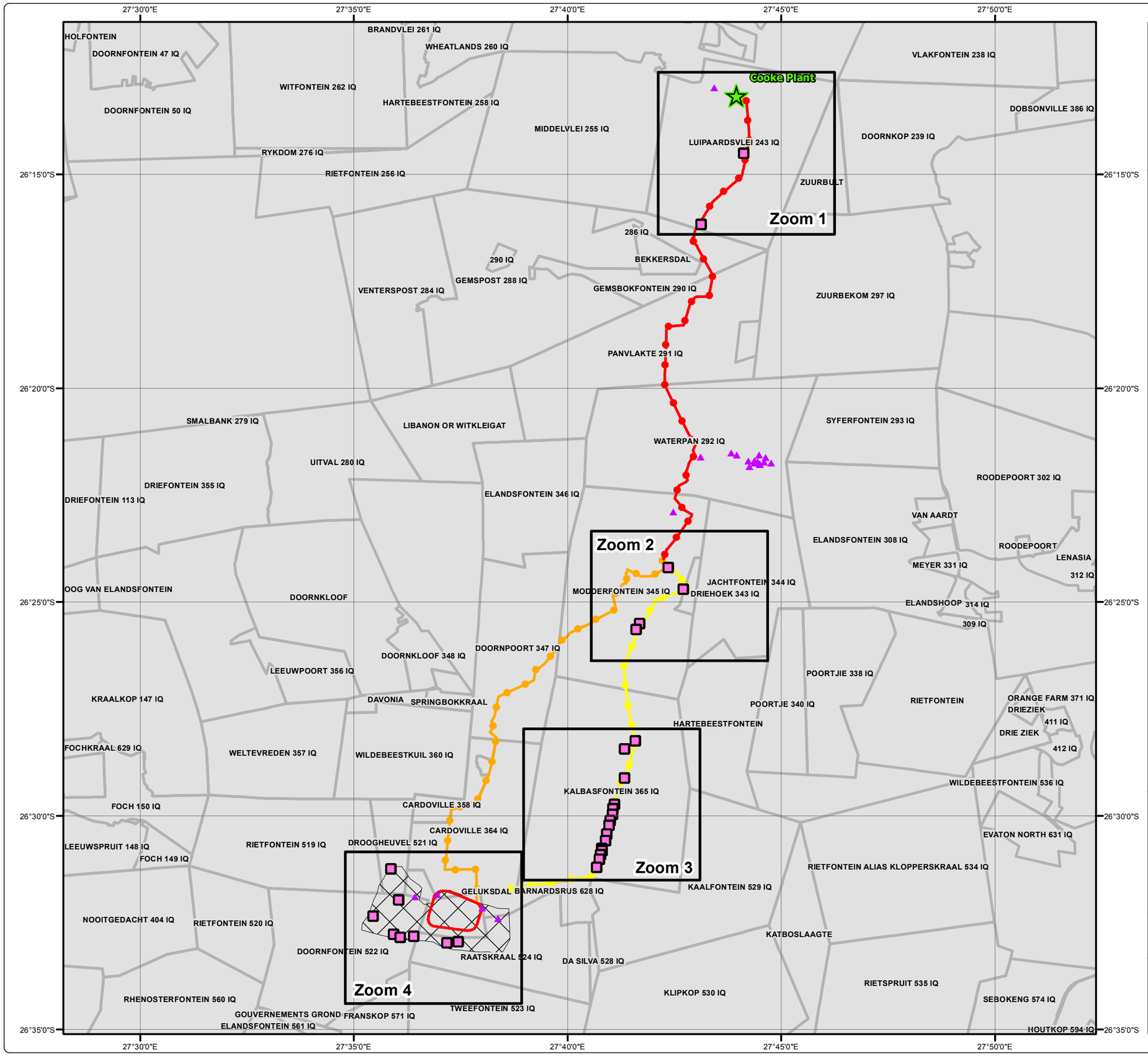
Kilometres

1:300 000

Plan 1

Gold One TSF & Pipeline

Land Tenure -Overview-



Legend

- 150 Mt TSF Footprint
- Study Area
- Built Structures
- Archaeological Sites
- Cooke Plant
- Proposed Pipeline Route
- Alternative Pipeline Route 1
- Alternative Pipeline Route 2
- Farm Boundary

GOLD ONE INTERNATIONAL LIMITED

DIGBY WELLS ENVIRONMENTAL
www.digbywells.com

Projection: Transverse Mercator	Ref #: amc.RAN1386.201205.100
Datum: Hartebeesthoek 1994	Revision Number: 1
Central Meridian: 27°E	Date: 25/05/2012

N

0 1 2 4 6 8

Kilometres

1:165 000

Plan 1

Gold One TSF & Pipeline

Heritage Sites

Legend

- 150 Mt TSF Footprint
- Study Area
- Cooke Plant
- Proposed Pipeline Route
- Alternative Pipeline Route 1
- Alternative Pipeline Route 2
- Heritage Tracks
- Farms

Heritage Sites

- 2 Graves
- Cemetery
- Cultural Place
- Historic Extended Settlement
- Historic Structure
- Late Iron Age Structure
- Mining Heritage Remains
- Built Structures

GOLD ONE INTERNATIONAL LIMITED

DIGBY WELLS ENVIRONMENTAL

www.digbywells.com

Projection: Transverse Mercator	Ref #: amc.RAN1386.201205.105
Datum: Hartebeesthoek 1994	Revision Number: 1
Central Meridian: 27°E	Date: 25/05/2012

N 0 1 2 4 6 8

Kilometres
1:146 000

Appendix C: Specialist CV’s

JUSTIN DU PIESANIE

Mr Justin du Piesanie

Archaeology Consultant

Social Sciences Department

Digby Wells Environmental

1 EDUCATION

University of the Witwatersrand

- BA Degree (2004)
- BA Honours Degree (2005) - Archaeology
    - Title of Dissertation - Seal Skeletal Distribution of Herder and Forager Sites at Kasteelberg, Western Cape Province of South Africa.
- Master of Science (MSc) Degree (2008) – Archaeology
    - Title of Dissertation – Understanding the Socio-Political Complexity of Leokwe Society during the Middle Iron Age in the Shashe-Limpopo Basin through a Landscape Approach

2 COURSES

- Introduction into ArcGIS. GIMS Ltd, Midrand. Received Certificate (2006)
- French Institute of South Africa (IFAS) GIS Workshop, University of the Witwatersrand. Received Certificate (2010)

3 CONFERENCES

- ASAPA, University of Botswana, Gabarone, Botswana (2005).
- Mupungubwe Symposium, University of Pretoria, Pretoria, South Africa (2006) - Presented paper titled, “Social Complexity in the Shashe Limpopo Basin: The Case of K2 and Leokwe”
- ASAPA, University of Cape Town, Cape Town, South Africa (2008).
- SAfA, University of Frankfurt, Frankfurt, Germany (2008) - Presented paper titled, “Social Complexity in the Shashe Limpopo Basin: Conclusions”

4 PUBLICATIONS

- Huffman, T.N. & du Piesanie, J.J. 2011. Khami and the Venda in the Mapungubwe Landscape. Journal of African Archaeology 9(2): 189-206

5 EMPLOYMENT

Present:	Archaeology Consultant at Digby Wells Environmental
2009 to 2011:	Archaeology Collections Manager at the University of the Witwatersrand.
2009 to 2011:	Freelance Archaeologist for Archaeology Resource Management (ARM), Matakoma Heritage Consultants, Wits Heritage Contracts Unit & Umlando Heritage Consultants.
2006 to 2007:	Tour Guide at Sterkfontein Caves World Heritage Site.

6 PROJECT EXPERIENCE

- Wits Fieldschool - Excavation at Meyersdal, Klipriviersberg Johannesburg (Late Iron Age Settlement).
- Wits Fieldschool - Phase 1 Survey of Prentjiesberg in Ugie / Maclear area, Eastern Cape.
- Wits Fieldschool – Excavation at Kudu Kopje, Mapungubwe National Park Limpopo Province.
- Wits Fieldschool – Excavation of Weipe 508 (2229 AB 508) on farm Weipe, Limpopo Province.
- Survey at Meyerdal, Klipriviersberg Johannesburg.
- Mapping of Rock Art Engravings at Klipbak 1 & 2, Kalahari.
- Survey at Sonop Mines, Windsorton Northern Cape (Vaal Archaeological Research Unit).
- Excavation of Kudu Kopje, Mapungubwe National Park Limpopo Province.
- Excavation of KK (2229 AD 110), VK (2229 AD 109), VK2 (2229 AD 108) & Weipe 508 (2229 AB 508) (Origins of Mapungubwe Project)
- Phase 1 Survey of farms Venetia, Hamilton, Den Staat and Little Muck, Limpopo Province (Origins of Mapungubwe Project)
- Excavation of Canteen Kopje Stone Age site, Barkley West, Northern Cape
- Excavation of Khami Period site AB32 (2229 AB 32), Den Staat Farm, Limpopo Province

Cultural Resource Management (CRM) Work

- Phase 2 Mitigation at Meyersdal, Klipriviersberg Johannesburg (ARM)
- Phase 1 Mitigation – Mapping of Late Iron Age Site in Pilansberg, Sun City (ARM)
- Phase 1 Mitigation – Survey of Witbank dam development (ARM)
- Phase 1 Mitigation – Survey of Glen Austin AH, Johannesburg (Matakoma)

- Phase 1 Mitigation – Survey of Modderfontein AH Holding 34, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 38, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 44, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 46, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 47, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 48, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 49, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 50, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 61, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 62, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 71, Johannesburg (Matakoma).
- Phase 1 Mitigation – Survey of Modderfontein AH Holding 72, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Modderfontein 35IR Portion 40, Johannesburg (Matakoma)
- Phase 1 Mitigation – Survey of Rhino Mines, Thabazimbi Limpopo Province (ARM)
- Phase 1 Mitigation – Survey of Moddergat 389KQ, Schilpadnest 385KQ, Swartkop 369KQ, Cronimet Project, Thabazimbi Limpopo Province (Matakoma)
- Desktop Study – Desktop study for the Eskom Thohoyandou SEA Project, Limpopo Province (Matakoma)
- Phase 2 Mitigation – Excavation of Iron Age site on Wenzelrust, Shoshanguve Gauteng (Heritage Contracts Unit)
- Phase 1 Mitigation – Mapping of Late Stone Age shelter, Parys, Free State
- Phase 1 Mitigation – Survey of Vaalkrans Battlefield for the Transnet NMPP Line (Umlando)
- Phase 1 Mitigation – Survey of Portion 222 of Mindale Ext 7 Witpoortjie 254 IQ & Portion 14 of Nooitgedacht 534 IQ, Johannesburg (ARM)
- Phase 2 Mitigation – Excavation of Site 19 for the Anglo Platinum Mines Der Brochen & Booysendal, Steelpoort, Mpumalanga (Heritage Contracts Unit)
- Phase 1 Mitigation – Mapping of sites 23, 26, 27, 28a & b for the Anglo Platinum Mines Der Brochen & Booysendal, Steelpoort, Mpumalanga (Heritage Contracts Unit)
- Desktop Study - Desktop study for the inclusion into the Thohoyandou Electricity Master Network for Eskom, Limpopo Province (Strategic Environmental Focus)
- Phase 1 Mitigation – Mapping of historical sites as part of the mitigation for the expansion of the Bathlako Mine's impact area (Heritage Contracts Unit).
- Phase 2 Mitigation – Grave Relocation Project (GRP) for the Kibali Gold Project, Democratic Republic of Congo (Digby Wells)
- Phase 1 Mitigation – Survey for the proposed Kibali Hydro Power Stations, Democratic Republic of Congo (Digby Wells)

- Phase 1 Mitigation – Survey of the farm Vygenhoek for Sylvania Resources Everest North Mining Project, Steelpoort, Mpumalanga (Digby Wells)
- Phase 1 Mitigation – Burial Grounds and Graves Survey (BGGS) for Platreef Resources, Mokopane, Limpopo Province (Digby Wells)

7 PROFESSIONAL AFFILIATIONS

Association of Southern African Professional Archaeologists (ASAPA): Professional & CRM Member

Society for Africanist Archaeologists (SAfA) Member

JOHAN NEL

Mr. Johan Nel

Archaeologist

Unit Manager: Cultural Resources Management

Social Sciences Department

Digby Wells Environmental

1 EDUCATION

- 2001 BA Anthropology & Archaeology, University of Pretoria
- 2002 BA Honours Archaeology, University of Pretoria (UP) (2002)
- Current MA Archaeology

2 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.

3 EXPERIENCE

PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENTS:

- Above Ground Storage Tanks survey, SASOL Oil (Pty) Ltd, Free State Province, South Africa
- Access road establishment , AGES-SA, Tzaneen, South Africa
- Boikarabelo Railway Link, Resgen South Africa, Steenbokpan, South Africa
- Conversion of prospecting rights to mining rights, Georock Environmental, Musina, South Africa
- Galaxy Gold Agnes Mine, Barberton, South Africa
- HCI Khusela Palesa Extension, Bronkhorstspruit, South Africa
- Kennedy's Vale township establishment, AGES-SA, Steelpoort, South Africa
- Koidu Diamond Mine, Koidu Holdings, Koidu, Sierra Leone
- Lonmin Platinum Mine water pipeline survey, AGES-SA, Lebowakgomo, South Africa
- Mining right application, DERA Environmental, Hekpoort, South Africa
- Mogalakwena water pipeline survey, AGES-SA, Limpopo Province, South Africa
- Nzoro Hydropower Station, Environmental and Social Impact Assessment, DRC
- Randgold Kibali Gold Project, Environmental and Social Impact Assessment, Kibali, Democratic Republic of the Congo
- Randwater Vlakfontein-Mamelodi water pipeline survey, Archaeology Africa cc, Gauteng, South Africa
- Residential and commercial development, GO Enviroscience, Schoemanskloof, South Africa
- Temo Coal, Limpopo, South Africa
- Transnet Freight Line survey, Eastern Cape and Northern Cape, ERM, South Africa
- Van Reenen Eco-Agri Development Project, GO Enviroscience, South Africa
- Platreef Platinum Mine, Ivanhoe Nickel & Platinum, Mokopane, South Africa

MITIGATION PROJECTS:

- Mitigation of Iron Age archaeological sites: Kibali Gold Project, DRC
- Mitigation of Iron Age metalworking site: Koidu Diamond Mine, Sierra Leone
- Mitigation of Iron Age sites: Boikarabelo Coal Mine, South Africa
- Exploratory test excavations of alleged mass burial site: Rustenburg, Bigen Africa Consulting Engineers, South Africa
- Mitigation of Old Johannesburg Fort: Johannesburg Development Agency (JDA), South

Africa

- Site monitoring and watching brief: Department of Foreign Affairs Head Office, Imbumba-Aganang Design & Construction Joint Venture, South Africa

GRAVE RELOCATION

- Du Preezhoek-Gautrain Construction, Bombela JV, Pretoria, South Africa
- Elawini Lifestyle Estate social consultation, PGS (Pty) Ltd, Nelspruit, South Africa;
- Motaganeng social consultation, PGS (Pty) Ltd Burgersfort, South Africa
- Randgold Kibali Mine, Relocation Action Plan, Kibali, DRC
- Repatriation of Mapungubwe National Park and World Heritage Site, DEAT, South Africa
- Smoky Hills Platinum Mine social consultation, PGS (Pty) Ltd Maandagshoek South Africa
- Southstock Colliery, Doves Funerals, Witbank, South Africa
- Tygervallei. D Georgiades East Farm (Pty) Ltd, Pretoria, South Africa
- Willowbrook Ext. 22, Ruimsig Manor cc, Ruimsig, South Africa
- Zondagskraal social consultation, PGS (Pty) Ltd,Ogies, South Africa
- Zonkezizwe Gautrain, PGS, (Pty) Ltd, Midrand, South Africa

OTHER HERITAGE ASSESSMENTS AND REVIEWS:

- Heritage Scoping Report on historical landscape and buildings in Port Elizabeth: ERM South Africa
- Heritage Statement and Cultural Resources Pre-assessment scoping report on Platreef Platinum Mine, Mokopane: Platreef Ltd
- Heritage Statement and Scoping Report on five proposed Photo Voltaic Solar Power farms, Northern Cape and Western Cape: Orlight SA
- Land claim research Badenhorst family vs Makokwe family regarding Makokskraal, Van Staden, Vorster & Nysschen Attorneys, Ventersdorp South Africa
- Research report on Cultural Symbols, Ministry for Intelligence Services, Pretoria, South Africa
- Research report on the location of the remains of kings Mampuru I and Nyabela, National Department of Arts and Culture, Pretoria, South Africa
- Review of Archaeological Assessment: Resources Generation, Coal Mine Project in the Waterberg area, Limpopo Province
- Review of CRM study and compilation of Impact Assessment report, Zod Gold Mine, Armenia

ACADEMIC FIELDWORK

Five seasons hosted: survey, mapping and excavation historic / Late Farmer Community sites on farms Bivack 14 MR and Eerstekrans 16 MR for personal MA research, Department of Anthropology and Archaeology, UP.

Ten projects / seasons attended as Teaching Assistant / Member of Staff

Eight projects / field seasons attended on invitation as undergraduate and graduate student

4 PROFESSIONAL AFFILIATIONS

- Association of Southern African Professional Archaeologists (ASAPA): Professional Member
- ASAPA Cultural Resources Management (CRM) section: Accredited member
- International Association of Impact Assessors (South Africa)
- Society for Africanist Archaeologists (SAFA)

5 PUBLICATIONS

Nel, J & Tiley, S. 2004. The Archaeology of Mapungubwe: a World Heritage Site in the Central Limpopo Valley, Republic of South Africa. Archaeology World Report, (1) United Kingdom p.14-22.

Nel, J. 2001. 2001. Cycles of Initiation in Traditional South African Cultures. South African Encyclopaedia (MWEB).

Nel, J. 2001. Social Consultation: Networking Human Remains and a Social Consultation Case Study. Research poster presentations at the Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists: National Museum, Cape Town.

Nel, J. 2002. Collections policy for the WG de Haas Anatomy museum and associated Collections. Unpublished. Department of Anatomy, School of Medicine: University of Pretoria.

Nel, J. 2004. Research and design of exhibition for Eloff Belting and Equipment CC for the Institute of Quarrying 35th Conference and Exhibition on 24 – 27 March 2004.

Nel, J. 2004. Ritual and Symbolism in Archaeology, Does it exist? Research paper presented at the Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists: Kimberley

Nel, J. 2007. The Railway Code: Gautrain, NZASM and Heritage. Public lecture for the South African Archaeological Society, Transvaal Branch: Roedean School, Parktown.

Nel, J. 2009. Un-archaeologically speaking: the use, abuse and misuse of archaeology in popular culture. The Digging Stick. April 2009. 26(1): 11-13: Johannesburg: The South African Archaeological Society.

Nel, J. 2011. ‘Gods, Graves and Scholars’ returning Mapungubwe human remains to their resting place.’ In: Mapungubwe Remembered. University of Pretoria commemorative publication: Johannesburg: Chris van Rensburg Publishers.

Appendix D: Significance and Impact Rating Systems

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 defendable 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.

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 defendable 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:

Significance = (Consequence x Probability) + Site significance

Where *Consequence = Severity + Spatial Scale + Duration*

And *Probability = 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 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** . In accordance with Regulation 51 of the MPRDA and Section 38 of the NHRA, management actions will be assigned for all identified impacts.

Table 1-1: Significance threshold limits

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

Table 1-2: 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.	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures of natural process will reduce the impact after implementation.	Certain/ Definite. 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.	National Will affect the entire country	Permanent: Mitigation Mitigation measures of natural process will reduce the impact.	Almost certain/Highly probable 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	Province/ Region Will affect the entire province or region	Project Life The impact will cease after the operational life span of the project.	Likely The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a	On-going serious social issues. Significant damage to structures / items of cultural	Municipal Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	**Social, cultural and heritage**			
	year	significance			
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.	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely 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.	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable 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, (e.g. ad hoc spills within plant area). Will have no impact on the environment.	Low-level repairable damage to commonplace structures.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None 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 l lowest and 7 highest. Descriptions of these aspects and parameters are provided in Table 1-1.

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 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:

Site significance = (sum of Context + Integrity + Extent + Uniqueness) ÷ 4

Where *Context = (sum of aspects a to i) ÷ 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 ÷ 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 ÷ 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 1-1: 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