

PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

FOR

MBET PIPELINE

LEDJADJA COAL (PTY) LTD

APRIL 2012

Digby Wells & Associates (Pty) Ltd. Co. Reg. No. 1999/05985/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa Tel: +27 11 789 9495, Fax: +27 11 789 9498, <u>info@digbywells.com</u>, <u>www.digbywells.com</u>

Directors: AR Wilke, LF Koeslag, PD Tanner (British)*, AJ Reynolds (Chairman) (British)*, J Leaver*, GE Trusler (C.E.O) *Non-Executive

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Name	Responsibility	Signature	Date	
Natasha Higgitt Archaeologist	Report compiler and specialist	1-1900	April 2012	
Johan Nel Archaeologist	1 st Review	Al.	April 2012	

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EXECUTIVE SUMMARY

This Phase 1 Archaeological Impact Assessment (AIA) is part of an Environmental Impact Assessment (EIA) undertaken by Digby Wells Environmental (Digby Wells) on behalf of Ledjadja Coal (Pty) Ltd (Ledjadja Coal). The AIA was undertaken as stipulated in the National Heritage Resources Act (no 25 of 1999) (NHRA) and the South African Heritage Resources Agency (SAHRA) Minimum Standards (2006). The AIA consisted of a desktop study, including background literature reviews, archival and database surveys, aerial and historical map surveys and a review of relevant impact assessment reports, as well as site survey.

The study area falls within the Lephalale Local Municipality along the proposed Boikarabelo Railway Line, the Steenbokpan road and the Eskom power line servitude. The approximate area that will be affected due to the construction of the pipeline is 58 km. The section of the proposed pipeline route that runs parallel to the proposed Boikarabelo Railway line was not surveyed, as it has previously been surveyed (Nel 2011).

During the March 2012 site survey, four archaeological resources were identified. These include one Stone Age find spot and three historical structures. The structures include a cement foundation, a mud brick house and pre-1960's farmstead that is currently occupied. However all of the historical structures are located outside of the road servitude and therefore outside of the proposed pipeline route. The Stone Age find spot is located within the road servitude, on a disturbed surface and therefore within the proposed pipeline route. During the railway survey in May 2011, 11 archaeological resources were identified along the rail route that coincides with the pipeline route. These include historical structures, Stone Age findspots and burial sites. Previous recommendations were given and will not be discussed further (Nel 2011).

No archaeological mitigation measures are recommended for the identified sites along the MBET Pipeline route, however if additional artefacts are uncovered during the construction phase, an archaeologist must be called to assess the significance of the site. Additionally, site monitoring will be necessary if any earthworks take place in or near the historical sites.

Site ID	Site description	Site Significance	Mitigation
2327CB/001 -23.685174/ 27.336828	Pre-1960's farmstead situated adjacent to the road servitude and pipeline route	2	No archaeological mitigation necessary. However, site monitoring will be necessary if any earthworks take place in or near the site as there are associated burials near the house.
2327CB/002 -23.70872/ 27.451202	Find spot: Isolated Middle Stone Age core and flake in a disturbed context within the road servitude	1	No archaeological mitigation necessary. However, if additional artefacts are uncovered during the construction phase, an archaeologist must



			be called to assess the significance of the site.
2327CB/003 -23.709185/ 27.49872	Cement foundation adjacent to the road servitude and pipeline route	1	No archaeological mitigation necessary. However, site monitoring will be necessary if any earthworks take place in or near the site as there may be burials associated with the foundation.
2327CB/004 -23.708796/ 27.500305	Dilapidated mud brick structure adjacent to the road servitude and pipeline route	1	No mitigation necessary. However, site monitoring will be necessary if any earthworks take place in or near the site as there may be burials associated with the foundation.



GLOSSARY

AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resources Management
	Early Iron Age- 300-900 AD. Farmers with domestic stock and agriculture settle at
EIA	permanent points and produce pottery, as well as trade with other groups. Metal
LIA	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
ESA	cleavers present within deposit.
IFC	International Finance Co-operation
КҮА	Thousand years ago
	Later Iron Age- 1300-1840 AD. Interaction with colonialists and the movement of
LIA	groups with the landscapes.
	Later Stone Age- ±20 000 BP to present. Artefacts include microliths such as
LSA	scrapers, flakes and bladelets. Art in the form of paintings and engravings occur,
	and domesticated stock and early pottery are present.
	Middle Iron Age- 900-1300 AD. Kingdom or capitals emerge with communities
MIA	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.
ΝΙΟΛ	Middle Stone Age- ±250 000 -20 000 BP. Stone tools such as blades and points, and
IVISA	other artefacts include shell beads, pendants and the use of ochre.
SAHRA	South Africa Heritage Resources Agency



1 INTRODUCTION

1.1 Project Overview

Digby Wells Environmental (Digby Wells) has been appointed by Ledjadja Coal (Pty) Ltd (Ledjadja Coal) to conduct a Phase 1 Archaeological Impact Assessment (AIA) for the proposed MBET Pipeline.

1.2 Project Description

Ledjadja Coal is in the process of developing a new coal mining complex in the Lephalale area, bordering the Limpopo River. Ledjadja Coal needs to secure 16MI/d of treated municipal effluent from the Lephalale Local Municipality (LLM). A pipeline with an approximate length of 58 km long is proposed to be constructed to transfer the treated and chlorinated effluent from the Marapong Municipal Wastewater Treatment Works to the proposed mine. One pump station associated with the pipeline is proposed to be constructed at the Marapong Municipal Wastewater Treatment Works. Various route alternatives have been identified. The proposed pipeline will follow existing road servitudes and a proposed Railway line.

1.3 Contact details of the client

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

Company:	Ledjadja Coal (Pty) Ltd
Contact person:	Hennie van den Aardweg
Tel no:	012 345 1057/ 082 957 7130
E-mail address:	haardweg@resgen.com.au
Postal address:	PO Box 5384, Rietvalleirand, 0174

Table 1-1: Contact details of the client

1.4 Contact details of the consultant

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

Table 1-2: Contact details of the consultant

Company:	Digby Wells Environmental
Contact person:	Louise Nicolai
Tel no:	+27 11 789 9495
Fax no:	+27 11 789 9498
E-mail address:	louise@digbywells.com
Postal address:	Private BagX10046, Randburg, 2125, South Africa



2 TERMS OF REFERENCE

Ledjadja Coal is in the process of developing a new mine and needs to secure 16MI/d of treated municipal effluent from the Lephalale Local Municipality via the pipeline. In support of the proposed pipeline the following are required:

- Environmental Impact Assessment; and
- Specialists studies in support of the EIA.

The project is proposed to take place over two phases:

- Phase 1: Scoping Phase; and
- Phase 2: EIA phase.

The Archaeological Impact Assessment fulfils requirements for the Heritage component support of the EIA as required by the National Heritage Resources Act, Act No. 25 of 1999.

2.1 Legal Requirements

The following legislation is governing the EIA and subsequent Archaeological Impact Assessment:

- National Heritage Resources Act, No. 25 of 1999 (NHRA), specifically section 38;
- National Environmental Management Act, Act No. 107 of 1998 (NEMA); and
- National Water Act, 36 of 1998 (NWA).

National guidelines and standards

- SAHRA Minimum Standards;
- Guideline for involving Heritage Specialists in the EIA Process (Heritage Western Cape);
- Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics.

International Best Practice and standards:

- IFC Standards, Performance Standard 8, 2012
- Equator Principles, 2006; and
- ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, 2010.

3 KNOWLEDGE GAPS

The following knowledge gaps were identified in the Archaeological Impact Assessment:

- Limited academic research and published work have been conducted within the immediate area with the result that site significance is difficult to assess; and
- Limitations included the lack of access to certain sections of the pipeline route such as those within the Eskom Power Line servitude. Alternative routes were not surveyed as access to the affected properties was barred.



Although this report has been written as comprehensively and inclusive as possible, it should be noted that some archaeological resources may be located on a sub-surface level. In addition, a large area of the project area surveyed has been disturbed due to the construction of the road, fences, telephone poles, farm front gates, road signs and related development. This may have destroyed any surface features that could be used to identify archaeological resources.

4 SCOPE OF WORK

4.1 Aim and objectives

Digby Wells aimed to assist Ledjadja Coal in identifying, documenting and managing archaeological and heritage resources found in the proposed project area in a responsible manner, in order to protect, preserve and develop these resources within relevant legislative frameworks. This study aims to:

- Identify, record and document potential archaeological resources of significance within the proposed development area;
- Evaluate whether the proposed development will have any negative impact on the archaeological resources during construction, operation and decommissioning phases;
- Recommend mitigation and management measures to avoid or alleviate any negative impacts on areas of archaeological importance; and
- Promote the overall conservation and protection of natural and cultural heritage resources.

The overall objective of this study was to conserve, mitigate and manage archaeological sites and artefacts according to the recommendations and criteria of the relevant heritage authorities and legislation.

4.2 Methodology

The methodology that was employed in the Archaeological Impact Assessment is discussed briefly.

Desktop study:

- Literature review of available published research;
- Review of available impact assessment reports;
- Review of applicable national legislation and international best practice standards;

Site mapping:

Desktop survey of available cartographic and satellite imagery survey;

Assessment:

- Determine pilot significance rankings for different archaeological resource categories that may be identified;
- Predict direct, indirect and cumulative impacts on potential archaeological resource categories based on current design information; and



 Assess impacts in relation to potential archaeological resources based on duration, extent, scale and severity.

Physical survey:

- A pedestrian survey that consisted of a vehicular survey, combined with spot checks every 5 km along the proposed route of the pipeline;
- A previous impact assessment had surveyed the section of the pipeline that will be running parallel to the railway. This section was not surveyed (See Nel, J. 2011)
- Resources were recorded through GPS and GIS technology with high resolution digital photography and geographic co-ordinates were recorded with a Garmin Etrex CV, average accuracy of ±5 m, using a WGS84 Datum;
- Photographic documentation was made using a Canon SX30IS camera;
- Site naming was done in accordance with established principles in southern African archaeology. Each recorded site was allocated an arbitrary field label usually derived from the GPS numbering sequence, e.g. 001. This label was given a site name wherein the 1: 50 000 map number and site number are reflected E.g. 2327CB (map sheet number)/001 (Site number).
- No artefacts or samples were collected;
- All resources were plotted on a 1: 50 000 topographical maps using a GIS programme.

5 EXPERTISE OF THE SPECIALIST

CV's of specialists and a declaration of independence is attached in Appendix B.

6 STUDY AREA

The study area falls within the Lephalale Local Municipality along a proposed Railway Line, the Steenbokpan road and the Eskom power line servitude. The approximate area that will be affected due to the construction of the pipeline is 58 km.







7 RESULTS

7.1 Natural Environment

The project area lies within the Western Sandy Bushveld vegetation region within the Savanna Biome. This is characterised by the occurrence of tall open woodland to low woodland, with trees such as the *Acacia erubescens* on flat areas, *Combretum apiculatum* on shallow soils and *Terminalia sericea* on deep soils. Sandstone, mudstone, sandstone, conglomerate, siltstone and shale of the Mokolian Waterberg group are found in the north of this region. The rainfall occurs in summer with very dry winters. The average rainfall is 450 mm in the north. The temperature fluctuates between 36°C in summer and -3.7°C in winter (Mucina & Rutherford 2006).

7.2 Cultural landscape

The cultural environment includes sites within the immediate area, as well as sites in the surrounding areas, from academic sources and from impact assessments. As very little academic research has been conducted and published within the surrounding and immediate areas, interpretations of the sites that have been recorded by means of Impact Assessments is lacking.

7.2.1 Literature review

The literature review was conducted by consulting various academic journals and academic books and textbooks.

7.2.1.1 Stone Age

The Stone Age of South Africa can be divided in to three temporal periods:

- Early Stone Age (2.5 MYA- 200 000 KYA)
- Middle Stone Age (200 000 KYA- 20 000 KYA)
- Later Stone Age (20 000 KYA- 2000 KYA)

The Stone Age surrounding the project area has not been extensively researched. The best example of a Stone Age site is Olieboomspoort Shelter (OBP), approximately 60 km southeast of the project area. From this site, the ESA occupation is short, while the MSA occupation is extensive. This follows a long break in occupation until the early Holocene about 800 years ago. Dates for the MSA occupation layers at Olieboomspoort have been found to be 20 303(20 187)20 065 BC. Felsite, quartz and other cryptocrystalline silicas were exploited as raw material throughout the MSA and LSA sequences identified in the Waterberg. ESA bifacial lithics were uncovered at OBP, including a handaxe (Ryst 2006).

The Later Stone Age of the area is characterised as part of the Wilton Industry. This industry consists of small end scrapers and segments (Sampson 1974). The LSA of OBP has a Wilton character (Ryst 2007). With the influx of herders and famers, the hunter-gatherer way of life had to adapt to a shared landscape. This resulted in a change in technology and forcing the hunter-gatherers to safe havens such as shelter (Ryst 2006).

7.2.1.2 Iron Age

Around 1500 CE two different facies derived from Icon become visible in the archaeological record. The Letsibogo facies has been recorded in the Motloutswe drainage in Botswana and in the Blouberg in the Limpopo Province. The Madikwe facies has been recorded from the Makapansgat area west into Botswana. Stylistically these facies differ in terms of the

decoration technique employed. Letsibogo emphasises punctates as opposed to stabs and fingernail impressions in Madikwe. Both these facies predate stonewalling ascribed to Sotho-Tswana speakers (Huffman 2007). These two facies form part of the Moloko Sequence, and are intermediate phases between the parent facies, Icon, and the later historical ceramic types, such as Buispoort, which later became associated with the western Sotho Tswana identity (Huffman 2007).

7.2.2 Database and archival results

The following databases were surveyed for information on the proposed pipeline route:

- Chief Surveyor General
- RSA (All Archives Repositories and National Registers of non-public records)
- South African Genealogical Database
- University of the Witwatersrand Archaeological Site Database

The Chief Surveyor General surveyed resulted in a number of results. Data concerning farms adjacent to the proposed project area were gathered (the railway section not included in this survey). Steenbokpan 295LQ was first surveyed in 1909 and was originally named Steenbokpan 622, and shows a possible old road on the plan. Kringgatspruit 318LQ was first surveyed in 1909 and was originally named Kringgatspruit 706. Indications of a possible old road are indicated on the plan. Most of the farms in the area were surveyed in 1908/1909.

The RSA archives survey resulted in a various documents including leases, Crown grants and railway servitudes; dating from 1913. This date is important in South Africa's history. In the Restitution of Land Rights Act of 1994, the 19 June 1913 is the date that is considered for land claims. However these documents could not be examined at the archives due to time constraints.

The University of the Witwatersrand Archaeological Site Database did not yield any results.

The survey of the South African Genealogical Database did not yield any results.

7.2.3 Cartographic and aerial imagery results

The 2327DA Lephalale and 2327CB Steenbokpan 1: 50 000 maps was examined for archaeological resources. No graves or ruins could be identified from these maps. The topography of the area is uniform with very gradual gradients.

A review of the aerial imagery of the proposed route revealed that the site is greatly disturbed due to construction of the road and power lines.

7.2.4 Baseline results

The following reports were examined for occurrences of heritage sites within and around the project area:

- Fourie, W. 2009. Archaeological Impact Assessment: Koert Louw Zyn Pan Project for Resources Generation on the farm Koert Louw Zy Pan 234 LQ and portions of the farm Klaarwater 231 LQ, District Lephalale, Limpopo. Unpublished report for Digby Wells Environmental. Professional Grave Solutions (Pty) Ltd: Pretoria.
- Fourie, W. 2010. Archaeological Impact Assessment: Res Gen SA Boikarabelo Coal Mine Project on portions of the farms Orsono 700 LQ, Zeekoevely 421 LQ, Vischpan 274 LQ, Kruishout 271 LQ, Kalkpan 243 LQ, Witkopje 237 LQ and Diepspruit 386 LQ,

District Lephalale, Limpopo. Unpublished report for Digby Wells Environmental. Professional Grave Solutions (Pty) Ltd: Pretoria.

- Huffman, T and Van der Walt, J. 2011. Final Mafuta Heritage Report: A field study prepared for Environmental Resources Management, Sasol Technology, SRK Consulting and Sustainable Environmental Solutions.
- Nel, J. 2011. Addendum to Phase 1 Archaeological Impact Assessment for the Boikarabelo Coal Mine (Proposed Railway Link from the Farm Kruishout to the Farm Buffelsjagt) Lephalale Local Municipality, Waterberg District, Limpopo Province. Unpublished report for Digby Wells Environmental: Randburg.
- Nel, J. 2012. Phase 2 Archaeological Impact Assessment Mitigation for Boikarabelo Coal Mine. Unpublished report for Digby Wells Environmental: Randburg.

The reviewed reports identified a total of 204 archaeological resources. These included Iron Age sites comprising of surface pottery scatters (undecorated and decorated) (Fourie 2009; Fourie 2010; Huffman; van der Walt 2011; Nel 2011), slag, grain bins, middens and cattle kraals. Stone Age lithics attributed to the Middle Stone Age were recorded around pans and historical structures and burials were recorded within the surrounding areas.

Nel (2012) conducted a Phase 2 Mitigation of sites recorded by Fourie (2010). Three sites were excavated and the remaining sites were mapped and samples were collected. The mitigation project resulted in the collection and identification of Letsibogo ceramics and Stone Age lithics from the Early, Middle and possible Late Stone Age.

7.2.5 Survey results

The survey was conducted via vehicular and pedestrian survey. Spot checks of the road servitude were conducted every 2.5 km. The area for the proposed pipeline route was characterised by grass vegetation which hampered visibility, disturbed areas due to road construction, fence construction, telephone poles, road signs and farm access gates (See Figure 7-1 to Figure 7-4).

Figure 7-1: Start of road survey. The pipeline leaves the rail servitude at the crossing and runs parallel to the road from this point.

Figure 7-2: Example of vegetation along the road servitude and telephone poles present along the proposed pipeline route.

Figure 7-3: Example of disturbances along the road servitude that affect archaeological site integrity

Figure 7-4: Areas under the power lines that could not be accessed to survey

7.2.5.1 2327CB/001 (23 41.110E/ 27 20.210S)

A farmstead, potentially dating to the 1960's was identified adjacent to the farm servitude on the farm Zandbult (Figure 7-5). This farmstead is not located within the project area; however it falls close enough to the proposed pipeline route to warrant attention. GPS coordinates and photographs were taken from the road as access to the property in question was not permitted. In a previous survey conducted for a proposed railway route, six burials were recorded adjacent to the house. These burials are adjacent to the proposed pipeline route and may be affected. For mitigation recommendations for the burials, please see Nel (2011).

Figure 7-5: Farmstead potentially dating to the pre-1960's

7.2.5.2 2327CB/002 (23 42.523E/ 27 27.072S)

A single Middle Stone Age core and flake were identified within the road servitude in a disturbed context (Figure 7-6 and Figure 7-7). This is defined as a find spot and is in an extremely disturbed state. The artefacts may have been brought to the road servitude due to the grading process or due to wash processes.

Figure 7-6: Middle Stone Age core identified at 2327CB/002

Figure 7-7: Middle Stone Age flake 2327CB/002

7.2.5.3 2327CB/003 (23 42.551E/ 27 29.923S)

Foundation remains of an unidentified structure were identified along the route on the farm Hieromtrent (Figure 7-8). This foundation was identified adjacent to the road servitude and does not fall within the project area; however it falls close enough to the proposed pipeline route to warrant attention. Historical burials may be associated with structures such as these

and must be monitored during the construction process. GPS co-ordinates and photographs were taken from the road as access to the property in question was not permitted.

Figure 7-8: Cement foundation identified adjacent to the road servitude

7.2.5.4 2327CB/004 (23 42.528E/ 27 30.018S)

A dilapidated mud brick house was identified adjacent to the road servitude; however it is situated sufficiently near the proposed pipeline route to warrant attention (Figure 7-9 and Figure 7-10). Historical burials may be associated with structures such as these and must be monitored during the construction process. GPS co-ordinates and photographs were taken from the road as access to the property in question was not permitted.

Figure 7-9: Mud brick structure identified adjacent to the road servitude.

Figure 7-10: Close up of the mud brick structure. Note the mud plaster.

8 **FINDINGS**

Heritage resources that were identified along the MBET Pipeline route included Middle Stone Age find spots and historical structures. Middle Stone Age sites have been previously identified within the surrounding areas, mostly around pans, so the Stone Age find spot is

not unique and is extremely disturbed. Historical sites, such as dwellings and structures hold the potential for burials and cemeteries and with reference to the information gathered during the archival and database survey, there is a possibility of historical structures dating back at least to 1909.

The foundations of a ruined building and dilapidated mud brick structure are difficult to date visually. Additionally, the identified foundations and structure are located outside of the road servitude on private property, so no close-up inspection could be made. As such, the foundations should not be impacted upon as they do not fall within the proposed pipeline route.

The farmstead identified at 2327CB/001 is currently occupied and has associated burials which must be fenced off and preserved *in situ*.

All archaeological resources identified outside of the road servitude on adjacent properties will not be directly impacted upon as they do not fall within the proposed project area.

9 SUMMARY TABLE

Identified heritage resources is summarised below in Table 9-1

Table 9-1: Sites identified along the proposed MBET Pipeline route

SIGNIFICANCE ASSESSMENT	р	~	~	~
DESCRIPTION	Farmstead potentially dating to the pre-1960's situated adjacent to the road servitude and pipeline route	Isolated Middle Stone Age core and flake in a disturbed context within the road servitude	Cement foundation adjacent to the road servitude and pipeline route	Dilapidated mud brick structure adjacent to the road servitude and pipeline route
PAST ENVIRONMENTS	A/A	A/A	A/A	AIA
STRATIFICATION	N/N	N/A	N/A	N/A
EXTENT	N/A	N/A	N/A	N/A
CULTURAL AFFINITIES	Historic to current occupation	Middle Stone Age	Historic occupation or use	Historic occupation
CONTEXT	Primary	Secondary	Primary	Primary
CATEGORY	Historic	Middle Stone Age	Historic	Historic
ТҮРЕ	Building	Lithics	Foundation	Building
z	27.336828	27.451202	27.49872	27.500305
GPS LOCATIO	-23.685174	-23.70872	-23.709185	-23.708796
SITE ID	2327CB/001	2327CB/002	2327CB/003	2327CB/004

10 SITE SIGNIFICANCE ASSESSMENT

The heritage resources site significance table is summarised below in **Error! Reference** source not found.

						PA		IETER						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)
2327CB/001	2	1	2	1	2	1	2	1	1	1	2	1	2	2
2327CB002	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2327CB/003	1	1	1	1	1	1	1	1	1	1	2	1	1	1
2327CB/004	1	1	1	1	1	1	1	1	1	1	2	1	1	1

Table 10-1: Site significance assessment in terms of Section 3 of the NHRA

11 IMPACT ASSESSMENT

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

The impact assessment for the heritage resource identified in the physical survey are summarised in **Error! Reference source not found.**

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Table 11-1: Impact Assessment of potential risks and threats to heritage resources identified in the MBET Pipeline route

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((() sonsoifingis stic					2				-				~				-
Probability (7)					1				-1				Ч				1
əɔuənbəsuoJ					1				-				Ч				1
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(T) noiteru					5				7				5				5
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11.1 Construction and operational phase

As described in **Error! Reference source not found.**, one heritage resource (2327CB/002) will be directly impacted on by the construction of the pipeline. This heritage resource comprised of an isolated Middle Stone Age core and flake identified on the disturbed surface of the road servitude. This heritage resource is presently in highly disturbed tertiary context and the severity of the impact will be negligible. 2327CB/H001 is a farmstead and is currently occupied and in use. This heritage resource may be impacted upon by the influx of workers, which may vandalise property. The burials that were previously recorded (Nel 2011) are close to the pipeline route and will need to be monitored during the construction phase.

11.2 Decommissioning and Closure phase

During the decommissioning and closure phase of the project, no additional surface disturbance activities or impacts are expected. The majority of heritage resources of archaeological and heritage significance (cultural and natural) will have been recorded, assessed and mitigated or conserved in preceding phases. Conditional to the effective identification, documentation and mitigation or protection of these sites during the construction and operational phases of the project, the significance of impacts anticipated for archaeological and heritage resources during these phases are low. However, sites 2327CB/001 (farmstead); 2327CB/003 (foundation) and 2327CB/004 (mud brick house) will need to monitored to avoid accidental damage during rehabilitation, decommissioning and closure phases.

11.3 Cumulative Impacts

No cumulative impacts on Heritage Resources were identified in this study.

12 MITIGATION MEASURES

Mitigation measures for the identified heritage resources are summarised in **Error! Reference source not found.**

Management actions and recommended mitigation, which aims to mitigate and reduce the impact on sites, are expressed as follows;

- A- No further action necessary;
- B- Mapping of site and controlled sampling required;
- C- Preserve site or extensive data collection and mapping of the site; and
- D- Preserve site

 Table 12-1: Recommended mitigation of heritage resources identified along the

 Proposed MBET Pipeline route

Site number, development phase and activity	Recommended mitigation	Site significance	Impact significance	Impact significance (post- mitigation)
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2327CB/001	С	Site clearing and construction, access routes, servitude	А	2	42	3
2327CB002	С	Site clearing and construction, access routes, servitude	A	1	64	2
2327CB/003	С	Site clearing and construction, access routes, servitude	А	1	29	2
2327CB/004	С	Site clearing and construction, access routes, servitude	A	1	29	2

13 RECOMMENDATIONS

The following recommendations are made with regards to the archaeological resources identified:

- No archaeological mitigation measures are recommended for the archaeological resources identified along the pipeline route as they will not be directly impacted on by the pipeline or they are in an extremely disturbed context and the impact will therefore be negligible;
- Access should be restricted to 2327CB/001; 2327CB/003 and 2327CB/004 to minimise vandalism by the influx of workers.

14 CONCLUSION

In conclusion, no archaeological mitigation measures are recommended for the archaeological resources identified along the MBET Pipeline route, however if additional artefacts are uncovered during the construction phase, an archaeologist must be called to assess the significance of the site. Areas that could not be accessed to be surveyed, such as the areas below the power lines, should be monitored during the construction phase as sub-surface archaeological and heritage remains could be present.

15 REFERENCES

Databases consulted:

Chief Surveyor General

RSA (All Archives Repositories and National Registers of non-public records)

South African Genealogical Database

University of the Witwatersrand Archaeological Site Database

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Impact

Appendix A: Archaeological Assessment Critera and Ratings

Archaeological Impact Assessment Criteria and Ratings

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 in 1.1.3 below.

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

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

 Table 1 1: Significance threshold limits

Table 1 2: Impact assessment parameter ratings

	Seve	erity			
Rating	Environmental	Social, cultural and heritage	Spatial scale	Duration	Probability

	Seve	erity			
Rating	Environmental	Social, cultural and heritage	Spatial scale	Duration	Probability
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.	<u>National</u> Will affect the entire country	Permanent: <u>Mitigation</u> Mitigation measures of natural process will reduce the impact.	<u>Almost</u> <u>certain/Highly</u> <u>probable</u> It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items	Province/ Region Will affect the entire province or region	Project Life The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year	On-going serious social issues. Significant damage to structures / items of cultural significance	<u>Municipal</u> <u>Area</u> Will affect the whole municipal area	<u>Long term</u> 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short- term effects but not affecting ecosystem function. Rehabilitation requires intervention of	On-going social issues. Damage to items of cultural significance.	Local extending only as far as the development site area	Medium term 1-5 years	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the project, therefore

	Seve	erity			
Rating	Environmental	Social, cultural and heritage	Spatial scale	Duration	Probability
	external specialists and can be done in less than a month.				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	<u>Short term</u> 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, (eg 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	<u>Highly</u> <u>unlikely/None</u> Expected never to happen.

1.2 AIA and HIA methodology

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

• Known heritage resources; and

• The potential of the identified resource to provide additional or new information regarding past environments and history.

In this regard, SAHRA has published minimum standards that must be complied with when undertaking Heritage and Archaeological Impact Assessments. The specialist is also required to rate identified heritage resources according to these minimum standards, which are based on criteria described in the NHRA. Although the NHRA is specifically South African legislation, it is based on international standards such as the ICOMOS, 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 I lowest and 7 highest. Descriptions of these aspects and parameters are provided in Table 1 3.

Appropriate mitigation recommendations are made based on the Site significance rating and the potential impacts identified in the EIA impact rating. However, it must be noted that mitigation measures are based primarily on the significance of resources and not necessarily the potential environmental impacts on those resources. For instance, where environmental impacts rated 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 $(63 \div 9 = 7)$ and added to Integrity, Extent and Uniqueness.

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

RES1166

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

	i. Site of significance relating to history of slavery	Exceptionally important site, great significance on national and international slavery	Very important site, high significance on national and international slavery
	h. Association with life or work of a person, group or of importance in the history of the country	Exceptional high association	Very high association
	g. Association to community or cultural group for social, cultural or spiritual reasons	Exceptional high socio- cultural significance in terms of identity, custom, religion, ancestry, etc.	Very high socio-cultural significance in terms of identity, custom, religion, ancestry, etc.
ХТ	f. Degree of technical / creative skill at a particular period	Uncommon / unique skill for period	Exception degree of skill for period
ERMINING CONTE	e. Importance in aesthetic characteristics	Exceptional example, complete, unique	Exceptional example, mostly complete, rare
ASPECTS DET	d. Importance in demonstrating principle characteristics	Exceptional example, complete, unique	Exceptional example, mostly complete, rare
	c. Information potential	Extremely high information potential: national and international	Extremely high information potential: national
	b. Possession of uncommon, rare or endangered natural or cultural heritage aspects	Endemic / exclusive to very specific localities / other occurrences unknown	Endemic / exclusive to specific localities / other occurrence infrequent
	a. Importance to community or pattern in country's history	Extremely important to the country's community or to the country's history on a national level.	Extremely important to the country's community or to the country's history on a provincial level.
	Value	2	Q

RES1166

Important site, high significance on national slavery	Important site, areas may have significance on national slavery	Site has a high likelihood of being associated with slavery	Possible slavery site, but unlikely
High association	Above average association	Average association	Lesser association
High socio- cultural significance in terms of identity, custom, religion, ancestry, etc.	Above average socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Average socio-cultural significance in terms of identity, custom, religion, ancestry, etc.	Low socio- cultural significance in terms of identity, custom, religion, ancestry, etc.
High degree of skill for period	Above average degree of skill for period	Average degree of skill for period	Limited degree of skill for period
Exceptional example, incomplete, rare	Exceptional example, common	Good example, incomplete, common	Common example, incomplete
Exceptional example, incomplete, rare	Exceptional example, common	Good example, incomplete, common	Common example, incomplete
High information potential: national	High information potential	Average Information potential	Low information potential
Localised to only few specific localities	Rarely occurs at this locality	Occurs at this locality, but occurrence unusual	Occurs at this locality, but not widespread
Extremely important to the community or to the history on a regional level.	Very important to the community or to the history on a district level.	Important to the community or to the history on a municipal level.	Important to the community or to the history on a local level.
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RES1166

No significance
No association
No socio- cultural significance in terms of identity, custom, religion, ancestry, etc.
Common skill for period
Damaged, destroyed, altered to extent where example is useless
Damaged, destroyed, altered to extent where example is useless
No information potential
Occurs widespread
Little importance to the community or to the history on any level.
~

B. INTEGRITY	C. EXTENT	D. UNIQUENESS	SIGNIFICANCE RATING	DESCRIPTION	SAHRA RATING (RSA only)	RECOMMENDED MITIGATION
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
Resource more than 60% intact, primary spatial context	Extensive resource: potential high site complexity, deep and various deposits, 3-5 features	Unique in present environment / landscape; few examples known elsewhere.	Q	High	Grade 2	Conservation: Provincial Site Nomination

RES1166

	Conservation: Regional Site Nomination	Mitigation and partly conserved
	Grade 3A	Grade 3B
	Hgh	Medium
	ى ب	4
	Good example of uncommon resource in present environment / landscape; landscape; limited distribution / occurrence in other places.	Good example of resource in present environment / landscape; occurs fairly commonly in other places.
present, large surface area >0.5 ha	Extensive resource: potential complex site, shallow deposit present, at least 1 or more features present, large surface area >0.5 ha	Good resource: site complexity exists, shallow deposit, possible features present, large surface <0.5 ha
	Resource more than 50% intact, primary spatial context.	Resource ±50% intact, primary spatial context
	Medium context and information potential.	Good context and information potential.
	ي ا	4

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Mitigation before destruction	Record before destruction	Destruction / none	
Grade 4A	Grade 4B	Grade C	
Average	Average	Low	
n	2	←	
Good examples of common resource in present environment / landscape; also occurs commonly in other places.	Fair example of common resource in present environment / landscape; also occurs commonly in other places.	Very common or poor example of resource occurring throughout different environments; many similar and better examples exists exists elsewhere.	
Average resource: average site complexity, deposit present, present, large surface >50 m2	Little to no site complexity, little to no deposit present, no features present, surface area <50 m2	Single, isolated find; find spot	
Resource less than 50% intact, primary spatial context.	Resource partly intact, mostly secondary spatial context	Resource completely altered, damaged or destroyed OR in tertiary spatial context.	
Average context and information potential	Low but significant context and information potential.	No significant context or information potential.	
e	5	.	

SAHRA FIELD RATING & GRADING	Digby Wells Grade	Significance	Recommended mitigation	Percentage
National Significance	Gr. 1	-	Conservation: National Site nomination (D)	87%- 100%
Provincial significance	Gr. 2	-	Conservation: Provincial Site nomination (D)	72%- 86%
Local Significance (LS)	Gr. 3A	High Significance	Conservation: Mitigation not advised (D)	56%- 71%
Local Significance (LS)	Gr. 3B	High Significance	Mitigation (Part of site should be retained) (C)	41%- 55%
Generally Protected A (GP. A)	Gr. 4A	High/Medium Significance	Mitigation before destruction (B)	29%- 40%
Generally Protected B (GP. B)	Gr. 4B	Medium Significance	Record before destruction (B)	15%- 28%
Generally Protected C (GP. C)	Gr. 4C	Low Significance	Destruction (A)	0%- 14%

Site significance (based on the NHRA and SAHRA standards)

Management actions and recommended mitigation, which aims to mitigate and reduce the impact on sites, are expressed as follows;

- A- No further action necessary;
- B- Mapping of site and controlled sampling required;
- C- Preserve site or extensive data collection and mapping of the site; and
- D- Preserve site

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 of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principle 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; and
- 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., stonewalling, stone tools and enclosures),
- Uniqueness and
- Potential to answer present research questions.

Mitigation measures

In the event of identified archaeological and cultural heritage resources situated within or in close proximity to proposed development areas, the specialist will 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 Pit (STP) after which development may legally proceed in the area.
- 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. It is recommended that if any of the ruins be affected by mining, a conservation architect evaluate them for significance and make the appropriate recommendations and implement the relevant mitigation measures (See Appendix A).

Monitoring plan

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.

Appendix B: CV's of Specialists

NATASHA HIGGITT

Ms Natasha Higgitt Archaeology Intern Social Sciences Department **Digby Wells Environmental**

1 **EDUCATION**

- University of Pretoria
- BA Degree (2008)
- Archaeology Honours (2009)
- Title of Dissertation- Pass the Salt: An Archaeological analysis of lithics and ceramics from Salt Pan Ledge, Soutpansberg, for evidence of salt working and interaction.

2 EMPLOYMENT

July 2011 to Present:	Archaeology Intern at Digby Wells Environmental
April 2011 to June 2011:	Lab assistant at the Albany Museum Archaeology Department
April 2010 to March 2011:	Intern at the Archaeology Department, Albany Museum under the Department of Sports, Recreation, Arts and Culture, Eastern Cape Government, South Africa (DSRAC)

3 PROJECT EXPERIENCE

- Rescue excavation at St Francis Bay (shell midden burial)
- Rescue excavation at Wolwefontein (skeleton in donga)
- Recorded two rock art sites at Blaauwbosch Private Game Reserve, Eastern Cape
- Attended a 2 week excavation/study tour in the Friuli Region in Italy, organised by the Società Friulana di Archeologia, sponsored by Ente Friuli nel Mondo, and excavated a 12th century medieval castle
- Attended a 2 week excavation in Limpopo, Waterpoort Archaeological Project organised by Xander Antonites (Yale PhD Candidate)
- UP Archaeology Fieldschool at Bivack, Limpopo (Survey and Excavation) (15 days)
- UP Archaeology Fieldtrip at De Witteberg, Mpumulanga (Rock Art recording) (1 day)
- UP Archaeology Fieldschool at Machete, Limpopo (Fieldschool administrator, Excavation and base station recording and mapping) (16 days)

Digby Wells & Associates (Pty) Ltd. Co. Reg. No. 1999/05985/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa

Tel: +27 11 789 9495, Fax: +27 11 789 9498, info@digbywells.com, www.digbywells.com

- UP Archaeology Fieldschool at Bivack, Limpopo and Ratho, Limpopo (Survey and excavation) (15 days)
- UP Geography Fieldschool at Injisuthi, Drakensberg (Weathering Analysis on Rock face with rock art) (2 days)
- UP Archaeology Fieldschool at Hillbrow, Gauteng (Phase 2 CRM Style Excavation) (7 days)
- UP Archaeology Fieldschool at Ratho, Limpopo (Excavation and Survey) (15 days)

CRM (Contract work)

- Notice of Intent to Develop and Cultural Resources Pre-Assessment for Orlight SA (PTY) Ltd Solar PV Project. 2012. (Digby Wells Environmental)
- Agricultural Survey for Platreef ESIA, Mokopane, Limpopo. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for the Proposed Sylvania Everest North Mining Development in Mpumalanga, near Lydenburg. 2011. (Digby Wells Environmental)
- Phase 2 Mitigation of Archaeological sites at Boikarabelo Coal Mine, Steenbokpan, Limpopo. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for Proposed Platinum Mine Prospecting in Mpumalanga, near Bethal for Anglo Platinum. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for proposed Platinum Mine at Mokopane, Limpopo for Ivanhoe Platinum. 2011. (Digby Wells Environmental)
- Phase 1 AIA Mixed-use housing Development, Kwanobuhle, Extension 11, Uitenhage, Eastern Cape. 2011.
- Phase 1 AIA Centane to Qholora and Kei River mouth road upgrade survey, Mnquma Municipality, Eastern Cape. 2011. (SRK Consulting)
- Phase 1 AIA Clidet Data Cable survey, Western Cape, Northern Cape, Free State and Eastern Cape. 2011. (SRK Consulting)
- Phase 1 AIA Karoo Renewable Energy Facility, Victoria West, Northern Cape. 2011. (Savannah Environmental)
- Phase 1 AIA Windfarm survey in Hamburg, Eastern Cape. 2010. (Savannah Environmental)
- Phase 1 AIA Windfarm survey in Molteno, Eastern Cape. 2010. (Savannah Environmental)
- Phase 1 AIA Housing Development at Motherwell, P.E. 2010. (SRK Consulting)
- Phase 1 AIA Sand quarry survey in Paterson, Eastern Cape. 2010. (SRK Consulting)
- Phase 1 AIA Quarry Survey at Victoria West. 2010. (Acer [Africa] Environmental Management Consultants)
- Phase 1 AIA Quarry Survey at Port Elizabeth. 2010. (E.P Brickfields)

4 PROFESSIONAL AFFILIATIONS

Association of Southern African Professional Archaeologists (ASAPA): Professional member

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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
2010 - present.	A Chaeologist and	Civili specialist,	

- 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.

Digby Wells & Associates (Pty) Ltd. Co. Reg. No. 1999/05985/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa Tel: +27 11 789 9495, Fax: +27 11 789 9498, <u>info@digbyw.ells.com</u>, <u>w.w.w.digbyw.ells.com</u>

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
- Sonkezizwe 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.

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