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ENVIRONMENTAL

**ADDENDUM TO PHASE 1 ARCHAEOLOGICAL IMPACT
ASSESSMENT**

FOR THE FOR BOIKARABELO COAL MINE

**(PROPOSED RAILWAY LINK FROM THE FARM KRUIHOUT TO THE FARM
BUFFELSJAGT)**

LEPHALALE LOCAL MUNICIPALITY,



WATERBERG DISTRICT, LIMPOPO PROVINCE

MAY 2011



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EXECUTIVE SUMMARY

A Phase 1 Archaeological Impact Assessment (AIA) was undertaken for Resource Generation's Boikarabelo Coal Mine in 2010. This report has been submitted to the South African Heritage Resources Agency (SAHRA). Subsequently, Resource Generation has planned a proposed railway link from the Boikarabelo Coal Mine project area that will connect to the existing railway line approximately 40 km southeast, near the Medupi Power Plant in the Limpopo Province. This report is thus presented as an Addendum to the original AIA, as all baseline information and results are the same.

In total 11 cultural resources were identified and recorded. In terms of heritage value, eight were rated medium, one average and two low. The following table below briefly describes the identified cultural resources and their significance (SR) and impact ratings (EIA):

SITE ID	GPS LOCATION	SAHRA CATEGORY	DESCRIPTION	SR	EIA
RES901/001	S23 40 43.6 E27 15 34.0	Grade 4A	Old dilapidated homestead, next to large baobab tree, apparently built by Harmse family. Age unknown, but probably older than 60 years. Building consists of red mud bricks with cement plaster and concrete floors. No evidence of burials nearby, although reported by one farmer.	3	53
RES901/002 & 003	S23 40 31.7 E27 15 04.1	Grade 3B	Large pan on Grootzwartbult, high concentration of lithics around perimeter. Geology of stones in and around pan indicates are suitable for material manufacture. High likelihood of sealed site/s to exist on perimeter or in pan.	4	40
RES901/004	S23 40 15.3 E27 13 06.1	Grade 4C	Single, isolated potsherd in small clearing. No visible context or other archaeological indicators present.	1	4
RES901/005	S23 40 25.7 E27 12 59.9	Grade 3B	MSA lithics found in approximate centre of small pan. Likelihood that larger site exists in general vicinity.	4	40
RES901/006	S23 41 07.7 E27 20 09.6	Grade 3B	Burial site consisting of six burials of Maherry family, close to road and old residence. All burials have formal granite dressings and headstone with inscriptions.	4	151
RES901/007	S23 41 09.6 E27 20 31.6	Grade 3B	Burial site consisting of four burials of Motsegwa family. All four burials have informal stone cairns with 'oukclip' headstones. Burials all orientated east-west.	4	37
RES901/008	S23 39 01.3 E27 11 37.5	Grade 4C	Single, isolated potsherd in small clearing. No visible context or other archaeological indicators present.	1	4
RES901/009	S23 39 20.3 E27 12 12.7	Grade 3B	MSA site located in and around a natural seep / waterhole. Lithics seem to erode from a layer of 'oukclip'. There is a strong likelihood that site represents a sealed site with high information potential.	4	40

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RES901/010	S23 41 54.4 E27 17 49.8	Grade 3B	Burial site consisting of eleven burials. Ten burials all consist of informal stone cairns. One has a formal granite dressing and inscription. Burial site possibly that of Molesiwa family.	4	37
RES901/011	S23 41 26.8 E27 16 55.8	Grade 3B	Burial site consisting of four visible graves. At least two more may exist. The burial site is fenced with barbed wire. Only one grave had a chipboard plaque identifying the deceased as Magwai.	4	37
RES901/012	S23 41 50.3 E27 17 18.2	Grade 3B	Burial site located on 'NG Kerk' property. At least thirteen burials were counted, of which six had legible headstones. All burials consisted of formal granite dressings.	4	37

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)
RES901/001	C	No mitigation is recommended.		3	53	33
RES901/002 & 003	C	Phase 2 archaeological mitigation and watching brief.		4	40	9
RES901/004	C	No mitigation is recommended.		1	4	148
RES901/005	C	Phase 2 archaeological mitigation and watching brief.		4	40	9
RES901/006	C	In situ preservation and/or grave relocation.		4	151	48
RES901/007	C	In situ preservation		4	37	48
RES901/008	C	No mitigation is recommended.		1	4	148
RES901/009	C	Phase 2 archaeological mitigation and watching brief.		4	40	22
RES901/010	C	In situ preservation		4	37	48
RES901/011	C	In situ preservation		4	37	48
RES901/012	C	In situ preservation		4	37	48

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ACRONYMS

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

1 INTRODUCTION

1.1 PROJECT OVERVIEW

A detailed project overview has been included in the original Phase 1 AIA submitted to SAHRA in 2010, and attached as Appendix C. The following is a brief summary thereof.

The proposed Boikarabelo Coal Mine is located within the Waterberg coal field that forms part of the Karoo sequence. The coal deposit is situated along the northern margins of the Zoetfontein fault. The combined Grootegeluk and Vryheid formations represent a stratigraphic thickness of at least 120 m in 11 zones. With the exception of zone 1, all the economically viable seams in those zones that are expected to be mined. The estimated resource within the project area is approximately 4.5 billion tonnes (Gross in Situ). The total ROM coal to be extracted during the first 5 years is estimated at 18Mt per annum that is subsequently planned to increase to 32Mt per annum, for the remaining LoM, estimated at 30 years.

The mining method proposed is described in the as the opencast bench method to extract the coal. The product will be transported to the crusher and wash plant where it will be crushed, washed and stockpiled in the Run of Mine (ROM) stockpile. From here and after crushing, export quality coal and the Eskom product will be extracted and stockpiled separately. The Eskom product will be sold at mine gate and delivered to the power station as arranged by Eskom. The export quality coal will be dispatched by rail to Richards Bay (or an alternative port), where it will be sold Free On Board to the European, Asian and Indian markets on long term contracts and also into the spot market.

1.2 PROJECT DESCRIPTION

The proposed rail loop and link from Boikarabelo Coal Mine to the existing railway line has been planned to provide the necessary transport of the coal to Eskom and ports. The proposed rail loop will be located on the farm Kruishout 271 LQ, from where it will continue east-southeastwards for approximately 37 km, until it joins the existing Exxaro Grootgeluk Coal Mine railway line. The proposed project will predominantly be located within or close to existing road servitudes, notably the D175 district road from Steenbokpan to Stockpoort and the D1675 road from Steenbokpan to Medupi/Lephalale. The proposed railway servitude, including the rail itself, is not expected to exceed 50 m.

Client details

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<i>Registration number:</i>	
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2 STUDY AREA

2.1 REGIONAL SETTING

Full details regarding the regional setting are supplied in the original Phase 1 AIA (Appendix C). A summary of the location data of the proposed development and cultural resources is provided in Table 2-1 below. The physical locations of the farms are illustrated in Figure 2-2 and Figure 2-3.

Table 2-1: Summary of Location Data

Province	Limpopo		
Local Authority	Lephalale Local Municipality		
Magisterial district	Waterberg Magisterial District		
Property	±3 km on BITTERFONTEIN 272 LQ		
	±5 km on BUFFELSJAGT 317 LQ (shared boundary with Kringgatspruit)		
	±7 km on GROOT-ZWART-BULT 290 LQ		
	±10 km on KRINGGATSPRUIT 318 LQ (of which ±5 km shared with Buffelsjagt)		
	±5 km on KRUISSHOUT 271 LQ		
	±4 km on LOOPLEEGTE 302 LQ		
	±400 m on SLANGKOP 296 LQ (not surveyed)		
	±3.5 km on STEENBOKPAN 295 LQ		
	±3 km on VANGPAN 294 LQ		
Closest town	Lephalale (Ellisras)	1:50000 map no.	2327 CA Hardekraaltjie 2327 CB Steenbokpan
Datum	WGS 84	Average accuracy	5 meter

Site name	Description	GPS co-ordinates (Garmin Etrex Legend Cx)
RES901/001	House ruins	S23 40 43.6 E27 15 34.0
RES901/002 & 003	Stone Age site / Pan	S23 40 31.7 E27 15 04.1
RES901/004	Iron Age find spot	S23 40 15.3 E27 13 06.1
RES901/005	Stone Age site / Pan	S23 40 25.7 E27 12 59.9
RES901/006	Burial site	S23 41 07.7 E27 20 09.6
RES901/007	Burial site	S23 41 09.6 E27 20 31.6
RES901/008	Iron Age find spot	S23 39 01.3 E27 11 37.5
RES901/009	Stone Age site	S23 39 20.3 E27 12 12.7
RES901/010	Burial site	S23 41 54.4 E27 17 49.8
RES901/011	Burial site	S23 41 26.8 E27 16 55.8
RES901/012	Burial site	S23 41 50.3 E27 17 18.2

Figure 2-1: Regional location of proposed Resgen Railway Link

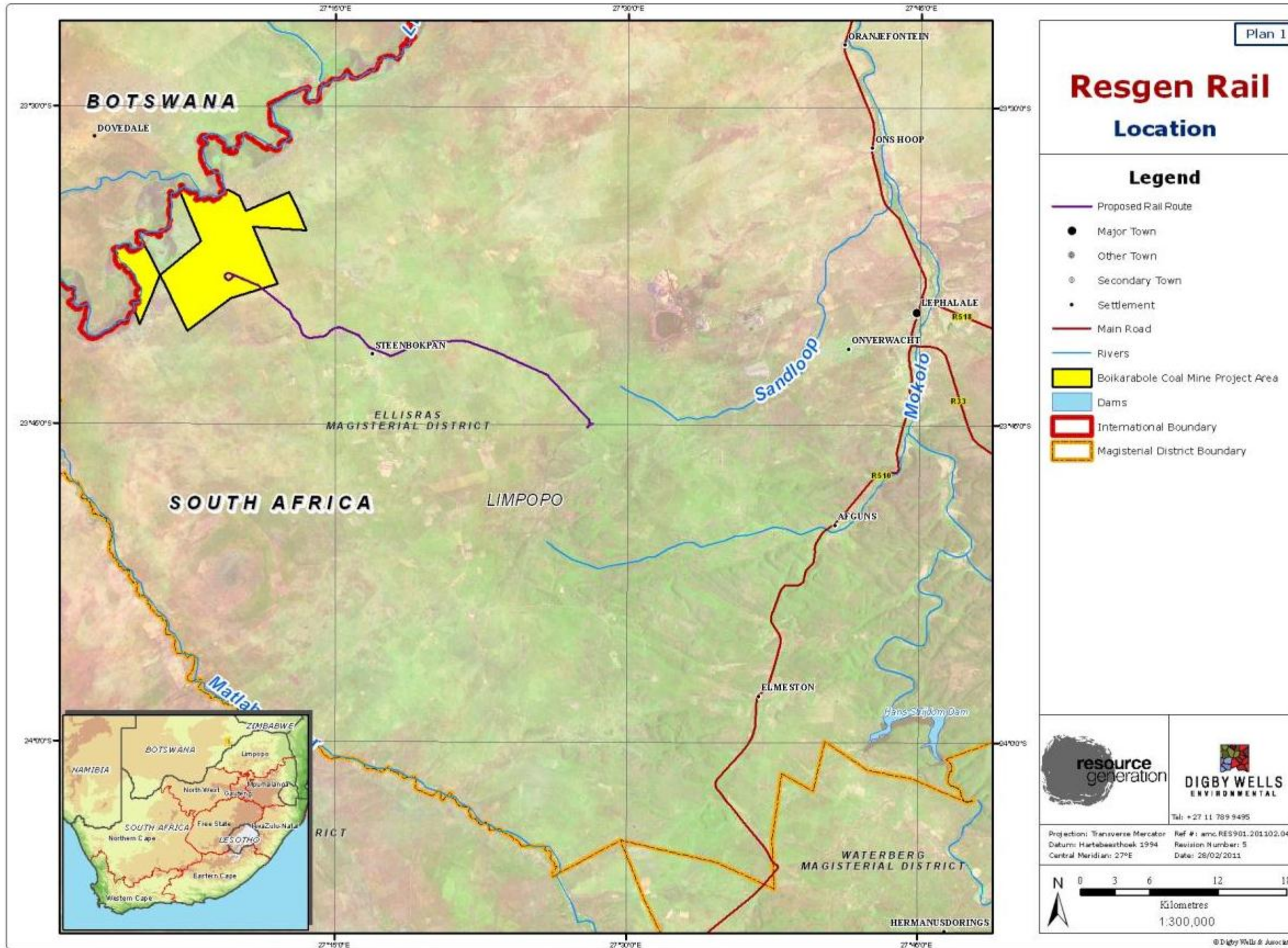


Figure 2-2: Location of farms that will be affected by the proposed Resgen Railway Link on 1:50 000 map sheets 2327 CA Hardekraaltjie

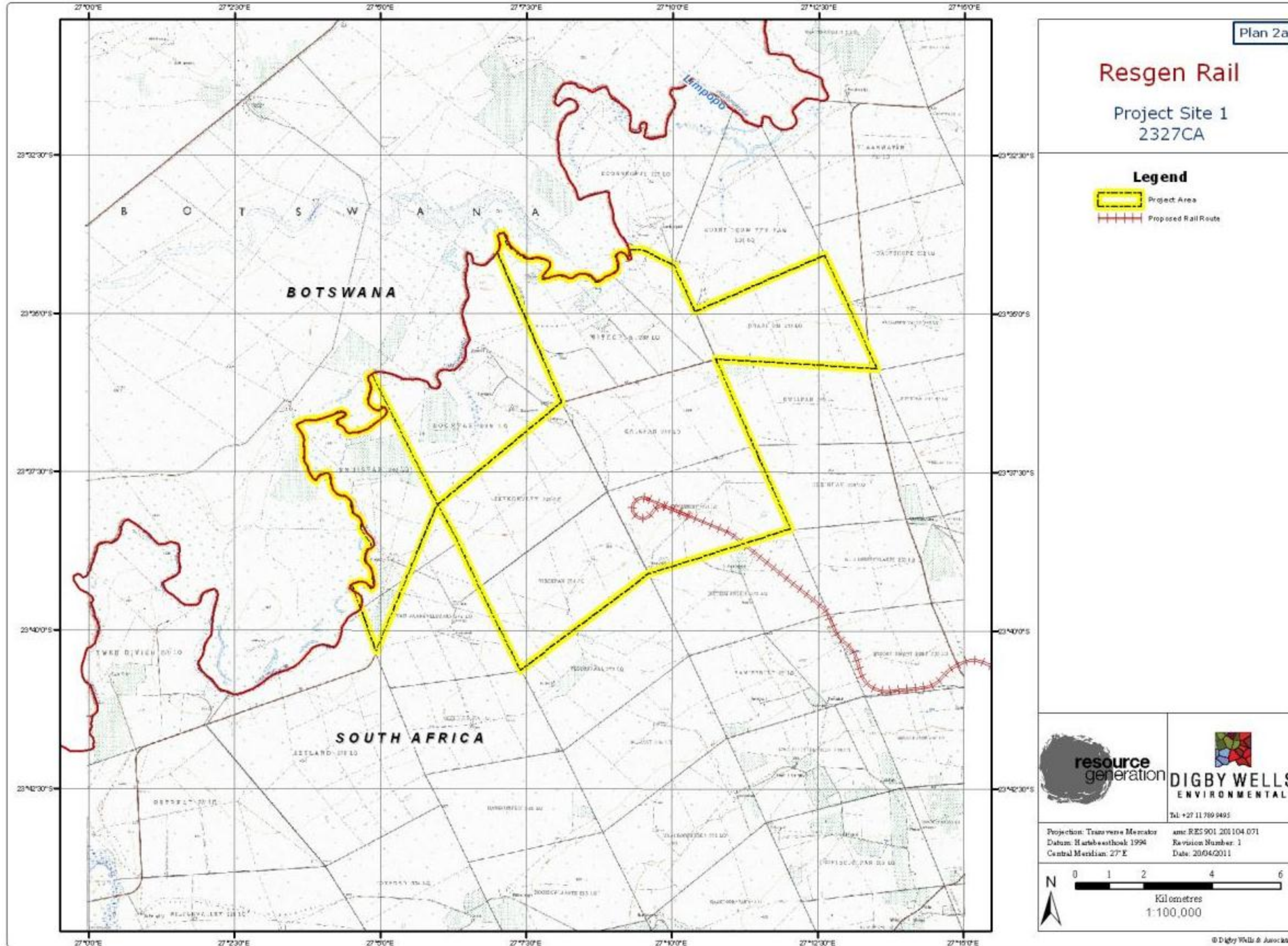


Figure 2-3: Location of Duikerpan, Kleinberg, Japie and Hans on 1: 50 000 map sheet 2327 CB Steenbokpan

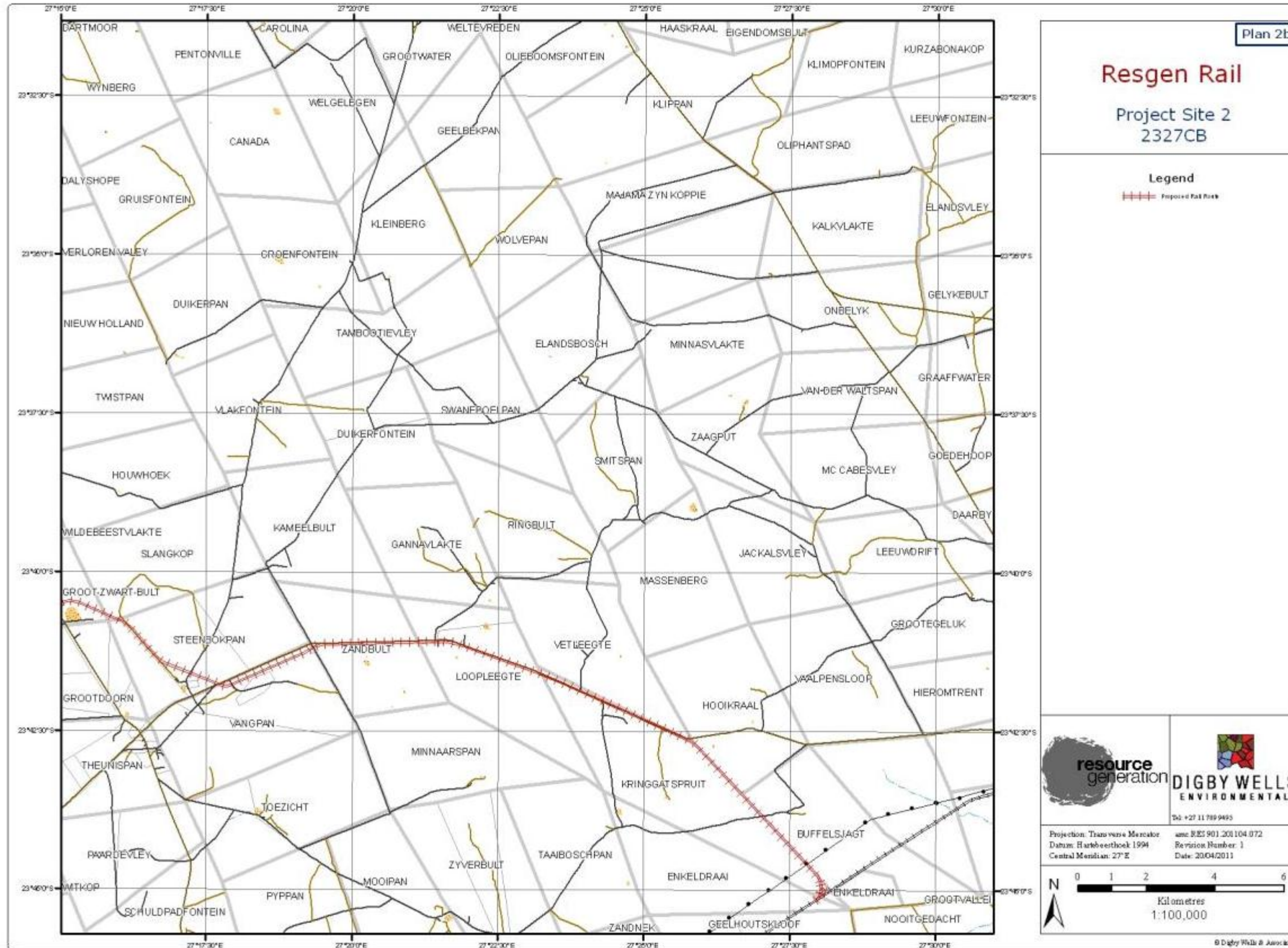
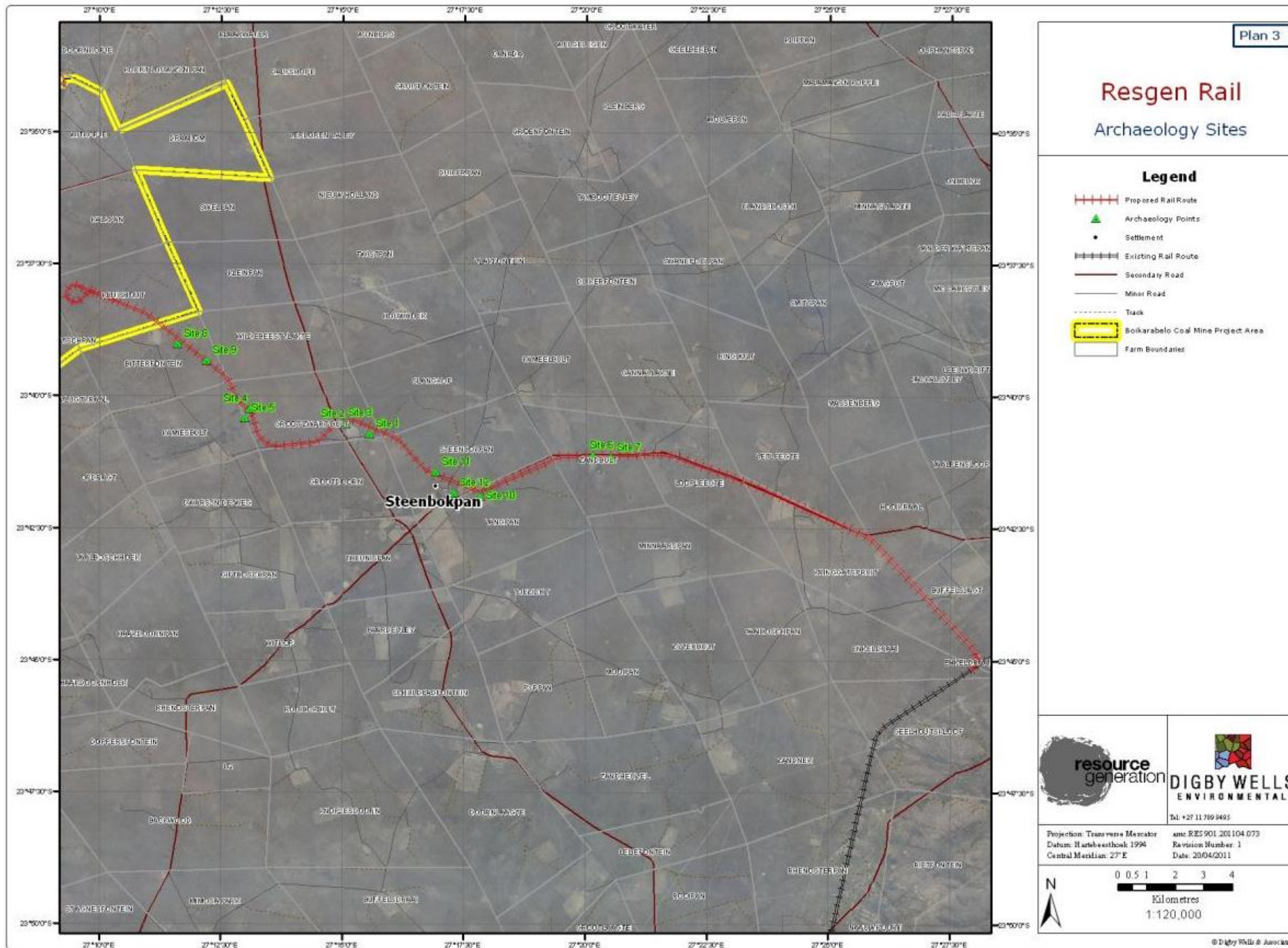


Figure 2-4: Location of identified cultural resources on aerial photo



Terms of Reference

This Phase 1 AIA was undertaken as an addendum to the existing Phase 1 AIA requested by Resgen for the Boikarabelo Coal Mine, in order to comply with relevant sections of the NEMA and the NHRA. The original AIA and subsequent report were included as specialist components of the HIA section of the Boikarabelo EIA/EMP, submitted to the DEA and DMR. This appended AIA included field-based studies and documentation of cultural heritage resources. The AIA complied with legal requirements as described in Section 38 of the NHRA, as well as the archaeological aspects of the SAHRA Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports (2007).

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

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

Aims and Objectives

The aim of this archaeological impact assessment was to assist Resgen South Africa 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 historical 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.

3 METHODOLOGY

The following methodology was employed to determine the potential occurrence of archaeological and heritage sites and the significance of identified sites. This archaeological impact assessment consisted of literature reviews, desktop based studies and pedestrian surveys. The primary aim of the site visit was to identify record and rate cultural resources, as required by the NHRA and SAHRA minimum standards. The integrated archaeological impact assessment process consisted of the following three steps:

3.1 LITERATURE REVIEW/DESKTOP STUDY:

Baseline information from the original AIA as well as others was consulted. This step was aimed at information gathering relating to known archaeological and heritage resources within and surrounding the proposed development area. Topographical maps and aerial photos further aided the physical survey.

3.2 INTERVIEWS AND INFERRED INFORMATION FINDINGS

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

3.3 FIELD VISIT AND SURVEY:

A physical survey and site visit was undertaken from 11 to 15 April 2011 by a qualified archaeologist along the proposed railway route. This survey was aimed at locating and documenting potential sites of archaeological and heritage significance located near or in the proposed route. General site conditions and features on site were recorded by means of photos, GPS location, and description.

Due to this being a linear route, the survey only followed the proposed route and servitude. The entire route was surveyed keeping within an approximate 100 m buffer zone.

3.4 DATA INTERPRETATION: ASSESSMENT OF SIGNIFICANCE AND IMPACTS

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

3.4.1 Site Significance Rating

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

A. Context of site:

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

- a) its importance in the community, or pattern of country's history;
- b) its possession of uncommon, rare or endangered aspects of country's natural or cultural heritage;
- c) its potential to yield information that will contribute to an understanding of country's natural or cultural heritage;

- d) its importance in demonstrating the principle characteristics of a particular class of country’s natural or cultural places or objects;
- e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h) its strong or special association with the life or work of a person, group or organisation of importance in the history of the country; and
- i) sites of significance relating to the history of slavery in country.

B. Site integrity:

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

C. Site extent:

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

D. Uniqueness:

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

The total rating determines in part the potential of any given site to provide information regarding the history of a particular area and time period and so forth.

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

3.4.2 Environmental Impact Assessment Rating and Criteria

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

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

The impact matrix describing impacts on the cultural and heritage environment thus calculates the rating out of 154 instead of the standard 147 which is used in the Boikarabelo Railway EIA/EMP, whereby Severity, Spatial Scale, Duration, Probability and Significance Rating are rated out of seven. Calculation of the Significance Rating is explained in Appendix A.

3.5 REPORT COMPILATION

This original specialist Phase 1 AIA report was compiled and incorporated into the heritage component of the EIA/EMP report. This report included the records of archaeological and heritage resources identified the affected area, as well as an assessment of the significance of such resources in terms of the heritage assessment criteria. Potential impacts of the development on such resources were furthermore assessed using an established impact assessment matrix that was adapted to include site significance ratings. The consideration of alternatives and proposed mitigation of any adverse effects during and after the completion of the development were also included.

4 EXPERTISE OF THE SPECIALIST

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

5 FINDINGS AND SURVEY RESULTS

5.1 DESKTOP RESEARCH

No known sites – based on other AIA undertaken in the area – were identified. It was shown in another Digby Wells study (2011) that most archaeological sites in the general vicinity occur close to natural water bodies such as streams and pans. With this in mind, special attention was paid to areas where the proposed railway link passed through or near pans, where the potential for human settlement was greater, especially in terms of Stone Age context.

5.2 INFERRED INFORMATION FINDINGS

The only places of heritage significance that were identified through the PPP - an on-going process involving the client's disclosure of information – were burial sites. These sites were recorded with the assistance of local farm community members. In one instance, the early settlement of Steenbokpan and the surrounding farms by the Harmse family (Digby Wells 2011) were reiterated by a local farmer. He also indicated that a dilapidated structure on the farm Grootzwartbult was built by a descendant of this family.

5.3 SURVEY

Eleven places were identified that could be considered to have significant heritage potential, of which eight were rated as medium in terms of heritage significance. Only one site, however, was calculated at medium in terms of environmental impacts. These sites are summarised in Table 5-1 and their locations illustrated in Figure 2-4.

Table 5-1: Summary of recorded heritage resources

SITE ID	DESCRIPTION	SR ¹	EIA ²
RES901/001	Old dilapidated homestead, next to large baobab tree, apparently built by Harmse family. Age unknown, but probably older than 60 years. Building consists of red mud bricks with cement plaster and concrete floors. No evidence of burials nearby, although reported by one farmer.	3	53
RES901/002 & 003	Large pan on Grootzwartbult, high concentration of lithics around perimeter. Geology of stones in and around pan indicates are suitable for material manufacture. High likelihood of sealed site/s to exist on perimeter or in pan.	4	52
RES901/004	Single, isolated potsherd in small clearing. No visible context or other archaeological indicators present.	1	4
RES901/005	MSA lithics found in approximate centre of small pan. Likelihood that larger site exists in general vicinity.	4	52
RES901/006	Burial site consisting of six burials of Maherry family, close to road and old residence. All burials have formal granite dressings and headstone with inscriptions.	4	151
RES901/007	Burial site consisting of four burials of Motsegwa family. All four burials have informal stone cairns with 'ouklip' headstones. Burials all orientated east-west.	4	100
RES901/008	Single, isolated potsherd in small clearing. No visible context or other archaeological indicators present.	1	4
RES901/009	MSA site located in and around a natural seep / waterhole. Lithics seem to erode from a layer of 'ouklip'. There is a strong likelihood that site represents a sealed site with high information potential.	4	52
RES901/010	Burial site consisting of eleven burials. Ten burials all consist of informal stone cairns. One has a formal granite dressing and inscription. Burial site possibly that of Molesiwa family.	4	100
RES901/011	Burial site consisting of four visible graves. At least two more may exist. The burial site is fenced with barbed wire. Only one grave had a chipboard plaque identifying the deceased as Magwai.	4	100
RES901/012	Burial site located on 'NG Kerk' property. At least thirteen burials were counted, of which six had legible headstones. All burials consisted of formal granite dressings.	4	100

6 CULTURAL RESOURCES DESCRIPTIONS AND IMPACT ASSESSMENTS

6.1 IDENTIFIED ENVIRONMENTAL IMPACTS ON SITES

This section aims to assess the significance of the potential impacts (threats or sources of risk) on archaeological and heritage resources in the proposed project area. The following impact assessment was completed in compliance with the impact assessment criteria implemented for the environmental impact assessment report, as well as in accordance with significance ratings and archaeological impact assessment criteria established by ASAPA and applicable international best practice guidelines. More information on the archaeological

¹ Significance Rating

² Environmental Impact Assessment

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impact assessment criteria and ratings used in this study and details on the weight assigned to the various parameters for positive and negative impacts in the formula are presented in Appendix A.

Table 6-1: Summary of heritage site Significance Ratings per site

Site number	PARAMETER													SIGNIFICANCE Rating (sum of A to D)
	(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	
RES901/001	3	1	3	2	1	3	4	3	1	2	3	3	2	3
RES901/002 & 003	4	3	4	4	3	3	1	1	1	3	5	4	4	4
RES901/004	1	4	1	1	1	1	2	1	1	1	1	1	1	1
RES901/005	4	5	4	4	3	3	1	1	1	3	5	4	4	4
RES901/006	7	5	4	3	3	3	7	1	1	4	4	4	5	4
RES901/007	7	5	4	3	3	3	7	1	1	4	4	4	5	4
RES901/008	1	1	1	1	1	1	2	1	1	1	1	1	1	1
RES901/009	4	3	4	4	3	3	1	1	1	3	5	4	4	4
RES901/010	7	5	4	3	3	3	7	1	1	4	4	4	5	4
RES901/011	7	5	4	3	3	3	7	1	1	4	4	4	5	4
RES901/012	7	5	4	3	3	3	7	1	1	4	4	4	5	4

Table 6-2: Summary of impact assessment on heritage resources

Site name, Phase and Activity			Impact Rating (before mitigation)									Impact Rating (after mitigation)								
Site name	Phase impact occurs (C, O, D, PC)	Activity	Reference in EIA	Nature of Impact (positive / Negative)	Spatial Scale (7)	Duration (7)	Severity (7)	Consequence	Probability (7)	SR (7)	EIA (154)	Nature of Impact (positive / Negative)	Spatial Scale (7)	Duration (7)	Severity (7)	Consequence	Probability (7)	SR (7)	EIA (154)	
Heritage																				
RES901/001	C	None		N	2	6	2	10	5	3	53	P	4	2	4	10	3	3	33	
RES901/002 & 003	C	Site clearing and construction, access routes, servitude		N	1	3	5	9	4	4	40	P	1	2	2	5	1	4	9	
RES901/004	C	None		N	1	1	1	3	1	1	4	P	7	7	7	21	7	1	148	
RES901/005	C	Site clearing and construction, access routes, servitude		N	1	3	5	9	4	4	40	P	1	2	2	5	1	4	9	
RES901/006	C, O, D	Site clearing and construction, access routes, servitude		N	7	7	7	21	7	4	151	P	5	2	4	11	4	4	48	
RES901/007	C, O, D	None		N	3	3	5	11	3	4	37	P	5	2	4	11	4	4	48	
RES901/008	C	None		N	1	1	1	3	1	1	4	P	7	7	7	21	7	1	148	
RES901/009	C, O, D	Site clearing and construction, access routes, servitude		N	1	3	5	9	4	4	40	P	4	2	3	9	2	4	22	
RES901/010	C, O, D	None		N	3	3	5	11	3	4	37	P	5	2	4	11	4	4	48	
RES901/011	C, O, D	None		N	3	3	5	11	3	4	37	P	5	2	4	11	4	4	48	
RES901/012	C, O, D	None		N	3	3	5	11	3	4	37	P	5	2	4	11	4	4	48	

6.2 CONSTRUCTION PHASE

As many of the identified heritage resources are similar in terms of significance ratings and potential impacts, they are discussed in groups to facilitate management plans and actions. Where sites, such as the burial sites, have similar significance ratings but different potential impacts, these will be discussed according to the impact ratings.

6.2.1 RES901/007, 010-012 Burial sites

Impacted environment:

Historical cultural landscape.

Description:

Four burial sites were recorded that fall outside the direct proposed railway line route. These four sites were divided into two types – informal and formal burial grounds.

Sites RES901/007, 010 and 011 were informal farm labourer burial sites. With the exception of one burial, all other burials consisted of informal stone cairns with no headstones. However, based on information obtained from local community members, the burial sites belonged to the families Motsegwa, Molesiwa and possibly Magwai respectively. One burial at RES901/007 consisted of a formal granite dressing and headstone, identifying the deceased as Molangoana George Molesiwa. A burial at RES901/011 had a chipboard plaque that identified the deceased as Elizabeth Pini Magwai. All individual burials were oriented east-west, whilst the burial sites themselves were oriented north-south. All three burial sites were relatively cleared of vegetation, possibly indicating fairly frequent visits by relatives.

Site RES901/012 was a formal ‘churchyard’ on the property of the local *Nederduits Gereformeerde Kerk* (Dutch Reformed Church). All the visible burials – at least 13 – consisted of formal dressings and headstones. The burial site was fenced with a stone wall. The site was in a poor state of preservation and/or maintenance, indicating a possible lack of interest or visits by relatives.

All four sites are located more than 70 m from the proposed railway link, and should not be affected by any potential environmental impacts.

Site significance:

Parameter	Description	Rating
Context	a. Burial sites in general may have wider than local importance. b. Burial sites may display uncommon aspects in terms of burial practices. c. Physical remains may provide information regarding past health and social conditions of communities.	4

	<p>d. Burial sites are good examples of commonly occurring sites.</p> <p>e. Burial sites are good examples of commonly occurring sites.</p> <p>f. Burial sites represent common skills for period.</p> <p>g. Burial sites in general have exceptionally high associations to communities in terms of spiritual and social levels.</p> <p>g. Burial site has little association in terms of history of country.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
Integrity	The site is less than 50% intact, but displays significant primary spatial context.	4
Extent	The visible parts of the site are less than 50 m2, however, features are present and a strong likelihood of deposit exists.	5
Uniqueness	The site represents a useable example of historic European occupation with the potential to provide information.	5
Significance	Medium	4

Impact assessment:

Parameter	Description	Rating
Spatial	Impacts will be limited to the proposed railway route and servitude. All sites fall outside this.	3
Duration	Potential impacts will only occur during construction phase, 1-5 years	3
Severity	Should impacts occur, it may result in damage or alteration of burial sites.	5
Probability	It is unlikely that impact will occur if site management measures are in place	3
Significance	Low sum of (Spatial + Duration + Severity) x (Probability) + Site Significance	37



Figure 6-1: General view of burial site RES901/007.



Figure 6-2: General view of burial site RES901/011.



Figure 6-3: General view of burial site RES901/012.



Figure 6-4: Detail of two burials at site RES901/012

6.2.2 RES901/007 Burial site

Impacted environment:

Historical cultural landscape.

Description:

A small informal family burial site was located in a general homestead area. All six recorded burials consisted of formal granite dressings and headstones identifying the deceased. The

burials were oriented east-west and the site itself north-south. No fence was noted and the site was fairly overgrown.

The site is located within the proposed railway link route; potential impacts will definitely damage or destroy the site.

Site significance:

Parameter	Description	Rating
Context	<p>a. Burials are generally important to communities, both local and descendent.</p> <p>b. Informal family or farm burial sites occur widespread throughout the country and do not usually represent any uncommon aspects.</p> <p>c. Burials and physical remains - when present - may provide average information regarding health status of historic communities.</p> <p>d. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist.</p> <p>e. The burial site is a common example of many similar sites in the region, and due to neglect no complete dressings exist.</p> <p>f. The burials represent common skills.</p> <p>g. Burial sites may have exceptionally high significance to communities in terms of spiritual or cultural reasons.</p> <p>h. The deceased may have average association in terms of local history.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	3
Integrity	The site is less than 0.5 ha in extent, but more than 50% intact, and in absolute primary spatial context.	4
Extent	The burial sites are less than 0.5 ha in extent.	4
Uniqueness	The site represents a useable example of historic European occupation with the potential to provide information.	5
Significance	Medium	4

Impact assessment:

Parameter	Description	Rating
Spatial	Impact on site is local and may affect local community's relationship with	7

	mine	
Duration	Relocation of burials will be permanent, other impacts will remain for the LoM	7
Severity	Legal implications and community dissent if burial site is destroyed without consultation or permission	7
Probability	Construction of open cast pit will definitely affect site	7
Significance	Medium	151



Figure 6-5: General view of burial site RES901/006.

6.2.3 RES901/002 & 003, 005 and 009 MSA sites

Impacted environment:

Archaeological cultural landscape and land use.

Description:

Three Stone Age sites – most notably MSA but with possible LSA occurring – were identified. All three sites were rated medium in terms of heritage significance, whilst environmental impacts were calculated as average. All three sites were situated on the perimeter or within dry pans, except site RES901/009 that was located in and around a small, natural seep. The sites were mainly identified through extensive surface concentrations of lithics that included cores, flakes and blades. Some examples showed evidence of secondary refinement and retouching. There is a potential that *in situ* sealed aspects of the sites may exist, as much of the material seem to be eroding out of a pebble

layer approximately 500 mm below surface. At site RES901/009, it seems that the material is eroding out of a layer of 'ouklip' (ferricrete or hard plinthite).

Site significance:

Parameter	Description	Rating
Context	<p>a. These sites are important in terms of demonstrating the pattern of MSA history in the region.</p> <p>b. Although MSA material is fairly widespread, large sites such as these are uncommon.</p> <p>c. The sites may contain high information potential regarding understanding of MSA in region.</p> <p>d. The principle characteristics of MSA lithics may be well represented at these sites.</p> <p>e. Good examples of lithics' aesthetics may be represented at the sites.</p> <p>f. The lithics probably represent average technology for the MSA period.</p> <p>g. Very little social or spiritual value to current communities can be attributed.</p> <p>g. No association with any person or organisation important in country or region's history.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	3
Integrity	The sites may be more than 50% intact and represents significant primary spatial context.	5
Extent	The sites represent good resources that have potential deposit and site complexity, and are larger than 0.5 ha.	4
Uniqueness	The sites are unusual in terms of size and potential information, and good examples of MSA sites.	4
Significance	Medium	4

Impact assessment:

Parameter	Description	Rating
Spatial	Potential impacts will be limited to specific parts of the sites	1
Duration	Potential impacts will be limited to construction phase of proposed railway.	6

Severity	Potential impacts may permanently destroy parts of site in primary context.	5
Probability	Impacts will probably take place.	4
Significance	Average	40



Figure 6-6: View of pan on Groot-Zwart-Bult. Proposed railway will pass pan on horizon.



Figure 6-7: Example if MSA lithic found in and around pan.



Figure 6-8: Detail of environment around perimeter of pan. Note the abundance of useable stone eroding into the pan, situated to bottom left of photo.



Figure 6-9: Detail of eroding stone, with large concentrations of lithics present.



Figure 6-10: Detail of erosion around perimeter of pan. Note a distinctive ‘pebble layer’ appearing from below surface.

6.2.4 RES901/004 and 008 Iron Age find spots

Impacted environment:

Archaeological cultural landscape and land use.

Description:

Two isolated instances where small, undiagnostic potsherds were found on the surface were recorded. RES901/004 was found in an open clearing where the remains of an old termite mound could be seen. It was impossible to determine any context regarding possible age or ceramic facies from the fragments and immediate environment.

Site significance:

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

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

Impact assessment:

Parameter	Description	Rating
Spatial	Any potential impact should be limited to the site itself	1
Duration	Potential impacts will be permanent	1
Severity	No severe repercussions as site itself is rated low heritage significance	1
Probability	Impacts most likely affect the site	1
Significance	Low	4



Figure 6-11: Potsherd found at find spot RES901/004.



Figure 6-12: Potsherd found at find spot RES901/008.

6.2.5 RES901/001 Historical built environment

Impacted environment:

Historical landscape.

Description:

A dilapidated and semi-demolished building was recorded that according to one farmer was built by a descendant of the Harmse family – an early European family that were seemingly fairly prominent in the area. A large *Adansonia digitata* (baobab) tree grew less than 50 m from this building, and may have been planted when the building was built. It could not be accurately determined what the shape of the building was, nor how many rooms it had. However, the building seemed to be square with at least two rooms, giving the appearance of a labourer’s cottage more than a farmer’s residence. Material culture that was found in and around the ruins included pieces of glazing (window glass), tin cans, and glass bottles, with some metal pieces present. All the material were of fairly recent date (less than 20 years), indicating possible recent occupation. The building also seems to have been deliberately demolished, based on the remains.

Site significance:

Parameter	Description	Rating
Context	a. The site may have some importance to the pattern of history in the area.	3
	b. The find is common throughout the region.	
	c. A single isolated find has no viable information potential.	

	<p>d. The find does not display any principle characteristics of any archaeological period known in the area.</p> <p>d. The find does not display any aesthetic characteristics of any archaeological period known in the area.</p> <p>f. The find represents a very common and widespread skill for the period and area.</p> <p>g. The find may have low significance in terms of local community identity or ancestry.</p> <p>h. It is unlikely that the find has any association of importance.</p> <p>i. Site is unlikely to have any significance related to the history of slavery.</p>	
Integrity	The find represents an isolated find with no context.	1
Extent	The find represents an isolated find with no context.	3
Uniqueness	Commonly found in region, with no viably information potential.	2
Significance	Average	2

Impact assessment:

Parameter	Description	Rating
Spatial	Any potential impact should be limited to the site itself	2
Duration	Potential impacts will be permanent	6
Severity	No severe repercussions as site itself is rated low heritage significance	2
Probability	Impacts most likely affect the site	5
Significance	Average	53



Figure 6-13: Ruins of building at site RES901/001. Note baobab tree to left of structure.



Figure 6-14: Detail of baobab at RES901/001. This was the only occurrence of baobabs noted in the study area, possibly indicating that it was planted.

6.3 OPERATIONAL AND DECOMMISSIONING PHASES

None of the sites should be impacted during the operational and decommissioning phases of the project, as recommended mitigation prior to the construction phase will lessen or negate any potential impact.

Table 6-3: Summary table of sites, detailing location, site type and other information.

Site	Affected Environment	EIA reference No	Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Estimated Cost	Responsible Person	Significance after mitigation
RES901/001	Cultural landscape: historic				11.1.1 (v)	None	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.					
RES901/002 & 003	Cultural landscape: Archaeological			To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off before construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	±R120,000.00 incl. RES901/005, 009	Archaeologist	Low
RES901/004	Cultural landscape: Archaeological				11.1.1 (v)	None	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.					
RES901/005	Cultural landscape: Archaeological			To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off before construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	See RES901/002&003	Archaeologist	Low
RES901/006	Cultural landscape: historic			To protect burial site from any accidental damage or destruction.	11.1.2 (i) AND/OR 11.1.2 (ii)	Fencing once-off; site monitoring monthly; grave relocation once-off.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	Construction	In situ preservation: ±R30,000.00; Relocation: ±R200,000.00	Environmental officer	Low
RES901/007	Cultural landscape: historic			To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/008	Cultural landscape: Archaeological				11.1.1 (v)	None	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.					
RES901/009	Cultural landscape: Archaeological			To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off during construction.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	See RES901/002&003	Archaeologist	Low
RES901/010	Cultural landscape: historic			To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.		In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/011	Cultural landscape: historic			To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/012	Cultural landscape: historic			To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA Sections 34, 35, 36, 38; SAHRA Regulations.	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low

7 CUMULATIVE IMPACTS

No potential cumulative impacts were identified.

8 DISCUSSION

The proposed project is a linear development and as such environmental impacts on sites are limited, when compared to developments where large surface areas may be impacted on. As such, only the heritage resources identified within the proposed railway link will be potentially impacted on. These impacts can be mitigated, according to the recommended measures given below.

8.1 LITERATURE REVIEW

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

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

8.2 BURIAL SITES

Burial sites in general constitute important heritage resources, with high significance to relatives and/or descendants and various communities. As such, burial sites should be treated with the necessary respect and sensitivity that it requires. The burial sites in the study area ranged from historical burials to fairly recent burials – 1933 being the oldest and 2006 the youngest. Table 8-1 below summarises the relevant dates and other information that could be recorded from the burial sites, with photographs of the sites following. Of the 15 burials recorded, only one is older than 60 years. The majority of burials (10) were created from 1955 to 1979. Only RES901/006 will be impacted on by the proposed railway link, being situated within the proposed route. All other burials are located at least 70 m from the proposed railway route.

Table 8-1: Details of deceased identified by headstones

Burial site number	Farm name	GPS location	No. burials	Deceased name	DoB	Fig. no.
RES901/006	Zandbult	S23 41 07.7 E27 20 09.6	6	Antonie JE Maherry	★ 1-1-1934 ‡ 22-10-1973	Figure 6-5
				Anna E Maherry	★ 5-9-1889 ‡ 8-8-1968	
				Rachel Anna Maria Lee (nee Visser)	★ 2-8-1882 ‡ 7-1-1963	
				Antonie Johannes Ennis Maherry	★ 27-12-1885 ‡ 1-1-1956	
				Petrus Maherry	★ 7-8-1909 ‡ 23-7-1979	
				Pieter Maherry	★ 21-10-1911 ‡ 9-6-1975	
RES901/007	Zandbult	S23 41 09.6 E27 20 31.6	4	No information		Figure 6-1
RES901/010	Vangpan	S23 41 54.4 E27 17 49.8	11	Molangoana George Molesiwa	★ 3-10-1950 ‡ 25-8-1995	
RES901/011	Steenbokpan	S23 41 26.8 E27 16 55.8	4-6	Elizabeth Pini Magwai	★ 15-2-1975 ‡ 2-11-2006	Figure 6-2
RES901/012	Steenbokpan	S23 41 50.3 E27 17 18.2	13	Annie van der Westhuizen	★ 22-8-1910 ‡ 22-11-2000	Figure 6-4
				Johannes Christoffel van Rooyen	★ 20-8-1882 ‡ 2-8-1955	
				Susanna MP van Rooyen	★ 23-5-1884 ‡ 26-11-1933	
				Anna Johanna Jacoba van der Westhuizen	★ 31-5-1912 ‡ 26-12-1955	

				Name illegible	† 9-2-1958
				Hermanus Arnoldus Smith	★ 4-1-1925 † 29-7-1996
				Hendrina Christina Lonerger	★ 29-7-1876 † 10-3-1967

8.3 MIDDLE STONE AGE SITES

The MSA sites identified represent potentially important archaeological sites due to the fact that a high likelihood exists for *in situ*, possibly stratified material, to occur. In general, such Stone Age sites are rare, and usually associated with cave or shelter deposits. Open-air sites could provide important information regarding use of the Stone Age landscape in the region. The pans in the region – although currently mainly seasonal and very brackish – seem to have been noticeably used by early humans, as well as attracted Iron Age groups to a lesser degree. This may furthermore provide important information regarding the palaeoenvironment and climate of an area that is currently water stressed and prone to drought. The proposed railway link seems to avoid all the larger pans. This in effect means that very little of the sites will be affected. However, RES901/009 is located within the proposed railway link route, and thus will be impacted on.

8.4 IRON AGE FIND SPOTS

These find spots are negligible in terms of any information potential, other than serving as evidence of possible Iron Age settlement in the area. Also, as the two finds could not be placed within any historical context, it is uncertain whether these represent Iron Age pottery or later historical, even recent, artefacts. However, both find spots were located close to the proposed railway link: should any subsurface deposits exist, these may be accidentally exposed if earth works take place.

8.5 HISTORICAL BUILT ENVIRONMENT

The semi-demolished building may represent an example of the early European built environment. However, there is some evidence that the building has been used until fairly recently, and probably also altered to such an extent that the integrity of the building has been lost. The building is furthermore sufficiently distant from the proposed railway link not to be impacted on.

8.6 PALAEOLOGICAL LANDSCAPE

In their letter acknowledging receipt of the BID (Addendum D), SAHRA required that a Palaeontological Impact Assessment (PIA) be done. However, based on the survey results it was found that, in terms of the proposed railway link, no geological features were present that may contain palaeontological material. Furthermore, as the proposed railway link is a linear development, and will not impact bedrock, no PIA has been done. However, as this

report is submitted as an addendum to the initial AIA, this issue has been raised with the client concerning the proposed Boikarabelo Coal Mine, where bedrock may be affected.

9 KNOWLEDGE GAPS

As most archaeological resources usually occur below surface, there chance finds may occur during the construction phase.

No other knowledge gaps were identified.

10 RECOMMENDED MITIGATION MEASURES AND MANAGEMENT PLAN

The Management Plan (EMP) has been described according to the project activities in order to provide an understanding of what objectives and recommended management measures are required to minimise the environmental impacts arising from these activities. The management measures are described in Table 12-1.

10.1 CULTURAL RESOURCES MANAGEMENT PLAN

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

Explanation of mitigation and management measures: heritage sites other than burial sites

- i. *Site conservation*: Conservation is essentially a ‘no development recommendation’. Depending on the importance of the resource and the economic viability of mitigation, site conservation may be the only recommendation or option to the developer or client. A separate Heritage Site Management Plan (HSMP) must be compiled that will describe management plans and actions.
- ii. *Site mitigation and part conservation*: Parts of a site can be mitigated through sampling, shovel test pits, test excavations, detailed documentation and mapping. The remainder, especially parts that display attributes that may display significant characteristics of the resource, must be conserved. A separate HSMP must be compiled for the part that will be conserved, that will describe management plans and actions.
- iii. *Site mitigation*: The entire site must be mitigated before destruction;
- iv. *Site monitoring*: The site can be left in situ with no mitigation, but periodic site monitoring must be implemented to evaluate and assess any secondary or cumulative impacts on the site. Site monitoring could also form part of an HSMP;
- v. *Site destruction*: If a particular identified resource is of little archaeological or cultural heritage significance, a recommendation of site destruction will be made by an accredited archaeologist/ specialist. A permit application for such destruction may be necessary. Where this is the case, the application must be completed and submitted

to SAHRA. Only upon receipt of the permit can a site then be destroyed, under supervision of an archaeologist or other heritage specialist; and

- vi. *Watching brief:* No mitigation of a site is needed, but during initial earthworks or other large-scale disturbances of an archaeologist must be onsite to determine whether any subsurface cultural heritage is exposed.

10.2 EXPLANATION OF MITIGATION AND MANAGEMENT OF BURIAL SITES

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

- i. *In situ* preservation: entails the conservation and protection of burial sites in their original location:
 - a) The site must be fenced and clearly marked to prevent accidental damage;
 - b) Access must be given to relatives to allow visits to the site. Access may be controlled if the burial site is located in a risk area, 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.
- ii. Grave relocation: is the process whereby a burial site is exhumed and relocated to a different, safer and appropriate site, usually within an existing cemetery administered by the local authority. This process should be undertaken in compliance with international and national legislation:
 - a) A comprehensive Public Participation Process (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;

- 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.

11 MONITORING PROGRAMME

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

Induction training: Responsible staff identified by Temo Coal should attend a short course on heritage management and identification of heritage resources. It is assumed that this person/s will be the Environmental Officer/s (EO);

Site monitoring and watching brief: as most heritage resources occur subsurface, all earth moving activities must be monitored to record any resources accidentally exposed. The largest environmental impact on heritage resources is the initial soil stripping or earthworks associated during construction. The EO should monitor all such activities on a daily basis. In the event that any heritage resources are found, all work should be immediately suspended in that area. The EO must contact the relevant authorities, archaeologist or heritage specialist and where possible, the local museum. In the event of human remains being exposed, the local police department must be informed immediately; and

An archaeological assessment must be conducted on the affected site by a qualified archaeologist. This may include analyses by relevant specialists. Sites of significance will be assessed and documented for records. Recommendations may be made for further studies.

12 SITE SPECIFIC RECOMMENDATIONS

12.1 RES901/006 BURIAL SITE

According to the current proposed infrastructure footprint, the site is situated within the railway link route, and will consequently be impacted on. Mitigation measures described under 10.2(i) and 10.2(ii) above are recommended, and should specifically include:

The site should be fenced to avoid accidental damage during construction;

An alternative route or position should be considered where the burial site is situated at least 50 m outside the servitude;

Monitoring of site during construction phase;

Relocation should only be considered as a last resort.

12.2 RES901/007, 010, 011 AND 012 BURIAL SITES

These sites should be preserved *in situ* according to 10.2 (i) above and fenced in order to protect and increase the visibility of the sites to prevent accidental damage during the

construction phase. Landowners and relatives may need to be consulted regarding the recommended mitigation.

12.3 RES901/002 & 003, 005, 009 MSA SITES

Although the proposed railway link avoids most pans, where these sites are situated, any construction on the perimeter may still uncover and/or damage or destroy *in situ* material. Mitigation measures described under 10.1(iii) and 10.1(vi) are recommended and may include:

- Specialist Stone Age Phase 2 sampling of sites, that may include surface sampling, mapping, and selective STPs; and
- Watching brief during any earthworks.

12.4 REMAINING SITES: RES901/001, 004 AND 008

No mitigation for any of these sites is recommended necessary for the following reasons:

- The sites fall outside the proposed development; and/or
- They either represent negligible examples of heritage resources (such as the potsherds), or have been altered, damaged and destroyed to such an extent that their significance has become negligible.

12.5 GENERAL RECOMMENDATIONS

In general, due to the proposed project being linear in extent, potential impacts to heritage resources can be minimised if the following recommendations are followed:

- Existing roads or disturbed areas should be used as access routes during as far as possible;
- Watching briefs (10.1(vi)) should be implemented within 100 m or less of MSA sites and 50 m or less of burial sites, where at least 50 m² of soil will be excavated or displaced.

Table 12-1: Summary of Cultural Resource Management in EMP

Site	Aspect	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Estimated Cost	Responsible Person	Significance after mitigation
RES901/001	Cultural landscape: historic		11.1.1 (v)	None	NHRA					
RES901/002 & 003	Cultural landscape: Archaeological	To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off before construction.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	±R120,000.00 incl. RES901/005, 009	Archaeologist	Low
RES901/004	Cultural landscape: Archaeological		11.1.1 (v)	None	NHRA					
RES901/005	Cultural landscape: Archaeological	To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off before construction.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	See RES901/002&003	Archaeologist	Low
RES901/006	Cultural landscape: historic	To protect burial site from any accidental damage or destruction.	11.1.2 (i) AND/OR 11.1.2 (ii)	Fencing once-off; site monitoring monthly; grave relocation once-off.	NHRA	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	Construction	In situ preservation: ±R30,000.00; Relocation: ±R200,000.00	Environmental officer	Low
RES901/007	Cultural landscape: historic	To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA	Fence site; locate and consult with relatives/descendants; initiate grave relocation process.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/008	Cultural landscape: Archaeological		11.1.1 (v)	None	NHRA					
RES901/009	Cultural landscape: Archaeological	To retrieve as much viable archaeological information from site before further damage and/or destruction occurs	11.1.1 (iii) AND 11.1.1 (vi)	Once-off during construction.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	See RES901/002&003	Archaeologist	Low
RES901/010	Cultural landscape: historic	To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.		In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/011	Cultural landscape: historic	To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low
RES901/012	Cultural landscape: historic	To protect burial site from any accidental damage or destruction.	11.1.2 (i)	Fencing once-off; site monitoring monthly during construction phase.	NHRA	Apply for applicable SAHRA permits; undertake intensive mapping and selective sampling.	Construction	In situ preservation: ±R30,000.00.	Environmental officer	Low

13 CONCLUSION

This AIA was undertaken as an addendum to the initial AIA done for the Boikarabelo Coal Mine. The initial report, as well as reports on other AIAs undertaken in the area, was reviewed to determine the likelihood of heritage resources occurring in the study area. It was concluded that in terms of archaeological resources, few sites could be expected, keeping in mind the demonstrated distribution of sites and the linear nature of the proposed project. Historical sites may on other hand not conform to this model, as was demonstrated in the findings.

A site visit was undertaken, aimed at locating and documenting potential sites of archaeological and heritage significance located along the proposed railway link route. Eleven occurrences of cultural resources were identified and recorded. Of these, only one will be definitely negatively impacted on. Three more sites may potentially be impacted on. 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 included:

- Four burial sites;
- Three MSA sites;
- Two Iron Age find spots, where isolated artefacts were found on the surface; and
- One historical building of unknown age.

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

14 REFERENCES

Equator Principles (2006) *A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing*; www.equator-principles.com

Huffman, T. 2007. *Handbook to the Iron Age. The archaeology of pre-colonial farming societies in Southern Africa*. University of Kwa-Zulu Natal Press.

International Finance Corporation (IFC) (2006) World Bank Group, 30 April (2006), Performance Standards of Social and Environmental Sustainability

International Finance Corporation (IFC). World Bank Group. 2007. *The Environmental, Health, and Safety (EHS) Guidelines for Mining*.

National Heritage Resources Act, No. 25 of 1999.

South African Heritage Resources Agency. 2007. *Minimum Standards: Archaeological & Palaeontological components of Impact Assessments*.

APPENDIX A: ARCHAEOLOGICAL AND ENVIRONMENTAL IMPACT ASSESSMENT

1.1 EIA Methodology

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

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

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

1.1.1 Impact identification

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

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

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

1.1.2 Impact rating

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

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

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

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

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

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

The impact matrix describing impacts on the cultural and heritage environment thus calculates the rating out of 154 instead of the standard 147, whereby Severity, Spatial Scale, Duration, Probability and Site significance are rated out of seven. Calculation of Site significance is explained 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.	<u>International</u> The effect will occur across international borders	<u>Permanent:</u> No <u>Mitigation</u> No mitigation measures of natural process will reduce the impact after implementation.	<u>Certain/ Definite.</u> The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	<u>National</u> Will affect the entire country	<u>Permanent:</u> <u>Mitigation</u> Mitigation measures of natural process will reduce the impact.	<u>Almost certain/Highly probable</u> It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items	<u>Province/ Region</u> Will affect the entire province or region	<u>Project Life</u> The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
4	Serious medium term environmental effects. Environmental damage can	On-going serious social issues. Significant damage to structures / items of cultural	<u>Municipal Area</u> Will affect the whole	<u>Long term</u> 6-15 years	<u>Probable</u> Has occurred here or elsewhere

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

1.2 AIA and HIA methodology

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

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

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

1.2.1 Site significance identification

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

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

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

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

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

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

Table 1-1: 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

APPENDIX B: CURRICULUM VITAE AND DECLARATION OF INDEPENDENCE

Johan Nel

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PERSONAL INFORMATION

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EDUCATION

1997 Hoërskool Brandwag Matric Exemption

2001 University of Pretoria, BA: Anthropology & Archaeology majors

2002 University of Pretoria, BA Honours in Archaeology

Current University of Pretoria, MA Archaeology.

EMPLOYMENT

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

PROFESSIONAL MEMBERSHIPS

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

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

DIGBY WELLS PROJECT EXPERIENCE:

Phase 1 Archaeological Impact Assessments:

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

Mitigation projects:

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

Grave relocation

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

Other Heritage assessments and reviews:

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