

# SASOL LIMPOPO WEST HERITAGE REPORT

A field study prepared for SRK Consulting

Professor T.N. Huffman

J. Van der Walt

Archaeological Resources Management

School of Geography, Archaeology and Environmental Studies

University of the Witwatersrand

Johannesburg

March 2013

Updated April 2013

## **EXECUTIVE SUMMARY**

Archaeological Resources Management examined the nine farms for the Sasol Limpopo West project for sites of archaeological, cultural and historical significance. Some 24 sites of different time periods were recorded. Middle Stone Age sites were associated with pans and ancient drainage systems throughout the project area. The remains of an Iron Age cattle post occurred on the edge of one pan. This cattle post was articulated with farming villages in the Limpopo Valley some distance to the west, outside the project area. A few standing houses were over 60 years old in various sections, while there were remarkably few graveyards anywhere. Every site is relevant to the Heritage Landscape, but none has outstanding significance. Eighteen sites will require mitigation. This mitigation complies with both SAHRA and international standards.

## **GLOSSARY**

Archaeological site: remains of human activity over 100 years old

Earlier Stone Age: 2.6 million to 250 000 years ago

Middle Stone Age: 250 000 to 25 000 years ago

Later Stone Age: 25 000 to 500 years ago

The Iron Age: AD 400 to 1840

Facies: Iron Age unit defined by ceramic style

Historic: AD 1840 to 1950

Historic building: over 60 years old

## **TABLE OF CONTENTS**

### **1 INTRODUCTION**

### **2. DESCRIPTION OF PROJECT**

#### **2.1. Mine**

### **3. METHOD**

### **4. BACKGROUND**

### **5. ENVIRONMENTAL BASELINE OF THE MINE**

#### **5.1. Middle Stone Age**

#### **5.2. Iron Age**

#### **5.3. Historic**

#### **5.4. Graveyards**

### **6. LEGAL PROVISIONS**

### **7. IMPACT ASSESSMENT**

#### **7.1. Phases 1 and 2**

#### **7.2. Phase 3**

#### **7.3 Phase 4**

#### **7.4. Cumulative Impacts**

### **8. MITIGATION**

#### **8.1. Mine**

#### **8.2. Timeline**

### **9. SUMMARY AND CONCLUSIONS**

#### **9.1 Middle Stone Age**

#### **9.2. Iron Age**

#### **9.3. Historic**

#### **9.4. Graveyards**

#### **9.5. Limitations**

#### **9.6. Mitigation**

### **10. REFERENCES**

## **11. DETAILS OF THE SPECIALISTS**

**11.1. T.N. Huffman**

**11.2. J. van der Walt**

## **12. DECLARATIONS OF INDEPENDENCE**

**12.1. T.N. Huffman**

**12.2. J. van der Walt**

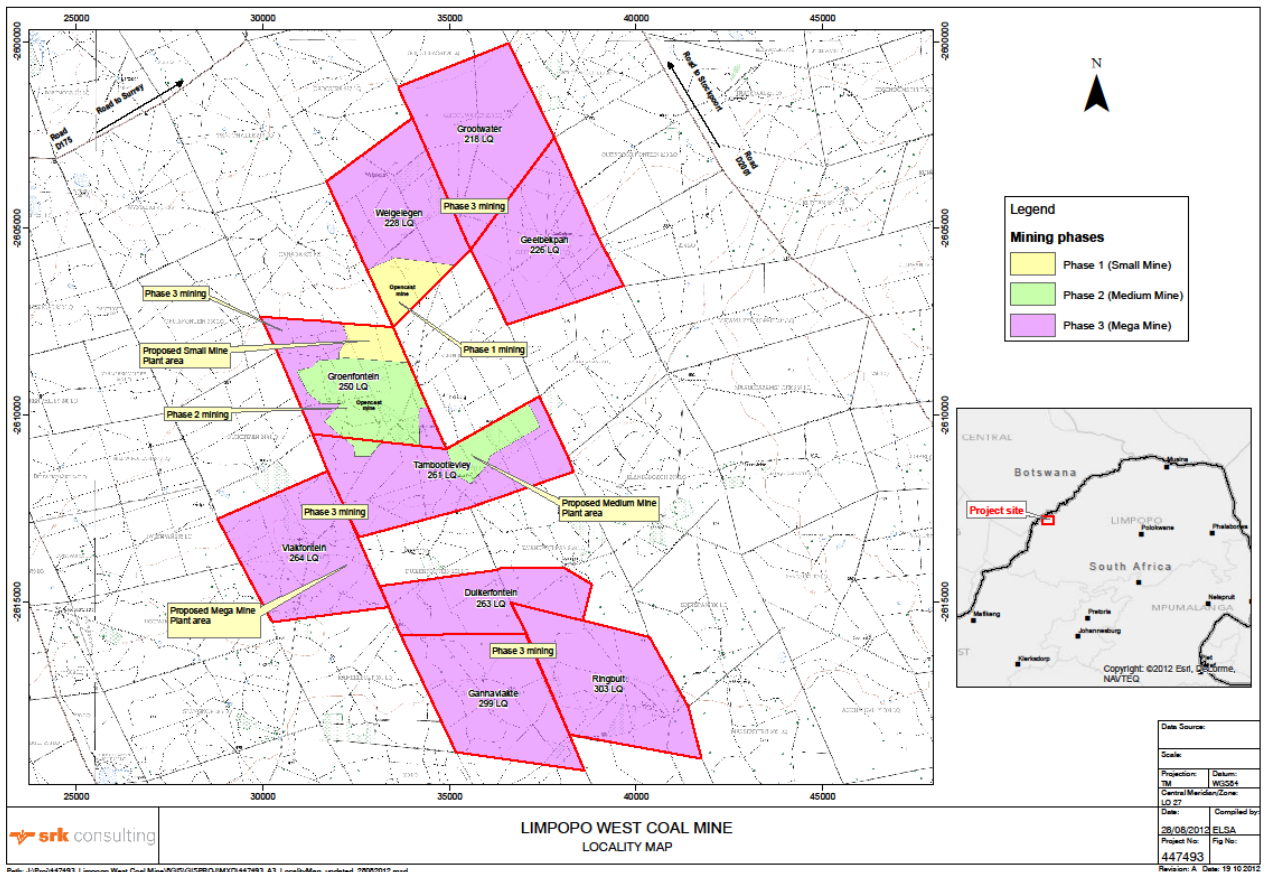
## **1. INTRODUCTION**

Sasol Mining (Pty) Limited intends to develop an open cast mine and supporting infrastructure in the Lephalale Municipal District of the Limpopo Province. Known as Limpopo West, the development will include an open-pit mine and associated infrastructure. Sasol Mining (Pty) Limited appointed SRK Consulting to coordinate the various specialist studies. SRK in turn appointed Archaeological Resources Management (ARM) to identify sites of archaeological, cultural and historical significance. The present report includes the baseline study, impact assessment and recommendations for mitigation.

## 2. DECRPTION OF PROJECT

For the heritage study the most important activities are those that disturb the ground. Because location is paramount, the actual processes are only indirectly relevant. The Limpopo West Project, it should be noted, will impact the ground surface over a huge area. Indeed, the Mine area covers some 9 900.43 hectares on nine farms: Grootwater 218LQ, Geelbekpan 226LQ, Welgelegen 228LQ, Groenfontein 250LQ (including a small portion of Matopi 705LQ), Tambootievley 261LQ, Vlakfontein 264LQ, Gannavlake 299LQ, Ringbult 303LQ and Duikerfontein 688LQ.

Sasol intends to proceed with mining in four stages (**Figure 2.1**). The first will be a small open cast mine on the southwest portion of Welgelegen. Mine staff will crush, screen and wash the ore on site while the Coal Grootwatering Plant will be located on Groenfontein and the discard on Matopi. It will be necessary to modify the existing haul road and to develop an internal road system. This first phase will last about 10 years, starting in 2015.



**Figure 2.1.** Proposed mining phases for the Limpopo West Project.

The second stage, starting in 2018, will last about 17 years. In addition to further mining on Welgelegen, a new pit will start on the farm Groenfontein, and then it will be transported by conveyor belt to be washed and screened at a new plant, located on Tambootievley. This phase will require a power line (probably from Medupi), a new railway line for transport out

of the area and a new pipeline for water into the mine from the Mokolo and Crocodile Water Augmentation Plant (MCWAP), starting near Steenbokpan.

The third phase (Phase 3.1) will last some 74 years. It will extend the mining south to Gannavlake, Ringbult and Duikerfontein. The extended mining will use the existing infrastructure, including the water, power and railway, but further roads will be needed, as well as a new plant on Vlakfontein.

The final, northern phase (Phase 3.2) will run simultaneously with Phase 3.1. It includes a mega mine on Grootwater, Welgelegen and Geelbekpan. Once crushed on site, the ore will be sent via a conveyor belt to the Vlakfontein plant. In addition to the previous infrastructure, this phase will require an extensive road network for construction, haulage and service purposes. This phase will start in about 2028, and will last to about 2117.

### 3. METHOD

The presence and distribution of heritage resources defines a Heritage Landscape. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the Limpopo West Project, the extent of impact necessitates a comprehensive survey. In all initial investigations, however, the specialists are responsible for the identification of resources only visible on the surface.

Two ARM staff members examined the project area on several occasions. In July 2008, the team concentrated on the bulk sampling area of the Mine and other portions of the original Mafutha Project area (Huffman & Van der Walt 2008a). In December of the same year, they surveyed the northern and southern sections of a proposed road between the Steenbokpan-Stockpoort road in the south and the Stockpoort-Lephalale road in the north (Huffman & Van der Walt 2008b). In October and November 2010, they examined the entire Mafutha Project area (Huffman and Van der Walt 2011). For the present report, it was unnecessary to re-examine the mining area: previous investigations were sufficient.

In all cases, staff examined the terrain on foot and by vehicle. In addition to random walks and spot surveys, the team concentrated on graves noted by local people as well as pans and European farmsteads. An earlier desktop study (Huffman 2008) identified the importance of these places. As a result, the team consulted farm owners and farm workers on almost every property. Later, Mokoena representatives met with Sasol personnel (memo from J du Plessis to S Muller, 20 September 2011) to identify isolated graveyards. Pans and farmsteads were first identified on a series of orthophotos at the scale of 1: 10 000 produced for Sasol Mining. Later, the team used Google Earth. All sites were recorded with a hand-held GPS instrument calibrated to WGS 84, the same calibration as the 1: 10 000 orthophotos. Sites were then transferred to the 1: 50 000 map sheet 2327CB Steenbokpan. Site numbers follow a national system based on these maps.

For background information, the team consulted Professor Lyn Wadley (University of the Witwatersrand, Archaeology), Richard Wadley (geological consultant living in the Waterberg) and Professor Marion Bamford (University of the Witwatersrand, Palaeontology). The team also consulted two colleagues (F. Roodt and W. Fourie) who had conducted independent heritage assessments in the neighbourhood (see Anon 2010) as well as an impact report by a third colleague (Pistorius 2007) for the Mmamabula pipeline that passed through the district.

The South African Heritage Resources Agency recognises National and Provincial Monuments for conservation purposes. None of these exist in the Limpopo West Project area. For the rest, ARM bases site importance on five interrelated criteria: (1) primary versus secondary context; (2) amount of deposit; (3) number and variety of features; (4) uniqueness; and (5), potential to answer present research questions. Sites with no importance do not require mitigation; low to medium sites may require limited mitigation; while high importance requires extensive mitigation. Outstanding sites should not be disturbed at all. Recognizable graves have high social value regardless of their archaeological importance. Remains of historic homesteads that are 100 years or more



have high importance, while standing buildings over 60 years, regardless of their aesthetic appeal, need to be recorded by an architectural historian.

#### 4. BACKGROUND

A few background comments are necessary to place the individual sites into perspective. First, there are no visible fossil-bearing strata in the study area. The shale lenses that are expected to occur between the coal seams, however, will be of interest to palaeontologists once mining has begun.

Secondly, Middle Stone Age (250,000 to 25,000 years ago) remains were found at almost every pan, usually where the calcrete base was exposed. This calcrete formed during a cold period with alternating wet and dry episodes that allowed calcium carbonate to precipitate on to the land surface. Some Middle Stone Age (MSA) artefacts occurred in the calcrete, and so they predate this geo-morphological formation. These artefact assemblages typically include radial cores, triangular points, convergent scrapers and flakes (**Figure 4.1**). They represent what is called a Post Howieson's Poort Industry and thus date to between 60,000 and 40,000 years ago (see Deacon and Deacon 1999: 96-98). These Post Howieson's Poort artefacts were made from quartz and quartzite pebbles that formed part of the fericrete horizon found underneath the calcrete. This fericrete is an iron-rich formation derived from the Waterberg sandstones to the south. The stones and iron-rich soil must have first washed down during a high-rainfall period and then formed under arid conditions, perhaps about 200,000 years ago. If Early Stone Age artefacts occur in the study area, they will lie under this fericrete horizon.

Thirdly, all decorated pottery found in the study area belong to a stylistic facies known as *Letsibogo* (**Figure 4.2**). This style dates to between 1550 AD and 1750 AD and was made by Sotho-Tswana people (Huffman 2007: 186-189). Presumably, the undecorated pottery found on its own also belongs to this facies.



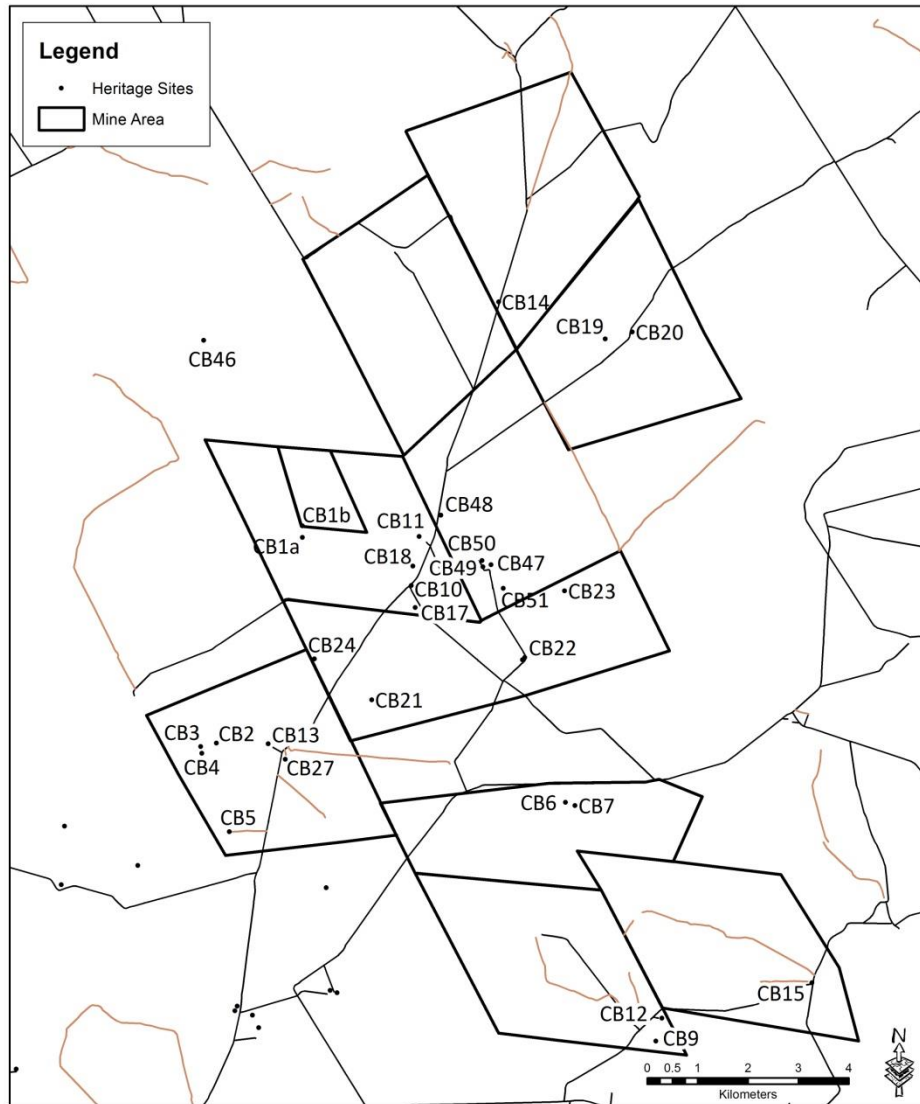
**Figure 4.1.** Typical Post Howieson's Poort artefacts.



**Figure 4.2.** *Letsibogo* pottery.

## 5. ENVIRONMENTAL BASELINE OF THE MINE

It will be convenient to document the heritage sites by time period (**Figure 5.1**). We consider the four mining phases later in Section 7—the Impact Assessment.



**Figure 5.1.** Heritage sites recorded in the Mine area.

### **5.1. Middle Stone Age**

**Site 2327CB1a** (23 35 02.5S 27 18 37E to 34 55S 18 37E S23.58403 E27.31028), a few stone artefacts scattered across the northwest side of large pan on the Matopi portion of Groenfontein (**Figure 5.2**). Besides the normal pebbles from the fericrete, some artefacts were made from hornfels and dolerite. *Medium importance*



**Figure 5.2.** Matopi pan: **CB1a**.

**Site 2327CB2** (23 37 14.6S 27 17 41.6E S23.62072 E27.29489), concentration of artefacts on east side of pan on Vlakfontein. Some artefacts are embedded in calcrete. *Medium importance*

**Site 2327CB3** (23 37 16.9S 27 17 31.5E S23.62136 E27.29208), another pan on Vlakfontein where MSA artefacts are embedded in calcrete. *Medium importance*

**Site 2327CB4** (23 37 21.2S 27 17 32.3E S23.62256 E27.29231), artefacts on top of calcrete border around pan on Vlakfontein. *Low importance*

**Site 2327CB5** (23 38 11.5S 27 17 50E S23.63653 E27.29722), small scatter of artefacts near a fericrete exposure in an artificially enhanced pan at the southern end of Vlakfontein. *No importance*

**Site 2327CB6** (23 37 52.7S 27 21 26E S23.63131 E27.35722), artefacts scattered around half of pan on Duikerfontein. *Low importance*

**Site 2327CB7** (23 37 54.8S 27 21 32.1E S23.63189 E27.35892), artefact scatter around pan about 200m from Site 2. *Low importance*

**Site 2327CB9** (23 40 26S 27 22 24E S23.67389 E27.37333), pan in southeast corner of Gannavlake. MSA on calcrete border and some embedded in calcrete. *Medium importance*

**Site 2327CB21** (23 36 46.8S 27 19 21.6E S23.61300 E27.32267), pan on Tambootievley with stone artefacts, calcrete and fericrete. *Medium importance*

**Site 2327CB23** (23 35 36.9S 27 21 25.4E S23.59358 E27.35706), pan in northeast corner of Tambootievley with stone artefacts covered by sand. *Medium importance*

**Site 2327CB24** (23 36 20.5S 27 18 44.7E S23.60569 E27.31242), pan in northwest corner of Tambootievley with stone tools and fericrete. *Medium importance*

## **5.2. Iron Age**

**Site 2327CB1b** (23 35 02.5S 27 18 37E to 34 55S 18 37E S23.58200 E27.31028), undecorated pot shards on calcrete rim of Matopi pan. *Low importance*

## **5.3. Historic**

**Site 2327CB10** (23 35 33.4S 27 19 46.9E S23.59261 E27.32969), remains of original Groenfontein homestead, built in 1907/08 by D.P. van der Westhuizen (**Figure 5.3**). According to the grandson, Mr P. du Beer, the house was built out of mud bricks made with paraffin tins. The complex includes the remains of a windmill and stables. Unfortunately, this site was damaged by the Road Widening project. *High importance*



**Figure 5.3.** Original homestead on Groenfontein: **CB10**.

**Site 2327CB11** (23 35 02S 27 19 52E S23.58389 E27.33111), housing for African labour on Groenfontein, used from about 1957 to 1980 when peanut farming was important. *Low importance*

**Site 2327CB12** (23 40 11.2S 27 22 27.8E S23.66978 E27.37439), foundations of pre-fabricated house on Gannavlake (**Figure 5.4**). *Low importance*



**Figure 5.4.** Pre-fabricated house on Gannavlakte: **CB12.**

**Site 2327CB13** (23 37 15S 27 18 15E S23.62083 E27.30417), original house on Vlakfontein (**Figure 5.5**), built in the 1930s, according to recent owner Mr M. Venter. *Medium importance*



**Figure 5.5.** Original house on Vlakfontein: **CB13.**

**Site 2327CB14** (23 32 31.5S 27 20 43E S23.54208 E27.34528), farm complex on Grootwater, probably built in the 1930s by the De Lange family. The complex includes house foundations, a windmill, standing barn and a small African compound. *Medium importance*

**Site 2327CB15** (23 39 48.6S 27 24 04.2E S23.66350 E27.40117), homestead complex on Ringbult. One brick building with wooden windows appears to be over 60 years old (**Figure 5.6**). *Low importance*



**Figure 5.6.** Brick building on Ringbult: **CB15**.

**Site 2327CB19** (23 32 55.4S 27 21 51.4E S23.54872 E27.36428), farm labourer housing on Geelbekpan (now Japie). *Low importance*

**Site 2327CB20** (23 32 51S 27 22 09E S23.54750 E27.36917), Geelbekpan homestead. *Medium importance*

**Site 2327CB22a** (23 36 19.7S 27 20 59.9E S23.60547 E27.34997), Tambootievley main house (**Figure 5.7**). *Low importance*



**Figure 5.7.** Main house on Tambootievley: **CB22a**.

**Site 2327CB26** (23 38 33.2S 27 16 51.2E S23.64256 E27.28089), farm labourer housing on Vlakfontein, including coal cinder, bottle glass and cut bone. *Low importance*

**Site 2327CB27** (23 37 25S 27 18 26E S23.62361 E27.30722), farm labourer housing on Vlakfontein. *Low importance*

#### **5.4. Graveyards**

**Site 2327CB17** (23 35 47.6S 27 19 49.4E S23.59656 E27.33039), the graves of two white children on Groenfontein, who died of flu in about 1914 (**Figure 5.9**). These children were members of a family passing through on the way to Botswana who had out-spanned on Groenfontein. *High social importance*



**Figure 5.9.** Two European graves on Groenfontein: **CB17**.

**Site 2327CB18** (23 35 21S 27 19 48E S23.58917 E27.33000), three to five African graves on Groenfontein (**Figure 5.10**). These graves belonged to women who had worked for Mrs van der Westhuizen more than 60 years ago. Community representatives identified these graves in September 2011 as belonging to the Tapeng, Masenya, Murulane and Ndlela families. *High social importance*



**Figure 5.10.** African graves on Groenfontein: **CB18**.



**Site 2327CB22b** (23 36 21.2S 27 20 58.4E S23.60589 E27.34956), five European graves of the Van der Westhuizen family in the Tambootievley cemetery (**Figure 5.11**). *High social importance*



**Figure 5.11.** European graves on Tambootievley: **CB22b**.

In September 2011, the Mokoena family met with Sasol personnel to identify graves of community members who had previously worked in the area (Memo from J du Plessis to S Muller, 20 September 2011). In addition to **CB18**, they identified four more sites. We record them here, even though they lie outside the project boundary, because they were omitted from the Mafutha report.

**Site 2327CB48** (23 34 48.49S 27 20 05.93E S23.58014 E27.33498), the grave of April Ramokomoto's wife on Japie. *High social importance*

**Site 2327CB49** (23 35 21.4S 27 20 32.9E S23.58928 E27.34247), April Ramokomoto's 2 babies on Kleinberg. *High social importance*

**Site 2327CB50** (23 35 17.5S 27 20 32.4E S23.58819 S27.34233), Jerimiha's grandfather on Kleinberg. *High social importance*

**Site 2327CB51** (23 35 35.2S 27 20 46.1E S23.59311 E27.34614), Maria and Ana's children on Kleinberg. *High social importance*

## 6. LEGAL PROVISIONS

When the National Environmental Management Act (Act No. 107 of 1998) and the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) require evaluations of heritage resources, the evaluations must comply with the provisions of the National Heritage Resources Act, 1999 (Act No. 25 of 1999). For the Limpopo West Project, the relevant provisions concern structures (section 34), archaeological sites (section 35) and graves (section 36).

According to the NHR Act, a 'structure' means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith (definitions page 12). Further, no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant heritage resources authority (section 34 page 58).

In the NHR Act, 'archaeological' means material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures (definitions page 6). Subject to the provisions of subsection (8) (a), all archaeological objects are the property of the State. Consequently, no person may, without a permit issued by the responsible heritage resources authority: (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological site; or (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological object (section 35 page 58).

Finally, a 'grave' is a place of internment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place (definitions page 8). Where it is not the responsibility of any other authority, the South African Heritage Resources Agency (SAHRA) must care for the graves of victims of conflict and graves older than 60 years located outside a formal cemetery administered by a local authority. Therefore, no person may, without a permit issued by SAHRA or its delegate, destroy, damage, alter, exhume, or remove from its original position or otherwise disturb: (a) the grave of a victim of conflict or burial ground which contains such graves; or (b) any grave or burial ground older than 60 years which is situated outside a formal cemetery (section 36 page 60).

Before SAHRA or its delegate will issue permits, it requires an impact assessment that identifies and maps the location of all heritage resources which will be impacted in the project area. The baseline report serves this purpose.

The baseline report also meets the Performance Standard concerning cultural heritage (Standard 8) recommended by the International Finance Corporation (IFC 2006: 32-34). For the Limpopo West Project the most important objective of Standard 8 is 'to protect cultural heritage from the adverse impacts of project activities and support its preservation'. The following impact assessment provides the platform for this objective.

## 7. IMPACT ASSESSMENT

The purpose of this impact assessment is to determine which heritage resources require protection or other mitigation measures before development continues. In this regard, heritage resources are somewhat different from other components of the environment in that they incorporate a ‘sense of place’ relevant to the people at the time. Furthermore, heritage resources are the result of human action in specific circumstances that can never be repeated. These are some of the reasons why heritage resources are irreplaceable and their destruction irreversible. As a result of these differences, numerical scales applied to natural resources will over-value some categories, such as Likelihood (frequency of activity and impact), and under-value others, such as Duration of Impact. Most importantly, the decision to mitigate is not an administrative decision by the developer, but must instead be based on heritage importance dictated by the heritage legislation outlined in Section 6. Nevertheless, it is possible to adapt the standard significance rating scheme to determine impact significance.

As a principle, heritage importance affects all impact categories. This importance is first expressed as none = 0, low = 1, medium = 3 and high = 4. Because grave sites have high social importance, their score always equals 4. Secondly, because heritage resources are irreplaceable and irreversible, the severity of impact is always permanent and therefore equals 5 (Because the Limpopo West project will impact a huge area, we assume all sites will be destroyed). In this scheme, Duration follows the same pattern as Severity, while the frequencies of Activity and Impact are determined by the heritage rating. With these adjustments, it is possible to determine the range of significance scores for each category of importance. **Table 7.1** illustrates significance scores for sites with different heritage ratings.

**Table 7.1.** Significance scores determined by heritage rating.

	Importance	Severity	Scope	Duration	Activity	Impact	Significance
none	0	5	0	5	0	0	10
low	1	5	1	5	1	1	22
medium	3	5	3	5	3	3	78
high	4	5	4	5	4	4	112

In the following sections, we group sites by their heritage importance, excluding the one site with none (**CB5**).

### **7.1. Phases 1 and 2**

Because both **Phase 1** and **2** involve disturbances on Welgelegen and Groenfontein, and because they start ground operations at almost the same time, we consider the two phases together. Because of the extensive ground disturbance, most heritage sites will ultimately be impacted. For practical reasons, we presume the sites will be completely destroyed. One

historic site (**CB11**) and one Iron Age site (**CB1b**) have low heritage importance, and so they each score 22. One MSA site (**CB1a**) has medium importance, and therefore scores 78. The historic Groenfontein house complex (**CB10**) and two graveyards (**CB17** and **CB18**) all have high significance. The Groenfontein homestead cannot be covered over without extensive damage, and so its significance score is 112. Because the graveyards have high social importance, their significance score is 112.

**Table 7.2.** Significance scores for sites in the Mine area for **Phases 1 and 2.**

100% damage	Site	Severity	Scope	Duration	Activity	Impact	Significance
1.	<b>CB1b, CB11,</b>	5	1	5	1	1	22
3.	<b>CB1a</b>	5	3	5	3	3	98
4.	<b>CB10, CB17, CB18</b>	5	4	5	4	4	112

**Table 7.3a.** Impact assessment for destruction of Stone Age site with medium importance: **CB1 a.**

Impact:		Heritage—medium importance					
Project phase:		Phases 1 and 2 Construction					
SRK CONSEQUENCE OF IMPACT					Sub-total: 13		
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT		RATING	DURATION OF IMPACT	RATING	
Insignificant / non-harmful	1	Activity specific		1	One day to one month	1	
Small / potentially harmful	2	Area / site specific		2	One month to one year	2	
Significant / slightly harmful	3	Local area (within 5 km of site)		3	One year to ten years	3	
Great / harmful	4	Regional (neighbouring areas)		4	Life of operation	4	
Extremely harmful	5	X	National	5	Post closure / permanent	5	X
SRK LIKELIHOOD OF IMPACT OCCURRING					Sub-total: 6		
FREQUENCY OF ACTIVITY		RATING		FREQUENCY OF IMPACT		RATING	
Annually or less / low		1		Almost never / almost impossible		1	
6 monthly / temporary		2		Very seldom / highly unlikely		2	
Monthly / infrequent		3		X Infrequent / unlikely / seldom		3	
Weekly / life of operation / regularly / likely		4		Often / regularly / likely / possible		4	
Daily / permanent / high		5		Daily / highly likely / definitely		5	
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>78</b>		

**Table 3b.** Impact assessment for destruction of house complex with high importance: **CB10.**

Impact:		Heritage—high importance					
Project phase:		Phases 1 and 2 Construction					
SRK CONSEQUENCE OF IMPACT					Sub-total: 14		
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING		
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1		
Small / potentially harmful	2	Area / site specific	2	One month to one year	2		
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3		
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4	X	
Extremely harmful	5	National	5	Post closure / permanent	5	X	
SRK LIKELIHOOD OF IMPACT OCCURRING					Sub-total: 8		
FREQUENCY OF ACTIVITY		RATING	FREQUENCY OF IMPACT		RATING		
Annually or less / low		1	Almost never / almost impossible		1		
6 monthly / temporary		2	Very seldom / highly unlikely		2		
Monthly / infrequent		3	Infrequent / unlikely / seldom		3		
Weekly / life of operation / regularly / likely		4	Often / regularly / likely / possible		4	X	
Daily / permanent / high		5	Daily / highly likely / definitely		5	X	
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>112</b>		

**Table 3c.** Impact assessment for destruction of grave sites: **CB17** and **CB18.**

Impact:		Heritage—high importance					
Project phase:		Phases 1 and 2 Construction					
SRK CONSEQUENCE OF IMPACT					Sub-total: 14		
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING		
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1		
Small / potentially harmful	2	Area / site specific	2	One month to one year	2		
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3		
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4	X	
Extremely harmful	5	National	5	Post closure / permanent	5	X	
SRK LIKELIHOOD OF IMPACT OCCURRING					Sub-total: 8		
FREQUENCY OF ACTIVITY		RATING	FREQUENCY OF IMPACT		RATING		
Annually or less / low		1	Almost never / almost impossible		1		
6 monthly / temporary		2	Very seldom / highly unlikely		2		
Monthly / infrequent		3	Infrequent / unlikely / seldom		3		
Weekly / life of operation / regularly / likely		4	Often / regularly / likely / possible		4	X	
Daily / permanent / high		5	Daily / highly likely / definitely		5	X	
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>112</b>		

### 7.3. Phase 3.1

The southern section of the large mine extends to Duikerfontein, Gannavlake and Ringbult. The two MSA sites on Duikerfontein (**CB6, CB7**) and the historic house foundations on Gannavlake (**CB12**) as well as the house complex on Ringbult (**CB15**) have low importance. Only the MSA site on Gannavlake (**CB9**) has medium importance.

**Table 7.4.** Significance scores for sites in the Mine area for **Phase 3.1**.

100% damage	Site	Severity	Scope	Duration	Activity	Impact	Significance
1.	<b>CB6, CB7, CB12, CB15</b>	5	1	5	1	1	22
3.	<b>CB9</b>	5	3	5	3	3	98
4.	none						

**Table 7.4a.** Impact assessment for destruction of Stone Age sites with low importance: **CB6** and **CB7**.

Impact:		Heritage—low importance							
Project phase:		Phase 4 Construction							
SRK CONSEQUENCE OF IMPACT						Sub-total: 11			
SEVERITY OF IMPACT	RATING	SPATIAL EXTENT	SCOPE /	RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1		Activity specific	1	X	One day to one month	1		
Small / potentially harmful	2		Area / site specific	2		One month to one year	2		
Significant / slightly harmful	3		Local area (within 5 km of site)	3		One year to ten years	3		
Great / harmful	4		Regional (neighbouring areas)	4		Life of operation	4		
Extremely harmful	5	X	National	5		Post closure / permanent	5	X	
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 2			
FREQUENCY OF ACTIVITY			RATING	FREQUENCY OF IMPACT			RATING		
Annually or less / low			1	X	Almost never / almost impossible			1	X
6 monthly / temporary			2		Very seldom / highly unlikely			2	
Monthly / infrequent			3		Infrequent / unlikely / seldom			3	
Weekly / life of operation / regularly / likely			4		Often / regularly / likely / possible			4	
Daily / permanent / high			5		Daily / highly likely / definitely			5	
TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT						22			

**Table 7.4b.** Impact assessment for destruction of houses with low importance: **CB12** and **CB15**.

Impact:		Heritage—low importance							
Project phase:		Phase 4 Construction							
SRK CONSEQUENCE OF IMPACT						Sub-total: 11			
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	OF	DURATION IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1	X	One day to one month	1			
Small / potentially harmful	2	Area / site specific	2		One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3		One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)	4		Life of operation	4			
Extremely harmful	5	National	5		Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 2			
FREQUENCY OF ACTIVITY			RATING	FREQUENCY OF IMPACT			RATING		
Annually or less / low			1	X	Almost never / almost impossible			1	X
6 monthly / temporary			2		Very seldom / highly unlikely			2	
Monthly / infrequent			3		Infrequent / unlikely / seldom			3	
Weekly / life of operation / regularly / likely			4		Often / regularly / likely / possible			4	
Daily / permanent / high			5		Daily / highly likely / definitely			5	
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>						<b>22</b>			

**Table 7.4c.** Impact assessment for destruction of Stone Age site with medium importance: **CB9**.

Impact:		Heritage—medium importance							
Project phase:		Phase 4 Construction							
SRK CONSEQUENCE OF IMPACT						Sub-total: 13			
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	OF	DURATION IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1		One day to one month	1			
Small / potentially harmful	2	Area / site specific	2		One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3	X	One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)	4		Life of operation	4			
Extremely harmful	5	National	5		Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 6			
FREQUENCY OF ACTIVITY			RATING	FREQUENCY OF IMPACT			RATING		
Annually or less / low			1		Almost never / almost impossible			1	
6 monthly / temporary			2		Very seldom / highly unlikely			2	
Monthly / infrequent			3	X	Infrequent / unlikely / seldom			3	X
Weekly / life of operation / regularly / likely			4		Often / regularly / likely / possible			4	
Daily / permanent / high			5		Daily / highly likely / definitely			5	
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>						<b>78</b>			

### 7.3. Phase 3.2

The northern section of the large mine involves new disturbances on Groenfontein, Grootwater, Geelbekpan and Geelbekpan and parts of Vlakfontein and Tambootievley. One MSA site on Vlakfontein (**CB4**) is of low importance along with two compounds (**CB26**, **CB27**) on Vlakfontein and one on Geelbekpan (**CB19**), as well as the main house on Tambootievley (**CB22a**). Two MSA sites on Vlakfontein (**CB2**, **CB3**) are of medium importance. The historic houses on Vlakfontein (**CB13**), Grootwater (**CB14**) and Geelbekpan (**CB20**) are also of medium importance. The graves on Tambootievley (**CB22b**), on the other hand, have high importance.

**Table 7.5.** Significance scores for sites in the Mine area for **Phase 3**.

100% damage	Site	Severity	Scope	Duration	Activity	Impact	Significance
1.	<b>CB4, CB19, CB22a, CB26, CB27</b>	5	1	5	1	1	22
3.	<b>CB2, CB3, CB13, CB14, CB20, CB21, CB23, CB24</b>	5	3	5	3	3	98
4.	<b>CB22b</b>	5	4	5	4	4	112

**Table 7.5a.** Impact assessment for destruction of Stone Age sites with low importance: **CB4** and **CB5**.

Impact:		Heritage—low importance							
Project phase:		Phase 3 Construction							
SRK CONSEQUENCE OF IMPACT						Sub-total: 11			
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT		RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific		1	One day to one month	1			
Small / potentially harmful	2	Area / site specific		2	One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)		3	One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)		4	Life of operation	4			
Extremely harmful	5	X	National	5	Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 2			
FREQUENCY OF ACTIVITY		RATING	FREQUENCY OF IMPACT			RATING			
Annually or less / low		1	Almost never / almost impossible			1			
6 monthly / temporary		2	Very seldom / highly unlikely			2			
Monthly / infrequent		3	Infrequent / unlikely / seldom			3			
Weekly / life of operation / regularly / likely		4	Often / regularly / likely / possible			4			
Daily / permanent / high		5	Daily / highly likely / definitely			5			
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>						<b>22</b>			



**Table 7.5b.** Impact assessment for destruction of houses and compounds with low importance: **CB26, CB27, CB19** and **CB22a**.

Impact:		Heritage—low importance						
Project phase:		Phase 3 Construction						
SRK CONSEQUENCE OF IMPACT					Sub-total: 11			
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1			
Small / potentially harmful	2	Area / site specific	2	One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4			
Extremely harmful	5	National	5	Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING					Sub-total: 2			
FREQUENCY OF ACTIVITY		RATING	FREQUENCY OF IMPACT		RATING			
Annually or less / low		1	Almost never / almost impossible		1	X		
6 monthly / temporary		2	Very seldom / highly unlikely		2			
Monthly / infrequent		3	Infrequent / unlikely / seldom		3			
Weekly / life of operation / regularly / likely		4	Often / regularly / likely / possible		4			
Daily / permanent / high		5	Daily / highly likely / definitely		5			
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>22</b>			

**Table 7.5c.** Impact assessment for destruction of Stone Age sites with medium importance: **CB2** and **CB3**.

Impact:		Heritage—medium importance						
Project phase:		Phase 3 Construction						
SRK CONSEQUENCE OF IMPACT					Sub-total: 13			
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1			
Small / potentially harmful	2	Area / site specific	2	One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4			
Extremely harmful	5	National	5	Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING					Sub-total: 6			
FREQUENCY OF ACTIVITY		RATING	FREQUENCY OF IMPACT		RATING			
Annually or less / low		1	Almost never / almost impossible		1			
6 monthly / temporary		2	Very seldom / highly unlikely		2			
Monthly / infrequent		3	Infrequent / unlikely / seldom		3	X		
Weekly / life of operation / regularly / likely		4	Often / regularly / likely / possible		4			
Daily / permanent / high		5	Daily / highly likely / definitely		5			
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>78</b>			

**Table 7.5d.** Impact assessment for destruction of houses with medium importance: **CB13, CB14 and CB20.**

Impact:		Heritage—medium importance						
Project phase:		Phase 3 Construction						
SRK CONSEQUENCE OF IMPACT						Sub-total: 13		
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1			
Small / potentially harmful	2	Area / site specific	2	One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3	X		
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4			
Extremely harmful	5	National	5	Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 6		
FREQUENCY OF ACTIVITY			RATING	FREQUENCY OF IMPACT		RATING		
Annually or less / low			1	Almost never / almost impossible		1		
6 monthly / temporary			2	Very seldom / highly unlikely		2		
Monthly / infrequent			3	Infrequent / unlikely / seldom		3	X	
Weekly / life of operation / regularly / likely			4	Often / regularly / likely / possible		4		
Daily / permanent / high			5	Daily / highly likely / definitely		5		
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>						<b>78</b>		

**Table 7.5e.** Impact assessment for destruction of graves: **CB22b.**

Impact:		Heritage—high importance						
Project phase:		Phase 3 Construction						
SRK CONSEQUENCE OF IMPACT						Sub-total: 14		
SEVERITY OF IMPACT	RATING	SPATIAL SCOPE / EXTENT	RATING	DURATION OF IMPACT	RATING			
Insignificant / non-harmful	1	Activity specific	1	One day to one month	1			
Small / potentially harmful	2	Area / site specific	2	One month to one year	2			
Significant / slightly harmful	3	Local area (within 5 km of site)	3	One year to ten years	3			
Great / harmful	4	Regional (neighbouring areas)	4	Life of operation	4	X		
Extremely harmful	5	National	5	Post closure / permanent	5	X		
SRK LIKELIHOOD OF IMPACT OCCURRING						Sub-total: 8		
FREQUENCY OF ACTIVITY			RATING	FREQUENCY OF IMPACT		RATING		
Annually or less / low			1	Almost never / almost impossible		1		
6 monthly / temporary			2	Very seldom / highly unlikely		2		
Monthly / infrequent			3	Infrequent / unlikely / seldom		3		
Weekly / life of operation / regularly / likely			4	Often / regularly / likely / possible		4	X	
Daily / permanent / high			5	Daily / highly likely / definitely		5		
<b>TOTAL OF PRE-MITIGATION SIGNIFICANCE OF IMPACT</b>						<b>112</b>		

#### **7.4. Cumulative Impacts**

Cumulative impacts are not an issue for these heritage resources. First, site significance is based on stand-alone criteria unaffected by future disturbances. Secondly, because the sites were fixed points on a past landscape, shrinking habitats due to development are not relevant. Further, the 'sense of place' for Historic and Iron Age sites can be reconstructed from historical accounts, while paleo-environmental data applies to Stone Age sites.

Cumulative impacts could only affect mitigation measures, but these, too, as the following section shows, already take into account relationships between sites.

## 8. MITIGATION

Although several heritage sites have medium to high impact significance scores, all can be mitigated. Moreover, they need to be mitigated before SAHRA will issue destruction permits. This mitigation constitutes a second phase of study. For the MSA, general surface collections will suffice for most sites with high artefact concentrations. In this case the collection should include a range of raw material (quartzite, hornfels, etc.) and artefact types (cores, flakes, points, etc.). For sites with medium importance, controlled sampling is preferred, that is all artefacts within a designated grid. The possibility of bone preservation is higher in sites with artefacts embedded in calcrete. Therefore, mitigation should include test excavations in some cases.

For the Iron Age, only surface collections are needed.

An architectural historian needs to record all standing buildings 60 years or older. Because of the 'sense of place' important to heritage resources, the record should include the entire complex, that is houses, outbuildings, kraals, graves and labourer housing. Historic sites 100 years or older need the same level of recording, and in addition historical archaeologists need to sample some features, such as middens.

Because of the high social importance of graveyards, both European and African, they should be left *in situ* as a matter of principle. Ultimately, however, the graves will be impacted; and so, they must be removed and reburied, following the mandated procedure. These points have already been explained to some descendents (Memo from J du Plessis to S Muller, 20 September 2011).

The damage to the historic site on Groenfontein during the Road Widening project shows the necessity to complete all mitigation before further development begins. A timeline for the proposed mitigation appears in section 8.2.

Once mitigation has been completed, the Significance of Impact scores change to 6 for all sites, regardless of the measures. Because there will be no site left, ideally, Severity is 'insignificant', Scope is 'site specific', and there will be no Duration. Similarly, there will not be any Frequency or Duration (therefore 'low' and 'almost impossible', respectively). **Table 8** thus applies to every site and situation.

**Table 8.** Post-mitigation impact significance.

<b>Proposed mitigation:</b>		<b>General collection, controlled collection, test excavation, architectural recording and grave removal</b>			
<b>SRK CONSEQUENCE OF IMPACT</b>					<b>Sub-total: 3</b>
<b>SEVERITY OF IMPACT</b>	<b>RATING</b>	<b>SPATIAL SCOPE / EXTENT</b>	<b>RATING</b>	<b>DURATION OF IMPACT</b>	<b>RATING</b>
insignificant	1	Site specific	1	none	1
<b>SRK LIKELIHOOD OF IMPACT OCCURRING</b>					<b>Sub-total: 2</b>
<b>FREQUENCY OF ACTIVITY</b>		<b>RATING</b>	<b>FREQUENCY OF IMPACT</b>		<b>RATING</b>
low		1	Almost impossible		1
<b>TOTAL OF POST-MITIGATION SIGNIFICANCE OF IMPACT</b>					<b>6</b>

## **8.1. Mine**

Archaeologists should make general collections from most MSA sites and controlled collections from the MSA sites on Matopi (**CB1a**), Vlakfontein (**CB2, CB3**), Gannavlake (**CB9**) and Tambootievley (**CB21, CB23** and **CB24**). Depending on the results, test excavations may also be required, especially at **CB1a, CB2, CB10, CB21** and **CB23** (**Table 8.1**). It would be useful to have the Matopi Pan (**CB1a**) trenched with a backhoe.

An architectural historian needs to record the European farm complexes on Vlakfontein (**CB13**), Grootwater (**CB14**) and Geelbekpan (**CB20**), including the associated African housing (e.g. **CB27**). By the time the different mining phases begin, these structures will be over 60 years old. In addition, the original farmstead on Groenfontein (**CB10**) requires extensive recording and test excavations. **CB10**, however, stands next to the new Mine road, and it may therefore not be under immediate threat. It should nevertheless be recorded because of possible future damage from road maintenance.

The three graveyards (**CB17, CB18** and **CB22b**) will ultimately need to be relocated. Before then, they may require protection.

**Table 8.1.** Recommended mitigation for the Mine area.

	General collection only	Controlled collection	Test excavation	Architectural recording	Grave reburial
<b>Sites</b>	<b>CB4, CB6, CB7</b>	<b>CB1a, CB2, CB3, CB9, CB21, CB23, CB24</b>	<b>CB1a, CB2, CB10, CB21, CB23</b>	<b>CB10, CB13, CB14, CB20, CB27</b>	<b>CB17, CB18, CB22b</b>

## **8.2. Timeline**

From a heritage perspective, developers are not responsible for research, but they are responsible for the recovery of research potential. Thus, mitigation should be sufficiently comprehensive to permit research in the future.

Although mining will proceed in four phases, it will be more efficient to consider the mitigation as a single process for the entire project area. As a general rule, one week of test excavations requires three weeks in the laboratory. Lab work includes curation (washing, labelling), minimal analysis (stone tool types, ceramic types, species list) and illustrations (artefacts, section drawings, site plans). Afterwards, the report requires another week. The seven recommended excavations will then need 28 weeks. Both kinds of Stone Age collections require one week each (1 day for sampling, 3 lab days and 3 report days). The archaeological mitigation thus needs some nine months before applications can be submitted to SAHRA for destruction permits.

The architect recording the six historic sites will need about four weeks for each (1 week in the field, 1 week redrawing and 2 weeks for the report), but this work can be completed simultaneously with the archaeological mitigation. SAHRA, however, will require a separate application for destruction.

For graves, social consultation and SAHRA permits usually take two months, and then the actual removal and reburial takes another two days per grave. The three graveyards contain

some 12 graves. The graveyards, then, will take about three months to process and remove. Their removal and reburial can be accomplished at the same time as the other mitigation.

Although some of the mitigation can be simultaneous, it is better to calculate the necessary lead-time separately. The total mitigation therefore needs to start about 20 months before land disturbance begins. If the mitigation proceeds in phases in concert with the mining schedule (**Table 8.2**), then the mitigation measures for **Phases 1 and 2** require about seven months lead time; **Phase 3** needs 13 months; and **Phase 4** one month. We repeat the previous comment about efficiency: it is better to conduct the mitigation as a single process.

**Table 8.2.** Mitigation by mining phases.

	General collection only	Controlled collection	Test excavation	Architectural recording	Grave reburial
<b>Phase 1/2</b>		1	2	2	3
<b>Phase 3</b>	1	5	3	4	
<b>Phase 4</b>	2	1			

## 9. SUMMARY AND CONCLUSIONS

### 9.1. Middle Stone Age

The project area contains many MSA sites as a result of the local geomorphology. The erosion of the Waterberg sandstone over 200 000 years ago introduced quartzite pebbles and other raw material suitable for making stone tools. These pebbles are cemented in the fercrete that in turn marks the locations of the ancient drainage channels. MSA people appear to have sampled this resource wherever the channels were exposed at the time. Today, windblown sands cover much of the project area. As Site **CB23** shows, MSA artefacts can occur 1m below this sand cover. Thus, more artefacts probably lie under the present land surface.

Most MSA sites noted in the survey are associated with calcrete pans. The calcrete formed around low spots inside the old drainage channels. The team sampled a large proportion of these. The formation of the calcrete itself must post-date the artefacts since some artefacts are embedded in the calcrete at several sites. Site **CB2**, **CB3** and **CB9** provide examples. The date of these artefacts thus provides a maximum date for the calcrete.

The range of artefacts is the same throughout the Limpopo West area. In particular, radial cores, triangular flakes and small triangular points characterise all assemblages. This inventory belongs to the Post Howieson's Poort Industry that dates to between 60 000 and 40 000 years ago. The large number of sites indicates that the local climate was favourable to hunter/gatherers at that time. According to climatic data (Deacon and Lancaster 1988), it was probably too cold before then for human occupation in this area.

Post Howieson's Poort people were fully modern in physical form and behaviour. They would have spoken a fully-formed language and would have been proficient hunters. The small triangular points indicate that they hunted with spears.

Other than questions regarding stone tool manufacture, most research issues are dependent on good organic preservation. Faunal remains in open sites, in particular, are an important source of evidence for past human behaviour. Some important pan sites in the Northern Cape, for example, contain a thick lens of fossilised bone and teeth. Such preservation is not a feature of the MSA sites in the Limpopo West area. Thus, their importance is limited. An elephant tooth from a pan in the original Project Mafutha area (Huffman and Van der Walt 2011), on the other hand, shows that faunal remains could be buried. This is why a deep trench at Matopi Pan would be useful. Bone preservation is also possible at sites where MSA artefacts are embedded in calcrete.

None of these MSA occurrences have high or outstanding archaeological significance. Those that will be directly impacted, however, will require some mitigation.

### 9.2. Iron Age

The modern terrain is relevant to the distribution of Iron Age sites. A cluster of kraals on the calcrete plateau (in the original Town area) served as cattle posts for Sotho-Tswana people living in the Limpopo Valley west of the project area (Anon 2010; Huffman and Van der Walt 2011). These 16<sup>th</sup> century villagers were cultivating the Limpopo floodplain while their

herdsmen utilised the calcrete plateau for summer grazing. Summer rains would have filled the numerous pans. Pottery at site **CB1b** on Matopi show that cattle were grazed up to 15km from the villages. In winter, cattle would have eaten stubble in the fields. This dual strategy probably characterised many Iron Age societies in the region (Denbow 1982).

### **9.3. Historic**

The Historic Period in this area is relatively recent. Tsetse fly made the area unsuitable at first, and so European settlement only began at the beginning of the 20<sup>th</sup> century. Some of the first settlers, D.P. van der Westhuizen and C. Ricks, both arrived in about 1901. The main ox-cart route to Botswana, crossing the Limpopo a few kilometres upstream from the modern border post, passes through the Mine area. Some pans were used as outspans along this route; the pan near Site **CB10** on Groenfontein is one example. According to local sources, five roads converged here.

Because African farmers did not live in the area, also because of tsetse fly, labour had to come from far afield. Peanuts were the main crop in later years, and a few farms had compounds for their labour force. Site **CB11** is an example on Groenfontein. Most of these homesteads appear on the 1970 edition of the Steenbokpan map, photographed from the air in 1965. They are therefore at least 50 years old.

An architectural historian needs to record all standing buildings over 60 years old, and all Historic sites 100 years or older, before they can be destroyed. Unfortunately, the Road Widening project has already damaged Site **CB10**, the original Groenfontein homestead, even though the legal requirements were made clear in previous reports. This damage emphasizes the need to complete mitigation before development proceeds. The developer should allow one year for this process.

### **9.4. Graveyards**

According to both European and African sources, most people were not buried on farms in the Mine area because their real homes were located elsewhere. There are only three exceptions in the Mine area. It is possible, however, that the team missed isolated, unmarked graves that no one remembers. Ultimately, all graves will have to be relocated.

### **9.5. Limitations**

The survey may have missed some MSA sites associated with ancient drainages, and there may be isolated graves somewhere that no one remembers. The survey was nevertheless comprehensive, and the ARM team is satisfied that no sites of outstanding significance exist within the Mine area. As in all Phase-1 heritage surveys, the team could not search for artefacts below the present surface. Consequently, the project coordinators will need to establish a protocol for archaeological monitoring during the construction phase.



## **9.6. Mitigation**

In all, 18 different sites require mitigation, ranging from general surface collections to extensive excavations to the reburial of historic graves. Overall, the recovery of research potential and the protection of sites with high importance are in line with international performance standards. In the case of the Limpopo West project, cumulative impacts are not an issue. The following table summarises the recommended action.

**Table 9.1.** Summary of total mitigation for the Limpopo West Project.

	Collection	Controlled collection	Test excavation	Architectural recording	Grave reburial
Mine	3 MSA	7 MSA	4 MSA 1 Historic	6 Historic	3 sites

Finally, if there is a change in location of any activity that will impact another site, the same measures recommended here must apply to the new location. Furthermore, any land disturbance that begins before the recommended lead-time must be reported to the environmental coordinators to insure compliance with the accepted mitigation process.

## 10. REFERENCES

- Anon 2010. *Archaeological Impact Assessment (AIA) for the Proposed Boikarabelo Coal Project in the Waterberg Area, Limpopo Province*. Prepared for Resource Generation. Digby Wells and Associates, Johannesburg and Professional Grave Solutions, Pretoria.
- Deacon, H.J., Deacon, J. 1999. *Human Beginnings in South Africa*. David Philip, Cape Town.
- Deacon, J., Lancaster, N. 1988. *Late Quaternary Palaeoenvironments of Southern Africa*. Oxford University Press, Oxford.
- Denbow, J. 1982. The Toutswe Tradition: a study in socio-economic change. In R.R. Hitchcock and M.R. Smith (eds), *Settlement in Botswana*, pp. 73-86. Heinemann Educational Books for the Botswana Society, Gaborone.
- Huffman, T.N. 2007. *Handbook to the Iron Age: The Archaeology of Pre-Colonial Farming Societies in Southern Africa*. University of KwaZulu-Natal Press, Pietermaritzburg.
- Huffman, T.N. 2008. *Environmental Baseline Assessment for the CTL Facility and Town in Lephalale, Limpopo*. A desktop study prepared for Environmental Resources Management. Archaeological Resources Management, Johannesburg.
- Huffman, T.N., Van der Walt, J. 2008a. *Mafutha EBA: Cultural Heritage and Archaeology Report*. A field study prepared for Environmental Resources Management. Archaeological Resources Management, Johannesburg.
- Huffman, T.N., Van der Walt, J. 2008b. *Mafutha Road Widening Project*. A field study prepared for Environmental Resources Management. Archaeological Resources Management, Johannesburg.
- Huffman, T.N. Van der Walt, J. 2011. *Mafutha Heritage Report*. A field study prepared for Environmental Resource management, Sasol Technology, SRK Consulting and Sustainable Environmental Solutions. Archaeological Resources Management, Johannesburg.
- IFC 2006. *International Finance Corporation's Performance Standards on Social & Environmental Sustainability*.
- Pistorius, J.C.C. 2007. *A Phase 1 Heritage Impact Assessment Study for the Eskom Mmamabula Delta Project near Lephalale in the Limpopo Province of South Africa*. Prepared for PBA International.

## **11. DETAILS OF THE SPECIALISTS**

### **11.1. T.N. Huffman**

Tom Huffman (BA Denver, MA and PhD Urbana Illinois) is a member of the CRM section of the Association of Southern African Professional Archaeologists and is also accredited with SAHRA. He is a Principal Investigator for Iron Age archaeology and has directed Stone Age projects as well as supervised two doctoral theses dealing with Stone Age topics. He was Professor and HOD of the Archaeology Department at the University of the Witwatersrand for 24 years and is now Professor Emeritus.

Since 1990, he has been Director of Archaeological Resources Management. During this time, he has conducted over 400 CRM projects involving linear developments such as power lines and pipelines along with large-scale surveys for dam basins and mining developments. He has worked in Botswana, Swaziland, Zambia and Zimbabwe as well as South Africa.

### **11.2. J. van der Walt**

Jaco van der Walt (BA Pretoria, BA Hons Wits. MA Wits) is a member of the CRM section of the Association of Southern African Professional Archaeologists and is also accredited with SAHRA and AMAFA. His accreditation includes Colonial, Iron Age and Stone Age archaeology and Grave relocation.

He has been involved in archaeological and heritage assessments since 2000. During this time, he has conducted some 300 impact assessments in Botswana and Mozambique as well as South Africa. Among other things, these projects have included large-scale surveys for ferrochrome, gold, manganese and platinum mines.

**12. DECLARATIONS OF INDEPENDENCE**

**12.1. T.N. Huffman**



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

**PROJECT TITLE**

Limpopo West Mine Project
---------------------------

Specialist:	Thomas N Huffman		
Contact person:	same		
Postal address:	Archaeology, P Bag 3, P.O. Wits		
Postal code:	2050	Cell:	
Telephone:	011 717 6042	Fax:	
E-mail:	Thomas.huffman@wits.ac.		
Professional affiliation(s) (if any)	Principal Investigator-ASAPA, accredited with SAHRA		

Project Consultant:			
Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

The specialist appointed in terms of the Regulations\_

I, Thomas N Huffman, declare that --

General declaration:

I act as the independent specialist in this application  
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant  
I declare that there are no circumstances that may compromise my objectivity in performing such work;  
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;  
I will comply with the Act, regulations and all other applicable legislation;  
I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
all the particulars furnished by me in this form are true and correct; and  
I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Thomas N Huffman

\_\_\_\_\_  
Signature of the specialist:

Archaeological Resources Management

\_\_\_\_\_  
Name of company (if applicable):

26 March 2013

\_\_\_\_\_  
Date:



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

**PROJECT TITLE**

Limpopo West Mine Project
---------------------------

Specialist:	Jaco van der Walt	
Contact person:	same	
Postal address:		Cell: 082 373 8491
Postal code:		Fax:
Telephone:	Jaco.heritage@gmail.com	
E-mail:	ASAPA, accredited with SAHRA and AMAFA	
Professional affiliation(s) (if any)		

Project Consultant:		
Contact person:		
Postal address:		Cell:
Postal code:		Fax:
Telephone:		
E-mail:		

The specialist appointed in terms of the Regulations\_

Jaco van der Walt

I, \_\_\_\_\_, declare that -- General

declaration:

I act as the independent specialist in this application  
 I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant  
 I declare that there are no circumstances that may compromise my objectivity in performing such work;  
 I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;  
 I will comply with the Act, regulations and all other applicable legislation;  
 I have no, and will not engage in, conflicting interests in the undertaking of the activity;  
 I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;  
 all the particulars furnished by me in this form are true and correct; and  
 I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Jaco van der Walt

\_\_\_\_\_  
Signature of the specialist:

Archaeological Resources Management

\_\_\_\_\_  
Name of company (if applicable):

23 March 2013

\_\_\_\_\_  
Date: