McGregor Museum
Department of Archaeology

Heritage Impact Assessment for a a mining permit application in respect of alluvial diamonds and dolomite on the farm Waterfall 133 near Ritchie, Sol Plaatje Municipality, Northern Cape

David Morris & Jani Louw
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David Morris & Jani Louw, McGregor Museum, Kimberley
P.O. Box 316 Kimberley 8300
Tel 082 2224777 email dmorriskby@gmail.com
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Background

The McGregor Museum was approached by Mr Norman and Mrs Nyameka Bethanie of Obodo Business (24 Brockman Place, Beaconsfield, Kimberley), working also through Mr Kwindla Nobaza, to conduct a Phase 1 Archaeological Impact Assessment for a proposed 5 ha mining site (alluvial diamond and dolomite [sic]) on the farm Waterfall 133 near Ritchie. The site is situated adjacent to the Riet River about 5 km west of the town of Ritchie. This report follows a site visit by the authors on 23 May 2019 and reports on observations made.

Specialist

The authors of this report are archaeologists (PhD (UWC) and MA (UCT) respectively), the senior author accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists. He has previously carried out surveys in the region of the proposed activity. In addition, the senior author is familiar with the history of the area and has UCT-accredited training on Architectural and Urban Conservation: researching and assessing local (built) environments (S. Townsend, UCT).

Description of environment and potential impacts

The environment in question consists of basement rock outcrops flanking a narrow valley adjacent to the Riet River, mantled in places by shallow sands and limited gravel (valley-bottom), with Kimberley Thornveld vegetation including *Vachellia tortilis* subsp *heteracantha*, *Tarchonanthus* and other associated species. The north-western corner is situated on a debris/gravel dump resulting from previous alluvial diamond mining in the vicinity. The locality is indicated in the following maps (Figs 1-2).

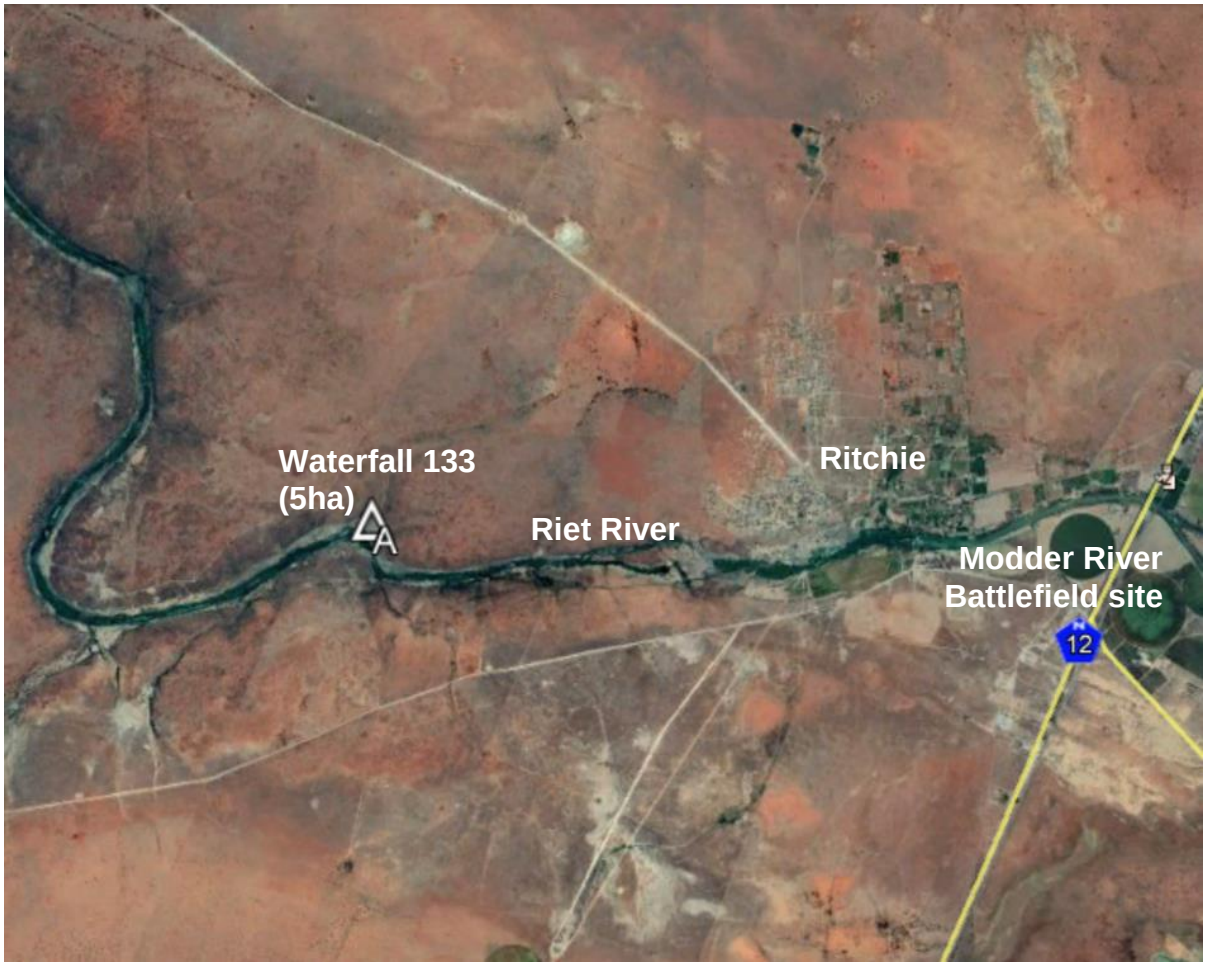

Figure 1. Google Earth image showing the location of the study site Waterfall 133 relative to the town of Ritchie and the historic Modder River Battlefield site which straddles the N12 south of the Riet River.

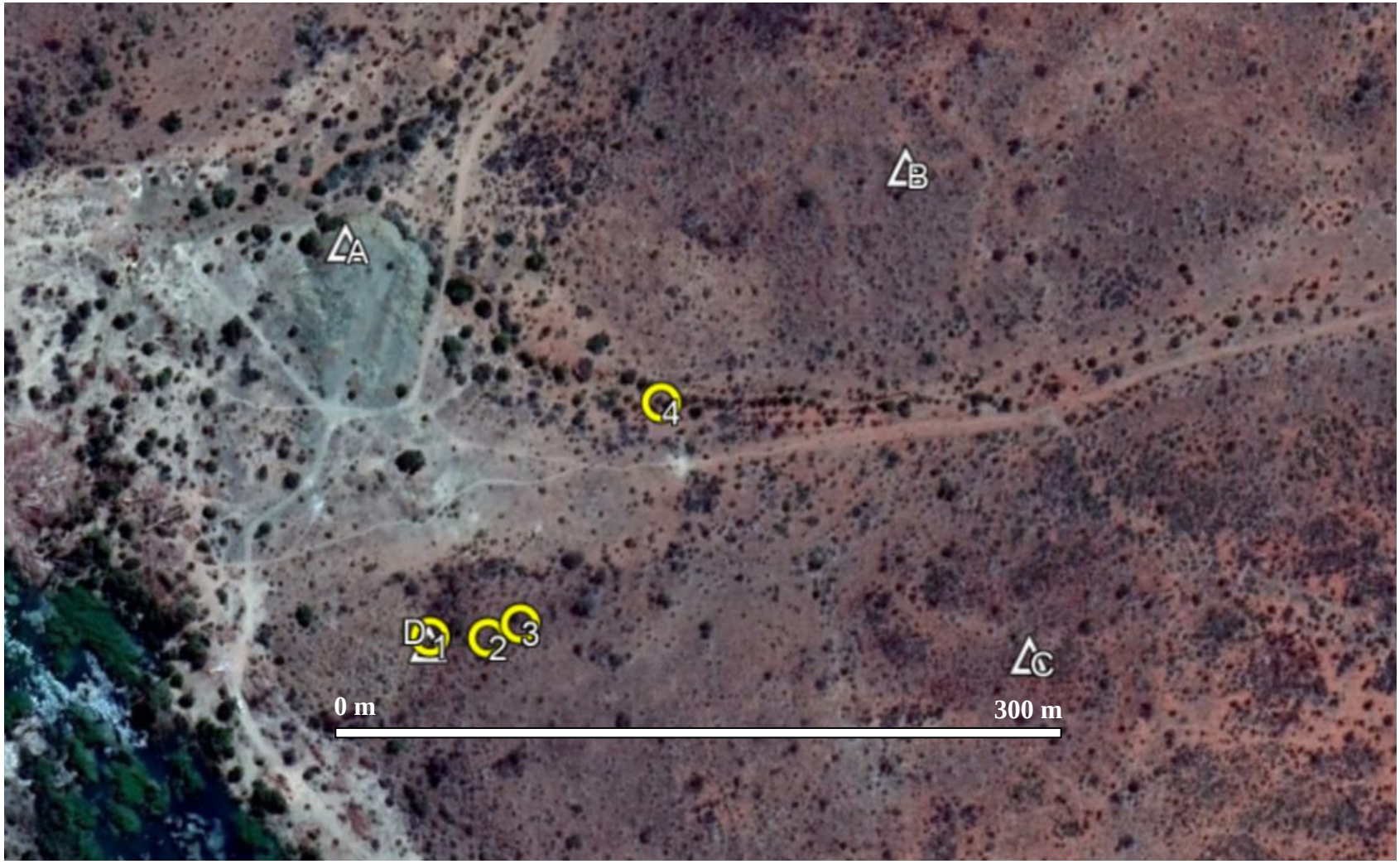

Figure 2. Google Earth image showing corner points A, B, C & D as well as observations 1-4 mentioned in the text below.

In terms of heritage features of the region, the following comments may be made:

Colonial history

Of greatest significance from the colonial period in the area is the history of the South African Anglo-Boer War (1899-1902) and specifically of the Battle of Modder River, 28 November 1899, which was fought south Ritchie, mostly south of the Riet River (F.M. Barbour pers. comm.). Further action took place at Koedoesberg Drift some 16 km downstream from the study site on 7 February 1900: all fords across the Riet will have been monitored in this period.

Some decades previously, the area lay to the north east of the Albania Settlement of the 1860s and it came to greater prominence following the discovery of diamonds around 1870. The northward extension of the railway, to Kimberley, in 1885 saw construction of the main line from Cape Town, through Modder River to the east of project area. The railway was subsequently to be of strategic importance for the British forces approaching northwards to Kimberley in November 1899, hence the Battle of Modder River taking place in this vicinity.

Stone Age

Stone Age material found in this area spans the Earlier, Middle and Later Stone Ages through Pleistocene and Holocene times. Of particular interest are Pleistocene sites in the wider area, along the Vaal River (e.g. Beaumont & Morris 1990; Beaumont & McNabb 2000), and similar material is known to occur along the Riet River. Late Holocene material with pottery is known to occur on the river banks, while rock engravings are richly distributed in the region, the site of Driekops Eiland being of particular renown (Wilman 1933; Morris 1988). Engravings occur at Scotchman's Pool, Ritchie, as well as in the hills south of Ritchie, e.g. within the Mokala Park. Near to the project area lies the distribution of "Type R" stone-walled settlements, but these are mainly along the Riet River upstream from Ritchie and generally at the foot of hills close to the river.

Terraces along the rivers have long been known for their association with archaeological and Plio-Pleistocene fossil material (e.g. Helgren 1979).

Description and evaluation of environmental issues and potential impacts

Heritage resources including archaeological sites are in each instance unique and non-renewable resources. Area and linear developments can have a permanent destructive impact on these resources in cases where they are impacted. The

objective of this study is to assess the significance of such resources, where present, and to recommend no-go or mitigation measures (where necessary) to facilitate or constrain the development.

Principally, area impacts would occur in the area of the proposed mining at Waterfall 133, with linear impacts along access roads. It is noted that an existing farm road links the proposed mining area directly with the Ritchie-Koedoesberg road that is visible in Figure 1.

Some confusion has pertained as to what mineral resources would be mined. DMR correspondence refers to dolomite, carbonate rock which does not occur here at all. The landscape cuts down into a pre-Karoo surface, with rocks outcropping being Ventersdorp andesite and granite relating to the Allenridge Formation (Agenbach 2004). The Agenbach report gives reasons for alluvial diamond mining not being viable on Waterfall 133 since the gravels are recent and not demonstrated to be diamondiferous. The applicants indicated that the resource to be exploited principally was "dolomite" (sic), presumably in fact Ventersdorp rocks, for crushing and supply of ballast to Transnet for refurbishment of railway lines.

Direct, indirect and cumulative impacts (in terms of nature and extent)

The destructive impacts that are possible in terms of heritage resources would tend to be direct once-off events occurring during active mining/quarrying and processing.

Indirect and cumulative impacts could result from on-going use or expansion of the site and secondary activities resulting from the movement or personnel and vehicles at the site and along access routes.

Statement of significance

In addition to guidelines provided by the National Heritage Resources Act, a set of criteria based on Deacon nd and Whitelaw 1997 for assessing archaeological significance has been developed for Northern Cape settings (Morris 2000a).

Estimating site potential

Table 1 is a classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon nd, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential. There are notable exceptions, such as the renowned rock art site Driekopseiland, near

Kimberley, which is on landform L1 Type 1. Generally, moreover, the older a site the poorer the preservation. Estimation of potential, in the light of such variables, thus requires some interpretation.

Assessing site value by attribute

The second matrix (Table 2) is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu-Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes. While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

Table 1. Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon, National Monuments Council).

Class	**Landform**	**Type 1**	**Type 2**	**Type 3**
L1	Rocky surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near feature such as hill	On old river terrace
L4	Sandy ground, Coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin
L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Sloping floor or small area	Flat floor, high ceiling
Class	**Archaeo-logical traces**	**Type 1**	**Type 2**	**Type 3**
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell or bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick

Table 2. Site attributes and value assessment (adapted from Whitelaw 1997)

Class	**Attribute**	**Type 1**	**Type 2**	**Type 3**
1	Length of sequence/context	No sequence	Limited sequence	Long sequence

		Poor context Dispersed distribution		Favourable context High density of arte/ecofacts
2	Presence of exceptional items (incl regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

Methodology for HIA assessment

A site visit to inspect the site was took place on 23 May 2019. An assessment was made of heritage traces within the 5 ha extent of the proposed mining site.

It was anticipated that indications of the archaeology of the site would be visible at the present surface, given the mainly erosional regime prevailing on the higher surfaces, as well as in donga cuttings in the valley that expose sections in a few places in the overlying silt/alluvium within the valley situated east-west through the 5 ha study site. Of interest on the rocky slopes are outcrops of Ventersdorp basement rock which may host rock engravings.

Observations

The high-lying areas representing remnants of a plateau flanking the incised Riet River valley and the drainage line between them (see Fig. 2) were walked by two archaeologists and archaeology assistant Koot Msalwula, in the course of which two principal kinds of archaeological observations were made.

- In a fairly small area at the south westernmost corner of the 5ha study site, four largely indeterminate rock engravings were found (Observations 1-3 in Fig. 2).

- On the rocky upland portions virtually no stone artefacts were noticed, but Middle Stone Age occurrences were noted in sheet-eroded areas and in donga

sections in the small valley dissecting the study site (Observation 4 in Fig. 2). A Later Stone Age lower grindstone was found within the distribution of the MSA surface scatter.

Figure 3. Engraved mark. 29°02’32.2”S 24°32’21.5”E

Figure 4. Engraved mark. 29°02’32.2”S 24°32’21.5”E

Figure 5. Engraved mark. 29°02’32.2”S 24°32’21.5”E

Figure 6. Engraved mark. 29°02’32.2”S 24°32’22.4”E

Figure 7. Engraved (scraped) mark. 29°02’32.0”S 24°32’22.9”E

Figure 8. Middle Stone Age artefacts on side of donga. 29°02’29”S 24°32’25”E

Figure 9. Later Stone Age lower grindstone on side of donga within distribution of MSA artefacts. 29°02’29”S 24°32’25”E

Figure 10. Watercourse through centre of the 5 ha site.

No colonial era features were noted within the study site. Potential Anglo-Boer War-associated heritage occurs in the wide landscape but is mainly linked with the Battles of Modder River to the end and of Koedoesberg Drift to the west of Waterfall 133.

Characterising the significance of impacts

The following criteria are used in this study to characterise the significance of direct, indirect and cumulative impacts:

- The **nature**, which shall include a description of what causes the effect, what will be affected, and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
    - local extending only as far as the development site area – assigned a score of 1;
    - limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
    - will have an impact on the region – assigned a score of 3;
    - will have an impact on a national scale – assigned a score of 4; or

    - will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment;
    - 2 is minor and will not result in an impact on processes;
    - 4 is low and will cause a slight impact on processes;
    - 6 is moderate and will result in processes continuing but in a modified way;
    - 8 is high (processes are altered to the extent that they temporarily cease); and
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
    - Assigned a score of 2 is improbable (some possibility, but low likelihood);
    - Assigned a score of 3 is probable (distinct possibility);
    - Assigned a score of 4 is highly probable (most likely); and
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- the **status**, which will be described as either positive, negative or neutral.
    - the degree to which the impact can be reversed.
    - the degree to which the impact may cause irreplaceable loss of resources.
    - the *degree* to which the impact can be *mitigated.*

The **significance** is determined by combining the criteria in the following formula:

S= (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Impact table summarising the significance of impacts at Ramphele PV site

Nature Acts or activities resulting in disturbance of surfaces and/or sub-surfaces containing artefacts (causes) resulting in the destruction, damage, excavation, alteration, removal or collection from its original position (consequences), of any archaeological material or object (what affected).		
	Without mitigation	***With mitigation***
Extent	Local (1)	Local (1)
Duration	Permanent (5) where archaeological material is impacted.	Permanent (5)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes, though not of critical significance.	
Can impacts be mitigated?	Plan impact on hilltop to avoid damaging the engravings at the south-western corner of the 5ha site.	On-going management as per EMP
Mitigation: Mitigation measures should be implemented so as to avoid destruction of the engraved rocks at the south-western corner of the site.		
Cumulative Impacts: Where any archaeological contexts occur the impacts are once-off permanent destructive events. Future expansion and any infrastructure development may lead to spatially extended impacts in the vicinity. EMP should provide for on-going monitoring.		
Residual Impacts: Depleted archaeological record.		

MEASURES FOR INCLUSION IN THE DRAFT ENVIRONMENTAL MANAGEMENT PLAN

OBJECTIVE: Archaeological or other heritage materials occurring in the path of any surface or sub-surface disturbances associated with any aspect of the development are highly likely to be subject to destruction, damage, excavation, alteration, or removal. The objective should be to limit such impacts to the primary activities associated with the mining/quarrying and hence to limit secondary impacts during the medium and longer term working life of the Waterfall 133 operation.

Project component/s	Any road construction over and above what is necessary and any extension of other components.
Potential Impact	The potential impact if this objective is not met is that wider areas or extended linear developments may result in further destruction, damage, excavation, alteration, removal or collection of heritage objects from their current context in the area.
Activity/risk source	Activities which could impact on achieving this objective include deviation from the planned lay-out of the mining operation and of access road/s without taking heritage impacts into consideration.
Mitigation: Target/Objective	A mining environmental management plan that takes cognizance of heritage resources in the event of any future expansion, access roads or other infrastructure.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Provision for on-going heritage monitoring in a facility environmental management plan which also provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of mining/development or operation.	Environmental management provider with on-going monitoring.	Environmental management plan to be in place before commencement of mining.
Plan layout of the mining operation in such a way as to avoid disturbance of the fixed rocks with engravings on the hill at the south-western corner of the 5ha mining site.	Mining company.	Planned mitigation in relation to engraved rocks to be in place before mining/quarrying starts.

Performance Indicator	Inclusion of further heritage impact consideration in any future expansion or infrastructural elements. Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of mining/quarrying.
Monitoring	Officials from relevant heritage authorities (National and Provincial) to be permitted to inspect the operation at any time in relation to the heritage component of the management plan.

CONCLUSIONS

Archaeological resources were found to occur in the study site in the form of four engraved rocks at one corner of the site and eroding Middle Stone Age artefacts at the lower western end of the valley which runs through the middle of the site.

The Waterfall 133 site is well clear of the 1899 battlefield and no colonial era heritage was noted.

From an archaeological perspective the observed heritage resources may be regarded not being of high significance, yet worthy of being conserved as far as this is possible. The occurrence of the few engraved rocks being at the outer south western edge of the proposed mining site, it is urged as a mitigation measure to plan quarrying activity around this feature and hence preserve it. Criteria used here for impact significance assessment rate the impacts as medium (mainly because for heritage traces, unlike biological processes, impacts are irreversible, of permanent duration and probable in terms of magnitude). The mitigation measures suggested would reduce this impact.

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