McGregor Museum
Department of Archaeology

Heritage Impact Assessment of proposed diamond (alluvial and general) mining at Jakhalsfontein near Schmidtsdrift, Northern Cape.

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1. INTRODUCTION

Carol Ntshwenyi, from Nyezi Holdings (Pty) Ltd, approached the McGregor Museum archaeology department to conduct a heritage impact assessment on a proposed diamond mining site on the farm Jakhalsfontein (portion 1 of Farm Schidtsdrift No: 248), west of Schmidtsdrift, within the administrative district of Herbert, Northern Cape.

The site was visited and inspected on 21 May 2018. This report accounts for findings made.

1.1. Focus and Content of Specialist Report: Heritage

This archaeology and heritage specialist study is focused on a an area designated by the applicant which is situated largely within in a valley and including the slopes on either side, being the upper reaches of a kloof between krantzes defining a minor scarp between the Ghaap and the Vaal.

This study outlines:

- Introduction, explaining the focus of the report (1.1) and introducing the author in terms of qualifications, accreditation and experience to undertake the study (1.2)
- Description of the affected environment (2) providing background to the development and its infrastructural components (2.1); background to the heritage features of the area (2.2); and defining environmental issues and potential impacts (2.3)
- Methodology (3) including an assessment of limitations (3.1); statement of expectations or predictions (3.2) and outline of EIA procedures including criteria for assessing archaeological significance (3.3).
- Observations and assessment of impacts (4), including field observations (4.1); characterizing archaeological significance (4.2); and characterizing the overall significance of impacts (4.3).
- Summary of Significance of Impacts is stated in tabular form (4.3.1).

- Measures for inclusion in a draft Environmental Management Plan for the development are set out in tabular form (5).
- Conclusions (6).

1.2 The author of this report

The first author (David Morris) of this report is a qualified archaeologist (PhD, University of the Western Cape) accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists. The author has worked as a museum archaeologist in the Northern Cape since 1985. In addition, the author has a comprehensive knowledge of Northern Cape history and built environment, and received UCT-accredited training at a workshop on Architectural and Urban Conservation: researching and assessing local (built) environments (S. Townsend, UCT). He is also Chairman of the Historical Society of Kimberley and the Northern Cape.

The second author (Jani MC Louw) is a qualified archaeologist (BA Honours, University of Cape Town). Assisting and working under the advisement of Dr David Morris (the first author).

The authors are independent of the organization commissioning this specialist input, and provides this Specialist Report within the framework of the National Heritage Resources Act (No 25 of 1999).

The National Heritage Resources Act no. 25 of 1999 (NHRA) protects heritage resources which include archaeological and paleontological objects/sites older than 100 years, graves older than 60 years, structures older than 60 years, as well as intangible values attached to places. The Act requires that anyone intending to disturb, destroy or damage such sites, objects and/or structures may not do so without a permit from the relevant heritage resources authority. This means that a Heritage Impact Assessment should be performed, resulting in a specialist report as required by the relevant heritage resources authority/ies to assess whether authorization may be granted for the disturbance or alteration, or destruction of heritage resources.

2. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The environment in question consists of the upper reaches of a kloof orientated south eastwards and overlooking, between distinct dolomite krantzes, the Vaal River valley (at Schmidtsdrift) at a distance of some ***** km. The topography forms a minor scarp mid-way between the Vaal River the Ghaap Escarpment proper. Bedrock defining the sides of the valley is dolomite, while calcrete and calcified sand patches occur within the valley. Vegetation consists of *Sengalia mellifera* thickets (with *Grewia* and *Ziziphus mucranata*) on the slopes and more open ground dotted with *Rhus lancea* in the valley bottom.

Clusters of stone wall structures are located within the proposed area. The structures are mainly a number of kraals, enclosures where farm animals such as cattle, sheep, and horses would have been kept. It is evident that the area is still used by cattle herders. The geographic features noted are plainly visible in the Google Earth image included in Figure 1, 2 and 3.

Figure 1. The location of the Jakhalsfontein proposed mining area west of Schmidtsdrift.

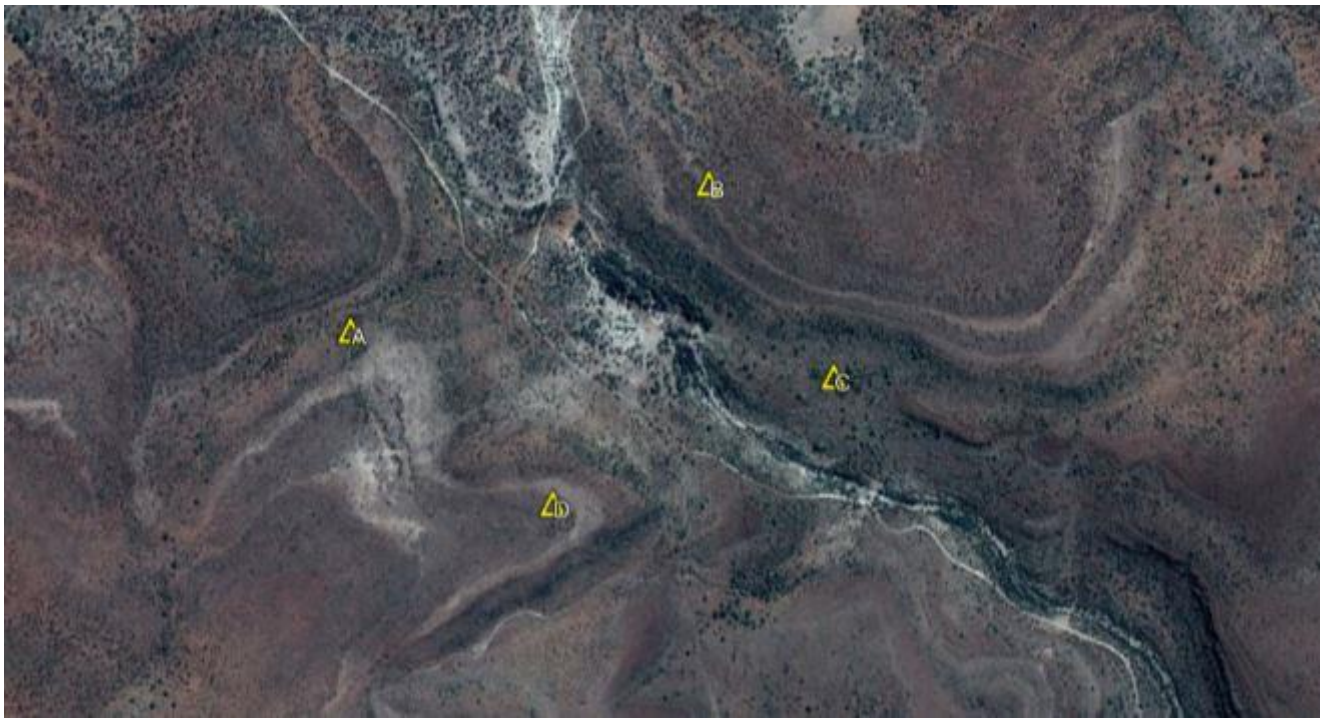

Figure 2. The proposed mining site.

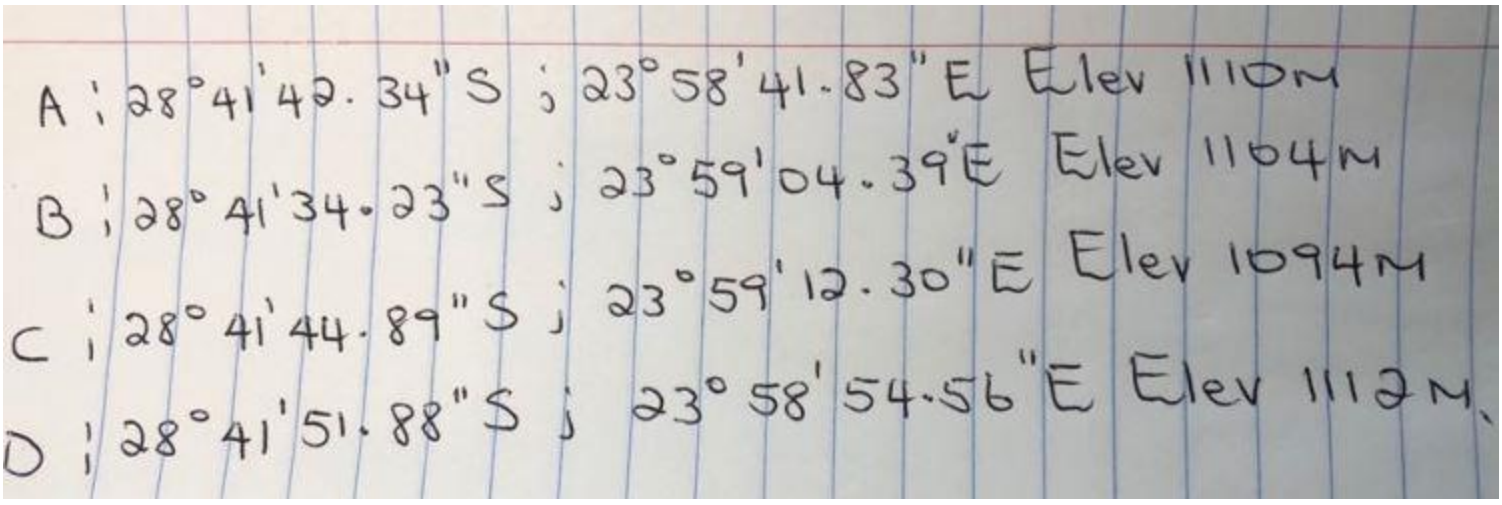

Figure 3. GPS coordinates for proposed site as provided by the client.

2.1 Background to the development – description of proposed infrastructure

As indicated, diamond mining (alluvial and general) is proposed to take place within the kloof and adjacent slopes. It is presumed that existing farm roads would be used.

2.2. Heritage features of the region

No previous archaeological survey work had been carried out on this particular locality. In the wider landscape studies have been carried out at Schmidtsdrift (e.g. Coetzee 2011; Beaumont 2012) and in shelters along the Ghaap Escarpment (Humphreys & Thackeray 1983).

2.2.1 Colonial frontier

Traveller W.J Burchell (1822) found the area to be inhabited by Setswana-speaking BaTlhaping as well as Khoe-San groups. Later in the century extant Batlhaping settlements in the Schmidtsdrift area led to this being defined as one of the 'Locations' reserved for Tswana people (Shillington 1985). San (Bushman) bands occupied shelters along the Ghaap Escarpment (such as Burchell's Shelter and Dikbosch), while !Kora set up campsites along the Vaal River banks as part of their seasonal transhumant use of resources in the wider landscape (famously illustrated by Burchell).

Schmidtsdrift was established as ford, with a pont and an hotel, on the main route from Kimberley to Griquatown. Diamond mining of the alluvial gravels was initially focused in places like Mosesberg to the north east but has become a major economic activity, mainly in the gravels alongside the river, at Schmidtsdrift itself.

In 1968 the Schmidtsdrift BaTlhaping community were forcibly removed from the area, but returned in the post-apartheid era. In the interim Schmidtsdrift became a military (SADF) area for ordnance testing and manoeuvres. In 1990 4000 !Xun and Khwe San refugees from Angola/N Namibia were settled by the military on Schmidtsdrift, south of the study area (Steyn 1994) before being moved in turn to Platfontein after the successful land claim in 1998 of the returning Batlhaping.

2.2.2 Stone Age Sequence

Because of a predominantly erosional regime having existed through the Cenozoic, sediments that preserve the Stone Age sequence of the area tend to

be confined to river gravels and sediments along the Vaal and its tributaries, and shelter settings where they occur – pre-eminently in this vicinity along the Ghaap Escarpment where they occur mainly in travertine deposits in kloofs.

The study area has potential in terms of localized pockets of sediment within the valley and possible shelters in adjacent krantzes.

In the broader landscape (Beaumont & Morris 1990), the Stone Age sequence is reflected in the Vaal River gravels (Helgren 1979), as documented particularly on Rooipoort on the east bank of the Vaal River (van Ryneveld 2005) and Schmidtsdrift (Beaumont 2012). The Holocene archaeology of the area is best represented by excavations by Humphreys at Dikbosch, Lime Rock and Burchell's Shelter at Campbell (Humphreys & Thackerary 1983). Raw materials used are predominantly andesite for the Earlier Stone Age; Dwyka-derived quartzites and chert becoming common for Middle Stone Age; and, in Later Stone Age sites, chert, localised hornfels, and cryptocrystalline silicates from the Vaal River Gravels. Later Stone Age sites also preserve ostrich eggshell and pottery, with organic remains including fauna and plant remains (Humphreys & Thackerary 1983).

Rock art occurs in several known sites on the east bank of the Vaal River, on andesite, the best-known site being Bushmans Fountain at Rooipoort (Fock & Fock 1979; Morris 1988; Wilman 1933).

2.3 Description and evaluation of environmental issues and potential impacts

Heritage resources including archaeological sites are in each instance unique and non-renewable. Area and linear developments can have a permanent destructive impact on these resources. The objective of an HIA would be to assess the sensitivity of such resources where present, to evaluate the significance of potential impacts on these resources and, if and where appropriate, to recommend no-go areas and/or measures to mitigate or manage said impacts.

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

The destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during prospecting and mining phases. In the long term, the proximity of such mining operations in a given area could result in secondary indirect impacts resulting from the movement of people or vehicles in the immediate or surrounding vicinity.

3. METHODOLOGY

An initial site visit was made with Ms Carol Ntshwenyi and a business partner on 4 May, with the follow-up field survey reported here carried out on 21 May 2018. The area was inspected on foot. Heritage traces would be evaluated in terms of their archaeological and heritage significance (see tables below). A set of predictions was made which the study would test with observations made in the field. The McGregor Museum head of archaeology (D. Morris) was assisted by A. Henderson with archaeology intern J. Louw.

3.1 Assumptions and limitations

It was assumed that, by and large in this landscape, with its shallow (and often zero) soil profiles, some sense of the archaeological traces to be found in the area would be readily apparent from surface observations (including assessment of places of erosion or past excavations that expose erstwhile below-surface features). An obstacle to total coverage was the presence of dense thickets of swarthaak (*Sengalia mellifera* subsp. *detinens*), but cattle pathways through these afforded means to examine representative extents of the area.

A proviso is routinely given, that should sites or features of significance be encountered during prospecting/mining on the site (this could include an unmarked burial, an ostrich eggshell water flask cache, or a high density of stone tools, for instance), specified steps are necessary (beginning with immediate suspension of work, and reporting to the heritage authority).

This study does not comment on palaeontology.

3.2 Predictions

It may be predicted that:

- Within the broader landscape the local environment and topographic features of the valley may have provided places favoured for Stone Age, Iron Age and colonial era exploitation/settlement. In particular the kloof would be offer water sources seasonally and perhaps more permanently in the form of springs.

- Dolomite kloofs and krantzes at the nearby Ghaap Escarpment provide small shelters utilized in LSA times, but these are usually formed in travertine carapaces, none of which have been observed in the valley in question.

- Rock art sites occur mainly on andesite exposures in the wider area, none of which occur in the study area. Exceptions occur on dolomite at Kransfontein along the nearby Ghaap Escarpment, and on the Ghaap Plateau near Papkuil, so that the possibility exists for engravings and this

should be borne in mind when surveying the area. Some shelters along the Ghaap Escarpment have ochre finger paintings.

3.2.1 Potentially significant impacts to be assessed in the HIA process

Any area or linear, primary and secondary, disturbance of surfaces in the proposed mining locale could have a destructive impact on heritage resources, where present. In the event that such resources are found, they are likely to be of a nature that potential impacts could be mitigated by documentation and/or salvage following approval and permitting by the South African Heritage Resources Agency and, in the case of any built environment features, by the Northern Cape Heritage Resources Authority. In exceptional cases there may be some that could require preservation in situ and hence modification of intended mining.

Disturbance of surfaces includes any mining, construction or agricultural farming (quarries, pits, roads, pipelines, pylons, sub-stations or plants, buildings), or any other clearance of, or excavation into, a land surface. In the event of archaeological materials being present such activity would alter or destroy their context (even if the artefacts themselves are not destroyed, which is also obviously possible). Without context, archaeological traces are of much reduced significance. It is the contexts as much as the individual items that are protected by the heritage legislation.

3.3 Determining archaeological significance

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (nd) and Whitelaw (1997) for assessing archaeological significance has been developed for Northern Cape settings (Morris 2000a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

Table 1 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon nd, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, can be of

exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Assessing site value by attribute

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 (given in the second column of the table). 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 Poor context Dispersed distribution	Limited sequence	Long sequence 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

4. OBSERVATIONS AND ASSESSMENT OF IMPACTS

The manner in which archaeological and other heritage traces or values might be affected by proposed diamond mining at Jakkalsfontein may be summed up in the following terms: it would be any act or activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). The obvious impact in this case would be land surface disturbance associated with any proposed mining, as well as the stone wall structures in the area.

4.1 Fieldwork observations

The site was visited on 21 May 2018.

Summary findings in relation to predictions made in section 3.2 above can be reported as follows:

- Within the broader landscape the local environment and topographic features of the valley may have provided places favoured for Stone Age, Iron Age and colonial era exploitation/settlement. In particular the kloof would be offer water sources seasonally and perhaps more permanently in the form of springs.

  Some Stone Age material was found and ample evidence of colonial era use of the valley in the form of dwellings and kraals, as also late twentieth century military use. Springs in the north side of the valley clearly provided part of the material reason for this focus of historical inhabition.

- Dolomite kloofs and krantzes at the nearby Ghaap Escarpment provide small shelters utilized in LSA times, but these are usually formed in travertine carapaces, none of which have been observed in the valley in question.

As noted, no travertines were noted and no shelters exist, with the upper part of the kloof represented by the study area having sloping sides rather that precipitous krantzes where shelters more likely would occur. Said krantzes, downslope from the study area, also appeared not to contain any shelters.

- Rock art sites occur mainly on andesite exposures in the wider area, none of which occur in the study area. Exceptions occur on dolomite at Kransfontein along the nearby Ghaap Escarpment, and on the Ghaap Plateau near Papkuil, so that the possibility exists for engravings and this should be borne in mind when surveying the area. Some shelters along the Ghaap Escarpment have ochre finger paintings.

  No rock art was found in the study area.

Isolated stone artefacts (including a lower grindstone) were noted as well as multiple stone wall structures. Historical artefacts such as porcelain, metal objects, glass, bullet cartridges and a hand smoke grenade were found, reflecting different histories of farming and military use of the landscape.

At present it is not possible to say who were the occupiers of the stone-walled farming site: it could be Griqua, Batlhaping or White farmers. The dwelling unit near the top of the south-west ridge (Observation 15) would seemingly have been a farm-hand's dwelling, close to the kraals (Observation 14). Further research would be required.

4.1.1 Occurrence of Stone Age traces:

Stone Age surface finds (observations 1, 2 & 3 in Table 3) were of an essentially isolated or low density nature. Typologically these appear to be LSA or MSA in character, but densities are too low to assess this definitively.

Table 3. Plotted artefact scatters and observations made.

	Latitude (S)	Longitude (E)	Comment	Significance
1	28°41'45.0"	23°58'59.5"	Grind stone (Fig 5)	LOW
2	28°41'42.5"	23°59'04.4"	Isolated flakes (chert) (Fig 6)	LOW
3	28°41'46.4"	23°58'44.5"	Isolated adze	LOW

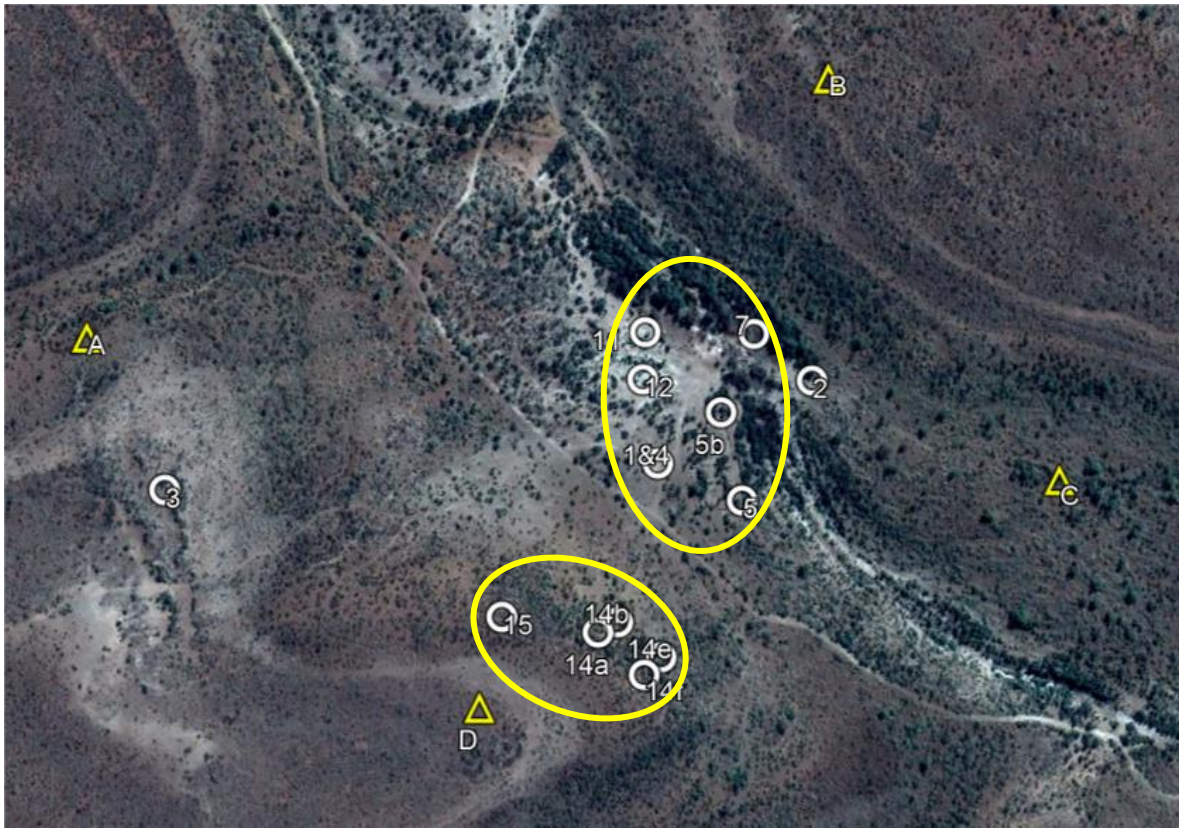

Figure 4a. Plotting of archaeological observations as tabulated in Table 3 & 4 (larger scale in Figures 4b below). Historical farm infrastructure circled (yellow).

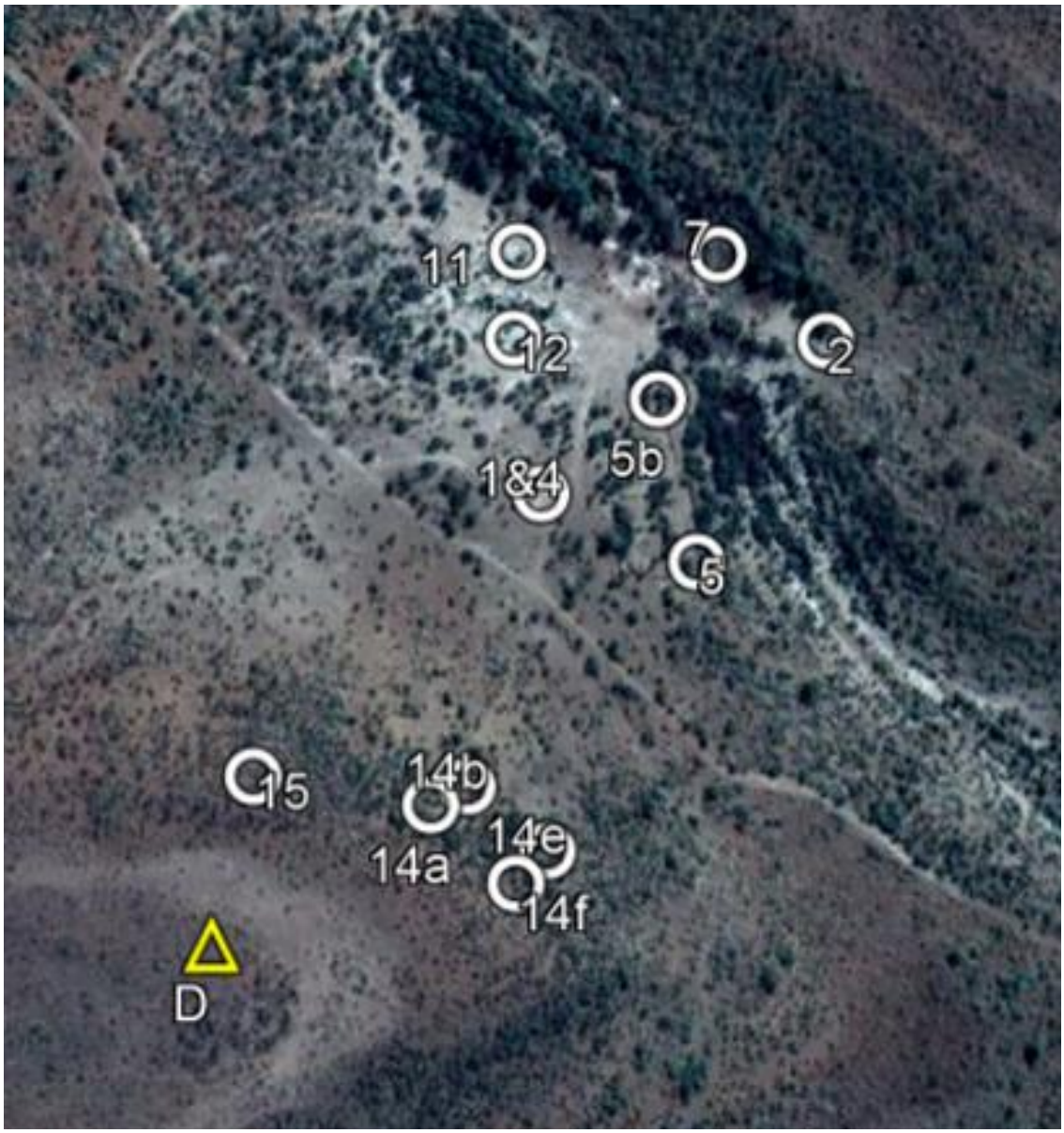

Figure 4b. Plotting of archaeological observations as tabulated in Table 3 & 4.

Figure 5. Grind stone. This was found on the floor of a colonial era dwelling and may represent re-use of an older precolonial object, or its occurrence in the floor may be entirely fortuitous. Observation 1.

Figure 6. Isolated flakes (chert). Observation 2.

Figure 7. Isolated adze and porcelain piece. Observation 3.

4.1.2 Colonial era traces

Various structures were observed in the area of proposed mining. A foundation of a small structure with cement floor was found in the valley bottom (small farmstead?) (Observation 4), and another (worker dwelling?) on the edge of the southern ridge (Observation 15). In the vicinity of both these dwellings were scatters of domestic waste (porcelain, glass, earthenware – with an ash heap most apparent in close proximity to Observation 4 where pieces of glass, including a Lenin bottle, porcelain and various metal objects were located).

Springs and seeps were noted in the north side of the valley, two of which had been artificially enlarged by digging into a body of calcified sand in the one instance and creating a channel into the rocky hillside in the other.

Table 4. Plotted artefact scatters and observations made.

	Latitude (S)	Longitude (E)	Comment	Significance
4	28°41’45.0”	23°58’59.7”	Foundation of structure	LOW
5	28°41’43.5”	23°59’02.4”	Corner of stone wall (kraal) (fig 8)	MEDIUM
	28°41’53.5”	23°59’01.6”	Corner two of stone wall kraal)	MEDIUM
6	28°41’43.5”	23°59’01.7	Corner of stone wall	MEDIUM
	28°41’42.3”	23°59’02.5”	Corner two of stone wall	MEDIUM
7	28°41’41.3”	23°59’02.5”	Corner one of first water trough (fig 9)	MEDIUM
	28°41’40.6”	23°49’02.0”	Corner two of first water trough (fig 9)	MEDIUM
8	28°41’41.5”	23°59’0.5”	Corner one of second water trough (fig 9)	MEDIUM
	28°41’40.6”	23°59’02.4	Corner two of second water trough (fig 9)	MEDIUM
9	28°41’42.6”	23°59’03.9”	Corner one of stone wall	MEDIUM
	28°41’42.5”	23°59’03.0”	Corner two of stone wall	MEDIUM
10	28°41’42.5”	23°59’04.4”	Possible road, point one	LOW
	28°41’42.1”	23°59’03.5	Possible road, point two	LOW
11	28°41’41.4”	23°58’59.1”	Rock feature, possible trap (fig 10)	MEDIUM
12	28°41’42.7”	23°58’59.8	Water well (fig 11a and 11b)	MEDIUM
13	28°41’44.6”	23°58’59.0”	Ash heap (Lenin bottle)(fig12)	MEDIUM
14	28°41’49.7”	23°58’58.1”	Kraal corner one (fig 13b)	MEDIUM
	28°41’49.4”	23°58’58.7”	Kraal corner two (fig 13b)	MEDIUM
	28°41’49.7”	23°58’59.2”	Kraal corner three (fig 13b)	MEDIUM
	28°41’50.1”	23°58’59.7”	Kraal corner four (fig 13b)	MEDIUM
	28°41’50.3”	23°59’00.1”	Kraal corner five (fig 13a and 13b)	MEDIUM
	28°41’50.8”	23°58’59.6”	Kraal corner six (fig 13b)	MEDIUM
15	28°41’49.4”	23°58’55.1”	Foundation of structure (fig 14)	MEDIUM
16	28°41’46.5”	23°58’53.3”	Collapsed structure	MEDIUM
17	28°41’46.2”	23°58’44.3”	Porcelain and metal (fig 15)	MEDIUM
18	28°41'45.3"	23°58'58.3"	Military hand smoke grenade (fig 20)	LOW

Figure 8. Eastern corner of stone wall enclosure. Observation 5.

Figure 9. The two water troughs. Observation 7 and 8.

Figure 10. Stone feature, possible trap – or a child's grave (but no evidence of other graves was found). Observation 11.

Figure 11a. Water well and ?dip or trough. Observation 12.

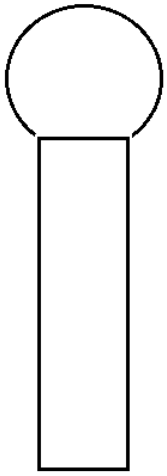

Figure 11b. Sketch of the water well. Observation 12.

Figure 12. Lenin glass bottle on ash heap. Observation 13.

Figure 13a. Corner 5 of enclosures. Observation 14

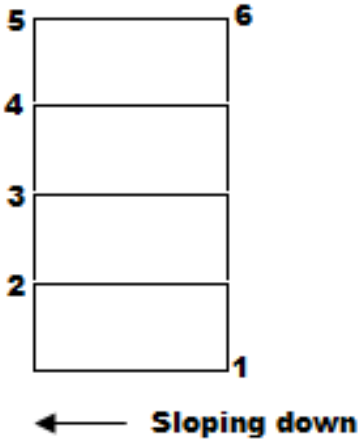

Figure 13b. Sketch of the enclosures. Observation 14

Figure 14. Foundation of structure (dwelling). Observation 15

Figure 15. Metal and porcelain. Observation 17

Figure 16. Artificially enlarged spring in calcified sand.

Figure 17. Spring source enlarged by cutting into the hill-side. (Adjacent to observations 7 and 8).

Figure 18. Portion of one of a few (partially washed away) dam walls across the valley. Observation 9.

Figure 19. Probably military use of the landscape in the 1970s-80s: cartridge cases.

Figure 20. A military hand smoke grenade reflecting military manoeuvres here in the 1970s-80s.

4.2 Characterising the archaeological significance (Refer to 3.4 above)

In terms of the significance matrices in Tables 1 and 2 under 3.4 above, the archaeological observations fall under a combination of Landform L3 Type 2 (valley bottom), and L1 Type 1 (valley sides). In terms of archaeological traces they all fall under Class A3 Type 1-3. These ascriptions (Table 1) reflect low to medium and sometimes higher potential for these criteria. For site attribute and value assessment (Table 2), the observations may be characterised as Type 1-2 for each of the Classes 1-7, again reflecting low to medium significance.

On archaeological grounds, the Stone Age occurrences, extremely sparse, can be said to be of low significance.

For colonial era context, the site has medium to high significance in terms of physical heritage traces.

4.3 Characterising the significance of impacts

The criteria on which significance of impacts is based include **nature**, **extent**, **duration**, **magnitude** and **probability of occurrence**, with quantification of significance being grounded and calculated as follows:

- The **nature**, namely a description of what causes the effect, what will be affected, and how it will be affected.

- The **extent**, indicating the geographic distribution of the impact:
    - 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;
    - impact is regional – assigned a score of 3;
    - impact is national – assigned a score of 4; or
    - impact across international borders – assigned a score of 5.

- The **duration**, measuring the lifetime of the impact:
    - very short duration (0–1 years) – assigned a score of 1;
    - 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:
    - 0 is small and will have no affect on the environment;

- 2 is minor and will not result in an impact on environmental processes;
- 4 is low and will cause a slight impact on environmental processes;
- 6 is moderate and will result in environmental processes continuing but in a modified way;
- 8 is high (environmental 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 environmental processes.

- The **probability of occurrence**, indicating the likelihood of the impact actually occurring (scale of 1-5)
  - 1 is highly improbable (probably will not happen);
  - 2 is improbable (some possibility, but low likelihood);
  - 3 is probable (distinct possibility);
  - 4 is highly probable (most likely); and
  - 5 is definite (impact will occur regardless of any prevention measures).

- The **significance**, determined by a synthesis of the characteristics described above and expressed as low, medium or high. Significance is determined by the following formula:
  S= (E+D+M) P; where S = Significance weighting; E = Extent; D = Duration; M = Magnitude; P = Probability.

- The **status**, either positive, negative or neutral, reflecting:
  - 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 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).

4.3.1 SUMMARY OF THE SIGNIFICANCE OF IMPACTS

Table 5. Significance of Impacts, with and without mitigation – based on the worst case scenario – for all area investigated.

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 or other heritage material or object (what affected). The following assessment refers to impact on physical archaeological/heritage traces.		
	Without mitigation	**With mitigation**
Extent	1	
Duration	5	
Magnitude	2	
Probability	3	
Significance	**24**	
Status (positive or negative)	NEGATIVE	
Reversibility	No	
Irreplaceable loss of resources?	Low density and significance of stone age traces; but potentially significant traces of colonial era farming activity of as yet uncertain context (possibly Griqua/ Tswana).	
Can impacts be mitigated?	Recommend monitoring if proposed prospecting / mining is to impact the colonial era walling.	Not needed
Mitigation: Recommend monitoring if proposed prospecting / mining is to impact the colonial era walling.		
Cumulative impacts: Cumulative Impacts: where any archaeological contexts occur, direct impacts are once-off permanent destructive events. Secondary cumulative impacts may occur with the increase in development and operational activity associated with the life of the proposed mining.		
Residual Impacts: -		

5. MEASURES FOR INCLUSION IN THE DRAFT ENVIRONMENTAL MANAGEMENT PLAN

The objective

Archaeological or other heritage materials that may occur in the path of any surface or sub-surface disturbances associated with any aspect of the diamond (alluvial and general) mining are likely to be subject to destruction, damage, excavation, alteration, or removal. The objective is to limit such impacts to the primary activities associated with the mining and hence to limit secondary impacts during the medium and longer term operational life of the operation.

Project component/s	Any road or other infrastructure construction over and above what is outlined in respect of the proposed site development.
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 (minimal as they are) from their current context along the route.
Activity/risk source	Activities which could impact on achieving this objective include deviation from any planned development without taking heritage impacts into consideration.
Mitigation: Target/Objective	An environmental management plan that takes cognizance of heritage resources in the event of any future extensions of infrastructure. Mitigation (based on present observations and mining proposal as communicated) is not considered to be necessary.

Mitigation: Action/control	Responsibility	Timeframe
Provision for on-going heritage monitoring in an 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.	Environmental management provider with on-going monitoring role set up by the mining company for the mining phase and for any instance of periodic or on-going land surface modification thereafter.	Environmental management plan to be in place before commencement of mining.

Should unexpected finds be made (e.g. precolonial burials; ostrich eggshell container cache; or localised Stone Age sites with stone tools, pottery; military remains), the relevant Heritage Authority should be contacted.	Environmental Control Officer should become acquainted at a basic level with the kinds of heritage resources potentially occurring in the area and should report to the Heritage Authority as needed (see next column).	In the event of finding any of the features mentioned in column 1, reporting by the developer to relevant heritage authority should be immediate. Contact: SAHRA Ms N. Higgins 021-4624502 or NC Heritage Resources Authority Mr Andrew Timothy 053-8312537/8074700.

Performance Indicator	Inclusion of further heritage impact consideration in any future extension of mining or any infrastructural elements.
Monitoring	Officials from relevant heritage authorities (National, Provincial or Local) to be permitted to inspect the site at any time in relation to the heritage component of the management plan.

6. CONCLUSIONS

Precolonial/Stone Age material noted at the portion of Jakkalsfontein investigated in this study was found to be generally of low significance, where present at all. However, numerous stone wall (mostly collapsed) structures will be impacted by the proposed mining. Various historical material artefacts were noted but these also have generally low significance. The largest impact would be on the structures. It is recommended that monitoring by a qualified archaeologist be provided for once the extent of proposed prospecting/mining has been determined, which may lead to limited Phase 2 impact assessment.

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