

**McGregor Museum
Department of Archaeology**



**Proposed construction of a 132kV powerline associated with
the Photovoltaic Solar Plants on the Farm Droogfontein, Northern Cape
Province.**

**Walk-Down Heritage Impact Survey of the Final Alignment and Tower
Positions**

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August 2018

Proposed construction of a 132kV powerline associated with the Photovoltaic Solar Plants on the Farm Droogfontein, Northern Cape Province: Walk-Down Heritage Impact Survey of the Final Alignment and Tower Positions

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1. INTRODUCTION

The McGregor Museum Archaeology Department has been appointed by juwi Renewable Energies (Pty) Ltd (24th Floor, Metropolitan Centre, 7 Walter Sisulu Avenue, Foreshore, Cape Town, 8001. www.juwi.co.za: contact Ms Nazley Towfie M.Sc.(Phys), Project Development Manager, Wind & Solar, Tel. 021 831 6131, Cel. 078 019 9357, Fax. 021 831 6199 nazley.towfie@juwi.co.za), to carry out a Walk-Down Heritage Impact Survey of the Final Alignment and Tower Positions for the proposed 132 kV power line from Droogfontein Solar Energy Power Plant – PV2 – to the existing Kimberley-Macfarlane 132kV power line was conducted on 21 & 24 August 2018 and is reported on in this report.

Background is as follows: SiVEST Environmental Division was appointed to conduct a Basic Assessment Process for the proposed construction of a 132kV powerline associated with the 75MW Photovoltaic (PV) Plant on the farm Droogfontein (PV 2) in Kimberley, Northern Cape Province. A Basic Assessment Report (BAR) was completed in support of the Environmental Authorisation Application in terms of the National Environmental Management Act, 1998 (NEMA) in 2011. The activities included the construction of one 132kV overhead powerline from the Droogfontein Solar Energy Power Plant – PV2 – to the existing Kimberley-Macfarlane 132kV power line; construction of an access road(s); and switchyards. The proposed development was granted with an Environmental Authorisation on the 30/04/2013 (14/12/16/3/3/1/508/1). The preferred route corridor 2B was approved. Professional Grave Solutions was appointed to conduct a Heritage Impact Assessment (HIA) as part of the BAR.

Fourie, W. 2012. Heritage Impact Assessment: Proposed construction of a 132kV powerline associated with the Photovoltaic Solar Plants on the Farm Droogfontein, Northern Cape Province.

Access issues during the survey resulted in a general evaluation of the alignments.

Recommendations provided in the report include the following:

- A Walk-Down of the final alignment and tower positions must be conducted before construction;
- Implementation of management measures to be included in the Environmental Management Programme (EMPr) for chance finds;
- A monitoring plan must be agreed upon by all the stakeholders for the different phases of the project.
- The developer undertakes to give the archaeologist sufficient time to identify and record archaeological finds and features;
- If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contact for an assessment of the find;
- A management plan must be developed for managing the heritage resources in the surface area impacted by operations during construction and operation of the development. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, excavations, and communication routes to follow in the case of a discovery.

SAHRA thus has recommended:

- The monitoring programme and management plan for heritage resources as stipulated by the heritage specialist should be submitted to SAHRA for record keeping purposes;
- The Walk-Down conducted prior to construction should be submitted to SAHRA;
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils (e.g. trace fossils or stromatolites) or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/John Gribble 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings at the expense of the developer. If the newly discovered heritage resources prove to be of archaeological or

palaeontological significance, a Phase 2 rescue operation may be required at the expense of the developer.

A Walk-Down Heritage Impact Survey of the Final Alignment and Tower Positions for the proposed 132 kV power line from Droogfontein Solar Energy Power Plant – PV2 – to the existing Kimberley-Macfarlane 132kV power line was conducted on 21 & 24 August 2018 and is reported on in this report.

1.1 Focus and Content of Specialist Report: Archaeology

The archaeology specialist study is focused on the final alignment and tower positions for the proposed transmission line.

This specialist study is a stand-alone report (as per the EIA Regulations) and incorporates the following information:

- » Introduction (1)
 - Focus and content of report (1.1)
 - Archaeology specialist (1.2)
- » Description of the affected environment (2)
 - Heritage features of the area (2.1)
 - Description and evaluation of environmental issues and potential impacts identified in the scoping phase (2.2)
- » Methodology (3)
 - Assumptions and limitations (3.1)
 - Description and evaluation of environmental issues (3.2)
 - Determining archaeological significance (3.3)
- » Observations and assessment of impacts (4)
 - Fieldwork observations (4.1)
 - Characterising the archaeological significance (4.2)
 - Measures for implementation during construction (4.3)
- » Conclusions (5)
- » References (6)

1.2 Archaeology Specialist

The author of this report is an archaeologist accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists, having previously carried out surveys and fieldwork on sites in the area around Kimberley (Beaumont & Morris 1990; Morris & Beaumont 2004).

The author works independently of the organization commissioning this specialist input, and I provide these preliminary scoping observations 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 palaeontological 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 authorisation may be granted for the disturbance or alteration, or destruction of heritage resources.

2. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The environment in question is Kimberley Thornveld with a significant/predominating grassland component, comprising relatively flat terrain with dolerite hills in the surrounding landscape. The vicinity is covered by Kalahari sands of up to a few metres depth, over calcrete and underlying dolerite bedrock, relatively sparsely vegetated by trees across the grassy plains. Surface archaeological traces are likely to be reasonably visible. However, experience of the terrain suggests that Stone Age material would most likely lie subsurface and overlie bedrock, at the base of the sands (e.g. Beaumont & Morris 1990).

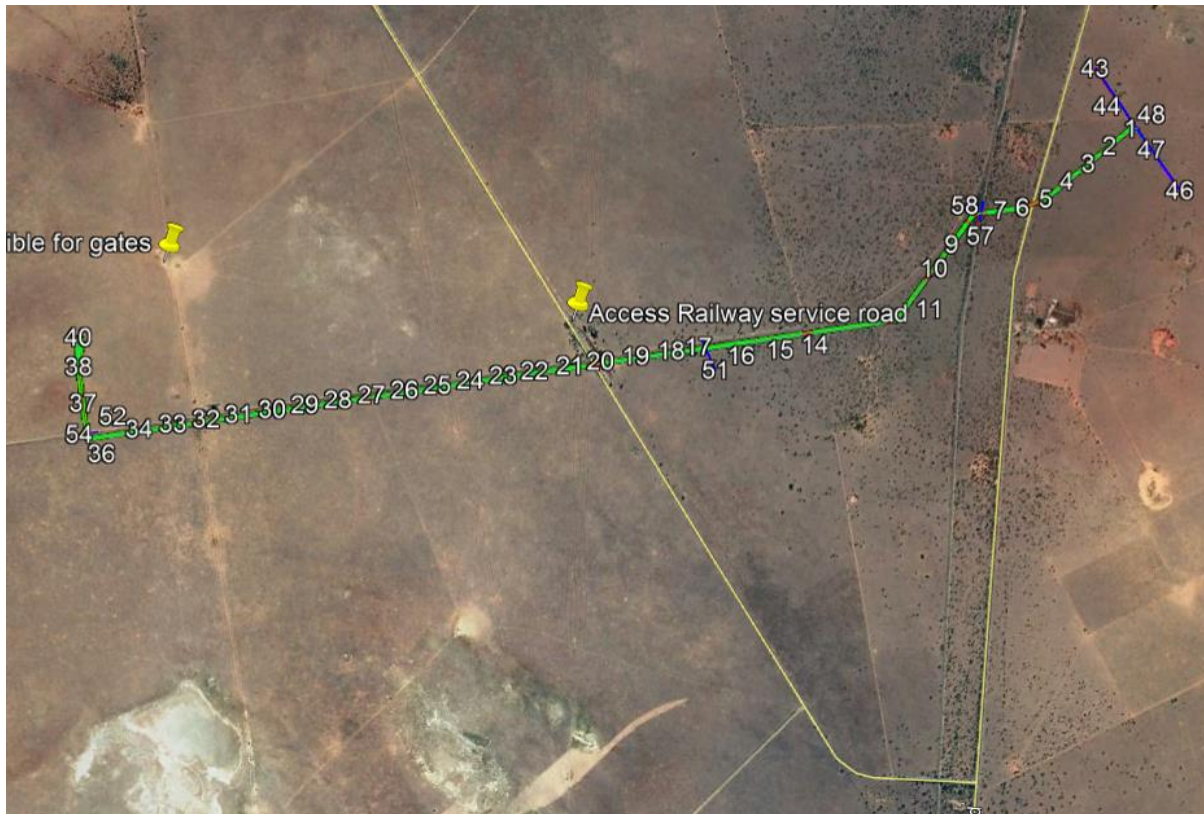


Figure 1. Location of proposed 132 kV power line from Droogfontein Solar Energy Power Plant – PV2 – to the existing Kimberley-Macfarlane 132kV power line. Showing tower positions.

Topographically, the proposed 132 kV power line from Droogfontein Solar Thermal Energy Power Plant – PV2 – to the existing Kimberley-Macfarlane 132kV power line is situated on relatively flat terrain and runs for most of its route alongside a railway loop, crossing the Kimberley-Johannesburg line, the N12 road and the road linking the N12 with Riverton. The presence of dolerite outcrops in the wider region would raise the possibility of the occurrence of rock engravings, but no such outcrops occur along the route of the power line.

2.1. Heritage features of the area

Much of the surrounding area has yet to be examined from an archaeological viewpoint but sites are on record for places adjacent to the Vaal River at Riverton (McGregor Museum database).

The following observations would be relevant:

- » that certain dolerite and andesite koppies in the wider region are known to have rock engravings (Fock & Fock 1989; Morris 1988). No such outcrops are noted along the power line proposed alignment however.
- » that background scatters of Stone Age artefacts are known on plains in the region, notably of Fauresmith industry sites, often resting on calcrete at the base of the red sands (Beaumont & Morris 1990, e.g. the site of Roseberryplain).
- » that historically noteworthy farm infrastructure may occur including possible colonial/recent farm graves.
- » That Anglo-Boer/SA War action took place along the railway line north of Kimberley, but this was at Dronfield closer to Kimberley.

A previous HIA report exists for the project:

Fourie, W. 2012. Heritage Impact Assessment: Proposed construction of a 132kV powerline associated with the Photovoltaic Solar Plants on the Farm Droogfontein, Northern Cape Province.

No archaeological occurrences were noted and no graves were seen or reported on by a local informant.

2.2. Description and evaluation of environmental issues and potential impacts identified in the scoping phase

Heritage resources including archaeological sites are in each instance unique and non-renewable resources. Linear developments such as that envisaged can have a permanent destructive impact on such resources, although Sampson (1985) reports minimal impact by powerlines; tower positions and any possible scraped road alignments would be points of impact.

2.2.1. 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 the initial construction period. In the long term, the proximity of 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.

With respect to the magnitude and extent of potential impacts, it has been noted that the erection of power lines would have a relatively small impact on Stone Age

sites, in light of Sampson's (1985) observations during surveys beneath power lines in the Karoo (actual modification of the landscape tends to be limited to the footprint of each pylon), whereas a road would tend to be far more destructive (modification of the landscape surface would be within a continuous strip), albeit relatively limited in spatial extent, i.e. width.

3. METHODOLOGY

A site visit was undertaken on 21 & 24 August to inspect the route and tower positions. Heritage traces would be evaluated in terms of their archaeological significance (see tables below).

3.1. Assumptions and limitations

It was assumed that, by and large in this landscape, with its relatively sparse vegetation, some sense of the surface archaeological traces to be found would be readily apparent from surface observations. However, the landscape is entirely veneered by red Hutton Sands which mask expected subsurface occurrences, particularly of Pleistocene age stone artefacts. Therefore all exposures, e.g. in borrow pits, along the route were inspected to assess the presence of such sub-surface material.

A proviso is routinely given, that should sites or features of significance be encountered during construction (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 (cease work, report to heritage authority).

Potentially significant impacts:

- » Where dolerite koppies occur there is a possibility that rock engravings might be found. None likely.
- » Stone Age artefacts may occur, notably Fauresmith industry sites, commonly resting on calcrete/dolerite at the base of the red Hutton Sands (cf. Beaumont & Morris 1990). A possibility.
- » Heritage features may exist in the vicinity of farm infrastructure. The route does not appear to intersect such features and no graves are reported.

This report does not address palaeontology.

3.2. Description and evaluation of environmental issues and potential impacts identified in the scoping phase

Any area or linear, primary and secondary, disturbance of surfaces in the development locales could have a destructive impact on heritage resources, where present. In the event that such resources of high significance 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 Northern Cape Heritage Resources Authority. Although unlikely, there may be some that could require preservation *in situ* and hence modification of intended placement of development features.

Disturbance of surfaces includes any construction: of a road, erection of a pylon, or preparation of a site for a plant, or building, 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.

Some of the activities have a generally lower impact than others. Sampson (1985) has shown that power lines tend to be less destructive on Stone Age sites than roads since access along the route of the line during construction and maintenance tends to be by way of a 'twee-spoor' temporary roadway (not scraped, the surface not significantly modified). Individual tower positions might be of high archaeological significance (e.g. a grave, or an engraving). The impact of a 'twee-spoor' could be far greater on Iron Age sites in other parts of South Africa, where stone walling might need to be breached.

3.4 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	Dispersed scatter	Deposit <0.5 m	Deposit >0.5 m thick;

Class	Landform	Type 1	Type 2	Type 3
	visible		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 the proposed development 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 most obvious impact in this case would be land surface disturbance associated with infrastructure construction.

4.1 Fieldwork observations

The proposed development footprint area was visited on 21 and 24 August 2018. In summary the findings can be reported in relation to predictions made in the scoping report (see 3.2 above):

4.1.1 Possible engraving occurrences on dolerite koppies or exposures:

No rocky exposures. No engravings.

4.1.2 Occurrences of Stone Age artefacts:

Background scatter occurrences of Pleistocene age material (Beaumont & Morris 1990; Underhill 2011) are known to occur in the wider area, typically within and at the base of the red Hutton Sands overlying calcrete or dolerite/andesite. Almost no such material was observed during the walk-down survey, since essentially the entire power line route is mantled by Hutton Sands. However, quarries/borrow pits along or near the route were closely examined and two of these revealed very low/close-to-zero density occurrences of stone artefacts. It can be anticipated that subsurface densities would vary but nowhere amount to much other than 'background scatter' (using Orton's [2016] classification).

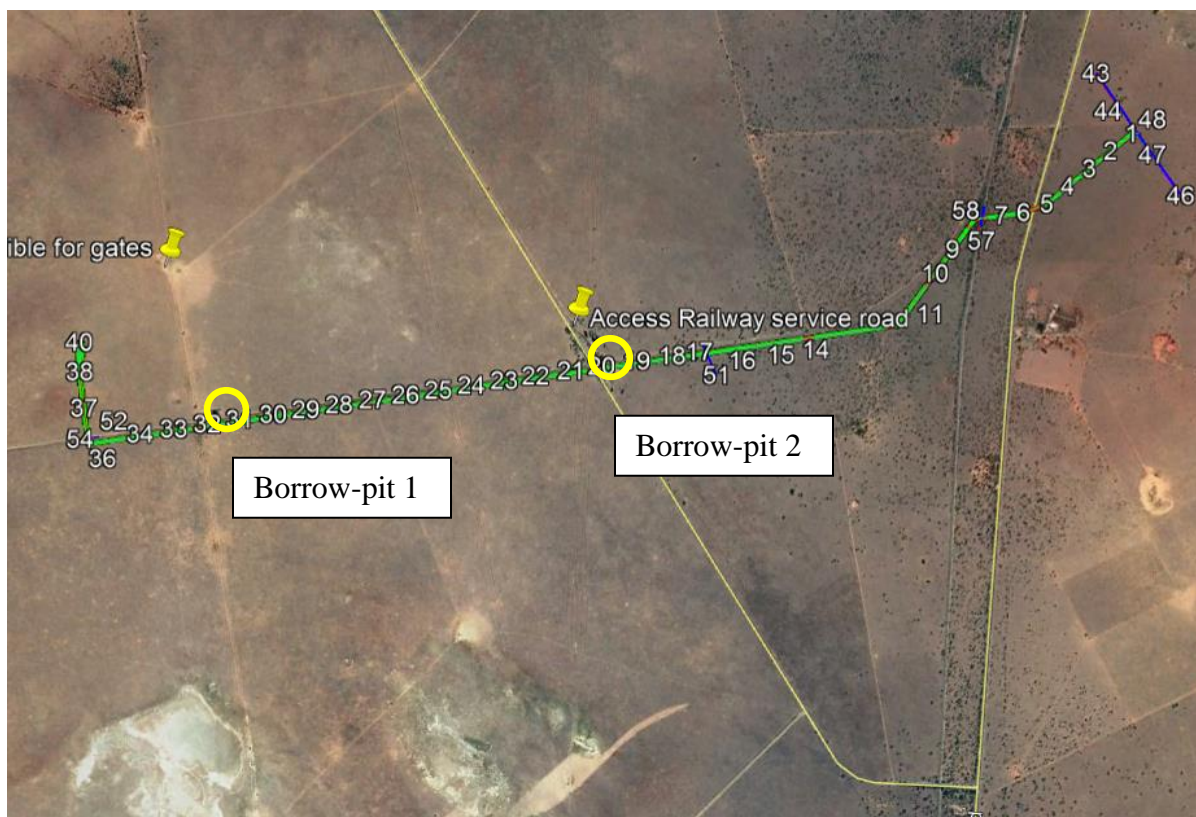


Figure 2. Borrow pits (yellow circles) where low density sub-surface Stone Age occurrences are recorded.

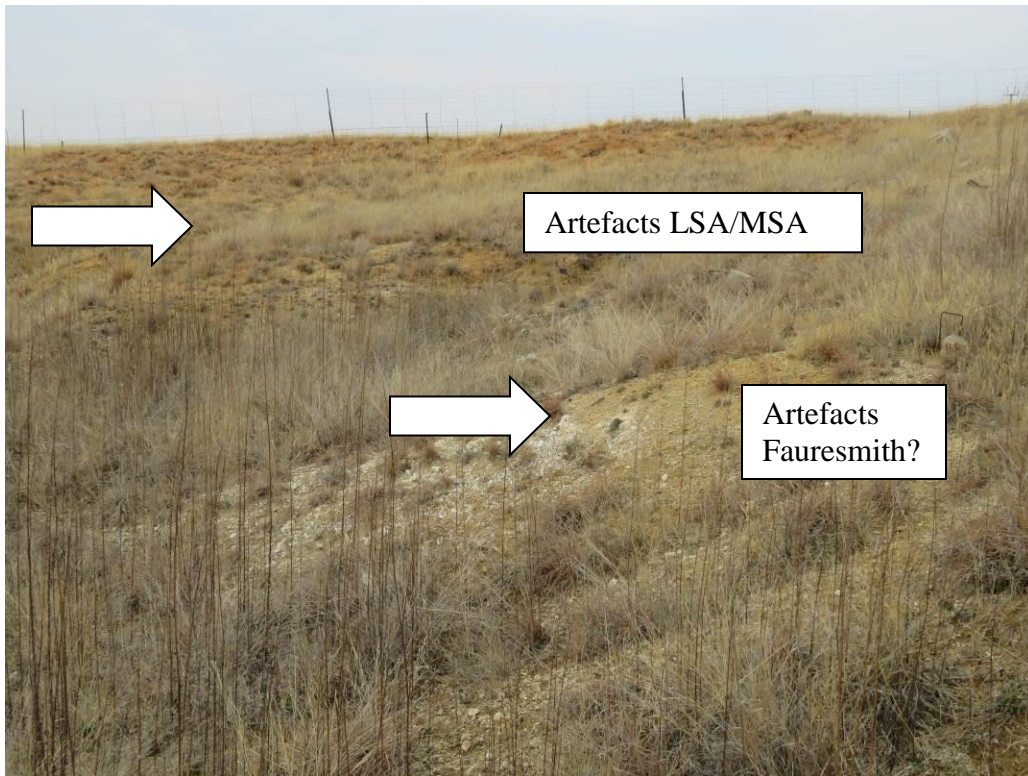


Figure 3. Artefact horizons documented in Borrow-pit 1.



Figure 4. LSA and MSA artefacts scattered down a slope from about 1 m below the Hutton Sands surface in Borrow-pit 1.



Figure 5. ?Fauresmith or MSA artefacts in a horizon near the base of the pit, in Borrow-pit 1.



Figure 6. The only artefact found in the profile of Borrow-pit 2.



Figure 7. The single artefact documented in Borrow-pit 2 shown relative to the surface of the Hutton Sands.

Observation	Co-ordinates	Description
Borrow-pit 1 Upper unit	28°34'46.3" S 24°42'57.6" E	Low density of stone tools in quartzite, hornfels and quartz – mainly MSA and possibly some LSA. From within the Hutton Sands and occurring in the ~1-1.5 m below the surface.
Borrow-pit 1 Lower unit	28°34'45.6" S 24°42'58.1" E	Low density occurrence of quartzite and hornfels artefacts overlying a coarser deposit at the base of the Hutton Sands, consistent with a Fauresmith or MSA ascription but the sample is not large enough to confirm this.
Borrow-pit 2	28°34'66.6" S 24°44'29.9" E	A single artefact on hornfels embedded about 1.5 m below the Hutton Sands surface.

4.1.3 Farm heritage:

No colonial era graves found or were reported in previous study (Fourie 2012). significant farm heritage infrastructure was noted: only farm fences.

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 minimal archaeological observations made fall under Landform L3 Type 1. In terms of archaeological traces they all fall under Class A3 Type 1. These ascriptions (Table 1) reflect poor contexts and likely low significance for these criteria.

For site attribute and value assessment (Table 2), all of the observations noted fall under Type 1 for Classes 1-7, reflecting low significance, low potential and absence of contextual and key types of evidence.

On archaeological grounds, the limited occurrences observed can be said to be of low significance.

4.3 Measures for implementation during construction

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 development and hence to limit secondary impacts during the medium and longer term working life of the facility.

Project component/s	Any road or other linear construction over and above what is necessary and any spatial extension of other components addressed.
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 on the site.
Activity/risk source	Activities which could impact on achieving this objective include deviation from the planned lay-out of infrastructure without taking heritage impacts into consideration.
Mitigation: Target/Objective	None recommended.

Mitigation: Action/control	Responsibility	Timeframe
Provision for on-going heritage monitoring during implementation/operational life of the line: promote awareness of personnel and procedures/guidelines on what to do in the event of any major heritage feature	Environmental management provider with on-going monitoring role during	During implementation and operation.

<p>being encountered during implementation and operation.</p> <p>Possible heritage resources: subsurface occurrences of higher density locally, not found during this walk-down survey (not expected to be likely)</p>	<p>implementation.</p>	
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<p>Performance Indicator</p>	<ul style="list-style-type: none"> • Provision for on-going monitoring in the unlikely event of significant archaeological material being encountered. • Inclusion of further heritage impact consideration in any future extension of infrastructural elements. • Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
<p>Monitoring</p>	<p>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.</p>

5. CONCLUSIONS

The recommended Walk-Down survey is completed and reported here. Extremely sparse heritage traces of low significance were found in quarries/borrow pits alongside or near to the proposed power line. No colonial era traces of significance were observed.

Project environment monitoring and management programme should provide for personnel awareness and reporting in the event of encountering significant heritage (chance finds):

- In the event of finding evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils (e.g. trace fossils or stromatolites) or other categories of heritage resources during the proposed development, SAHRA APM Unit (Natasha Higgitt/John Gribble 021 462 5402) must be alerted.
- If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), must be alerted immediately.
- A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings at the expense of the developer.
- If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required at the expense of the developer.

6. REFERENCES

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