

McGregor Museum Department of Archaeology



BLACK MOUNTAIN CONCENTRATED SOLAR POWER FACILITY DEVELOPMENT AT AGGENEYS, NORTHERN CAPE

Heritage Impact Assessment

David Morris
April 2011

Black Mountain Concentrated Solar Power Facility development at Aggeneys, Northern Cape

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Background

Aurora Power Solutions (Pty) Ltd (APS) in partnership with Black Mountain Mining (BM) wish to establish a photovoltaic power generation facility within the mining area of BM situated at Aggeneys in the Northern Cape. The proposed project is situated at Black Mountain Mine located adjacent to the N14 between Springbok and Pofadder, in close proximity to the Namibian border.

The facility is proposed to have an array of photovoltaic panels covering up to 19.5 hectares. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep seated screw. A 10MW plant will have in the region of 45456 (220watt) panels.

The main civil works anticipated are:

- Terrain levelling. Flat areas will be selected where possible to avoid/minimize the need for levelling.
- Construction and use of access and inside roads/paths. The extensive network of existing roads will be used where possible to avoid/minimize the need for new road construction. The turning circle of trucks will need to be taken into consideration. There will be minimal use of access roads/paths once the plant is in operation.
- Trenching. All DC and AC wiring within the PV plant will be trenched (buried underground).
- Foundations. Concrete foundations for panels could be cast or holes drilled into the ground for supporting a deep seated screw, depending on the mounting method to be used.

The author was approached to undertake a Heritage Impact Assessment (principally archaeology) at alternative sites identified for the above proposed development. The study sites are on the farm called Aggeneys, west, south west and south east of the town of that name.

1.1 Focus and Content of Specialist Report

The archaeology specialist study (commissioned by SRK Consulting (South Africa) (Pty) Ltd, P.O. Box 55291, Northlands 2116, email lbrown@srk.co.za, tel 011-4416162 mob 0722653584) is focused on the development footprint of the proposed solar development areas.

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

- Introduction to the Specialist in terms of qualifications, accreditation and experience to undertake the study (1.2, below)
- Description of the affected environment (2)
- Description of heritage features of the region (2.1)
- Description of issues identified during the Scoping process (2.2)
- Methodology of determining the significance of the impacts and assumptions as well as scoping phase predictions (3)
- Observations and Assessment of impacts, including a summary in tabular format (4)
- Comparative assessment of alternatives (4.3.2)
- Recommended measures for draft Environmental Management Plan and site-specific mitigation (5)
- Conclusions (6)

1.2 Archaeology/heritage Specialist

The author of this report is an archaeologist accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists. I have previously carried out surveys in the vicinity of the proposed activity (Morris 1999a-b, 2000a-c, 2001, 2010). In addition, the author has received UCT-

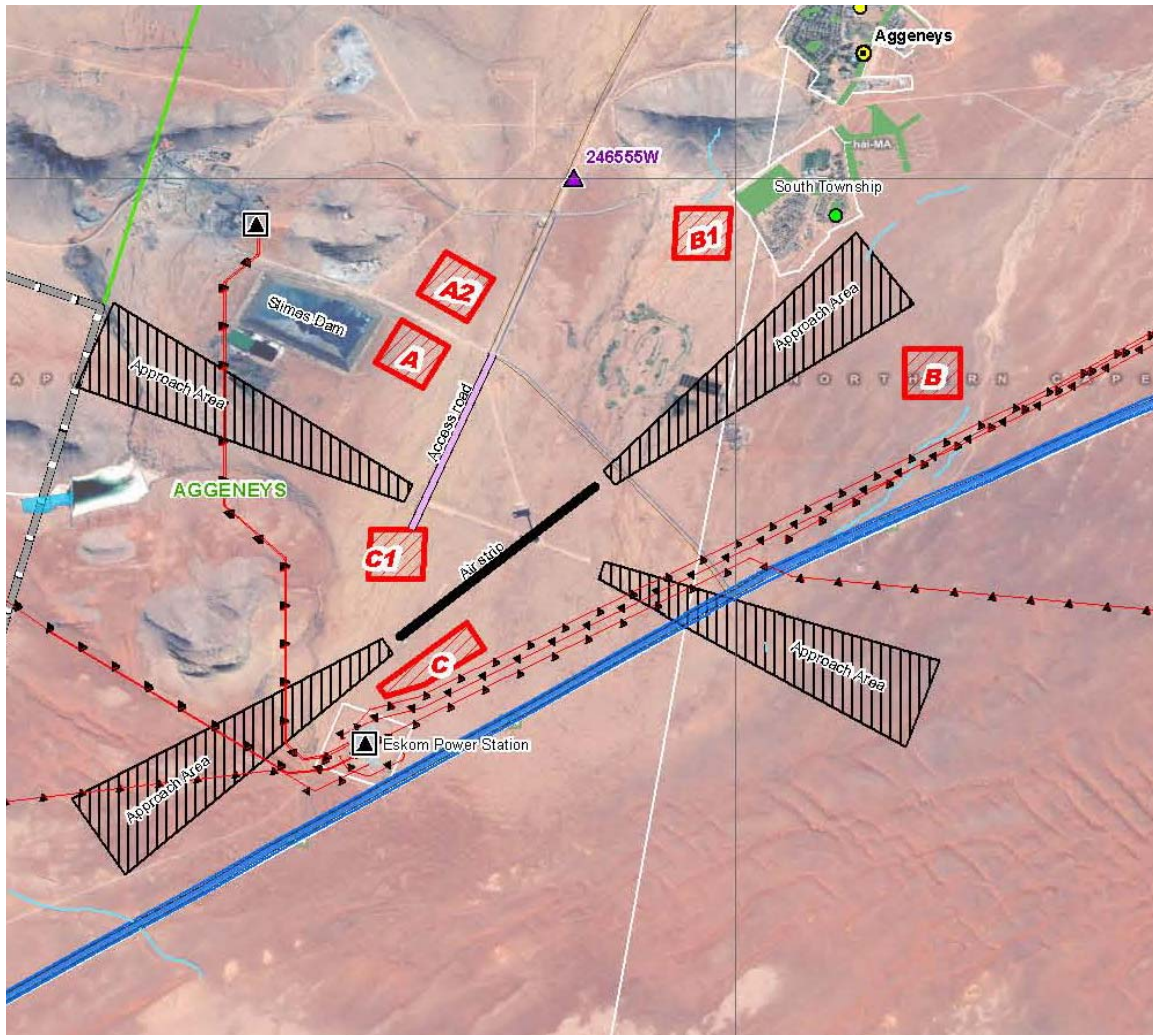
accredited training in Architectural and Urban Conservation: researching and assessing local heritage environments (S. Townsend, UCT), and is familiar with the broad history of the Northern Cape.

I work 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 arid, comprising relatively flat drainage plains with inselbergs such as the Aggeneys Mountains, Black Mountain and Gamsberg rising above the plains in the wider landscape. The landscape is sparsely vegetated, therefore making any surface archaeological traces highly visible.



Map of the area showing localities relevant to this study south and south west of Aggeneys township (from SRK Map of 29 March 2011).

2.1 Description of heritage features of the region

2.1.1 Colonial frontier

The eighteenth- and nineteenth-century records for this region (Penn 2005) include the travelogues of George Thompson (1827) and E.J. Dunn (1931, Robinson 1978), who visited the area in 1824 and 1872 respectively. Place names were becoming fixed in this colonial frontier period (in a cadastral sense, on maps and in farm names), many such names having Khoe-San origins encapsulating vestiges of precolonial/indigenous social geography. A much more

prominent appreciation is now emerging concerning the history of genocide against the Bushmen in this area (Anthing 1863), with certain mountainous areas (like Gamsberg and Namiesberg near Aggeneys) being likely massacre sites, referred to by Dunn in 1872 (Robinson 1978) and, more obliquely, by Anthing (1863; Jose Manuel de Prada-Samper pers. comm. 2009).

A variety of interpretations exist for the name Aggeneys/Aggeneis. The name appeared first in written form as *Achenijs* in 1859. In a “Brief history of Aggeneys” published in *The Cape Argus* in July 1973 (Nienaber & Raper 1977:173) the following story is given:

“Aggeneys is the name of a kloof on Vickie Burger’s farm ... Long before the turn of the century, the Bushmen had several strongholds in the mountains between Pofadder and Springbok and from these they carried out raids on the farmers. Finally the farmers could no longer tolerate the marauding Bushmen and formed a commando which followed the spoor of the Bushmen and the livestock that they had stolen to the kloof, which is today known as Aggeneys. Near the kloof they split into three parties which surrounded and trapped the Bushmen at a spring near the confluence of three ravines. The Bushmen were wiped out and the kloof became known as ‘The Place of Blood’. The Nama Coloureds have always known the kloof as ‘The Place of Water’, as there were several natural springs there, but to this day no-one is quite certain of the origin of the name Aggeneys...” (Nienaber & Raper 1977:173).

Other interpretations are cited by Nienaber and Raper, including the possibility that it means ‘Place of Red Clay’ or that it is associated with reeds (*riete*) (reviewed in Morris 2000a:10).

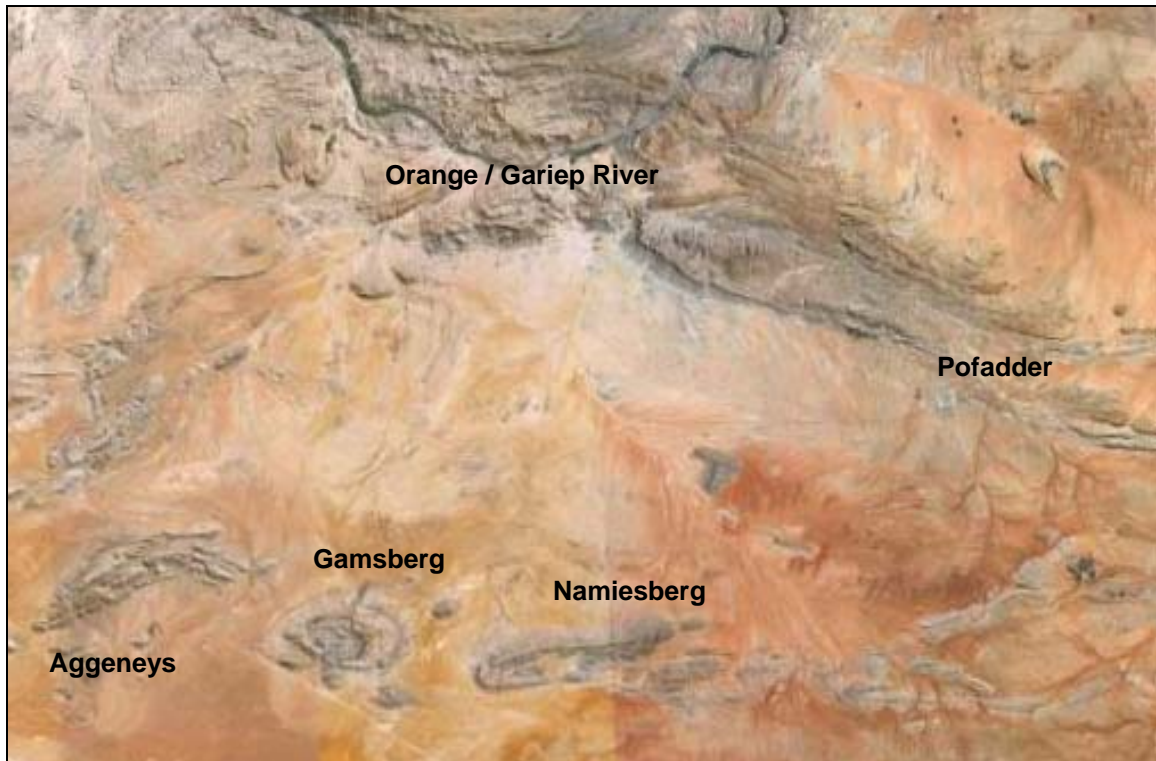
An important further source not accessed previously comes in the form of C.R. Burger’s (1986) thesis, *’N Ondersoek na die Oorsprong en Betekenis van Plek- en Plaasname in die Landdrosdistrik Namakwaland*, which cites A.J. Burger, a

retired farmer, in commentary given in a letter written in 1982 which contradicts the above and links the incident of the killing of Bushmen rather with Gamsberg than with Aggeneys.

“Daar was beslis riete, ook nounog, en daar was ook een of meer fonteine toe my oorlede vader die plaas in 1910 gekoop het. Daar was en is ook nog rooi klei. Ek kan onthou hoe die meide hulle gesigte besmeer het – eintlik ’n rooi sagte klip. Die laaste vesting waar die Boesmans doodgeskiet is deur die Boere, was nie Aggeneys nie, maar baie beslis aan die suiderkant van Gamsberg – so ’n lelike kloof in die berg. Jy kan dit sien as jy met die ou gryspad ry.” (Burger 1986 :147-148). (Emphasis added).

[“There were certainly reeds, even now, and there were also one or more springs when my late father purchased the farm in 1910. There was also and still is red clay. I can remember the Coloured women [*meide*] smearing their faces with it – actually a red soft stone. *The last place where the Bushmen were shot dead by the farmers was not at Aggeneys, but very definitely on the southern side of Gamsberg* – a dreadful kloof in the mountain. You can see it if you drive along the old gravel road”] (Emphasis added).

C.R. Burger thus rejects the meaning ‘Place of Blood’ for Aggeneys, on the one hand, and is inclined to opt for ‘Place of Reeds’ – from the Nama *ḡa* meaning riet and *!keis* meaning place.



Regional focus: the study area relative to Aggeneys and some other places mentioned.

2.1.2 Later Stone Age

Late Holocene Later Stone Age (LSA) sites are the predominant archaeological trace noted in past surveys in the Aggeneys-Pofadder region (Morris 1999a-b, 2000a-c, 2001, 2010). Beaumont *et al.* (1995) have shown, with reference to the LSA, that “virtually all the Bushmanland sites so far located appear to be ephemeral occupations by small groups in the hinterland on both sides of the [Orange] river” (1995:263). This was in sharp contrast to the substantial herder encampments along the Orange River floodplain itself (Morris & Beaumont 1990), which reflected the “much higher productivity and carrying capacity of these bottom lands.” “Given choice, the optimal exploitation zone for foragers would have been the Orange River.” The appearance of herders in the Orange River Basin, Beaumont *et al.* argue, led to competition over resources and ultimately to marginalisation of hunter-gatherers, some of whom then occupied Bushmanland, probably mainly in the last millennium, and focused their hunting and gathering

activities around the limited number of water sources in the region. Surveys have located signs of human occupation mainly in the shelter of granite inselbergs, on red dunes which which provided clean sand for sleeping, or around the seasonal pans (Beaumont *et al.* 1995:264). Possibly following good rains, herders moved into the Orange River hinterland, as attested archaeologically at sites with ample pottery near Aggeneys and, east of Pofadder, at Schuitdrift South – Morris 1999a). However, Thompson (1824) refers to herder groups settled at the stronger springs such as Pella dispersing during periods of drought to smaller springs in the region, which could equally well account for the traces referred to here. At such times competition between groups over resources and stress within an already marginalised hunter-gatherer society, must have intensified.

2.1.3 Pleistocene: Middle and Earlier Stone Age

Beaumont *et al.* (1995:240-1) note a widespread low density stone artefact scatter of Pleistocene age across areas of Bushmanland to the south where raw materials, mainly quartzite cobbles, were derived from the Dwyka till. Systematic collections of this material made at Olyvenkolk, south west of Kenhardt and Maans Pannen, and east of Gamoep, could be separated out by abrasion state into a fresh component of Middle Stone Age (MSA) with prepared cores, blades and points, and a large aggregate of moderately to heavily weathered Earlier Stone Age (ESA).

Beaumont *et al.* have shown that “substantial MSA sites are uncommon in Bushmanland” (1995:241): and those that have been documented thus far have generally yielded only small samples (Morris & Beaumont 1991; Smith 1995).

The ESA included Victoria West cores on dolerite, long blades, and a very low incidence of handaxes and cleavers. The Middle (and perhaps in some instances Lower) Pleistocene occupation of the region that these artefacts reflect must have occurred at times when the environment was more hospitable than today.

This is suggested by the known greater reliance of people in Acheulean times on quite restricted ecological ranges, with proximity to water being a recurrent factor in the distribution of sites.

No substantial sites have been found previously in the survey area. Only very sparse localized scatters of stone tools have been seen in places, with limited traces in the hills (e.g. an MSA site at the top of Gamsberg) or at the bases of hills.

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. Developments such as those envisaged can have a permanent destructive impact on these resources. The objective of an EIA would be to assess the sensitivity of such resources where present to assess the significance of potential impacts on these resources and to recommend no-go areas and measures to mitigate or manage said impacts.

Area impacts are possible in the case of the Black Mountain PV development and associated infrastructure, if heritage traces occur.

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.

3. METHODOLOGY

A site visit was necessary to inspect various parts of the terrain on foot, focusing on areas of expected impact. 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 sparse vegetation and shallow 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). It was not considered necessary to conduct excavations as part of the EIA to establish the potential of sub-surface archaeology.

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).

With regard to fossils, a preliminary assessment of the likelihood of their occurring here should be obtained from a palaeontologist. The context did not appear promising from a palaeontological point of view.

3.2 Scoping phase predictions

There was no explicit scoping phase to this particular heritage input other than the review given above on the colonial and precolonial history of the area. It was expected that features such as rock outcrops or the immediate footslopes of hills might be places where Stone Age and probably also colonial era traces would occur, if present. Previous experience has shown that the flat plains away from such features are almost entirely bereft of heritage traces.

3.3 Potentially significant impacts to be assessed in the EIA process

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 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 Ngwao Bošwa ya Kapa Bokone (the Northern Cape Heritage 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 including any *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.

3.4 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	Archaeological 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
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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 areas 'A2', 'B' and 'C' and their surrounds were visited on 12 and 13 April 2011. In summary the findings can be reported in relation to predictions made in the scoping report.

4.1.1 *Reduced archaeological visibility away from landscape features such as hills and rock outcrops:*

This notion was not contradicted at any of the development alternative sites visited. In fact what was found was an extremely low incidence of any form of artefact whatsoever, whether Stone Age or colonial in age.

The plains are veneered with sand, an unconsolidated layer generally thinly spread on a harder older crust of sand. Occasional nodules of quartz or other stones were noted and in a very few instances these turned out to have been flaked in areas A2, B and C.

In a single instance in area B an isolated piece of corroded ostrich eggshell was found in a dry watercourse. Where Later Stone Age sites occur in this environment they often have fairly substantial numbers of ostrich eggshell pieces, the remains of water flasks.

None of the above isolated single-artefact finds could be considered as constituting “sites” in a conventional archaeological or heritage sense.



One of the very few completely isolated flakes found in area A2,
at 29.25834° S 18.80920° E



An isolated flake found in area C at 29.29197° S 18.79942° E.

4.1.2 Higher archaeological visibility at or around landscape features such as hills and rock outcrops:

Upslope from development area A2 is a known Later Stone Age shelter with finger paintings against a boulder that has been known to Black Mountain environmental management for some time, and previously recorded by Deacon (1995, pers. comm.)

The report by Deacon (1995) describes rock paintings found on the boulder, next to the Aggregate Quarry at Black Mountain Mine (29°15'26" S; 18°48'12" E). These are simple finger paintings including two "Star" motifs and an indented oval shaped image. Paintings similar to these are to be found over a wide area in the western half of the interior of South Africa, not infrequently on isolated boulders in the Karoo (sometimes along with rock engravings), and in rock shelters. Their age and context is not well understood, but they appear to be associated in this region with KhoeSan (very possibly Khoekhoe) of approximately the last millennium, rather than with other groups regarded as the makers of finger paintings elsewhere in the subcontinent.

During our visit to the site in April 2011 we also recorded archaeological traces on the floor of the shelter formed by this boulder, namely pieces of ostrich eggshell and flaked quartz.



Faintly visible 'star' image finger painting.



Painted boulder with protective fence and reed roof (needs repairing).

The site is situated at 29.25644° S 18.80339° E



Quartz flake and ostrich eggshell fragment from painted boulder site

The base of the hill may have had further Later Stone Age traces but we found that it had been substantially disturbed during earlier phases of mining in the area. At the eastern end of the hill we found a gently sloping bedrock exposure bearing numerous grinding surfaces such as are found in a few other similar places in the local environment (Morris 2010). (See image below).



Rock surfaces where water collects after rains (above) with localised grinding surfaces (below)



One of several grinding stone surfaces in the vicinity of 29.25362° S 18.80600° E

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, most of the archaeological observations fall under Landform L3 Type 1. The painted shelter (outside the area of development) is L8 Type 2. In terms of archaeological traces on areas of proposed development all Table 1 ascriptions 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, again reflecting low significance, low potential and absence of contextual and key types of evidence – with the exception of the sites noted against the hillside and outside of the areas of proposed development.

The painted shelter continues to warrant conservation and the reed shading to reduce direct sunlight on the already faded finger paintings needs to be replaced (as discussed with Black Mountain environmental management staff).

In conclusion, the heritage traces on all the areas of proposed PV development at Black Mountain/Aggeneys were found to be extremely limited in quantity and of negligible significance in terms of criteria outlined above.

4.3 Determining overall significance

Assessment Criteria

The criteria for the description and assessment of environmental impacts were drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998).

Potential Impact

This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. Its description should include what is being affected and how it is being affected.

Extent

The physical and spatial scale of the impact is classified as:

- Local: The impacted area extends only as far as the activity, e.g. a footprint.
- Site: The impact could affect the whole, or a measurable portion of the site.
- Regional: The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.

*(In all instances the impact, if any, would be **Local**)*

Duration

The lifetime of the impact, which is measured in relation to the lifetime of the proposed base.

- Short term: The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than any of the phases.
- Medium term: The impact will last up to the end of the phases, where after it will be entirely negated.

- Long term: The impact will continue or last for the entire operational lifetime of the Development, but will be mitigated by direct human action or by natural processes thereafter.
- Permanent: This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

*(Impacts on heritage and archaeological resources may be mitigated and hence classed as 'Short term' but the original in situ context is usually altered in a 'Permanent' way. If the archaeological or heritage significance of the resources in question is considered to be low – which is the case here – then the significance of the permanent loss is **low**).*

Intensity

The intensity of the impact is considered here by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. These are rated as:

- Low: The impact alters the affected environment in such a way that the natural processes or functions are not affected.
- Medium: The affected environment is altered, but functions and processes continue, albeit in a modified way.
- High: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

*(Archaeological and heritage resources being non-renewable, the intensity of any direct impact would be high by definition but this evaluation would again be ameliorated by the significance attached to the particular resources in question – which is **extremely low** given the general absence of such resources).*

Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:

Improbable:	The possibility of the impact occurring is none, due either to the circumstances, design or experience.
Possible:	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
Likely:	There is a possibility that the impact will occur to the extent that provisions must therefore be made.
Highly Likely:	It is most likely that the impacts will occur at some stage of the Development. Plans must be drawn up before carrying out the activity.
Definite:	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on.

*(With regard to this project the probability of impacts on heritage including archaeological resources is **Improbable**)*

Determination of Significance – Without Mitigation

Significance is determined through a synthesis of impact characteristics, and is an indication of the importance of the impact in terms of both physical extent and time scale. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:

No significance:	The impact is not substantial and does not require any mitigation action.
Low:	The impact is of little importance, but may require limited mitigation.
Medium:	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

High: The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

Determination of Significance – With Mitigation (NOT APPLICABLE)

Significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. In this case the prediction refers to the foreseeable significance of the impact after the successful implementation of the suggested mitigation measures. Significance with mitigation is rated on the following scale:

No significance: The impact will be mitigated to the point where it is regarded to be insubstantial.

Low: The impact will be mitigated to the point where it is of limited importance.

Low to medium: The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.

Medium: Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

Medium to high: The impact is of great importance. Through implementing the correct mitigation measures the negative impacts will be reduced to acceptable levels.

High: The impact is of great importance. Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of great importance, and, taken within the overall context of the project, is considered to be a fatal flaw in the project proposal. This could render the entire development option or entire project proposal unacceptable.

Nature	Construction and operational phases of power line development	Status	-
Impact source(s)	Any disturbance of the existing land surfaces may have an impact on archaeological or heritage resources where present. See also comments above on intangible values and visual impacts relative to heritage landscapes.		
Affected stakeholders	Heritage is part of the national estate: affected stakeholders are citizens at large.		
Magnitude	<i>Extent</i>	Local	
	<i>Intensity</i>	Considered Low	
	<i>Duration</i>	Considered Low	
	<i>Reversibility</i>	Heritage resources are non-renewable – but extremely low quantities of material were encountered on all the alternative sites examined.	
	<i>Probability</i>	Improbable	
Significance	<i>Without mitigation</i>	The significance of impact would be low, i.e. NOT requiring mitigation.	L
	<i>With mitigation</i>	No significance.	N
Confidence	This assessment is based on examination of the alternative sites on foot which confirm regional patterns based on prior experience at other sites in similar local terrain.		

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

Project component/s

Any road construction over and above what is necessary and any extension of other components addressed in this EIA.

Potential Impact

The potential impact if this objective is not met is that wider areas or extended linear developments may result in destruction, damage, excavation, alteration,

removal or collection of heritage objects from their current context on the site – where they exist.

It is noted in this report that heritage sites do exist relatively close to A2 in the form of the painted shelter and the grinding surface site.

Activity/risk source

Activities which could impact on achieving this objective include deviation from the planned lay-out of road/s and infrastructure without taking heritage impacts into consideration.

Mitigation: Target/Objective

A facility environmental management plan that takes cognizance of heritage resources in the event of any future extensions of roads or other infrastructure.

It is not regarded as necessary that any mitigation should take place for the areas identified for development.

Mitigation: Action/control	Responsibility	Timeframe
<p>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 development or operation.</p> <p><i>In the event that any heritage feature (which may be sub-surface, such as an unmarked grave) is encountered during the development or operational life of the facility, work is to be halted immediately and contact made with the Northern Cape Heritage Authority Ngwao Bošwa ya Kapa Bokone (Mr Sinthumule at 053-8074700), or SAHRA (Ms N. Ndobachani/Ms C. Scheermeyer at 021-4624502), who would arrange for a specialist to assess the find for possible mitigation.</i></p>	<p>Environmental management provider with on-going monitoring role set up by the developer.</p>	<p>Environmental management plan to be in place before commencement of development.</p>
<p>No Phase 2 (mitigation) regarded as necessary in terms of present development layout.</p>	-	-

Performance Indicator

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.

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.

6. CONCLUSIONS

Very sparse heritage traces were found in the development footprint areas.

From an archaeological perspective the observed heritage resources either fall well outside of the proposed development footprint or are of very low significance. Criteria used here for impact significance assessment rate the impacts as Low (even taking into consideration the fact that for heritage traces, unlike biological processes, impacts tend to be irreversible, of permanent duration and high magnitude).

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