

CHAPTER 9
HERITAGE IMPACT ASSESSMENT

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9 HERITAGE IMPACT ASSESSMENT

9.1 SUMMARY

This chapter has been adapted from an Archaeological Impact Assessment (AIA) conducted by Dr David Morris from the McGregor Museum as part of the EIA for the proposed Blocuso solar Energy Project. Following a desktop assessment of the Blocuso solar energy site, a field-based heritage impact assessment has been carried out in April 2012. The chapter will be completed by a review of paleontological sensitivity and assessment of potential impact by Dr John Almond from Natura cc.

No 'sites' per se could be said to be found and these parts of the landscape may be characterised as of very low significance in terms of heritage. As anticipated by the desktop assessment, eroded surfaces west of and between the dunes were found to have generally very low density surface scatters or, more typically, isolated finds, of mainly Pleistocene Stone Age material on banded ironstone (from the Orange valley) and quartz. Later Stone Age (LSA) and Ceramic Later Stone Age sites do occur in deflation hollows particularly along the tops of the Kalahari sand dunes. A variety of raw material types are in evidence indicating access to river gravels as well as more local sources, and finds include pottery fragments (thin-walled, grit-tempered) and, albeit not abundant, ostrich eggshell flask fragments. No burials were noted, either precolonial or colonial.

On the basis of findings in the study area it is recommended that a less sensitive area for the placement of the solar field would be in the western part of the identified area on Blocuso property. The dunes that run north-south tend to be more sensitive in term of Stone Age remains. In terms of heritage-visual impacts, the hills and dunes of the Blocuso area are identified as being a notable feature along a tourism route. The dunes are hence identified as a feature to be avoided if possible when selecting final solar field layout.

Alternatives were investigated with respect to power line connection. It was found that no major factors favour the one over the other from a heritage point of view, but that visual impacts might be greater in the case of alternative 1, hence favouring the developer's preferred option.

9.2 INTRODUCTION

The aim of the study is to locate and map archaeological sites that may be impacted by the planning, construction and implementation of the proposed Blocuso solar energy project, to assess the significance of the potential impacts and to propose measures to mitigate the impacts.

The author of this report is a qualified archaeologist (PhD) 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 and has carried out research and surveys in the region (Beaumont & Morris 1990, Morris & Beaumont 2004).

The author is 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).

9.2.1 Approach to the study

The methodology for this heritage impact assessment includes a survey on foot across the terrain of the proposed solar field and associated infrastructure. This study suggests areas of greater and lesser sensitivity from an archaeological perspective to assist in the narrowing of options for the placement of the Blocuso solar field (approx 200 ha within a 4452 ha property).

The approach followed for the archaeological study entailed the following:

- A one-day survey of the proposed solar energy farm that included an assessment of the location sites of the solar field, and associated infrastructures.
- An assessment of the two alternatives for electrical connections (i.e. loop connection of approx. 300 m and alternative 2 of approx. 3 km new overhead transmission line) that will link to the Eskom Oasis rural substation.
- Description of the area and proposed site in terms of heritage/archaeological features with reference to any relevant information for future planning and related implications for heritage assets;
- Identification of any potential fatal flaws due to the proposed project and proposed facilities;
- Recommendations of practical measures which can be incorporated into the planning of the project that will result either in the avoidance of potentially significant negative environmental impacts or their mitigation to the extent that residual effects fall within acceptable limits; and enhancement of positive aspects of the project;
- Estimation of the carrying capacity of the site for solar energy development in terms of environmental/social criteria;
- Identification of any potential “no go areas” on the site where the panels should not be located;
- Sensitivity maps including all relevant archaeological/heritage impacts - mapping of a zoning on a low-medium-high sensitivity rating
- The integration of visual aspects into heritage impact assessment is sought and relation to the landscape pattern and cultural values.

9.2.2 Constraints and limitations

Major limitation in prediction of archaeological sensitivity is the limited visible surface features, given that archaeological traces, where present, are often, indeed usually, buried. This is however not an issue for much of the proposed site since erosion has occurred over large parts of it rendering any artefacts there highly apparent at the surface.

In certain zones of the site, pre-eminently on the dunes or in sandy flats in depressions or drainage lines, archaeological traces may be buried, although they may become exposed by burrowing animals or through wind action (e.g. in deflation hollows on the dunes). Instances of the latter kind are used in this study to characterise the likelihood of archaeological traces occurring, for instance, along the dunes.

It is possible that significant features may occur sub-surface, including possible precolonial graves or features such as an ostrich eggshell cache. Standard provisos are given for alerting heritage authorities in the event of discovery of such hidden features during project development or operational phases.

9.3 BACKGROUND INFORMATION ON THE PROPOSED PROJECT

South Africa Mainstream Blocuso solar (Pty) Ltd plans to develop a solar energy project on the Blocuso trust Farm (Farm RE 644), located 4 kilometres (km) north of Keimoes and approximately 35 km south-west of Upington, in the Northern Cape. The farm covers an area of approximately 4452 hectares (ha), of which approximately 200 ha would be required for the total project footprint (including all associated infrastructure required during construction and operations). South Africa Mainstream Blocuso solar (Pty) Ltd considers two alternatives for the solar module type to generate electricity: the alternative 1 is to install photovoltaic modules and the alternative 2 is to install concentrated photovoltaic modules on the solar field. There is to this date no preferred option regarding the solar field and final decision will be based on which technology is available at the time of construction. The system may be fixed (PV), or may track the movement of the sun (CPV). The Blocuso solar facility is planned to generate a maximum capacity of 100 megawatts (MW) of electricity from solar energy, and will be connected to the Eskom grid via the Oasis Rural substation located approximately 2 km south from the site. Once a Power Purchase Agreement (PPA) is awarded, this facility will generate electricity for a minimum period of 20 years. The project details are discussed in Chapter 2 of this report.

The South Africa Mainstream Blocuso solar (Pty) Ltd solar facility will be connected to the national grid via an onsite transformer unit in the form of a 132kV delivery substation. The project applicant has engaged with

Eskom to formalise this grid application and the agreement will form part of the PPA. The electrical infrastructure for both PV and CPV technology types will be the same. Therefore no major new design activities would be triggered by technology alternative 2 i.e. CPV technology.

South Africa Mainstream Blocuso solar (Pty) Ltd considers two alternatives for the electrical connection of the solar facility to the existing grid. Alternative 1 is to connect into the existing 132 kV Gordonia-Oasis transmission power line that feeds into the oasis rural substation located approximately 3 km south-west of the site. For this purpose, a loop connection would be built into the Gordonia-Oasis transmission power line with an on-site substation located at the south of the proposed Blocuso site. A transformer unit will facilitate this feed in. Alternative 2 is the construction of a new 132 kV line (approx. 3 km long) running parallel to the existing Gordonia-Oasis transmission power line with a on-site substation located at the south of the proposed Blocuso site. There is to this date no preferred option regarding the electrical connections and final decision will be based on preliminary assessment and recommendations from ESKOM. These electrical connections alternatives are discussed in Chapter 3.

9.4 DESCRIPTION OF THE RECEIVING ENVIRONMENT AND REGIONAL HERITAGE RESOURCES

The terrain consists of sparsely vegetated farmland, namely grazing camps with adjacent land used for tourism in the form of 4x4 routes. South of the main Upington-Keimoes road, and in close proximity to the Orange River for irrigation, land is given over to vineyards, with potential for future expansion of such farming north of the road (as has occurred already further to the east).

Much of the terrain consists of hard stony ground with little depth of soil, other than in drainage lines, while marked dunes of Kalahari sand trend north to south from the prominent hills that lie immediately north of the study area. Drainage lines trend south-westwards from the hills towards the Orange River.

Vegetation being sparse, surface archaeological traces would be fairly to highly visible, particularly in places where the predominant geological processes of recent times have been erosional rather than depositional. Subsurface traces would tend to occur in areas where sediments or aeolian sands have accumulated, particularly in downslope areas in drainage lines and along the dunes. The hills potentially provide shelters, with one cave site of high significance being known on Zovoorby north of the study area (Smith 1995).

The west central interior where the site under investigation is situated is at the southern extremity of the Kalahari, on the north bank of the Orange River near Keimoes. This is an arid environment with relatively flat drainage plains and local features such as the Zovoorby hills immediately north of the study area and dunes trending southwards from the hills towards the Orange River.

The region has a sparse but significant precolonial archaeological heritage (e.g. Morris & Beaumont 1991), these often being focused along the river itself or on dunes or in the shadow of inselbergs or ranges of hills such as on the farm Zovoorby within the project area (Smith 1995). Late Holocene Later Stone Age (LSA) sites are frequently noted in surveys in the wider region and along the Orange River (e.g. Morris & Beaumont 1991; Beaumont et al. 1995). These are generally short-duration occupations by small groups of hunter-gatherers. In contrast, there are substantial herder encampments along the Orange River floodplain itself (Morris & Beaumont 1991) and in the hills north of Kakamas (Parsons 2003). In the range of hills north of the study area, on Zovoorby, a rock shelter and specularite working (a sparkling mineral with known cosmetic and ritual use in the precolonial past) has been excavated (Smith 1995). LSA sites are usually focused on a particular feature in the landscape such as a rocky outcrop, often on dunes, or in relation to resources like water and associated habitats richer in animals and plant foods.

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 glacial till. Similar occurrences have been noted north of Upington in situations where raw materials are abundant. Systematic collections of this material at Olyvenkolk south west of Kenhardt and Maans Pannen

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. 1995).

The ESA included Victoria West cores on dolerite and quartzite (a fine example has been found at Hondeblaf north of Upington), 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.

Very low density “off-site” scatters of ESA and MSA material has been noted over large areas on plains both north and south of the Orange River where raw materials are less readily to hand. These most likely reflect opportunistic knapping/use of nodules of raw material carried during foraging activities.

Colonial era traces may occur, including those relating to farming activity. The region was marked by conflict in the late nineteenth century, including the Korana Wars. Earlier records of the eighteenth- and nineteenth-century for this region (Penn 2005) pertain mainly to the areas south of and along the Orange River. The travellers Wikar and Gordon followed the river as far as and beyond this region in the 1770s, describing communities living along the river (see Morris & Beaumont 1991 for a summary). Dunn and others describe the situation of a somewhat transformed social landscape a century later (Robinson 1978).

9.5 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).

9.5.1 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 and, 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.

9.5.2 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,	Far from water	In floodplain or near	On old river terrace

Class	Landform	Type 1	Type 2	Type 3
	inland		feature such as hill/dune	
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

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

9.6 PERMIT REQUIREMENTS

In the event that significant heritage resources are found that require phase 2 mitigation then specific mitigation permit/s would need to be sought from SAHRA or the Northern Cape Heritage Authority, Ngwao Boswa jwa Kapa Bokone (depending on which of these is the appropriate authority at the time and under the circumstances: currently archaeological matters go through SAHRA and built environment matters through Boswa; but this could change if Boswa becomes accredited for archaeology).

Where mitigation is not required but heritage resources (low significance) are nevertheless likely to be impacted, then a destruction permit would need to be obtained before construction proceeds.

9.7 RESULTS OF THE DESK TOP STUDY

9.7.1 ARCHAEOLOGY

The desktop study has indicated that most of the area, particularly older eroded surfaces, would be found to have generally very low density surface scatters of mainly Pleistocene Stone Age material. A comparable situation at Spitskop north of Upington was alluded to, as well as at sites north of the Upington-Keimoes road previously recorded, where this material comprises Middle Stone Age and possibly Fauresmith artefacts (McGregor Museum records).

Later Stone Age (LSA) and Ceramic Later Stone Age sites, it was suggested, may occur in more recent surfaces and sediments such as the dune areas.

Later Stone Age burials are known from the region and whereas these are known from areas immediately adjacent to the river, it was noted that they may occur in places further upslope (Morris 1992).

Rock engravings were known to occur in the wider region, e.g. at Biesje Poort north of Kakamas (Morris 1988) but it was not known if any would be found in the hills that lie north of the study area.

9.7.2 BUILT ENVIRONMENT AND COLONIAL ERA HERITAGE

On Google Earth limited farm infrastructure on the project footprint area appeared evident.

9.7.3 SENSE OF PLACE, VISUAL IMPACTS AND SCENIC ROUTES

The N14 from Upington to Keimoes is a touristic route for travellers from Gauteng to Namaqualand, Richtersveld and southern Namibia and the terrain north of the road near Keimoes is locally picturesque. Upon approaching Keimoes, however, the hills and dunes give way to hi-tech farming infrastructure and the Oasis power substation.

9.7.4 POTENTIALLY SIGNIFICANT IMPACTS TO BE ASSESSED

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 jwa 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: of a road, erection of a pylon, or preparation of a site for a sub-station, or 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 indicated here have a generally lower impact than others. For example, 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.

9.8 RESULTS OF THE FIELD WORK STUDY

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.

The likely area to contain the proposed development footprint area and ancillary infrastructure locales were visited on 10 April 2012. In summary the findings can be reported in relation to predictions made during the desktop assessment (see 8 above):

9.8.1 Archaeological

- 1) That most of the area, particularly older eroded surfaces, would be found to have generally very low density surface scatters of mainly Pleistocene Stone Age material (Figure 1). Our findings corroborated this prediction, that over most of the area examined, the major part of which consists of nearly horizontal or gently sloping plains with shallow drainage lines characterised preponderantly by erosion, was sparsely covered by very low density, in fact essentially isolated, flaked stone tools. These are mainly in banded ironstone (a raw material introduced to the vicinity from the Orange River gravels) and quartz pieces. Formal elements included faceted platforms on rare triangular flakes suggesting MSA context while some large flakes could be earlier. At no place could any accumulation of such material be construed as a definite 'site': the situation suggests a landscape (Figure 2) with traces of diffuse, opportunistic off-site stone tool use in Pleistocene times.

In terms of the archaeological significance matrices (see 9.5 above) the scoring for Landform: L1/L3 Type 1 or 2; Archaeological traces: A3 Type 1, and Site attributes: Classes 1-7 Type 1, all denote a generally low archaeological significance.



Figure 1: Isolated artefacts from the plain west of the dunes



Figure 2: View from the plain towards the dunes

- 2) Later Stone Age (LSA) and Ceramic Later Stone Age sites may occur in more recent surfaces and sediments such as the dune areas (see Figure 6). Numerous deflation areas along the tops of dunes contained evidence of Later Stone Age use of these parts of the landscape, where stone tools were made on a variety of stone raw materials imported from the river gravels (many river-rounded flaked pieces) as well as quartz of more local derivation. A variety of tools were found including a hammer stone and flaked microliths (some with retouch) blades and cores. Ostrich eggshell fragments were not much in evidence, though present, while ceramics, comprising thin-walled grit-tempered potsherds were found at several places on the dunes (Figures 3, 4 & 5).

In terms of the archaeological significance matrices (see 9.5 above) the scoring for Landform: L3 Type 2; Archaeological traces: A3 Type 1 and possibly 2, and Site attributes: Classes 1, 3-7 Type 1, Class 2 possibly Type 2, underscore the potential for higher archaeological significance.



Figure 3: LSA artefacts



Figure 4: Hammer stone



Figure 5: Potsherd

- 3) Rock engravings – not likely in situations away from fixed rock features. A few bedrock outcrops were noted in the plains but none had surfaces suitable for engraving and no engravings were found.

9.8.2 Colonial era heritage

The principal colonial era heritage noted was association with the old Upington-Keimoes road, including a borrow pit. No significant features and no graves were noted.

9.8.3 Sense of place, visual impacts and scenic routes

It has been noted that the N14 from Upington to Keimoes is a touristic route for travellers from Gauteng to Namaqualand, Richtersveld and southern Namibia and the terrain north of the road near Keimoes is locally picturesque. Upon approaching Keimoes, however, the hills and dunes give way to hi-tech farming infrastructure and the Oasis power substation.

If the site eventually chosen for the Blocuso development is set back from the road and to the west of the dunes it is likely to have less of a visual impact on this heritage landscape (of which the combination of dunes and Zovoorby hills constitute perhaps the principal features).



Figure 6: The northern end of the western-most dune in the Blocuso study area

9.9 ASSESSMENT OF IMPACTS

Heritage resources including archaeological sites are in each instance unique and non-renewable resources. Area and linear developments such as those envisaged can have a permanent destructive impact on these resources. The objective of the EIA is 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 measures to mitigate or manage said impacts.

In the case of the Blocuso solar field and associated infrastructure, the power lines and access roads represent potential linear impacts. 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 or a water supply pipeline 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 (Sampson compares such destruction to the pulling out of a thread from an ancient tapestry).

The study has shown that the extent of the impacts of the proposed Blocuso solar energy facility on the archaeological landscape is likely to low (negative) (refer to Table 9-1).

There is the possibility of encountering archaeological remains during excavation for the solar panels installation (e.g. CPV system) and underground cables within the solar facility, for example, but this is also likely to be very low impact significance. A surface examination of the impacted area for the electrical connection alternatives revealed low potential impacts.

It is maintained that the proposed development of the Blocuso solar energy facility will not have an impact of great significance on potential archaeological remains that might be encountered during the construction phase of the proposed project.

Table 9-1 Blocuso solar energy farm: Summary of impacts to archaeological assets

Nature of the Impact	Status	Extent	Duration	Intensity	Probability	Significance Without mitigation	Mitigation	Significance with mitigation	Confidence
<p>Destruction or disturbance of archaeological sites. (See 9.8.1) This may result from any disturbance of surfaces during construction, operational or closure phases. (See 9.7.4)</p>	Negative	Local	Permanent	Low	Improbable	Low	<p>No mitigation is required if development is situated west of the dunes. (See 9.11.1)</p> <p>Local mitigation may be recommended if dunes are intersected (See 9.11.1) (See also Table 9-2)</p> <p>No mitigation is required for electrical connection alternatives (See 9.11.2) but alternative 2 may have greater visual impact than alternative 1.</p>	Low	High
<p>Possible destruction or disturbance of significant sub-surface features, e.g. precolonial grave or ostrich eggshell cache not located during AIA</p>	Negative	Local	Permanent	Low	Improbable	Unknown, subject to assessment if found.	<p>May be required (See Table 9-2)</p> <p>In the event of any such feature being found during any phase of the development it should be reported to relevant heritage authorities so</p>	Unknown, depending on nature and significance of resource if found.	Medium

(see 9.2.2)							that appropriate mitigation needs may be evaluated.		
Destruction or disturbance of colonial era sites. (See 9.8.2)	Negative	Local	Permanent	Low	Improbable	Low	No mitigation required	Low	High
Impact on sense of place, visual impacts and scenic routes (see 9.8.3)	Negative	Local	Long term	Medium	Probable	Medium	Setting the development back from the N14 road and west of the dunes (see 9.8.3) Selection of electrical connection alternative 1 (loop into existing line) may have less visual impact than erection of new power line (see 9.11.2)	Low	Medium

Table 9-2 Blocuso solar energy farm: Mitigation and monitoring

Impact	Mitigation objectives	Mitigation/ Management action	Monitoring		
			Methodology	Frequency	Responsibility
<p>Construction phase:</p> <p>In the event that more sensitive dune area is to be disturbed</p>	Mitigate destruction or disturbance of archaeological resources.	Inspection and assessment of specific locale within zone of greater sensitivity where disturbance is expected; act on specific recommendations.	Assessment and mitigate if deemed necessary.	In the event of sensitive zone falling within area of expected construction/ disturbance	Project planning.
<p>Construction or operations phase:</p> <p>In the event that any heritage feature is uncovered during construction or operation (including any possible expansion of the facilities).</p>	Mitigate unexpected uncovering, disturbance or destruction of archaeological resources, e.g. burial or feature.	<p>Alert relevant heritage authority in the event of finding any feature during construction or operation.</p> <p>Assess in the event of any expansion or possible impact beyond the area covered by this report.</p>	Alert heritage authority and mitigate if deemed necessary.	In the event of unexpected uncovering of feature.	Project construction/ operation team

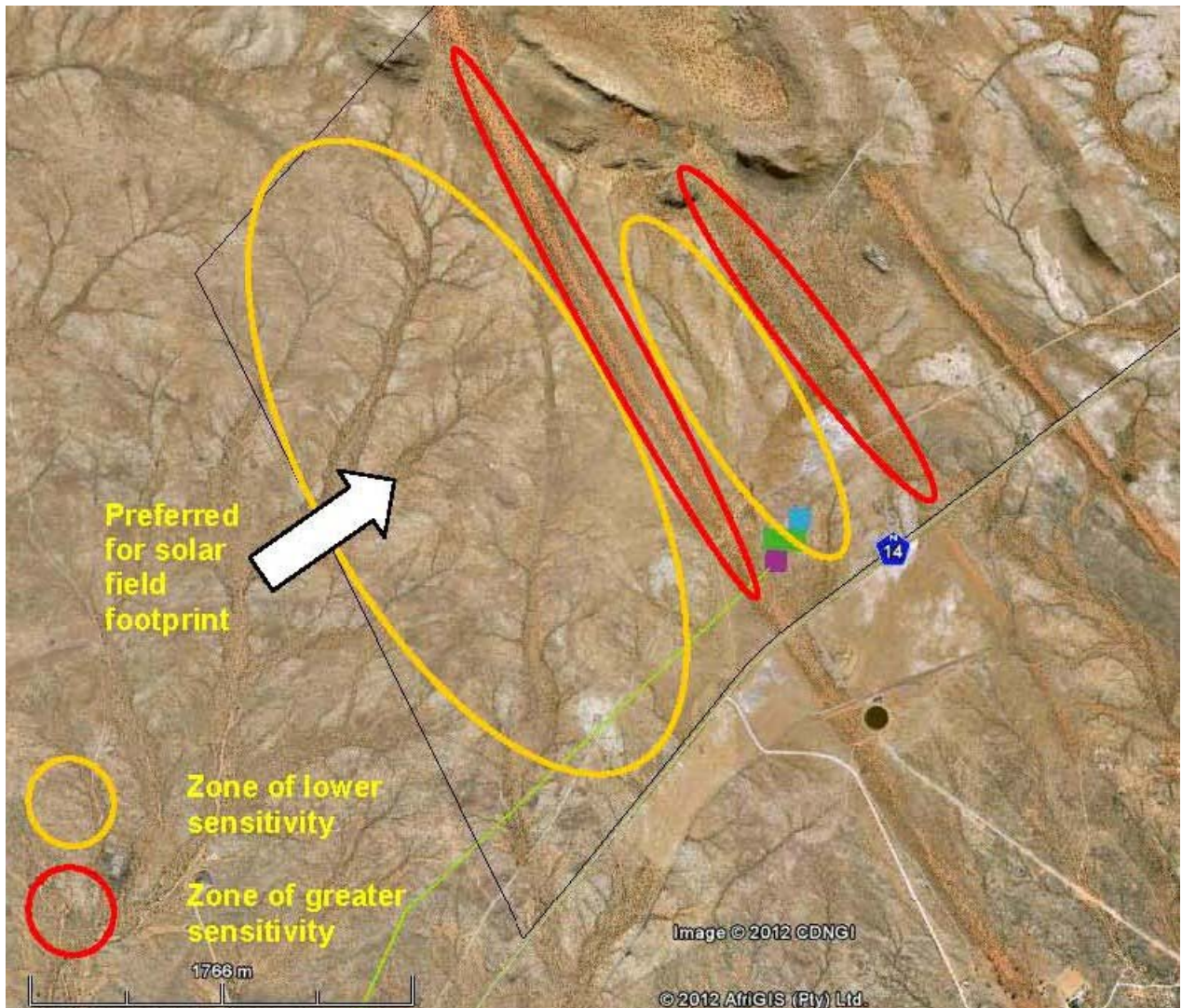


Figure 7: Sensitivity map including all relevant archaeological/heritage impacts

9.10 REVERSIBILITY OF IMPACTS AND IRREPLACEABILITY OF RESOURCE LOSS

In all cases the impacts on the physical heritage resources of the past considered here, both colonial (found to be minimal) and precolonial (occurring throughout but with areas of higher sensitivity on the dunes and low significance elsewhere) would be both **non-reversible** and **irreplaceable**. In instances where mitigation is recommended (i.e. where a zone of possibly higher sensitivity is likely to be impacted), the conditions of non-reversibility and irreplaceability of resources would be ameliorated by documentation and recovery of representative material, i.e. mitigation.

9.11 ASSESSMENT OF ALTERNATIVES

9.11.1 Solar field layout alternative

At this stage alternative site options have yet to be set out but in terms of heritage the following remarks can be made:

- that the numerous deflation areas along the dunes containing LSA traces renders the dunes an archaeologically more sensitive feature in this landscape. It is thus recommended that where infrastructure in the final layout would intersect the dunes, these specific places should be examined if possible with the potential that some such places may need mitigation.

- that a preferred area for the development from an archaeological perspective would be the plains that extend westwards of the dunes, as indicated in the map above.

9.11.2 *Electrical connection to existing grid alternatives*

Alternatives for the power line connection are: alternative 1 is to loop into the existing line, and alternative 2 is to run a new power line parallel with the existing line to the substation. The route for Alternative 2 across eroded and rocky surfaces mainly (Figure 7) was investigated and found to reflect the same very low density occurrences of Stone Age material as was noted for the plains westward of the dunes. In these terms from an archaeological perspective there is no particular reason why one alternative should be preferred over the other. Possibly from the point of view of visual impact the alternative 1 (loop into existing line) would be preferable.



Figure 7: Route for Alternative 2 across eroded and rocky surfaces mainly (view eastwards towards Blocuso from near Oasis rural substation)

9.12 CUMULATIVE IMPACTS

The likely impact of the proposed development on archaeological resources, where they occur, is anticipated to take place mainly as a once-off permanent impact during any disturbances of the current land surfaces in the construction phase with relatively minimal impact thereafter. However, in the event of future expansion or increased traversing of the surrounding terrain as a result of the development, further impacts are possible.

9.13 CONCLUSION AND RECOMMENDATIONS

It had been predicted that the more sensitive area within the identified area of likely development would tend to be in the vicinity of the hills (to the north of the study area) and along the dunes (extending southwards into the study area). It was also expected that the plains would have a much sparser heritage trace of generally highly dispersed stone tools.

Findings during the field survey confirmed and amplified these expectations. The numerous deflation areas along the dunes containing LSA traces (though none of them particularly rich in themselves) renders the dunes an archaeologically more sensitive feature in this landscape.

It is recommended that where any infrastructure in the final layout would intersect the dunes, these specific places should be examined and if necessary made subject to mitigation (excavation/sampling of archaeological material as necessary).

A preferred area for the development from an archaeological perspective would be the plain westwards of the dunes, as indicated above. From a heritage point of view there is no particular preference for either of the power line alternatives, but the project's preferred option (loop into existing line) would have a lower visual impact.

9.13.1 Recommendations

That the development should preferably be situated, from an archaeological and colonial heritage point of view, in the area westward of the dunes (much lower density of Stone Age traces) and set back from the N14 road (lessened visual impact).

That while neither of the electrical connection alternatives is expected to have any significant negative impact on archaeological resources, the preferred option (loop into existing line) would have a lower visual impact.

That should the development footprint cross over the dunes, the specific places where this would happen should be inspected to determine whether local mitigation is necessary.

9.14 REFERENCES

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APPENDIX 1: CONVENTIONS USED TO DETERMINE THE SIGNIFICANCE OF CULTURAL HERITAGE RESOURCES

The following criteria are applied for determining archaeological significance based on field survey of material culture traces in the landscape (*relevant for field assessment as yet to be carried out for the present project*):

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 2000). 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 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 settlements, 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

Class	Landform	Type 1	Type 2	Type 3
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

APPENDIX 2: CONVENTIONS USED TO IDENTIFY POTENTIAL RISKS/ IMPACTS OR “NO-GO AREAS” ON HERITAGE RESOURCES

The following criteria can be applied for determining overall significance:

These criteria for description and assessment of environmental impacts are 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).

9.14.1 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.

9.14.2

9.14.3 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.

9.14.4 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 then the significance of the permanent loss is **low**).*

9.14.5 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).

9.14.6

9.14.7 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.

9.14.8 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.

9.14.9

9.14.10 Determination of Significance – With Mitigation

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.

APPENDIX 3. RELEVANT LEGISLATION

Extracts from the

National Heritage Resources Act (No 25 of 1999)

DEFINITIONS

Section 2

In this Act, unless the context requires otherwise:

- ii. *"Archaeological"* means –
 - a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
 - b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation;
 - c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic,... and any cargo, debris, or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation.
- viii. *"Development"* means any physical intervention, excavation or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including –
 - a) construction, alteration, demolition, removal or change of use of a place or structure at a place;
 - b) carrying out any works on or over or under a place;
 - c) subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
 - d) constructing or putting up for display signs or hoardings;
 - e) any change to the natural or existing condition or topography of land; and
 - f) any removal or destruction of trees, or removal of vegetation or topsoil;
- xiii. *"Grave"* means a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place;
- xxi. *"Living heritage"* means the intangible aspects of inherited culture, and may include –
 - a) cultural tradition;
 - b) oral history;
 - c) performance;
 - d) ritual;
 - e) popular memory;
 - f) skills and techniques;
 - g) indigenous knowledge systems; and
 - h) the holistic approach to nature, society and social relationships.
- xxxi. *"Palaeontological"* means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance;
- xli. *"Site"* means any area of land, including land covered by water, and including any structures or objects thereon;
- xliv. *"Structure"* means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith;

NATIONAL ESTATE

Section 3

- 1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
- 2) Without limiting the generality of subsection 1), the national estate may include –
 - a) places, buildings, structures and equipment of cultural significance;
 - b) places to which oral traditions are attached or which are associated with living heritage;
 - c) historical settlements and townscapes;
 - d) landscapes and natural features of cultural significance;
 - e) geological sites of scientific or cultural importance
 - f) archaeological and palaeontological sites;
 - g) graves and burial grounds, including –
 - i. ancestral graves;
 - ii. royal graves and graves of traditional leaders;
 - iii. graves of victims of conflict
 - iv. graves of individuals designated by the Minister by notice in the Gazette;
 - v. historical graves and cemeteries; and
 - vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No 65 of 1983)
 - h) sites of significance relating to the history of slavery in South Africa;
 - i) movable objects, including –
 - i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - ii. objects to which oral traditions are attached or which are associated with living heritage;
 - iii. ethnographic art and objects;
 - iv. military objects;
 - v. objects of decorative or fine art;
 - vi. objects of scientific or technological interest; and
 - vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 xiv) of the National Archives of South Africa Act, 1996 (Act No 43 of 1996).

STRUCTURES

Section 34

- 1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

ARCHAEOLOGY, PALAEOLOGY AND METEORITES

Section 35

- 3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- 4) No person may, without a permit issued by the responsible heritage resources authority –

- a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
 - b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
 - c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
 - d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
- 5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may –
- a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
 - b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
 - c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph a) to apply for a permit as required in subsection 4); and
 - d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.
- 6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

BURIAL GROUNDS AND GRAVES

Section 36

- 3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority –
- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
 - b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
 - c) bring onto or use at a burial ground or grave referred to in paragraph a) or b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- 4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction of any burial ground or grave referred to in subsection 3a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.
- 5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection 3b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority –

- a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
 - b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.
- 6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority –
- a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
 - b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-internment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

HERITAGE RESOURCES MANAGEMENT

Section 38

- 1) Subject to the provisions of subsections 7), 8) and 9), any person who intends to undertake a development categorised as –
- a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
 - b) the construction of a bridge or similar structure exceeding 50 m in length;
 - c) any development or other activity which will change the character of a site –
 - i. exceeding 5 000 m² in extent; or
 - ii. involving three or more existing erven or subdivisions thereof; or
 - iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
 - iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
 - d) the rezoning of a site exceeding 10 000 m² in extent; or
 - e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,
- must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.
- 2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection 1) –
- a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or
 - b) notify the person concerned that this section does not apply.
- 3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection 2a) ...
- 4) The report must be considered timeously by the responsible heritage resources authority which must, after consultation with the person proposing the development decide –
- a) whether or not the development may proceed;
 - b) any limitations or conditions to be applied to the development;

- c) what general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;
- d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and
- e) whether the appointment of specialists is required as a condition of approval of the proposal.

APPOINTMENT AND POWERS OF HERITAGE INSPECTORS

Section 50

- 7) Subject to the provision of any other law, a heritage inspector or any other person authorised by a heritage resources authority in writing, may at all reasonable times enter upon any land or premises for the purpose of inspecting any heritage resource protected in terms of the provisions of this Act, or any other property in respect of which the heritage resources authority is exercising its functions and powers in terms of this Act, and may take photographs, make measurements and sketches and use any other means of recording information necessary for the purposes of this Act.
- 8) A heritage inspector may at any time inspect work being done under a permit issued in terms of this Act and may for that purpose at all reasonable times enter any place protected in terms of this Act.
- 9) Where a heritage inspector has reasonable grounds to suspect that an offence in terms of this Act has been, is being, or is about to be committed, the heritage inspector may with such assistance as he or she thinks necessary –
 - a) enter and search any place, premises, vehicle, vessel or craft, and for that purpose stop and detain any vehicle, vessel or craft, in or on which the heritage inspector believes, on reasonable grounds, there is evidence related to that offence;
 - b) confiscate and detain any heritage resource or evidence concerned with the commission of the offence pending any further order from the responsible heritage resources authority; and
 - c) take such action as is reasonably necessary to prevent the commission of an offence in terms of this Act.

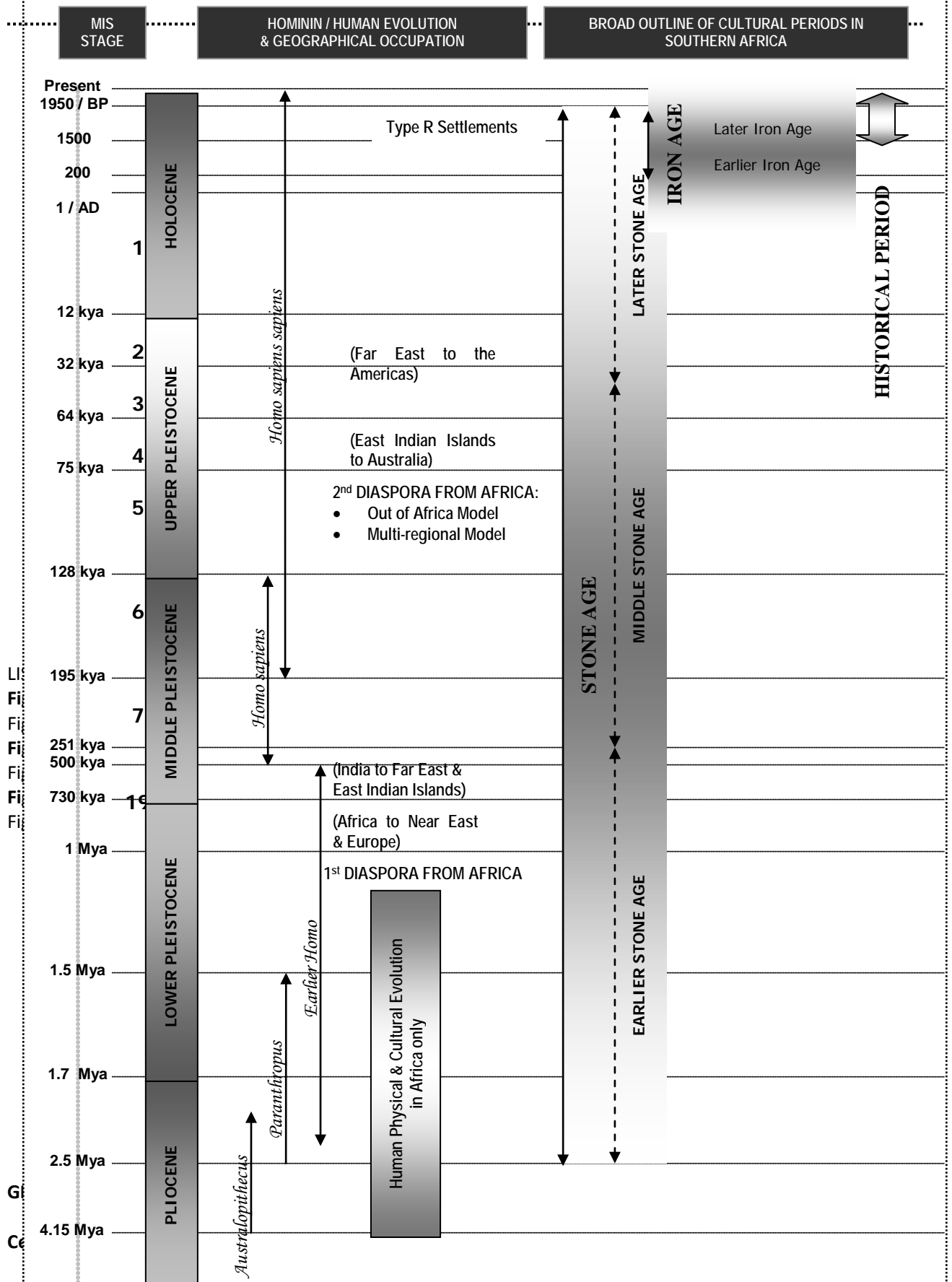
A heritage inspector may, if there is reason to believe that any work is being done or any action is being taken in contravention of this Act or the conditions of a permit issued in terms of this Act, order the immediate cessation of such work or action pending any further order from the responsible heritage resources authority.

APPENDIX 4. ILLUSTRATIONS / MAPS

Maps based on Google Earth and with property definition as supplied have been included in the text above.

Appended below is a schematic time line of human physical and cultural evolution in Africa.

Schematic Human Physical and Cultural Evolution in Africa



Colonial era – equates with ‘Historical Period’ in the above chart, essentially post-1500 and referring to initially non-indigenous material culture and evolving local forms.

Fauresmith – a Middle Pleistocene expression of the evolving Stone Age technologies documented by archaeologists in Southern Africa, transitional between the Earlier and Middle Stone Age (see chart above).

Later Stone Age (LSA)– the most recent of the major heuristic subdivisions of the Stone Age in South Africa (see chart above). Continuities have been pointed out between some features of Later Stone Age technology and behaviour and the historically documented material and lived culture of the Khoe-San. Ceramic Later Stone Age – Later Stone Age (see below) sites with pottery.

MSA – Middle Stone Age – one of the major heuristic subdivisions of the Stone Age in South Africa (see chart above).

Pleistocene – a subdivision of geological time preceding the current Holocene epoch.

Precolonial – pre-1500 indigenous material culture and history, often interdigitating with colonial era features (e.g. Type R settlements which were probably contemporary with European colonisation of the Cape but preceded the frontier advance in the interior).

Rock engravings – a subset of South Africa’s heritage of rock art, also known as petroglyphs, typically occurring on exposed rocky hilltops in the central interior of the country.

Specularite working – specularite is a flaky decomposing form of haematite which glitters in sunlight. It was mined (at ‘workings’) in precolonial times and, when crushed and mixed with fat, was used in cosmetic and ritual contexts. Natural occurrences are rare, in rather specific locales, e.g. near Keimoes and Postmasburg, making these sites highly significant.