

McGregor Museum
Department of Archaeology



PAULPUTS CSP FACILITY
NEAR POFADDER, NORTHERN CAPE
SPECIALIST INPUT FOR THE SCOPING PHASE OF
THE ENVIRONMENTAL IMPACT ASSESSMENT
ARCHAEOLOGY

David Morris
August 2015

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IMPACT ASSESSMENT
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Background

This report provides a scoping phase evaluation of the footprint of a proposed construction of a 200 MW Concentrated Solar Power (CSP) Tower facility, and associated infrastructure immediately north of an existing solar thermal facility on the farm Scuit-Klip 92 near Pofadder in the Northern Cape. It is a desk-top study aimed at providing high-level identification of potential areas of sensitivity, together with a recommended methodology for the EIA process. The CSP Tower facility is proposed to make use of molten salt technology and include the following infrastructure:

- » CSP Tower up to 260m in height with heliostat field,
- » on-site project substation, switching station, 132 kV power line to Paulputs Substation
- » Water supply abstraction point located at the Gariep river
- » filter and booster station
- » water supply pipeline
- » on-site water storage reservoir and tanks
- » lined evaporation ponds
- » packaged water treatment plant
- » auxilliary wet cooled tower/chiller plant,
- » power island including salt storage tanks, steam turbine
- » generator, heat exchanger, dry cooled condenser

Specialist

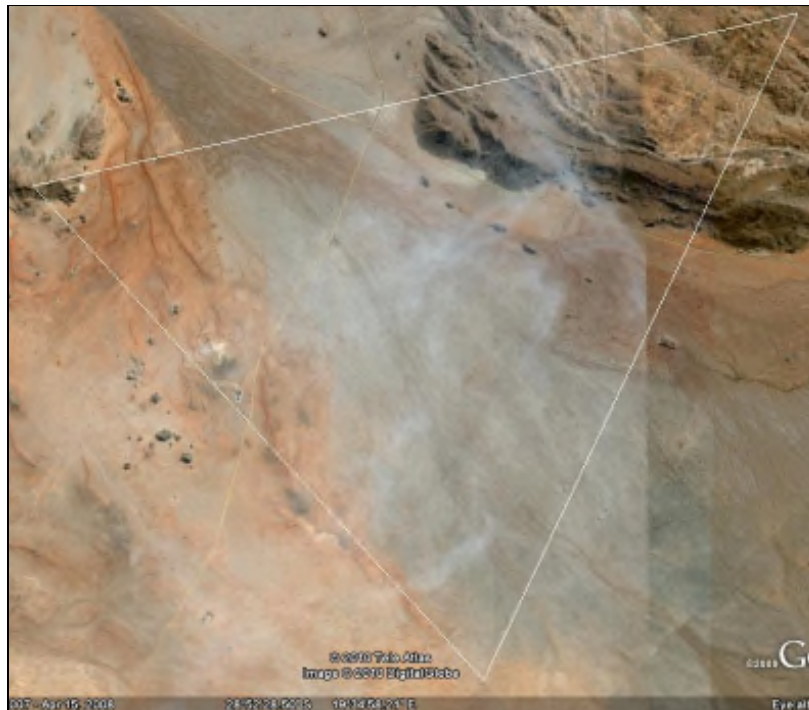
The author of this report is an archaeologist accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists, employed at Head of Archaeology at the McGregor Museum in Kimberley and an Extraordinary Professor in the Heritage Studies Department at the Sool Plaatje University. Work has previously been carried by the author in the vicinity of the proposed activity (Morris 1999a-b, 2000a-c, 2001, 2010, 2012, 2014).

The author works independently of the organization commissioning this specialist input, and 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.

Description of the receiving environment and potential impacts

The environment is arid, comprising relatively flat drainage plains with dunes to the west of the proposed development and several outcropping rocky features in the north eastern part of the development footprint. A water pipeline is to be situated westwards to the Gariiep River. The landscape is sparsely vegetated, hence any surface archaeological traces are likely to be highly visible.



Google Earth image of the terrain prior to the initial development of the Kaxu and Xina solar thermal facilities, in which physical landscape features mentioned are clearly visible.

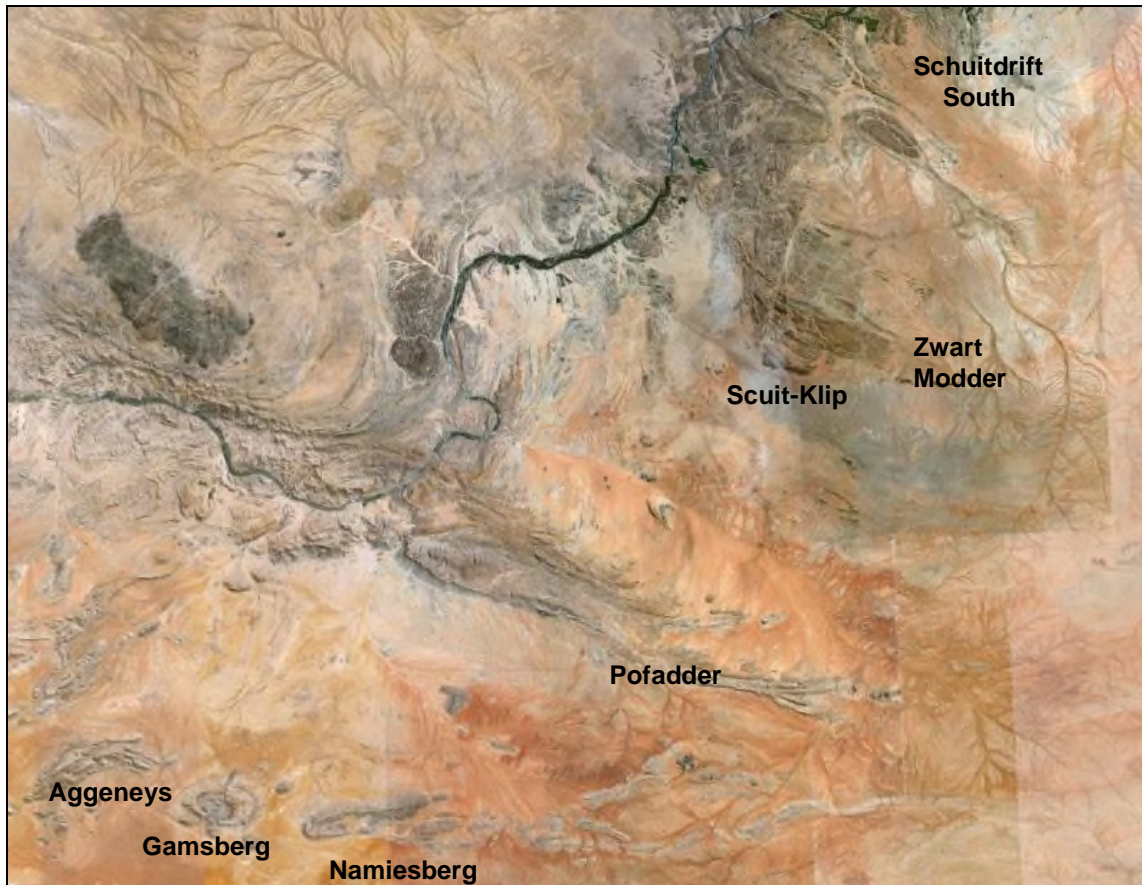


Google Earth image showing the proposed development north of the existing Kaxu Solar One development and projected southern Xina footprint, and including re-routing of the MR73 road, and the incoming pipeline along the road from Onseepkans.

Heritage features of the region

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 Khoekhoegowab origins encapsulating vestiges of precolonial/indigenous social geography. Genocide against the indigenous people is documented in this area (Anthing 1863; de Prada Samper 2012), with certain mountainous areas (like Gamsberg near Aggeneys and Namies) being the likely settings of massacre sites, referred to by Dunn in 1872 (Robinson 1978) and, more obliquely, by Anthing (1863; Jose Manuel de Prada-Samper pers. comm. 2009). Dunn refers to conflict at Zwart Modder, the farm adjoining Scuit-Klip, where he recorded an isolated grave of a member of the Northern Border Police, which has yet to be relocated. Immediately below the Ysterberg ridge, located on the Farm Scuit-Klip, there is a road-side twentieth century grave (Morris 1999a).



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

Later Stone Age

Late Holocene Later Stone Age (LSA) sites are the predominant archaeological trace noted in 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 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 Schuifdrift 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. Dunn, in 1872, refers to a place at Schuit Klip (i.e. Scuit-Klip) where water collected following rains and was still available after a year of no rain in the vicinity (Robinson 1978:60-61). At such times competition between groups over resources and stress within an already marginalised hunter-gatherer society, must have intensified.

Fairly minimal traces of LSA have been found on dunes immediately west of the KaXu project (e.g. Morris 2012, 2014).

Pleistocene: Middle and Earlier Stone Age

As indicated previously, Beaumont *et al.* (1995:240-1) have noted 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 extensive surface spreads of Dwyka tillite. 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.

A handaxe and isolated large flakes were previously found near a rocky outcrop in the Kaxu footprint.

Description and evaluation of environmental issues and potential impacts

Heritage resources including archaeological sites are in each instance unique and non-renewable resources. Area and linear developments 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 Paulputs CSP Facility itself; the proposed substation; the power lines, water supply lines and access roads would represent linear impacts. Potentially associated with roads are borrow pits (although none is indicated) which – in the event of their use – could have a major impact if heritage resources are present.

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

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

With respect to the magnitude and extent of potential impacts, it has been noted that the erection of power lines would have a relatively small impact on Stone Age sites, in light of Sampson's (1985) observations during surveys beneath power lines in the Karoo (actual modification of the landscape tends to be limited to the footprint of each pylon), whereas a road 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). A water pipeline, if sourcing water at the river, could traverse more sensitive terrain, i.e. impacting a potentially greater density of archaeological sites.

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

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

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

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

Class	Attribute	Type 1	Type 2	Type 3
1	Length of sequence/context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte/ecofacts
2	Presence of exceptional items (incl regional rarity)	Absent	Present	Major element

3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

Potential areas of sensitivity

Based on previous experience in the area, it is estimated that the terrain close to hills or rocky features, particularly sandy spots near sheltering rocks, may tend to have traces of precolonial Stone Age occupation/activity. Such a site was previously documented on the adjoining farm Zwart Modder (Morris 1999a), while rather minimal evidence of LSA occupation has been noted on a dune between the KaXu Solar One development and the MR73 road (Morris 2012, 2014). A handaxe and a few large ESA/MSA flakes (illustrated below) were found adjacent to a rock outcrop north of the KaXu Solar One development (Morris 2012).



Stone artefacts (above) found downslope from this rocky outcrop (below) (Morris 2012).

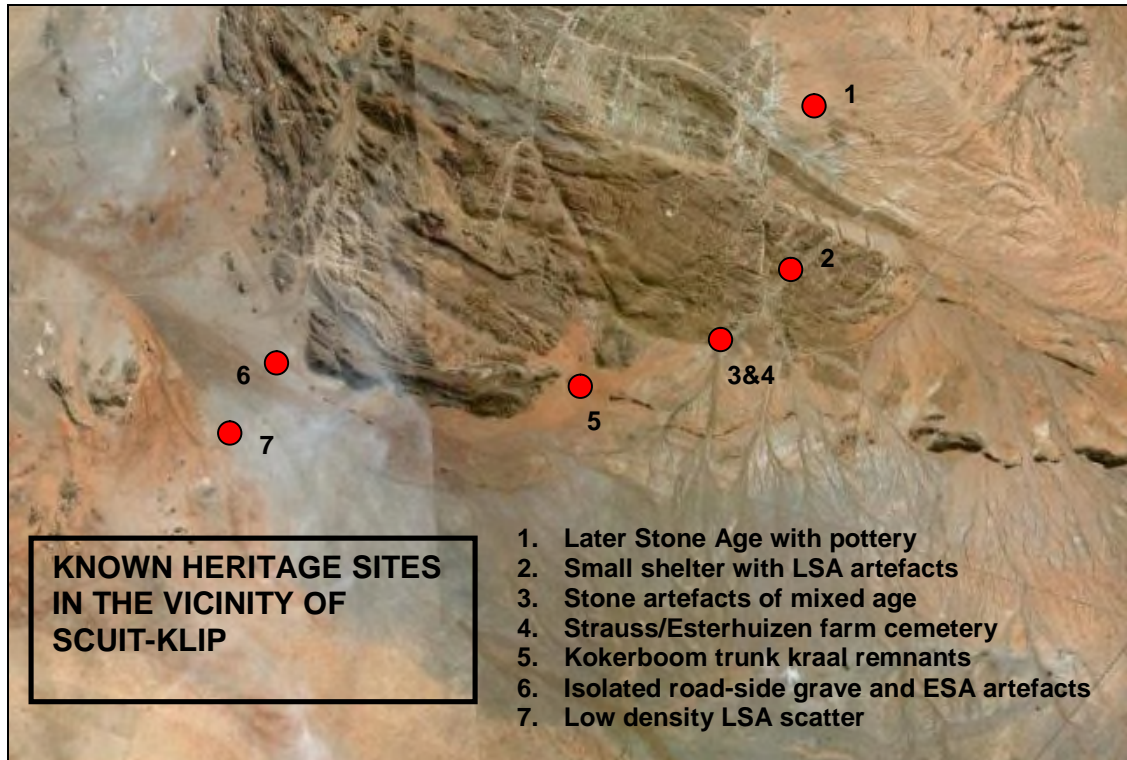


While places in the open plains have been found to have sparsely scattered artefacts (such as at Konkonsies near the Paulputs Substation site – Morris 1999a), these areas are expected to be less significant. An exception to this is where rocky outcrops at the surface on the plains provide places where water pools exist after rains. Such places often attracted people in the past with traces of this including artificial grinding grooves in the bedrock and ample evidence of stone artefacts and pottery. A very good example of this is at Schuitdrift South. The name Scuit-Klip may refer to such a locale on this property, though not necessarily in that portion selected for the present project. It is in fact described in some detail by Dunn (Robinson 1978:60-61): “Two holes occur in the gneiss at the crest of a ridge ... when heavy thunder rains sweep over this arid country the water runs into and sometimes fills these most useful reservoirs, in which it is stored up and lasts many months.”

The sand dunes in the north western part of the area may also have been a focus for past human occupation.

Colonial era sites or features within the study area include the known road-side grave below Ysterberg, a presently unknown grave recorded by Dunn (see above) of a member of the Northern Border Police (near Zwart Modder), and a farm cemetery and homestead/kraal ruins at the old Skuit-Klip farm between the study area and Zwart

Modder. Strauss and Esterhuizen family graves in the cemetery date between 1914 and 1974.



Potentially significant impacts to be assessed in the EIA process

In view of the above, anticipated locations for both area and linear, primary and secondary, developments should be examined on foot, particularly on dunes and around rocky outcrops – both of which features occur in the area of proposed development. Any disturbance of surfaces in the development area could have a destructive impact on heritage resources. 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, the Northern Cape Heritage Resources Authority. Should exceptional heritage features be found (not considered likely), some could require preservation *in situ* and hence modification of intended placement of development components.

Disturbance of any surface includes any construction: of a road, a pipeline, 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 powerlines 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). This does not mean that the route of the line should not be checked in the EIA process, as 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.

Impact table summarising the evaluation of Potential Impacts Associated with the Construction of the Facility at the Scoping phase

<p>Impacts <i>Description of the expected impacts.</i> Any spatial or linear development which potentially displaces or destroys heritage (archaeological) resources occurring on or below the present surface. <i>Areas anticipated to be affected.</i> Potentially much of the footprint of the development, but to be determined during an EIA phase heritage survey.</p> <p>Desktop Sensitivity Analysis of the Site: <i>Sensitivity analysis in terms of the impacts expected.</i> See discussion above. <i>Areas of high concern.</i> Higher sensitivity expected in the vicinity of topographic features such as rocky outcrops and dunes.</p>			
Issue	Nature of impact	Extent of impact	No-Go areas
Disturbance and loss of heritage resources (archaeology)	Displacement from context or destruction of the resource where it occurs.	Impact could be local/regional or national depending on the nature of material if and where it occurs.	Not possible to predict ahead of EIA phase site inspection.
<p>Gaps in knowledge & recommendations for further study While surveys have been conducted in the region providing an idea of what heritage resources to anticipate, the specific area of proposed development has not been surveyed for heritage (archaeological) resources. Hence a site visit is recommended to address this gap.</p>			

Methodology for EIA assessment

A site visit is recommended since the extent of the proposed development footprint has not previously been examined. As noted there are topographic features that may have been favoured as places for occupation/activity in Stone Age times, i.e. rocky outcrops and dunes.

Once sites are plotted they would be assessed in terms of the tables given above and relative to the known heritage of the region, providing a quantifiable measure for defining significance as a basis for recommendations to be made.

One assumption made in this scoping report is that, by and large in this landscape, some sense of the archaeological traces to be found in the area would be apparent from surface observations (including assessment of places of erosion or past excavations that expose erstwhile below-surface features). There remains the possibility that during construction sites or features of significance could be encountered sub-surface (this could include an unmarked burial, or a high density of stone tools, for instance), in which case specified steps are necessary (cease work, report to heritage authority, and so on – to be indicated

in the EIA phase report). It is not considered necessary, however, to conduct excavations as part of the EIA to establish the potential of sub-surface archaeology.

Nineteenth- and twentieth-century cultural history and intangible heritage values attached to places would need to be assessed during EIA fieldwork but may be difficult to recover owing to the sparse population.

A preliminary assessment of the likelihood of fossils occurring here should be obtained from a palaeontologist. Miocene fossils are known from sites along the nearby Koa palaeoriver valley.

The manner in which archaeological traces might be affected by the proposed development has been indicated above, but can 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.

Given that places in this region are now in the process of being linked with specific accounts of nineteenth century genocide against the San, the heritage value of larger-scale landscapes may become more significant and it could be expected that there would be increased concerns in the future over the visual impacts of developments in the area.

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