

McGregor Museum Department of Archaeology



Heritage Impact Assessment for the proposed AGGENEIS – PAULPUTS 400kV Transmission Powerline and Substations Upgrade, Northern Cape

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**David Morris
December 2016**

**Heritage Impact Assessment for the proposed
AGGENEIS – PAULPUTS 400kV DC Powerline and Substations Upgrade,
Northern Cape**

for Mokgope Consulting

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1. INTRODUCTION

This report pertains to a proposed project entailing the construction of approximately 97 km long 400 kV transmission powerline with three alternative corridors from Aggeneis to Paulputs substations. It would involve upgrades of the two substations to accommodate the 400kV powerline.

1.1 Focus and Content of Specialist Report: Archaeology

The archaeology specialist study with comments on the broader heritage component (but excluding palaeontology) focuses on the development footprint alternatives of the proposed Transmission Line in general, to make a recommendation with respect to the three alternatives, noting that it would be desirable, as a phase 2 survey, to assess specific tower positions in more sensitive parts of the route once these are established.

A previous 220kV line project was carried out in the region in 2010 (Morris 2011) which this study draws upon.

1.2 Archaeology Specialist

The author of this report is an archaeologist (PhD, UWC) accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists and has

previously carried out surveys in the vicinity of the proposed activity (Morris 1999a-b, 2000a-c, 2001, 2009, 2011, 2016).

In addition, the author has a comprehensive knowledge of Northern Cape history and built environment, and received UCT-accredited training on Architectural and Urban Conservation: researching and assessing local (built) environments (S. Townsend, UCT). He is also Chairman of the Historical Society of Kimberley and the Northern Cape, and is appointed as an Extraordinary Professor (School of Humanities), Sol Plaatje University (Kimberley).

The author works independently of the organization commissioning this specialist input, and provides 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 gently undulating drainage plains with dunes and mountainous features at a few points along (i.e. adjacent to) the alternative transmission line routes. The landscape is sparsely vegetated, therefore making any surface archaeological and heritage traces highly visible.

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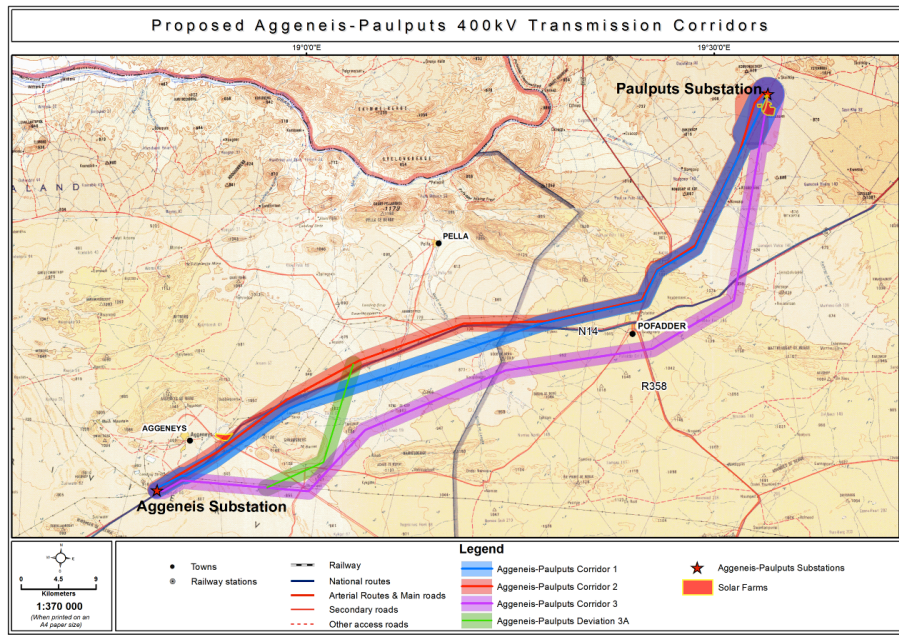


Figure 1. Google Earth Map indicating the region with three alternative transmission line routes.

The alternative routes had been defined in a communication dated 2 June 2016, since revised (18 July 2017) and presented in Figure 1, It is noted that Corridor 3A was suggested by landowners affected by Route 3, which they oppose.

2.1 Description of heritage features of the region

A previous EIA & Servitude Project Investigation Report (Makhanya & Jizana 2010) identified heritage issues as a major concern in terms of risks:

“The Northern Cape holds serious historical value with relation to the Voortrekker movement and human settlement associated to that. The development of diamond and copper mines also resulted in the influx of workers coming from as far as

Comment [J1]: Map to be amended to include deviation 3A and 4km corridor near Paulputs.

Deviation 3A was suggested by landowners affected by Route 3, which they oppose.

The corridors closer towards Paulputs substation will be **4km wide**. This is to allow sufficient space within the corridors to locate the powerline and to avoid clashes with the IPPs in proximity to Paulputs substation. The Solar Farms are indicated on the locality map.

Namibia. Amongst these people there were also the San people who were rich in terms of stone-age tools.”

One would strongly disagree with the specifics of this statement which treats the history of the Northern Cape as if viewing it through the wrong end of a telescope. Some of the most recent history pertains to so-called Trekboers rather than Voortrekkers (whose history refers to areas well to the east). The statement also implies that amongst the influx of workers to the mines were San people – whereas the San and people of the Stone Age have a deed local history as testified by the heritage traces occurring at many sites along the alternative routes of the proposed powerline.

Some of the particular issues mentioned in Makhanya & Jizana’s (2010) Table 02 (“Risk Identification and Proposed Mitigation”) tend to be relevant in only very broad terms. The table is reproduced here with an additional column of comments (indicated in bold type) by the present author:

Risks Identified	Probability	Impact	Proposed Mitigation	Comment (this report)
Many sites across the province, mostly in open air locales or in sediments alongside rivers or pans, document Earlier, Middle and Later Stone Age habitation. The proposed development will have adverse effects on the historical sites.	High	High	Heritage specialist will have to form part of the team and all the necessary applications to relevant government departments will have to be processed accordingly.	Such sites are known in the specific study area but previous work has indicated that their density is generally fairly low compared with other parts of the Northern Cape. Impact may be High in the event of a tower being built directly on a site, but generally impacts of a transmission line may turn out to be Medium or Low (see Sampson 1985)
The Northern Cape is also the home of over 1,000 San who immigrated from Namibia following the independence of the country; they had served as trackers and scouts for the South African government during the war, and feared reprisals from	High	High	Settlement site of the San people will have to be properly identified, studied and documented. These will be avoided during construction should they fall within an approved servitude	This is irrelevant. The !Xun and Khwe San are settled at Platfontein outside Kimberley, some 700 km east of the proposed development.

their former foes. San are associated with rich historical and heritage background that can be disturbed by the development.				
The copper mines of Namaqualand and the diamond rush to the Kimberley area resulted in industrial archaeological landscapes in those areas which herald the modern era in South African history.	High	High	These site will reveal historical significance and should be treated as such during the study and avoided during construction	The historic industrial landscapes referred to lie some 150 km west (copper) and 700 km east (diamonds) of the proposed development.
All archaeological traces in the Northern Cape that are greater than 100 years old are automatically protected by the South African Heritage Resources Act, while some are formally protected by declaration as either Provincial Heritage Sites or National Heritage Sites. The study area is characterised by the archaeological traces that can hinder construction.	High	High	SAHRA, Provincial Heritage department should be involved as part of the stakeholders.	<p>The heritage report would need to be approved by SAHRA currently acting on an agency basis for the Northern Cape Heritage Resources Authority.</p> <p>There are no as yet declared sites along any of the proposed alternative transmission line routes. The proposed project lies beyond the buffer zone of the proposed Namaqualand Copper industrial landscape World Heritage Site (but other parts of Eskom's Northern Cape Strengthening project may encroach into that heritage landscape).</p> <p>Archaeological sites along the route would be automatically protected as stated.</p> <p>Heritage landscapes here do include sensitive areas of frontier conflict /struggle history (especially the Aggeneis, Gamsberg, Namiesberg area) and nearby are notable colonial features such as Pofadder, the</p>

Comment [J2]: My previous reports for the northern cape were submitted to SAHRA only.

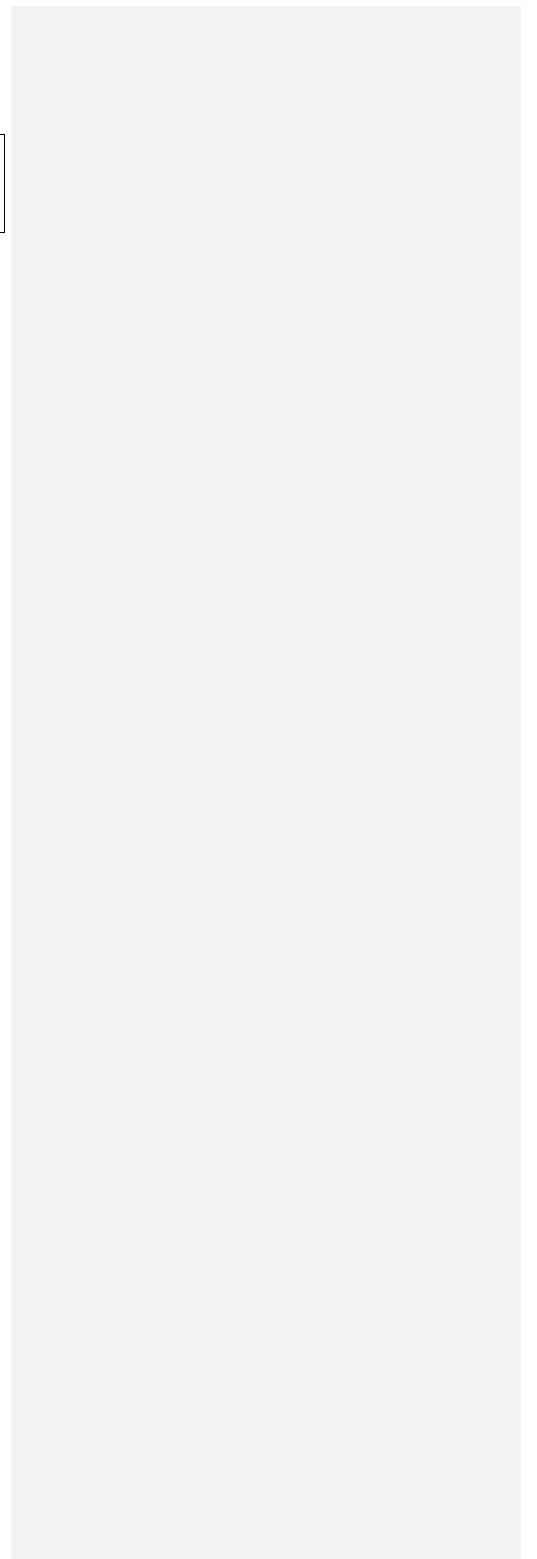
I am not familiar with Northern Cape Heritage Resource Authority. Do you have their contact details and whom to submit to?

Comment [i3R2]: I have revised this to reflect that SAHRA currently acts for the NCHRA on an agency basis – so in fact your submitting to SAHRA is sufficient at this time.

				Pella Mission and the traces of farmer settlement (including graves and memorials).
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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 which is to the east of the town of 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).



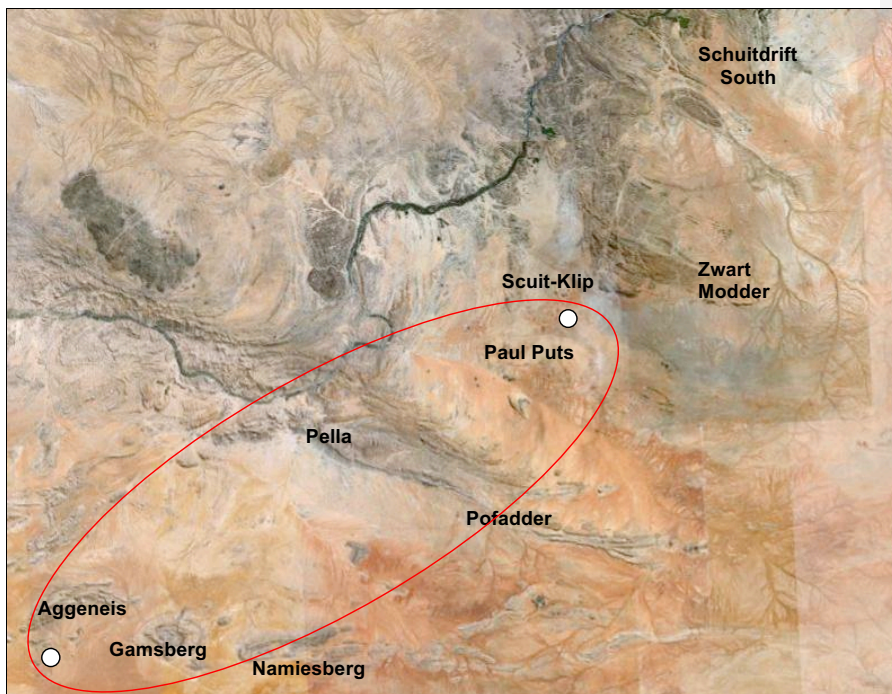


Figure 2. Regional focus: the study area relative to Aggeneis and Paul Puts and some other places mentioned.

2.1.2 Later Stone Age

Late Holocene Later Stone Age (LSA) sites are the predominant archaeological trace noted in surveys in the Aggeneys-Pofadder region (Morris 1999a-b, 2000a-c, 2001, 2009). 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 Aggeneis 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 or at the bases of hills.

2.1.4 Concerns by local Interested and Affected Parties

It is noted that a meeting of I&APs took place at the Pofadder Hotel on 26 October 2016 at which a concern was raised about archaeological material removed from the area to the McGregor Museum. It needs to be clarified that the McGregor Museum itself has undertaken no Phase 2 archaeological mitigation in the area thus far, and therefore has not been responsible for removal of any material from the area to the Museum. A small collection of material has been received from another contract archaeologist resulting from mitigation.

In response to the concern raised (by Louise Coertzen – Minutes of meeting of 26 October 2016), the following from a report on Gamsberg (Morris 2013b) is relevant. It was recommended that one of the mitigation measures to be implemented was “creation of a museum or resource centre for Gamsberg ... as a means of enhancing tourism in the area while also addressing community needs in terms of local heritage (both for general awareness as well as formal educational uses). Such a centre could also have a role in relation to the emerging status of the Gamsberg area in relation to the nineteenth century demise of the ‘Bushmen’ of this region.” In terms of heritage legislation material derived from mitigation has to be curated by an accredited repository such as the McGregor Museum. But it was recommended that “a selection of typical examples of artefacts could be made available for exhibition in any eventual museum/resource centre at Gamsberg, together with relevant reports/publications, posters, and so on, with materials also being generated for use in local schools.”

This report would reiterate this sentiment and advocate the creation of a museum or resource centre in Pofadder to serve the heritage interests of the area. In the event of Phase 2 mitigation eventuating from this project it is recommended that means be found to make examples of artefacts and, particularly, research findings available locally.

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. 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 development project envisaged in terms of localized extension of the substation. The power transmission line routes with access roads would represent linear impacts.

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

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

With respect to the magnitude and extent of potential impacts, it has been noted that the erection of power lines would have a relatively small impact on Stone Age sites, in light of Sampson's (1985) observations during surveys beneath power lines in the Karoo (actual modification of the landscape tends to be limited to the footprint of each pylon), whereas a road could 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. The '*twee spoor*' roadways generally made for erection and maintenance of power lines tend to have a minimal impact on Stone Age sites. Where these intersect features such as stone walling or a grave, obviously the impact can be highly negative.

3. METHODOLOGY

Site visits were carried out to inspect various parts of the terrain on foot and by road. A Scoping Phase assessment set out assumptions and likely anticipated limitations which were verified during the site visits. This report details the field observations that were made when visiting the alternative route corridors.

In the Scoping Phase report it was suggested that heritage in some sensitive parts of the environment should be further verified once the route is finalised and actual tower positions are known. This recommendation is upheld in this report. To have thoroughly traversed the ~2 km broad corridors along the entire length of each of the three alternative routes would have been enormously and unjustifiably costly at this stage. Certain areas were selected for detailed inspection and are reported on in this report.

A major constraint that was encountered during the fieldwork was that certain farms were inaccessible (access barred) with one landowner actively preventing us from alighting from our vehicle except at his homestead. It appears that Eskom has yet to negotiate access to these farms. Until access is allowed only very general remarks may be made.

Heritage traces that were observed are evaluated in terms of their archaeological significance (see tables below).

3.1 Assumptions and limitations

Apart from the limitations highlighted in the previous paragraph, 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 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).

It is stressed that verification of heritage would be needed once a particular route is finalised and specific tower positions are known.

This study does not assess palaeontology.

3.2 Predictions: 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. The range of hills north east of Pofadder may tend to have more sites than other places in this landscape.

While places in the open plains have been found to have (usually very) sparsely scattered artefacts (such as on the dunes east of 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. An example near the proposed routes of the powerline is to the north of the national road near Gamsberg (Morris 2001; 2009), to the south of Aggeneis (Morris 2013a), and south of Pofadder (this study).

It was suggested (Scoping Report) that the belt of sand dunes between Paul Puts and Pofadder may also have been a focus for past human occupation (verified in this report).

Colonial era sites or features within the study area include stone walled farming infrastructure, homesteads and graves.

The area between Gamsberg and Namiesberg is considered to be sensitive in light of the history of San genocide which has been associated with that particular landscape (Morris 2013b)

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 the Northern Cape Heritage Resources Authority. Although unlikely, there may be some that could require preservation *in situ* and hence modification of intended placement of development features.

Disturbance of surfaces includes any construction: of a road, 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.

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). Individual tower positions might be of high archaeological significance (e.g. a grave, or an engraving). The impact of a 'twee-spoor' could be far greater on Iron Age sites in other parts of South Africa, where stone walling might need to be breached.

3.4 Determining archaeological significance

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

Estimating site potential

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

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

Assessing site value by attribute

Table 2 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu-Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

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

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

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

Class	Attribute	Type 1	Type 2	Type 3
1	Length of sequence/context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte/ecofacts
2	Presence of exceptional items (incl regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

4. FIELD OBSERVATIONS

The manner in which archaeological and other heritage traces or values might be affected by the proposed alternative routes 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, namely substation expansion and erection of a transmission line along one of three possible alternative routes.

4.1 Fieldwork observations

The proposed substation expansion site and transmission line routes have been subject to investigations by the author over a number of years between 2010 and the end of 2016 in connection with this and other projects.

Richness of archaeological traces: general comment

As a general comment it was found that the sites of the Paulputs and Aggeneis substations and the terrain through which the transmission line would pass is not rich in archaeological and colonial era heritage traces. As a rule, over virtually the entire development area stone artefacts (the predominant heritage resource noted) were found to occur in extremely low densities of between 0 and <1 per 10 x 10 m area. In the dune east of Paulputs, for example, the only visible trace of what is taken to be Later Stone Age occupation was the occurrence of very low numbers of ostrich eggshell fragments and no more than about five widely scattered quartz flakes (Fig. 3).



Figure 3. Quartz flakes found on dunes east of Paulputs substation.

Similar findings were repeated along the generalised route of the three alternative transmission line routes, where artefacts were generally either absent or widely scattered as isolated finds.

Recommendation for focused survey once tower positions are known

It is recommended, as mentioned above, and for this reason, that a more economic approach would be to inspect specific tower positions in identified more sensitive landscape segments once exact tower positions are known along a finally approved route option.

4.1.1 Specific observations along the Northern and Central Corridors

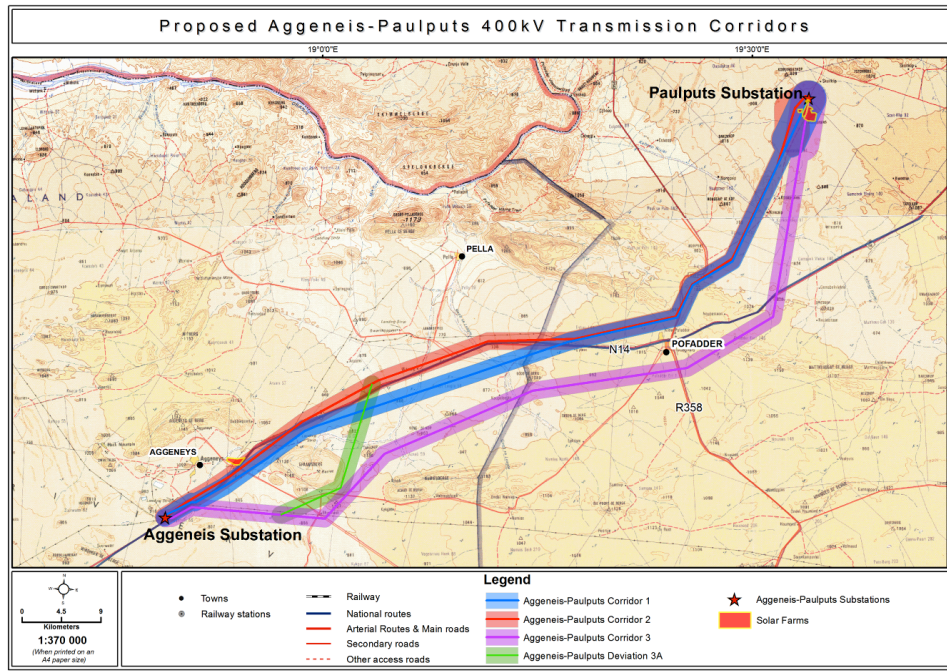


Figure 4: The northern and central corridors (red and blue) follow the same route for a major part of the route, diverging from part of the route between Pofadder and Aggeneis.

At most points investigated the general observation applies, of extremely low densities of heritage traces (stone artefacts), occurring in quantities from 0 to <1 per any given 10 x 10 m area.

A few exceptions to this were found:

In the vicinity of 29.19952° S 18.98030° E there is a small cluster of Later Stone Age sites north of the national road Pofadder-Aggeneis and situated amongst exposures of bedrock where water collects after rain. Here a fair abundance of Ceramic Later Stone Age artefacts was noted including stone tools, pottery and ostrich eggshell fragments,

probably representing repeated short-duration encampments dating from within the last millennium (see also Morris 2009).

Just north of Pofadder, in the vicinity of 29.10232° S 19.39923° E remains of a probably later twentieth century explosives magazine were noted (photo Fig. 4), not of major heritage significance but relating to pre-1961 mining nearby (A.B. Thomas pers. comm.). No Stone Age traces were found here nor in the stream course nearby; however it was reported that sites with pottery had been found on the north side of the adjacent hills, but away from the proposed route of the transmission line.



Figure 5. Remains of pre-1961 mining infrastructure.

In the vicinity of 29.09366° S 19.41174° E no sites were found but the minimal past impact of the existing Eskom tower was noted which confirmed the impression based on Sampson's (1985) observation, that transmission lines would tend to have a low or negligible impact on Stone Age archaeological traces in this kind of landscape (photo below).



Figure 6. Minimal disturbance in the vicinity of a tower on an existing transmission line.

The vicinity of 29.05551° S 19.44380° E (photos below) has sensitive farm-related features including stone walling. Farm grave yards may exist in this valley and the vicinity would be one of the areas to be inspected in more detail once tower positions are determined.

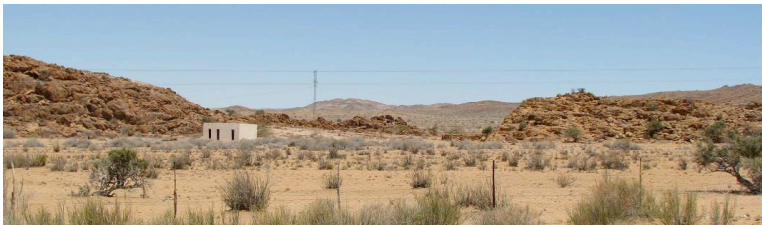


Figure 7 a & b. Historical farm infrastructure including stone-walled kraals.



Significant vernacular architecture along the generalised route, in this instance not in a good state of repair, was noted at 28.97807° S 19.52695° E. Nearby farm infrastructure

(in the second photograph below) is possibly of more recent vintage and from a heritage/architectural perspective less significant.



Figure 8 a&b. Farm worker dwelling (8a above) and main homestead (8b below) at the farm Konkonsies I



The area of proposed expansion of the Paulputs Substation at 28.87937 ° S 19.56397 ° E, in the foreground of the following photograph, is already disturbed and no traces of heritage features were found.



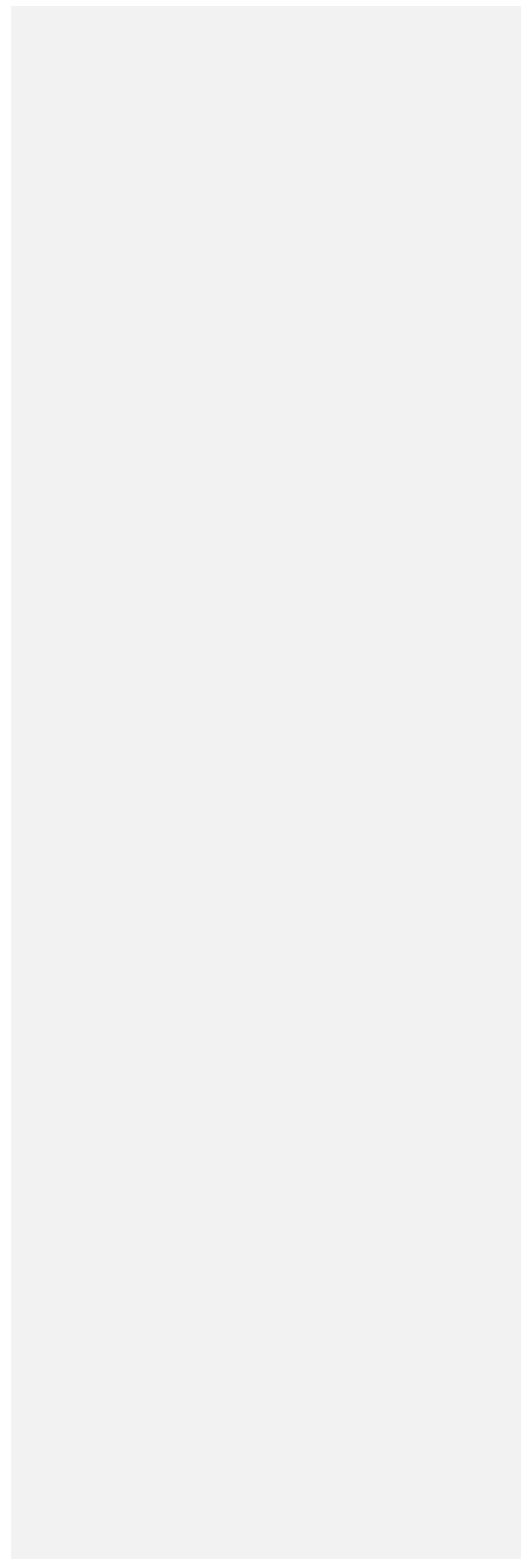
Figure 9. Already disturbed areas around the Paulputs Substation – no heritage traces found.

Relative impacts of alternative northern and central corridors

Given the absence of specific route details within the 2 km width of each corridor, and given the general sparsity of heritage traces in this landscape, there appears to be little specific basis to judge one corridor over the other. Where possible, from the point of view of visual impact in the heritage landscape between Aggeneis and Pofadder, the impact of the line could be minimised by keeping the new transmission line on the same side of the national road as the existing line. This is particularly the case between Pofadder and the Pella turn-off where the existing view of the Pella Mountains to the north of the national road should not be compromised if possible.



Figure 10. Landscape north of the road towards the Pella Mountains.



4.1.2 Specific observations along the Southern Corridor

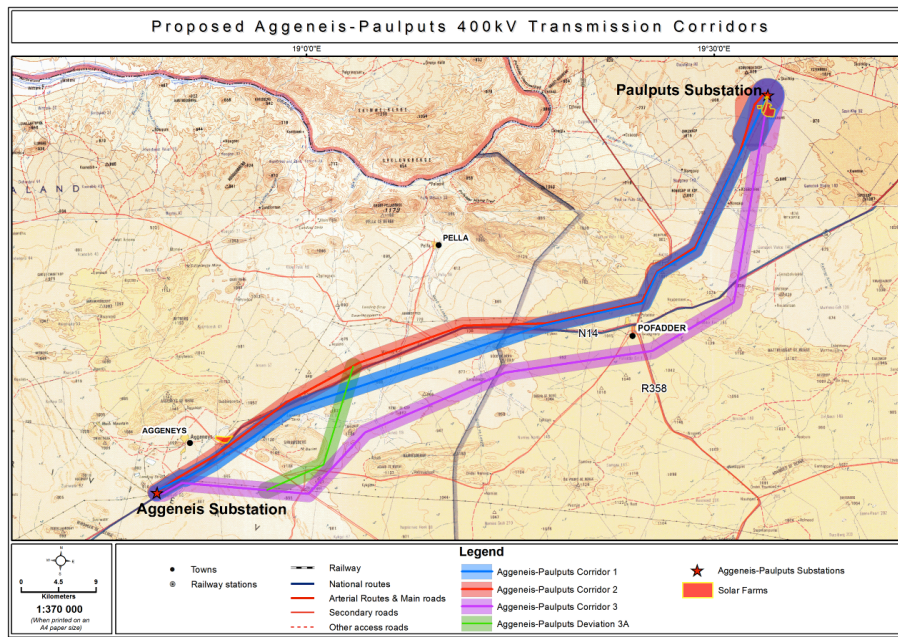


Figure 11: The southern corridor (purple) follows a route quite distinct from the northern and central corridors.

As for the northern and central corridors discussed above, so also along the southern corridor: at most points investigated the same general observation applies, of extremely low densities of heritage traces (essentially stone artefacts), occurring in quantities from 0 to <1 per any given 10 x 10 m area.

Again, some exceptions are to be noted.

South from Paulputs, in dunes on the farm Konkonsies 1, a deflated area was found where stone artefacts, potsherds and ostrich eggshell fragments eroded out of the top of a dune, at 28°58'31.1"S; 19°32'11.3"E. At the base of the dunes nearby a further Ceramic Later Stone Age site was located at 28°58'35.7"S; 19°32'08.4"E.

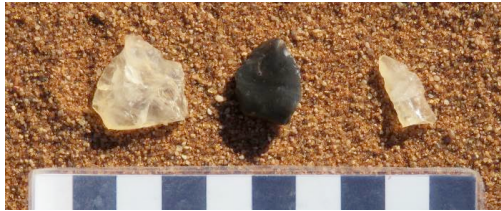
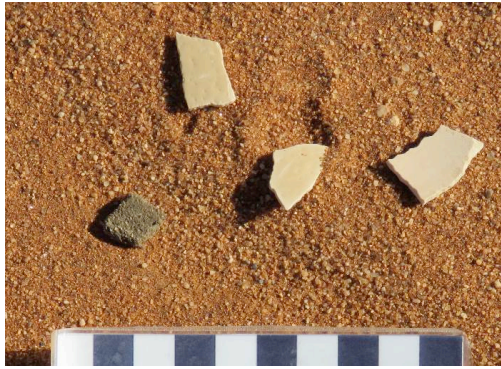


Figure 12 a-c. Potsherds, ostricj eggshell fragments and stone tools found on a dune crest at 28°58'31.1"S; 19°32'11.3"E.at Konkonsies 1.



Figure 13. The Ceramic Later Stone Age site on the dune crest at Konkonsies 1.



Figure 14. potsherds found along with quartz flaked stone artefacts at the base of the dune at 28°58'35.7"S; 19°32'08.4"E at Konkonsies 1.



Figure 15. Ceramic Later Stone Age site at base of dune, Konkonsies 1.

Rocky outcrops known as *bakkes* or *goras*, where water collects after good rains, were found to occur on terrain within the 2 km broad corridor south of Pofadder. A number of these were inspected closely and found to have been the focus of past human activity, resulting in moderately high densities of artefacts, principally stone tools. But these sites were not as rich as similar localities documented near Gamsberg (e.g. that mentioned above in relation to the northern and central corridors and those documented on the farm Bloemhoek south of Aggeneys – Morris 2013a). These instances, south of Pofadder, were noted in the vicinities of 29°09'06.9"S; 19°24'37.1"E, 29°09'09"S; 19°22'40.4"E and 29°09'45"S; 19°22'16.5"E. At the last-mentioned locality there is a grinding groove on exposed bedrock. Stone artefacts are based on quartz, predominantly, and to a lesser extent on jaspilite, most likely derived from the Orange River.



Figure 16. One of the bakkes within the corridor south of Pofadder, at $29^{\circ}09'06.9''\text{S}$; $19^{\circ}24'37.1''\text{E}$.



Figure 17. Potsherd, ostrich eggshell piece and stone artefact.



Figure 18. Grinding area on bedrock in vicinity of 29°09'06.9"S; 19°24'37.1"E.



Figure 19. Grinding groove at a further exposure at 29°09'45"S; 19°22'16.5"E.



Figure 20. Bakkes or goras in the vicinity of 29°09'45"S; 19°22'16.5"E.



Figure 21. Later Stone Age stone artefacts in the vicinity of 29°09'45"S; 19°22'16.5"E.

It was not possible to gain access to farms along the southern corridor between Pofadder and Aggeneis (one property owner shared his views but would not allow us to go to the corridor zone crossing his farm). On the basis of previous work in the area, however, it is possible to report on some specific observations and to make some general comments on the particular heritage sensitivities of surrounding parts of the southern corridor.

At and near where an existing Eskom line crosses the Aggeneis-Loop 10 road, there is a cluster of stone kraals at 29°17'50.7"S; 18°59'22.7"E against the southern side of a small

inselberg. In this vicinity there are also scatters of Later Stone Age artefacts together with grinding grooves in bedrock exposures at 29°17'47.3"S; 18°59'24.2"E and 29°17'45.9"S; 18°59'20.6"E.



Figure 22. Stone kraals at 29°17'50.7"S; 18°59'22.7"E.



Figure 23. Ostrich eggshell fragment, stone artefact and potsherd alongside grinding surfaces (Figure 24) at 29°17'47.3"S; 18°59'24.2"E.



Figure 24. Grinding groove at 29°17'47.3"S; 18°59'24.2"E.



Figure 25. Grinding surfaces at 29°17'45.9"S; 18°59'20.6"E.

The proposed southern corridor alternative is indicated as being routed south-westwards between Namiesberg and Gamsberg before veering westwards towards Aggeneis. This is a historically sensitive landscape associated with one of the darker episodes in South African's past, namely the genocide against San or Bushman people. A much more prominent appreciation now exists concerning the history of genocide against the Bushmen in this area (Anthing 1863), with strong indications that a kloof on the south east side of Gamsberg was one of the massacre sites, referred to by Dunn in 1872 (Robinson 1978), by Burger (1986) and, more obliquely, by Anthing (1863; Jose Manuel de Prada-Samper pers. comm. 2009). A local farmer recently (2013) referred to a particular kloof as 'Inkruip' (Creep In), which corresponds with the above descriptions. It is identified as Site SG 7 in a report on Gamsberg (Morris 2013b). Namiesberg has also been named in relation to this history. A call has already been made for massacre sites to be identified on the ground and declared as Provincial Heritage Sites (eg by the folklorist Jose de Prada-Samper in discussion with staff of the Northern Cape Struggle History Project and the Northern Cape Provincial Heritage Resources Authority). It is suggested that any development or visual impact on this landscape would be insensitive (with regard to possible mining on the south side of Gamsberg, one comment received was that "mining here would be like mining Auschwitz"). Such sites could ultimately form part of a /Xam and Khomani Heartland World Heritage Site, already on South Africa's Tentative List, although the main centre for the /Xam is likely to be further to the south east in the area between Kenhardt and Carnarvon.

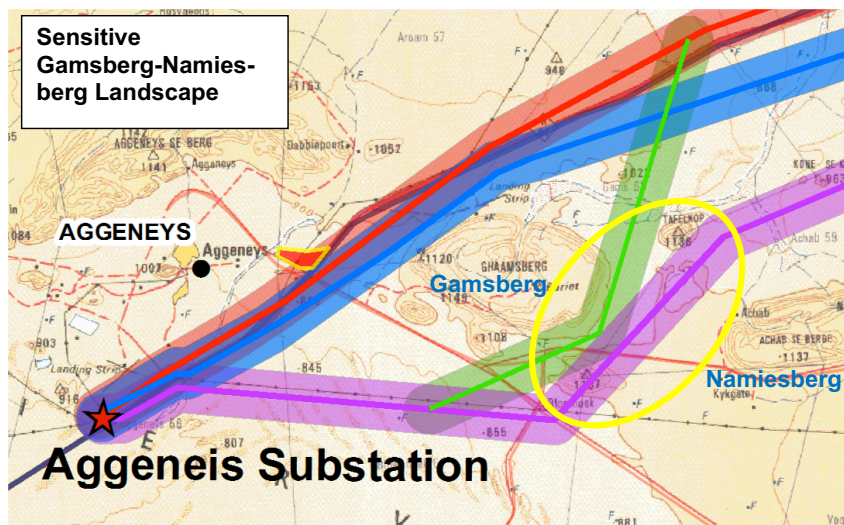


Figure. 26. Historically sensitive landscape in the Gamsberg-Namiesberg vicinity.



Figure 27. Sensitive landscape: view westwards from the Namiesberg side towards Gamsberg.



Figure 28. 'Inkruip Kloof' at the south eastern side of Gamsberg – possible site of genocidal massacre.



Figure 29. View south eastwards towards Namiesberg with Gamsberg on left.

5. Assessing significance

5.1 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 Landforms L1 and L3 Type 1 with some L1 Type 2 settings. In terms of archaeological traces they all fall under Class A3 Type 1. All of these ascriptions (Table 1) reflect poor contexts and likely low significance for these criteria.

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

On archaeological grounds, therefore, the individual occurrences may be said to be of generally low significance. However, cumulatively and in relation to the often extreme sparsity of archaeological finds in the surrounding landscape, each of these higher density accumulations assumes greater significance in this arid environment which must always have been hostile to human occupation.

The landscape setting rather than individual sites takes on major significance along with southern-most section of the southern corridor in the plain situated between Namiesberg

and Gamsberg, where historical records attest to massacres during the genocide against the San of this region.

This report recommends that the higher landscape sensitivities associated with the southern corridor should make this the *least* favoured route, and therefore recommends that, instead, either the northern or the central route should be preferred.

It is recommended that once tower positions have been determined, or at least a more focused corridor is established, a follow-up survey should be undertaken to assess specific impacts.

5.3 Characterising the significance of impacts

The following criteria are used in this Environmental Impact Assessment to characterise the significance of direct, indirect and cumulative impacts:

Nature: what would cause the effect, what would be affected, and how it would be affected.

Extent: whether the impact would be local or regional or beyond (scored 1-5 from local to international)

Duration: the lifetime of the impact, whether short, medium or long term, or permanent (scored 1-5 accordingly).

Magnitude: ranging from small and no effect to very high with complete destruction (scored 1-10 accordingly).

Probability of occurrence: the likelihood of the impact actually occurring, graded from improbable to definite (scored 1-5 accordingly).

Significance: a synthesis of the above characteristics on the formula $S = (E+D+M) P$ with the resultant overall score assessed as low (<30 points), medium (30-60) or high (>60).

Status is defined as positive, negative or neutral depending on reversibility of impact and potential for adequate mitigation.

5.3.1 Impact table summarising the significance of impacts (with and without mitigation)

At the areas of substation expansion at Paulputs and along the three alternative routes.

Nature: Acts or activities resulting in disturbance of surfaces and/or sub-surfaces containing artefacts (causes) resulting in the destruction, damage, excavation, alteration, removal or collection from its original position (consequences), of any archaeological material or object (what affected).		
	Without mitigation	With mitigation
Extent	1	1
Duration	1	1
Magnitude	4	4
Probability	2	1
Significance	12	6
Status (positive or negative)		
Reversibility	No	No
Irreplaceable loss of resources?	Yes, where present – but occurrence is extremely low density and of low significance.	Regarded as unlikely to be necessary but depends on inspection of tower positions in key parts of the final route.
Can impacts be mitigated?	Yes – see comments in next column, but otherwise considered unlikely to be necessary though contingent on inspection of tower positions in key parts of the final route.	<p>Sensitivities concerning the heritage landscape of genocide between Gamsberg and Namiesberg makes this a highly sensitive area which should not be impacted. It is recommended that on these grounds the southern corridor should not be considered as viable.</p> <p>Visual impacts along the main road between Pofadder and the turn-off to Pella should be considered in choice of power line alignment – avoid a route north of this road at this point if possible.</p> <p>A small Later Stone Age site cluster in the vicinity of 29.199525° S 18.980306° E should be avoided.</p> <p>Otherwise regarded as unlikely to be necessary but final approval to depend on inspection of tower positions in key parts of the final route chosen.</p>
Mitigation: Mitigation Measures: Artefact densities are close to zero over virtually all of the proposed routes. The area of proposed substation expansion at Paulputs is already disturbed and devoid of artefacts visible at the present surface (not more than very low density expected if pristine). Mitigation measures are not expected to be necessary but it is recommended that final tower positions in key locales should be inspected before the need for mitigation is ruled out.		
Cumulative impacts: Cumulative Impacts: where any archaeological contexts occur the impacts are once-off permanent destructive events. Future expansion and secondary impacts to be managed in an		

EMP. It is to be noted that individual occurrences observed in this study may be said to be of generally low significance, but that cumulatively and in relation to the often extreme sparsity of archaeological finds in the surrounding landscape, each of these higher density accumulations assumes greater significance in an arid environment which must always have been hostile to human occupation.

Residual Impacts: -

5.4 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 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 transmission line and substations.

Project component/s	Any infrastructure 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 sites where they occur.
Activity/risk source	Activities which could impact on achieving this objective include deviation from the planned lay-out of infrastructure without taking heritage impacts into consideration.
Mitigation: Target/Objective	An environmental management plan that takes cognizance of heritage resources in the event of any future extensions of infrastructure. Specific mitigation measures may be proposed following a phase 2 assessment of specified tower positions along the chosen transmission line route.

Mitigation: Action/control	Responsibility	Timeframe
Provision for on-going heritage monitoring in an environmental management plan which also provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of development or operation. Specific mitigation measures may be proposed following a phase 2 assessment of specified tower positions along the chosen transmission line route.	Environmental management provider with on-going monitoring role set up by the developer. Environmental management provider.	Environmental management plan to be in place before commencement of development. Mitigation, if and where necessary, prior to construction.

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

Generally very low density, isolated archaeological and colonial heritage traces were found in the development footprint areas of the proposed transmission line within the three corridor alternatives, and substation expansion at Paulputs.

From an archaeological perspective the observed heritage resources, with a few exceptions, are of low significance, but places and areas of higher sensitivity in terms of sites and visual impact are noted in the report. It is recommended that a phase 2 survey of specific tower positions in areas of potentially higher significance should be undertaken once such tower positions are defined.

It has been noted that where individual occurrences may be said to be of generally low significance, cumulatively and in relation to the often extreme sparsity of archaeological finds in the surrounding landscape, each of these higher density accumulations may assume greater significance in an arid environment generally hostile to human occupation. The landscape setting rather than individual sites within it takes on major significance along with southern-most section of the southern corridor in the plain situated between Namiesberg and Gamsberg, where historical records attest to massacres during the genocide against the San of this region.

In terms of the alternative corridors, this report recommends that the higher landscape sensitivities associated with the southern corridor should make this the *least* favoured route, and therefore recommends that, instead, either the northern or the central route should be preferred.

It is recommended that once tower positions have been determined, or at least a more focused corridor is established, a follow-up survey should be undertaken to assess specific impacts.

In the event of Phase 2 mitigation work taking place, the provision of some kind of local heritage information (possibly at a tourism information centre if not through establishment of a local museum) is advocated for enhancing tourism information and addressing community heritage appreciation and education needs.

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