



A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENTS OF THE PROPOSED SUBSTATION, SWITCHING STATION AND POWER LINE GRID CONNECTION FOR THE IZIDULI EMOYENI WIND FARM, BLUE CRANE ROUTE LOCAL MUNICIPALITY, SARAH BAARTMAN DISTRICT, EASTERN CAPE PROVINCE.

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BRIEF SUMMARY

Background to the study

Emoyeni Wind Farm Renewable Energy (Pty) Ltd is proposing the establishment of a new substation and 132kv power line grid connection for the Iziduli Emoyeni Wind Farm south of Bedford and southeast of Eskom's Poseidon Substation near Cookhouse. The proposed development falls within the Bedford Magisterial District of the Blue Crane Route Local Municipality in the Eastern Cape Province (Maps 1 & 2). The Iziduli Substation (and switching station) will be constructed east of the R350 main road between Grahamstown and Bedford. Four power line options are proposed; one from the project substation in a northwestern direction; the second following the existing power line to the Poseidon Substation; the third from the project substation to the proposed Msenge Emoyeni en route to the KopLeegte Substations (see Binneman 2014b) and the fourth a loop in – loop out connection to the existing Poseidon/Albany Substation. Savannah Environmental (Pty) Ltd (independent environmental consultants) on behalf of Emoyeni Wind Farm Renewable Energy (Pty) Ltd, appointed Eastern Cape Heritage Consultants to conduct the Phase 1 Archaeological Impact Assessment for the proposed substation and power line development.

Several comprehensive archaeological impact assessments and reports have been compiled for the wider area earmarked for the construction of wind farms and associated infrastructures, including the north-western part of the power line routes to the Poseidon Substation and to the Kopleegte Substations (Maps 2, 3 & 4) (see Hart et al. 2010; Binneman 2012a, b, & c, 2014a & b). All background information is included in these reports and will not be repeated here in any detail.

Purpose of the Study

The purpose of the study was to conduct a Phase 1 Archaeological Impact Assessments of the proposed construction of the substation and power line grid connection for the Iziduli Emoyeni Wind Farm southeast of Eskom's Poseidon substation near Cookhouse, Blue Crane Route Local Municipality, Bedford Magisterial District, Eastern Cape Province, in order to establish;

- the range and importance of possible exposed and *in situ* heritage remains and features within the servitude of the proposed developments,
- the potential impact of the developments on these heritage resources,
- to make recommendations to minimize possible damage to these heritage sites/materials,

The site and location

The proposed Iziduli Emoyeni WEF power line routes from the substation site to Eskom's Poseidon Substation, Msenge Emoyeni (Klipspringer Substation), and to the Kopleegte Substations and to the existing Poseidon-Albany 132kV line are located within the 1:50 000 topographic reference maps 3325DB Cookhouse, 3225DD Golden Valley and 3226CC Herbert's Hope. The study area investigated for this project falls within the 3226CC Herbert's Hope map (Map 1). The development is situated in the Blue Crane Route Local Municipality, Cacadu District Municipality (recently renamed the Sarah Baartman District Municipality), in the Eastern Cape Province. It is situated approximately 20 kilometres south of Bedford (nearest point) and west and east of the R350 main road connecting Grahamstown with Bedford. The Poseidon Substation is situated approximately 23 kilometres northwest of the proposed Iziduli substation location which is close to the intersection (approximately 400 metres north) of the R350 main road and the gravel road to Adelaide.

The general landscape comprises a gentle undulating hill landscape, lowlands and non-perennial open valley drainage systems/lines (Figures 1-9). No perennial rivers traverse the study area. The major rivers occurs many kilometres to the west, south (Great Fish River) and east (Koonap River). The dominant natural vegetation is grassland, small, low shrubs in places and patches of *Acacia karroo* in the drainage valleys. The main activity in the study area is commercial stock and game farming and the land is used for grazing of livestock. Apart from the usual small scale disturbances due to farming activities such as fences, tracks, dams, soil erosion and power lines which crosses through the area, the hill tops shows little disturbances. Most development and disturbance, such as homesteads, and associated infrastructure occur mainly along and adjacent to the network of gravel roads which traverse the study area, or in valleys areas close to drainage lines.

The survey for the four power line routes and substation was conducted on the following farm portions (Map 1);

Remaining Extent of the Farm Brakkefonteyn 218

Portion 1 of the Farm Brakkefonteyn 218

Portion 2 of Farm Brakkefonteyn 218

Remaining Extent of the Brakfontein Farm 220

Vogel Fonteyn Farm 219

Farm 225

Farm Stompstaart Fontein 168

Farm 222

Portion 1 of Farm Normandale 206

Portion 3 of the Farm Plat House 203
Farm kop Leegte 205
Farm 260
Farm 242
Remaining Extent of Far, 73 (Van Wyks's Kraal)

Type of development

Emoyeni Wind Farm Renewable Energy (Pty) Ltd is proposing the establishment of a new substation switching station and 132kV power line southeast of Eskom's Poseidon Substation near Cookhouse for the Iziduli Emoyeni Wind Energy Farm. The substation and switching station will be approximately 2 ha in extent and established within a footprint of approximately 5 ha. The power line options include: Option 1: a power line of up to 132kV from the Iziduli Emoyeni onsite substation to the Klipspringer substation (on the neighbouring Msenge Emoyeni project site). Option 2: a power line of up to 132kV from the Msenge Emoyeni onsite substation to the to the Kopleegte substation (on the nearby Amakhala Emoyeni project site). Option 3: a power line of up to 132kV from the Iziduli Emoyeni onsite substation to the Poseidon substation. Option 4: a loop in/out power line from the Iziduli Emoyeni onsite substation to the existing 132kV Poseidon/Albany power line – which runs through the Iziduli Emoyeni project site.

Investigation

The terrain was relatively easy to access and the archaeological visibility in general was poor due to the dense surface cover of tall, dry grass and shrubs. Apart from a few isolated weathered stone tools no other archaeological sites/materials of any significance were observed. However, it is possible that sites/materials are covered by soil and vegetation and may be exposed during the construction of the substation and power lines. Two sites with historical structures were observed during the investigation which included a dry packed stone wall kraal and a labourer settlement with three small houses that appear to be older than 60 years.

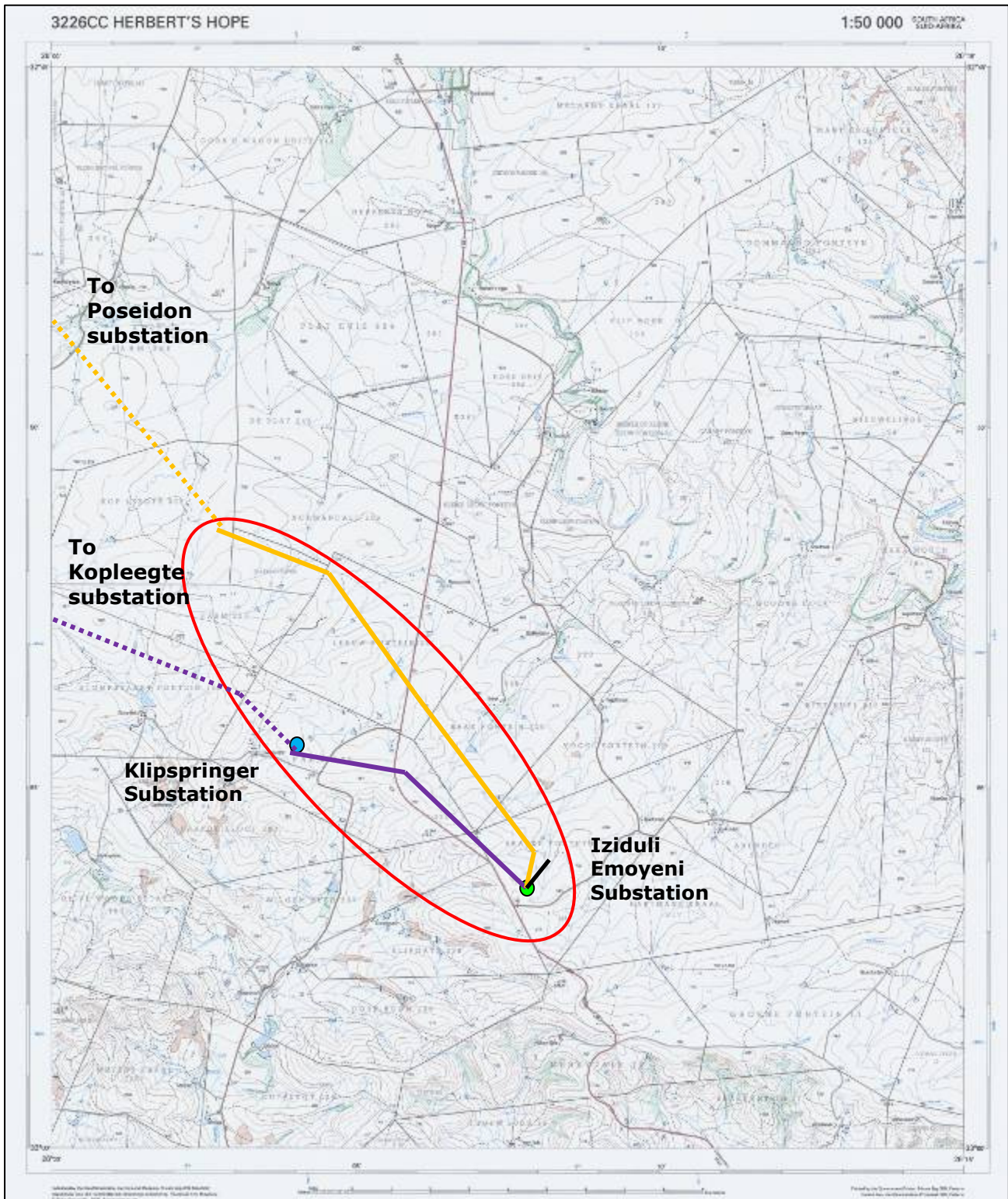
Cultural sensitivity

In general the study area investigated appears to be of low archaeological and historical (sites/materials) sensitivity and the impact of construction therefore will be of low negativity (see recommendations below). However, the construction of the substation and powerline will have a cumulative visual impact and negative effect on the cultural landscape.

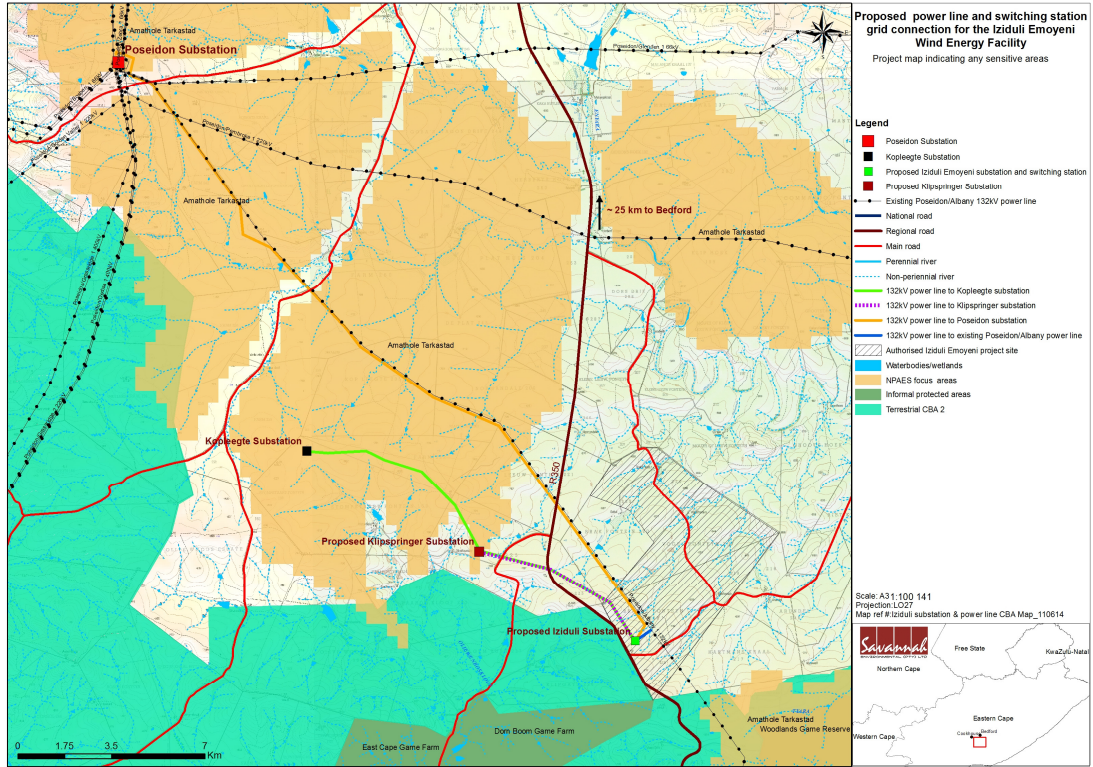
Recommendations (see p. 17)

1. The power lines and service roads must be constructed 50 metres from the dry packed stone kraal and the labourer settlement.
 - Marked buffer zones must be placed around the stone kraal and the labourer settlement before construction starts to protect them from possible vandalism.

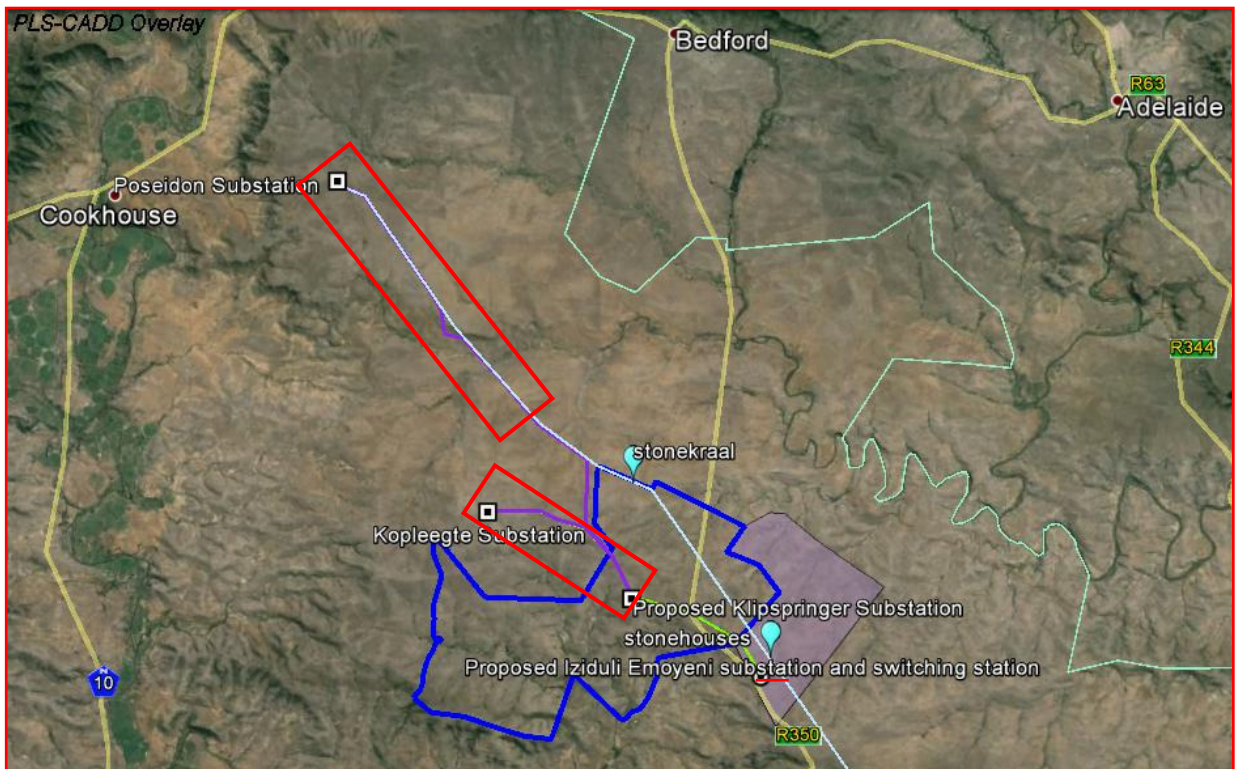
- If the existing service tracks will be used during the construction, then they must be re-routed to avoid damage to the stone kraal and the labourer settlement.
2. All construction activities must be monitored by an archaeologist/heritage practitioner or alternatively a person must be specially trained, for example the ECO, to conduct the monitoring. This must include the clearing of vegetation, leveling, placing and excavations of the pylon foundations and construction of the access roads.
 3. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. Alternatively the ECO must be trained as a site monitor to report to the foreman when archaeological sites are exposed/found.
 4. If any concentrations of archaeological materials are exposed, work must stop immediately and reported to the archaeologist at the Albany Museum (046 6222312) or to the Eastern Cape Provincial Heritage Resources Authority (043 6422811). Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation.



Map 1. 1:50 000 Map indicating the location of the study area marked by the red oval. The green dot marks the proposed Iziduli Emoyeni Substation and the blue dot the proposed Klipspringer Substation. The bold yellow line marks the northern and the bold purple line the southern power line routes investigated. The yellow broken line continues to the Poseidon Substation and the broken purple line to the Kopleegte Substation, and the black line to the existing 132kV Poseidon-Albany power line (see Maps 2-3 below).



Map 2. Map indicating the proposed substation and power line grid connection for the Iziduli Emoyeni Wind Farm.



Map3. An aerial image of the proposed substation and power line grid connection for the Iziduli Emoyeni Wind Farm site (shaded area). The power line routes within the red lines have been investigated previously. The Msenge Emoyeni WEF site is outlined in blue and the light blue bubbles mark the historical features along the northern route. Iziduli Emoyeni to Klipspringer (green line), Klipspringer to Kopleegte (purple line), Poseidon to Albany (white line) and. Iziduli Emoyeni to existing 132kV Poseidon-Albany power line (red line).

Archaeological background

The pre-colonial archaeology and history of the area have been address in several reports and will not be repeated here again (see relevant impact assessments reports below).

Relevant impact assessments

- Binneman, J. 2014a. An archaeological walkthrough survey of the Msenge Emoyeni Wind Energy Facility power line routes and substation location, Bedford District, Blue Crane Route Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.). Eastern Cape heritage Consultants.
- Binneman, J. 2014b. An archaeological walkthrough survey of the proposed turbine footprint and infastructure for the Msenge Emoyeni Wind Energy Facility, Bedford District, Blue Crane Route Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.
- Binneman, J. 2012a. An archaeological walkthrough survey of the turbine footprint for the proposed Phase 1 Amakhala Emoyeni Wind Energy Facility, Cookehouse District, Blue Crane Route Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.
- Binneman, J. 2012b. Basic archaeological assessments for: 1. the kopleegte substation (250m x 250m), 2. the new 132kv power line from Kopleegte Substation to Poseidon Substation,3. the re-route of the 66kv power line from Poseidon Substation to Zebra Substation, 4. the re-route of the 132kv power line from Klipfontein to Poseidon Substation, Cookhouse District, Blue Crane Route Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.
- Binneman, J. 2012c. Basic archaeological assessments for the proposed: 1. Golden Valley-Poseidon 132kv power lines (3 power lines), 2. Golden Valley-Kopleegte power lines (2 power lines) and, 3. the 132kv Golden Valley Substation (250m x 250m) (2 options), Bedford District, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.
- Binneman, J. 2012d. An archaeological scoping report for the proposed amendments to the Msenge Emoyeni Wind Energy Facility and associated infrastructure, Bedford District, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental Ltd. (Pty). Eastern Cape heritage Consultants.
- Halket, D., Webley, L., Orton, J. and Pinto, H. 2010. Heritage impact assessment of the proposed Amakhala-Emoyeni Wind Energy Facility, Cookhouse District, Eastern Cape. Prepared for Savannah Environmental Ltd. (Pty). ACO Associates cc.

ARCHAEOLOGICAL INVESTIGATION

Methodology

The landowners were contacted prior to the visit to inform them of the investigation and to obtain permission for access to their properties. They were also consulted on possible locations of historical buildings and features, cemeteries, graves and archaeological sites.

An extensive Google aerial investigation was conducted of the area and the proposed power line routes and substation location prior to the survey to familiarize oneself to the area and to identify areas of possible heritage sensitivity. The survey for the proposed Iziduli Emoyeni WEF power lines and substation followed the route layouts as supplied by the developer. The power line routes mainly follow the hilltops and high ground (Map 2). The investigation was conducted on foot and spots checks and surveys were also conducted from a vehicle to investigate as much of the terrain as possible. Special attention was given to areas where the proposed power line crosses drainage lines. GPS readings were taken and all important features were digitally recorded (for views of the study area and the surrounding landscape see Appendix D, Figs 1-7).

Limitations and assumptions

Although the terrain was relatively easy to access, the archaeological visibility in general was poor due to the dense surface cover of long, dry grass and shrubs in places. The region experienced exceptional good rainfall the past summer months. Due to the dense surface vegetation and little sheet erosion on the high ground it was difficult to locate archaeological sites/materials. Regardless of the restrictions imposed by the dense vegetation, the experiences and knowledge gained from several other investigations in the adjacent region, provided background information to make assumption and predictions on the incidences and the significance of possible pre-colonial archaeological sites/material which may be located in the area, or which may be covered by the soil and vegetation.

Results and findings

Access to the terrain was relatively easy and by following the service track in a vehicle along the existing power line, foot surveys and spot checks could be conducted along the entire route. The northern section of the proposed power line route from the Poseidon Substation to the boundary of the Amakhala Emoyeni RE Phase 1 development has been investigated previously (Map 3 & 4) (Binneman 2012a and 2014a).

The survey for the northern power line route which follows the existing power line from the Poseidon Substation near Cookhouse to the proposed Iziduli Substation, started near the boundary between the Amakhala Emoyeni RE Phase 1 development and the Msenge Emoyeni WEF site (Maps 3 & 4). From there the survey continued through the Msenge Emoyeni WEF site along the gentle gradients of the undulating hills, over a ridge and the R350 main road towards the Iziduli Substation location which falls outside the latter site (Maps 2, 3, 4 & 5) (Figures 1-6). Due to the dense, tall, dry grass the archaeological visibility was poor and no significant sites/materials were observed. Only one historical structure, a dry packed stone kraal was observed within the Msenge Emoyeni WEF site (GPS location: 32.51.768S; 26.03.963E) (Map 3 & 4) (Figure 2). It is situated next to the service track under the power line. The age of the stone kraal is not known, but it is not as high and well-constructed like the other stone walls in the area and may be not of similar age. Nevertheless, the feature is an example of the local architecture and must be conserved. The proposed power line route runs some 40 metres from the stone kraal and will not impact on it. However, if the existing service track will be used during the construction, it must be re-routed to avoid possible damage to the structure.

From the R350 main road the proposed power line route continues in a south-easterly direction for approximately 3,5 kilometres before it makes a sharp turn to the southwest towards the proposed Iziduli Substation (Map 5) (Figures 4 & 5). This part of the power line route also runs through an area covered by dense, tall, dry grass with poor archaeological visibility. Apart from a few isolated stone tools no significant sites/materials were observed, but a farm labourer settlement that consists of three small houses was observed some 40 metres from the existing power line (GPS location: 32.55.955S; 26.07.955E) (Map 5) (Figures 5 and 6).

Two of the dwellings, one square and the other round, were built from local flat stones and the walls were plastered with clay/mud and must be older than 60 years. These two stone houses are significant examples of the distinct architectural characteristic of the region and represent the shared and combined heritage skills of all the people of the region (European farmers, KhoiSan and Bantu speakers) in the past and must be conserved and protected. The third house, which may be younger than the stone houses, was built of red clay sun-baked bricks. Unfortunately time did not allow for a complete investigation, but refuse dumps were observed and there may be graves in the immediate vicinity of the settlement. The settlement is about 80 metres from the proposed power line route, but care must be taken that the structures are not damaged or vandalized during the construction phase. The settlement must be regarded as a no-go area and fenced-off before construction starts.

The southern power line route which starts at the Kopleegte Substation and runs southeast to the proposed Msenge Emoyeni Substation, has also been investigated previously (Binneman 2012a, b and 2014a). From the Msenge Emoyeni Substation it continues in a south-easterly direction, crosses the R350 main road and runs parallel to the main road for approximately 4 kilometres to the proposed Iziduli Substation near the intersection (approximately 400 metres north) of the R350 main road and the gravel road to Adelaide (Maps 2, 3 & 5) (Figure 7). Dense, tall, dry grass with poor archaeological visibility made it difficult to observe any significant archaeological sites/materials.

ASSESSMENT OF THE IMPACTS

The substation and switching station

The proposed location for the substation and switching station appears to be of low cultural sensitivity. The area is relatively large and together with the additional activities such as the service road for the construction vehicles, clearing of vegetation and levelling of the site will disturb the land surface on a large scale. These activities may have a negative effect on the above and below ground archaeological remains (if any). The disturbances to the landscape may be rehabilitated over time, but the substation and associated infrastructure, however, will have a long term visually impact on the general countryside.

Pre-colonial archaeology and colonial/historical period heritage

Nature of the impacts

The main impact to pre-colonial archaeological and colonial period heritage sites/remains (if any) will be the physical disturbance and/or destruction of the material and its context. The construction of the substation and access road may expose, disturb, displace and destroy archaeological sites/material. However, no pre-colonial archaeology or colonial period heritage sites/remains were observed and it would appear that the proposed sites for the construction of the substation are of low cultural significance. Notwithstanding, sites/materials may be covered by soil and vegetation.

Extent of the impacts

Construction of the substation may impact on remains which are buried, but these impacts will be limited and restricted to the local area. The construction activities will only disturb a small area and the negative impact on possible pre-colonial archaeology and colonial period heritage sites/remains may be relatively small. Other projects such as the construction of the access road and other infrastructure will disturb larger areas and may expose sites/materials on a larger scale. In both cases further disturbances of sites/materials can be limited by mitigation.

Table 1. Impacts of the construction of the proposed Iziduli Ssubstation on the pre-colonial archaeology and colonial/historical period heritage sites/materials.

Nature: The potential impact of the construction of the proposed Iziduli Substation, access road and other infrastructure on the below and above ground pre-colonial archaeological and colonial/historical period heritage sites/remains.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Unlikely (2)	Unlikely (2)
Significance	Low (16)	Low (16)
Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	No, but in some cases, yes	No
Can impacts be mitigated?	Yes	
<p>Mitigation</p> <p>No mitigation is proposed before construction starts because the archaeological remains (if any) are of low significance (excluding human remains). However, if concentrations of archaeological materials are exposed then all work must stop for an archaeologist to investigate (see below).</p> <p>If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the Eastern Cape Provincial Heritage Resources Authority, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation.</p>		
Cumulative impacts: The size of developments at the substation in the future will determine the impact on the buried materials (if any) and if these increase so will the impact.		
Residual impacts: Long term to permanent		

The power lines

The proposed 132KV power lines will consist of overhead cables suspended from wooden/metal structures placed a few hundred metres apart and must be firmly positioned in the ground. Although the placing of the structures will only affect a few square metres, it will be the additional activities such as the service roads for the construction vehicles and clearing of vegetation along the servitude which will disturb the land surface on a large scale.

These activities may have a negative effect on the above and below ground archaeological remains. The disturbances to the landscape may be rehabilitated over time, but the power lines, however, will have a long term visually impact on the general countryside, especially where these cross the R350 main road and/or close to colonial/historical period heritage sites.

Pre-colonial archaeology

Nature of the impacts

The main impact on the pre-colonial archaeological heritage sites/remains (if any) will be the physical disturbance of the material and its context. The construction of the tower foundations for the power line and service roads may expose, disturb and displace archaeological sites/material. Nevertheless, from the available information it would appear that the proposed 132kv power line routes from the proposed substation to the Poseidon Substation are of low archaeological sensitivity. However, sites/material may be covered by soil and vegetation.

Extent of the impacts

Construction of the power line tower foundations and service roads may impact on remains which are buried, but these impacts will be limited and restricted to the local area. The construction of the tower foundations will also only disturb small areas and the negative impact on possible pre-colonial archaeological heritage sites/materials may be relatively small. Other projects such as the construction of service roads will disturb larger areas and may expose sites/materials on a larger scale. In both cases further disturbances of sites/materials can be limited by mitigation.

Table 2. Impacts of the proposed power lines from the proposed Iziduli Substation to the Poseidon and Msenge Emoyeni Substations on the pre-colonial archaeology.

Nature: The potential impact of the construction of the power line foundations and service roads on above and below ground pre-colonial archaeological sites/materials.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Unlikely (2)	Unlikely (2)
Significance	Low (16)	Low (16)
Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	No, but in some cases, yes	No
Can impacts be mitigated?	Yes	

Mitigation

No mitigation is proposed before construction starts because the archaeological remains are of low significance (excluding human remains). However, if concentrations of archaeological materials are exposed then all work must stop for an archaeologist to investigate (see below).

If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the Eastern Cape Provincial Heritage Resources Authority, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation.

Cumulative impacts: The number of tower foundations will determine the impact on the buried materials (if any), but in general it will be negligible.

Residual impacts: Long term to permanent

Colonial/historical period heritage*Nature of the impacts*

The majority of the historical build environment, graveyards and other features are concentrated at settlements along the main gravel roads and in the valleys. In general the power lines and substation developments are fair distances from these heritage features and the development will not have directly impact on those features. However, the power line to the Poseidon Substation will pass close to a dry packed stone wall kraal and a small labourer settlement. These structures are an integral part of the cultural landscape and are sensitive to damage. Especially with large scale developments close to them they may be damaged during construction work. Historically these structures were function specific/significant and are therefore context sensitive to changes in the surrounding landscape. The increase of a large number of workers into the area may also have an impact on these historical buildings and structures due to possible vandalism.

Extent of the impacts

The stone structures and houses are large and easy to identify and therefore impacts on these features are generally not expected. Nevertheless, to avoid/minimize possible impacts on the stone structures and the cultural context/significance marked buffer zones around the features must be implemented for the construction of roads and positioning of pylons. These features are excellent examples of the distinctive architectural characteristic/'style' of the region and are of medium/high heritage significance. They also represent the shared and combined heritage skills of all the people of the region in the past.

Table 3. Impacts on the colonial/historical period heritage.

Nature: The potential impact of the construction of the power lines and access roads on colonial/historical period structures, features and heritage site/materials.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Unlikely (2)	Unlikely (2)
Significance	Low (16)	Low (16)

Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	No in general, but may in some cases	No
Can impacts be mitigated?	Yes	
<p>Mitigation</p> <p>It is recommended that buffer zones of at least 50 metres are implemented around the dry packed stone kraal (Map 4) and the small labourer settlement (Map 5) for the construction of the power lines and roads.</p> <p>If graves or any other concentrations of colonial/historical heritage material are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the Eastern Cape Provincial Heritage Resources Authority, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation.</p>		
Cumulative impacts: Similar to above		
Residual impacts: Permanent in the case of graves		

Cultural landscape and sense of place

In terms of the National Heritage Resources Act (Act No. 25 of 1999) the cultural landscape include all heritage resources such as places or objects of aesthetics, architectural, historic, scientific, social, spiritual linguistic or technological value or significance and are protected. Any assessment should make provision for the protection of all these heritage components including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects. It is therefore important that the Visual Impact Assessment specialist take into account the impact of the development on the cultural landscape or consults with a heritage practitioner in this regard.

Power lines and substations are an integral part of the South African landscape and in many instances dominate the skyline. The proposed power lines and the substation, however, are relatively small in comparison to the proposed network of turbines that will be constructed in the near future. These features will be dwarfed by the large number of turbines and will probably have little impact in the short term on the cultural landscape.

Nature of the impacts

It is difficult to assess what impact the power lines will have on the cultural landscape in the sort term because they will eventually be dwarfed by the huge wind turbines. Notwithstanding, the substation and power lines to Poseidon Substation will contribute to the cumulative visual impact and the change of sense of place, especially where they cross the R350 main road. Furthermore, it will also start to introduce an 'industrial character' to a once rural agricultural environment and have a negative visual impact on the historical and natural landscape character of the area.

Extent of the impacts

Due to the relatively small size of the proposed new 132kV power lines the visual impact on the cultural landscape will be local and may not be very prominent in the short term. However, when the turbines and other infrastructures are added to the area it will contribute to the cumulative visual impact to the landscape. The power line to the Poseidon Substation will follow the existing line and will add to the cumulative visual impact to the region. The power line to the Msenge Emoyeni Substation (Klipspringer) will create a 'new' visual disturbance especially on the high ground and where it crosses the R350 main road. The main impact on the cultural landscape will be the extensive construction of roads and other activities which will be permanent.

Table 4. Impacts on the cultural landscape.

Nature: The potential impact of the construction of the power lines and substation on the cultural landscape in terms of visual impacts and changes to 'sense of place'.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (2)	Probable (2)
Significance	Low (14)	Low (14)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	yes	
Mitigation Mitigation cannot reduce the negative visual effect on the cultural landscape and 'significance of place'.		
Cumulative impacts: The construction of the power lines will slightly increase the visibility of these features on the high ground and where they cross the R350 main road. It will also create new visual effects especially in areas where there were no lines before.		
Residual impacts: Disturbances to the cultural landscape by the construction of service roads will be permanent.		

Table 5. Environmental management programme for heritage resources

Objective: Preserving the pre-colonial archaeological and colonial/historical period heritage sites/remains for the proposed construction of the substation and power line grid connection for the Iziduli Emoyeni Wind Farm	
Project component/s	Construction of power lines, substation and associated infrastructure.
Potential impact	The physical disturbance, damage and/or destruction of pre-colonial archaeology and colonial period heritage sites/remains.
Activity/risk source	Large scale levelling, construction of substation, power lines and access roads for construction vehicles
Mitigation: Target/Objective	All construction activities on the substation site must be monitored by an archaeologist/heritage practitioner (or alternatively a person specially trained to conduct the monitoring, i.e. the ECO). This must include the clearing of the vegetation (which constrained the visibility of heritage resources during the walkthrough investigation), and the levelling of the site.

Mitigation: Action/control	Responsibility	Timeframe
<p>Two colonial/historical period heritage sites of high significance were observed during the investigation. No development may occur within 50 metres of the sites and they and must be fenced-off</p> <p>All construction activities must be monitored by an archaeologist or heritage practitioner or alternatively a person must be specially trained, for example the ECO, to conduct the monitoring.</p> <p>If any human remains (or any other concentrations of heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the Eastern Cape Provincial Heritage Resources Authority so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material.</p> <p>Recommendations will follow from the investigation.</p>	<p>Proponent, consultant, contractor and the heritage practitioner.</p> <p>Proponent, consultant, contractor, heritage practitioner</p> <p>Proponent, consultant, contractor, heritage practitioner and heritage authority.</p>	<p>Before and during construction starts.</p> <p>From the start and duration of all phases of the construction phases, i.e., during the clearing of the vegetation for the above ground heritage.</p> <p>During the levelling phase for the buried heritage.</p>

Performance indicator	All heritage sites/materials observed during any construction activity must be recorded. The success of the monitoring will be determined by the degree of damage/disturbance that can be avoided to heritage resources.
Monitoring	All construction activities must be monitored by a heritage practitioner or alternatively a person must be specially trained, for example the ECO. The heritage practitioner should apart from monitoring specific activities at specific time also regularly visit the construction site (for example, once a month) to inspect the construction routes and activities (or to meet with the ECO, A report and if required a list of recommendations, should be compiled and submitted to the Eastern Cape Provincial Heritage Resources Authority after the monitoring phase(s) for comment.

DISCUSSION AND MITIGATION

Due to the dense tall, dry grass and little sheet erosion on the high ground the archaeological visibility was poor and made it difficult to locate pre-colonial archaeological sites and materials throughout the study area. Only a few isolated weathered stone tools were observed and it would appear unlikely that any significant *in situ* sites/material will be exposed during the development. However, it is possible that sites/materials are covered by soil and vegetation. Two historical sites were observed close to the proposed

northern power line route. Both are typical examples of the architectural 'style' of the region and of high significance. These must be protected against possible damage/vandalism during the construction phase. In the proposed power line routes and substation site appear to be of low archaeological significance. It is recommended that;

1. The power lines and service roads must be constructed 50 metres from the dry packed stone kraal and the labourer settlement.
 - Marked buffer zones must be placed around the stone kraal and the labourer settlement before construction starts to protect them from damage/ vandalism.
 - If the existing service tracks will be used during the construction, then they must be re-routed to avoid possible damage to the stone kraal and the labourer settlement.
2. All construction activities must be monitored by an archaeologist/heritage practitioner or alternatively a person must be specially trained, for example the ECO, to conduct the monitoring. This must include the clearing of the dense grass (which constrained the visibility of heritage resources during the investigation), levelling, placing and excavations of the pylon foundations and construction of the access roads.
3. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.
 - Alternatively the ECO must be trained as a site monitor to report to the foreman when archaeological sites are exposed/found.
4. Although it would seem unlikely that any significant archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development. Should such material be exposed during construction, all work must cease in the immediate area (depending on the type of find) and it must be reported to the archaeologist at the Albany Museum in Grahamstown (046 6222312) or to the Eastern Cape Provincial Heritage Resources Authority (043 6422811), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation (See appendix B for a list of possible archaeological sites that maybe found in the area).

GENERAL REMARKS AND CONDITIONS

Note: This is an Archaeological Impact Assessment (AIA) report compiled for the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) to enable them to make informed decisions regarding the heritage resources assessed in this report and only they have the authority to revise the report. This Report must be reviewed by the ECPHRA where after they will issue their Review Comments to the EAP/developer. The final decision rests with the ECPHRA who must grant permits if there will be any impact on cultural sites/materials as a result of the development

This report is a Phase 1 Archaeological Impact Assessment and does not exempt the developer from any other relevant heritage impact assessments as specified below:

In terms of the National Heritage Resources Act, No. 25 of 1999 (section 38) ECPHRA may require a full Heritage Impact Assessment (HIA) to assess all heritage resources, that includes *inter alia*, all places or objects of aesthetical, architectural, historic, scientific, social, spiritual, linguistic, or technological significance that may be present on a site earmarked for development. A full Heritage Impact Assessment (HIA) should assess all these heritage components, and the assessment may include archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasized that this Phase 1 AIA is based on the visibility of archaeological sites/material and may not therefore reflect the true state of affairs. Sites and material may be covered by soil and vegetation and will only be located once this has been removed. In the event of such finds being uncovered during construction activities, ECPHRA or an archaeologist must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed (see attached list of possible archaeological sites and material). The developer must finance the costs should additional studies be required as outlined above. The *onus* is on the developer to ensure that the provisions of the National Heritage Act No. 25 of 1999 and any instructions from ECPHRA are followed. The EAP/developer must forward this report to ECPHRA in order to obtain their Review Comments, unless alternative arrangements have been made with the heritage specialist to submit the report.

APPENDIX A: brief legislative requirements

Parts of sections 35(4), 36(3) and 38(1) (8) of the National Heritage Resources Act 25 of 1999 apply:

Archaeology, palaeontology and meteorites

35 (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;*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.*

Burial grounds and graves

36. (3) (a) 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.*

Heritage resources management

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of the site –*
 - (i) exceeding 5000m² in extent, or*
 - (ii) involving three or more erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*

- (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;*
- (d) the re-zoning of a site exceeding 10 000m² in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must as 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.*

APPENDIX B: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM INLAND AREAS: guidelines and procedures for developers

Human Skeletal material

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general human remains are buried in a flexed position on their side, but are also found buried in a sitting position with a flat stone capping. Developers are requested to be on alert for the possibility of uncovering such remains.

Freshwater mussel middens

Freshwater mussels are found in the muddy banks of rivers and streams and were collected by people in the past as a food resource. Freshwater mussel shell middens are accumulations of mussel shell and are usually found close to rivers and streams. These shell middens frequently contain stone tools, pottery, bone, and occasionally human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist.

Large stone cairns

They come in different forms and sizes, but are easy to identify. The most common are roughly circular stone walls (mostly collapsed) and may represent stock enclosures, remains of wind breaks or cooking shelters. Others consist of large piles of stones of different sizes and heights and are known as *isisivane*. They are usually near river and mountain crossings. Their purpose and meaning is not fully understood, however, some are thought to represent burial cairns while others may have symbolic value.

Stone artefacts

These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologists notified.

Fossil bone

Fossil bones may be found embedded in geological deposits. Any concentrations of bones, whether fossilized or not, should be reported.

Historical artefacts or features

These are easy to identify and include foundations of buildings or other construction features and items from domestic and military activities.

APPENDIX C

DIGITAL IMAGES OF THE LANDSCAPE
AND
AERIAL VIEWS OF STUDY AREA AND HERITAGE SITES



Map 4. An aerial image of the proposed power line routes (northern, top and southern, bottom) west of the R350 (green lines). The broken yellow lines mark the sections of the routes investigated previously and the blue bubble the stone kraal.

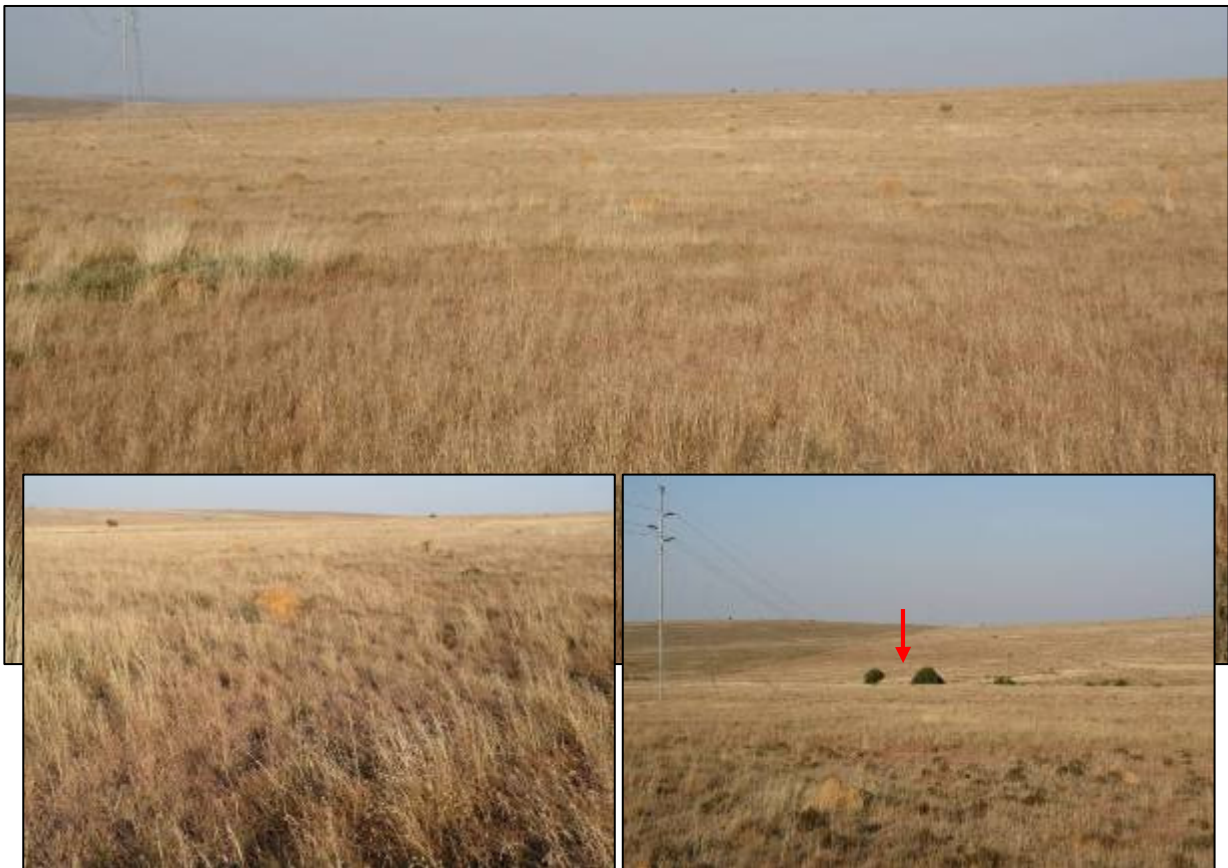


Figure 1. General views of the proposed northern power line route from the boundary of the Msenge Emoyeni WEF site (main image and left insert) towards the stone kraal location indicated by the red arrow (Right insert)

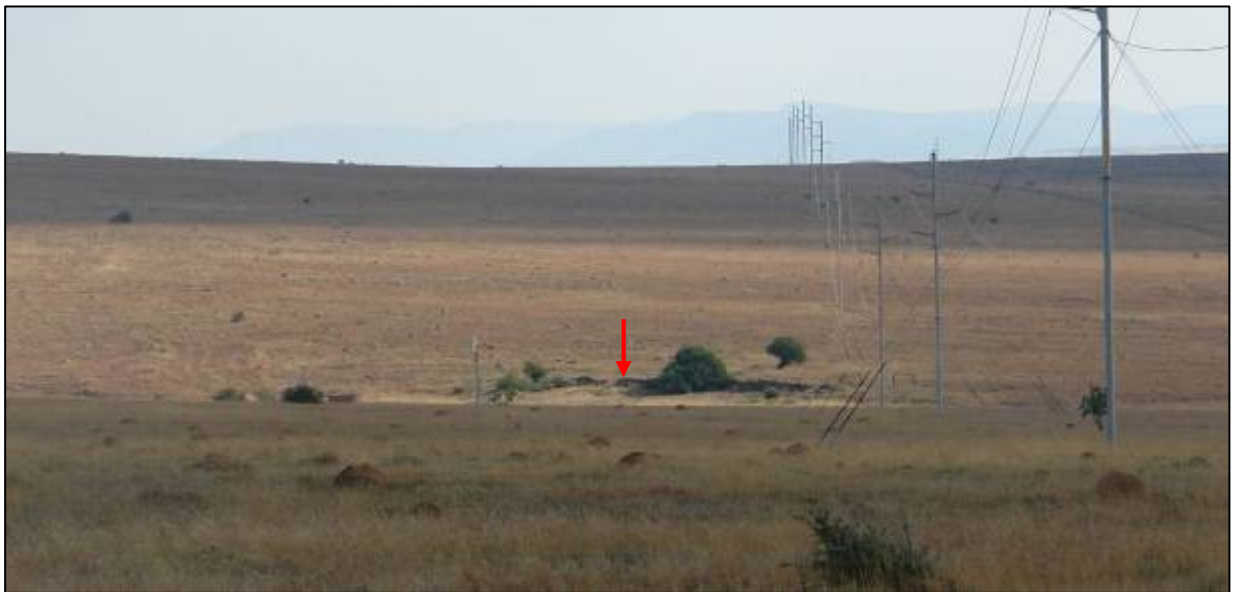
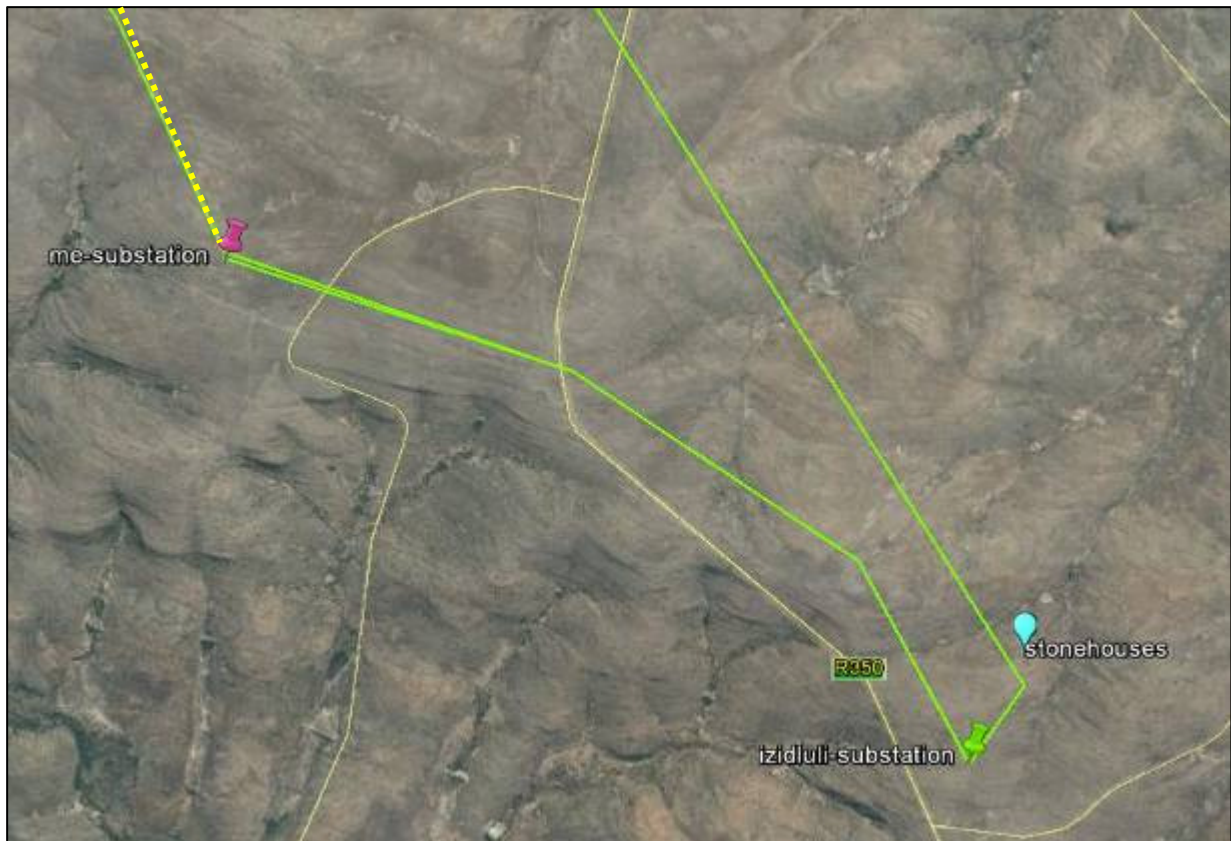


Figure 2. General views of the stone kraal (main image and bottom inserts) and a reverse view towards the stone kraal and the Poseidon Substation (middle image).



Figure 3. General views towards the ridge (main image), reverse view towards the Poseidon Substation (left insert) and a view towards the R350 main road (right insert).



Map 5. An aerial image of the proposed power line routes (northern, top and southern, bottom) and the location of the substation west of the R350 (green lines). The broken yellow line marks the section of the route investigated previously and the blue bubble marks the labourer houses.



Figure 4. General views of the landscape from the R350 main road towards the substation location.



Figure 5. Views of the labourer settlement near the existing power line (main image), towards the substation (left insert) and the substation site (right insert).



Figure 6. Images of the three labourer houses close to the existing power line (main image and inserts) and bottle glass and metal from a rubbish dump (left bottom insert).



Figure 7. Views of the southern power line route from the Msenge Emoyeni Substation (main image) towards the proposed Iziduli Substation (inserts).