

**A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED KAROO RENEWABLE ENERGY FACILITY ON A SITE SOUTH OF VICTORIA WEST, NORTHERN AND WESTERN CAPE PROVINCE ON THE FARMS PHAISANTKRAAL 1, MODDERFONTEIN 228, NOBELSFONTEIN 227, ANNEX NOBELSFONTEIN 234, EZELSFONTEIN 235, AND RIETKLOOFPLAATEN 239.**

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**Note:** This report follows the minimum standard guidelines required by the South African Heritage Resource Agency (SAHRA) for compiling a Phase 1 Archaeological Impact Assessment (AIA).

## **EXECUTIVE SUMMARY**

### **Purpose of study**

The purpose of the study was to conduct a phase 1 archaeological impact assessment (AIA) of the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape, on the farms Phaisantkraal 1, Modderfontein 228, Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235 and, Rietkloofplaaten 239. The survey was conducted to establish the range and importance of the exposed and *in situ* archaeological heritage materials and features, the potential impact of the development and, to make recommendations to minimize possible damage to these sites.

### **Brief Summary of Findings**

The area proposed for the Karoo Renewable Energy Facility is situated approximately 34km south of the small Karoo town of Victoria West across the Western and Northern Cape border and falls within the Ubuntu and the Beaufort West Local Municipalities. The proposed 200km<sup>2</sup> / 20 222ha area for the development of wind and solar renewable energy facilities is nestled between the N12, N1 and R63 roads.

The general landscape of proposed area for development comprised of mountains, hillocks and flat flood plains mostly covered in sparse vegetation of grass, small trees and shrubs mostly within the flood plain areas allowed for good archaeological visibility in the exposed unvegetated areas, although occurrences of denser grass and shrub vegetation made archaeological visibility slightly more difficult. Parts of the area, have been disturbed by the construction of fences, powerlines, dams, windmills, farm roads and the railway that crosses over the farm Nobelsfontein 227 as well as by grazing, natural erosion and other general farming activities.

Occurrences of Middle Stone Age and Later Stone Age stone artefacts were observed within the open exposed areas, flood plains and at the base of rocky outcrops and ridges. The stone artefacts were manufactured using a variety of raw materials such as

shale, hornfels, quartz and silcrete and included flakes, broken flakes, blades, scrapers, cores, rejuvenated cores and faceted platform flakes peculiar to the Middle Stone Age, some stone artefacts having been retouched and utilized as identified by the edge-damage. Three probable stone artefact knapping (manufacturing) sites were also documented within the area proposed for development.

Ceramic sherds of Khoekhoen pottery possibly belonging to one pot was documented on the farm Nobelsfontein 227. A few broken ostrich eggshell fragments were found in association with scatters of mainly Later Stone Age stone artefacts and within the rock shelters that contained rock paintings.

Rock paintings and rock engravings were documented on two of farms within the area proposed for development. The rock paintings were mainly red ochre finger paintings and contained images of human figures and geometric and abstract paintings. The rock engravings occurred mainly on boulders with a dark / black patination and contained mainly colonial images, animal figures and abstract patterns and cross-hatching.

Stone-wall structures resembling mainly large rectangular kraals and smaller circular pens, foundations of historical dwellings and animal traps occurred within the area proposed for development. Ruins of one farm house, possibly constructed out of sun-dried bricks and later modified with modern building materials, was documented on the farm Phaisantkraal 1. Some of the stone-wall structures and the area around the ruins of the farm house contained waste midden dumps that contained mainly rusted tin, metal and historical ceramic-wares and glass.

Human remains were found exposed along the side of a 3m-4m high river donga and one burial could be observed in the side of the donga approximately 1m below the surface with a few human remains exposed at the surface on the farm Nobelsfontein 227.

## **Recommendations**

The area is of a medium cultural sensitivity and the following recommendations must be considered:

1. The exposed human remains must be reported to the South African Heritage Resources Agency (SAHRA) so that they may appoint the relevant archaeologist/s to remove the exposed human remains.
2. No construction activities may take place within 100m of the documented rock shelters containing rock paintings and boulders containing rock engravings.
3. The ridges and rocky outcrops surrounding the locations of the turbines and solar panels must be investigated prior to construction to establish whether undocumented rock shelters contain rock paintings and rocky outcrops contain

boulders with rock engravings. If any are encountered the recommendations in point 2 will be implemented.

4. No construction activities may take place within 100m of the documented stone-wall structures.
5. If it is inevitable that construction activities must take place within 100m of any documented and undocumented rock shelters containing paintings, rocky outcrops with boulders containing rock engravings and stone-wall structures a perimeter fence must be erected to protect the sensitive area from any possible negative impact.
6. It is possible that *in situ* archaeological sites/remains, and human remains may be uncovered during construction. Therefore, a professional archaeologist should be appointed during the vegetation removal and construction phases of the development.

## **BACKGROUND INFORMATION**

The phase 1 archaeological impact assessment (AIA) report is required for the environmental impact assessment (EIA).

### **Developer:**

South African Renewable Green Energy (Pty) Ltd (SARGE)

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### **Terms of Reference**

To conduct a survey of possible archaeological heritage sites within the area of the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape Province on the farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, Rietkloofplaaten 239, Modderfontein 228 and Phaisantkraal 1. The survey was conducted to establish the range and importance of the exposed and *in situ* archaeological heritage materials and features, the potential impact of the development and, to make recommendations to minimize possible damage to these sites.

## **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 5000m<sup>2</sup> 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 000m<sup>2</sup> 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.

## **BRIEF ARCHAEOLOGICAL BACKGROUND**

An archaeological desktop study has been conducted for the proposed Karoo renewable energy project prior to undertaking the phase 1 archaeological impact assessment; this is a summary extract from the study.

Little is known about the archaeology of the immediate area, mainly because no systematic archaeological research has been conducted within the proposed area for the Karoo Renewable Energy Facility. Records of early travelers through the area as well as those of early settlers of the town of Victoria West and surrounds make mention of their interactions with San people who still inhabited the area during the latter half of the 1800's. Archaeologists such as A.H.J. Goodwin, during the mid-1920's, identified an exclusive stone tool industry as the Victoria West Industry which occurred around the town of Victoria West and along the Vaal River (Goodwin 1926, 1946). Rock engravings are widespread over the Karoo landscape, substantial research has been conducted within the Northern and Western Cape areas of the Karoo (Parkington *et al.* 2008). A few relevant phase 1 archaeological impact assessments that have been conducted close to the area proposed for development provide a more recent and accurate recording of what may be found within the area proposed for development (Binneman *et al.* 2010; Morris 2006).

### **References:**

- Binneman, J.; Booth, C. & Higgitt, N. 2010. A phase 1 archaeological impact assessment (AIA) for the proposed Skietkuil Quarries 1 and 2 on the Farm Skietkuil No. 3, Victoria West, Central Karoo District, Western Cape Province.
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- Goodwin, A. J. H. 1926. The Victoria West Industry. In: Goodwin, A.J.H. & van Riet Lowe, C. (eds). *The South African Cultures of South Africa*. Annals of the South African Museum.
- Goodwin, A.J.H. 1946. Earlier, Middle and Later. *South African Archaeological Bulletin*, Vol. 3 (1): 74-76.
- Morris, D. 2006. Revised archaeological specialist input for the proposed Hydra-Gamma 765kV transmission lines along the (existing) 400kV corridor near De Aar and

Victoria West, Northern Cape Province.  
Parkington, J.; Morris, D. & Rusch, N. 2008. *Karoo Rock Engravings*. Cape Town: Creda Communications.

## **DESCRIPTION OF THE PROPERTY**

### **Area surveyed**

### **Location data**

Map 1:250 000 - 3122 VICTORIA WEST

The area for the proposed Karoo Renewable Energy Facility is located on a site approximately 34km south of Victoria West, Northern and Western Cape, on the farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, Rietkloofplaaten 239, Modderfontein 228 and Phaisantkraal 1 over an area of about 200km<sup>2</sup> / 20 222ha in extent nestled between the N12, N1 and R63 roads.

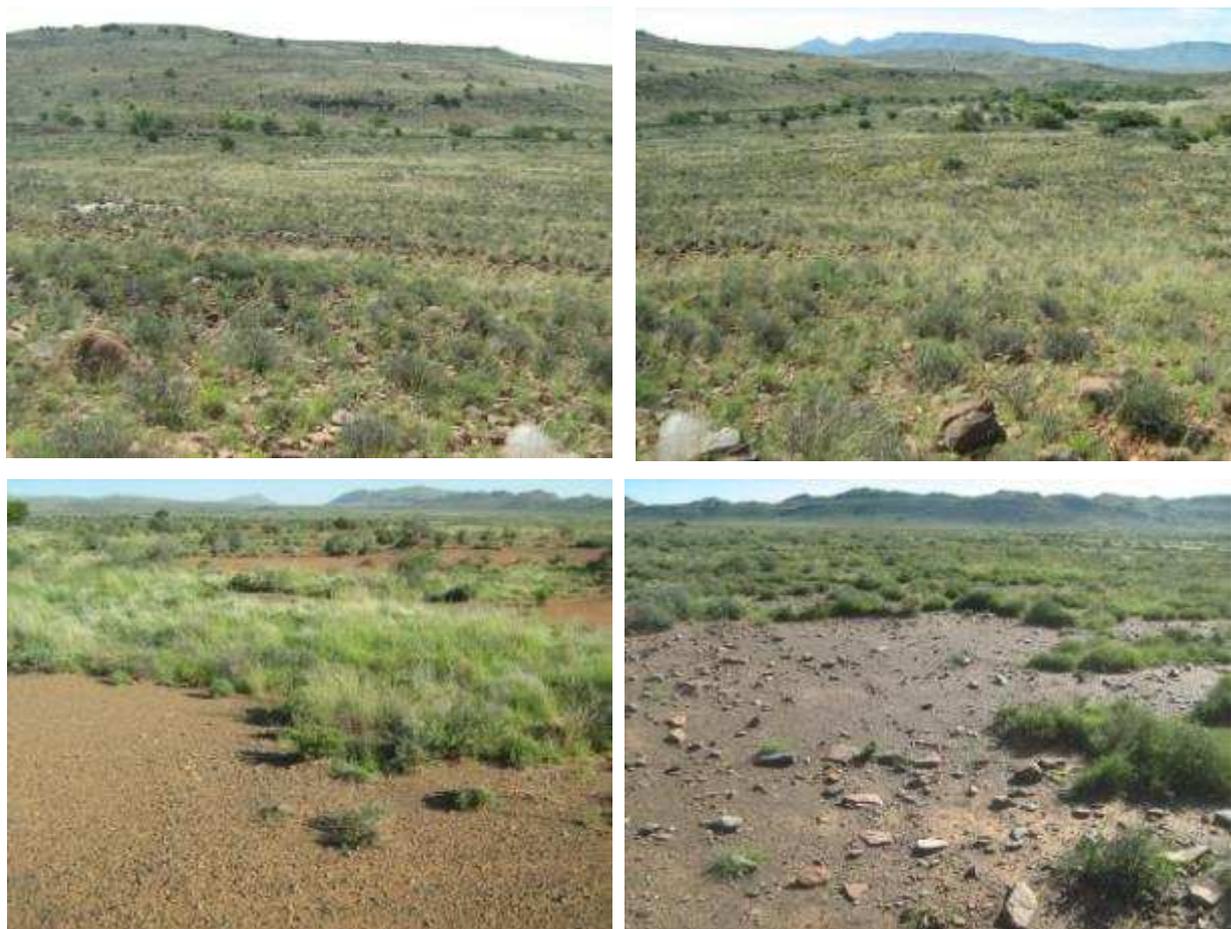
## **ARCHAEOLOGICAL INVESTIGATION**

### **Methodology**

The survey was conducted by three people mostly on foot within the floodplains, rocky outcrops and rock shelters and by conducting spot checks from a vehicle following the existing farm and service roads. GPS readings were taken using a Garmin Plus II. (Refer to Maps 1-3 for the location of GPS co-ordinates and Areas referred to in text).

### **Phaisantkraal 1**

The farm Phaisantkraal 1 is situated on the eastern side of the proposed area for development and covers an area of approximately 9km x 6km. The landscape is varied, consisting of flat, open floodplains, ridges, rocky outcrops, and hillocks/koppies. The area is covered in the typical Karoo vegetation and relatively dense grass, which made archaeological visibility. Exposed unvegetated open areas were inspected for possible archaeological material remains. (Figs 1-4). The farm also consists of natural springs and dams. Disturbed areas include the construction of farm roads, fences, dams, windmills, a farm house and associated buildings, powerlines and telephone lines as well as by grazing by domesticated stock and other general farming activities.



**Figs 1-4. Views of the general landscape and exposed areas investigated for archaeological material remains on the farm Phaisantkraal 1.**

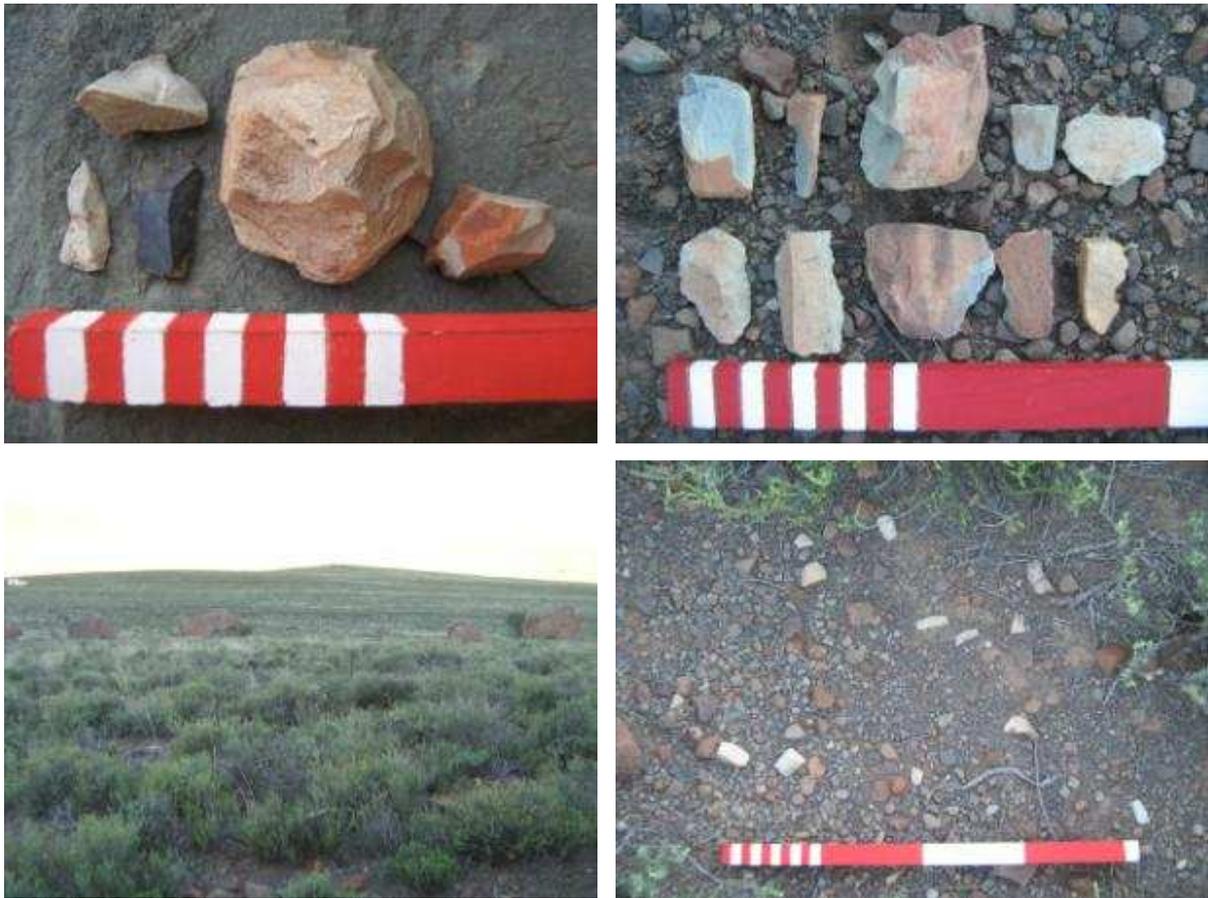
One relatively small in size late Early Stone Age hand axe was documented in the flat floodplain area. Predominately singular isolated surface scatters of Middle Stone Age stone artefacts were observed within the exposed unvegetated areas on the flat floodplain areas, around particular rocky outcrops and at the base of ridges. The Middle Stone Age stone artefacts included cores, flakes and broken flakes identified by the characteristic faceted platform, some had been retouched and shaped into large scrapers and some had been utilised that was identified by light and heavy edge-damage manufactured on a variety of local raw materials that includes hornfels and medium- to fine-grained shale (Figs 5-6). The distribution of small concentrations of Middle Stone Age stone artefacts can be highlighted at the areas marked S23 and in the vicinity of GPS17, between S1 and GPS1, between S9 and GPS5, as well as in the vicinity of GPS15. Edge damaged and retouched flakes were observed at S1, S17 and S18. No other archaeological material remains were found to be associated with the Middle Stone Age stone artefact surface scatters.



**Figs 5-6. A possible late Early Stone Age hand axe (left) and examples of the Middle Stone Age Stone artefacts observed.**

Later Stone Age stone artefacts occurred mainly in small concentrations within particular areas, on the slopes, at the bases of rocky outcrops and on the flat floodplains, and included upper grinding stones, cores, formal tools, flakes and broken flakes predominantly manufactured on hornfels but also included quartz, silcrete and fine-grained shale raw materials that contained signs of miscellaneous retouch and edge-damage indicating possible utilisation. The upper grinding stone was observed in association with formal tools manufactured on hornfels and some quartz broken flakes as well as a relatively dense concentration of ostrich eggshell fragments occurred at the area marked S24 located at the base of a rocky outcrop. S26 and S27 are characteristic of Later Stone Age stone artefact knapping (manufacture) areas (Figs 7-10). S26 is located near a farm road within a floodplain, it is a relatively small area of approximately 8m x 10m in extent comprising mainly of cores, flakes and large number of chips. S27 is located at the base of the slope of 'koppie' marked *Rondekop* in and amongst several boulders. The area relatively large approximately 50mx200m in extent and comprised mainly of concentrated patches of stone artefact that resemble areas of knapping (manufacture) and include cores, flakes and large numbers of chips.

Three rock shelters containing rock paintings were documented on the farm Phaisantkraal at the areas marked S4, S20 and S21, however, not all of the rock shelters within the proposed area were investigated and there may be more unknown rock shelters that contain rock paintings. S4 is not included within the area proposed for the construction of wind turbines; however, it was recorded and is mentioned within the report as an indication of the predicted areas that possible rock shelters containing rock paintings within the proposed area for development may occur. S4 is a rock shelter that overlooks the floodplains and is situated approximately 50m upslope. All of the paintings were painted using red ochre and consist of finger painted images of six human figures, in procession and possibly holding hands as well as three finger painted strips. The paintings are relatively weathered. The rock shelter contained no archaeological deposit, however, a few broken ostrich eggshell fragments were observed. S20 and S21



**Figs 7-10. Examples of Later Stone Age stone artefacts (top) and the boulder area of S27 and *in situ* stone artefacts characteristic manufacture site.**

are located close to and facing each other nestled in a small kloof and densely covered in vegetation. S20 is a shallow, north-west facing rock shelter that contained no archaeological deposit. The paintings comprise of red ochre painted finger paintings of U-shaped curls and finger painted stripes. Site 21 is a deeper rock shelter with a few stone artefacts scattered on the floor of the rock shelter; however, a slight archaeological deposit could be observed and may have been disturbed by previous occupation. Later Stone Age stone artefacts including cores and flakes, bone fragments loose and *in situ*, ostrich eggshell fragments, and historically related material such as a metal kitchen knife, a white metal bowl and corrugated iron were observed on the surface of the rock shelter. Stone walling approximately 2m in height has been built onto the rock shelter to act as a wind break or an extra shelter for occupation possibly by shepards. The rock paintings comprise of red ochre finger paintings of shapes such as stripes and indistinguishable human and animal figures (Figs 11-14).





**Figs 11-14. View of the Site 21 (top left); archaeological and historical artefacts observed within the rock shelter (top right) and examples of the rock painting shapes and images (bottom).**

Two main areas containing engraved boulders were identified on the farm Phaisantkraal 1, however, not all of the rocky outcrops containing boulders were investigated owing to the extent of the wide distribution of boulders. S5 contains four boulders evenly distributed in an almost horizontal line situated in the flat floodplain that the rock shelter that contains rock paintings overlooks. Only two of the four boulders contain any indication of engravings that includes fine-line images of a triangular geometric shape and horizontal scratches one side of the boulder and an image of an indistinguishable animal (Figs 15-16). S7 is located on a rocky dolerite outcrop and contains four engraved boulders distributed within an area of approximately 50m x 50m. The boulders contained deep scratches approximately 25cm in length, relatively patinated cross-hatching images that resemble nets, two images of European settlers one image of a male figure dressed in a top hat and heeled boots standing in a hands-on-hips posture and the other sitting on a horse. Isolated scatters of Middle Stone and Later Stone Age stone artefacts were documented within the vicinity of the rock engravings. A semi-circle stone wall structure approximately 5m x 3m in extent and 1m in height was located within the area of the boulders and stone artefacts (Figs 17-18).





**Figs 15-18. Examples of engraved images on the farm Phaisantkraal 1 (from top left) the indistinguishable engraved animal at S5, cross-hatching with heavy patination at S7, the image European settler (left) and a close up (right) at S7.**

Several stone wall structures were encountered during the survey on the farm Phaisantkraal 1, most of them either rectangular or circular in shape, varying in size, and between 1m and 1.5m in height. S2 and S3, not included within the immediate area proposed for the construction of the wind turbines, were documented about 20m from each other made up of packed stone walling approximately 1m in height and 2mx3m in extent, which may have been used as pens for calves or kids or shelter as hut for shepards. S2 is situated directly next to the current farm fence and S3 is situated about 20m west on a slope next to small rock shelter. Broken fragments of glass, ceramics and porcelain as well as isolated occurrences of hornfels stone artefacts occurred within the immediate surrounding area. S19 consists of a small stone walled hut packed into the slope of at the top of the ridge, facing west and overlooking one of the valleys. The stone wall structure is approximately 4mx3m in extent and 2m in height. No archaeological remains were observed within the immediate surrounding area. On the flat plains above the rock shelter at S21 is a relatively large rectangular stone-packed kraal and a smaller square stone packed structure with scatters of broken glass, ceramics and porcelain. A stone wall approximately 4mx3m in extent and 1m in height is situated adjacent to the farm road nearby a dam in the floodplain area at the area marked S25. Ceramics, porcelain, metal pot fragments and Middle Stone Age stone artefacts were observed within the immediate surrounding area. A relatively small dwelling that was constructed using corrugated iron sheets, wire and wooden poles was located against a rock shelter at S22. This make-shift dwelling is within 200m of the rock shelters at S20 and S21. Fragments of bones, cloth, and plastic maize bags were found within the make-shift dwelling (Figs 19-22).



**Figs 19-22. Examples of stone walling encountered on the farm Phaisantkraal 1 (from top left) S19, the make-shift dwelling at S22, on the plains above the rock shelter at S21.**

S6 includes a larger farmstead complex. The complex consists of a ruined farmhouse constructed out of sun-dried bricks with modern additions for renovations. The complex also has several other buildings, the building next to the farmhouse ruins and the shed approximately between 80-100m from the farmhouse ruins. There is a typical historical midden (rubbish dump) between the farmhouse ruins and the larger shed. The complex is situated next to stream and has been planted with alien vegetation as windbreaks. A large stone-walled kraal complex is situated within the farmstead complex and is still being utilised by the current farmer to house domesticated stock.

Archaeological heritage and material remains encountered during the survey on the farm Phaisantkraal 1 included surface scatters of predominantly Middle Stone Age stone artefacts within the floodplain areas and at the base of rocky outcrops within no other archaeological material remains in association with the stone artefacts; small concentrations of Later Stone Age stone artefacts occurred within particular areas and within one rock shelter containing paintings, however, these may not be impacted by the construction of the proposed development; rock art including paintings observed within three rock shelters and rock engravings on a few investigated boulders, stone wall structures of varying sizes and shapes; scatters of historical glass, ceramics and metal and; a farmstead complex containing ruins of a farmhouse and a possible historical midden (rubbish dump).



**Figs 23-24. View of the farmhouse ruins (left) and examples of glass, ceramic, stoneware and porcelain historical artefacts from the midden.**

It is highly likely that the surface scatters of Middle Stone Age stone artefacts encountered occur in a disturbed context owing to water runoff, wash and erosion along the floodplains as well as being washed down the slopes of rocky outcrops and ridges. The possible Later Stone Age stone artefact knapping (manufacture) areas may contain stone artefacts *in situ* and should be avoided during the construction phases of the proposed project. The small concentrations of Later Stone Age stone artefacts contain ephemeral occurrences of other archaeological remains; however, these concentrations may be in disturbed context owing to natural and animal disturbances. The Later Stone Age stone artefacts and historical material encountered within the rock shelters may be also be in a disturbed context owing to previous occupation. The rock shelters containing rock paintings should be avoided during construction and the surrounding ridges with rock shelters should be investigated for further possible occurrence of rock paintings so that recommendation regarding the avoidance of these areas can be made. Similarly, documented areas containing rock engravings on boulders should be avoided and further investigation into the areas containing boulders surrounding the points of the proposed turbines should be investigated for further possible occurrences of rock engravings. The stone wall structures must be avoided during the construction phase of the proposed development.

### **Modderfontein 228**

The farm Modderfontein 228 is located between the farms Phaisantkraal 1 and Nobelsfontein 227 and covers an area of approximately 9km x 9km. The landscape is varied, consisting of flat, open floodplains, ridges, rocky outcrops and hillocks/koppies. The area is covered in the typical Karoo vegetation and dense grass, which at times hindered archaeological visibility. However, exposed open areas were investigated for possible for archaeological material remains (Figs 25-28). The farm also consists of natural springs and dams. Disturbances owing to the construction of farm roads, fences,

powerlines, telephone lines, windmills and dams as well as domestic stock grazing and other farming activities occurs throughout the area.



**Figs 25-28. Views of the landscape, vegetation and exposed areas investigated.**

Predominantly isolated surface scatters of Middle Stone Age stone artefacts occurred throughout the farm Modderfontein 228 in the flat floodplains and at the base of rocky outcrops and ridges, although small concentrations of stone artefacts occurred within certain areas. The Middle Stone Age stone artefacts comprised mainly of cores including prepared cores and rejuvenated cores, flakes, mostly identified by the characteristic faceted platform, broken flakes, and occasional formal tools, but most contained only miscellaneous retouched edges and some showing utilisation by the evidence of edge-damage. The raw materials used for manufacture of the stone artefacts included hornfels, medium and fine-grained shale and fine-grained purple and green mudstone (Figs 29-32). A possible purple mudstone quarry area occurs next to a river and small rocky outcrop at the area marked S29, similar Middle Stone Age stone artefacts to the purple mudstone occur within the immediate area. Small concentrations of Middle Stone Age stone artefacts occurred at the areas marked S12 situated at the base of a ridge on the flat floodplain and resembled Middle Stone Age stone artefacts found at sites on the West Coast of South Africa dated within the last 50 000 years, S13 and S14 both situated at the base of ridges and comprised of cores and flakes, S15 is situated on the flat floodplain, S16 is situated on a small rocky outcrop adjacent to the farm road, S34 is

a relatively more dense scatter of red patinated weathered Middle Stone Age stone artefacts within an exposed area on the flat floodplain, and S36 is approximately 10m x 4m in extent and situated on the flat floodplain. Sporadic and isolated scatters of Middle Stone Age cores and flakes occur across the rest of the area. No other archaeological materials were found in association with the occurrence of the Middle Stone Age stone artefacts.



**Figs 29-32. Examples of Middle Stone Age stone artefacts documented on the farm Modderfontein 228.**

Later Stone Age stone artefacts are not as prevalent across the area as the Middle Stone Age stone artefacts and were only observed at three particular areas. S31 indicates one of the better represented Later Stone Age sites within the area proposed for development. The stone artefacts comprised a variety of cores, flakes and formal tools predominantly manufactured on hornfels, *in situ* bone was also observed within the 10 x 20m area. The site is situated on the banks, approximately 50m, of a non-perennial stream. A large stone walled kraal may have been built over some of the site as stone artefacts were observed within the kraal area. S32 is situated on the ridge across the non-perennial stream from S31 on a flat rocky outcrop. The stone artefacts are indicative of the typical Inland Wilton microliths (8 000 – 4 500 B.P.) comprising a thumbnail scraper and a borer manufactured on silcrete. S39 is located adjacent to the farm road and may have been disturbed when the road was being constructed, however, a small concentration of Later Stone Age stone artefacts were observed comprising

mainly cores, flakes, a grinding/digging stone and a scraper manufactured on hornfels (Figs 33-36). A surface scatter of Middle Stone Age stone artefacts were also observed within the immediate vicinity of this Later Stone Age stone artefact scatter.



**Figs 33-36. View overlooking S31 into the valley and the kloof (top left) and scatter of Later Stone Age stone artefacts at S31 (top right), the disturbed scatter of Later Stone Age stone artefacts (bottom left) and; examples of the typical Inland Wilton Later Stone Age stone artefacts (bottom right)**

Two rock engraving areas were documented on the farm Modderfontein 228, however, not all of the rocky outcrops and boulders were investigated owing to the extent of the wide distribution of these rocky outcrops and boulders. Four boulders were identified, at the area marked S10, as containing rock engraving images of an antelope, approximately 20cm x 10cm, a male figure dressed in a top hat possibly holding a rifle with one arm stretched out sitting on a horse, a signature done in cursive, as well as abstract and geometric patterns. Middle Stone Age stone artefacts also occurred within the immediate rocky outcrop area surrounding the engravings. One boulder that has been split in half owing to climatic factors marked at the area S35 was documented as containing rock engraving images of an ostrich approximately 20cm x 15cm in size, a star approximately 70cm x 40cm in size, and an indistinguishable figure, as well as general scratches. The area contains several boulders at the base of a koppie, however, only the above-mentioned images were documented and other boulders only contained a few engraved scratches.

S11 is the location of a gong rock. Hammering is evident on the top of two of the boulders, and a metallic sound is made when beaten with hands. The location of the gong rock is ideal, as it has a good view down the two valleys. The gong rock is in close proximity to the engraved boulders at S10. A few Middle Stone Age flakes were observed in front of the rock gong next to the farm road.



**Figs 37-40. (Top) S10 showing the concentration of boulders and the general landscape within these areas and examples of the rock engraving images, (bottom) S25 showing the location of the split boulder and examples of the rock engraving images.**

Several stone wall structures were encountered during the survey on the farm Modderfontein 228. A large stone wall packed kraal referred to as S30, is approximately 150m x 40m in extent, and is situated adjacent to and most probably on top of the Later Stone Age site marked at the area S31 close to the non-perennial stream (Figs 41-42). The area within the kraal contained a few Middle and Later Stone Age stone artefacts, an upper grinding stone, a few ostrich eggshell fragments and a few fragments of fresh water occurred between the kraal and the stream. A large stone wall complex including three large kraals and small pen and occupation area occurred at the area marked S33 over an area of about 200m x 100m. The kraals were built on the slight gradient slope; similar to those encountered on the farm Skietkuil situated about 15km to the north of the farm Modderfontein. One area contained two relatively large kraals built against the slope adjacent and connecting to each other, approximately 50m x 30m in extent, and

the remains of foundations of a stone wall structure that resembles a 10m x 5m hut at the base of the slope. Two smaller stone wall kraals are situated about 200m to the north, the larger rectangular kraal is situated against the slope and is about 15m x 10m in extent below this structure at the base of the slope is a smaller circular pen approximately 2.5m x 2.5m in extent that may have been used to house lambs, kids or calves (Figs 43-46).



**Figs 41-42. View of the extent of the large stone walled kraal (left) and a close-up of the stone packed wall (right).**



**Figs 43-46. View of the stone wall complex (top left), example of one of the kraals and pen situated within (top right), foundations of a hut (bottom left) and the smaller rectangular kraal and pen.**

The remains of a stone walled hut approximately 2m x 4m in extent, probably a shelter for the shepards, is situated at S37. Pieces of corrugated iron which may have been used as the roof of the hut, broken glass fragments and metal pieces of wire were observed in the vicinity of the stone walled hut. A few ostrich eggshell and bone fragments were observed within the remaining structure of the hut. A stone packed structure, approximately 3m x 2m in extent and 1.5m in height, situated on the edge of low ridge directly opposite S37 referred to as S38 resembled a small igloo and was used as an animal trap to trap predators that may have been a threat to the small domesticated stock (Figs 47-48). No archaeological heritage or other material remains were observed within the immediate surrounding area.



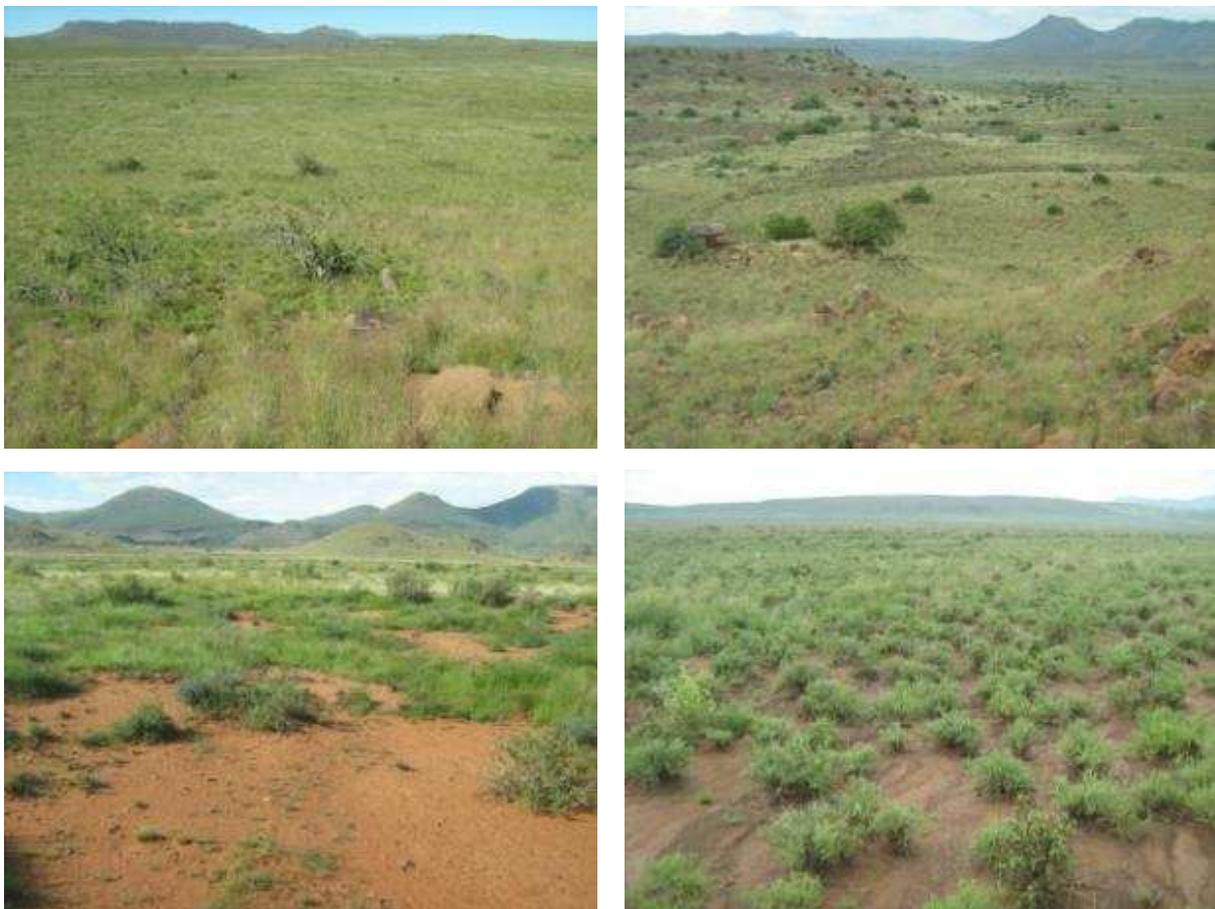
**Figs 47-48. Views of the stone walling encountered at S37 (left) and S38 (right).**

The archaeological heritage and material remains encountered on the farm Modderfontein 228 include surface scatters of Middle Stone Age stone artefacts that contained no other associated archaeological materials remains; small concentrations of Later Stone Age stone artefacts within particular areas, boulders with rock engravings and scratches and; stone wall structures.

It is highly likely that the surface scatters of Middle Stone Age stone artefacts encountered occur in a disturbed context owing to water runoff, wash and erosion along the floodplains as well as being washed down the slopes of rocky outcrops and ridges. Similarly the occurrence of Later Stone Age stone artefacts may have been disturbed by erosion as well as natural and animal disturbances. Documented areas containing rock engravings on boulders should be avoided and further investigation into the areas containing boulders surrounding the points of the proposed turbines should be investigated for further possible occurrences of rock engravings. The stone wall structures must be avoided during the construction phase of the proposed development.

**Nobelsfontein 227 (Including the farms Annex Nobelsfontein 234, Ezelsfontein 235, Rietkloofplaaten 239,**

The farm Nobelsfontein 227 (including the farms Annex Nobelsfontein 234, Ezelsfontein 235 and Rietkloofplaaten referred to collectively as Nobelsfontein 227) is situated at the western side of the proposed area for development of approximately 10km x 8km in extent. The landscape is varied, consisting of flat, open floodplains, ridges, rocky outcrops and hillocks/koppies. The area is covered in the typical Karoo vegetation and dense grass, which at times hindered archaeological visibility. However, exposed open areas were investigated for possible archaeological material remains (Figs 49-52). The farm also consists of natural springs and dams. Disturbances owing to the construction of farm roads, fences, powerlines, telephone lines, windmills and dams as well as domestic stock grazing and other farming activities have occurred throughout the area.



**Figs 49-52. Views of the landscape on the farm Nobelsfontein including the vegetated areas (top) and the exposed and washed areas (bottom) investigated for archaeological material remains.**

Sporadic and isolated surface scatters of Middle Stone Age stone artefacts occurred across the proposed area mainly within the flat floodplain areas across the farm Nobelsfontein 227. The Middle Stone Age stone artefacts occurrences comprised mainly a variety of cores including cores that had been prepared prior to stone artefact manufacture, flakes bearing the characteristic Middle Stone Age faceted striking

platform and blades manufactured predominantly on medium- and fine-grained shale and hornfels raw materials. Surface scatters of small concentrations of Middle Stone Age stone artefacts were documented at the areas marked S43, S46 and S48. The stone artefacts documented at S48 were adjacent to the farm road at the base of the hillock/koppie that contained several engraved and scratched boulders and a lower grinding near to the stone artefact surface scatter (Figs 53-56). No other archaeological remains in association with the stone artefact scatters were encountered.



**Figs 53-56. Examples of Middle Stone Age stone artefacts including prepared cores, flakes and blades (top) and the surface scatter at the area marked S48 (bottom).**

Later Stone Age stone artefacts were only encountered at two areas on the farm Nobelsfontein 227 at the areas marked S46 and GPS48. The area S46 is situated on a flat floodplain within relatively dense grass vegetation, a silcrete microlith core was observed within the exposed area next to the farm road and a few flakes were observed within the immediate surrounding area. The area marked GPS48 had a small concentration of Later Stone Age stone artefacts comprising mostly of flakes manufactured on fine-grained raw materials was documented within the exposed area next to the farm road. The only occurrence of Khoekhoen pottery within the area proposed for development occurred at the area marked S40 on the farm Nobelsfontein 227. The area, approximately 10mx5m, contained a surface scatter of a few broken undecorated sand and grit tempered pottery sherds, presumably sherds of one whole

pot. No other archaeological heritage and material remains were documented in association with the broken pottery sherds (Figs 57-58).



**Figs 57-58. Examples of the Later Stone Age microlith core (right) and the surface scatter of broken pottery sherds (left).**

Some of the rock shelters on the farm Nobelsfontein 227 were investigated for possible rock paintings, of which only two rock shelters containing rock paintings were documented, these are referred to as S49 and S50. The rock shelter at S49 overlooks the flat floodplains and contained "faded" abstract red ochre finger-painted images of stripes and crosses. The rock shelter at S50 is situated along a ridge within several other rock shelters that did not contain any rock paintings within 100m of a small stream and similarly contained "faded" abstract red ochre finger painted images of vertical and horizontal stripes.

Several boulders containing rock engravings were encountered on the farm Nobelsfontein 227, however, not all the rocky outcrops containing rock boulders were investigated owing to the vast extent of the distribution. Boulders containing rock engravings were observed at the areas marked S41, S42, S47, and S48 and comprised mainly of abstract scratched, horizontal lines, possible animal images and cross-hatching. S41 is situated on a rocky outcrop approximately 100m from the occurrence of the broken pottery sherds and contained scratched approximately 20cm in length. No archaeological material remains occurred within the immediate area. Three engraved boulders situated on a rocky dolerite outcrop were documented at the area marked S42 contained vertical and diagonal lines approximately 20cm in length which have been slightly patinated, abstract scratches as well as possibly bird-like image. The areas marked S47 and S48 contained mostly boulders containing abstract scratches, however, several patinated images of cross-hatching resembling nets and similar to those encountered on the farm Phaisantkraal 1 were observed (Figs 59-62).



**Figs 59-62. Examples of the distribution of boulders (top left), the scratches that occur on most of the as rock engravings (top right) and the patinated cross-hatching images observed at S48.**

One area containing three stone wall structures was documented on the farm Nobelsfontein at the area marked S44 overlooking the flat floodplain. Three circular stone-packed structures averaging between 2.5mx2.5m in extent and 1m-1.5m in height are situated about 20m in distance from each other. Each stone walled structure has an entrance of about 1m (Figs 63-64).



**Figs 63-64. Examples of the circular stone wall packed structures at S44 overlooking the flat floodplain.**

Exposed human remains were encountered on the edge of an approximately 3m river donga which has eroded way at the area marked S45. The area of exposure is situated within 200m and 150m from the railway and the farm road. Buried human remains about 1m below the surface could be seen in the side of the donga. The human remains seem to have been buried in a plastic weaved almost hessian-like sack wearing modern clothes. Three wooden railroad sleepers had been placed on top of the burial and then covered over with soil. The skull has been eroded out of the burial area and may have been washed away by the river, one of the clavicle (collar bone) was recovered on the bank of the river area immediately below the burial area (Figs 65-68).



**Figs 65-68. Views of the exposed human remains in the side of the donga.**

More human remains are exposed at the surface area of the 3m-4m high donga next to the exposed burial. One humerus (arm bone) has been completely exposed at the surface. The area of exposed human remains is approximately 20mx10m in extent and may have been an informal burial area for the railroad workers. There is no evidence of occupation structures within the immediate area, however, sporadic concentration of broken glass, ceramics and porcelain occurs between the railway, the farm road and the river donga area (Figs 69-72).



**Figs 69-72. Exposed human remains at the surface of the donga.**

Three wind masts (GPS30, GPS33, and GPS 39 [Map2] and marked as green flags on Map 3) had either been erected or were in the process of being erected. The area surrounding the wind masts were investigated for possible archaeological heritage and material remains, however, none were observed with the areas dug for the mast anchors to construct the wind masts.

The archaeological heritage and material remains encountered on the farm Nobelsfontein 227 ((including the farms Annex Nobelsfontein 234, Ezelsfontein 235 and Rietkloofplaaten) include surface scatters of Middle Stone Age stone artefacts that contained no other associated archaeological heritage and material remains; Khoekhoen pottery sherds that had probably been a part of 1 pot; rock shelters containing “faded” rock paintings; boulders with rock engravings and scratches and; stone wall structures.

It is highly likely that the surface scatters of Middle Stone Age stone artefacts encountered occur in a disturbed context owing to water runoff, wash and erosion along the floodplains as well as being washed down the slopes of rocky outcrops and ridges. Similarly the occurrence of Later Stone Age stone artefacts may have been disturbed by erosion as well as natural and animal disturbances. Documented areas such as rock shelters containing rock paintings and areas containing boulders with rock engravings

should be avoided and further investigation into the areas containing boulders surrounding the points of the proposed turbines should be investigated for further possible occurrences of rock engravings. The stone wall structures must be avoided during the construction phase of the proposed development.

### **Survey/Description of sites**

A possible late Early Stone Age hand-axe occurred at the area marked S17. Mostly isolated and slight concentrations of Middle Stone Age stone artefacts surface scatters were documented at the areas marked S1, S9, S12-S18, S23, S34, S43 and S46. A possible Middle Stone Age stone artefact knapping (manufacture) area was documented at S36. Later Stone Age surface scatters and small concentrations were also documented at the areas marked S24, S28, S31, S32, S39 and S46. The Middle Stone Age stone artefacts comprised a variety of cores, general flakes and flakes with the characteristic Middle Stone Age faceted platform, broken flakes, retouched and edge-damaged pieces, as well as formal tools manufactured on hornfels and medium- and fine-grained raw materials. The stone artefacts occur mainly in a secondary disturbed context owing to natural erosion, animal trampling and construction activities. No other archaeological heritage and material were in association with the stone artefact surface scatters.

Mostly small concentrations of Later Stone Age stone artefacts occurred within particular areas, sometimes in association with upper and lower grinding stones as well scatter of ostrich eggshell fragments. Three Later Stone Age stone artefacts indicative of the Inland Wilton microlithic industry comprising a thumbnail scraper and a borer were documented at the area marked S31. Two Later Stone Age knapping (manufacturing) areas were documented at the areas marked S26 and S27.

Rock shelters containing rock paintings were documented on the farms Phaisantkraal 1 and Nobelsfontein 227, at the areas marked S4, S20, S21, S49 and S50 and occur along the tops of ridges and in a valley. The paintings were painted in red ochre and contained images of human figures and U-shaped curls and finger stripes. Boulders containing rock engravings were documented at the areas marked S5, S7, S35, S41, S42, S47 and S48. Images include depictions of European settlers and animal figures, as well as scratches and abstract and patinated cross-hatch patterns. Two gong rocks were observed at S11 and S42 in close proximity to the rock engravings.

The only occurrence of Khoekhoen pottery within the area proposed for development occurred at the area marked S40 on the farm Nobelsfontein 227.

Stone-wall structures were documented at the areas marked S2, S3, S8, S19, S22, S25, S30, S33, S37, S38 and S44 occurring mainly on the hill slopes, next to a river and on the flat plain areas. A farmstead complex and an associated midden (rubbish dump) were documented at S6.

Exposed human remains were identified in the side of a 3m-4m high river donga documented at the area marked S45. The skull and the clavicles have eroded out of the 1m deep burial area into the river area below. More exposed human remains can be identified at the surface of the donga next to the exposed burial.

## **RECOMMENDATIONS**

The area is of a medium cultural sensitivity and development may proceed as planned, although the following recommendations must be considered:

1. The exposed human remains must be reported to the South African Heritage Resources Agency (SAHRA) so that they may appoint the relevant archaeologist/s to remove the exposed human remains.
2. No construction activities may take place within 100m of the documented rock shelters containing rock paintings and boulders containing rock engravings.
3. The ridges and rocky outcrops surrounding the locations of the turbines and solar panels must be investigated prior to construction to establish whether undocumented rock shelters contain rock paintings and rocky outcrops contain boulders with rock engravings. If any are encountered the recommendations in point 2 must be implemented.
4. No construction activities may take place within 100m of the documented stone-wall structures.
5. If it is inevitable that construction activities must take place within 100m of any documented and undocumented rock shelters containing paintings, rocky outcrops with boulders containing rock engravings and stone-wall structures a perimeter fence must be erected to protect the sensitive area from any possible negative impact.
6. It is possible that *in situ* archaeological sites/remains, and human remains may be uncovered during construction. Therefore, a professional archaeologist should be appointed during the vegetation removal and construction phases of the development. This includes the construction of new roads for heavy vehicles for the transport of the wind turbines, solar panels, and other infrastructure.
7. Substation 1 Option 1 - Immediate turn-in line to the Hutchinson/Biesiespoort-1 132kV line and Substation 2 Option 1 - Immediate turn-in line to the Droerivier/Hydra-2 400kV line, are the preferred alternatives for the construction of the powerlines.

## **GENERAL REMARKS AND CONDITIONS**

**Note:** This report is a phase 1 archaeological heritage impact assessment/ investigation only and does not include or exempt other required heritage impact assessments (see below).

The National Heritage Resources Act (Act No. 25 of 1999, section 35) (Brief legislative requirements) requires a full Heritage Impact Assessment (HIA) in order that all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual linguistic or technological value or significance are protected. Thus 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, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasized that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, reflect the true state of affairs. Many sites/features 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, (such as during any phase of construction work), archaeologists must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed. The onus is on the developer to ensure that this agreement is honoured in accordance with the National Heritage Act No. 25 of 1999.

It must also be clear that Archaeological Specialist Reports (AIAs) will be assessed by the relevant heritage resources authority. The final decision rests with the heritage resources authority, which may grant a permit or a formal letter of permission for the destruction of any cultural sites.

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

### 1. 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 the remains are buried in a flexed position on their sides, but are also found buried in a sitting position with a flat stone capping and developers are requested to be on the alert for this.

### 2. 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 m<sup>2</sup> in extent, should be reported to an archaeologist.

### 3. 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

### 4. Fossil bone

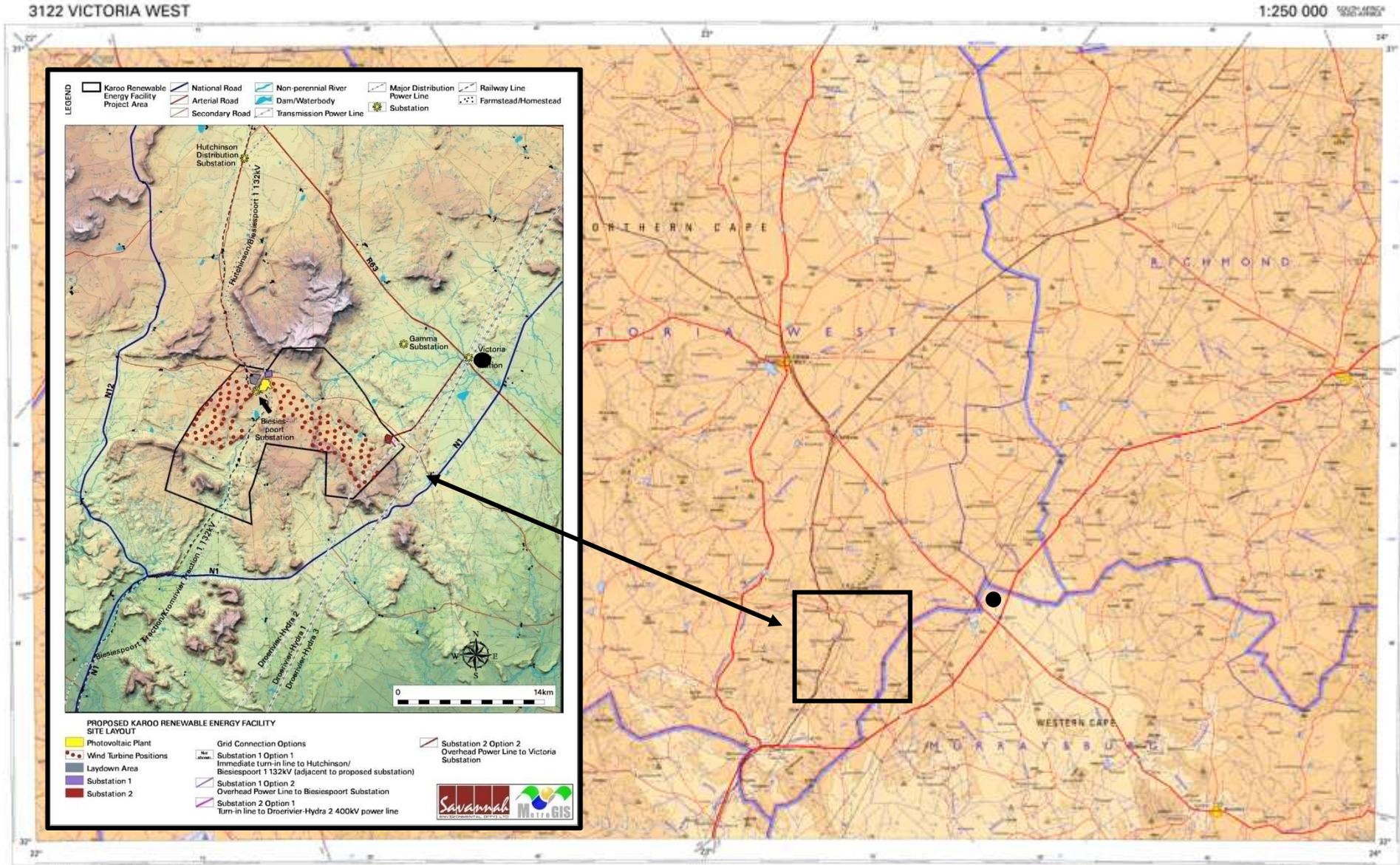
Fossil bones may be found embedded in geological deposits. Any concentrations of bones, whether fossilized or not, should be reported.

### 5. Large stone features

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.

## 6. Historical artefacts or features

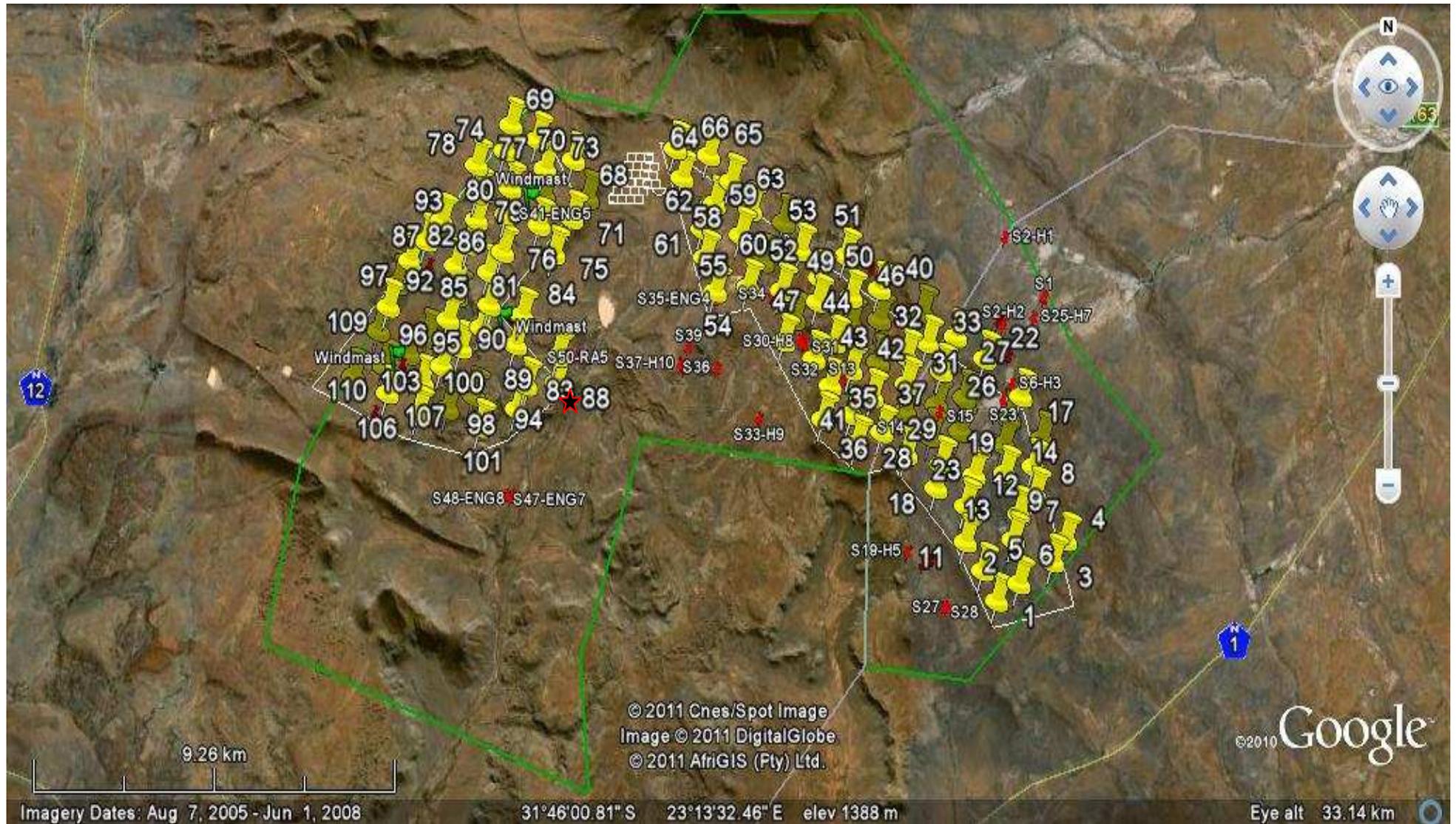
These are easy to identified and include foundations of buildings or other construction features and items from domestic and military activities.



Map 1. 1:250 000 Map indicating the area proposed for the Karoo Renewable Energy Facility (insert map courtesy Savannah Environmental)



**Map 2. Aerial view of the outline of the Karoo Renewable Energy Facility showing the general GPS co-ordinates and plotted sites (Star shows area of the exposed human remains).**



**Map 3. Aerial view of the proposed plots of the wind turbines and pv panels, the areas of the wind masts and the sites documented during the survey (the star shows the area of the exposed human remains).**

**Table 1: Co-ordinates of the areas containing archaeological heritage and material remains and general GPS readings.**

<b>Sites Recorded Within the Area Proposed for the Karoo Renewable Energy Project (Bolded entries indicate sites of higher significance)</b>			
<b>Reference</b>	<b>Description</b>	<b>Co-ordinates</b>	<b>Farm name</b>
S1	MSA stone artefact surface scatter	31°44'43,77"S; 23°18'39,05"E	Phaisantkraal
<b>S2-H1</b>	<b>Stone wall structure</b>	<b>31°44'3,84"S; 23°17'58,38"E</b>	<b>Phaisantkraal</b>
<b>S3-H2</b>	<b>Small rock shelter containing stone wall structure</b>	<b>31°45'4,20"S; 23°17'56,82"E</b>	<b>Phaisantkraal</b>
<b>S4-RA1</b>	<b>Rock shelter containing rock paintings</b>	<b>31°45'2,16"S; 23°17'51,72"E</b>	Phaisantkraal
<b>S5-ENG1</b>	<b>Engraved boulders</b>	<b>31°44'58,86"S; 23°17'55,44"E</b>	Phaisantkraal
<b>S6-H3</b>	<b>Farmstead with farmhouse ruins and historical rubbish dump and stone wall structures</b>	<b>31°45'45,84"S; 23°18'4,62"E</b>	Phaisantkraal
<b>S7-ENG2</b>	<b>Engraved boulders and stone wall structure</b>	<b>31°46'54,54"S; 23°18'31,20"E</b>	Phaisantkraal
<b>S8-H4</b>	<b>Stone wall structure</b>	<b>31°46'51,12"S; 23°18'34,32"E</b>	Phaisantkraal
S9	MSA stone artefact surface scatter	31°45'35,64"S; 23°16'59,46"E	Phaisantkraal
<b>S10</b>	<b>Engraved boulders</b>	<b>31°44'17,34"S; 23°15'34,14"E</b>	<b>Modderfontein</b>
<b>S11</b>	<b>Rock gong</b>	<b>31°44'16,38"S; 23°15'30,66"E</b>	<b>Modderfontein</b>
<b>S12</b>	<b>MSA stone artefact surface scatter</b>	<b>31°44'25,68"S; 23°15'49,74"E</b>	<b>Modderfontein</b>
S13	MSA stone artefact surface scatter	31°45'44,04"S; 23°15'19,98"E	Modderfontein
S14	MSA stone artefact surface scatter	31°46'14,70"S; 23°16'7,08"E	Modderfontein
S15	MSA stone artefact surface scatter	31°46'5,22"S; 23°16'54,60"E	Modderfontein
S16	MSA stone artefact surface scatter	31°44'44,76"S; 23°14'40,32"E	Modderfontein
S17	ESA, MSA and LSA stone artefact surface scatter	31°46'7,32"S; 23°17'48,48"E	Phaisantkraal
S18	MSA stone artefact surface scatter	31°46'27,72"S; 23°17'28,74"E	Phaisantkraal
<b>S19-H5</b>	<b>Stone wall structure</b>	<b>31°47'42,06"S; 23°16'24,0"E</b>	<b>Phaisantkraal</b>
<b>S20-RA2</b>	<b>Rock shelter containing rock art</b>	<b>31°47'48,36"S; 23°16'46,26"E</b>	<b>Phaisantkraal</b>
<b>S21-RA3</b>	<b>Rock shelter containing stone walling and rock art</b>	<b>31°47'48,24"S; 23°16'44,52"E</b>	<b>Phaisantkraal</b>
S22-H6	Make-shift shelter against rock shelter	31°47'50,76"S; 23°16'38,46"E	Phaisantkraal
S23	MSA stone artefact surface scatter	31°45'56,28"S; 23°17'56,10"E	Phaisantkraal
S24	LSA stone artefact surface scatter	31°45'26,76"S; 23°18'1,50"E	Phaisantkraal
<b>S25-H7</b>	<b>Stone wall structure</b>	<b>31°44'59,22"S; 23°18'26,28"E</b>	<b>Phaisantkraal</b>
<b>S26</b>	<b>LSA stone artefact manufacture site</b>	<b>31°44'46,38"S; 23°18'36,06"E</b>	<b>Phaisantkraal</b>
<b>S27</b>	<b>LSA stone artefact manufacture site</b>	<b>31°48'20,94"S; 23°17'1,74"E</b>	<b>Phaisantkraal</b>
S28	LSA stone artefact surface scatter	31°48'21,12"S; 23°16'58,32"E	Phaisantkraal
<b>S29</b>	<b>Possible stone artefact quarry site</b>	<b>31°45'7,92"S; 23°14'33,12"E</b>	<b>Modderfontein</b>
<b>S30-H8</b>	<b>Stone wall structure</b>	<b>31°45'14,88"S; 23°14'39,72"E</b>	<b>Modderfontein</b>

S31	LSA stone artefact surface scatter	31°45'17,28"S; 23°14'43,98"E	Modderfontein
S32	LSA stone artefact surface scatter	31°45'25,26"S; 23°14'38,10"E	Modderfontein
<b>S33-H9</b>	<b>Stone wall structure complex</b>	<b>31°46'9,90"S; 23°13'59,70"E</b>	<b>Modderfontein</b>
<b>S34</b>	<b>MSA stone artefact surface scatter</b>	<b>31°44'43,74"S; 23°14'12,72"E</b>	<b>Modderfontein</b>
<b>S35-ENG4</b>	<b>Engraved boulder</b>	<b>31°44'47,34"S; 23°13'19,14"E</b>	<b>Modderfontein</b>
<b>S36</b>	<b>Possible MSA stone artefact manufacture site</b>	<b>31°45'34,86"S; 23°13'19,14"E</b>	<b>Modderfontein</b>
<b>S37-H10</b>	<b>Stone wall structure</b>	<b>31°45'31,80"S; 23°12'44,34"E</b>	<b>Modderfontein</b>
<b>S38-H11</b>	<b>Stone wall structure</b>	<b>31°45'35,52"S; 23°12'47,46"E</b>	<b>Modderfontein</b>
S39	LSA stone artefact surface scatter	31°45'20,76"S; 23°12'51,42"E	Modderfontein
<b>S40</b>	<b>Pottery surface scatter</b>	<b>31°43'46,80"S; 23°10'3,24"E</b>	<b>Nobelsfontein</b>
<b>S41-ENG 5</b>	<b>Engraved boulder</b>	<b>31°43'48,48"S; 23°10'0,90"E</b>	<b>Nobelsfontein</b>
<b>S42-ENG 6</b>	<b>Engraved boulders and gong rock</b>	<b>31°43'44,88"S; 23°09'58,14"E</b>	<b>Nobelsfontein</b>
S43	MSA stone artefact surface scatter	31°45'31,44"S; 23°08'15,06"E	Nobelsfontein
<b>S44 -H12</b>	<b>Stone wall structures</b>	<b>31°45'46,56"S; 23°08'22,98"E</b>	<b>Nobelsfontein</b>
<b>S45-HR1</b>	<b>Exposed human remains</b>	<b>31°45'56,65"S; 23°10'52,96"E</b>	<b>Nobelsfontein</b>
S46	LSA and MSA stone artefact surface scatter	31°46'04,95"S; 23°07'48,17"E	Nobelsfontein
<b>S47-ENG7</b>	<b>Engraved boulders</b>	<b>31°47'03,09"S; 23°09'54,70"E</b>	<b>Nobelsfontein</b>
<b>S48-ENG8</b>	<b>Engraved boulders</b>	<b>31°47'04,19"S; 23°10'00,09"E</b>	<b>Nobelsfontein</b>
<b>S49-RA4</b>	<b>Rock shelter containing rock paintings</b>	<b>31°44'22,85"S; 23°08'41,74"E</b>	<b>Nobelsfontein</b>
<b>S50-RA5</b>	<b>Rock shelter containing rock paintings</b>	<b>31°45'26,50"S; 23°11'03,77"E</b>	<b>Nobelsfontein</b>
<b>General GPS Readings Taken Within the Proposed Area for the Karoo Renewable Energy Project</b>			
GPS1	General reading	31°44'56,30"S; 23°17'2,88"E	Phaisantkraal
GPS2	General reading	31°45'2,10"S; 23°17'51,66"E	Phaisantkraal
GPS3	General reading	31°45'45,84"S; 23°18'4,62"E	Phaisantkraal
GPS4	General reading	31°47'1,62"S; 23°18'59,46"E	Phaisantkraal
GPS5	General reading	31°45'25,80"S; 23°16'50,22"E	Phaisantkraal
GPS6	General reading	31°44'34,56"S; 23°16'3,84"E	Modderfontein
GPS7	General reading	31°44'53,28"S; 23°16'6,24"E	Modderfontein
GPS8	General reading	31°45'50,64"S; 23°15'33,54"E	Modderfontein
GPS9	General reading	31°46'2,04"S; 23°15'27,48"E	Modderfontein
GPS10	General reading	31°44'6,96"S; 23°15'8,94"E	Modderfontein
GPS11	General reading	31°44'34,80"S; 23°14'56,76"E	Modderfontein
GPS12	General reading	31°44'39,96"S; 23°14'53,88"E	Modderfontein
GPS13	General reading	31°44'47,64"S; 23°14'36,96"E	Modderfontein

GPS14	General reading	31°43'39,06"S; 23°14'28,80"E	Modderfontein
GPS15	General reading	31°47'30,36"S; 23°16'48,12"E	Phaisantkraal
GPS16	General reading	31°47'15,36"S; 23°17'9,42"E	Phaisantkraal
GPS17	General reading	31°47'43,32"S; 23°16'49,50"E	Phaisantkraal
GPS18	General reading	31°48'31,50"S; 23°17'23,82"E	Phaisantkraal
GPS19	General reading	31°47'50,94"S; 23°18'9,90"E	Phaisantkraal
GPS20	General reading	31°47'23,94"S; 23°18'49,32"E	Phaisantkraal
GPS21	General reading	31°45'4,02"S; 23°14'34,38"E	Phaisantkraal
GPS22	General reading	31°45'5,64"S; 23°14'25,74"E	Modderfontein
GPS23	General reading	31°45'24,18"S; 23°14'28,62"E	Modderfontein
GPS24	General reading	31°45'44,52"S; 23°14'23,04"E	Modderfontein
GPS25	General reading	31°46'27,54"S; 23°13'54,78"E	Modderfontein
GPS26	General reading	31°44'49,26"S; 23°14'10,98"E	Modderfontein
GPS27	General reading	31°44'48,06"S; 23°13'39,30"E	Modderfontein
GPS28	General reading	31°45'34,86"S; 23°12'31,92"E	Modderfontein
GPS29	General reading	31°44'0,54"S; 23°10'21,96"E	Modderfontein
GPS30	Windmast	31°43'40,56"S; 23°10'3,72"E	Nobelsfontein
GPS31	General reading	31°45'31,44"S; 23°08'15,06"E	Nobelsfontein
GPS32	General reading	31°45'23,46"S; 23°08'1,26"E	Nobelsfontein
GPS33	Windmast	31°45'30,45"S; 23°08'11,76"E	Nobelsfontein
GPS34	General reading	31°44'39,21"S; 23°08'39,00"E	Nobelsfontein
GPS35	General reading	31°44'49,62"S; 23°08'42,53"E	Nobelsfontein
GPS36	General reading	31°45'36,58"S; 23°08'19,38"E	Nobelsfontein
GPS37	General reading	31°45'51,53"S; 23°08'17,69"E	Nobelsfontein
GPS38	General reading	31°45'46,39"S; 23°09'29,91"E	Nobelsfontein
GPS39	Windmast	31°45'03,51"S; 23°09'55,86"E	Nobelsfontein
GPS40	General reading	31°45'13,74"S; 23°10'55,38"E	Nobelsfontein
GPS41	General reading	31°45'28,79"S; 23°10'55,39"E	Nobelsfontein
GPS42	General reading	31°45'28,86"S; 23°11'10,60"E	Nobelsfontein
GPS43	General reading	31°45'04,00"S; 23°11'32,88"E	Nobelsfontein
GPS44	General reading	31°43'10,18"S; 23°12'26,52"E	Nobelsfontein
GPS45	General reading	31°45'20,52"S; 23°11'01,46"E	Nobelsfontein
GPS46	General reading	31°45'51,68"S; 23°10'54,62"E	Nobelsfontein
GPS47	General reading	31°47'01,42"S; 23°10'31,93"E	Nobelsfontein

GPS48	General reading	31°47'01,80"S; 23°10'18,49"E	Nobelsfontein
GPS49	General reading	31°47'04,37"S; 23°10'00,84"E	Nobelsfontein
GPS50	General reading	31°47'01,07"S; 23°09'35,62"E	Nobelsfontein
GPS51	General reading	31°46'39,64"S; 23°08'15,03"E	Nobelsfontein
GPS52	General reading	31°46'04,95"S; 23°07'48,19"E	Nobelsfontein
GPS53	General reading	31°46'00,09"S; 23°08'06,58"E	Nobelsfontein
GPS54	General reading	31°47'04,76"S; 23°10'00,23"E	Nobelsfontein
GPS55	General reading	31°47'42,91"S; 23°09'18,21"E	Nobelsfontein

Table 2. Cultural Significance table for the Karoo Renewable Energy Facility

<b>Nature: The impact of the proposed Karoo Renewable Energy Facility development on the archaeological heritage and material remains</b>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	International (3)	Local (3)
<b>Duration</b>	Permanent (5)	Short (2)
<b>Magnitude</b>	Very High (10)	Minor (2)
<b>Probability</b>	Probable (3)	Improbable (2)
<b>Significance</b>	Medium (54)	Low (14)
<b>Status (positive or negative)</b>	Negative	Neutral
<b>Reversibility</b>	Irreversible	Reversible
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>• The exposed human remains must be reported to the South African Heritage Resources Agency (SAHRA) so that they may appoint the relevant archaeologist/s to remove the exposed human remains.</li> <li>• No construction activities may take place within 100m of the documented rock shelters containing rock paintings and boulders containing rock engravings.</li> <li>• The ridges and rocky outcrops surrounding the locations of the turbines and solar panels must be investigated prior to construction to establish whether undocumented rock shelters contain rock paintings and rocky outcrops contain boulders with rock engravings. If any are encountered the recommendations in point 2 will be implemented.</li> <li>• No construction activities may take place within 100m of the documented stone-wall structures.</li> <li>• If it is inevitable that construction activities must take place within 100m of any documented and undocumented rock shelters containing paintings, rocky outcrops with boulders containing rock engravings and stone-wall structures a perimeter fence must erected to protect the sensitive area from any possible negative impact.</li> <li>• It is possible that <i>in situ</i> archaeological sites/remains, and human remains may be uncovered during construction. Therefore, a professional archaeologist should be appointed during the vegetation removal and construction phases of the development. This includes the construction of new roads for heavy vehicles for the transport of the wind turbines, solar panels, and other infrastructure.</li> </ul>		
<b>Cumulative impacts:</b> Archaeological heritage remains (artefacts and sites) will be disturbed.		
<b>Residual impacts:</b> Archaeological sites will be irreversibly disturbed.		

**Table 3: Measures for inclusion into the EMP pertaining to the archaeological heritage and material remains**

OBJECTIVE: Reducing / No impact of the proposed Karoo Renewable Energy Facility development including the construction of the PV solar panels, wind turbines, powerlines and associated infrastructure on the archaeological heritage and material remains.		
Project Component/s	PV solar panels, wind turbines, powerlines, new roads and associated infrastructure	
Potential Impact	Irreplaceable loss of the archaeological heritage and material remains	
Activity / Risk Source	Construction of new roads for the transportation of the construction equipment for the establishment of the pv panels, wind turbines, powerlines, and associated infrastructure. Construction of the foundations for the pv panels, wind turbines and powerlines and associated infrastructure. Construction of the associated infrastructure.	
Mitigation: Target / Objective		
<ul style="list-style-type: none"> <li>To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation</li> <li>To ensure that the cultural landscape and sense of place is maintained as far as possible.</li> </ul>		
Mitigation: Action / Control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>Report exposed human remains to SAHRA to guide on removal process</li> <li>No construction activities may take place within 100m of stone wall structures, rock shelters containing paintings, and rocky outcrops with boulders containing rock engravings.</li> <li>The ridges and rocky outcrops surrounding the locations proposed for the construction of the pv solar panels and wind turbines should be investigated to establish whether further rock shelters with rock paintings and rocky outcrops with boulders containing rock engravings may be impacted.</li> <li>Rock shelters containing rock paintings and rocky outcrops with boulders containing rock engravings, and stone wall structures within 100m of the construction and development activities to be fenced off to protect the sensitive area from any negative impact.</li> <li>Monitoring vegetation clearing and construction activities</li> </ul>	<ul style="list-style-type: none"> <li>Ms Celeste Booth, SAHRA, additional heritage authority/archaeologists</li> <li>SAHRA, the developer</li> <li>SAHRA, the developer, the appointed professional archaeologist/s</li> <li>SAHRA, the developer, the appointed relevant heritage authority or professional archaeologist/s</li> <li>SAHRA, the developer, the appointed professional archaeologist/s</li> </ul>	<ul style="list-style-type: none"> <li>Current</li> <li>To be decided by SAHRA and included during the planning phase</li> <li>To be decided by SAHRA and included in the planning phase</li> <li>To be decided by SAHRA and included in the planning phase</li> <li>To be decided by the SAHRA and included in the planning phase</li> </ul>
Performance Indicator	The recommendations made in the report and agreed upon by the South African Heritage Resources Agency (SAHRA) in the Record of Decision (RoD) have been considered and implemented and no negative impacts on the archaeological heritage and material remains can be witnessed.	
Monitoring	Compliance with the recommendations in this report and South African	

	Heritage Resources Agency's (SAHRA's) Record of Decision (RoD), Letter of Appointment (LoA) of a professional archaeologist/s and the relevant reports required.
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