ARCHAEOLOGICAL IMPACT ASSESSMENT: PROPOSED CONSTRUCTION OF A 132 kV POWERLINE FROM THE RHEBOKSFONTEIN WIND ENERGY FACILITY TO THE AURORA SUBSTATION, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act No 25 of 1999)

Prepared for:

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EXECUTIVE SUMMARY

1. Site Name

The transmission lines for the Rheboksfontein Wind Energy Facility (WEF), Western Cape Province.

2. Location

The proposed 132 kV line will run from the Rheboksfontein WEF, which is located 3 km west of the town of Darling, to the Aurora substation which is west of Hopefield.

3. Locality Plan

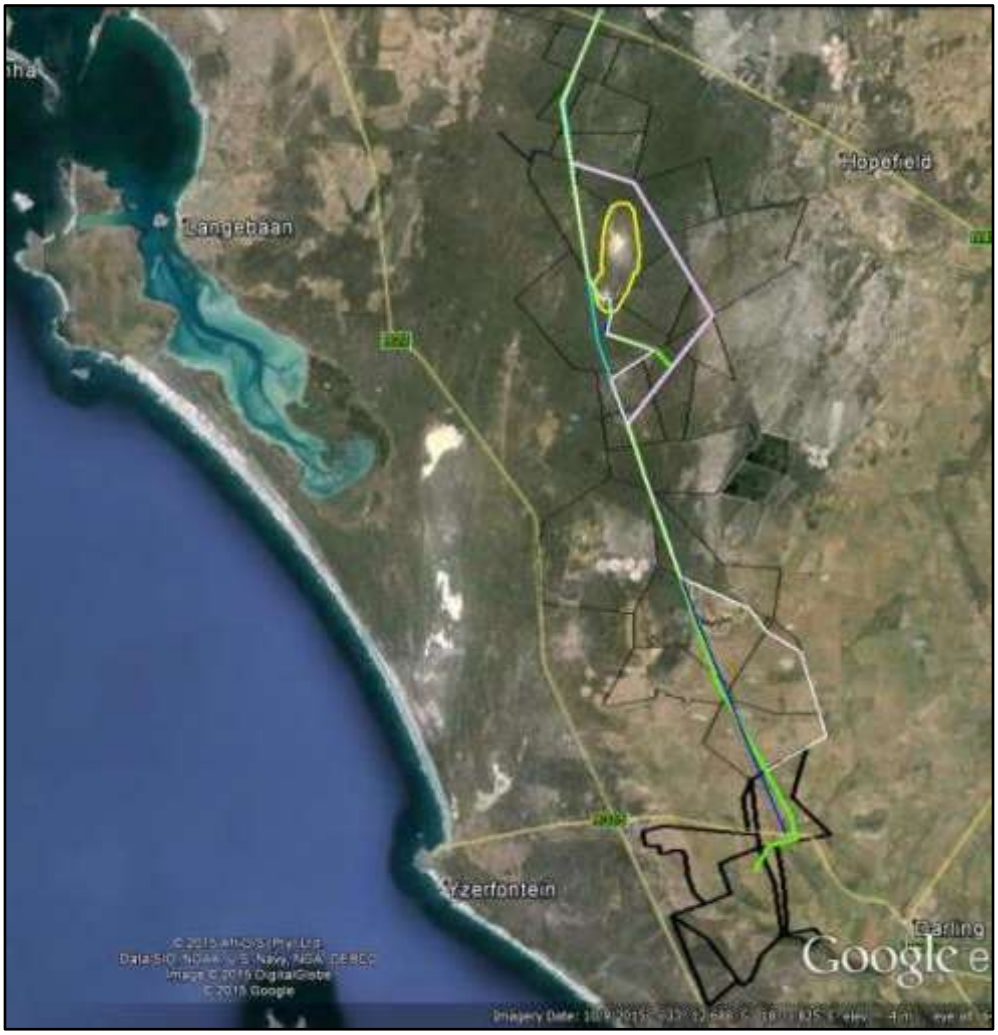

Figure: Alternatives 1A powerline (green), 1C (dark blue) and 1E all follow the existing 400 kV lines, although 1A and 1C make small deviations to the south. Alt 1D (white) runs to the east of some salt pans on the southern section of the line. Alt 1B (pink) runs along the eastern boundary of the Elandsfontein PHS (which is outlined in yellow).

4. Description of Proposed Development

Five new transmission line alternatives, linking the Rheboksfontein WEF to the Aurora substation, have been proposed. **The Rheboksfontein WEF has already received a positive comment from Heritage Western Cape (2011) and Environmental**

Authorisation from DEA in February 2012 with an amendment issued in November 2012.

Five new power line corridors will be assessed through a Basic Assessment process. The developer would like to obtain separate environmental authorisation for the powerline.

A Southern Alternative transmission line from the Rheboksfontein WEF to the Dassenberg substation at Atlantis was assessed in 2013 but proved technically unfeasible.

This report considers five **132 kV** alternatives transmission line options, namely Alternative 1A and Alternatives 1B – 1E, from the Rheboksfontein WEF to the Aurora substation.

- Alternatives 1A is 45.5 km long, Alt 1C and 1D will run in parallel to two existing 400 kV lines, with a short 8.5 km deviation to avoid crossing Elandsfontein 349/3 which belongs to the West Coast National Park. This means crossing the southern portion of the Elandsfontein PHS;
- Alternative 1B is 51.6 km long and deviates from the existing 400 kV corridor for approximately 15 km in an easterly direction;
- Alternative 1E runs in parallel with the two existing 400kV lines.

Figure 2: Alt 1A (green), Alt 1B (pink), Alt 1C (dark blue), Alt 1D (white) and Alt 1E (turquise). At least 3 alternative run through the southern section of the Elandsfontein PHS.

The 132 kV line will include a mono-pole tower structure, about 22-30 m in height, and with a 31 m wide servitude (15.5 m on either side of the line).

5. Archaeological Resources Identified

The most significant heritage resource along the proposed route is the Elandsfontein Provincial Heritage site (PHS) or fossil dune site. Alternatives 1A, 1C and 1D will cut though the southern portion of the PHS, in order to avoid crossing the West Coast National Park, while Alternative 1C follows the eastern boundaries of the property (Figure 1). Alternative 1E runs in parallel with the two existing 400kV lines along the western margins of the PHS.

An ephemeral, but widespread distribution of fossil bone fragments and isolated stone artefacts was recorded to the north, west and south of the dunefields along the existing powerline servitude (Alternatives 1A, 1C, 1D and 1E). Isolated fossil bone fragments were found along Alternative 1B.

The Elandsfontein farmhouse, on the farm Elandsfontyn 349 portion 7 is located on Alternatives 1A, 1C and 1D. The werf comprises a restored 19th century farmhouse, a ruined stone cottage and the original fountain which formed the focus of the farm in 1836. These properties have been included in the Elandsfontein PHS declaration (Provincial Gazette: Western Cape 29 May 2015).

6. Anticipated Impacts on Archaeological Resources

- Fragments of fossilised bone and stone artefacts are thinly distributed across the landscape;
- Alternatives 1A, 1C and 1D cross the southern portion of the Elandsfontein PHS;
- Alternatives 1A, 1C and 1D bisects the werf of Elandsfontyn 349, resulting in possible damage to below ground historical archaeological material and will have a negative visual impact on the homestead;
- The construction of Alternative 1E in parallel with the two existing 400 kV powerlines and in the existing Eskom servitude, reduces the potential risk of constructing a new access road for maintenance;
- The footprint of the tower for the proposed 132 kV line is very small and anticipated impacts to potential sub-surface archaeology and palaeontology are expected to be limited;
- Tower holes will reach a maximum depth of 3 m. The tower holes will present an opportunity to assess the sub-surface stratigraphy and may be positive for archaeologists and palaeontologists who are interested in the extent of the fossiliferous deposits.

7. Recommendations

- The construction of the 132 kV powerline is supported from an archaeological perspective;
- There is marginally more archaeological material evident on the surface along Alternatives 1A, 1C, 1D and 1E while Alternative 1B may potentially be less sensitive from a palaeontological and archaeological perspective;
- Alternative 1E will follow the route of an existing servitude with two existing 400 kV powerlines. The proposed 132 kV line is significantly smaller than the 400 kV lines. While an additional line may introduce further "industrial clutter" to the western border of the proposed PHS, it is submitted that there will be a consolidation of linear infrastructure;
- Alternative 1E is the preferred alternative as it avoid running through the southern portion of the Elandsfontein PHS and impacting negatively on the Elandsfontein farmhouse, outbuildings and fountains;
- An accredited archaeologist/palaeontologist must monitor the excavation of the tower holes around the Elandsfontein PHS. It is recommended that monitoring

take place between the deviation of Alternative 1B from the existing line, and where Alternative 1B rejoins the line;
- If any significant concentrations of archaeological/palaeontological material is uncovered, then these should be collected by a professional, accredited archaeologist/palaeontologist under a Work Plan issued by Heritage Western Cape.

8. Author and Date

Lita Webley & David Halkett November 2015

November 2015

Declaration of Independence:

I, Lita Webley, am an independent specialist consultant who is in no way connected with the proponent, other than in terms of the delivery of consulting services.

I hold a PhD degree in Archaeology and have been consulting since 1996 in the Northern, Eastern and Western Cape Provinces. I am an accredited Principal Investigator with the Association of Southern African Professional Archaeologists (ASAPA). I hold accreditation in Stone Age Archaeology, Shell Midden Archaeology and Colonial Period Archaeology (PI status) and Human Remains (Field Director).

GLOSSARY

Archaeology: Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: The archaeology of the Stone Age between 700 000 and 2500 000 years ago.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.

Holocene: The most recent geological time period which commenced 10 000 years ago.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.

National Estate: The collective heritage assets of the Nation

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Pleistocene: A geological time period (of 3 million – 20 000 years ago).

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage in the Northern Cape.

Structure (historic): Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

Acronyms

DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency

1. INTRODUCTION

ACO Associates cc was appointed by Savannah Environmental, on behalf of the client Moyeng Energy (Pty) Ltd, to undertake a Heritage Impact Assessment for a proposed 132 kV powerline linking the Rheboksfontein Wind Energy Facility (WEF) near Darling, with the Eskom Grid (Figure 1).

The client has received environmental authorisation for the Rheboksfontein Wind Farm project (DEA Ref: 12/12/20/1582).

Initially, two powerline options were proposed (Webley & Schietecatte 2013); a southern (preferred) line running from the Rheboksfontein WEF to the Dassenburg substation in Atlantis, and a northern line from the Rheboksfontein WEF to the Aurora substation near Langebaanweg. Subsequently, in 2014 the southern route was found to be technically unfeasible and the northern option is now the only option being considered (Figure 1).

This comprises five alternatives. Alternative 1A follows the two existing 400 kV lines closely, except for a small deviation to avoid Farm 349/3 which belongs to the West Coast National Park. Alternative 1B makes a 15 km deviation to the east to avoid the Elandsfontein Provincial Heritage Site (PHS) was declared a PHS (Grade II site) in May 2015.

Figure 1: The various line alternatives follow the route of the two existing 400 kV powerline routes (indicated with a red arrow). The position of the Elandsfontein Fossil Beds (proclaimed a provincial heritage site in 2015) is also shown with an arrow.

Alternative 1C makes a small deviation to the south of the Elandsfontein PHS, while Alternative 1D avoids some pans along the southern section of the route. Alternative 1E represents the existing line.

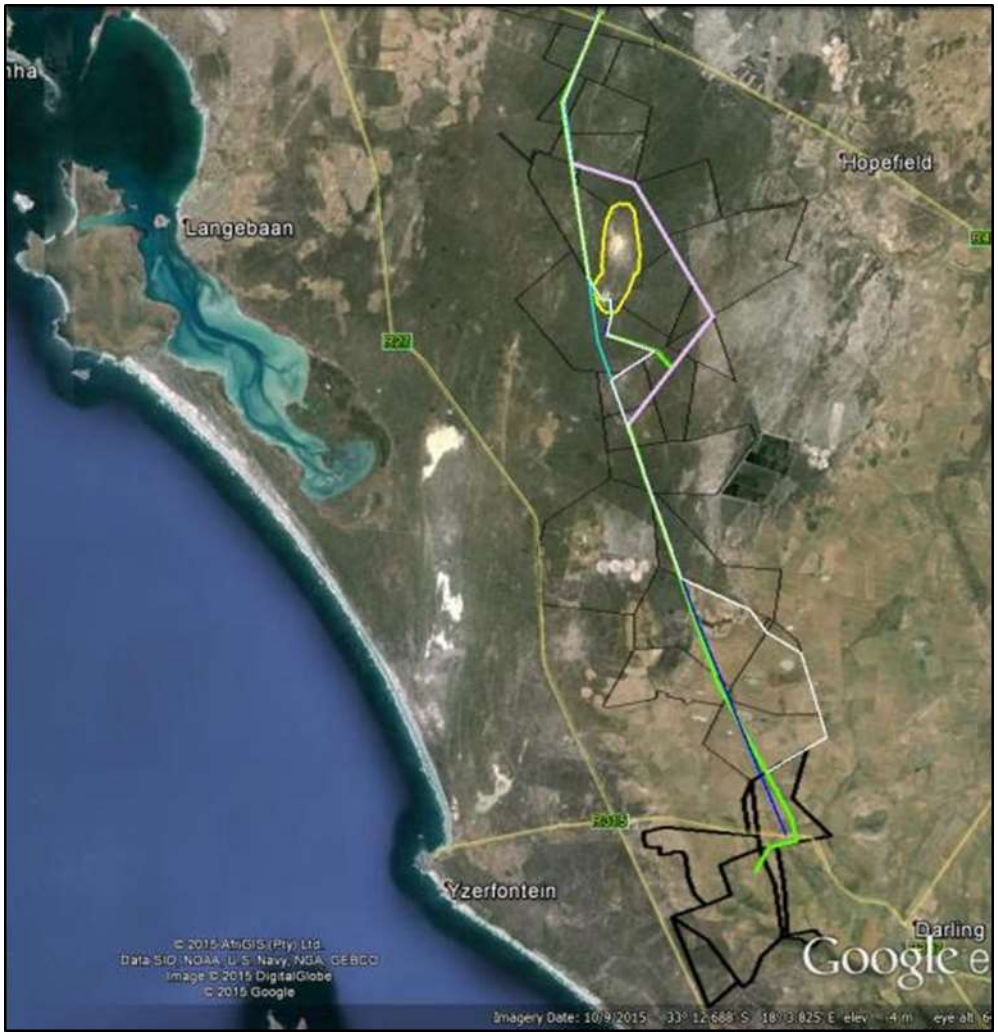

Figure 2: Alternatives 1A powerline (green), 1C (dark blue) and 1E all follow the existing 400 kV lines, although 1A and 1C make small deviations to the south. Alt 1D (white) runs to the east of some salt pans on the southern section of the line. Alt 1B (pink) runs along the eastern boundary of the Elandsfontein PHS (which is outlined in yellow).

2. BACKGROUND

Moyeng Energy (Pty) Ltd intends to construct a 132 kV powerline to connect the Rheboksfontein Wind Energy Facility (Orton 2010a; Orton 2010b & Orton 2013) with the Eskom grid. The route will run in parallel with two existing 400 kV lines, crossing farmland in a northerly direction, to connect with the Aurora substation to the west of Hopefield (Figure 1).

2.1 Project Description

Five alternative 132 kV transmission powerlines are proposed to link the Rheboksfontein WEF, which is located 3 km to the west of Darling, with the Aurora substation about 12 km north-west of the town of Hopefield (Figure 1).

The alternatives would follow the alignment of two existing 400 kV line corridors (Ankerlig-Aurora) which traverses the Rheboksfontein WEF site. Small deviations are proposed to accommodate the West Coast National Park, the Elandsfontein PHS as well as various environmental issues.

Alternative 1E is the shortest route at 41.5 km long, Alternative 1A is the preferred alternative at 45.5 km long, while Alternative 1D at 48 km is the longest.

The tower design is shown below (Plate 1).

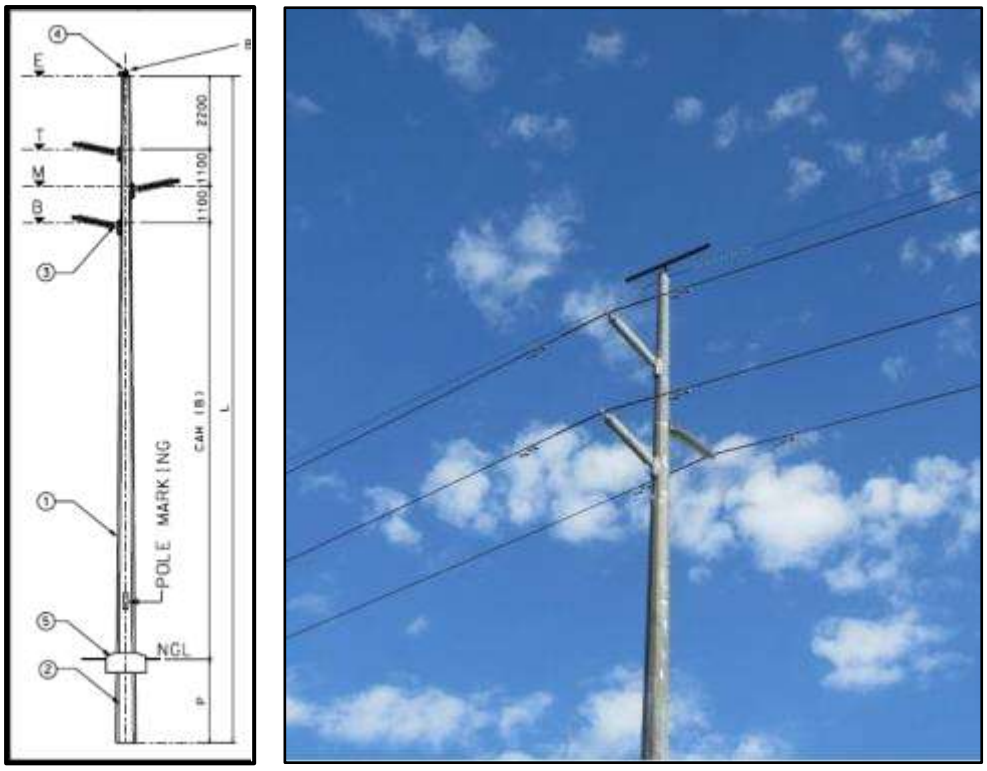

Plate 1: A view of a typical 132 kV steel mono-pole tower

The tower will be a single steel pole (mono-pole) about 22-30 m in height. Depending on the length of the pole, the maximum depth for the footing will be 3m. The dimensions of the footings (foundations) for the powerline towers are not specified in available information. The footings vary according to the size of the tower and the geotechnical characteristics at each tower site.

Plate 2: The base of the tower footing.

The servitude would have to be about 31 m wide, 15.5 m on either side of the line. Generally, servitude of this size would require a narrow jeep track for the purposes of maintenance.

The flat terrain would enable the deployment of relatively fewer and smaller towers.

3. HERITAGE LEGISLATION

This report is conducted in terms of Section 38 (8) of the National Heritage Resources Act, No 25 of 1999.

The NHRA provides protection for the following categories of heritage resources:

- Landscapes, cultural or natural (Section 3 (3))
- Buildings or structures older than 60 years (Section 34);
- Archaeological Sites, palaeontological material and meteorites (Section 35);
- Burial grounds and graves (Section 36);
- Public monuments and memorials (Section 37);
- Living heritage (defined in the Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships) (Section 2 (d) (xxi)).

A Notice of Intent to Develop was submitted to Heritage Western Cape for the 132 kV powerline linking the Rheboksfontein WEF with the Aurora substation and they have asked for:

An Archaeological study, a Palaeontological study as well as a Visual Impact Assessment with an Integrated set of recommendations (Case: 15031602GT0317E dated 6 May 2015).

3.1 Grading

The South African heritage resources management system is based on grading, which provides for assigning the appropriate level of management responsibility to a heritage resource. Heritage resources were assessed according to criteria specified in the NHRA and HWC Policy & Guidelines (2015).

Table 1: Grading of Heritage Resources

Grade	Level of significance	Description
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIA	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3a heritage resources.
IIIB	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3b heritage resources.
IIIC	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3c heritage resources.

Elandsfontein was declared a Provincial Heritage Site in the Provincial Government Gazette 7396:858 on the 29th May 2015. The declaration is attached at the end of this specialist archaeological report. The declaration reads as follows: "the archaeological and palaeontological sites, unmarked burials, landscapes and natural features of cultural significance and structures situated on or at Farm Elandsfontein 349, Saldanha Bay Municipality, known as Elandsfontein Fossil Beads, and described in schedule below, are hereby formally protected in terms of the provisions of section 27 of the Act, bearing sections 34, 35 and 36 in mind".

The significance of the site: The Elandsfontein site lies 10km inland from Langebaan lagoon and is known for significant finds of Acheulian artefacts, a hominid skull of *Homo heidelbergensis* (Saldanha Man) and excellent preservation of fossils of a myriad of diverse fauna. The significance of this site is established by the extensive fossil collection from this site, as well as excellently well-preserved fossils that continue to erode from the dune fields.

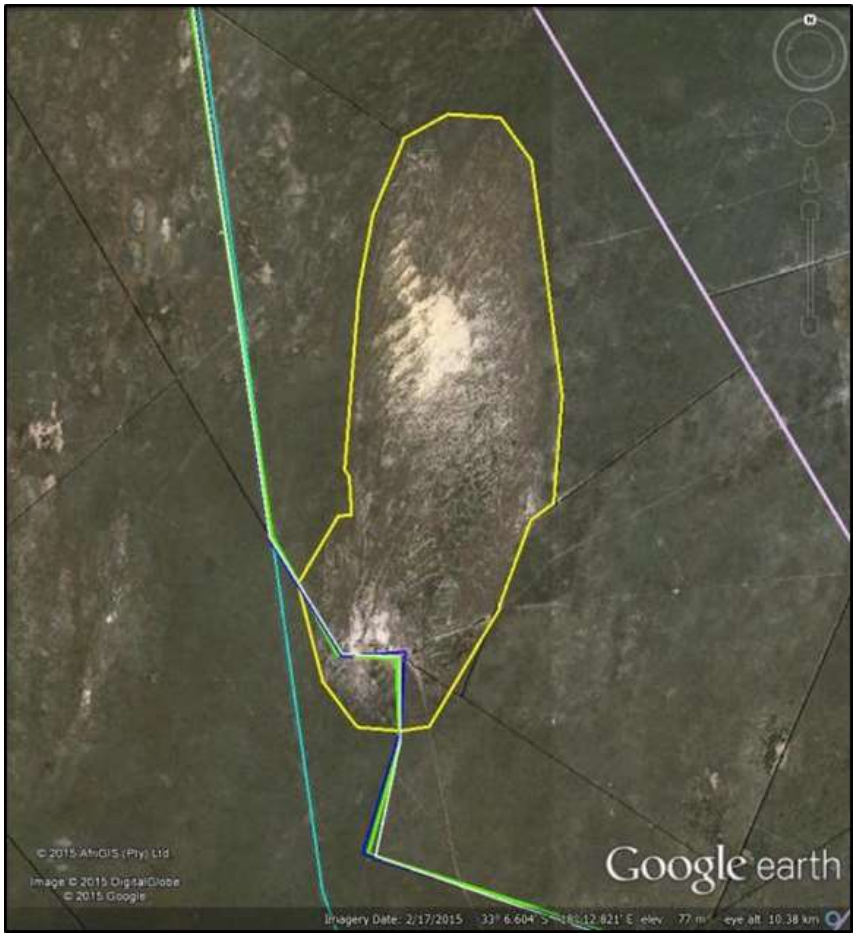

Figure 3: The boundaries of the Elandsfontein PHS are indicated in yellow. The PHS declaration is attached as an appendix at the end of the Archaeological Specialist Report. Alternative 1B (pink) runs along the eastern margins of the PHS, while Alternative 1E (turquoise) follows the existing 400 kV lines. The other three line options (1A, 1C and 1D) will cut through the southern portion of the PHS, crossing over the Elandsfontein farm house.

4. METHODOLOGY

4.1 Literature Survey

A survey of available literature was carried out during the initial Scoping process (Webley & Schietecatte 2013) to assess the general heritage context of the area. A background search of other Cultural Resource Management (CRM) projects in the area was made via the South African Heritage Resources Information Systems (SAHRIS) database.

4.2 Field Surveys

The initial survey in 2013, by Lita Webley and Liesbet Schietecatte concentrated on the southern route as it was the preferred option and more accessible. Alternatives 1A and 1B were surveyed by Lita Webley, David Halkett and Graham Avery in April 2015. Our tracks were recorded by means of Garmin GPS devices and all sites were digitally recorded.

4.3 Assumptions and Limitations

The palaeontological and archaeological aspects of the survey were hampered by limited access to the private property along the alternative powerline routes.

- Only Alternatives 1A and 1B were surveyed in the field. Alternatives 1C, 1D and 1E have been assessed at the desktop level;
- Some landowners live in Cape Town and only visit their farms over the weekend making co-ordination of the survey difficult.
- Our field survey concentrated on that area of greatest archaeological sensitivity around the Elandsfontein PHS. Much of the southern section of the line has been significantly transformed by ploughing.

"Only the extreme southern and northern portions of both Alternatives 1A and 1B are located in proximity to public roads. The bulk of the alignment is only approachable via a number of different gravel farm roads, largely private and access controlled (locked gates). Large portions of the proposed alignments north of Skilpadsfontein are only accessible by 4x4" (Barbour & van der Merwe 2015).

5. DESCRIPTION OF AFFECTED ENVIRONMENT

The aerial view of the study area clearly shows the two soil types which prevail (Figure 1). The lighter coloured areas in and around Darling Hills comprise a granite batholith coated with shale- and granite-derived soils. To the north of the hills are the sandy coastal plans of the Sandveld. The sandy plains have white sand with darker green, predominantly indigenous vegetation, while the shale-soils are more orange in colour and are under dry land agriculture, primarily wheat.

Plate 3: View of the typical strandveld vegetation which is widespread along the northern sections of the study area.

Plate 4: The wheatfields which characterise the landscape along the southern section of the study area. Note the two existing 400 kV lines which cross the landscape.

The farms from the R315 as far as the farm Schilpadsfontein are considered suitable for intensive agriculture such as cereal cropping. "Thereafter from Schilpadsfontein north to the Aurora substation, the alignment is located across untransformed Hopefield Sand Fynbos and traverses lower potential agricultural lands used for stock grazing and bee keeping. With the exception of properties located in the extreme north (Schaftplaas, Wolfiesfontein, Springfontein, Driehoeksfontein), the settlement pattern along this stretch of the alignment is sparse. Few farmsteads are located in proximity to the alignment, and most owners do not reside on their properties" (Barbour & van der Merwe 2015).

5.1 Archaeological Background

Little information is available on the archaeology of the area between Darling and Hopefield. The most significant archaeological (and palaeontological) site in the study area is located on the farm Elandsfontein 349.

Braun et al (2013) has described the history of the 4 km long Elandsfontein as a "blow-out" which are defined as "where Aeolian erosion has removed surficial sand bodies to expose the underlying Quaternary sediments".

Hollows between dunes (interdune areas) are the sites of ponding of water seeping from the dunes, leading to the deposits of springs and small vleis. These are usually muddy, with plant fossils, but being waterholes, are usually richly fossiliferous. Pether (2013) interprets Elandsfontein as a fossil inter-dunal vlei exposed by deflation. The discovery of a hominin calvarium (Plate 5) in the south-western portion of the dune-field brought international attention and throughout the 1950s, thousands of fossil bones and stone artefacts were collected. Singer & Wymer (1968) conducted a series of excavations "across the dunefield as well as in the Sandveld outside the areas of modern deflation".

The first published account of an early human skull cap (the so-called "Saldanha Man") from Elandsfontein was published in 1953. This fossil find places Elandsfontein into a category of a few unique sites world-wide that contain rare early human material, and the potential certainly exists to find more.

Plate 5: Oblique view of the "Saldanha" skull from Elandsfontein showing the pronounced brow ridges (after *Singer* 1954).

During the 1980s, Dr Graham Avery, of the South African Museum, conducted further surveys and excavated a number of areas which he described as "death sites" and accumulations of bones which he described as "brown hyena nursery dens". From January 2009, Dr David Braun of the University of Cape Town has been excavating at the site and continued with research (Archer & Braun 2010).

The site is described as an open air locality of approximately 16 square kilometre outcrop of fossil and artefact-bearing Middle Pleistocene sediments (dating between 600 thousand and 1 million years ago).

The finds from this area have attracted numerous analyses of various aspects of the bone assemblage with the research still continuing to this day (Archer & Braun 2010). Among the stone artefacts found at Elandsfontein are Early Stone Age Acheulian hand-axes as well as artefacts pertaining to the Middle and Later Stone Ages.

It is unclear how far the Pleistocene fossil deposits extend into the surrounding sandveld landscape. However, Singer & Wymer (1968) describe excavating "two cuttings on the east and west sides of the dune area, in each case about 1,000 feet outside the limit of the dunes in apparently undisturbed Sandveld" and finding some silcrete flakes at a depth of 7 feet (around 2 m) to the east of the dunes and a few scraps of fossil bone at around 7 feet to the west of the dune field. Further, it is noted that during his survey, Orton (2007) recorded exposures of fossil material and stone artefacts about 3 km north of the central section of the Elandsfontein fossil site.

During their survey for a phosphate mine to the west of the Elandsfontein PHS, Halkett & Webley (2015) found only isolated fragments of bone, sparsely distributed across the landscape. However, during construction for the mining platform, large pieces of fossilised bone were uncovered between 1-3m below the surface.

Figure 5: The Elandsfontein dune field indicating the areas of deflation hollows which have formed the focus of research by Braun et al (2013).

Plates 6 & 7: View of the dunefield (left) and fossilised bone (right)

Little other archaeology is known from the immediate area although Braun (pers comm) has indicated that Later Stone Age sites are also present in the Elandsfontein dune system.

Very little information is available on the archaeology of the southern section of the line, as it passes through wheatfields immediately to the north of the R315.

Orton (2012) has described a Later Stone Age site on the Rheboksfontein WEF site south of the R315. Rheboksfontein 1 is described as an artefact scatter in ploughed lands around a granite outcrop. While there was no pre-colonial pottery present, the artefacts assemblage, consisting of ground artefacts, broken cobble manuports and flaked artefacts resemble the "informal" assemblages elsewhere ascribed to herder groups.

Together with these informal artefacts were a broken bifacial point (probably of MSA origin) and some historical artefacts, including two fragments of Chinese coarse porcelain.

6. FINDINGS OF FIELD SURVEY

Fieldwork was undertaken by Webley, Halkett and Avery and concentrated on Alternatives 1A and 1B around the Elandsfontein PHS (Figure 5). Access to the area was gained by the new mine road.

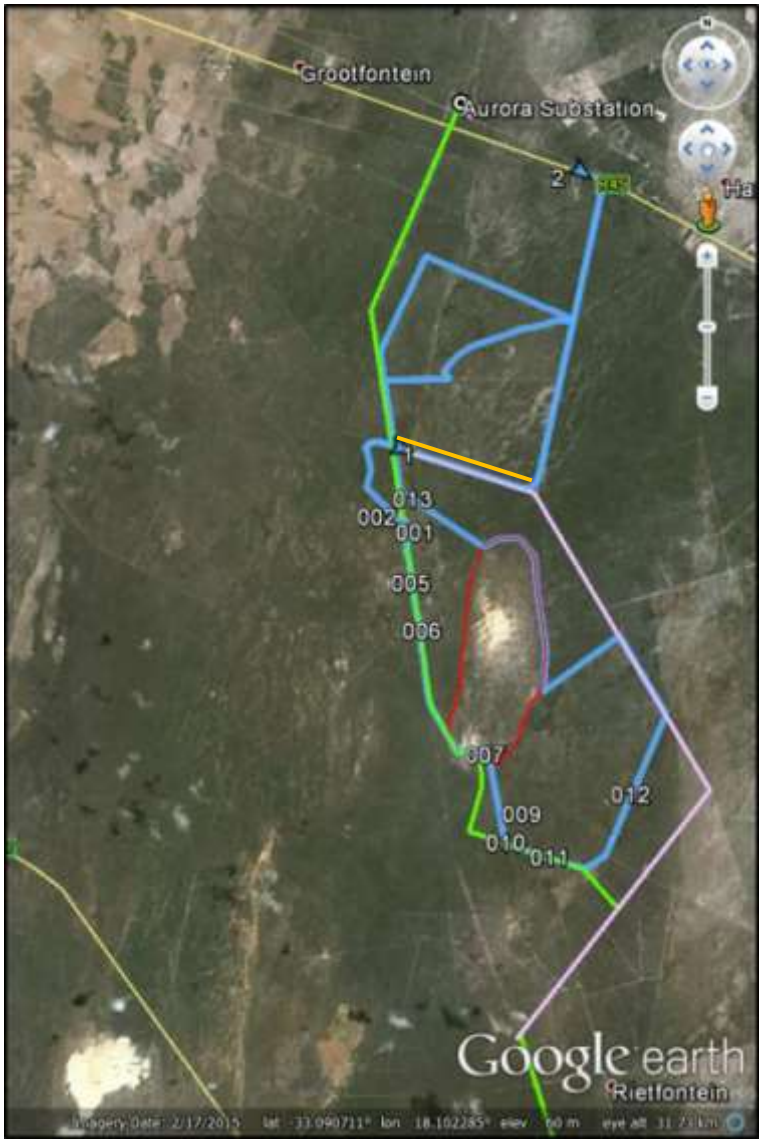

Figure 6: The field survey was restricted to assessing Alternatives 1A (green) and 1B (pink). The boundaries of the PHS are shown in red, the new mine road in orange and our survey tracks in blue.

Avery (pers comm) is currently involved in monitoring the new mine road which runs along the northern route of the proposed Alternative 1B powerline (Figure 6). Where road work has exposed underlying deposits, the lower soils are a buff colour. They too, do not appear to contain any fossil remains or stone artefacts. However, Orton (2007) mentions finding fossils immediately south of the road in the sandy areas which he believes were brought to the surface by burrowing animals.

Plate 8: View of the road cuttings along the northern section of Alternative 1B.

Mineralised bone and stone artefacts were found wherever underlying calcretes are exposed on the surface (Table 2). A number of scatters were recorded along the route of the existing powerline servitude (the route of Alternative 1A). A few of the sites are briefly described below. The existing powerline appears to have been placed on a calcrete ridge running north-south and which is slightly elevated above the surrounding sandy plains.

Plate 9: View of the location of Site 004 on top of a calcrete ridge.

Site 004: is situated on a calcrete ridge, in close proximity to two 400 kV powerline towers. It comprises a scatter of stone artefacts as well as a few fragments of bone, over an area of 8 m². The stone artefacts include quartz cores and a quartz scraper as well as silcrete cores and flakes. There is some tortoise bone present and a fragment of very lightly mineralised bone. The assemblage appears to be of Holocene age.

Plate 10: Selection of stone artefacts and bone fragments at Site 004.

Site 007/008: comprises a scatter of stone artefacts which are distributed along the top and slopes of a sand dune close to the Elandsfontein homestead. The site includes a portable grooved stone, flaked manuports, quartz and silcrete flakes as well as a few fragments of annular ware.

Plates 11 & 12: Selection of stone artefacts and one fragment of china, from 007/008.

Plates 13 & 14: Fragments of mineralised bone found along the route of Alternative 1A.

Scatters of small fragments of mineralised bone were widely distributed and occur along the western and southern sections of the proposed line (Plates 13 7 14). The fragments are often reddish coloured and very small, generally 2 cm in size of less. Avery (pers comm) is of the opinion that the bone fragments to the south of the PHS site, which are found on the old road to Darling, may have been introduced as road material and may not necessarily be in situ.

Orton's (2007) survey immediately to the south of the new mine road, and along a section of the Alternative 1B powerline, also records widespread distribution of fossil material and stone artefacts. Surface material was probably brought to the surface by the actions of moles, but Orton also observes, as we did, that the bone fragments were often found in the lowest parts of the terrain, in slightly deflated areas. According to Braun et al (2013) "the geomorphological processes that have modified the dunefield are so complex that this stratigraphic relationship cannot be consistently inferred for the entire dunefield and must be tested with large scale systematic geological trenches".

7. ASSESSMENT OF IMPACTS

7.1 Impacts to Pre-Colonial Archaeology

The significance of the Elandsfontein fossil site lies in the Pleistocene fossil fauna and associated archaeology. Indications are that this is one of the richest sites of its kind in Africa (Braun pers comm.). The site was declared a Grade II heritage site, i.e. a Provincial Heritage Site in May 2015, during the period of the assessment (Appendix).

Alternative 1A powerline will run along the western boundary of the proposed PHS . Alternative 1B will run more to the east, at a distance of between 2 km and 600 m from the boundary of the proposed PHS. Alternative 1C closely follows Alternative 1A, while Alternative 1D avoids a number of large pans in the south. Alternative 1E follows the same route as the two existing 400 kV powerlines which cross the property.

It is currently unclear as to how far the Pleistocene fossil deposits extend into the surrounding Sandveld landscape. Indications are that the distribution of Pleistocene archaeology and fossils at Elandsfontein is spatially extensive. The current survey, as well as those of Braun (pers comm.) and Orton (2007) has observed archaeological and palaeontological material to the north, west and south of the current archaeological exposure. Sparse distributions of bone and artefacts were recorded by Halkett & Webley (2015) to the west of the powerline. The implications of these observations is that Pleistocene archaeological and palaeontological material is a locally widespread phenomenon and therefore highly likely to occur in the upper sandy and calcrete layers which will be crossed by the powerline. It is difficult to predict the density of the occurrences outside of the fossil area.

Table 3: Potential impacts to Pre-colonial Archaeology

NATURE OF IMPACT: Negative impacts to sub-surface archaeological material which may include stone artefacts, fossilised bone and potentially hominin remains.		
	Without mitigation	With mitigation
EXTENT	Provincial (4)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Moderate (6)	Minor (2)
PROBABILITY	Definite (5)	Highly probably (4)
SIGNIFICANCE	(70)	(40)
STATUS	Negative	Neutral

REVERSIBILITY	Reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	Yes
MITIGATION: Monitoring of the holes excavated for the towers in the vicinity of the Elandsfontein Fossil site will be required.		
CUMULATIVE IMPACTS: Potential negative visual impacts would be experienced through additional powerlines in the area.		
RESIDUAL IMPACTS: n/a		

The tower footings for the 132 kV line are relatively small (About 1 X 1 m and up to ~3 m depth) and they are unlikely to result in significant damage to underlying fossiliferous and archaeological material. The excavation of holes for the tower footings presents an opportunity to assess the underlying stratigraphy of the area.

Recommendations: It is recommended that palaeontological/archaeological monitoring is undertaken after the holes have been excavated for the tower footings to assess the underlying stratigraphy and to determine if any material has been uncovered in the spoil heaps.

7.2 Impacts to Colonial Archaeology and the Built Environment

Alternatives 1A, 1C and 1D run very close (within 10 m) of the *Elandsfontein* farmhouse and nearby ruined outbuilding. It is not clear whether they will run on Portions 2 or 3 of the farm. Nevertheless, according to the Surveyor General, there has been a dwelling on this location on the farm since 1836. The presence of the fountain would have been a strong incentive for settlement in this barren area (Figure 5). The present house has been restored but from the outside appears to have some 19th century elements. While it appears to be unoccupied, nevertheless it has historic significance. According to Avery (pers comm), the archaeologists Singer and Wymer lived in the outbuilding when they were working in the fossil dunes in the 1960's. The construction of the powerline will impact both visually and on below-ground historical archaeological remains. This conclusion is supported by the recovery of ceramics on the archaeological site (007-008) identified nearby.

Alternative 1B follows the cadastral boundaries between portions of Elandsfontein 349 and Groote Fontein 305.

Figure 7: The route of the Alternatives 1A (green), 1C (dark blue) and 1D (white) are shown crossing over the main homestead of Elandsfontein. Two further buildings (one in ruins) are outlined in red in this aerial map. The fountain is shown in blue. The position of the archaeological site 007/008 is also indicated with the yellow icon.

Plate 15: One of the ruined outbuildings **Plate 16:** The restored Elandsfontein house. which was still occupied in the 1960's.

Table 4: Summary of impacts to Built Environment and Pre-Colonial Archaeology

NATURE OF IMPACT: Impacts will be through possible direct impacts on historical archaeology as well visual intrusion on the farmhouse of Elandsfontein on the farm Elandsfontyn 349.		
	Without mitigation	With mitigation
EXTENT	Regional (3)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Moderate (6)	Low (4)
PROBABILITY	Probable (3)	Improbable (2)
SIGNIFICANCE	Medium (39)	Low (20)
STATUS	Negative	Neutral

REVERSIBILITY	Yes	Yes
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	Yes
MITIGATION: Move the powerline so that it does not cut through the werf (comprising of the homestead and outbuildings including kraals and fountain).		
CUMULATIVE IMPACTS: n/a.		
RESIDUAL IMPACTS: n/a.		

7.3 Human Remains

In the event of human bones being found on site, work must stop in that area, and Heritage Western Cape must be notified immediately. If the remains are archaeological in nature, then the remains may be removed by an archaeologist under an emergency permit. This process will incur some expense as removal of human remains is at the cost of the developer. Time delays may result while application is made to the authorities and an archaeologist is appointed to do the work.

7.4 Cumulative Impacts

There are already two 400 kV lines running along the western boundary of the Elandsfontein PHS.

- The construction of a third 132 kV powerline (Alternatives 1A, 1C, 1D or 1E), in parallel to the existing two powerlines, may have a cumulative visual impact on the western boundary of the proposed PHS;
- Constructing the line along the existing 400 kV line (Alternative 1E) will be the most preferable in terms of visual impacts, as there will be a consolidation of linear infrastructure;
- Constructing a new 132 kV powerline along Alternative 1B will introduce a new industrial element into the strandveld vegetation along the eastern boundary of the proposed PHS.

Plate 18: Two existing 400 kV lines and access road.

The additional of a single 132 kV line will increase the cumulative visual impacts on the proposed PHS, but it is submitted that these are preferable to building a new line along the eastern section boundary of the PHS, in a new area. This would have a greater potential impact on relatively unspoilt natural areas adjoining the PHS.

8. CONCLUSIONS

- The construction of Alternatives 1A, 1C or 1D will result in the proposed 132 kV powerline running through the southern section of the Elandsfontein PHS. This may result in direct, negative impact to buried palaeontological and archaeological remains, including potential hominid remains. However, the excavations for the tower footings (3 m deep and spaced 300 to 400 m apart) will allow palaeontologists and archaeologists to assess the sub-surface material and determine the distribution of the material;
- Constructing the line along the existing 400 kV line (Alternative 1E) will be the most preferable in terms of visual impacts, as there will be a consolidation of linear infrastructure;
- Alternative 1E, along an existing servitude, already has an existing access road while a section of the new access road will run along an existing track.
- Alternative 1C (located along the eastern cadastral boundaries of the property) is less likely to impact on potential archaeological and fossil remains, although the full extent of the sub-surface distribution has not been mapped.

9. RECOMMENDATIONS

- The construction of the 132 kV powerline is supported from an archaeological perspective;
- There is marginally more archaeological material evident on the surface along Alternatives 1A, 1C, 1D and 1E while Alternative 1B may potentially be less sensitive from a palaeontological and archaeological perspective;
- Alternative 1E will follow the route of an existing servitude with two existing 400 kV powerlines. The proposed 132 kV line is significantly smaller than the 400 kV lines. While an additional line may introduce further "industrial clutter" to the

western border of the proposed PHS, it is submitted that there will be a consolidation of linear infrastructure;
- Alternative 1E is the preferred alternative as it avoid running through the southern portion of the Elandsfontein PHS and impacting negatively on the Elandsfontein farmhouse, outbuildings and fountains;
- Monitoring of the tower holes by an accredited archaeologist/palaeontologist around the Elandsfontein PHS is recommended;
- If any significant concentrations of archaeological/palaeontological material is uncovered, then these should be collected by a professional, accredited archaeologist/palaeontologist under a Work Plan issued by Heritage Western Cape.

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Table 2: List of finds recorded during the survey.

Point	Co-ordinates	Description	Significance
001	-33.081354° 18.220402°	Calcrete outcrop	
002-003	-33.081216° 18.220499°	Calcrete kraal or reservoir base and one silcrete flake	IIIC
004	-33.081645° 18.222226°	Site on a raised calcretes ridge next to two towers. The LSA/late Pleistocene site comprises 3 silcrete flakes, 2 quartz cores, 1 quartz chunk, 1 quartz scraper, tortoise bone and slightly mineralised bone fragments.	IIIB
005	-33.093162° 18.223630°	A flat, open area (near the existing lines) with several fragments of mineralised bone, reddish in colour and not more than 2 cm in size.	IIIC
006	-33.101702° 18.226019°	About 5 fragments of mineralised bone spread in a small area near the powerlines	IIIC
007-008	-33.123835° 18.239072°	An LSA site on the side of a small dune. Upper Grindstone; portable grooved stone; flaked porphyry cobble, silcrete core, 2 quartz chunks, 1 quartz flake, 2 schist flakes, 2 pieces of annular ware	IIIB
009	-33.137302° 18.243260°	1 fragments of mineralised bone in the road. Possible that road sub-strate may have been introduced from elsewhere.	IIIC
010	-33.139805° 18.244020°	Fragments of mineralised bone in the road, which appears to be located on a calcretes ridge	IIIC
011	-33.142446° 18.253478°	Two fragments of mineralised bone	IIIC
012	-33.131150° 18.270773°	At an open, deflated area, a few fragments of mineralised bone and a possible silcrete denticulate	IIIC
013	-33.078007° 18.224134°	A single silcrete flake and one quartz chunk on the road on a very pronounced calcrete ridge	IIIC