

**HERITAGE 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

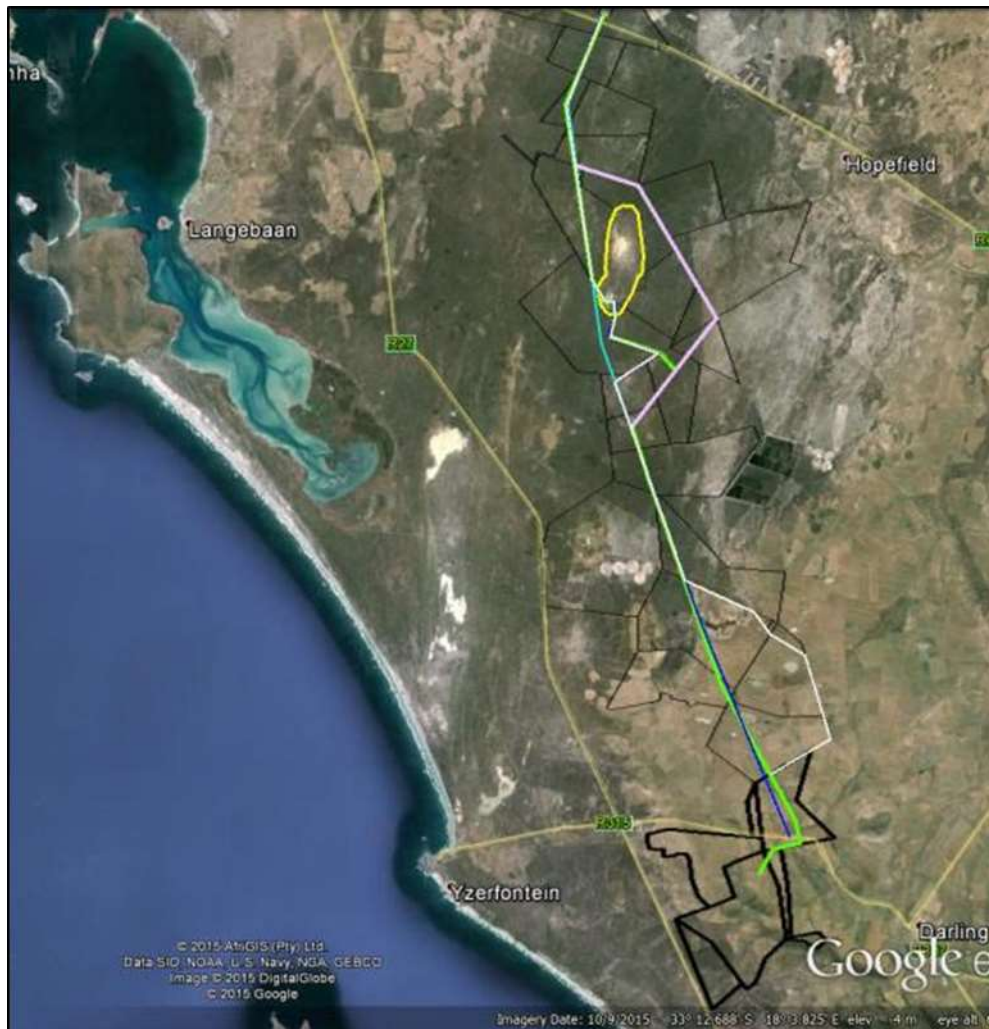
1. Site Name

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. This is a distance of 45 km.

3. Locality Plan



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, both 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.

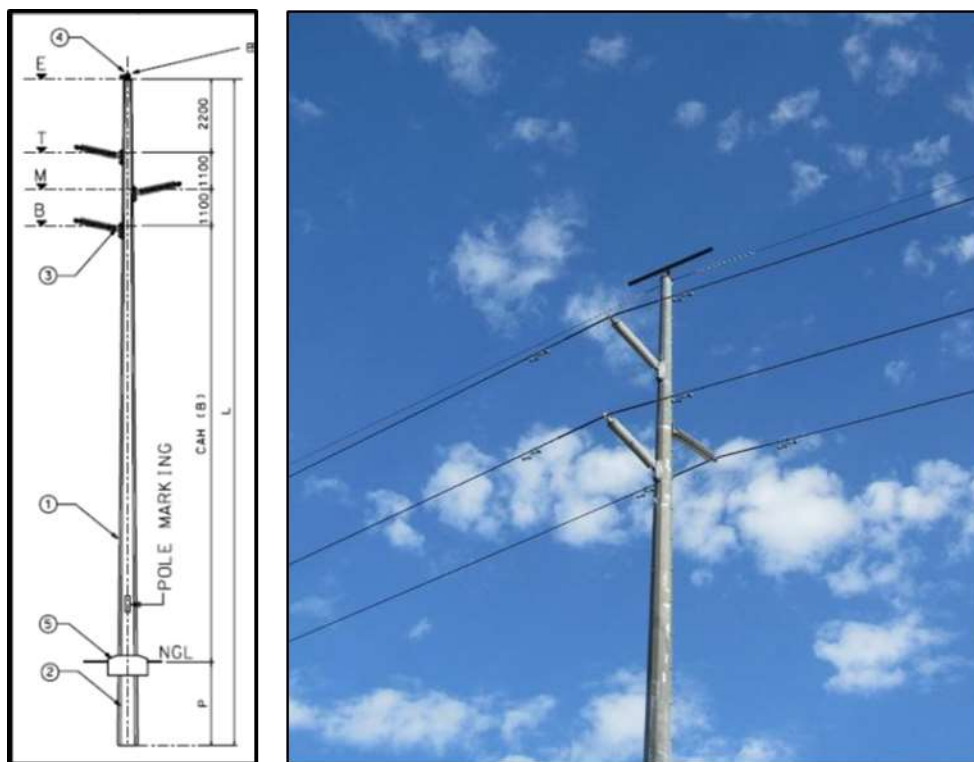
A Southern Alternative transmission line from the Rheboksfontein WEF to the Dassenberg substation at Atlantis (2013) has proved technically unfeasible.

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.

This report considers five **132 kV** alternatives transmission line options, namely Alternative 1A (preferred) 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.

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).



Design of the mono-pole tower structure utilised for a 132 kV line

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).

5. Heritage Resources Identified

The most significant heritage resources along the route between the Rheboksfontein WEF and the Aurora substation is the Elandsfontein Provincial Heritage Site, declared a PHS in May 2015.



Alt 1A (green), Alt 1B (pink), Alt 1C (dark blue), Alt 1D (white) and Alt 1E (turquoise). At least 3 alternatives run through the southern section of the Elandsfontein PHS. The turquoise line follows the route of two existing 400 kV lines.

- The northern section of all five alternatives will cut through palaeontologically sensitive Langebaan and Springfontyn Formations;
- From an archaeological perspective, the most significant heritage resource is the Elandsfontein Provincial Heritage site (fossil dune site). Alternatives 1A, 1C and 1D will cut through 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;
- The Rheboksfontein WEF is located in the Darling Hills Cultural Landscape. The proposed powerline will exit the northern section of the Darling Hills Cultural Landscape. The core of the cultural landscape lies further to the south and is centred on Darling;
- The proposed powerline will cross the R315 linking road from Darling to Yzerfontein and the R45 from Hopefield to Velddrift. Both are considered linking roads of Grade III significance. The powerline will not be visible from the R27 West Coast Road which lies some 7 km to the west.

6. Anticipated Impacts on Heritage Resources

From an engineering perspective, the towers/towers are generally located about 250 m apart. The foundations for the steel monopoles may reach a depth of 3 m depending on the soil conditions. An additional access road will not be necessary if the existing powerline (Alternative 1E) is followed.

- All five alternatives will be aligned along existing 400 kV powerlines for the majority of the route. Various alternative have been proposed to avoid impacts to the Elandsfontein PHS and/or the West Coast National Park;

- While fragments of fossilised bone and stone artefacts are thinly distributed across the northern section of the proposed line, it is anticipated that the direct, physical impacts to below-ground heritage (archaeology and palaeontology) are likely to be low in view of the small size of the footprint;
- Excavations into sediments not normally accessible to palaeontologists and archaeologists is regarded as positive, as long as appropriate management protocols are established to deal with the recovery of potentially important fossil material;
- None of the Alternatives will be visible from the R27, Darling or Hopefield. They will cross the R315 to the north of Darling, at the same spot as an existing 400 kV line and cross the R45 to join the Aurora substation. Impacts to scenic routes is expected to be very low;
- Alternatives 1A, 1C and 1D will cross within 10 m of the restored homestead of Elandsfontein which appears to date to the late 19th century (although it may have an early 19th century core). A field grading of IIIC is proposed for the house. While the house is unoccupied and will not be directly impacted, it is likely that the proposed powerline will result in a visual impact to the homestead and may impact below ground historical archaeological material;
- The construction of an additional power line, together with the two existing 400 kV power lines to the Aurora substation is likely to increase the potential cumulative visual impact of industrial type infrastructure within the region. This needs to be weighed against the potential impacts of the proposed phosphate mining on the western edge of the Elandsfontein PHS.

6.1 Visual Impact Assessment

The Visual Impact Assessment, conducted by AfZelia (2015). He notes that the line has the potential to be visually exposed due to the fact that it traverses mainly flat terrain with very limited undulation or topographical features to shield observers from the proposed line.

The visual impact index for the power line is described as follows.

- The visual impact index map indicates a core zone of **high** visual impact within a 0.5km radius from the alignment.

This area is generally devoid of sensitive visual receptors, except for the two sections where the alignment crosses over the R315 and R45 arterial roads.

These receptors may experience **very high** visual impacts due to their close proximity to the power line infrastructure. It must however still be borne in mind that the power line will not be viewed in isolation, but against the backdrop of the existing 400kV power lines.

- The extent of potential visual impact subsides very quickly within the 0.5km and 1.5km zone from the alignment. This area is expected to have a **moderate** visual impact, where sensitive visual receptors are generally absent, but may be **high** where observers are present. Homesteads and residences located within this zone include: Elandsvlei Wes (west of the proposed power line), Elandsvlei (2) and Droëvlei (located east of the existing 400kV power lines).
- Visual impacts beyond 1.5km and up to 3km from the alignment, is expected to be **low** to **very low**, but may potentially be **moderate** (at worst) where observers are present.
- Visibility beyond 5km from the power line is expected to have a **negligible** visual impact.

6.2 Comments from Interested and Affected Parties

The comments of the Interested and Affected Parties are appended as Appendix 4.

The Swartland Heritage Foundation (which represents Darling, Hopefield and Malmesbury) was contacted but they were unable to comment due to organisational matters (Letter attached). This is the only one HWC registered conservation body with a declared interest in the area.

The comments from the Swartland Heritage Foundation and the Public Meeting held on the 30 September 2010, for Interested and Affected Parties are attached as Appendix 4.

No heritage issues were raised at the Public Participation process. Comments were raised about the visual impact on the R27 and the Darling Hills.

The Social Impact Assessment, conducted by Tony Barbour & Schalk van der Merwe (April 2015) indicate that both alternative 1A and 1B are acceptable but that Alternative 1A is shorter.

7. Recommendations

- *Alternatives 1A, 1C and 1D cross the southern sections of the Elandsfontein PHS. Alternatives 1B and 1E are acceptable from a palaeontological, archaeological and visual perspective and the construction of either Alternative is supported.*

Recommendations: Palaeontology and Archaeology

The impact is likely to be low and manageable, provided that the recommendations in the Palaeontological report are adhered to the proposed powerline can be allowed to proceed from the palaeontological perspective.

- There is marginally more palaeontological and archaeological material on the surface along Alternatives 1A, 1C, 1D and 1E. Alternative 1B is potentially less sensitive from a palaeontological and archaeological perspective;
- Alternative 1E will follow the route of servitude with two existing 400 kV powerlines. These lines are significantly larger than the proposed 132 kV line. An additional line may introduce further "industrial clutter" to the border of the proposed PHS. Conversely, it may be argued that it is preferable to keep infrastructure along a single servitude and that there will be a consolidation of linear infrastructure;
- There is likely to be further negative visual impact on the western section of the PHS through the construction of the Elandsfontein phosphate mine;
- Utilising Alternative 1B will introduce a new line to the eastern boundary of the PHS, which is currently undisturbed, natural landscape;
- If Alternative 1E is selected along the existing Eskom servitude, then it will not be necessary to construct a new access road, reducing potential impacts;
- It is recommended that an archaeological/palaeontological monitoring programme for the excavation of the tower footings is implemented 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;
- The frequency of the monitoring is to be worked out with the contractor;
- Protocols for dealing with the discovery of palaeontological and/or palynological (fossil pollens) material and possible mitigation should be included in the EMP;
- Any material recovered during monitoring must be lodged at the Iziko South African Museum;
- If any human remains are uncovered during construction, then work should stop in that areas while HWC is informed;
- If either Alternatives 1A, 1C or 1D are selected the line infrastructure should be positioned in such a way as to avoid damage to the Elandsfontein house, outbuildings and fountain.

Visual Recommendations

- With regard the Visual Impacts, the specialist notes that “No mitigation of this impact is possible”, but measures are recommended as best practice and listed in the recommendations at the end of Appendix 3.

8. Author and Date

Avery, G. 2015. Palaeontological Assessment Proposed Power Line from the Rheboksfontein Wind Energy Facility to the Aurora substation, Western Cape Province (1:50 000) between 3318AD Darling and 3317BB&3318AA Saldanha).

Webley, L. & Halkett, D. 2015. Archaeological Impact Assessment: Proposed Construction of a 132 kV powerline from the Rheboksfontein Wind Energy Facility to the Aurora Substation, Western Cape. Unpublished report for Savannah Environmental (Pty) Ltd.

MetroGIS (Pty) Ltd. 2015. Proposed Rheboksfontein Wind Energy Facility Power Line: Visual Impact Assessment. Unpublished report for Savannah Environmental (Pty) Ltd.

Sustainable Futures ZA. 2010. Proposed Moyeng Energy Rheboksfontein Wind Energy facility Environmental Impact Assessment. Public Meeting. Notes of Public Meeting.

Swartland Heritage Foundation. 24 April 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

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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).

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).

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

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

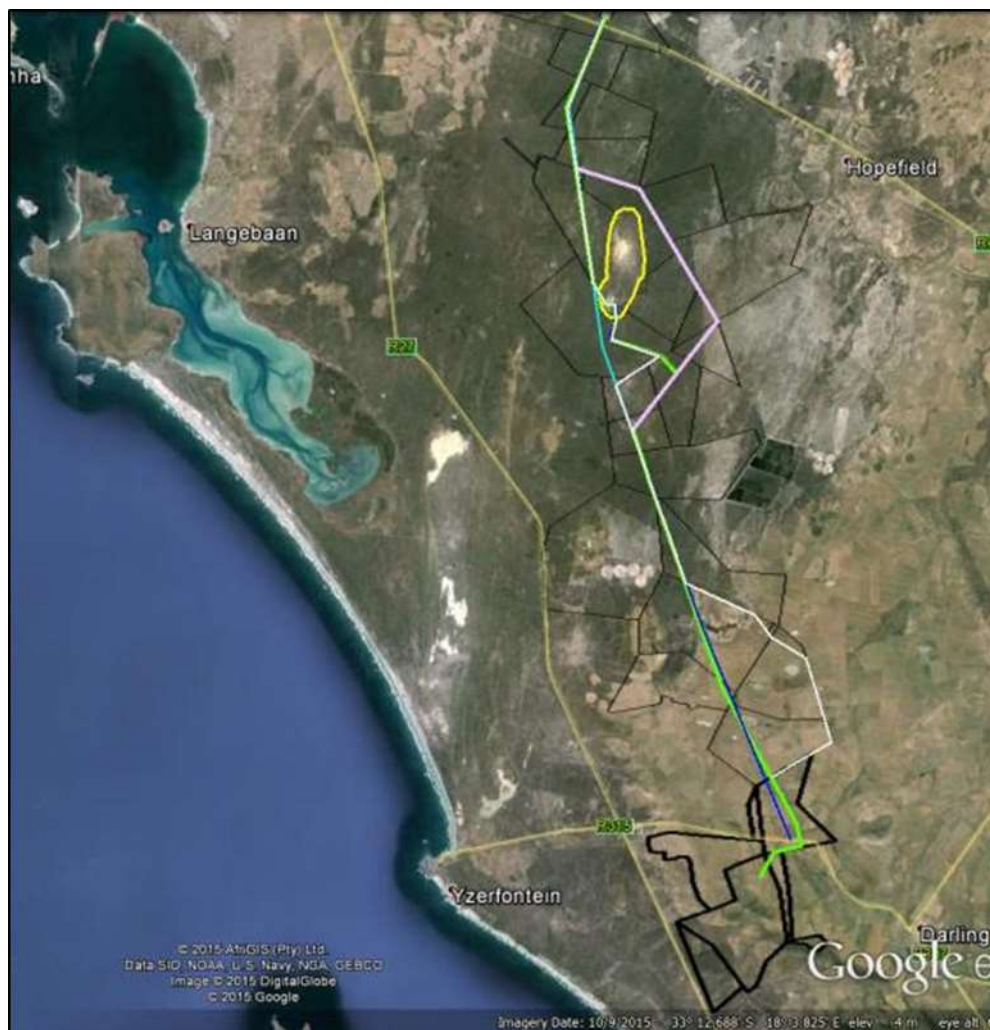


Figure 1: Alternatives 1A powerline (green), 1C (dark blue) and 1E all follow the existing 400 kV lines, although 1A and 1C make small deviations to the south. Alt 1D (white) runs to the east of some salt pans on the southern section of the line. Alt 1B (pink) runs along the eastern boundary of the Elandsfontein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

1.1 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).

1.2 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 largely follow the alignment of an existing 400 kV line corridor (Aurora-Dassenberg) 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 attached (Plate 1). 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.

The servitude would be about 31 m wide, 15.5 m on either side of the line. Generally, a servitude of this size would require a narrow jeep track for the purposes of maintenance. However, if the proposed line follows the existing 400 kV line, then use could be made of an existing access road and a new road will not be necessary.

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

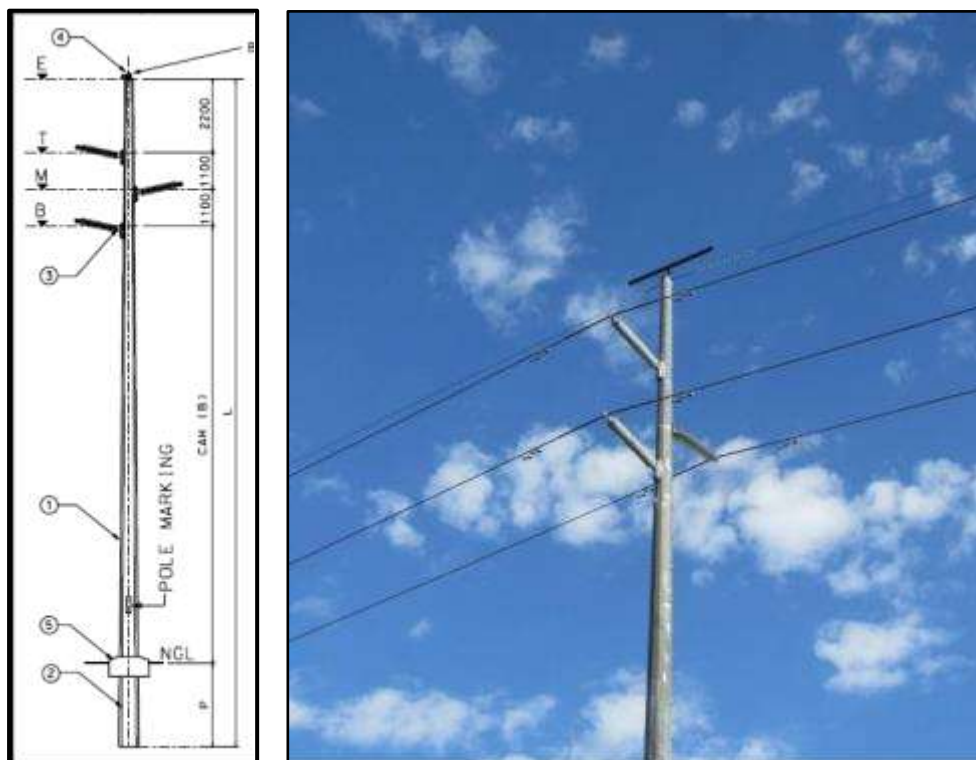


Plate 1: A view of a typical 132 kV steel mono-pole tower



Plate 2: The base of the tower footing.

This report considers five **132 kV** alternatives transmission line options, namely Alternative 1A (preferred) 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.

2. 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)).

2.1 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
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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.

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 HIA consisting of an Archaeological study, a Palaeontological study and a Visual Impact Assessment with an Integrated set of recommendations (06 May 2015).



Figure 2: 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.

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.

3. METHODOLOGY

A short discussion on each specialist report is presented below, with the full reports attached as appendices at the end.

- Palaeontological Impact Assessment by Dr Graham Avery (Appendix 1)
- Archaeological Impact Assessment by Lita Webley & David Halkett (Appendix 2)
- Visual Impact Assessment by MetroGIS (Appendix 3)
- Comments from Interested and Affected Parties (Appendix 4).

3.1 Assumptions and Limitations

- Only Alternatives 1A and 1B were surveyed in the field. Alternatives 1C, 1D and 1E have been assessed at the desktop level;
- 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.

4. DESCRIPTION OF AFFECTED ENVIRONMENT

4.1 Palaeontological Background

The specialist palaeontological assessment was prepared by Dr Graham Avery and attached as Appendix 1. The upper deposits comprise gravelly clay/loam soils of Pleistocene to Holocene age with low fossil potential; they overlie the Langebaan Formation comprising limestones and calcretes of the Middle to Late Pleistocene with moderate fossil potential; they overlie the Springfontyn Formation of light-grey to pale-red sandy soils dating to the Early to Late Pleistocene with high fossil potential; they overlie the Darling Batholith which contains no fossils within granite.

Portions of the proposed power line will be situated in a palaeontologically sensitive and important area of the west coast. It is entirely possible that excavations into sediments not normally accessible to palaeontologists will be encountered in sub-surface deposits.

4.2 Archaeological Background

The specialist archaeological assessment was prepared by Dr Lita Webley and Mr David Halkett and is attached as Appendix 2.

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 run through the southern section of the PHS, while Alternative 1B follows the eastern boundaries of the property (Figure 2). 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.

There are a number of historic farmsteads along the powerline route, but none fall within the corridor except for the restored farmstead of Elandsfontein on Elandsfontyn 349. The house appears to date to the late 19th century (although it may have an early 19th century core). A field grading of IIIC is proposed for the house. While the house is unoccupied and will not be directly impacted, there may be impacts to buried historical material and the proposed powerline will result in a visual impact to the homestead and associated elements (fountain and ruined cottages).

4.3 Scenic Routes

The proposed powerline will cross the R315 between Darling and Yzerfontein. It is considered an important linking route through the Darling Hills and has been given a Grade III grading by Winter & Oberholzer (2013). Similarly two powerline alternatives will terminate at the substation on the R45 (connecting Malmesbury to Vredenburg). This too is considered an important linking route of Grade III significance. However, the powerlines will not be visible from the R27 which runs parallel to the coast and is some 7 km to the west.

4.4 Visual

The specialist visual assessment was prepared by MetroGIS and is attached as Appendix 4.

They have noted that the line has the potential to be visually exposed due to the fact that it traverses mainly flat terrain with very limited undulation or topographical features to shield observers from the proposed line.

The visual impact index for the power line is described as follows.

- The visual impact index map indicates a core zone of **high** visual impact within a 0.5km radius from the alignment.

This area is generally devoid of sensitive visual receptors, except for the two sections where the alignment crosses over the R315 and R45 arterial roads.

These receptors may experience **very high** visual impacts due to their close proximity to the power line infrastructure. It must however still be borne in mind that the power line will not be viewed in isolation, but against the backdrop of the existing 400kV power lines.

- The extent of potential visual impact subsides very quickly within the 0.5km and 1.5km zone from the alignment. This area is expected to have a **moderate** visual impact, where sensitive visual receptors are generally absent, but may be **high** where observers are present. Homesteads and residences located within this zone include: Elandsvlei Wes (west of the proposed power line), Elandsvlei (2) and Droëvlei (located east of the existing 400kV power lines).
- Visual impacts beyond 1.5km and up to 3km from the alignment, is expected to be **low** to **very low**, but may potentially be **moderate** (at worst) where observers are present.
- Visibility beyond 5km from the power line is expected to have a **negligible** visual impact.

5. ASSESSMENT OF IMPACTS

The most significant impacts of the proposed lines are to the palaeontological and archaeological resources represented by the Elandsfontein PHS.

Indications are that the distribution of Pleistocene archaeology and fossils at Elandsfontein is extensive as both Braun (pers comm.) and Orton (2007) have observed archaeological and

palaeontological material to the south and north of the current archaeological exposure. 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. While the tower footings for the 132 kV line are relatively small (About 1 X 1 m and up to ~3 m depth), the palaeontological and archaeological material are of high significance and mitigation, in the form of monitoring, will be necessary.

5.1 Impacts to Palaeontology

The impact is likely to be minimal to zero and manageable, provided that the recommendations in the report are adhered to the proposed powerline can be allowed to proceed from the palaeontological perspective.

Table 2: Potential impact to Palaeontology

NATURE OF IMPACT:		
	Without mitigation	With mitigation
EXTENT	Medium (3)	Low (1)
DURATION	Permanent (5)	Permanent (5)
MAGNITUDE	Medium (5)	Minor (2)
PROBABILITY	Probable (3)	Improbable (1)
SIGNIFICANCE	Medium (39)	Low (8)
STATUS	Negative	Neutral
REVERSIBILITY	No	Yes
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Ensure a walk down of the final powerline route situated in proximity to the Elandsfontein Fossil site. Monitoring of the holes excavated for the towers will be required.		
CUMULATIVE IMPACTS: A loss of context would be experienced through additional powerlines in the area.		
RESIDUAL IMPACTS: n/a		

In the event of significant occurrences of fossils, further mitigation in the form of excavations under a "Work Plan" from Heritage Western Cape will be required.

5.2 Impacts to Archaeology

- If Alternative 1E is selected along the existing Eskom servitude, then it will not be necessary for Eskom to construct a new access road, reducing potential impacts;
- 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.

Table 3: Potential impacts to 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.

5.3 Visual Impacts

With regard to impacts on users of arterial and secondary roads in close proximity to the proposed line, the specialist concludes that the northern alternative has the potential to have a **low** visual impact on road users travelling along the R315 and the R45. He concludes that **No mitigation of this impact is possible**, but measures are recommended as best practice.

Table 5: Visual impact on users of arterial roads

NATURE OF IMPACT: Visual impact on users of arterial and secondary roads in close proximity to the proposed powerline.		
	Without mitigation	With mitigation
EXTENT	Local (4)	n/a
DURATION	Long term (4)	n/a
MAGNITUDE	Very High (10)	n/a
PROBABILITY	Very improbable (1)	n/a
SIGNIFICANCE	Moderate (18)	n/a
STATUS	Negative	n/a
REVERSIBILITY	Recoverable (3)	n/a
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	No
MITIGATION:		
<u>Planning:</u>		
<ul style="list-style-type: none"> Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude 		
<u>Operations:</u>		
<ul style="list-style-type: none"> Maintain the general appearance of the servitude as a whole 		
<u>Decommissioning:</u>		
<ul style="list-style-type: none"> Remove infrastructure not required for the post-decommissioning use of the servitude Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications Monitor rehabilitated areas post-decommissioning and implement remedial actions. 		

CUMULATIVE IMPACTS: The construction of an additional power line, together with the existing power lines to the Aurora and Dassenberg substations, the wind turbines and the Darling WEF and the future Rheboksfontein WEF, is likely to increase the potential cumulative visual impact of the industrial type infrastructure of the region.
RESIDUAL IMPACTS: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.

Table 6: Visual impact on residents of homesteads and settlements in close proximity to the proposed facility.

The potential visual impact on a number of residents of homesteads in close proximity to the southern alignment is expected to be of high significance.

NATURE OF IMPACTS: Visual impact on residents of homesteads and settlements in close proximity to the proposed facility		
	Without mitigation	With mitigation
EXTENT	Local (4)	n/a
DURATION	Long term (4)	n/a
MAGNITUDE	Very high (10)	n/a
PROBABILITY	Probable (3)	n/a
SIGNIFICANCE	Moderate (54)	n/a
STATUS (POSITIVE OR NEGATIVE)	Negative	n/a
REVERSIBILITY	Recoverable (3)	n/a
IRREPLACEABLE LOSS OF RESOURCES?	No	n/a
CAN IMPACTS BE MITIGATED?	No	
MITIGATION:		
<u>Planning:</u> <ul style="list-style-type: none">Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.		
<u>Operations:</u> <ul style="list-style-type: none">Maintain the general appearance of the servitude as a whole.		
<u>Decommissioning:</u> <ul style="list-style-type: none">Remove infrastructure not required for the post-decommissioning use of the servitude.Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.Monitor rehabilitated areas post-decommissioning and implement remedial actions.		
CUMULATIVE IMPACTS: The construction of an additional power line, together with the existing power lines to the Aurora substation, the wind turbines of the Darling WEF and the future Rheboksfontein WEF, is likely to increase the potential cumulative visual impact of industrial type infrastructure within the region.		
RESIDUAL IMPACTS: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.		

5.4 Cumulative Impacts

The construction of an additional power line, together with the two existing 400 kV power lines to the Aurora substation, the wind turbines and the Darling WEF and the future Rheboksfontein WEF, as well as the proposed Elandsfontein Phosphate mine is likely to increase the potential cumulative visual impact of the industrial type infrastructure of the region. Additional clutter of powerlines and towers will impact on the wilderness aspect of the area. However, it may equally be argued that it is preferable that electrical infrastructure is kept within a narrow band along the western border of the Elandsfontein fossil site (i.e. to consolidate linear infrastructure), rather than expanding into a new area.

6. COMMENTS FROM INTERESTED AND AFFECTED PARTIES

The comments from the Swartland Heritage Foundation and the Public Meeting held on the 30 September 2010, for Interested and Affected Parties are attached as Appendix 4.

No heritage issues were raised at the Public Participation process. Comments were raised about the visual impact of the Rheboksfontein WEF on the R27 and the Darling Hills, but this has already received environmental approval.

7. RECOMMENDATIONS AND CONCLUSIONS

7.1 Palaeontological Recommendations

- Excavation for foundations should be monitored by a palaeontologist or archaeologist with appropriate palaeontological knowledge. The frequency of this to be worked out *a priori* with the contractor to minimize time spent on site;
- If possible, geotechnical information together with the proposed locations and depths of excavations for foundations and/or infrastructure should be provided prior to the commencement of construction. This may enable a better estimation of the time(s) when monitoring would be necessary;
- Protocols for dealing with palaeontological/palynological (fossil pollens) monitoring and possible further mitigation must be included in the Environmental Management Plan (EMP);
- Any material recovered will be lodged in the collections of Iziko South African Museum;
- Funds must be available *a priori* to cover costs of fieldwork and one date should the need arise.

7.2 Archaeological 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 Alternative 1A while Alternative 1B may potentially be less sensitive from a palaeontological and archaeological perspective;
- Alternative 1E will follow the route of servitude with two existing 400 kV powerlines. These lines are significantly larger than the proposed 132 kV line. An additional line may introduce further "industrial clutter" to the border of the proposed PHS;
- However, it may be argued that it is preferable that further powerlines are placed in parallel with existing lines, rather than being introduced to a new area along the eastern boundary of the PHS;
- The construction of either powerline Alternative is supported, with monitoring of the tower holes by an accredited archaeologist/palaeontologist around the Elandsfontein fossil site recommended;
- If any concentrations of archaeological/palaeontological material are uncovered, then these should be collected with a Work Plan issued by Heritage Western Cape. Any sites which are discovered should be fully recorded so that this information is available for future scientists who want to undertake research in the area.

7.3 Visual Recommendations

The visual specialist considered the original northern vs southern powerline alternatives in his report, and only commented briefly on the deviation to the northern route. He concluded that the northern alternative is the preferred option from a visual perspective and that the deviation is not expected to alter the visual impact associated with the powerline.

The primary visual impact, namely the appearance of the power line is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Secondary impacts anticipated as a result of the proposed power line (i.e. visual character and sense of place) are also not possible to mitigate.

The following mitigation is, however possible:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. This measure will help to soften the appearance of the power line within its context.
- Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management and rehabilitation of the construction site. Recommended mitigation measures include the following:
 - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
 - Reduce the construction period through careful logistical planning and productive implementation of resources.
 - Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
 - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
 - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
 - Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
 - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
 - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- During operation, the maintenance of the power line structures will ensure that the power line does not degrade, thus aggravating visual impact.
- Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as and when required.
- Once the power line has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.
- All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

Good practice requires that the mitigation of both primary and secondary visual impacts as listed above be implemented and maintained on an ongoing basis.

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