# HERITAGE IMPACT ASSESSMENT FOR PROPOSED POWER LINES AND SUBSTATIONS NEAR SALDANHA BAY, HOPEFIELD AND VREDENBURG MAGISTERIAL DISTRICTS, WESTERN CAPE

Required under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999).

HWC Case No.: 15091511GT0916E

*Report for:*

**Savannah Environmental (Pty) Ltd**
P.O. Box 148, Sunninghill, 2157
Tel: 011 656 3237
Email: john@savannahsa.com

*On behalf of:*

**Eskom**


**Dr Jayson Orton**
**ASHA Consulting (Pty) Ltd**
6A Scarborough Road, Muizenberg, 7945
Tel: (021) 788 8425 | 083 272 3225
Email: jayson@asha-consulting.co.za

In association with:
**Dr Graham Avery**
25 San Bernado, 18 De Lorentz Street, Cape Town, 8001
Tel: 083 441 0028
Email: gavery@iziko.org.za

1st draft: 12 September 2016
Final report: 14 October 2016

## EXECUTIVE SUMMARY

1. **Site Name**

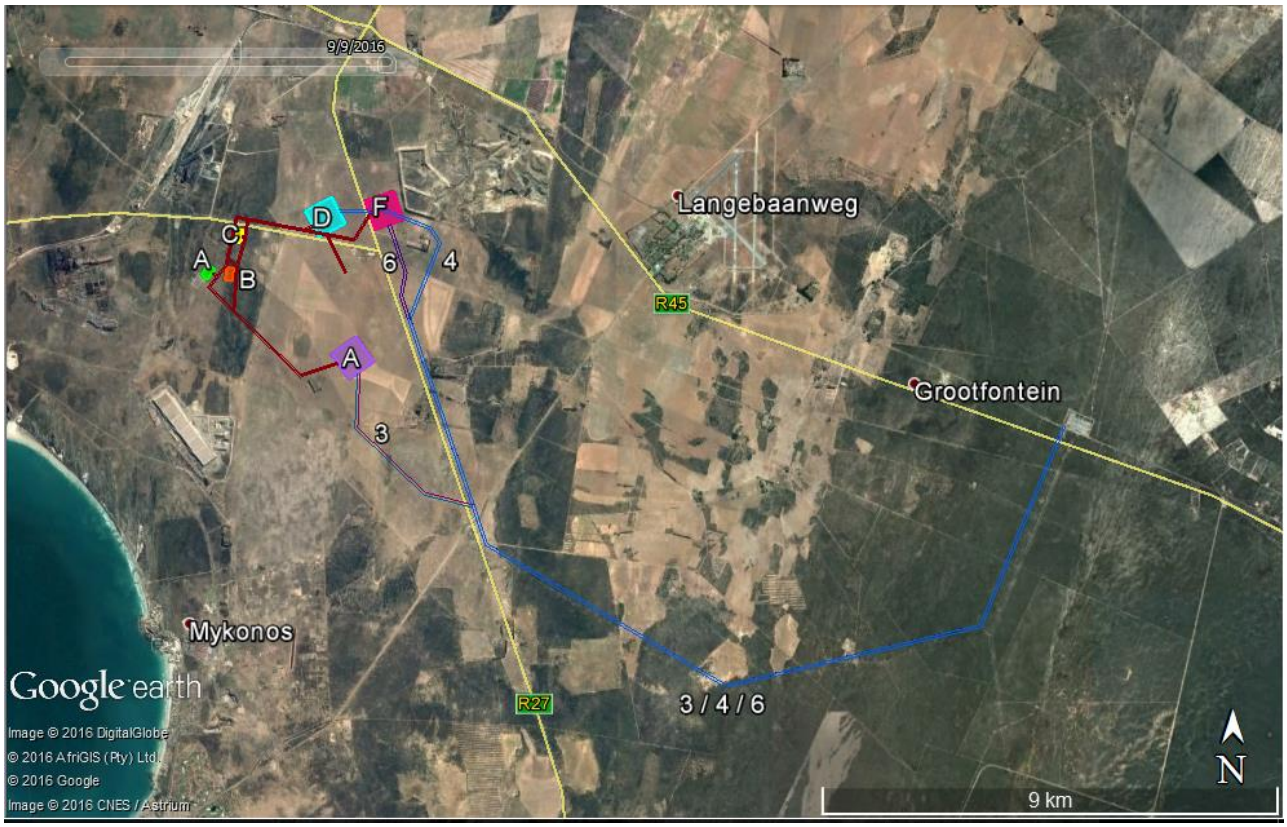
n/a

2. **Location** (Street address/farm name, town/district, erf number and GPS coordinates)

The project is located near Saldanha Bay. The western end of the study area is at 32° 58′ 40″ S 18° 03′ 00″ E, while the eastern end is at 33° 00′ 25″ S 18° 14′ 00″ E. The following farm portions may be affected, depending on the final selection of project alternatives:

| **Farm name** | **Farm number** | **Portion number** |
|---|---|---|
| Adjoining Springfontein | 174 | Remainder |
| Driehoeks Fontein | 176 | Remainder |
| Yzerfontein | 178 | 8 |
| Yzerfontein | 178 | 3 |
| Zoutekuilen | 179 | Remainder |
| Waschklip | 183 | Remainder |
| Langeberg | 187 | Remainder |
| Langeberg | 187 | 1 |
| Langeberg | 187 | 4 |
| Langeberg | 187 | 11 |
| Langeberg | 188 | Remainder |
| Langeberg | 188 | 6 |
| Uyekraal | 189 | Remainder |
| Uyekraal | 189 | 1 |
| Everts Hope | 190 | Remainder |
| Farm 1162 | 1162 | Remainder |

## 3. Locality Plan




## 4. Description of Proposed Development

The scope of Saldanha Bay network strengthening project includes the following:

- Construction of a new 400/132kV Transmission Substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers. The transmission substation footprint will be 600m x 600m. A number of alternative sites were identified but after the Scoping Phase of the project only Alternatives A, D and F have been carried forward into the EIA Phase;
- Construction of a new 132/66kV Distribution Substation near the current Blouwater Substation in the Saldanha Bay area. The distribution substation footprint will be 120m x 120m. Three Alternatives – A, B and C – are being assessed in the EIA Phase;
- The construction of two 400kV power lines (approximately 35 - 40 km) from the Aurora Substation to the new proposed distribution and transmission substations. A servitude of 55m is required for each power line. A number of alternative routes were identified but after the Scoping Phase of the project only Alternatives 3, 4 and 6 have been carried forward into the EIA Phase. More than half of the distance is shared by the three alternatives and runs parallel to a number of existing power lines extending westwards from the Aurora Substation;
- Replacing two of the four existing 250 MVA 400/132 kV transformers with 2 x 500 MVA transformers at Aurora Substation; and
- Establishing 2 x 132 kV feeder bays around Aurora Substation.

## 5. Heritage Resources Identified

The identified heritage indicators include:

» archaeological resources in the form of several historical ruins that lie beneath the proposed Transmission Line Alternative 4 and 6 alignments (largely Grade IIIC but some NCW);
» palaeontological resources in the form of buried fossils are likely to occur widely beneath the broader area (largely Grade IIIB but potentially as high as Grade I); and
» the cultural landscape which is a combination of a historical agricultural landscape, an area of relatively natural landscape and a modern electrical and industrial landscape (Grade IIIC).

Although other resources like structures (suggested up to Grade IIIB) and the R45 scenic route (suggested Grade IIIB) are present, they will not be unduly impacted.

## 6. Anticipated Impacts on Heritage Resources

Archaeological resources (historical ruins) may require demolition but this is as yet unknown. Palaeontological resources are likely to be disturbed, damaged and/or destroyed during excavations for foundations, especially for the substations. The power lines are of less concern because of the small size of the required foundations. The cultural landscape will not experience significant impacts because the project will merely add to the electrical infrastructure layer that is already present on the landscape. The project alternatives are tabulated below along with their expected impacts.

| Project alternative | Preference (1 = most; 3 = least) | Motivation |
|---|---|---|
| Transmission Line 3 | 1 | Keeps electrical infrastructure grouped to the west of the R27 |
| Transmission Line 4 | 3 | Introduces large electrical infrastructure to the east of the R27 and is very close to the WCFP |
| Transmission Line 6 | 2 | Introduces large electrical infrastructure to the east of the R27 |
| Transmission Substation A | 1 | Keeps large electrical infrastructure grouped to the west of the R27 |
| Transmission Substation D | 2 | Its large foundation excavations are still fairly close to the WCFP |
| Transmission Substation F | 3 | Introduces large electrical infrastructure to the east of the R27 and its large foundation excavations would be very close to the WCFP. Although impacts could be extensive, the potential positive impact of revealing new fossils and the screening effect of the large berm mean that this option is not fatally flawed |
| Distribution Substation A | 1 | Adjoins existing substation and reduces proliferation of impacts |
| Distribution Substation B | 2 | Located away from existing substation but is further from nearby road |
| Distribution Substation C | 3 | Located away from existing substation and also in close proximity to nearby road |

## 7. Recommendations

Because the mitigation and management of any archaeological and palaeontological impacts that might arise are entirely feasible, it is recommended that the proposed project be allowed to proceed from a heritage point of view. However, the preference for Transmission Line Alternative 3, Transmission Substation Alternative A and Distribution Substation Alternative A are stressed (but see preference ranking above). The following recommendations are relevant and should be incorporated into the environmental authorisation for the project as relevant:

- If Transmission Line Alternatives 4 or 6 are authorized, then archaeological mitigation of the historic ruins should take place under a workplan approved by HWC if they cannot be preserved *in situ*;
- Full-time palaeontological monitoring of both authorized substation foundations (any Alternatives) and ad hoc monitoring of power line foundations is required under a workplan approved by HWC. The workplan must include provision for the collection and recording of any fossils unearthed during construction;
- Training in the identification of fossils should be provided to project staff (construction workers, excavator operators and the Environmental Control Officer (ECO) who should be instructed to watch for fossils and report any discoveries;
- Any fossil material recovered during the course of the project should be properly recorded and then lodged with an appropriate repository; and
- If any further archaeological and/ or palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist or palaeontologist. Such heritage is the property of the state and may require excavation and curation in an approved collection repository.

## 8. Author/s and Date

Heritage Impact Assessment: Dr Jayson Orton, ASHA Consulting (Pty) Ltd, & Dr Graham Avery

Responsibilities: Dr Jayson Orton – archaeological aspects and HIA reporting
Dr Graham Avery – palaeontological aspects and HIA review

Date: 14 October 2016

## Glossary

**Early Stone Age**: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

**Fossil:** The petrified physical remains of a plant or animal (body fossil) or an impression (trace fossil) embedded and preserved in rock or other sediment.

**Holocene**: The geological period spanning the last approximately 10-12 000 years.

**Hominid**: a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

**Hominin**: a smaller group consisting of modern humans, extinct species of humans and all their immediate ancestors.

**Later Stone Age**: Period of the Stone Age extending over the last approximately 20 000 years.

**Middle Stone Age**: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

**Pleistocene**: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

**Sub-fossil**: A bone which has not completely fossilised, either because of insufficient time or inappropriate mineralisation conditions.

## Abbreviations

**APHP**: Association of Professional Heritage Practitioners

**ASAPA**: Association of Southern African Professional Archaeologists

**CRM**: Cultural Resources Management

**DEA:** National Department of Environmental Affairs

**ECO**: Environmental Control Officer

**EIA**: Environmental Impact Assessment

**ESA**: Early Stone Age

**GPS**: global positioning system

**HIA**: Heritage Impact Assessment

**HWC**: Heritage Western Cape

**ka:** Thousand years ago

**LSA**: Later Stone Age

**Ma:** Million years ago

**MSA**: Middle Stone Age

**NEMA**: National Environmental Management Act (No. 107 of 1998)

**NHRA**: National Heritage Resources Act (No. 25) of 1999

**NID**: Notification of Intent to Develop

**PHS:** Provincial Heritage Site

**SAHRA**: South African Heritage Resources Agency

**SAHRIS**: South African Heritage Resources Information System

**WCFP**: West Coast Fossil Park.

**CONTENTS**

## 1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction of power lines and substations near Saldanha Bay, in the Hopefield and Vredenburg Magisterial Districts (Figures 1 & 2). The western end of the study area is at 32° 58' 40" S 18° 03' 00" E, while the eastern end is at 33° 00' 25" S 18° 14' 00" E.

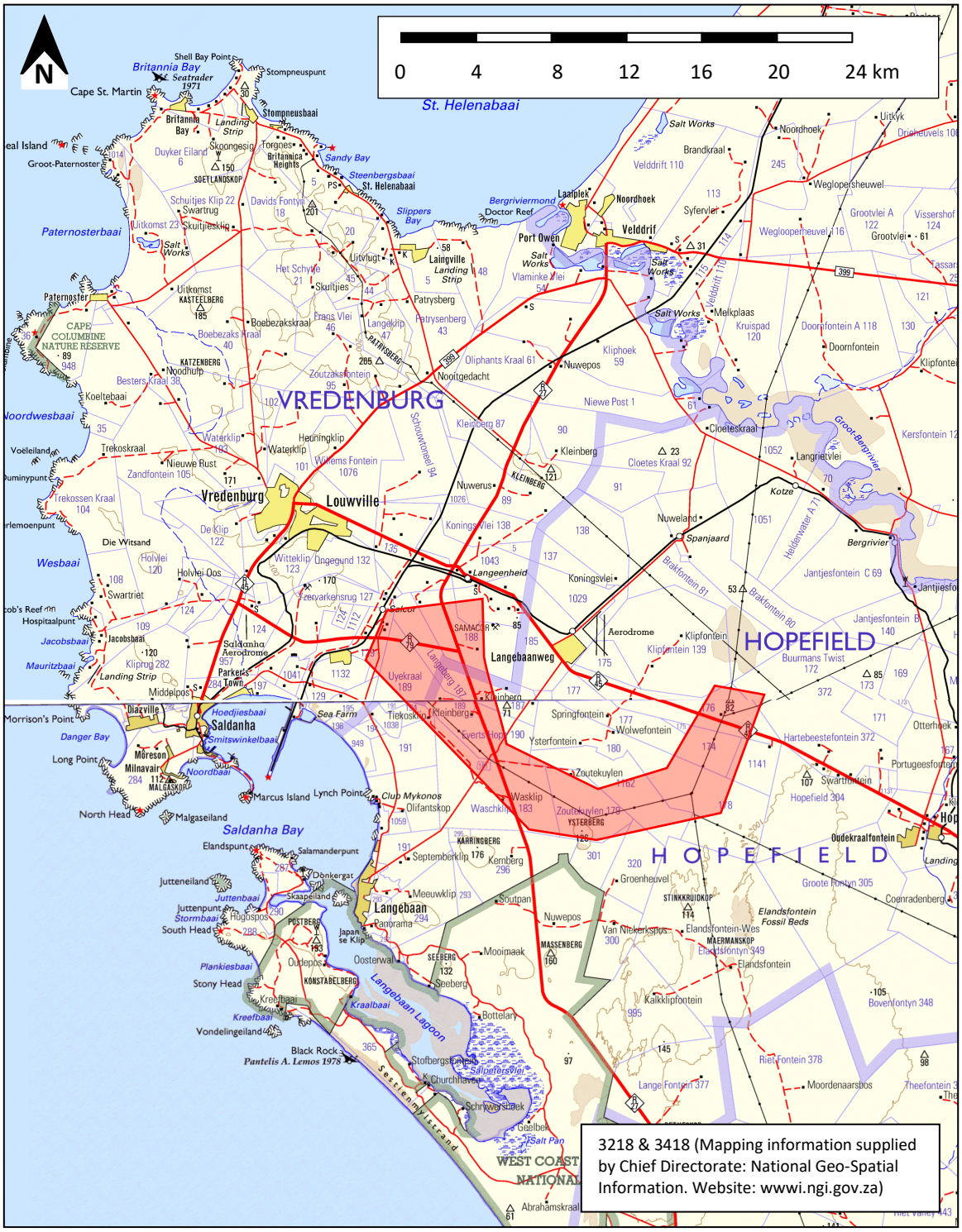



***Figure 1:*** *Map showing the location of the site. All project alternatives lie within the red shaded polygon (see Figure 2 for details).*

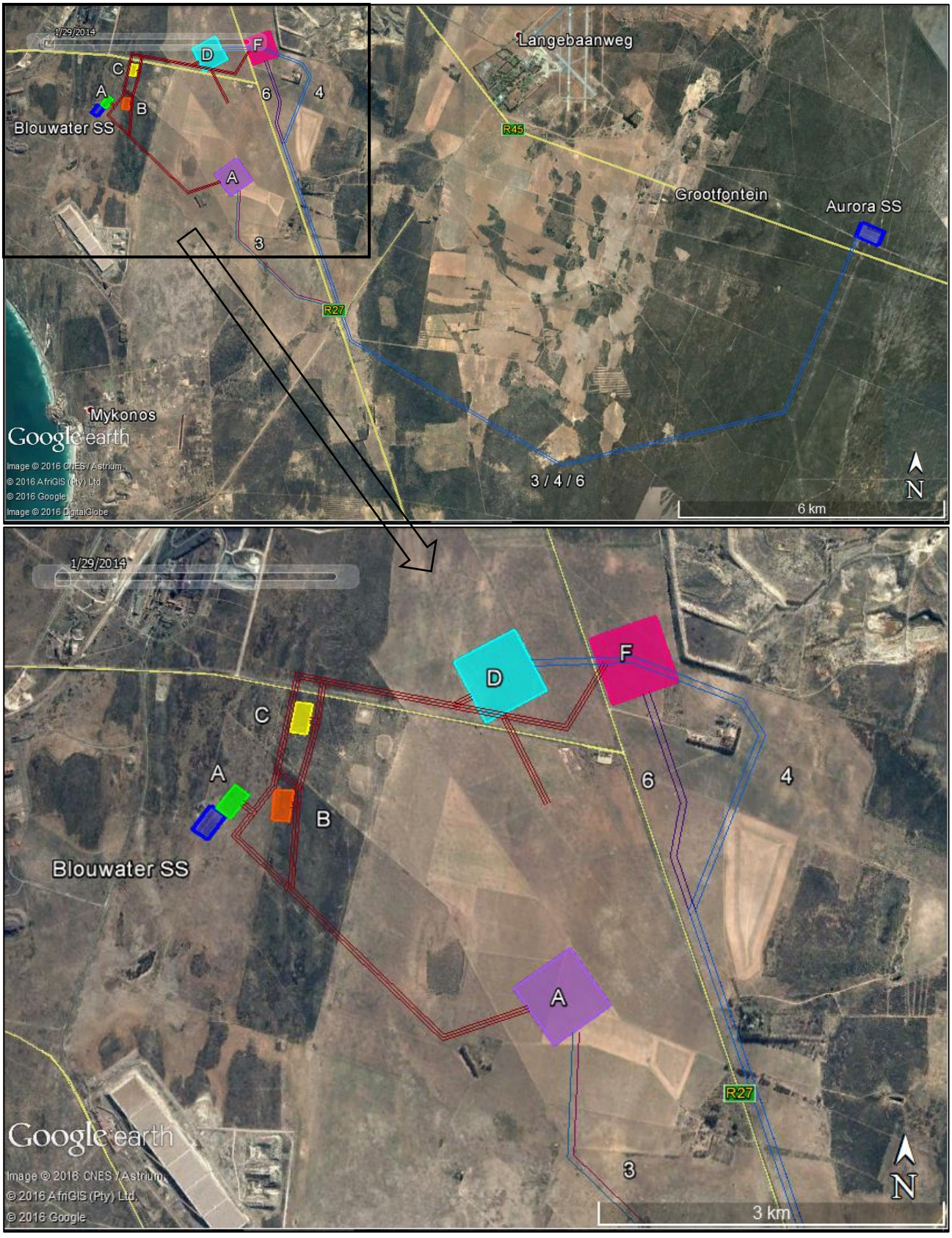



***Figure 2:*** *Aerial view of the study area showing the transmission line alternatives (labelled 3, 4 and 6), the transmission substation alternatives (coloured squares labelled A, D and F) and the distribution substation alternatives (coloured rectangles labelled A, B and C). The existing Blouwater and Aurora Substations are in blue and labelled. Source: Google Earth Professional.*

As part of the envisaged developments in the Saldanha Bay area, Eskom has reassessed the capability of the existing electricity network in the area in order to meet the forecasted load requirements from industrial customers, the Industrial Development Zone (IDZ) and local distributors, and also to facilitate the integration of renewable power generation. Power to the Saldanha Bay area is supplied from Aurora Substation which is located 28km east of Saldanha Bay. Aurora Substation supplies the Blouwater, Saldanha Steel and Smelter Distribution Substations. From the load forecast, it is evident that there will be a constraint at Aurora Substation. The projected new load of approximately 200 MVA that will be realised in the area together with the natural load growth will increase demand on the Aurora Substation from 517 MVA to approximately 890 MVA by the year 2030. The firm capacity in the area will be exceeded in 2018 if the additional loads are to be supplied from Aurora Substation. The transformation capacity is also insufficient to evacuate all of the potential renewable generation planned in the area, amounting to 2 885 MW.

### 1.1. Project description

The scope of Saldanha Bay network strengthening project includes the following:

- Construction of a new 400/132kV Transmission Substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers. The transmission substation footprint will be 600m x 600m. A number of alternative sites were identified but after the Scoping Phase of the project only Alternatives A, D and F have been carried forward into the EIA Phase;
- Construction of a new 132/66kV Distribution Substation near the current Blouwater Substation in the Saldanha Bay area. The distribution substation footprint will be 120m x 120m. Three Alternatives – A, B and C – are being assessed in the EIA Phase;
- The construction of two 400kV power lines (approximately 35 - 40 km) from the Aurora Substation to the new proposed distribution and transmission substations. A servitude of 55m is required for each power line. A number of alternative routes were identified but after the Scoping Phase of the project only Alternatives 3, 4 and 6 have been carried forward into the EIA Phase. More than half of the distance is shared by the three alternatives and runs parallel to a number of existing power lines extending westwards from the Aurora Substation;
- Replacing two of the four existing 250 MVA 400/132 kV transformers with 2 x 500 MVA transformers at Aurora Substation; and
- Establishing 2 x 132 kV feeder bays around Aurora Substation.

Table 1 presents a list of all the farm portions that may possibly be affected by the project, although certain portions may be excluded depending on the final alignments and locations chosen for implementation.

***Table 1:*** *List of farm portions that might be affected by the proposed project.*

| Farm name | Farm number | Portion number |
|---|---|---|
| Adjoining Springfontein | 174 | Remainder |
| Driehoeks Fontein | 176 | Remainder |
| Yzerfontein | 178 | 8 |
| Yzerfontein | 178 | 3 |
| Zoutekuilen | 179 | Remainder |
| Waschklip | 183 | Remainder |
| Langeberg | 187 | Remainder |
| Langeberg | 187 | 1 |
| Langeberg | 187 | 4 |
| Langeberg | 187 | 11 |
| Langeberg | 188 | Remainder |
| Langeberg | 188 | 6 |

| Farm name | Farm number | Portion number |
|---|---|---|
| Uyekraal | 189 | Remainder |
| Uyekraal | 189 | 1 |
| Everts Hope | 190 | Remainder |
| Farm 1162 | 1162 | Remainder |

### *1.1.1. Aspects of the project relevant to the heritage study*

All aspects of the proposed development are relevant since excavations for foundations may impact on archaeological and/or palaeontological remains, while the above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

## 1.2. Terms of reference

ASHA Consulting (Pty) Ltd was requested to compile and submit to Heritage Western Cape (HWC) a Notification of Intent to Develop (NID) and then, once a response had been received, compile and submit a Heritage Impact Assessment (HIA). The assessment was to include a field survey. Corridors of 1 km width around all the proposed linear infrastructure were provided as the study area.

On submission of the NID, HWC responded with the following request on 30th September 2015:

> Requirement:
> You are hereby notified that, since there is reason to believe that the proposed development will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of section 38(3) of the NHRA be submitted.
>
> All three routes described in the NID documentation cross a sensitive landscape.
>
> This HIA must have specific reference to the following:
>
> -Impacts to archaeological heritage resources
> -Impacts to palaeontological heritage resources
>
> The required HIA must have an integrated set of recommendations.
>
> The comments of relevant registered conservation bodies and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

It should also be noted, however, that following S.38(3) of the National Heritage Resources Act (No. 25 of 1999), even though certain specialist studies may be specifically requested, all heritage resources should be identified and assessed.

## 1.3. Scope and purpose of the report

An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the National Department of Environmental Affairs (DEA) who will review the Environmental Impact Assessment (EIA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

### 1.4. The authors

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in the Western Cape and Northern Cape provinces of South Africa since 2004 (Please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

Dr Graham Avery has an MA (UCT, 1976) and PhD (UCT, 1990), both in archaeology but has worked extensively in the palaeontological field, focusing on the south-western coast of South Africa and in both research and commercial contexts (please see curriculum vitae included as Appendix 1). He has conducted research on a variety of Early, Middle and Later Stone Age and palaeontological sites and published the findings. He is a member of the Palaeontological Society of South Africa. He holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #008) as follows:

- Principal Investigator: Stone Age, Shell Middens Middle Pleistocene studies & archaeozoology.

### 1.5. Declaration of independence

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

## 2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: "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";
- Palaeontological material: "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";
- Archaeological material: a) "material remains resulting from human activity which are 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"; b) "rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation"; c) "wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of

the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation"; and d) "features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found";

- Grave: "means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place"; and
- Public monuments and memorials: "all monuments and memorials a) "erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government"; or b) "which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual."

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list "historical settlements and townscapes" and "landscapes and natural features of cultural significance" as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value; some of these speak directly to cultural landscapes.

Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. HWC is required to provide comment on the proposed project in order to facilitate final decision making by DEA.

## 3. METHODS

### 3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 map and historical aerial images were sourced from the Chief Directorate: National Geo-Spatial Information. Geological and palaeontological information was sourced from 1:125 000 and 1:250 000 geological maps and published and unpublished reports.

### 3.2. Field survey

The site was surveyed on 17th and 18th August 2016. This was during winter and plant growth, especially of annuals, was quite advanced. This meant that visibility was not ideal but, given our knowledge of the area, was sufficiently adequate not to have had a negative effect on the outcomes of the report. Data from two earlier surveys (Orton 2011, 2014) were also included in the project because of the overlapping study areas. During the surveys the positions of finds were recorded on a hand-held GPS receiver set to the WGS84 datum. Note that the locations of some gum tree lines were plotted on aerial photography from the desktop. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

Although it is well known that Stone Age archaeological resources and fossil material are very unlikely to be found on the surface in the study area, the main foci of the survey were as follows:

» Check for any disturbances or excavations in the study area that may provide subsurface observations to confirm existing knowledge;

» Check for the presence of any small fossil bone fragments in the southern part of the study area that might indicate an extension of the Elandsfontein occurrence; and
» Locate historical sites in the study area because these are known to occur in places.

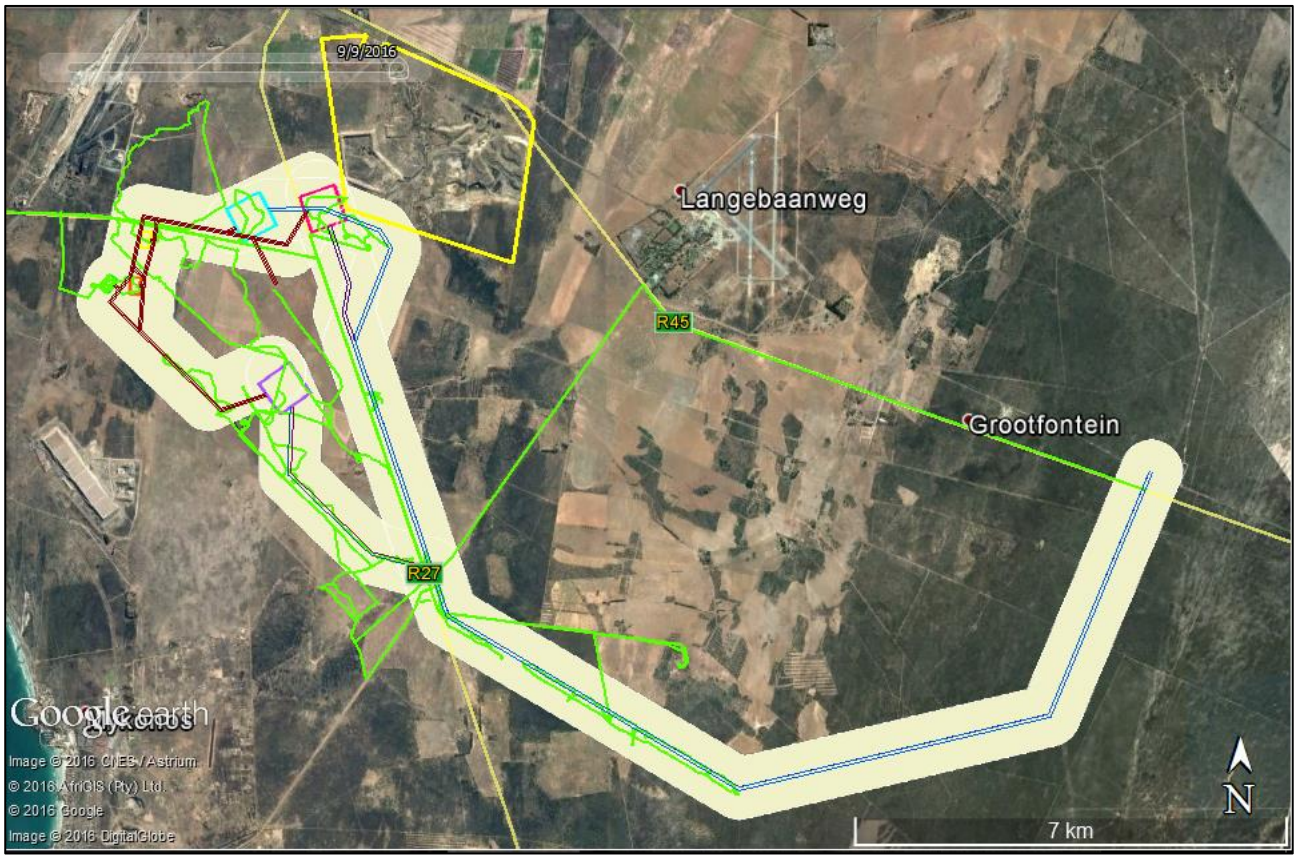



***Figure 3:*** *Aerial view of the study area (white shading) showing the proposed infrastructure (see Figure 2 for details) and the walk and drive paths recorded during the survey (green lines). The yellow polygon indicates the West Coast Fossil Park.*

### 3.3. Specialist studies

This report includes specialist assessments of both archaeology (by Dr Jayson Orton) and palaeontology (by Dr Graham Avery). Both assessments are included within the body of the report.

### 3.4. Impact assessment

For consistency, the impact assessment was conducted through application of a scale supplied by Savannah Environmental (Pty) Ltd.

### 3.5. Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to

happen. Heritage Western Cape (2016), however, uses a system in which resources of local significance are divided into Grade IIIA, IIIB and IIIC. These approximately equate to high, medium and low local significance, while sites of very low or no significance (and generally not requiring mitigation or other interventions) are referred to as Not Conservation Worthy (NCW).

### 3.6. Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological and palaeontological sites would not be readily located. Similarly, it is not always possible to determine the depth of such material visible at the surface. We were limited to a degree by the vegetation cover, especially in areas of indigenous vegetation.

We were limited by not being able to contact one of the landowners (Farm 1162, Portions 3 and 8 of Farm 178) and not being allowed onto one of the farms (Remainder of Farm 176).

## 4. PHYSICAL ENVIRONMENTAL CONTEXT

### 4.1. Site context

The site varies greatly from west to east. The western part is quite industrialised with a number of large factories present in the surrounding area. In keeping with the fact that this area is part of the Industrial Development Zone (IDZ) many large industrial-type development applications have been made for the area in recent years. The existing Blouwater Substation occurs at this end of the proposed development area. Much of the land in the west and central parts is currently agricultural land. Towards the east the project crosses over mostly undisturbed natural vegetation with the Aurora Substation located at the eastern end. Existing power lines link the above-mentioned substations and the various industrial facilities in the area.

### 4.2. Site description

The landscape is generally flat, although one large, low hill occurs in the central/southern part of the study area. In the west the agricultural lands were covered with low vegetation (Figures 4 & 5). The surface was sandy, but in places there were patches of calcrete gravel (Figure 6) and, at times, small expanses of solid calcrete were visible at the surface (Figure 7). Although the vast majority of the area is sandy, granite bedrock protrudes in a few places in the west (Figure 8). In the east the bulk of the land is covered with fairly dense indigenous vegetation with very few areas of open agricultural land (Figures 9 & 10).

***Figure 4:*** *View towards the east of the Blouwater Substation and, to its left, the proposed Alternative A distribution substation site. Alternative B lies further east in the distance, while Alternative C is out of view towards the left.*

***Figure 5:*** *View towards the southwest across the proposed Alternative F site for the transmission substation. Alternative D lies in the background, while Alternative A is in the distance at far left of this picture. This view is from the berm along the western margin of the West Coast Fossil Park.*

***Figure 6:*** *Typical agricultural land in the western part of the study area with calcrete gravel on the surface. This view is towards the east across the Alternative F transmission substation site and the western berm of the West Coast Fossil Park lies in the background.*

***Figure 7:*** *Exposed patches of intact surface calcrete near transmission substation Alternative A (Source: Orton 2011: figure 7).*

***Figure 8:*** *A small granite outcrop along a transmission line Alternative 3 in the western part of the study area.*

***Figure 9:*** *View towards the west across the southern part of the study area from the hill to the east of the R27.*

***Figure 10:*** *View towards the south from the R45 with the Aurora Substation behind the viewer.*

## 5. HERITAGE CONTEXT

This section of the report contains the desktop study and establishes what is already known about heritage resources in the vicinity of the study area. What was found during the field survey may then be compared with what is already known in order to gain an improved understanding of the significance of the newly reported resources.

### 5.1. Archaeological aspects

The broader area around Langebaan, Saldanha Bay and the Vredenburg Peninsula contains some highly significant archaeological sites including Middle Stone Age (MSA) shell middens (Avery *et al.* 2008; Berger & Parkington 1995; Churchill *et al.* 2000; Kyriacou et al. 2015; Stynder *et al.* 2001; Will *et al.* 2013; Volman 1978). Bifacial points commonly associated with the MSA period known as "Still Bay" have also been found on the Vredenburg Peninsula (Bateman 1946; Smith 2006).

Later Stone Age (LSA) material is more common, however, and sites of this period occur widely, but with a focus on the coastline and prominent rocky outcrops. The Kasteelberg hill, located 10 km northwest of Vredenburg is particularly important as a centre of regular settlement (Klein and Cruz-Uribe 1989; Sadr *et al.* 2003; Smith 2006; Smith *et al.* 1991; Volman 1978). Other outrcrops at Vredenburg and Honingklip have also revealed archaeological occupation sites (Smith *et al.* 1991). One site of significance that has been documented in the open lands around Kasteelberg is KFS5 where it was suggested that a Khoekhoe kraal may once have been present (Fauvelle-Aymar *et al.* 2006). Various studies on the plains in the western part of the present study area have shown that archaeological material is virtually entirely absent away from the immediate coastline and larger granite outcrops (Hart 2003; Hart & Pether 2008; Kaplan 2007; Orton 2007, 2011; Smith 2011). Within the West Coast Fossil Park (WCFP) boundary, however, is a large deflation hollow on a low hill called Anyskop. In addition to occasional ESA and MSA artefacts, numerous LSA artefacts and burnt stones indicative of hearths have been recorded there (Dietl *et al.* 2005; Kandel and Conard 2012). This site lies 1.5 km from the Alternative 4 transmission line route. Kaplan (2007) also recorded an ephemeral LSA scatter in a shallow blowout to the southeast of Anyskop.

LSA shell middens occur behind the rocky outcrops in the vicinity of Club Mykonos some 7 km southwest of the present study area (Hart 2001; Hart and Gribble 1998; Hart & Jerardino 1998), while another very large midden, Diaz Street Midden was destroyed during construction

of the Saldanha Bay police station (Orton 2009). The entire coastline of the Vredenburg Peninsula has shell middens and scatters of varying density all around it (see references in Orton 2014), while the northern shores of Saldanha Bay have revealed a number of smaller sites (e.g. Hart 2003; Kaplan 1994).

LSA burials are relatively uncommon from this area (Morris 1992), although as many as six burials were found in Diaz Street Midden in Saldanha Bay (Dewar 2010).

Historical material is uncommon in the area, but a few sites are on record. About 1.5 km north of distribution substation Alternative C, Kaplan (1996) recorded a shepherd's hut and collected an associated scatter of late 19th century material. Orton (2007) found a scatter of late 19th or early 20th century glass and ceramics some 8.5 km west of the distribution substation sites but the scatter did not appear to be associated with anything. About 4 km southwest of these substation sites Kruger (2016) located an historical farm complex that included ruins, a threshing floor and two middens with historical artefacts.

## 5.2. Palaeontological aspects

The bedrock formations in the study area are Malmesbury Group shales and Cape Granite Suite rocks; these are of no palaeontological interest. However, the overlying younger deposits have yielded important fossil finds in a number of localities, especially from the Langebaan, Springfontyn and Velddrif Formations (Pether 2014). Table 2 and Figure 11 summarise the regional stratigraphic and lithological sequence for the study area. Although sparsely distributed, mineralized or sub-fossil palaeontological remains may be encountered in any of the fossiliferous deposits described, including the earliest formations above bedrock which occur at significant depth and are only reached by extensive wind erosion, such as at Elandsfontein, or the deep excavations related to mining, at Langebaanweg and other locations. The earlier Formations are not expected to be encountered during the construction of the powerline, but deeper excavations at the substations may do so as evidenced at the WCFP, Saldanha Steel and the Langeberg borehole (Table 2; Gavin Stigling, personal communication 2016).

In the most recent superficial Witzand Formation rare sub-fossil and more recent remains from archaeological sites and chance finds provide historical distributional information that supplements a sparse published record (Boshoff, Landman, and Kerley 2016; Skead 2011). Coastal dune plumes, some extending many kilometers inland, are a feature of the area. From Yzerfontein, a significant coastal dune plume extends in a roughly north-easterly direction towards and beyond Hopefield (>45 km) (Roberts *et al.* 2009; Roberts & Smith 2008) and from Saldanha Bay and other coastal areas (Roberts *et al.* 2013); over time pulses of advancing aeolian sediments of Middle and Late Pleistocene and Holocene age, interspersed with re-vegetation and erosion, have contributed to this feature, which overlies the older Langebaan Formation, which, in turn, is also subdivided into older and younger elements (Table 2).

Tracts of Recent Witzand Formation sediments overlie the Springfontyn Formation sediments, which are known to include fossils of Pleistocene age, including the significant occurrence at Elandsfontein. On the coast, marine mollusc deposits occur in the Velddrif and other Formations (Pether 2014; Kilburn & Tankard 1975; Rogers 1980).

Partially exposed, and underlying these deposits, is the ubiquitous calcareous Langebaan Formation, which is the white-coloured calcrete visible over large surface areas; it has yielded terrestrial and marine fossils (Hendey 1981, 1982; Rogers 1980). Langebaan Formation aeolian deposits are known to contain isolated fossil terrestrial snails, tortoises, ostrich bones and eggshell fragments and other sparsely scattered bones. Significant also are bone concentrations associated with erosion hollows in older Langebaan calcrete in which Middle and Late Pleistocene hyenas have left large accumulations of their prey at Sea Harvest (Grine and Klein 1993), Hoedjiespunt (Berger and Parkington 1995; Stynder 1997; Klein 1983), the

Saldanha Yacht Club (Avery 2013, 2014; Manthi 2002) and Besaansklip (Brink 2005). Fossils can also be found within calcrete and between layers of calcrete. Dune slacks with accumulated water may have attracted animals in the past and such localities can produce rich fossil assemblages.

The Langebaan Formation is underlain by the late Pliocene Uyekraal Formation and early Pliocene Varswater Formation, which includes Langebaanweg, and the middle Miocene Prospect Hill Formation, which has yielded important evidence of an extinct ostrich, and the lowermost, Elandsfontyn Formation, of fluvial origin, known primarily for microfossils and, in particular, plant remains, which have provided details of the middle Miocene palaeoenvironment, which included forest trees and palms (Rogers 1980; Coetzee 1978; Roberts *et al.* 2013) (Table 1).

Although palaeontological remains are not normally associated with very ancient rocks like the Cape Granite suite and Malmesbury Group bedrock, such rocks (and some older Langebaan Formation calcretes) may, nevertheless, provide features, such as holes and overhangs that were used by animals who in turn left the bones of their prey in these contexts.

**Table 2:** Summary of the stratigraphy and lithology of the Sandveld Group (Pether *et al.* 2000), Pether (2014), Roberts *et al.* (2006) and G. Avery (pers. observation). Source: modified from Pether (2013: table 2).

| Formation | Age and Lithologies | Fossil Potential |
|---|---|---|
| Witzand | Holocene and recently active calcareous dune fields and cordons (<~12 ka) | Rare sub-fossils of importance for historical faunal distribution. Mainly Later Stone Age archaeological sites. |
| Springfontyn | Pleistocene to Recent (Holocene) quartzose sand dunes, silts and peats (<~2 Ma) | Mineralized bones generally sparse, but can be prolific in some areas, e.g. Elandsfontein and part of Baard's Quarry. High significance |
| Langebaan | Late Quaternary aeolianites <~3 Ma | Mineralized bones moderately common. Local to high significance. Extends under sea. Local to high significance |
| Velddrif | Quaternary raised beaches and estuarine deposits <~1.2 Ma. Sea levels below ~15 m asl | Marine molluscs common and rare bones at or near the coast. High significance |
| *Marine erosion surfaces below ~15 m asl.* | | |
| Old indet. sands | | |
| Langebaan | Late Pliocene to mid- Quaternary aeolianites. <~3 Ma | Molluscs and sparse (can be patchy concentrations, e.g. Langebaanweg, bones of terrestrial and marine forms. Extends under sea. Local to high significance |
| Uyekraal -- Previously subsumed in the upper Varswater Fm | Mid-Pliocene marine deposits ~3 Ma. Sea-level max. ~35 m asl | Shell fossils common, local significance. Fossil bones very sparse, high significance |
| *Marine erosion surface to ~35 m asl* | | |
| Old indet. sands | | |
| Langebaan | Earlier Pliocene aeolianites <~3 Ma. | Fossil bones moderately common, local to high significance |
| Varswater – upper | Later early Pliocene regressive deposits of wider area. 5-4 Ma. Sea-level max. ~50-60 m asl | Fossil bone rare, high significance. Poorly known, fossil shells of high significance |
| Varswater – lower | Early Pliocene transgressive marine deposits in embayments (upper KGM?, LQSM and MPPM members | Fossil bone common locally, high significance. Shells very sparse, high significance |
| *Marine erosion surface to ~ 60 m asl* | | |
| Very old indet sands | | |
| Prospect Hill | Miocene aeolianite 12 to 9 Ma | Fossils very sparse – high significance |
| Saldanha | Mid-Miocene marine deposits (predicted presence), 17-14 Ma. Sea-level max. ~90 m asl. May Include the lower KGM? | Very few fossils recovered, high significance if found. |
| *Marine erosion surface to ~100 m asl* | | |
| Langeenheid Clayey Sand -- Previously a member of the Lower Varswater Fm | Mid Miocene early-transgression estuarine deposits (prev. LCSM Member in lower Varswater Fm.). 18-17 Ma. | Plant microfossils – high significance |
| Elandsfontyn | Middle to late Miocene fluvial coarse, angular sands, muds and carbonaceous sediments. ~15 Ma to ~12 Ma | Microfossils, including pollens, and macro remains of plants, high significance |

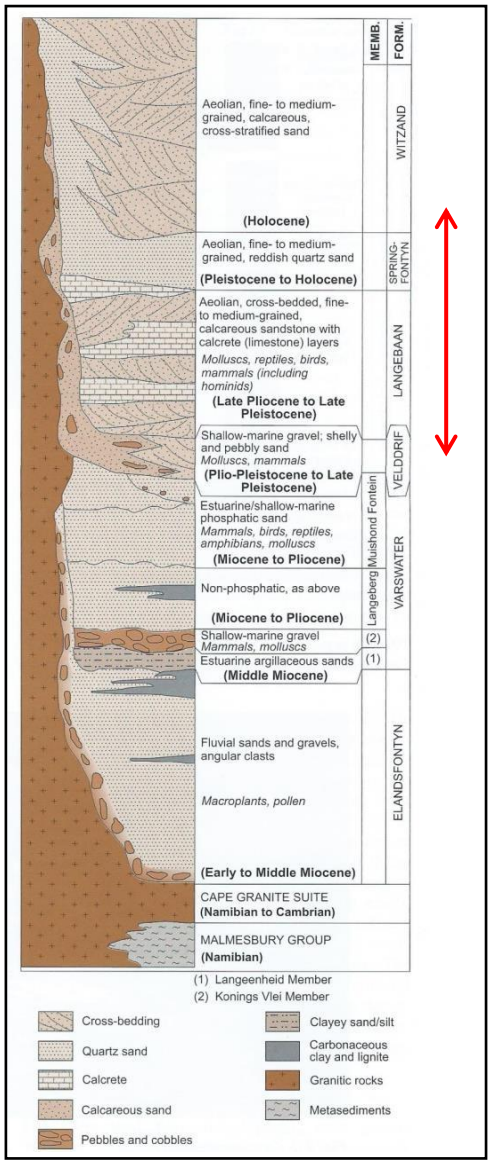



**Figure 11:** Composite summary of Sandveld Group Lithostratigraphy in the Saldanha region (Roberts *et al.* 2006). Formations most likely to yield palaeontological remains are arrowed.

The Springfontyn, Langebaan, Velddrif and Uyekraal Formations would be the most likely sediments to yield palaeontological material, although considerably-deeper fossil-bearing sediments (Lower Langebaan, Uyekraal, Varswater, Prospect Hill, Saldanha, Langeenheid and Elandsfontyn Formations) also underlie the project area (Roberts et al. 2006; Roberts et al. 2011; Roberts and Brink 2002; Pether 2013). In this context, preserved Pleistocene archaeological material is unlikely to be older than the Springfontyn Formation (Braun, Levin, Stynder, et al. 2013; Klein et al. 2007; Avery, in preparation a & b; Fuchs *et al.* 2008; Felix-Henningsen *et al.* 2003; Kandel & Conard 2012) where it overlies, or is in the topmost, Langebaan Formation, as at Elandsfontein and Anyskop.

Locations of local palaeontological sites are shown on Figure 12. Highly significant sites are remarkably rich and include, for example, the well-known Early Pliocene terrestrial, fluvial and marine palaeontological occurrence in the Varswater Formation at the WCFP with deposits laid down during a higher sea level. It should be noted that the WCFP, which was declared a National Heritage Site (NHS) on 28 November 2014 for its outstanding scientific value, lies immediately east of the northern end of transmission line Alternative 4 and transmission substation Alternative F. The gazetted notice contained the following description of its significance (SAHRA n.d.):

> The West Coast Fossil Park at Langebaanweg is a five million year old fossil bed that was discovered in the floor of an open cast phosphate mine in the 1960s. Since then, researchers at the Iziko: South African Museum have amassed over one million vertebrate fossils from controlled excavations, surface collecting and bulk sampling in different parts of the mine. These fossils have achieved international acclaim by scientists for their superb preservation, abundance and richness in diversity to the extent that this locality is now widely regarded as possibly the most important Early Pliocene terrestrial fossil occurrence in the world.

Research into the deposits of the WCFP has been extensive (Eze & Meadows 2014; Franz-Odendaal *et al.* 2002; Franz-Odendaal 2002; Govender 2014; Govender *et al.* submitted; Govender & Chunsamy 2013; Haarhof 1988; Halkett & Hart 1999; Hendey 1969, 1981; Manegold *et al.* 2014; Matthews *et al.* 2015; Merceron & Unger 2005; Olson 1985; Pavia *et al.* 2014; Pether 2009; Rich 1980; Rich & Haarhof 1985; Roberts *et al.* 2011; Rossouw *et al.* 2009; Simpson 1975, 1979; Singer 1961; Smith & Haarhof 2006).


**Figure 12:** Locations of known palaeontological sites in the Saldanha area (details in Table 3).

Equally well-known is Elandsfontein (Archer 2010; Avery 1988; Braun, Levin, Stynder, et al. 2013; Inskeep and Hendey 1966; Klein 1978, 1988; Klein & Cruz-Uribe 1991; Klein *et al.* 2007; Luyt *et al.* 2000; Mabutt 1956; Singer 1954; Singer & Wymer 1968; Smith & Stynder 2015; Stynder 2009; Vrba 1982) which lies within 6 km of the transmission route to the south of the Aurora Substation. This site is a declared Provincial Heritage Site (PHS) and has ESA, MSA and LSA remains as well as a diverse terrestrial fauna in the context of water bodies. Spreeuwalle, which has yielded far fewer fossils (unpublished data referenced in Klein *et al.* 2007), and the 117 000 year old human and animal tracks (trace fossils) preserved in aeolianite (Roberts & Berger 1997) both lie along the shores of the Langebaan Lagoon. Also important is the Early Pliocene marine Varswater occurrence at Saldanha Steel (Roberts 1997b).

Fossils, many in Middle Pleistocene hyaena accumulations, have been found in Langebaan Formation sediments in a number of excavations in the vicinity, including at the Namakwa Sands smelter (Pether 2006; 1.5 km north of distribution substation Alternative C), Besaansklip Mine (Brink 2005), SALKOR (Pether 2011), and on the coast at Sea Harvest (Grine & Klein 1993) and Hoedjiespunt (Berger and Parkington 1995; Churchill, Berger, and

Parkington 2000; Hare and Sealy 2013; Matthews, Denys, and Parkington 2005; Stynder et al. 2001; Stynder 1997; Klein 1983). The latter site also yielded human remains. These and other sites contribute significantly to knowledge on past biodiversity and the development of past human behaviour. The area is palaeontologically and archaeologically sensitive; however, with a few notable exceptions, it remains understudied.

**Table 3:** Summary details for palaeontological and Pleistocene archaeological sites shown in Figure 12. See Table 2 for regional stratigraphy and lithological and chronological details.

| Site | Formation | Selected References | Type of Occurrence | Acronym |
|---|---|---|---|---|
| Besaansklip | Langebaan | (Brink 2005); National Museum, Bloemfontein | Palaeontology. Hyaena den accumulation in Langebaan Formation. | Bklip |
| Brandsfontein | | (Pether 2013) | Palaeontological. Farm name only. (Pether 2013), Fig. 5. In same area as the JO sites, which are plotted. | JO |
| Danger Bay | Velddrif | (Pether 2014) | Palaeontological. Molluscs in raised beach deposits <15 m asl. | DangerB |
| Die Witsand | | (Pether 2013) | Palaeontological. Farm name only. (Pether 2013), Fig. 5. | DieWit |
| Donkergat – Military area | Langebaan (upper) | G Avery pers. observation | Palaeontological. Bones of small terrestrial vertebrate (*Bathyergus suillus*) in upper aeolianite exposure. | Dgat |
| Eensaamheid – Wind Farm proposal | Springfontyn Langebaan ?Varswater | (Avery and Avery 2009) | Palaeontology. Langebaan Formation included fossil gastropod *Trigonephrus globulus*. | Ens |
| Elandsfontein | Springfontyn-Langebaan erosion surface? | (Orton 2007); GAvery pers Observation; (Avery 2015) | Palaeontology and Pleistocene archaeology. Scattered mineralized bone fragments and artefacts in blow outs NNW of the "Main" Site. | JO; Rftn; EFTph |
| Elandsfontein | Springfontyn-Langebaan mixed exposure | (Avery 2015; Avery, in preparation a & b; Plasket 2013; Halkett and Webley 2015) | Eroded Langebaan Formation outcrops. Sparse fragments of mineralized bone and sparse MSA/ESA artefacts (and see Elandsfontein Wes). | J-LP |
| Elandsfontein – "Bone Circle" | Langebaan | (Inskeep and Hendey 1966; Luyt, Lee-Thorp, and Avery 2000); Iziko South African Museum Cenozoic Collections | Palaeontological. Hyaena accumulation. | EFT bon |
| Elandsfontein – "Main" Site | Springfontyn; Langebaan; Varswater; Elandsfontyn | (Archer 2010; Avery 1988, in preparation a & b; Braun, Levin, Roberts, et al. 2013; Braun, Levin, Stynder, et al. 2013; Inskeep and Hendey 1966; Klein et al. 2007; Klein 1978; Klein and Cruz-Uribe 1991; Luyt, Lee-Thorp, and Avery 2000; Roberts and Braun 2014; Smith and Stynder 2015 In Press; Stynder 2009; Singer and Wymer 1968; Rogers 1980; Drennan 1953, 1954; Klein 2009; Volman 1984; Goodwin 1953); Iziko South African Museum Cenozoic Collections, UCT | Palaeontological and Pleistocene Archaeological. Provincial Heritage Site. Well-preserved fossils and artefacts exposed in dune slacks by wind erosion. Diverse terrestrial vertebrate taxa, plants (pollens); Early Stone Age (ESA) – Late Acheulean.in probable association with fossils in the Cutting 10 excavation. Rare Middle Stone Age (MSA) – Still Bay artefacts. Early *Homo sapiens* (*Homo heidelbergensis*) cranial remains contemporary with ESA. Hyaena accumulations contiguous with general surface. | EFT Main |
| Elandsfontein – Phosphate Mine terraces | | (Goodwin 1953; Mabbutt 1956; Avery, in preparation a & b; Halkett and Webley 2015) | Palaeontological and Archaeological. In the past deflated areas extended west and south of Elandsfontein "Main". Scattered fossils and Pleistocene artefacts were reported. Such scatters on the Springfontyn/Langebaan Formation erosion surface have been encountered during excavations for infrastructure. Finds on spoil heaps were collected, but are not plotted on Figure 18 since their provenience is unknown. | EFTPh |

| Site | Formation | Selected References | Type of Occurrence | Acronym |
|---|---|---|---|---|
| Elandsfontein Wes | Springfontyn-Langebaan erosion surface | (Mabbutt 1956; Singer and Wymer 1968; Roberts and Braun 2014; Plasket 2013; Avery, in preparation a & b; Goodwin 1953; Halkett and Webley 2015) | Palaeontology and Pleistocene archaeology. Sparsely scattered mineralized bones, very rare stone artefacts, exposed in blow outs and by excavations for mine infrastructure. | EFT W |
| Geelbek – dunes | Springfontyn ; Langebaan | (Felix-Henningsen, Kandel, and Conard 2003; Kandel, Felix-Henningsen, and Conard 2003; Fuchs et al. 2008; Dale and McMillan 1999) | Palaeontological. Terrestrial vertebrates. MSA artefacts. Not in Saldanha Municipal area. | Gbek Main |
| Geelbek – old road | ?Springfontyn | G Avery pers. observation | Palaeontological. Between old road and head of lagoon Mineralized fragments, including elephant. Not in Saldanha Municipal area. | Gbekfos |
| Groenheuwel – Massenberg | | (Pether 2013) | Palaeontological. Farm name only (Pether 2013), Fig. 5. | Mberg |
| Hoedjiespunt – hyaena | Langebaan | (Klein 1983; Berger and Parkington 1995; Churchill, Berger, and Parkington 2000; Hare and Sealy 2013; Stynder et al. 2001; Stynder 1997; Woodborne 2000; Grine and Klein 1993); Iziko South African Museum Cenozoic Collections | Palaeontological. Brown hyaena den in eroded ridge of Langebaan Formation with terrestrial and marine taxa and modern *Homo sapiens* remains. | HDP1 |
| Hoedjiespunt – Middle Stone Age | Langebaan | (Woodborne 2000; Kyriacou et al. 2015; Stynder et al. 2001; Stynder 1997; Will et al. 2013); Iziko South African Museum Cenozoic Collections, UCT | Middle Stone Age artefacts associated with shell midden, which includes terrestrial and marine vertebrate taxa. | HDP1 |
| Kalkklipfontein | | (Pether 2013) | Palaeontological. Farm name only provided (Pether 2013), Fig. 5). | Kklipftn |
| Kraalbaai | Langebaan (Kraalbaai Member) | (Roberts and Berger 1997; Roberts and Brink 2002) | Trackway of modern human *Homo sapiens* footprints; spoor of probable hyaena. Exposed between fractured cross-bedded structures of aeolianite. Rare vertebrate bones. | Fprint |
| Kraalbaai | Langebaan (lower?) | (Rogers 1980; Compton and Franceschini 2005; Pether 2013; Theron et al. 1992; Almond 2012) | Marine Molluscs underlying aeolianite. | Fprint |
| Kreeftebaai – Tierbank, Postberg | Velddrif | (Flemming 1977; Pether 2013); G Avery pers. observation | Palaeontological. Molluscs, including extinct *Crepidula capensis praerugulosa* in calcrete. (Pether 2013), Fig. 5. | Kreef2 |
| Kreeftebaai – Tierbank, Postberg | ?Velddrif | (Flemming 1977; Pether 2013) G Avery pers. observation | Palaeontological. Molluscs in loose raised beach deposits above HWS. Palaeontological. (Pether 2013), Fig. 5. | Kreef1 |
| Langebaanweg – E Quarry | Elandsfontyn | (Coetzee 1978); Iziko South African Museum Cenozoic Collections | Macro and micro plant remains, underlying Varswater Formation, encountered during boring for water. | LBW |
| Langebaanweg – E Quarry | Langebaan; Varswater (including Saldanha) | (Hendey 1974; Grine and Hendey 1981; Hendey 1981; Roberts et al. 2011); Iziko South African Museum Cenozoic Collections | Palaeontological. National Heritage Site of global importance. Sub-surface, reached during mining. Highly diverse terrestrial, aquatic, marine vertebrate taxa; marine molluscs. Most taxa extinct. Plant taxa (pollens). Primates very rare, no hominins. Sea level > 40 m. | LBW |
| Langebaanweg – Baard's Quarry | ?Langebaan; Varswater | (Hendey 1978); Iziko South African Museum Cenozoic Collections | Palaeontological. Sub-surface, reached during mining. Probably mixed Pliocene and Lower Pleistocene in river channels. Terrestrial and marine/estuarine vertebrate taxa. | Baard's |
| Langebaanweg–Anyskop | Springfontyn | (Dietl, Kandel, and Conard 2005); Iziko South African Museum Cenozoic | Middle and Late Pleistocene archaeological. Early Stone Age (ESA) artefacts – Late Acheulean – and Middle Stone Age – | Akop |

| Site | Formation | Selected References | Type of Occurrence | Acronym |
|---|---|---|---|---|
| | | Collections | Howiesons Poort. | |
| Langeberg 188 | Langebaan or Varswater | G Avery, this survey. Gavin Stigling – owner – pers com. | Palaeontological. Sub-surface, reached in borehole. Langebaan Fm. Encountered marine shells at 15 m. This is the depth at which Varswater Fm. Marine marine shell deposit was recorded during the Saldanha Steel plant excavations (Roberts 1997b). | L188 |
| Langfontein | Varswater; Uyekraal | (Pether 2013) | Palaeontological. Farm name only provided (Pether 2013), Fig. 5. | Lftn |
| Lime Quarry – Hoedjiesbaai | Langebaan | (Cooke 1955; Hendey 1974) | Palaeontological. Marine fossils. First fossil otariid seal recorded in South Africa, (Cooke 1955), p166. | LQ |
| Namaqua Sands Smelter | Langebaan ?Uyekraal ?Varswater | (Pether 2006) | Palaeontology. Bones, from Langebaan Formation noted in nearby borrow pit. Likelihood of intersecting fossiliferous formations if excavation is deep enough. | Nsand |
| Oosterwal | Langebaan | (R. Govender, pers. comm.); Iziko South African Museum Cenozoic Collections | Palaeontological. Marine fish and mollusc remains on intertidal platform. | Owal |
| Prospect Hill – lower quarry | Langebaan (Diaz Member) | (Almond 2012; Roberts and Brink 2002; Avery 1997; Roberts 1997a; Pether 2012; Pether 1995) | Palaeontological. Younger calcareous deposit abutting on upper Prospect Hill deposits with marine molluscs in lime mine, abutting against older Prospect Hill. Terrestrial molluscs. | LPH |
| Prospect Hill – upper | Prospect Hill | (Avery 1997; Roberts and Brink 2002; Pether 1995; Pether 2012); Iziko South African Museum Cenozoic Collections | Palaeontological. Calcareous aeolianites with terrestrial vertebrates and fossil gastropod *Trigonephrus globulus*. | UPH |
| Rietfontein | | (Avery 2015; Pether 2013; Webley and Halkett 2015) | Ephemeral traces of mineralized bone and stone artefacts. | Rftn |
| Saldanha Bay – Iron Ore Terminal | Langebaan; Varswater | (Hart and Pether 2008) 2008); G Avery pers. observation); Iziko South African Museum Cenozoic Collections | Palaeontological. Fossils recovered from sediments during dredging. | Term |
| Saldanha Port – Portion 16 Pienaars Poort 197 | ?Velddrif | G Avery pers. observation | Palaeontological. Marine molluscs exposed in borrow pit. | SP |
| Saldanha Steel | Langebaan; Varswater | (Pether 1995; Roberts 1997a; Avery and Klein 2011; Avery 1994); Iziko South African Museum Cenozoic Collections | Palaeontological. Sub-surface, reached during deep excavation for foundations. Some terrestrial *Trigonephrus globulus* in Langebaan Fm. In the Varswater Fm. mostly marine molluscs with sparse marine vertebrate species, some extinct. Recorded presence of "crocodile" is incorrect – teeth are of fish. | SSt |
| Saldanha Yacht Club – Barn Owl | Langebaan | (Manthi 2002) | Palaeontological. Barn Owl roost with micromammal taxa. | YC |
| Saldanha Yacht Club – hyaena | Langebaan | (Avery 2014, 2013); Iziko South African Museum Cenozoic Collections | Palaeontological. Brown hyaena den with terrestrial taxa. | YC |
| Sea Harvest – hyaena | Langebaan | (Grine and Klein 1993; Butzer 2004; Klein 1983); Iziko South African Museum Cenozoic Collections | Palaeontological. Brown hyaena den with terrestrial and marine taxa and modern *Homo sapiens* remains. In crevices eroded into the Langebaan Formation. Rhizoliths (root castes) and *Trigonephrus globulus* in aeolianites. | SH |
| Sea Harvest – Middle Stone Age | Langebaan | (Grine and Klein 1993; Volman 1978; Butzer 2004); Iziko South African Museum Cenozoic Collections | Archaeological. Middle Stone Age shell midden contiguous with adjacent hyaena dens. In eroded Langebaan Formation crevice/overhang. | SH |
| Skurwerug | Langebaan | (Hendey and Cooke 1985; Tankard 1976; Rogers 1982); Iziko South African Museum Cenozoic Collections | Palaeontological. Excavations for crude oil storage encountered a small patch of important terrestrial fossils, including an extinct pig. | Srug |

| Site | Formation | Selected References | Type of Occurrence | Acronym |
|---|---|---|---|---|
| Spreeuwalle | Langebaan | (Flemming 1977; Avery et al., in preparation); Iziko South African Museum Cenozoic Collections | Palaeontological and Pleistocene archaeological. Diverse terrestrial taxa; aquatic and terrestrial molluscs. Date on overlying calcrete duricrust of 59 ka (W. Sharp, pers. comm.). Intertidal – formed during period of lower sea level. | SPW |
| Vredenburg – urban | ? | P. Haarhof, pers. comm., G Avery, pers. observation | Palaeontological. Small pocket of bones against granite mass. Probably collected by hyaena. | Vu |
| Zoutekuyl | | (Pether 2013) | Palaeontological. Farm name only. (Pether 2013), Fig. 5. | Zkuyl |

Figure 13 indicates the expected palaeontological sensitivity of the area as sourced from the SAHRIS Palaeo-sensitivity map. This is only a guide and local variations in the density of fossils can result in higher or lower significances being applicable. It is clear, though, that the bulk of the study area does have the potential to bear important subsurface palaeontological heritage resources.

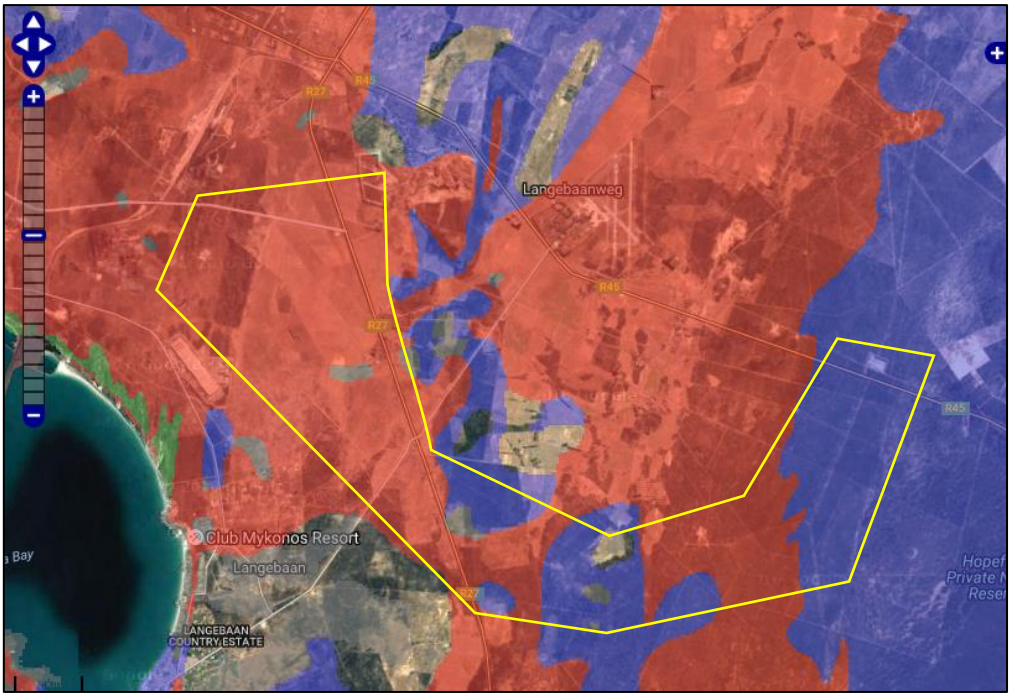



***Figure 13:*** *Extract from the SAHRIS Palaeosensitivity map indicating areas expected to be of very high (red shading), moderate (green shading) and low (blue shading) sensitivity. Unshaded areas are unknown.*

### 5.3. Built environment

Old buildings of significance are uncommon in this area. Fransen (2004) reports a number of important heritage structures around Langebaan Lagoon, largely within the West Coast National Park. However, he also lists the house at Was(ch)klip which he estimates to be from about 1860 and to which he assigns a 'minor monument' significance rating. This house lies 1.5 km southwest of the shared power line corridor. Orton (2011) reported a suite of old buildings on the farm Uyekraal (Figure 11) and which lie just across the R27, some 300 m west of the Alternative 4 and 6 transmission line routes. Three of the structures on this farm, one of them in partial ruin, were suggested to be of Grade IIIB significance.

***Figure 14:*** *A typical stone-walled, tin-roofed vernacular farm structure on the farm Uyekraal 189 (Source: Orton 2011:figure 14).*

## 6. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Table 4 provides a list of findings.

***Table 4:*** *List of heritage resources recorded in the study area. Note that although corridors are being assessed the distances from project components given here are as measured from the indicative layout provided by the client.*

| GPS | Co-ordinates | heritage resource | description | significance, grade and mitigation |
|---|---|---|---|---|
| 229 | S33° 00'19.9" E18° 05'44.4" | Uyekraal farm complex | Complex including a number of vernacular buildings of varying age, function and intactness. See full description in Orton (2011). 1868 survey diagram shows a 'dwelling house' in this location. Nearest structures are some 300 m from the proposed Alternative 4 and 6 transmission lines. | » Medium<br>» Grade IIIB<br>» No mitigation required |
| 230 | S33° 00' 4.5" E18° 05' 53.3" | Gum tree line (cultural landscape) | A gum tree line of some 850 m in length that lies on the boundary between Everts Hope 190 and Langeberg 187. The trees are smaller towards the east and a number of spaces occur. The Alternative 4 and 6 transmission lines pass through this tree line. | » Low<br>» Grade IIIC<br>» Remove as few as possible |
| 232 | S32° 59' 54.7" E18° 05' 52.9" | Gum tree line (cultural landscape) | A gum tree line of some 500 m in length separating farm portions. The trees are smaller towards the east. The Alternative 4 and 6 transmission lines pass within 20 m of the west end of this tree line. | » Low<br>» Grade IIIC<br>» Remove as few as possible |
| 233 | S32° 59' 49.0" E18° 05' 49.1" | Ruined historic cottage | Ruined vernacular long house with all walls intact but roof and joinery are missing. The walls were of rough calcrete blocks and mud with plaster outside. Door frames still present. One window frame surrounded by red brick and cement was obviously a later addition. Possibly late 19th/early 20th century. Very large pepper tree occurs immediately alongside the structure to its west. Site lies directly within the path of the Alternative 4 and 6 transmission lines. | » Low-medium<br>» Grade IIIC<br>» Avoid, or else record in detail before demolition |

| | | | | |
|---|---|---|---|---|
| 234 | S32° 59′ 51.4″<br>E18° 05′ 49.1″ | Old pepper trees (cultural landscape) | Three old pepper trees, one with very broad trunk (>1 m diameter) and several old prickly pears in a cluster between sites 233 & 235. Site lies directly within the path of the Alternative 4 and 6 transmission line routes. | » Low<br>» Grade IIIC<br>» Avoid |
| 235 | S32° 59′ 54.6″<br>E18° 05′ 47.6″ | Ruined historic cottage | Ruined vernacular long house with walls mostly tumbled/partially demolished. They were built of rough calcrete blocks and mud, although one collapsed section showed the use of some red bricks and cement in a later addition. Medium-sized manitoka and pepper trees occur alongside the ruin. Possibly late 19th/early 20th century. Site lies some 30 m west of the Alternative 4 and 6 transmission line routes. | » Very low<br>» NCW<br>» Avoid or else record before demolition |
| 236 | S32° 59′ 47.9″<br>E18° 05′ 50.6″ | Ruined historic structure | Ruined remains of a small farm structure of unknown form and function. Very poor state of repair. Site lies some 50 m east of the Alternative 4 and 6 transmission line routes. | » Very low<br>» NCW<br>» No mitigation required |
| 237 | S32° 59′ 46.4″<br>E18° 05′ 50.6″ | Ruined historic kraal complex | Ruined historic kraal and barn complex. Roof and original joinery all missing but a few more recent gates and fences occur. Site lies some 75 m east of the Alternative 4 and 6 transmission line routes. | » Low<br>» Grade IIIC<br>» Avoid or else record before demolition |
| 238 | S32° 59′ 45.9″<br>E18° 05′ 49.0″ | Gum tree line (cultural landscape) | A 70 m long line of old gum trees that lies within 30 m of and parallel to the Alternative 4 and 6 transmission line routes. | » Very low<br>» NCW<br>» No mitigation required |
| 239 | S32° 58′ 24.4″<br>E18° 05′ 30.5″ | Ruined historic structure | Ruined vernacular stone and mud long house (it was L-shaped at an early date) but has been added to over time and the roof raised to become a typical rectangular mid-20th century farm cottage. Some old door and window frames and some 20th century examples and roof beams present but all other joinery is missing. Visible in 1938 aerial photography. The site lies 280 m southwest of the Alternative 4 transmission line and 170 m east of the Alternative 6 transmission line. | » Low<br>» Grade IIIC<br>» No mitigation required |
| 240 | S32° 58′ 25.1″<br>E18° 05′ 30.5″ | Historic and modern dump | Low density dump of 19th and 20th century glass, ceramics, metal, etc. located 20 m south of the ruin at site 239. | » Very low<br>» NCW<br>» No mitigation required |
| 241 | S32°58'33.4″<br>E18° 05'41.7″ | Gum tree line (cultural landscape) | An L-shaped line of old gum trees on the southern and eastern sides of a farm complex. The two arms of this tree line are 410 and 220 m long respectively. Post-dates 1938. | » Low<br>» NCW<br>» No mitigation required |
| 242 | S33° 00′ 55.7″<br>E18° 05′ 28.2″ | cultural landscape | Broken wind pump and small cement reservoir that form part of the rural landscape. The site lies directly within the Alternative 3 transmission line route. | » Very low<br>» NCW<br>» No mitigation required |
| 243 | S33° 00′ 02.4″<br>E18° 04′ 26.1″ | Demolished 20th century farm complex | Several structures and features of a 20th century farm complex that have been demolished. One structure remains standing. They were built of stone, brick and cement. Most materials seem to be modern but some dressed calcrete blocks | n/a |

| | | | | |
|---|---|---|---|---|
| | | | and a broken vernacular styled low wall betray the presence of older fabric. Includes a main house, outbuildings (one of which is the standing structure) and a round brick and cement reservoir. Some decorative breeze blocks in one area. A number red clay frog bricks at the main house have "KB&T Co" imprinted on them may have been imported from the USA where the Kansas Brick and Tile Company has been in operation since 1954 (Lusco Brick & Stone Company n.d.). The bulk of the complex appears to be less than 100 years old and is thus not protected under the NHRA, although the 1938 aerial photograph shows a busy farm complex to have been present, but with a different configuration. It lies 250-350 m south of the distribution line routes. | |
| 244 | S33° 00' 2.1"S E18° 04' 21.4" | Gum tree line (cultural landscape) | A 270 m long line of old gum trees that lies west of site 243. A small clump of gum trees some 120 m to the east protected the main house from the southeast wind. Post-dates 1938. | » Low<br>» Grade IIIC<br>» Remove as few as possible |
| 245 | S33° 01' 28.4" E18° 05' 15.8" | Ruined historic structure | Ruined vernacular gabled farm house with loft accommodation and an external masonry staircase on the intact northern gable. The southern end has a large hearth-and-chimney stack, but the gable has collapsed. The front of the house (west face) has a door and three windows. A large room was added to the rear (east) face with a large (tractor-sized) opening bearing a concrete lintel and animal feeding troughs. A room was also added to the north of this room extending beyond the original north gable. The structure is built from beautifully dressed calcrete and cement and is likely early 20$^{th}$ century in age. Whether it is more than 100 years old and legally protected or not remains unknown. The 1938 aerial photography appears to show the original section of the house without the addition to the east, although this is not clear. It also seems that there were one or more structures to the northwest that have since been entirely removed. The house does not appear on an 1870 survey diagram, although another does at the main Waschklip farm complex. The house is 950 m southwest of the Alternative 3 transmission line and will not be affected. | » Medium<br>» Grade IIIB<br>» None (located outside study area) |

## 6.1. Archaeology

No Stone Age archaeological resources were located. This was expected and is consistent with the finding of other assessments as described above.

A number of historical archaeological resources were found. These included a variety of structures in varying states of ruin as well as a scatter of glass, ceramic and metal artefacts located close to one of the ruins. Details of these finds are presented in Table 4. The ruins are

strongly vernacular and are built in styles and with methods that are typical of the Vredenburg Peninsula area. Walls are frequently of calcrete blocks and are built with two skins of rocks. The space between the skins was filled with rubble and mud. Figures 15 to 18 show examples of two farm labourers' cottages that were located on the periphery of the historical farm complex on Langeberg 187 (see aerial photography below). Other structures forming part of the complex are situated nearby and presumably functioned as a barn/stable and livestock enclosures (Figures 16 & 20). At least one further structure is preserved and still in use on a neighbouring property (a relatively recent subdivision) but it was not visited and its intactness is unknown. A number of other structures have been completely removed from the complex, while many modern structures have been added on the subdivided portion to allow its use as an accommodation and function venue. It is almost certain that the majority of these structures are at least late 19th century in age. An 1868 survey diagram for the property shows a 'dwelling house' in the vicinity of this farm complex which means that at least some part of the complex is around 150 years of age, whether a standing structure or not remains unknown.

***Figure 15:*** *The north gable of the ruin at waypoint 233.*

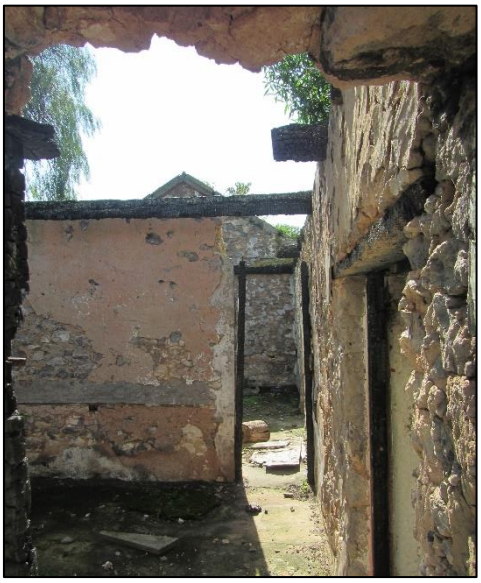


***Figure 16:*** *Interior of the ruin at waypoint 233.*

***Figure 17:*** *The ruin at waypoint 235 with showing surrounding trees.*

***Figure 18:*** *The ruin at waypoint 235 the walls made with two calcrete skins and a rubble fill.*

***Figure 19:*** *Historical farm complex at waypoint 237, to the north of the two cottages. The structure to the right seems to have been a barn/stable.*

***Figure 20:*** *Feeding trough inside part of the historic farm complex at waypoint 237. Note the calcrete block walls.*

The location of the Langeberg 188 farm complex had very few historical buildings. Some may be preserved in the modern complex but this was not determined on site. Nearby there is an outlying ruin that began as an L-shaped, probably late 19th century house but was extended during the mid-twentieth century to become a rectangular house (Figures 21 & 22). Outside this ruin, to its southwest, there was a scatter of historical artefacts that included glass, ceramics and metal (Figures 23 & 24). The scatter inlcudes both obvious 19th and 20th century materials but with the bulk likely to be late 19th century. The scatter is of low density and cannot be referred to as a midden.

***Figure 21:*** *The ruin at waypoint 239 as seen from the southwest.*

***Figure 22:*** *The interior of the ruin at waypoint 239.*

***Figure 23:*** *Artefacts from the historical scatter at course waypoint 240. Scale in cm.*

***Figure 24:*** *A fragment of Asian porcelain 'ginger jar'. Scale in cm.*

The most impressive ruin seen during the survey was on the farm Waschklip at waypoint 245. It was not located within the prescribed study area but, because of the amount of architectural information still preserved it is deemed to have value and be worthy of noting for the record. It was quite an impressive farm house but, oddly, it was not marked on survey diagrams; the main farm complex for this farm lies well to the south. Waschklip was formed through the consolidation in 1870 of Zoutkuil (granted 1845) and Teekoes Klip (granted 1835). The Waschklip complex lies on the old Zoutkuil, while the ruin is on the Teekoes Klip portion suggesting that it could predate 1870. It was a gabled house with loft accommodation, an external masonry staircase, a hearth and chimney stack that were not integrated with the southern gable wall and, on the east side, a barn section with feeding troughs that was added later (Figures 25 to 27). It is evident that the house has had changes over time but it maintained its strong vernacular character. The standing gable has a concrete lintel over the oft door suggesting that the gable may have been rebuilt at some point during the 20$^{th}$ century. It is not possible to tell whether the roof was thatched or corrugated iron originally, but the aerial photography examined below suggests that, in 1938 at least, it might have been thatch. Corrugated iron sheets are present in the ruined additions on the east side of the main house.

***Figure 25:*** *View of the north-western corner of the ruin at waypoint 245 showing the external staircase. The front faces west (right hand side), while additions are visible to the east.*

***Figure 26:*** *Inside view of the still standing north gable showing the concrete lintel above the loft door.*

***Figure 27:*** *The ruin at waypoint 245 as viewed from the south-eastern corner. The added on barn/stabling lies to the right with a wooden feeding trough still visible. The inset shows the internal opening of the hearth.*

### 6.2. Palaeontology

With the exception of terrestrial land snails *Trigonephrus globulus*, which occur commonly, but patchily, in Langebaan formation surface calcrete exposures, no other fossil material was seen during the survey. There was little opportunity to examine subsurface deposits, although two borrow pits into calcrete were located in the south-western part of the study area (Figure 28). No fossils were evident at either location.

***Figure 28:*** *Cutting through calcrete along the east side of the R27 within corridor occupied by all three transmission alternatives.*

Based on the desktop review above, it is highly likely that sub-surface, probably sparsely-scattered, fossils will be present in the study area. The scientifically important finds at the WCFP, Saldanha Steel and Elandsfontein, point to the very high palaeontological sensitivity of the general area. Known occurrences are primarily sub-surface and have usually been encountered during mining and other large excavations, as at the WCFP, the residue dam at Namaqua Sands (Pether 2006) and at the Besaansklip quarry (Brink 2005).

A recent borehole on Langeberg 188, just west of the WCFP, yielded marine shells at 15 m below the surface (Gavin Stigling, personal communication 2016). This depth is coincidental with that at which fossil marine shells and marine vertebrates were encountered during

construction of the Saldanha Steel precinct and suggests that similar finds might be encountered should any excavations proceed to that depth at any of the substation sites which are all in the same area.

On Anyskop, 2 km east of transmission substation Alternative F, Middle Pleistocene MSA stone artefacts and rare bone occur on deflated surfaces of the sandy Springfontyn Formation show that surface finds can occur in the study area. Similar surface finds come from Elandsfontein to the southeast of the study area.

Although many important fossil collections have been made in the Saldanha Bay area, the intervening areas should be treated as unknown, although it can be predicted that sparse fossils may be encountered. As examples of potential, the richness of the globally important WCFP fossil landscape (Hendey 1981), Prospect Hill localities, Elandsfontein (Klein *et al.* 2007), Sea Harvest (Grine & Klein 1993), Hoedjiespunt (Berger & Parkington 1995) and Besaansklip (Brink 2005) localities and their important scientific contributions to knowledge of past animal life should be noted.

### 6.3. Cultural landscape

The landscape in the study area is characterised by three primary land uses. The first, which dominates the western parts, is the rural/agricultural landscape used for dryland agriculture and livestock grazing (Figures 2, 5, 6 & 7). The area was far more open in 1938 with none of the large sheltering wind rows and clusters of gum trees present (e.g. Figure 29). These tree lines do, nevertheless, contribute to the character of the cultural landscape as it stands today.


***Figure 29:*** *View towards the north of the gum tree line at waypoint 230 that separates Uyekraal 189 and Langeberg 187. This tree line was not present in 1938.*

The second landscape type is the relatively undisturbed natural landscape which dominates on the nutrient-poor sands in the eastern parts of the study area (Figures 2, 9 & 10). This is essentially a natural landscape with the only cultural aspects relating to farm tracks and fences. The third landscape aspect is the modern industrial and electrical landscape that is so prevalent throughout the study area. The proposed project will add further electrical infrastructure to this landscape. The presence of the Saldanha Bay IDZ means that further industrial infrastructure will be constructed in the area in the future which will further entrench the industrial nature of the area.

A survey of historical aerial imagery is helpful to examine the ways in which the landscape has changed over time. It is quite evident that the agricultural aspects (structures, gum tree lines and clusters, ploughed lands) have changed considerably. In Figure 30 we see historical and modern views of the Langeberg 188 farm complex and surrounds. It is evident that many

structures have been added to the complex, the large windrow at waypoint 241 was planted after 1938, new lands were cleared for planting, new roads were added and the phosphate mine (now the WCFP) was not yet present.

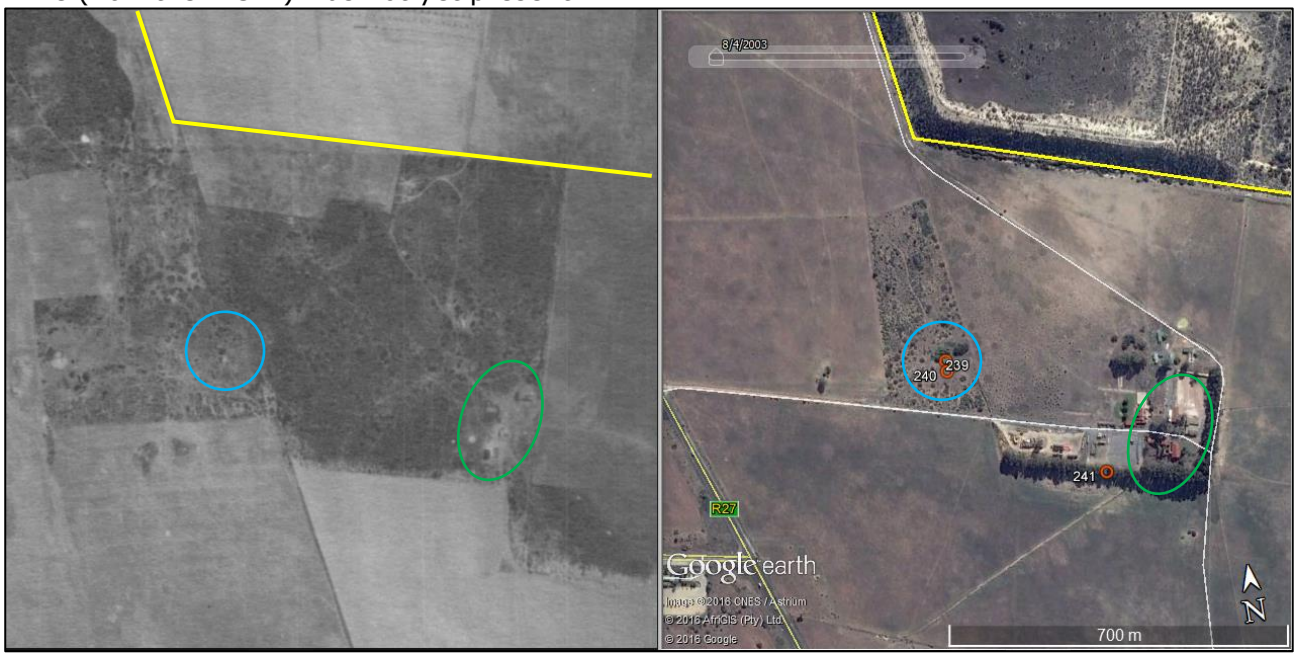



***Figure 30:*** *Historical aerial photograph from 1938 (Job 126, strip 19, photograph 10132) and equivalent modern view showing the house at waypoint 239 and its pepper tree (blue circle) and the farm complex (green oval) on Langeberg 188 in the northern part of the study area. The yellow outline is the south-western corner of the WCFP.*

Figure 31 shows the farm complex on Langeberg 187, just to the south. It is evident that some structures have been demolished to make way for new ones and the large wind row of gum trees (waypoint 232) and smaller one to the northwest (waypoint 232) both post-date 1938. Despite their size, the pepper trees and prickly pears at waypoint 234 appear to not have been present in 1938, or were perhaps too young to be discernible on aerial photography.

In Figure 32 we see the now demolished farm complex in the south-western part of Uyekraal 189. The changes evident over the last 78 years include the planting of a large windrow (waypoint 244), the clearing of further lands around the complex and the subsequent demolition of the entire complex.

Figure 33 shows the north-western Waschklip farmhouse at waypoint 245. In 1938 a secnd large structure was present just to the north, while a smaller structure, presumably a labourer's cottage, lay to the southwest. Although we did not specifically look in these areas, there was obviously little enough left that no evidence of their existence could be seen from a short distance away. There is no sign of them on modern aerial photography. Interestingly, the roof of the main house seems to be dark with a north-south pale line. This could well indicate a thatch roof.

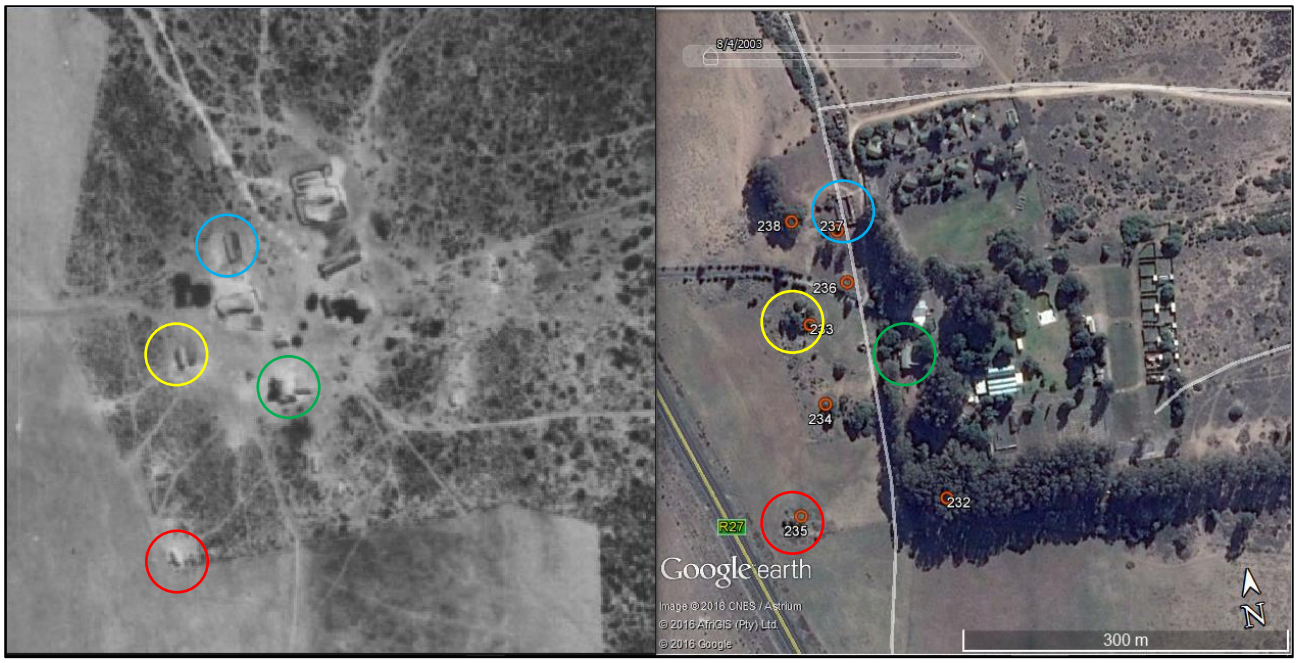



***Figure 31:*** *Historical aerial photograph from 1938 (Job 126, strip 22, photograph 08553) and equivalent modern view showing the house at waypoint 233 (yellow circle), the house at 235 (red circle) and the farm buildings at 237 (blue circle) on Langeberg 187. Another structure that was not visited was also present (green circle) but others to the north have been demolished.*


***Figure 32:*** *Historical aerial photograph from 1938 (Job 126, strip 22, photograph 08552) and equivalent modern view showing the demolished farm complex on Uyekraal 189.*


***Figure 33:*** *Historical aerial photograph from 1938 (Job 126, strip 23, photograph 10843) and equivalent modern view showing the ruined farmhouse at waypoint 245 on Waschklip 183.*

Although already discussed under palaeontology, it is worth noting that Winter and Oberholzer (2013) regarded the WCFP as a Grade II palaeontological landscape (it was at the time a PHS) with the potential to be recognised as a World Heritage Site. It has subsequently been elevated to NHS status as already noted.

### 6.4. Built environment resources

Three extant farm complexes lie within the study area. The first two lie on Langeberg 187 and Langeberg 188, while the third straddles the boundary of Uyekraal 189 and Everts Hope 190 (the complex was split and the western portion added to Uyekraal through a subdivision and consolidation in 1954). The first and last each have a 'dwelling house' marked on an 1868 survey diagram. A fourth complex (now demolished) lies further to the west on Uyekraal 189 and is of no interest here (see Figure 32 above).

The Langeberg 187 complex is now split across two properties and, although falling within the study area corridor, the smaller property was not deemed to be an affected landowner and that property was not examined. At least one standing structure on that property is likely to include old fabric because it corresponds with a structure visible in the 1938 aerial photograph (Figure 31 above). The majority of older structures in this complex have fallen into ruin with useable building materials no doubt having been salvaged over the years. These ruined structures were examined in Section 6.1 above. The standing structures are well-shielded by gum trees and are of no further concern here.

The Langeberg 188 complex is largely modern with at least one structure likely to be old, or to have an old core. Which one was not determined. The project will avoid the complex and it is well-shielded by gum trees.

The Uyekraal/Everts Hope complex was described in Orton (2011) and mentioned in the desktop review above (Section 5.3). It lies to th west of the R27, on the opposite side to the planned transmission lines and only just inside the edge of the study area. It would not be unduly affected by the development.

## 6.5. Other heritage resources

### 6.5.1. Cattle thoroughfare

The 1868 survey diagram for Waschklip 183 shows the presence of a cattle thoroughfare over the property (Figure 34). There is absolutely no sign of this thoroughfare today, either in property boundaries, fence lines, or vegetation patterns. It is labelled "Thoroughfare for cattle of Olifants Kop to Zoutkuil". This suggests that the same person may have owned both farms and was keen to have a passage between them. Olifants Kop was a farm at modern day Langebaan to the southwest.

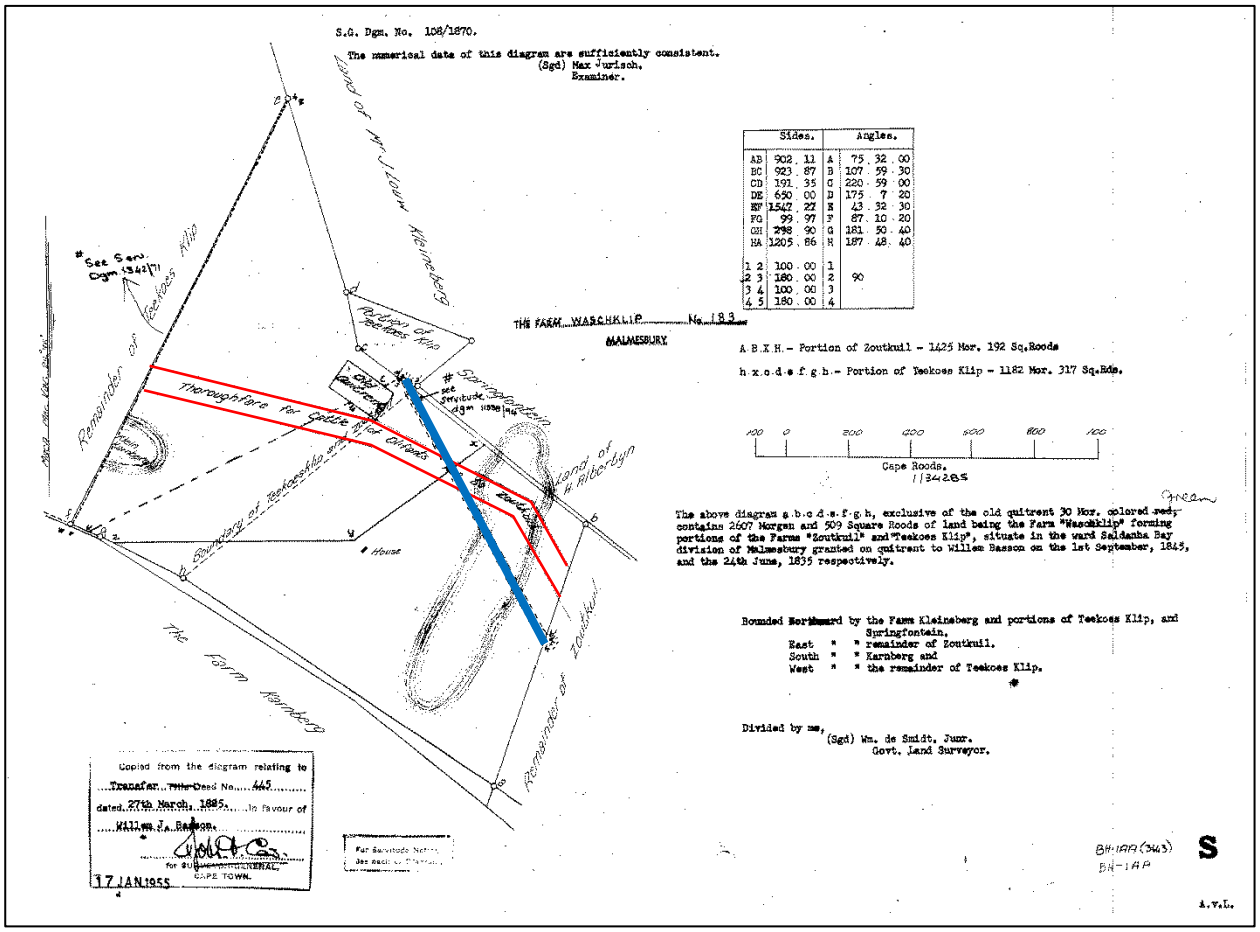



***Figure 34:*** *1870 survey diagram for Waschklip 183 showing the two farm portions that were consolidated to create the farm, the cattle thoroughfare (red outline) and the more recent Eskom servitude which the present project also follows (blue line).*

### 6.5.2. Graves

Although no graves were encountered anywhere in the study area, there is always the possibility that unmarked precolonial graves could be found during development, especially in the sandy areas. However, given the extremely sparse Stone Age archaeology in the inland areas, the chances of this are negligible and do not merit further concern.

### 6.5.3. Scenic routes

Although the R27 can be regarded as a scenic route, the vicinity of the study area is already heavily compromised in terms of its scenic qualities by the extensive electrical and industrial development that already exists in the area. Winter and Oberholzer (2013) did not identify it as such, however. They did note the R45 lining Vredenburg and Malmesbury as being a Grade III scenic resource. This road passes the existing Aurora Substation in the east and will be

crossed by all three transmission line alternatives in that area (in parallel with existing transmission lines). It then veers north of the study area as it continues towards Vredenburg.

### 6.6. Statement of significance

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ''cultural significance'' means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

The archaeological resources, in this instance largely historical ruins, are deemed to have low cultural significance for their architectural, social and technological value.

Any palaeontological resources encountered in the Springfontyn or Langebaan Formations would be considered rare finds and would have high, or even very high, scientific value.

The broader (surface) cultural landscape is highly compromised but there is still a fairly strong sense of place to the Saldanha Bay region and it is thus considered to be of low-medium significance for its aesthetic value. The buried fossil landscape of the area is considered to have high cultural significance for the tremendous scientific value that it has.

The few historical buildings in the Uyekraal/Everts Hope farm complex are of at least medium significance for their architectural and social value. Other structures in the study area may be heavily modified which would reduce their significance to low.

The cattle thoroughfare is of low cultural significance for its historical value. Graves are highly unlikely to be encountered but are deemed to have high cultural significance for their social value. The scenic route (R45) is of medium cultural significance for its aesthetic value.

### 6.7. Summary of heritage indicators and provisional grading

The main heritage indicators of concern here are archaeological resources (largely Grade IIIC but some NCW), palaeontological resources (largely Grade IIIB but potentially as high as Grade I) and the cultural landscape (Grade IIIC). Although other resources like structures (suggested up to Grade IIIB) and the R45 scenic route (suggested Grade IIIB) are present, they will not be unduly impacted and are not considered further.

## 7. ASSESSMENT OF IMPACTS

It should be noted that all impacts to archaeological and palaeontological heritage are expected to occur during the construction phase. Impacts to the cultural landscape will also occur during construction but would continue through operation but with no change in the ratings. The proposed project is not expected to have a decommissioning phase. As such, only a construction phase assessment is provided for each relevant heritage component.

### 7.1. Impacts to archaeological resources

The only project components likely to result in archaeological impacts are Transmission Line Alternatives 4 and 6 because they run directly above some historical ruins. As a worst case scenario it is assumed that these ruins may need to be levelled in order to clear the transmission corridor. Because of the low cultural significance of these sites, this would not be considered a fatal flaw and the extent of the impacts would be local. Indirect impacts are not expected. Table 5 shows that with total destruction of the historical ruins along Transmission Line Alternatives 4 and 6 the impacts could be of medium significance. With mitigation this would be reduced to low significance. Impacts to archaeological resources for all other potential project components are considered to be of low significance (Table 6). Because no impacts are expected, no mitigations measures are proposed.

***Table 5:*** *Assessment of archaeological impacts for Transmission Line Alternatives 4 and 6.*

| ***Nature:*** **Direct disturbance and/or destruction of archaeological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Low (4) | Small (1) |
| ***Probability*** | Probable (3) | Very improbable (1) |
| ***Significance*** | **Medium (30)** | **Low (7)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | No |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:*** The ideal mitigation in this instance is to avoid the ruins in question and leave them as they are. The alternative would be to record their layouts (measured drawings) and construction techniques and materials in detail prior to demolition. | | |

***Table 6:*** *Assessment of archaeological impacts for Transmission Line Alternative 3 and all Distribution Line and Transmission and Distribution Substation Alternatives.*

| ***Nature:*** **Direct disturbance and/or destruction of archaeological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Small (0) | Small (0) |
| ***Probability*** | Very improbable (1) | Very improbable (1) |
| ***Significance*** | **Low (5)** | **Low (5)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | n/a | |
| ***Mitigation:*** Because no significant impacts are expected and the chances of any impacts at all ae very low, no mitigation measures are suggested. | | |

The potential cumulative impacts to archaeological resources for Transmission Line Alternatives 4 and 6 are likely to be of low significance both before and after mitigation (Table

7). The potential cumulative impacts to archaeological resources for all other project components will likely be of low significance and no mitigation is required (Table 8).

***Table 7:*** *Cumulative assessment of archaeological impacts for Transmission Line Alternatives 4 and 6.*

| ***Nature:*** **Direct disturbance and/or destruction of archaeological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Minor (2) | Small (1) |
| ***Probability*** | Probable (3) | Very improbable (1) |
| ***Significance*** | **Low (24)** | **Low (7)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | No |
| ***Can impacts be mitigated?*** | Yes | |
| ***Confidence in findings:*** High | | |
| ***Mitigation:*** The ideal mitigation in this instance is to avoid the ruins in question and leave them as they are. The alternative would be to record their layouts (measured drawings) and construction techniques and materials in detail prior to demolition. | | |

***Table 8:*** *Cumulative assessment of archaeological impacts for Transmission Line Alternative 3 and all Distribution Line and Transmission and Distribution Substation Alternatives.*

| ***Nature:*** **Direct disturbance and/or destruction of archaeological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Small (0) | Small (0) |
| ***Probability*** | Very improbable (1) | Very improbable (1) |
| ***Significance*** | **Low (6)** | **Low (6)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | n/a | |

| |
|---|
| ***Confidence in findings:*** |
| High |
| ***Mitigation:*** |
| Because no significant impacts are expected and the chances of any impacts at all ae very low, no mitigation measures are suggested. |

### 7.2. Impacts to palaeontological resources

The regional palaeontological potential varies with substrate and depth of potentially-fossiliferous deposits from the surface. For this reason the assessments below have been grouped into substation and power line components – the substations are likely to result in larger and deeper excavations than the power lines are. The assessments consider both individual palaeontological resources and the broader fossil landscape with the latter thus excluded from the cultural landscape assessment in Section 7.3 below. Contextual impacts to the WCFP are not of great significance because of the very large vegetated berm that is in place around the south-western part of the Park which would largely screen it from the proposed developments.

It is entirely possible that excavations into sediments not normally accessible to palaeontologists will encounter fossils in sub-surface deposits, particularly in the Velddrif, Springfontyn, Langebaan and Varswater Formations. Although the potential to impact on highly significant palaeontological material does exist, such material would be unknown to science until such time as the impact occurs. For this reason, the impact, if mitigated appropriately, is regarded as being a positive one because it may provide opportunities to recover potentially important fossils that enable observations that could otherwise not have been made. Although extensive impacts could occur, the above positive aspect and the screening from the berm means there is no fatal flaw.

In spite of relatively good borehole coverage, which provides a framework, the depth of potentially fossil-bearing sediments is largely unknown and difficult to assess without excavation; it is thus not possible to exclude the possibility that sparsely-distributed sub-surface fossils may be encountered during any excavations into the surface. Small pockets of bone can occur, for instance, where bone accumulators like hyaenas, jackals or porcupines used holes/burrows dug by aardvarks; older and younger sediments, too, may contain ancient wetland deposits and/or more-recent sub-fossils.

Table 9 shows the impact assessment for all the substation alternatives. Because of the potentially high cultural significance of fossils in the study area (and known national significance of the WCFP), the extent of impacts is given a high rating. Because of the potential size and depth of excavations, the overall significance of impacts before mitigation is rated as being high. After mitigation the impacts would only be of medium significance but would be considered positive because of the potential contribution that mitigation could make to science. Indirect impacts are not expected. Because the excavations required for the various power line alternatives would be far smaller than those for the substations, the potential impacts for all power lines alternatives are less likely to occur and are rated as of low significance both before and after mitigation (Table 10).

***Table 9:*** *Assessment of palaeontological impacts for all Transmission and Distribution Substation Alternatives.*

| ***Nature:*** **Direct disturbance and/or destruction of palaeontological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Regional (5) | Regional (5) |

| | | |
|---|---|---|
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | High (8) | Minor (2) |
| ***Probability*** | Highly probable (4) | Highly probable (4) |
| ***Significance*** | **High (74)** | **Medium (48)** |
| ***Status (positive or negative)*** | Negative | Positive |
| ***Reversibility*** | Low | low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:***<br>Full-time monitoring by an appropriately-qualified person must be carried out at all substation locations until bulk earthworks are completed. Any fossils found must be recorded following accepted palaeontological standards and the material collected for curation in an approved repository where it will be available for future research. | | |

***Table 10:*** *Assessment of palaeontological impacts for all Transmission and Distribution Line Alternatives.*

| ***Nature:***<br>**Direct disturbance and/or destruction of palaeontological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Regional (3) | Regional (3) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Low (4) | Minor (2) |
| ***Probability*** | Improbable (2) | Improbable (2) |
| ***Significance*** | **Low (24)** | **Low (20)** |
| ***Status (positive or negative)*** | Negative | Positive |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | Yes | |
| ***Mitigation:***<br>Because of the limited likelihood of encountering significant fossils, monitoring can be conducted on an ad hoc basis by the palaeontologist at times when suitable holes are exposed. The environmental control officer (ECO) and by project staff should also be appropriately briefed beforehand to ensure that they are able to recognise and rescue any fossils found during excavations. Any fossils found must be protected, preferably *in situ*, and reported to a palaeontologist for inspection, assessment and collection if necessary. The find should be recorded following accepted palaeontological standards and the material deposited for curation in an approved repository where it will be available for future research. | | |

Almost all developments in the Saldanha Bay region that involve excavations will result in some sort of impacts to palaeontological resources. Cumulative impacts are thus almost certain to occur. For the substations, which would likely require fairly substantial foundation excavations, the significance of cumulative impacts without mitigation is regarded as high and negative. However, application of the suggested mitigation measures would reduce this to medium significance but the impacts would be positive because of the potential contributions to science that may result from successful mitigation (Table 11). The power line alternatives would all require far smaller excavations which means that the chances of encountering fossils is much less. Nevertheless, similar excavations across the broader area would probably result in potential cumulative impacts of medium significance both before and after mitigation (Table 12).

***Table 11:*** *Cumulative assessment of palaeontological impacts for all Transmission and Distribution Substation Alternatives.*

| ***Nature:*** **Direct disturbance and/or destruction of palaeontological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Regional (5) | Regional (5) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | High (8) | Minor (2) |
| ***Probability*** | Highly probable (4) | Highly probable (4) |
| ***Significance*** | **High (74)** | **Medium (48)** |
| ***Status (positive or negative)*** | Negative | Positive |
| ***Reversibility*** | Low | low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | Yes | |
| ***Confidence in findings:*** Medium | | |
| ***Mitigation:*** Full-time monitoring by an appropriately-qualified person must be carried out at all substation locations until bulk earthworks are completed. Any fossils found must be recorded following accepted palaeontological standards and the material collected for curation in an approved repository where it will be available for future research. | | |

***Table 12:*** *Cumulative assessment of palaeontological impacts for all Transmission and Distribution Line Alternatives.*

| ***Nature:*** **Direct disturbance and/or destruction of palaeontological resources within the development footprint.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Regional (3) | Regional (3) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Low (4) | Minor (2) |

| | | |
|---|---|---|
| ***Probability*** | Probable (3) | Probable (3) |
| ***Significance*** | **Medium (36)** | **Medium (30)** |
| ***Status (positive or negative)*** | Negative | Positive |
| ***Reversibility*** | Low | Low |
| ***Irreplaceable loss of resources?*** | Yes | Yes |
| ***Can impacts be mitigated?*** | Yes | |
| ***Confidence in findings:***<br>High | | |
| ***Mitigation:***<br>Because of the limited likelihood of encountering significant fossils, monitoring can be conducted on an ad hoc basis by the palaeontologist at times when suitable holes are exposed. The environmental control officer (ECO) and by project staff should also be appropriately briefed beforehand to ensure that they are able to recognise and rescue any fossils found during excavations. Any fossils found must be protected, preferably in situ, and reported to a palaeontologist for inspection, assessment and collection if necessary. The find should be recorded following accepted palaeontological standards and the material deposited for curation in an approved repository where it will be available for future research. | | |

### 7.3. Impacts to the cultural landscape

It should be noted that the assessment in this section refers only to the surface landscape as viewed and experienced by people in the area. It specifically excludes impacts to the fossil landscape which have been assessed under palaeontological impacts (Section 7.2).

Because of the already highly compromised nature of the landscape within and around the study area, impacts are likely to be of low significance. The proposed developments would only be adding to an existing electrical infrastructure layer on the landscape. There are no fatal flaws. Although the impacts are not considered significant from a heritage point of view, it should be noted that the calculated impact significance comes out as medium in Table 13 because of the permanent duration and certainty that the impacts would happen. Mitigation of cultural landscape impacts would generally involve screening the development. However, because of the nature and size of the proposed new infrastructure, there are no feasible/practical mitigation measures that could be suggested to reduce the expected impacts.

***Table 13:*** *Assessment of cultural landscape impacts for all project components.*

| ***Nature:***<br>**Disruption/degradation of the cultural landscape within the broader area.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Minor (1) | Minor (1) |
| ***Probability*** | Definite (5) | Definite (5) |
| ***Significance*** | **Medium (35)** | **Medium (35)** |
| ***Status (positive or negative)*** | Negative | Negative |

| | | |
|---|---|---|
| ***Reversibility*** | High | High |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated?*** | No practical measures possible | |
| ***Mitigation:***<br>There are no feasible/practical mitigation measures that could reduce the impacts to the landscape. | | |

For the same reasons stated above, the potential cumulative impacts to the cultural landscape are considered to be of low significance from a heritage point of view, although, once more, the permanent nature and certainty that they would occur result in a calculated impact significance of medium.

***Table 14:*** *Cumulative assessment of cultural landscape impacts for all project components.*

| ***Nature:***<br>**Disruption/degradation of the cultural landscape within the broader area.** | | |
|---|---|---|
| | **Without mitigation** | **With mitigation** |
| ***Extent*** | Local (1) | Local (1) |
| ***Duration*** | Permanent (5) | Permanent (5) |
| ***Magnitude*** | Minor (1) | Minor (1) |
| ***Probability*** | Definite (5) | Definite (5) |
| ***Significance*** | **Medium (35)** | **Medium (35)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | High | High |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated?*** | No practical measures possible | |
| ***Confidence in findings:***<br>High | | |
| ***Mitigation:***<br>There are no feasible/practical mitigation measures that could reduce the impacts to the landscape. | | |

## 8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

Certain measures will need to be adhered to in order to reduce the impacts to archaeological and palaeontological resources. These are detailed below. Note that in the case of archaeology, the measures described are only to be implemented if the relevant sites cannot be avoided and preserved *in situ*. There are measures for implementation by an archaeologist, a palaeontologist and the project environmental control officer (ECO).

### 8.1. Archaeology

OBJECTIVE: To ensure that archaeological resources (historical ruins) are fully recorded and described prior to their destruction.

| | |
|---|---|
| **Project component/s** | Transmission Line Alternatives 4 and 6 . |
| **Potential Impact** | Destruction of the resources and loss of all information about them. |
| **Activity/risk source** | Clearing of transmission line servitude in advance of construction. |
| **Mitigation: Target/Objective** | Suitable recording, including measured drawings, should be carried out so as to rescue information regarding the form and construction details of the ruins. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| The ruins should be measured and have plans drawn. Details regarding the methods of construction and materials used should be recorded. A report on this work must be submitted to HWC for approval. | The project archaeologist will need to implement the measures under a workplan approved by HWC. | The mitigation should be completed and approved by HWC prior to commencement of demolition of the ruins. |

| | |
|---|---|
| **Performance Indicator** | The mitigation report is completed and approved by HWC prior to construction. |
| **Monitoring** | The ECO should ensure that the approval of HWC is obtained prior to commencement of construction in the vicinity of the ruins. |

## 8.2. Palaeontology

OBJECTIVE: To ensure that fossils and information about their context are rescued during implementation.

| | |
|---|---|
| **Project component/s** | Palaeontological resources are affected by all subsurface foundation excavations. |
| **Potential Impact** | Destruction and loss of fossils and contextual information. |
| **Activity/risk source** | Bulk earthworks for foundations. |
| **Mitigation: Target/Objective** | Successful rescue of significant fossils and relevant contextual data during the construction period. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| For substation foundation excavations full-time specialist palaeontological monitoring will be required under a workplan approved by HWC. The project palaeontologist will be responsible for reporting to HWC.<br>For the power line foundation excavations monitoring can be conducted on an ad hoc basis by the palaeontologist at times when suitable holes are exposed. The environmental control officer (ECO) and project staff should also be appropriately briefed beforehand to ensure that they are able to recognise and rescue any fossils found during excavations. Any fossils so discovered must be reported to the palaeontologist for assessment as part of the monitoring report. | For substation foundation excavations a specialist palaeontologist should be appointed.<br>For the power line foundation excavations the ECO should ensure that any isolated fossils are protected and/or rescued and reported to a palaeontologist.<br>All project staff, construction workers, etc should be made aware of the need to watch for fossils and report them when found. | Monitoring needs to occur during all earthworks. At the substation sites monitoring must be full-time. For the power lines project staff can be aware of what is being excavated as they work, while periodic visits from the ECO are conducted. |

| | |
|---|---|
| **Performance Indicator** | Fossils are successfully rescued and relevant scientific data are captured. |
| **Monitoring** | The ECO should ensure that the approval of HWC has been obtained within a reasonable period (refer project palaeontologist for advice) once the bulk earthworks have been completed. The project ECO should examine any spoils from power line foundation excavations whenever possible, while project staff should be aware of potential fossil finds at all times. Finds should be reported to the ECO/palaeontologist. |

## 9. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

Section 38(3)(d) requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. The present project will ensure a sustainable electricity supply for the further industrial development of the Saldanha Bay IDZ. The negative impacts to heritage resources are not of such a significance as to outweigh the social benefits of the project. In addition, the palaeontological impacts will be positive with mitigation.

## 10. CONSULTATION WITH HERITAGE CONSERVATION BODIES

As requested by HWC, the draft HIA was submitted to the Saldanha Bay Municipality (SBM) and the WCFP for comment. This was done on 13th September 2016. A follow-up email was sent by way of a reminder on 11th October 2016 because it is strongly preferred that comments be included.

SBM submitted a comment on 13th October 2016 indicating that they had no additional information that might be added to the HIA. The WCFP sent a brief email on the same day indicating that more palaeontological monitoring should be built in to the construction phase works and that the alternatives located further from the WCFP should be preferred.

The WCFP comment resulted in a change to the monitoring requirements, while the HIA already gave preference to the project alternatives located furthest west.

Please find screen shots of the above-mentioned correspondence in Appendix 2 (note that the original email files were submitted electronically with this report).

## 11. CONCLUSIONS

Although archaeological resources and the cultural landscape may be negatively affected by the proposed project, the significance of impacts to these resources will be low. There is, however, the potential for highly significant impacts to palaeontological resources to occur. These are deemed manageable and, in fact, positive impacts will be felt with the implementation of successful palaeontological mitigation. Given the limited information available at present, any fossil finds should be treated as significant and would require careful recording and possible systematic excavation in order to ensure that benefits are derived.

This assessment has demonstrated that the proposed project is feasible and that there are no fatal flaws from a heritage perspective. The requirement of HWC to specifically assess archaeological and palaeontological resources as part of the HIA has been met.

### 11.1. Preference for alternatives

Because of the archaeological resources located along the shared Transmission Line Alternative 4 and 6 corridor, the use of Transmission Line Alternative 3 is preferred. This will also reduce the degree to which the power lines are visible from the R27, and result in better clustering of the lines. As such, Transmission Substation Alternative A is also preferred so that the majority of electrical infrastructure can be placed on the western side of the R27 where all other industrial and electrical infrastructure currently sits. Should Transmission Line Alternative 4 or 6 be used, then Transmission Substation D is preferred over Alternative F so that the majority of infrastructure will be west of the R27 and the substation would be further away from the WCFP.

In terms of the Distribution Substations, Alternative A is preferred purely because it concentrates impacts alongside the existing Blouwater Substation. Distribution Substation

Alternative C is least preferred because of its proximity to a main road. The preferences are ranked and motivated in Table 15.

***Table 15:*** *Ranking of alternatives.*

| Project alternative | Preference (1 = most; 3 = least) | Motivation |
|---|---|---|
| Transmission Line 3 | 1 | Keeps electrical infrastructure grouped to the west of the R27 |
| Transmission Line 4 | 3 | Introduces large electrical infrastructure to the east of the R27 and is very close to the WCFP |
| Transmission Line 6 | 2 | Introduces large electrical infrastructure to the east of the R27 |
| Transmission Substation A | 1 | Keeps large electrical infrastructure grouped to the west of the R27 |
| Transmission Substation D | 2 | Its large foundation excavations are still fairly close to the WCFP |
| Transmission Substation F | 3 | Introduces large electrical infrastructure to the east of the R27 and its large foundation excavations would be very close to the WCFP. Although impacts could be extensive, the potential positive impact of revealing new fossils and the screening effect of the large berm mean that this option is not fatally flawed |
| Distribution Substation A | 1 | Adjoins existing substation and reduces proliferation of impacts |
| Distribution Substation B | 2 | Located away from existing substation but is further from nearby road |
| Distribution Substation C | 3 | Located away from existing substation and also in close proximity to nearby road |

## 12. RECOMMENDATIONS

Because the mitigation and management of any archaeological and palaeontological impacts that might arise are entirely feasible, it is recommended that the proposed project be allowed to proceed from a heritage point of view. However, the preference for Transmission Line Alternative 3, Transmission Substation Alternative A and Distribution Substation Alternative A are stressed (but see preference ranking above). The following recommendations are relevant and should be incorporated into the environmental authorisation for the project as relevant:

- If Transmission Line Alternatives 4 or 6 are authorized, then archaeological mitigation of the historic ruins should take place under a workplan approved by HWC if they cannot be preserved *in situ*;
- Full-time palaeontological monitoring of both authorized substation foundations (any Alternatives) and ad hoc monitoring of power line foundations is required under a workplan approved by HWC. The workplan must include provision for the collection and recording of any fossils unearthed during construction;
- Training in the identification of fossils should be provided to project staff (construction workers, excavator operators and the ECO) who should be instructed to watch for fossils and report any discoveries;
- Any fossil material recovered during the course of the project should be properly recorded and then lodged with an appropriate repository; and
- If any further archaeological and/ or palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be

halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist or palaeontologist. Such heritage is the property of the state and may require excavation and curation in an approved collection repository.

## 13. REFERENCES


Almond, J. 2012. Palaeontological Specialist Study: Combined Desktop and Scoping Study - Phase 1 of proposed Aeolus Solar Energy Facility on Farms Lekkerwater 183, Everts Hope 190 and Portions 4 & 5 of Waschklip 191 near Langebaan, Saldanha Bay Municipality, Western Cape. Cape Town: Natura Viva cc.

Archer, W.A. & Braun, D.R. 2010. Morphometric analysis of Acheulian technology at Elandsfontein, Western Cape, South Africa. *Journal of Archaeological Science* 37: 201-209.

Avery, G. 1988. Some features distinguishing hominid and other occurrences at Elandsfontein, southwestern Cape Province. *Palaeoecology of Africa* 19: 213-219.

Avery, G. 1994. Review of Saldanha Steel Project Phase 2 Environmental Impact Assessment Archaeological Study. Cape Town: South African Museum.

Avery, G. 1997. Alpha Saldanha Cement Project: Archaeological & Palaeontological Potential of Limestone Deposits. Cape Town: South African Museum.

Avery, G. 2013. Palaeontological Assessment Saldanha Bay and Pepper Bay: Stabilization of Eroded Embankments (3317BB & 3318AA Saldanha), Vredenburg Magisterial District.

Avery, G. 2014. Addendum to Palaeontological Assessment Saldanha Bay and Pepper Bay: Stabilization of Eroded Embankments (3317BB & 3318AA Saldanha), Vredenburg Magisterial District.

Avery, G. In preparation a. Palaeontological Assessment Elandsfontein Phosphate Mine.

Avery, G. In preparation b. Palaeontological Monitoring of the Access Road, Terrace Area and Power Line Link on Elandsfontein 349.

Avery, G., & Klein, R.G. 2011. Review of fossil phocid and otariid seals from the southern and western coasts of South Africa. *Transactions of the Royal Society of South Africa* 61:14-24.

Avery, G., Klein, R.G., Cordova, C. Bergh, E., Sharp, W., Luyt, J. & Avery, D.M. In preparation. Spreeuwalle: a Late Pleistocene Wetland in Saldanha Bay, Western Cape Coast, South Africa, and its Implications for the Pleistocene History of the Fynbos.

Avery, G. 2015. Palaeontological Assessment Proposed Power Line from the Rheboksfontein Wind Energy Facility to the Aurora Substation, Western Cape Province (1:50000 between 3318AD Darling and 3317BB & 3318AA Saldanha).

Avery, G. & Avery, D.M. 2009. Palaeontological & Archaeological Assessment: Eensaamheid 135 portion 39 (a portion of portion 3) 3218CA&CC Velddrif. Cape Town: Iziko South African Museum.

Avery, G., Halkett, D., Orton, J., Steele, T. & Klein, R. 2008. The Ysterfontein 1 Middle Stone Age Rockshelter and the evolution of coastal foraging. *South African Archaeological Society Goodwin Series* 10: 66-89.

Bateman, P. 1946. Archaeological notes on the Saldanha Bay district. *South African Archaeological Bulletin* 1: 41-45.

Berger, L.R. & Parkington, J.E. 1995. A new hominid-bearing Pleistocene locality at Hoedjiespunt, South Africa. *American Journal of Physical Anthropology* 98: 601-609.

Boshoff, A, Landman, M. & Kerley, G. 2016. Filling the gaps on the maps: historical distribution patterns of some larger mammals in part of southern Africa. *Transactions of the Royal Society of South Africa* 71: 23-87.

Braun, D.R., Levin, N.E. Roberts, D., Stynder, D., Forrest, F. Herries, A.I., Matthews, T., Bishop, L., Archer, W. & Pickering, R. 2013. Initial investigations of Acheulean hominin behaviour at Elandsfontein. In: Jerardino, A., Malan, A. & Braun, D.R. (eds) *The Archaeology of the West Coast of South Africa*: 10-23. British Archaeological Reports International Series 2526. Oxford: Archaeopress.

Braun, D.R., Levin, N.E., Stynder, D., Herries, A.I.R., Archer, W., Forrest, F., Roberts, D.L., Bishop, L.C., Matthews, T., Lehmann, S.B., Pickering, R., & Fitzsimmons, K.E. 2013. Mid-Pleistocene Hominin occupation at Elandsfontein, Western Cape, South Africa. *Quaternary Science Reviews* 82: 145-166.

Brink, J.S. 2005. The study of the materials from Besaansklip, Western Cape Province. Interim Report to the Council for Geoscience, Pretoria.

Butzer, K.W. 2004. Coastal eolian sands, paleosols, and Pleistocene geoarchaeology of the Southwestern Cape, South Africa. *Journal of Archaeological Science* 31: 1743-1781.

Churchill, S.E., Berger, L.R. and Parkington, J.E. 2000. A Middle Pleistocene human tibia from Hoedjiespunt, western Cape, South Africa. *South African Journal of Science* 96:367-368.

Coetzee, J.A. 1978. Climatic and biological changes in south-western Africa during the Late Cainozoic. *Palaeoecology of Africa* 10: 13-29.

Compton, J.S., & Franceschini, G. 2005. Holocene geoarchaeology of the Sixteen Mile Beach barrier dunes in the Western Cape, South Africa. *Quaternary Research* 63: 99-107.

Cooke, H.B.S. 1955. Some fossil mammals in the South African museum collections. *Annals of the South African Museum* 42: 161-168.

Dale, D.C. & McMillan, I.K.. 1999. On the Beach. A field Guide to the Late Cainozoic Micropalaeontological History Saldanha Region, South Africa. Cape Town: De Beers Consolidated Diamond Mines.

Dewar, G. 2010. Late Holocene burial cluster at Diaz Street Midden, Saldanha Bay, Western Cape, South Africa. *South African Archaeological Bulletin* 65: 26-34.

Dietl, H., Kandel, A.W. & Conard, N.J. 2005. Middle Stone Age settlement and land use at the open-air sites of Geelbek and Anyskop, South Africa. *Journal of African Archaeology* 3: 233-244.

Drennan, M.R. 1953. A preliminary note on the Saldanha Skull. *South African Journal of Science* 50: 7-11.

Drennan, M.R. 1954. Saldanha man and his associations. *American Anthropologist* 56: 879-884.

Eze, P.N., & Meadows, M.E. 2014. Mineralogy and micromorphology of a paleosol sequence at Langebaanweg, South Africa: Inference of paleoclimates. *Palaeogeography Palaeoclimatology Palaeoecology* 409: 205-216.

Fauvelle-Aymar, F.-X., Sadr, K., Bon, F. & Gronenborn, D. 2006. The visibility and invisibility of herders' kraals in southern Africa, with reference to a possible early contact period Khoekhoe kraal at KFS5, Western Cape. *Journal of African Archaeology* 4:253-271.

Felix-Henningsen, P., Kandel, A.W. & Conard, N.J. 2003. The significance of calcretes and paleosols on ancient dunes of the Western Cape, South Africa, as stratigraphic markers and paleoenvironmental indicators. In: Füleky, G. (ed.) *Papers of the 1st International Conference on Soils and Archaeology, Százhalombatta, Hungary, 30 May - 3 June 2001*: 45-52. Oxford: British Archaeological Reports International Series 1163.

Flemming, B.W. 1977. Distribution of recent sediments in Saldanha Bay and Langebaan Lagoon. *Transactions of the Royal Society of South Africa* 42:317-340.

Fransen, H. 2004. *The old buildings of the Cape*. Johannnesburg & Cape Town: Jonathan Ball Publishers.

Franz-Odendaal, T., Lee-Thorp, J.A. and Chinsamy, A. 2002. New evidence for the lack of C4 grassland expansions during the early Pliocene at Langebaanweg, South Africa. *Paleobiology* 28: 378-388.

Franz-Odendaal, T.A. 2002. Palaeopathology in the Pliocene fossil record: an analysis of the pathologies found in the herbivores of Langebaanweg and a palaeoenvironmental reassessment. Unpublished Ph.D. thesis. Rondebsoch: University of Cape Town.

Fuchs, M., Kandel, A.W., Conard, N.J., Walker, S.J., & Felix-Henningsen, P. 2008. Geoarchaeological and chronostratigraphical investigations of open-air sites in the Geelbek Dunes, South Africa. *Geoarchaeology* 23: 425–449.

Goodwin, A.J.H. 1953. Hopefield: The Site and the Man. *South African Archaeological Bulletin* 8: 41-46.

Govender, R. 2014. Preliminary phylogenetics and biogeographic history of the Pliocene seal, Homiphoca capensis from Langebaanweg, South Africa. *Transactions of the Royal Society of South Africa* 70: 25-39.

Govender, R., Avery, G. & Chinsamy-Turan, A. 2011. Pathological skeletal changes in the fossil phocid seals from Langebaanweg (Early Pliocene), west coast of South Africa. *South African Journal of Science* 107: 72-77.

Govender, R., & Chinsamy, A. 2013. Early Pliocene (5 Ma) Shark–Cetacean trophic interaction from Langebaanweg, Western Coast of South Africa. *Palaios* 28: 270-277.

Grine, F.E., & Hendey, Q.B. 1981. Earliest Primate Remains from South Africa. *South African Journal of Science* 77:374- 376.

Grine, F.E., & Klein, R.G. 1993. Late Pleistocene human remains from the Sea Harvest site, Saldanha Bay, South Africa. *South African Journal of Science* 89: 145-152.

Haarhoff, P.J. 1988. A new fossil stork (Aves, Ciconiidae) from the Late Tertiary of Langebaanweg, South Africa. *Annals of the South African Museum* 97: 297-313.

Halkett, D. & Hart, T. 1999. West coast report on pilot excavations at 'E' Quarry, Langebaanweg Fossil Park, Langebaanweg. Unpublished report prepared for Earth Sciences Division, South African Museum. Archaeology Contracts Office, University of Cape Town.

Halkett, D., & Webley, L. 2015. Specialist archaeological study: Elandsfontein Phosphate Mining Right on a portion of portion 2 and portion 4 of the farm Elandsfontein 349, Saldanha. For Braaf Environmental Practitioners. St James: ACO Associates cc.

Hare, V., and Sealy, J. 2013. Middle Pleistocene dynamics of southern Africa's winter rainfall zone from δ13C and δ18O values of Hoedjiespunt faunal enamel. *Palaeogeography, Palaeoclimatology, Palaeoecology* 374: 72-80.

Hart, T. 2001. Phase 2 mitigatory archaeological excavations at Leentjiesklip 3 Club Mykonos, Langebaan. Unpublished report prepared for Club Mykonos, Langebaan. University of Cape Town, Archaeology Contracts Office.

Hart, T. 2003. Heritage impact assessment of a portion of the farm Pienaars Poort owned by National Port Authority (NPA), Saldanha Bay. Unpublished report prepared for Philip Rosenthal, Environmental Engineer. Archaeology Contracts Office, University of Cape Town.

Hart, T.J. G and Gribble J. 1998. Phase 2 archaeological sampling of Late Stone Age middens, Leentjiesklip 2, Langebaan. Unpublished report prepared for Langebaan Waterfront Pty Ltd. ACO. UCT.

Hart, T.J.G. & Jerardino, A.M. 1998. Phase 2 archaeological sampling of Late Stone Age archaeological sites at Paradise Beach, Club Mykonos. Unpublished report prepared for CML Developers. ACO. UCT.

Hart, T. & Pether, J. 2008. Phase 2 expansion of the Sishen - Saldanha Iron Ore Export Corridor, Saldanha Bay, Western Cape: heritage impact assessment (part 1), palaeontological impact assessment (part 2). Unpublished report prepared for Transnet. University of Cape Town: Archaeology Contracts Office.

Hendey, Q.B. 1969. Quaternary vertebrate fossil sites in the south-western Cape Province. *South African Archaeological Bulletin* 24:96-105.

Hendey, Q.B. 1978. The age of the fossils from Baard's Quarry, Langebaanweg, South Africa. *Annals of the South African Museum* 75: 1-24.

Hendey, Q.B. 1974. The late Cenozoic Carnivora of the South-western Cape Province. *Annals of the South African Museum* 63: 1-369.

Hendey, Q.B. 1981. Palaeoecology of the Late Tertiary fossil occurrence in 'E' Quarry, Langebaanweg, South Africa, and a reinterpretation of their geological context. *Annals of the South African Museum* 84: 1-104.

Hendey, Q.B. 1982. *Langebaanweg a Record of Past Life*. Cape Town: South African Museum.

Hendey, Q.B., & Cooke, H.B.S. 1985. Kolpochoerus paiceae (Mammalia, Suidae) from Skurwerug, near Saldanha, South Africa, and its palaeoenvironmental implications. *Annals of the South African Museum* 97: 9-56.

Heritage Western Cape. 2016. Grading: purpose and management implications. Document produced by Heritage Western Cape. 16 March 2016.

Inskeep, R.R., & Hendey, Q.B. 1966. An Interesting association of bones from the Elandsfontein fossil site. In: Cuscoy, L.D. (ed.) *Actes du V Congres Panafricaini de prehistoire et de L' Etude du Quaternaire*: 109-124. Pan African Archaeological Association. Museo Arqueologico: Santa Cruz de Tenerife.

Kaplan, J. 1994. Saldanha Steel Project Phase 2 Environmental Impact Assessment – Archaeological Study. Report prepared for CSIR Environmental Services. Riebeek West: Agency for Cultural Resource Management.

Kaplan, J. 1996b. Report on archaeological surface collection and test excavation Saldanha Steel Mini Mill. Report prepared for Saldanha Steel (Pty) Ltd. Riebeek West: Agency for Cultural Resource Management.

Kaplan, J. 2006. Phase 1 Archaeological Impact Assessment proposed construction of a new residue dam Namakwa Sand Smelter Saldanha Bay. Report prepared for Resource Management Services. Riebeek West: Agency for Cultural Resource Management.

Kaplan, J. 2007. Archaeological Impact Assessment proposed development Gavin's Farm Farm 1195, 187/4, 1891/1 and 188, Saldanha. Unpublished report prepared for CK Rumboll and Partners. Riebeek West: Agency for Cultural Resource Management.

Kandel, A.W., Felix-Henningsen, P. & Conard, N.J. 2003. An overview of the spatial archaeology of the Geelbek Dunes, Western Cape, South Africa. In: Füleky, G. (ed.) *Papers of the 1st International Conference on Soils and Archaeology, Százhalombatta, Hungary, 30 May - 3 June 2001*. Oxford: British Archaeological Reports International Series 1163.

Kandel, A.W. & Conard, N.J. 2012. Settlement patterns during the Earlier and Middle Stone Age around Langebaan Lagoon, Western Cape (South Africa). *Quaternary International* 270: 15-29.

Kilburn, R.N., & Tankard, A.J. 1975. Pleistocene molluscs from the west and south coasts of the Cape Province, South Africa. *Annals of the South African Museum* 67:183-226.

Klein, R.G. 1978. The fauna and overall interpretation of the "Cutting 10" Acheulean site at Elandsfontein (Hopefield), southwestern Cape Province, South Africa. *Quaternary Research* 10: 69-83.

Klein, R.G. 1983. Palaeoenvironmental implications of Quaternary large mammals in the Fynbos biome. In: Deacon, H.J., Hendey, Q.B. & Lambrechts, I.I.N. (eds) *Fynbos Palaeoecology: a Synthesis*: 116-138. Pretoria: CSIR.

Klein, R.G. 1988. The archaeological significance of animal bones from Acheulean sites in southern Africa. *African Archaeological Review* 6: 3-25.

Klein, R.G. 2009. The Human Career: Human Biological and Cultural Origins. Chicago: University of Chicago Press.

Klein, R.G., Avery, G., Cruz-Uribe, C. & Steele, T. 2007. The mammalian fauna associated with an archaic hominin skullcap and later Acheulean artefacts at Elandsfontein, Western Cape Provence, South Africa. *Journal of Human Evolution* 52:164-186.

Klein, R.G., & Cruz-Uribe, K. 1989. Faunal evidence for prehistoric herder-forager activities at Kasteelberg, Vredenburg Peninsula, Western Cape Province, South Africa. *South African Archaeological Bulletin* 44: 82-97.

Klein, R.G., & Cruz-Uribe, K. 1991. The bovids from Elandsfontein, South Africa, and their implications for the age, palaeoenvironment, and origins of the site. *African Archaeological Review* 9: 21-79.

Kruger, N. 2016. Vortum Energy (Pty) Ltd: proposed combined cycle gas turbine (CCGT) power plant on a portion the remainder of the farm Langeberg 188 and associated infrastructure across a number of farm portions in the Saldanha Bay Local Municipality, West Coast District Municipality, Western Cape Province. Archaeological Impact Assessment. Unpublished report prepared for Vortum Energy (Pty) Ltd. Pretoria: Exigo 3.

Kyriacou, K., Parkington, J.E., Will, M., Kandel, A.W. & Conard, N.J. 2015. Middle and Later Stone Age shellfish exploitation strategies and coastal foraging at Hoedjiespunt and Lynch Point, Saldanha Bay, South Africa. *Journal of Archaeological Science* 57: 197–206.

Lusco Brick & Stone Company. n.d. Kansas Brick & Tile. Accessed online at: http://140819.us.all.biz/kansas-brick-tile-g235473 on 28 August 2016.

Luyt, J., Lee-Thorp, J.A. & Avery, G. 2000. New light on Middle Pleistocene environments from Elandsfontein, Western Cape Province, South Africa. *South African Journal of Science* 96: 399-404.

Mabbutt, J.A. 1956. The physiography and surface geology of the Hopefield fossil site. *Transactions of the Royal Society of South Africa* 35:21-58.

Manegold, A., Pavia, M. & Haarhoff, P. 2014. A New Species of Aegypius Vulture (Aegypiinae, Accipitridae) from the Early Pliocene of South Africa. *Journal of Vertebrate Paleontology* 34: 1394-1407.

Manthi, F.K. 2002. The taphonomy of a micromammalian faunal assemblage from the Saldanha Bay Yacht Club: a contribution to the study of the South African west coast palaeoenvironments. Department of Archaeology, University of Cape Town.

Matthews, T., Denys, C. & Parkington, J.E. 2005. The palaeoecology of the micromammals from the late middle Pleistocene site of Hoedjiespunt 1 (Cape Province, South Africa). *Journal of human Evolution* 49: 432-451.

Matthews, T., van Dijk, E., Roberts, D.L. & Smith, R.M.H. 2015. An early Pliocene (5.1 Ma) fossil frog community from Langebaanweg, southwestern Cape, South Africa. *African Journal of Herpetology* 64: 39–53.

Merceron, G., & Unger, P. 2005. Dental microwear and palaeoecology of bovids from the Early Pliocene of Langebaanweg, Western Cape Province, South Africa. *South African Journal of Science* 101: 365-370.

Morris, A.G. 1992. *A master catalogue: Holocene human skeletons from South Africa*. Johannesburg: Witwatersrand University Press.

Olson, S.L. 1985. Early Pliocene Procellariiformes (Aves) from Langebaanweg, south-western Cape Province, South Africa. *Annals of the South African Museum* 95: 123-145.

Orton, J. 2007. Archaeological Impact Assessment for proposed prospecting on Portion 6 of Farm 349, Elandsfontein, Hopefield Magisterial District, Western Cape. Rondebosch: University of Cape Town Archaeology Contracts Office.

Orton, J. 2007. Archaeological and palaeontological assessment of two portions of a road alignment near Langebaan and Saldanha Bay, Vredenburg and Hopefield Magisterial

Districts. Unpublished report prepared for The Environmental Partnership. University of Cape Town: Archaeology Contracts Office.

Orton, J. 2009. Rescue excavation at Diaz Street Midden, Saldanha Bay, South Africa. *Azania: Archaeological Research in Africa* 44: 107-120.

Orton, J. 2011. Heritage impact assessment for the proposed Uyekraal Wind Energy Facility, Hopefield Magisterial District, Western Cape. Unpublished report prepared for Savannah Environmental. University of Cape Town, Archaeology Contracts Office.

Orton, J. 2014. Heritage impact assessment for the proposed Saldanha Regional Marine Outfall Project, Vredenburg Magisterial District, Western Cape. Unpublished report prepared for CSIR. Muizenberg: ASHA Consulting (Pty) Ltd.

Pavia, M., Manegold, A. & Haarhoff, P. 2014. New Early Pliocene Owls from Langebaanweg, South Africa, with First Evidence of Athene South of the Sahara and a New Species of Tyto. *Acta Palaeontologica Polonica* 60: 815-828.

Pether, J. 1995. Anglo-Alpha Saldanha Cement Project Environmental Impact Assessment. Specialist Palaeontological Study. The Potential Impacts of the Shale and Limestone Mining. Cape Town: South African Museum.

Pether, J. 2006. Draft heritage specialist impact assessment palaeontological investigation and mitigatory actions for proposed Residue Dam, Namakwa Sands Smelter, Saldanha Bay Municipal Area. Unpublished report prepared for Resource Management Services. Kommetjie: John Pether geological and palaeontological consultant.

Pether, J. 2009. Draft Palaeontological Impact Assessment Proposed Phosphate Prospecting Langebaanweg Langeberg 185 Ptns 7 and 12 and farm 1043 Vredenburg Magisterial District, Saldanha Bay Municipality. Unpublished report prepared for Site Plan Consulting. Kommetjie: John Pether.

Pether, J. 2010. Impact Assessment Proposed West Coast One Wind Energy Facility Vredenburg. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Kommetjie: John Pether.

Pether, J. 2011. Palaeontological Impact Assessment Proposed Afrisam Cement Plant, Mine and Associated Infrastructure in Saldanha, Western Cape. Kommetjie: John Pether.

Pether, J. 2012. Palaeontological Impact Assessment (Desktop Study) Proposed Construction of the Afrisam Cement Plant, Limestone and Clay Quarries and Associated Infrastructure at Saldanha Bay, Western Cape. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. Kommetjie: John Pether.

Pether, J. 2013. Palaeontological assessment (desktop study) proposed prospecting for phosphate on portions 4 and 2 of the farm Elandsfontyn 349 near Hopefield, Western Cape. Unpublished report prepared for Elandsfontein Exploration and Mining Limited. Kommetjie: John Pether.

Pether, J. 2014. Palaeontological Impact Assessment (Desktop Study) Proposed construction of a marine outfall pipeline and associated infrastructure in Danger Bay in the Saldanha Bay region, Western Cape, South Africa. The Saldanha Regional Marine Outfall Project. Unpublished report prepared for CSIR. Kommetjie: John Pether geological and palaeontological consultant.

Pether, J., Roberts, D.L. & Ward, J.D. 2000. Deposits of the west coast. In: Partridge T.C. & Maud R.R. (eds) The Cenozoic of Southern Africa: 33-54. Oxford: Oxford University Press.

Plasket, J-L. 2013. Elandsfontein Pre-Drilling Surface Survey Report.

Rich, P.V. 1980. Preliminary report on the fossil avian remains from Late Tertiary sediments at Langebaanweg (Cape Province), South Africa. *South African Journal of Science* 76: 166-170.

Rich, P.V. & Haarhoff, P.J. 1985. Early Pliocene Coliidae (Aves, Coliiformes) from Langebaanweg (Cape Province), South Africa. *Ostrich* 56: 20-41.

Roberts, D. 1997a. Palaeontological Impact Assessment Alpha Cement Project. Cape Town: Council for Geosciences.

Roberts, D.L. 1997b. Fossil occurrence at the Saldanha Steel site. Pretoria: Council for Geoscience Geological Survey.

Roberts, D.L., Bateman, M.D., Murray-Wallace, C.V. Carr, A.S, & Holmes, P.J. 2009. West coast dune plumes: climate driven contrasts in dunefield morphogenesis along the western and southern South African coasts. *Palaeogeography, Palaeoclimatology, Palaeoecology* 271: 24-38.

Roberts, D., & Berger, L.R. 1997. Last Interglacial (c. 117 kyr) human footprints from South Africa. *South African Journal of Science* 93: 349-350.

Roberts, D.L., Botha, G.A. Maud, R.R. & Pether, J. 2006. Coastal Cenozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds) *Geology of South Africa*: 605-628. Cape Town: Geological Society of South Africa & Council for Geoscience.

Roberts, D, & Braun, D.R. 2014. Report on the Survey of Drilling Areas at Elandsfontein Farm (379). Unpublished report prepared for Elandsfontein Exploration and Mining Limited. Council for Geoscience & University of Cape Town.

Roberts, D.L., & Brink, J.S. 2002. Dating and correlation of Neogene coastal deposits in the western Cape (South Africa): implications for neotectonism. *South African Journal of Geology* 105: 337-352.

Roberts, D., Cawthra, H., & Musekiwa, C. 2013. Dynamics of late Cenozoic aeolian deposition along the South African coast: a record of evolving climate and ecosystems. In: Martini, I.P. & Wanless, H.R. (eds) Sedimentary Coastal Zones from High to Low Latitudes: Similarities and Differences. Geological Society, London, Special Publications 388: 353-387.

Roberts, D.L., Matthews, T., Herries, A.I.R., Boulter, C. Scott, L. Dondo, C., Mtembi, P. Browning, C., Smith, R.M.H., Haarhoff, P. & Bateman, M.D. 2011. Regional and global context of the Late Cenozoic Langebaanweg (LBW) palaeontological site: West Coast of South Africa. *Earth-Science* Reviews 106: 191-214.

Roberts, D.L., Sciscio, L., Herries, A.I.L., Scott, L., Bamford, M.K., Musekiwa, C. & Tsikos, H. 2013. Miocene fluvial systems and palynofloras at the southwestern tip of Africa: Implications for regional and global fluctuations in climate and ecosystems. *Earth-Science Reviews* 124: 184-201.

Roberts, D, & Smith, R. 2008. Report on the Geology/Palaeontology of the Gavin Plaas Development.

Rogers, J. 1980. First report on the Cenozoic Sediments between Cape Town and Elands Bay. In Reports of the Geological Survey of South Africa.

Rogers, J. 1982. Lithostratigraphy of Cenozoic sediments between Cape Town and Eland's Bay. *Palaeoecology of Africa* 15: 121-137.

Rossouw, L., Stynder, D.D. & Haarhoff, P. 2009. Evidence for opal phytoliths preservation in the Langebaanweg 'E' Quarry Varswater Formation and its potential for palaeohabitat reconstruction. *South African Journal of Science* 105: 1-5.

Simpson, G.G. 1975. Notes on variation in penguins and on fossil penguins from the Pliocene of Langebaanweg, Cape Province, South Africa. *Annals of the South African Museum* 69: 59-72.

Simpson, G.G. 1979. A new genus of Late Tertiary penguin from Langebaanweg, South Africa. *Annals of the South African Museum* 78: 1-9.

Singer, R., & Wymer, J. 1968. Archaeological investigations at the Saldanha skull site in South Africa. *South African Archaeological Bulletin* 23: 63-74.

Skead, C.J. 2011. *Historical Incidence of the Larger Land Mammals in the Broader Western and Northern Cape*. 2nd edition. Centre for African Conservation Ecology, Nelson Mandela Metropolitan University.

Smith, K.M., & Stynder, D.D. 2015. Biogeography and molar morphology of Pleistocene African elephants: new evidence from Elandsfontein, Western Cape Province, South Africa. *Quaternary Science Reviews* 105: 101-111.

Smith, R.M.H., & Haarhoff, P. 2006. Sedimentology and taphonomy of an early Pliocene sivathere bonebed at Langebaanweg, Western Cape Province, South Africa. *African Natural History* 2: 197-198.

Stynder, D.D. 1997. The use of faunal evidence to reconstruct site history at Hoedjiespunt 1 (HDP1), Western Cape. MA, Archaeology, University of Cape Town, Cape Town.

Stynder, D.D. 2009. The diets of ungulates from the hominid fossil-bearing site of Elandsfontein, Western Cape, South Africa. *Quaternary Research* 71: 62-70.

Stynder, D., Moggi-Cecchi, J., Berger, L.R. & Parkington, J.E. 2001. Human mandibular incisors from the Late Middle Pleistocene locality of Hoedjiespunt 1, South Africa. *Journal of Human Evolution* 41: 369-383.

Tankard, A.J. 1976. Cenozoic sea-level changes: a discussion. In: Proceedings of the Southern African Society for Quaternary Research, 1-17. *Annals of the South African Museum*.

Theron, J.N., Gresse, P.G., Siegfried, H.P. & Rogers, J. 1992. *The Geology of the Cape Town Area*. Explanation of Sheet 3318 Scale 1:250 000. Pretoria: Government Printer.

Volman, T.P. 1984. Early prehistory of southern Africa. In: Klein, R.G. (ed.) *Southern African Prehistory and Palaeoenvironments*: 169-395. Rotterdam: A.A. Balkema.

Volman, T.P. 1978. Early Archeological Evidence for Shellfish Collecting. *Science* 201: 911-913.

Vrba, E.S. 1982. Biostratigraphy and chronology, based particularly on Bovidae, of southern hominid-associated assemblages: Makapansgat, Sterkfontein, Taung, Kromdraai, Swartkrans; also Elandsfontein (Saldanha), Broken Hill (now Kabwe) and Cave of Hearths. In: De Lumley, M.A. (ed) *L'Homo erectus et la place de l'homme de Tautavel parmi les hominidés fossils*: 707-752. Nice: 1er Congrès International de Paléontologie Humaine.

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. St James: ACO-Associates.

Will, M., Parkington, J.E. Kandel, A.W. & Conard, N.J. 2013. Coastal adaptations and the Middle Stone Age lithic assemblages from Hoedjiespunt 1 in the Western Cape, South Africa. *Journal of human Evolution* 64: 518-537.

Woodborne, S. 2000. Luminescence dating of the Middle Stone Age in South Africa. Report to the National Reseach Foundation.

Sadr, K., Smith, A., Plug, I., Orton, J. & Mutti, B. 2003. Herders and foragers on Kasteelberg: interim report on excavations 1999-2002. *South African Archaeological Bulletin* 58: 27-32.

SAHRA. n.d. Formal protection of archaeological and palaeontological sites, landscape and natural features of cultural significance, structures and unmarked burials, situated on or at the West Coast Fossil Park on Farm 1223 in the Division of Malmesbury, Hopefield District. Accessed online at: http://www.sahra.org.za/sahris/sites/default/files/sitesotherdocs/2014/12/15/WestCoastFossilPark%20SAHRA%20gazette%20notice.pdf on 30 August 2016.

Singer, R. 1954. The Saldanha skull from Hopefield, South Africa. American Journal of Physical Anthropology n.s. 12:345-362.

Singer, R. 1961. The new fossil sites at Langebaanweg, South Africa. *Current Anthropology* 2:385-387.

Singer, R. & Wymer, J. 1968. Archaeological investigations at the Saldanha skull site in South Africa. South African Archaeological Bulletin 23:63-74.

Smith, A.B. 2006. Excavations at Kasteelberg and the origins of the Khoekhoen in the Western Cape, South Africa. Oxford: BAR International Series 1537.

Smith, A.B. 2011. Archaeological report: proposed new warehouse shed for the Exxaro Namakwa Sands Smelter, on Portion 3 Yzervarkensrug. Unpublished report prepared for SRK Consulting (South Africa) (Pty) Ltd. Rondebosch: University of Cape Town.

Smith, A.B., Sadr, K., Gribble, J. & Yates, R. 1991. Excavations in the South-Western Cape, South Africa, and the archaeological identity of prehistoric hunter-gatherers within the last 2000 years. *South African Archaeological Bulletin* 46: 71-91.

Stynder, D.D., Moggi-Cecchi, J., Berger, L.R. & Parkington, J.E. Human mandibular incisors from the late Middle Pleistocene locality of Hoedjiespunt 1, South Africa. *Journal of Human Evolution* 41: 369-383.

Winter, S. & Oberholzer, B. 2013. Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. Report prepared for the Provincial Government of the Western Cape Department of Environmental Affairs and Development Planning. Sarah Winter Heritage Planner, and Bernard Oberholzer Landscape Architect / Environmental Planner, in association with Setplan.

**APPENDIX 1 – Curriculum Vitae**

*Curriculum Vitae*

***Jayson David John Orton***

*ARCHAEOLOGIST AND HERITAGE CONSULTANT*

## *Contact Details and personal information:*


**Address:** 6A Scarborough Road, Muizenberg, 7945
**Telephone:** (021) 788 8425
**Cell Phone:** 083 272 3225
**Email:** jayson@asha-consulting.co.za


**Birth date and place:** 22 June 1976, Cape Town, South Africa
**Citizenship:** South African
**ID no:** 760622 522 4085
**Driver's License:** Code 08
**Marital Status:** Married to Carol Orton
**Languages spoken:** English and Afrikaans

## *Education:*

| | | |
|---|---|---|
| SA College High School | Matric | 1994 |
| University of Cape Town | B.A. (Archaeology, Environmental & Geographical Science) | 1997 |
| University of Cape Town | B.A. (Honours) (Archaeology)* | 1998 |
| University of Cape Town | M.A. (Archaeology) | 2004 |
| University of Oxford | D.Phil. (Archaeology) | 2013 |

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

## *Employment History:*

| | | |
|---|---|---|
| Spatial Archaeology Research Unit, UCT | Research assistant | Jan 1996 – Dec 1998 |
| Department of Archaeology, UCT | Field archaeologist | Jan 1998 – Dec 1998 |
| UCT Archaeology Contracts Office | Field archaeologist | Jan 1999 – May 2004 |
| UCT Archaeology Contracts Office | Heritage & archaeological consultant | Jun 2004 – May 2012 |
| School of Archaeology, University of Oxford | Undergraduate Tutor | Oct 2008 – Dec 2008 |
| ACO Associates cc | Associate, Heritage & archaeological consultant | Jan 2011 – Dec 2013 |
| ASHA Consulting (Pty) Ltd | Director, Heritage & archaeological consultant | Jan 2014 – |

## *Memberships and affiliations:*

South African Archaeological Society Council member 2004 – 2006 –
Assoc. Southern African Professional Archaeologists (ASAPA) member 2007 – 2013 –
ASAPA Cultural Resources Management Section member 2013 – 2014 –
UCT Department of Archaeology Research Associate 2014 –
Heritage Western Cape APM Committee member
UNISA Department of Archaeology and Anthropology Research Fellow
Fish Hoek Valley Historical Association

***Professional Accreditation:***

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)
  Stone Age archaeology (awarded 2007)
  Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)
  Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP)

- Accredited Professional Heritage Practitioner

***Fieldwork and project experience:***

Extensive fieldwork as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

<u>Phase 1 surveys and impact assessments:</u>

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

<u>Phase 2 mitigation and research excavations:</u>

- ESA open sites
  - Duinefontein, Gouda
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland

- LSA coastal shell middens
    - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
    - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
    - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
    - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

# *Curriculum Vitae - Dr Graham Avery*

## Contact Details

Home Address: 25 San Bernado
18 De Lorentz Street
Upper Gardens
Cape Town 8001

## Business Details

Graham Avery (Sole Proprietor): Archaeozoology, Stone Age Archaeology and Quaternary Palaeontology.
- Telephone: (021) 4241285 (H)
- Cell: 083 441 0028
- Email: gavery@iziko.org.za; drgavery97@gmail.com

## Professional Qualifications

- PhD (archaeology) 1990 "*Archaeological and palaeoenvironmental interpretation of avian remains from archaeological sites*". University of Cape Town.
- MA (archaeology) 1976 "*Systematic Investigation of Coastal Shell Middens in the South Western Cape*". University of Cape Town.
- BA (Archaeology, Social Anthropology, African History, History and Geography) 1969 University of Cape Town.

## Current Position

Retired 31 January 2012.
Associate Natural History Collections Department, Cenozoic Studies, Iziko South African Museum (April 2012–).
Research Associate, Archaeology Department, University of Cape Town (July 2012–).

## Positions Held

- Archaeozoologist, Curator of Quaternary Collections, Cenozoic Studies Section, Natural History Department, Iziko South African Museum (2002–January 2012). [moved to Natural History Collections Department when Iziko came into being]
- Head of Human Sciences Division, South African Museum (1993–2002).
- Head of Archaeology Department, South African Museum (1990–1993).
- Acting Head of Archaeology Department, South African Museum (1985–1990).
- Researcher, Archaeology Department, South African Museum (1980–2002).
- Manager: Archaeological Data Recording Centre, South African Museum (1974–1979).
- Environmental Archaeologist, South African Museum (1970–1973).
- Manager (temporary): Archaeological Data Recording Centre, South African Museum (1969).

## Research

### Research Interests

The Late Quaternary palaeoecology of south-western Africa covering material from the Pliocene to the Holocene:
- Archaeozoological studies—mammals, birds and molluscs in the palaeo-ecological and human history of South Africa;
- Experimental and comparative actualistic studies – taphonomy of human and non-human bone accumulations resulting from carnivores, scavengers and raptors, such as hyaenas, jackals, leopards, eagles and the larger owls. These include a 29-year long-term project monitoring beached birds and mammals;
- Past climates and environments using evidence from birds and mammals (including pollens from hyaena coprolites); and
- The application of archaeozoological and palaeontological research to modern issues of global change, conservation, heritage resource management and education.

### Research Projects

- Taphonomy of Verreaux's Eagle prey (with Aaron Armstrong, University of Minnesota).
- Prey of Verreaux's Eagles in the Cedarberg and Sandveld (with Megan Murgatroyd, UCT) – ongoing.
- Prey of African Crowned Eagle in Urban areas of Kwazulu Natal (with Malan, et al.). 2008 – 2014. Paper submitted to Ostrich.
- Taphonomy and pathology of seal remains from the Langebaanweg Early Pliocene fossil site (with R. Govender, Iziko Museums of South Africa).
- Interpreting the environment of human development in eastern Africa (with D.M. Avery, Iziko SA Museum and F.K. Manthi and S. Mucila, National Museums of Kenya. Funding from PAST 2009 – ongoing.
- Spreeuwalle Late Pleistocene Wetland on The Western Cape Coast, South Africa, And its Implications for the Pleistocene History of the Fynbos (with R.G. Klein, Stanford University, USA, C. Cordova, Oklahoma State University, USA, E. Bergh, Iziko South African Museum, Warren Sharp, UC Berkeley, USA and Julie Luyt, University of Cape Town). Funding From Leakey Foundation and PAST. 2003 – Ongoing.
- Uniab brown hyaena den: Taphonomy of a modern hyaena den on the Uniab delta fan, Skeleton Coast Park, Namibia (with P. Fosse, CNRS, Université de Toulouse Mirail, France, J-B. Fourvel, Université de Toulouse Mirail, France, J-F. Tournepiche, Angolême Museum, D.M. Avery, Iziko Museums of South Africa, R. Loutit and S. Braine).

- Pathologies on Gemsbok at the Uniab brown hyaena den (with R. Govender, Iziko Museums of South Africa).
- Human behavior, taphonomy, biodiversity and palaeoecology from osteological remains of birds from archaeological and palaeontological sites in the western and Eastern Cape Provinces: Includes a range of Middle and Late Pleistocene ocurrences.
- CNRS/NRF International Co-operation Project on taphonomy of spotted hyaena bone accumulating habits. (with P. Fosse, CNRS, Université de Toulouse Mirail, France, J-F. Tournepiche, Angolême Museum and J-B Fourvel, Université de Toulouse Mirail, France). 2002 – ongoing.
- Late Pleistocene Middle Stone Age shell midden at Ysterfontein (with R.G. Klein, Stanford University, T.E. Steele, UC Davis, D. Halkett, University of Cape Town): excavation and study of the bird remains. 2002–2007.
- Records of Middle and Upper Pleistocene birds in fossil and archaeological sites. – ongoing.
- Palaeo-ecology of the Western Cape Coast. (with Klein, R.G., Stanford University, L. Scott, University of the Free State). Funded initially by NRF grant to A. Chinsamy-Turan, Iziko Museums of Cape Town). 2002 – ongoing.
- Prey of black sparrow hawks in the western Cape (with R. Simmons, Percy FitzPatrick Institute for African Ornithology, University of Cape Town, and O. Curtis, Cape Technikon Nature Conservation MA student).2002 – ongoing.
- Cercopithecoid and other remains in crowned and black eagle prey assemblages. (with J. P. Kerbis, Field Museum, Chicago, USA; G. Malan, Tshwane University of Technology; A. Armstrong, University of Minnesota, USA). 2001 – ongoing.
- Co-Director of Duinefontein Project (with R.G. Klein, Stanford University and K. Cruz-Uribe, Northern Arizona University): excavation and overall interpretation; avian remains; palaeo-environment (carbon and oxygen isotopes with J. Lee-Thorp, University of Cape Town); pollens in hyaena coprolites (with L. Scott). NSF and Leakey Foundation funding allocated to RGK. 1997–2002.
- Co-Director of Die Kelders Cave Project (with R.G. Klein Stanford University, F.E. Grine and C. Marean, State University of New York at Stony Brook). NSF funding allocated to RGK. 1992–1995.
- Prey of black, martial and crowned eagles in the Cape Province (with A. Boshoff and G.N. Palmer, Cape Nature Conservation). 1988–1994.
- Late Quaternary palaeoecology of south-western Africa – avian fauna project, taphonomy of modern and archaeological/fossil bone accumulations and an investigation of the Middle Pleistocene hominid and other occurrences at the Elandsfontein fossil site, south-western Cape. Funding through colleagues involved in the project. Now part of "Palaeo-ecology of the Western Cape Coast Project" 1980 – ongoing.
- Avian fauna, palaeoenvironments and palaeoecology in the Pleistocene/Holocene of the southern and western Cape (PhD). Funding through colleagues involved in excavation projects. 1978–1990.
- Monthly survey of dead seabirds and marine mammals on South African beaches.1977–2006.
- Archaeological salvage of historical material from the Cape Town Station Concourse and Golden Acre Sites. Excavation and preservation of Wagenaar's Reservoir. 1974–1979.
- Systematic investigation of open-station shell midden sites along the south-western Cape coast (MA). CSIR, HSRC, Museum funding to GA. 1970–76.

**Fieldwork Experience**

- Extensive fieldwork (survey and excavation) at a range of archaeological and palaeontological sites dating from the Miocene to the Holocene (see Appendices 1 & 2).
- Surveys and collections of modern prey of mammals and raptors for taphonomic and palaeo-environmental studies.
- Monthly surveys for beached seabirds birds and marine mammals over 29 years.
- Initial development of the avian comparative osteology collection and contributions to its subsequent expansion and to that of the mammal comparative osteology collection. Assisted in the collection of barn owl pellets and in bird atlassing. This and other study material (above) led to the establishment of the Iziko Taphonomic Collection in Cenozoic Studies.

## Curatorial and Museology

**Collections Management**

Planning, management, curation and co-ordination of the archaeological, physical anthropology and Quaternary collections of Iziko SA Museum, as well as the Archaeological Data Recording Centre. Using databases of different types. Writing contracts for collections, external loans and impact assessments. Overseeing the input of the archaeological, physical anthropology caste and Quaternary mollusc collections on Excel spreadsheets to make them more accessible and contributing to the improvement and upgrading of the LogosFlow Humanities Database, used by the African Studies section. Assisting in the development of a LogosFlow Archaeology/Quaternary Database to capture data for individual cultural items, fossils and assemblages with a view to simplifying transfer of data already on spreadsheets to an Access relational database.

**Collections Policy Development**

Assisting in the development of Archaeology, Human Remains and Palaeontology collection policies.

**Sensitive Collections**

Best practices for sensitive collections (human remains). Organized a workshop on sensitive collections, the results of which led to greater understanding of museum and social issues, which have significantly changed the way in which many museums in South Africa treat human remains in particular. Contributed to public forums on the issues of museums and human remains and a member of the Iziko Reference Group on Human Remains, which developed Iziko's current Policy on Human Remains.

**Collection Development and Access**

Development of the archaeology, Quaternary, Comparative Osteology and Taphonomy collections.
Encouraged researchers to use the museum as an institutional base and to deposit their material in Iziko's collections leading to significant additions to Iziko holdings at virtually no cost to the museum. As visitors, they have helped to create critical mass in

cultural archaeology, archaeozoology, and Quaternary palaeontology, added scientific value to the collections and enhanced public and academic perceptions (local and international) of the museum.
Marketing Iziko's archaeological and Quaternary collections, which have been increasingly studied by local and international researchers and postgraduate students.

## Cultural Resource Management

Extensive experience in this field.

## Contributions to Development and Training

Lectures to university and technikon students and courses on the curation and conservation of collections and collection management. Provided in-service training and mentoring for museum staff, university students, postdocs and interns. Participated in training programmes for tour guides and museum volunteers.

## Membership of Professionally-Related Societies

- ❑ Royal Society of South Africa.
- ❑ Association of Southern African Professional Archaeologists (ASAPA). Professional Member #008 with Cultural Resource Management (CRM) accreditation.
- ❑ South African Society for Quaternary Research (SASQUA).
- ❑ International Council for Archaeozoology (ICAZ).
- ❑ South African Archaeological Society.
- ❑ Southern African Museums Association (SAMA) (Life Member).

## Other primary interests

Conservation, particularly participation in processes aimed at engendering and promoting civil and State understanding and the implementation of sound practices in environment and resource use. To this end, I have been active in promoting the principles, policies and actions of WESSA of which I have been a Regional Chairman, National Councilor, Board member and, as national President, Chairman of the Council and Board of Directors. I am a strong supporter of the Society's initiatives in environmental education and conservation, empowerment of communities and networking with other environmental NGOs.

## Honorary Positions

Honorary Research Associate, Iziko South African Museum (2012–).
Research Associate, Archaeology Department, University of Cape Town (2012–).
Editor *RSSAfNews* (2012–).
Editor *Piscator* (2012–).
Council Member Royal Society of South Africa (RSSAf) (2010–).
Member Cape Town Science Centre Scientific Advisory Board (2008–).
Member of Cape Nature Klipgat Development Group (2004–2007).
Past President and Honorary Life Member Wildlife and Environment Society of South Africa (WESSA) (2004–).
Member: Permit Review Committee, Amafa aKwaZulu-Natali (Heritage KwaZulu-Natal) (2001–ongoing).
Chairperson, Southern African Association of Archaeologists (now ASAPA) (2000–2004).
Specialist Advisor: Archaeology, Palaeontology & Meteorite Permit Committee, South African Heritage Resources Agency (SAHRA) (2000–2003).
Research Associate, University of Cape Town (UCT/Iziko MOU) (1999-2011).
Member of the Percy FitzPatrick Institute for African Ornithology Advisory Board (Representing WESSA) (1999–).
Trustee, World Wildlife Fund South Africa (WWF SA) (1999–).
Trustee, Klipgat Trust for coastline and heritage between Die Kelders Cave (Klipgat) and Gansbaai (1998–).

## APPENDIX 2 – Proof of Consultation

Original email sent to SBM and WCFP on 13 September 2016:

**Saldanha Strengthening: Heritage Consultation**

From "Jayson Orton" <jayson@asha-consulting.co.za>
to "Duarte, Nazeema" <Nazeema.Duarte@sbm.gov.za> and other 2 people

Tue 2016-09-13 04:11 PM

You replied to this message on 11 October 2016 11:03:08 PM.

Saldanha Strengthening HIA.pdf (6,8 MB)

Dear Nazeema and Pippa

As you are both aware, HWC requires consultation with affected parties who have an interest i heritage resources. I have, with the help of Dr Graham Avery, just completed an HIA for the proposed new substations and power lines in the Saldanha Bay area for Eskom. I have attached the draft report here and request that you provide any comment that you may have in relation to any aspect of heritage resources. Should you not have any comment then please indicate as much so I know.

Many thanks for your time on this.

Best wishes
Jayson

**Jayson Orton**
ASHA Consulting (Pty) Ltd
6A Scarborough Road, Muizenberg, 7945
jayson@asha-consulting.co.za
T: 021 788 8425 | C: 083 272 3225
www.asha-consulting.co.za

Follow-up email sent to SBM and WCFP on 11 October 2016:

**Re: Saldanha Strengthening: Heritage Consultation**

From "Jayson Orton" <jayson@asha-consulting.co.za>
to "Duarte, Nazeema" <Nazeema.Duarte@sbm.gov.za> and other 2 people

Tue 2016-10-11 11:03 PM

Dear Nazeema and Pippa

I just wanted to send a reminder regarding the email below as the 30 day comment period required by HWC is almost over. I would still prefer to include any comments you both may have but also do not want to unduly delay the project.

with all best wishes
Jayson

Comment received from SBM:

SALDANHA BAAI BAY
MUNISIPALITEIT | MUNICIPALITY | uMASIPALA

REF NO: 12/1/2/71
ENQUIRIES: N Duarte, Ms

ASHA Consulting
Dr Jayson Orton
6A Scarborough Road
Muizenburg
7945

REGISTERED MAIL
jayson@asha-consulting.co.za

Dear Sir

HERITAGE IMPACT ASSESSMENT FOR PROPOSED POWER LINES AND SUBSTATIONS NEAR SALDANHA BAY, HOPEFIELD AND VREDENBURG MAGISTERIAL DISTRICTS, WESTERN CAPE

1. The Heritage Impact Assessment for Proposed Power lines and Substations Near Saldanha Bay, Hopefield and Vredenburg Magisterial Districts, Western Cape dated 12 September 2016 has reference.

2. The Saldanha Bay Municipality has undergone a process of drafting a first phase Heritage Survey and whatever additional information is welcomed, to include when the survey is updated.

3. For this report, the SBM does not have additional information or recommendations.

**pp: MUNICIPAL MANAGER**
Date 13/10/2016

T: (022) 701 7000 ◦ F: (022) 715 1518
mun@sbm.gov.za ◦ www.sbm.gov.za
Private Bag X12 ◦ Vredenburg ◦ 7380

*Serve, Grow and Succeed Together*

Comment received from WCFP:

**RE: Re[2]: Saldanha Strengthening: Heritage Consultation**

From "Pippa Fossilpark mailbox" <pjh@fossilpark.org.za>
to "'Jayson Orton'" <jayson@asha-consulting.co.za>

11:04:25 PM

You replied to this message on 13 October 2016 11:09:39 PM.

image001.png (7 kB)

Hi Jayson
Sorry – have been in town all day.
Please do include more palaeo monitoring and the works to be located as far away from the Park as possible
This lovely west coast is going to be changed so much...

Regards
Pippa