

KOEBERG INTEGRATION PROJECT

Heritage Impact Assessment for the construction of two 400kV  
transmission lines between Koeberg 2 NPS, Omega substation,  
Muldervlei substation and the Stikland substation, Cape Town  
Metro, Western Cape Province

Prepared for

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## Executive summary

The Archaeology Contracts Office of the University of Cape Town was appointed by Savannah Environmental (Pty) Ltd of behalf of Eskom to undertake a heritage impact assessment as a specialist component of an EIA for the construction of two 400kV transmission lines and alternative deviations between the proposed Koeberg 2 nuclear power station and the Omega, Muldersvlei and Stikland substations in the Cape Town Metropolitan area. The study has revealed the following heritage indicators:

- Significant areas of Cainozoic and Pleistocene palaeontology;
- Significant sites of Pleistocene archaeology and with less information available on the Holocene archaeology of the routes;
- Historical farmsteads;
- Cultural landscapes.

### Mitigation

*Palaeontology and precolonial archaeology.* Apart from the Koeberg 2 – Omega and Koeberg - Omega Deviation 1 all the corridors discussed in this report pass through highly transformed landscapes, and lie on Malmsbury derived soils that are not palaeontologically sensitive. Indications are that Late Stone Age sites have been severely damaged by agriculture and are very difficult to identify in these environments. Dispersed scatters of Early and Middle Stone age material survive the action of years of plowing, however their heritage significance is diminished by context destruction. There is a possibility that historic middens may be found in areas where historic habitation took place, however these are relatively uncommon and not deemed to be a source of significant negative impact.

- As a general measure an archaeologist should be involved in the final walk-down phase of the line design to ensure that tower bases are not located on sensitive archaeological sites.

*Built environment:* For safety reasons transmission servitudes have to be kept clear and large trees and structures removed. Demolition of any of the heritage structures identified in this study must be avoided as they are protected by law for the reason that they are irreplaceable. Notwithstanding this, the visual impact of the lines on heritage structures constitutes a serious potential impact.

Under ideal circumstances there should be a 1 km buffer between heritage sites with aesthetic significance and transmission lines so that context is conserved, however in this densely farmed and populated landscape there is not enough space available to realistically enforce such a recommendation.

- In terms of the broader interests of conservation of landscape, this study supports as a general principle the re-use of existing corridors.
- It is recommended that no new transmission lines be constructed any closer to heritage structures than those that exist today.
- In new corridors, a buffer of 500 m is recommended around heritage buildings.
- For existing transmission lines at unacceptably close distance (e.g. in the vicinity of Hazendal), the building of new transmission lines should be used as an opportunity to create benefit by re-routing existing lines to less sensitive positions, where technically feasible.
- It is recommended that a heritage specialist be brought onto the project at the design phase to help find solutions to visual impacts on significant heritage structures or any other tourism facility.

*Cultural landscape and sense of place.* Since the existing Eskom servitudes are already established and a familiar element of the landscape, the addition of further transmission lines will be an additional visual impact to an already disturbed place.

- Re-use of existing alignments and consolidation of the electrical infrastructure is more preferable than creating a completely new corridors. Mitigation action lies within the domain of visual impact assessment, however it is suggested that tower designs be kept consistent within existing corridors to minimize visual clutter.

## **Conclusion**

In overall terms, the rich heritage landscape of the Western Cape makes the identification of potential of transmission line corridors a difficult task as heritage structures/places are so densely distributed that finding corridors that provide ideal visual buffer zones is extremely difficult. Transmission lines are a necessity to provide for the future economic growth of the Province. Given the existing infrastructure and numerous environmental constraints, the corridor options that have been identified and are supported by this study are the only viable opportunities. Provided that the transmission lines are designed with sensitivity to heritage resources, the proposed activity is supported.

No fatal flaws have been identified.

**Declaration:**

Mr Tim Hart and Dr Lita Webley are independent specialist consultants who are in no way connected with the proponent, other than delivery of consulting services.

Tim Hart (MA) is an archaeologist with 22 years of working experience in heritage throughout southern Africa. He is accredited with Principal Investigator status with the Association of Professional Archaeologists of Southern Africa.

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## GLOSSARY

Archaeology: 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.

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

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

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

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

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

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

National Estate: The collective heritage assets of the Nation

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

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

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

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

Wreck (protected): A ship or an aeroplane or any part thereof that lies on land or in the sea within South Africa is protected if it is more than 60 years old.

## Acronyms

DEA	Department of Environmental Affairs
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
LSA	Late Stone Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
NPS	Nuclear Power Station
PHS	Provincial Heritage Site
SAHRA	South African Heritage Resources Agency

## 1. Introduction

The Archaeology Contracts Office of the University of Cape Town was appointed by Savannah Environmental (Pty) Ltd of behalf of the proponent Eskom to conduct a heritage impact assessment for the construction of 400kV transmission lines and alternative deviations between the HV-yard at the proposed new Nuclear Power Station site (known as Koeberg 2) and the Omega substation (under construction), Muldersvlei substation (existing) and Stikland substation (existing).

This proposal has triggered a full EIA process, this report being the heritage component of this study.

### 1.1 The need for the project

South Africa is currently experiencing an energy crisis with the national electricity provider (Eskom Holdings Limited) being unable to produce enough power to serve the nation's peak demand or projected needs to satisfy a 6% growth rate. Eskom is investigating the feasibility of establishing new conventional nuclear power stations at:

- Duynfontein (next to the existing Koeberg 1 facility)
- Bantamsklip (near Gansbaai)
- Thyspunt (near St Francis Bay)

Eskom Transmission is investigating possible transmission line options for each of these three sites.

### 1.2 The proposal

The proposal is to construct (2) 400 KV transmission lines between the proposed Koeberg 2 Nuclear Power Station (NPS) and the Stikland substation. The proposal is somewhat complex involving 7 possible configurations and alternative deviations. The envisaged work will involve:

- Construction of towers
- Service roads

The proposed routes are as follows and are depicted on figure 1.

*Koeberg 2 – Omega.* The 2 x 400kV lines will follow an existing servitude across the Cape Flats Dune Strandveld then cross in a south easterly direction to the Omega substation situated at Groot Oliphants Kop.

Deviation 1 runs in an almost due east direction before diverting southwards to Omega through the Vaatjie area.

*Omega – Muldersvlei.* The proposed alignment consists of an additional 2 x 400kV transmission lines which follow an existing power line corridor that heads south east from Omega via Kalkfontein, Koeberg Hill over rolling wheat lands to the edge of the winelands at Joostenberg Vlakte eventually crossing the N1 where they pass around Muldersvlei substation.

Deviation 1 follows an alignment in a proposed new corridor via Sondagsfontein, Rondebosjeberg towards Muldersvlei.

*Koeberg 2 – Stikland.* The proposed alignment (2x400kV) leaves Koeberg 2 via the existing

corridor but takes a new corridor southwards towards Durbanville at the point where it intersects with the R302. The alignment runs north-south for about for about 12.5 km through the Kuils River corridor past Wellway Park before reaching the Stikland substation at Brakenfell. For the main part this is a densely populated area and the corridor is fairly restricted. This is the only corridor is largely devoid of heritage sites.

Deviation 1. The proposed corridor leaves the Koeberg-Stikland-Muldersvlei corridor over undeveloped land (small holdings, chicken farms, some vines) past Wallacedene and the high density Bloekombos development before it connects with the Muldersvlei–Stikland corridor close to the Bellevue Wine Estate Provincial Heritage Site.

Deviation 2. This is a short corridor between Damaraskloof and the Muldersvlei – Stikland corridor. This corridor passes over agricultural land for a distance of 6 km.

Koeberg-Muldersvlei-Stikland: The proposed transmission lines (2x400 kV) follows the existing corridor from Koeberg to Muldersvlei. Starting at Muldersvlei the proposed alignment follows an existing corridor crossing the Old Paarl Road through the winelands passing through a number of notable farms such as Bellevue and Hazendal. The Botelary Road lies along the Eastern boundary of the corridor.

### **1.3 The Scoping Study**

The following heritage indicators were identified during the scoping study:

- Significant potential areas of Cainozoic and Pleistocene palaeontology at Koeberg only;
- Significant sites of Pleistocene archaeology at Koeberg and with less information available on the Holocene archaeology of the routes;
- Historical farmsteads in a winelands context
- Cultural landscapes characterised as rural agricultural and scenic routes such as the R307.

It was found that the impact of the construction of new service roads is likely to be greater than the construction of the towers on below ground heritage resources.

As a preliminary assessment it was recommended that the transmission lines follow the path of the existing transmission lines (southern route) as opposed to constructing new lines across unspoilt landscapes. However, the cumulative impact of additional transmission lines will need to be assessed by a visual impact specialist.

## **2. Methodology for study**

This study has been commissioned as the heritage component of an EIA. It assesses the identified range of impacts in terms of accumulated knowledge of the area. The source of information that is used for this process is based on scientific publications related to archaeological work undertaken on the farm Duynfontein, as well as unpublished heritage reports on the history of the area. Information with respect to the built environment was obtained from a variety of sources and built environment surveys and is of relatively good quality throughout the study area. A survey of heritage resources has been conducted and visual heritage indicators (conservation-worthy buildings and places celebrated as heritage) identified, visited and mapped. The study area between Koeberg and Omega has been subjected to comprehensive archaeological assessments in the past (a complete survey of the existing Koeberg – Omega servitude was completed by Hart and Lanham (Hart 2008) while Hart and Orton completed a comprehensive assessment of the proposed Omega site and surrounds at Groot Oliphantskop in 2004. In 2006 Halkett and Orton conducted a survey of archaeological sites on Vaatjie Farm. Little however is known about the Swartland wheat farming areas in terms of archaeology apart from the fact that the landscape is extensively transformed and unlikely therefore to be particularly sensitive.



The outcomes of the various specialist studies will dictate the most suitable servitude alignments within the 2 km wide corridors.

Since the study area is approximately 2 km in width, there is little merit in conducting a saturation survey of the corridors as this is simply unfeasible. A final route walk-down will take place in the line design stage to make sure that any surface archaeological sites are identified and avoided during construction.

## **2.1 Assessing heritage in the context of transmission lines**

The assessment of transmission lines in terms of heritage is methodologically unlike other impact assessments that involve assessing physical landscape disturbance. Since typically transmission lines evoke the greatest change to a landscape above the ground surface, the emphasis is to assess impacts to heritage that is visually sensitive. By this we mean places or structures that are publicly celebrated as heritage or have the potential to be publicly celebrated as such. Historic farms, iconic landscapes and views are therefore a focus of this assessment.

The following guiding principles are used;

In open landscape during daylight hours transmission lines (400 kV) on self-supporting towers are visible (but not necessarily intrusive) from a distance of 5 km. Figure 2 depicts transmission lines from a distance of 2 km.

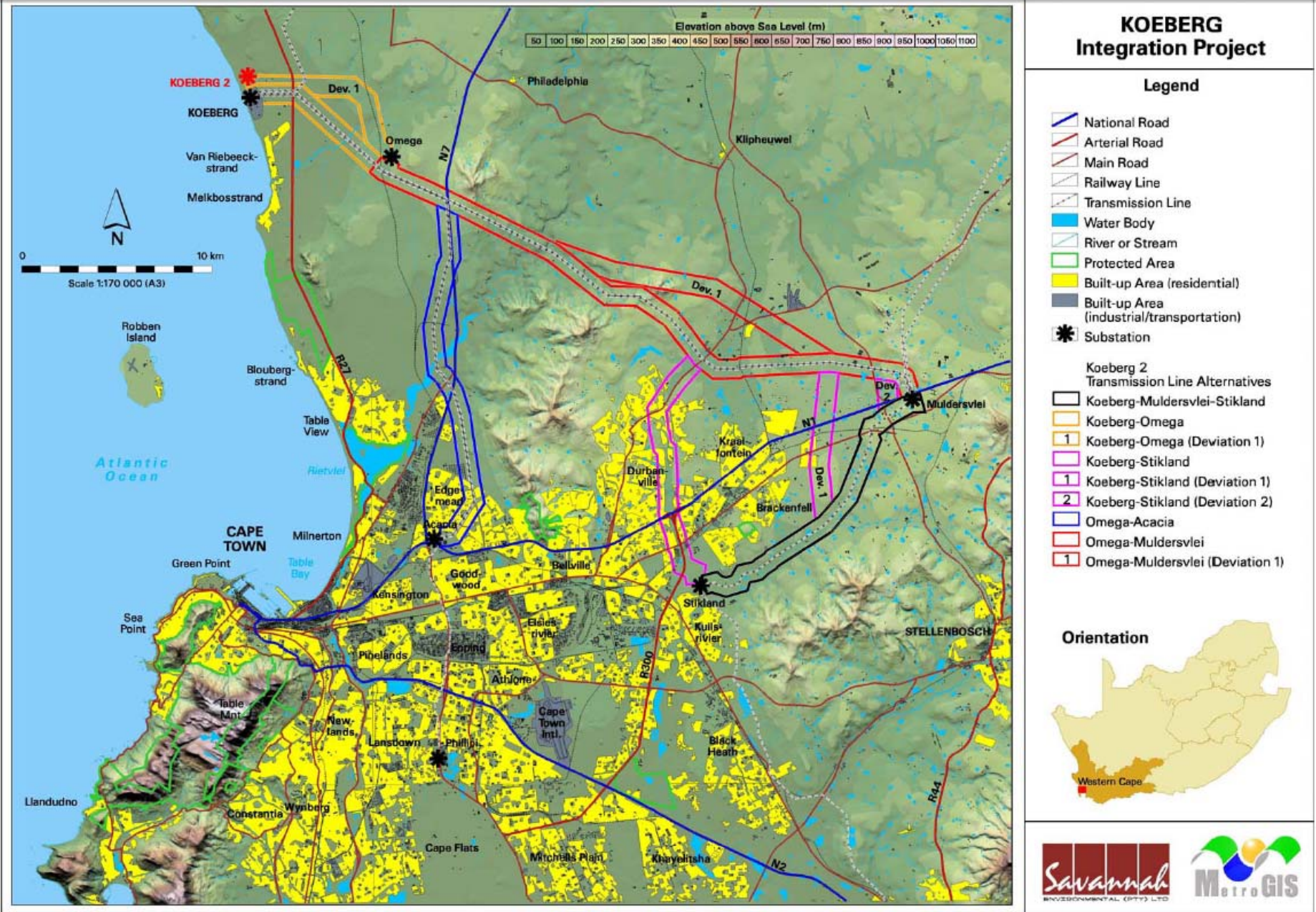
CNdV and DEAP (2006) in their development of guidelines for the establishment of wind energy facilities in the Western Cape have suggested that a buffer zone of 1 km be established around significant heritage sites to minimize the change to "sense of place" (this is sometimes difficult to achieve in parts of the Western Cape such as the winelands where celebrated heritage places are common on the landscape). The point at which a transmission line may be perceived as intrusive or offensive, is a subjective judgment, however in our experience lines within 1 km of a reference point are noticeable but not necessarily intrusive. After 450 m the lines become increasingly intrusive and become visually dominating after 100 m (depending on topography).

The presence of pre-existing transmission lines in an area serves as a mitigatory factor (rather than a cumulative negative impact) in terms of establishing new transmission lines in the same area. In other words electrical infrastructure clutter is best confined to existing areas or corridors of vertical visual disturbance, rather than introducing new vertical visual disturbance to undisturbed landscape.

While archaeological and palaeontological sites share the potential to be publically celebrated heritage places, they are less visible than structures in a landscape and are therefore less celebrated as tangible heritage with visual sensitivity. Since the impact on the land surface caused by transmission lines is very small, and reasonably adjustable at the level of final route selection, this study has focused on those aspects of heritage that are less easy to negotiate in terms of the proposed activity, namely heritage sites that are visually sensitive.

The direct impact on archaeological and palaeontological sites cannot be addressed at the EIA phase in specific terms as the servitude for the transmission lines first has to be situated within the 1 km wide corridor. Direct assessment of these impacts can only be determined at the line design and walk-down phase of the proposed activity. Mitigation can normally be achieved by micro-adjustment of tower positions and exclusion of sensitive areas.

Figure 1 The proposed Transmission line corridors.





**Figure 2 4x400 kV transmission lines Koeberg – Omega viewed from roughly 2000 m in open landscape.**

## **2.2 Restrictions and assumptions**

- Palaeontology. It is assumed that palaeontological remains recovered from Duinefontein may be uncovered in other areas.
- Saturation archaeological survey of the 2 km wide study area is unfeasible due to the large amount of land involved.
- It is assumed that the final route walk-down will allow for the protection of visible archaeological material through tower position adjustment, and allow for sensitive routing of lines in the areas of historic buildings and farmsteads.

## **3. Legislative context**

The basis for all heritage impact assessment is the National Heritage Resources Act 25 (NHRA) of 1999, which in turn prescribes the manner in which heritage is assessed and managed.

Loosely defined, heritage is that which is inherited. The National Heritage Resources Act 25 of 1999 has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms. In South Africa the law is directed towards the protection of human made heritage, although places and objects of scientific importance are covered. The National Heritage Resources Act also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage which must be considered in any heritage assessment includes:

- Cultural landscapes
- Buildings and structures (greater than 60 years of age)
- Archaeological sites (greater than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and grave yards
- Living heritage

Section 38 of the NHRA requires that Heritage Impact Assessments (HIA's) are required for certain kinds of development such as rezoning of land greater than 10 000 sq m in extent or exceeding 3 or more sub-divisions, or for any activity that will alter the character or landscape of a site greater than 5000 sq m. "Standalone HIA's" are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils Section 38 provisions.

#### **4. Description of the general heritage environment/context**

##### **4.1 Palaeontology**

The mineralised bones of ancient fauna are often found in this region of the Cape west coast. Fossils are regularly encountered between Woodstock beach, near Cape Town, and Saldanha Bay to the north of Yzerfontein. These include the material excavated from sites such as Elandsfontein (Singer & Wymer 1968), Duinefontein 2 (Klein et al. 1999) and Langebaanweg (Halkett & Hart 1999; Hendey 1969; Singer 1961). Fossil bones were also seen at Bakoond (Orton 2007) and Tygerfontein (Halkett & Hart 1995), both to the south of Yzerfontein, and a large collection has been made from an occurrence at Melkbosstrand (Hendey 1968). Material from the Milnerton beach area has also been recorded (Avery 1995; Broom 1909). Fossil material at Milnerton includes terrestrial and marine fauna, as well as shell deposits (Avery 1995). Many of these occurrences occur near the surface with the Melkbosstrand material having been exposed by wind deflation on an old marine terrace some 5 to 6 m above sea level (Hendey 1968). The Duinefontein 2 material occurs buried within red Pleistocene sands immediately north of the Koeberg power station within about 0.7 m of the surface (Klein et al. 1999), however it is not clear how far inland the fossiliferous deposits extend, but in all likelihood it is to the edge of the Sandveld.

##### **4.2 Archaeology**

Little formal archaeological academic research work has been carried out in the general vicinity of the study area; however various impacts assessments have led to the accumulation of some knowledge. Although southern Africa has been occupied by hominids for more than one million years, little evidence of the earliest occupation is preserved within the local region. The fossil site of Duinefontein 2 in the Koeberg Private Nature Reserve contains Early Stone Age (ESA, >200 thousand years ago (kya)) artefacts and similar isolated items are routinely found in ploughed fields across the south-western Cape. Kaplan (1996, 2000b) reports ESA artefacts from farmlands near the study area.

Middle Stone Age (MSA, 200kya – 20kya) artefacts were found in association with the Melkbosstrand fossils (Hendey 1968) indicating at least some MSA presence in the area. MSA artefacts of the Stillbay type have also been collected in the region of Maitland just south of the study area (Goodwin 1926, 1928) and at a site described as being between Milnerton and Maitland (Goodwin & Van Riet Lowe 1929). Artefacts thought to date to the MSA were observed at Groot Oliphantskop to the east of the Melkbosstrand WWTW (Orton & Hart 2004) and in the region of Vissershok (Kaplan 2002a).

In general, Later Stone Age (LSA, <20kya) sites are far more commonly encountered than earlier material. This may be largely due to burial of older sites beneath recent sand. The only

formal excavations to have taken place at an LSA site are those in the near coastal dunes of the Atlantic Beach Golf Estate, just northwest of Blaauwberg Hill and at Melkbosstrand. At the Atlantic Beach sites late Holocene LSA occupation probably pertaining to the Khoekhoen people was found. The sites were located in the high sand dunes and consisted of shell middens and associated artefacts. The lowest shell layers were dated to about AD 700 to AD 750 at AB1 and about AD 1050 at AB3 (Sealy et al. 2005). Kaplan (2000a) and Gray (2000) conducted excavations in a shell midden with material probably dating back to the mid-Holocene but this has never been studied further. Hendey (1968) and Avery (1995) also mention the existence of LSA shell middens among the coastal dunes and photographs of Bloubergstrand from the early 1900s in Duminy (1979) show the kind of dunes that would undoubtedly have housed LSA middens. The Atlantic Beach sites are approximately 1.3 km from the sea so the chance of finding further sites within the study area does exist.

Relevant to the study area the farm Groot Oliphantskop – site of the Omega sub-station (Kaplan 1996; Orton & Hart 2004) as well as other farms in the area (Kaplan 2004). Halkett (per comm.) reports the presence of Early Stone Age scatters on the farm Vaatjie as well as substantial Late Stone Age open sites on an adjoining property. Early Stone Age material has also be located on the farm Brakkefontein just south of Atlantis (Halkett 2005).

Two burials were reportedly excavated from the Groot Oliphantskop farm in the mid-20th century (Kaplan 1996). Morris (1992) has catalogued human burials from South Africa and records numerous burials from the Milnerton (13 listed), Blaauwberg (20 listed) and Melkbosstrand (22 listed) areas. Others have also been recorded in recent years (e.g. Avery 1995; Deacon & Goosen 1997; Kaplan 2000a, 2002b; Yates 2001) and continue to be found at new development sites.

Within the Swartland archaeological material is scarce, and references to finds are few and far between. Since the area has been subject to plowing for hundreds of years, the spatial context of archaeological sites will be extensively disturbed, hence the area has not attracted much research. Recently Smith (per comm.) conducted surveys in the wheatlands of the Durbanville-Klipheuwel area and found that material is very sparse. Orton (pers com) has reported similar findings. To the south on the Cape Flats LSA artefacts have also been noted from the vicinity of Maitland (Goodwin & Van Riet Lowe 1929).

#### **4.3 The colonial period heritage**

The western portion of this area was significant in the early history of the refreshment station at the Cape particularly in terms of the cattle route between the Cape and the grazing lands along the west coast and the interior. By the time the refreshment station had been established in 1652, there was already a tradition amongst the Cape Khoekhoen of moving their herds of stock between the interior and coastal grazing lands<sup>1</sup>, which was strengthened by trade opportunities from the 16th century onwards with passing ships on route from Europe to the East.

A number of VOC outposts were established in this area: Keert de Koe, established at the mouth of the Salt River in 1659, guarded the entry of the Khoekhoen into the Table Bay as well as attempting to control trade between the freeburghers and the Khoekhoen (Sleigh 1993). Other VOC outposts were established at Paarden Island (De Kijkuit c1659), Tableview (Rietvallei c1660), Bommelshok (c1676), Milnerton (Jan Biesjies Kraal c1685), Kuilsrivier (de Kuilen pre 1700). A number of cattle posts were later re-granted as farms, of which Phisantekraal and possibly Oliphantskop may be examples. Kuilsrivier is also situated on an early VOC outpost, which was sold to Olaf Berg in 1700. Although a few farms were granted in this area in the late 17th century (specifically Klein Oliphants Kop, Phesantekraal, Diemersdal and Mosselbank), the expansion of the settlement into this area dates to the early decades of the 18th century (specifically Brakkefontein, Kuiperskraal, Rondeboschje, Ligtenburgh, Hercules Pillar and Waarborg between 1702 and 1705, with Brakkenfont, Brakkekuil, Rust

Plaats being granted between 1714 and 1715) (Guelke 1987). A series of signal cannons were used to call outlying farmers to Cape Town in times of trouble; a canon was situated on the farm Rondeboschje.).

While both alternative routes between the Koeberg-2 HV yard and the Omega substation cross the farm Kleine Zoute Rivier, Deviation 1 will pass in close proximity to the farmhouse of Vaatjie which is located on Portion 84 of Kleine Zoute Rivier. According to survey diagrams, the Loan Place was granted in 1836 and crossed by a "main wagon route" (The Surveyor General).

The area to the north west of Kuilsriver and Durbanville (Halkett & Attwell 2009) was the site of a number of early land grants. The two proposed *Omega – Muldersvlei* corridors diverge at the farm Kuiperskraal which was granted in 1702 and Welgegund which dates to 1743 (Guelke 1987). These are all early freehold farms and so there is archaeological potential and important historical layering of the landscape.

The occupation of the Cape by the British, first in 1795 and again in 1806, heralded British colonialism. The British actively expanded the settlement at the Cape, granting additional farms, establishing towns and encouraging immigration. During the early half of the 19th century, Durbanville was established as a town. During the same time, fishing villages were established eg at Blaauwberg, although the practice of seasonal visits to the coastal areas by farmers from the interior, is one that has its roots in the earlier migration practices of the Khoekhoe moving their herds on a seasonal round between the coast and the interior.

The end of the 19th century saw the formalization of the road network, development of the rail transport extending as far as Wellington. Small urban nodes also developed around the railway stations e.g. Kraaifontein. Associated with these infrastructural improvements, was an increase in urban development eg Milnerton, Brackenfell, Kuilsrivier and Parow.

In the 1920s this trend increased, with the residential areas of Milnerton and Parow expanding and additional suburbs laid out at Brooklyn, Rugby, Blauwbergstrand and Melkbosstrand. The area to the north/ northwest of the Tygerberg was still predominately agricultural, being mixed cattle and grain farms.

The period around the Second World War saw an increase in residential and suburban development with Tableview being laid out on the approximate location of the old Rietvlei outpost (Rennie & Scurr 2001). Joostenberg Vlake was laid out as a small holding area in the 1940s, particularly for the cultivation of flowers (Winter 2002).

The declaration of the Group Areas Act and its related town planning strategies, resulted segregated towns and limited access to coastal resources for most of the inhabitants of Cape Town and surrounds. The modern suburbs within the study area were developed during this period as 'white residential' areas. Edgemoed, Platteklouf and Montevista are relatively recent residential developments dating to the last 20-odd years. In 1996 the Tygerberg Municipality was formed, incorporating the smaller municipalities of Goodwood, Parow, Durbanville and Bellville.

#### **4.4 Cultural Landscape**

*Fragmented Sandveld landscape:* The area between Koeberg and Omega falls within the Swartland region and the landscape is characterised as rural and agricultural (Orton & Hart 2004). Settlement patterns are sparse. There are a number of historical villages and old farm werfs dotted across the undulating landscape and a number of historic routes bisect the area. Koeberg is situated within the Sandveld characterized by coastal Fynbos in conserved areas (Koeberg Nature Reserve), which inland of the R27 gives way to a fragmented landscape of densely alien-vegetated tracks of land, some grazing land along with sand mines and clay pits and numerous 4x4 trails, quad - bike and dirt bike adventure schemes.

*The Swartland wheatlands cultivated landscape:* Once the Sandveld gives way to Malmsbury

shale derived soils, wheat cultivation dominates. This is an attractive and historic landscape of rolling hills, valleys, well defined farmsteads and workers cottages. It is however, highly transformed in that cultivation of the land is almost universal apart from on the sides of steep slopes and deep valleys where small patches of Rhenosterveld vegetation still survives. Hart & Clift (2008) discusses the layering of the landscape and explains that the pre-colonial layers and the early colonial farming element are invisible as the region is dominated by the 20th century landscape of contour plowing.

*Mixed agricultural landscape and winelands edge:* The study area incorporates the northern edge of the Durbanville Hills. This area is characterised by undulating hills covered in wheat fields and pastures. Further to the south, the landscape is covered in vineyards and there are houses with Classic Cape Dutch architectural style and historical tree plantings. This area is significant for the intactness of landscape, its cultural continuity and the concentration of conservation worthy homesteads. While the Durbanville Hills winelands lies outside the study area, the eastern edge – i.e. the Muldersvlei-Stikland corridor lies on the edge of the winelands.

The existing Muldersvlei Stikland corridor passes along the western edge of the Cape Winelands. This incorporates the Joostenberg Vlakte, an area with a long history of small holdings. Halkett & Attwell (2009) have characterised the landscape around Joostenberg Vlakte as unused agricultural lands, an undulating topography with distant views of the mountains. They have described the area as having limited heritage and scenic significance although the landscape currently possesses a sense of openness particularly enhanced by the land slopes towards the south west from the R312. The Muldersvlei substation and existing power line servitudes to Stikland has already resulted in notable impacts to a number of historic Cape farms. The farm Joostenberg Vlakte lies adjacent to a veritable maze of electrical infrastructure. Transmission lines pass through the landscape of the historic farm Bellevue Provincial Heritage Site and are overtly visible as a backdrop to Hazendal, also a Provincial Heritage Site (see figures 3 and 4).

The area in the immediate vicinity of the Stikland substation is located on the M23 (Bottelary Rd). The landscape around the substation is described as undeveloped farms and small holdings, however this is rapidly being encroached on by the growing suburbs of Brakenfell and Kuils River



**Figure 3 The heritage site Joostenberg Vlakte (in the fore-ground) has been negatively impacted by transmission lines and other infrastructure within 200 m of the buildings.**





**Figure 4 Transmission lines and towers located some 80 m behind the farm buildings at Hazendal Provincial Heritage Site dominate the view towards the buildings and destroy the sense of history of the place.**

## **5. Assessment of Impacts**

### **5.1 Activities that will affect the heritage environment**

The transmission lines will consist of overhead cables suspended from towers (there are several designs utilised by Eskom) placed 400-500 m apart. Each steel tower will need to be mounted on concrete footings set into the ground surface. Hence each point of land surface disturbance is confined to the few square meters of the towers bases. The actual servitude will require a service road (normally an unpaved track) while the corridor will have to be cleared of tree cover. During construction the landscape will be subject to a period of temporary disturbance when construction equipment is brought onto site for building of the towers and lifting of the cables.

Heritage sites can be negatively affected by disturbance of the land surface, destruction of significant structures and places, as well as any action that will alter the feel and appearance of an historic place or building. Hence, transmission lines are likely to result in moderate impacts to the land surface during the construction phase but permanent changes in terms of visual impacts and changes to sense of place.

The following potential impacts on heritage resources have been identified.

### 5.1.1 Koeberg 2 – Omega Identified Heritage Impacts

The range and attributes of heritage sites within the study area are summarized below.

TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Koeberg – Omega Dev 1	Duinefontein	Koeberg Nature Reserve	Buried Pleistocene archaeology and palaeontology	Limited local impact at tower bases
Koeberg – Omega Dev 1	Oliphants Kop	S 33° 42' 13.2" E 18° 30' 24.4";	Late Stone Age artefact scatters in sandy rise on edge of ploughed land. Very low significance.	Impact by tower bases and construction vehicles can be avoided by marking site.
Koeberg - Omega	Eskom Servitude	S 33 41 44.1 E 18 29 26.7	Artefact scatters in disturbed land, low significance.  Indeterminate cultural affiliation	Impact by tower bases and construction vehicles can be avoided by marking site.
Koeberg - Omega	Eskom servitude	S 33 42 17.2 E 18 30 17.7	Raft silcrete with evidence of some quarrying. Disturbed land.  Indeterminate cultural affiliation	Impact by tower bases and construction vehicles can be avoided by marking site.
Koeberg -Omega	Eskom servitude	S 33 42 11.5 E 18 29 57.5	Raft silcrete with evidence of some quarrying. Large chunks of coarse silcrete lying around Disturbed land. Indeterminate cultural affiliation	Impact by tower bases and construction vehicles can be avoided by marking site.
Koeberg – Omega Dev 1	Vaatjie	33° 41'1.78"S 18 29'56.95"E	Irregular werf layout consisting of U-shaped dwelling and 3 historic outbuildings. Early – mid-late 19th century core with 20th century layering.  Slightly fragmented landscape setting on edge of strandveld. Some agriculture and grazing, also sand mining.  Proposed grading: 3b-3a	New transmission lines likely within less than 500 m of farm buildings
Koeberg Omega Omega –	Oliphantskop	33°42'26.63"S 18°30'56.26"E	Farm complex, with associated cemetery,	Omega substation

TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Muldersvlei			<p>dating to 18th century with early 20th century additions. Linear werf layout, with evidence suggesting organic growth from pioneer style longhouse (ACO 2004:10-12). 1930's remodeling of the outbuildings.</p> <p>Rolling wheatland and grazing landscape. Omega substation authorized.</p> <p>Proposed grading 3a</p>	<p>already authorised, existing 4x400 Kv 450 m from farm but screened by Oliphantskop Hill. Additional impacts of similar nature expected.</p>

**Table 1 Koeberg 2 – Omega heritage sites**

- Palaeontology (Koeberg-Omega)

The area around the existing Koeberg nuclear power station was subjected to detailed studies in the 1970s and the palaeontological potential of the area resulted in a number of scientific studies cumulating in significant discoveries which have since been published. The status of this material was re-affirmed by Hart (2010) during the course of assessments for the proposed Koeberg 2 NPS.

*Nature of impacts:* It is not anticipated that the construction of the towers will impact on the below ground palaeontological heritage to any significant degree as the tower footprint are limited to a few square meters of disturbance.

*Extent of impacts:* The construction of the transmission lines will impact on relatively small areas of the potential fossil rich area and the extent of the impact is therefore likely to be highly local.

NATURE OF IMPACT: Disturbance of buried palaeontological material by tower footings		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (12)
STATUS	– Negative	+ Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	Yes
MITIGATION: There is positive benefit to be derived from checking excavations for tower footings for fossil material during construction. This allows development of spatial information that can feed into both research and future EIA processes.		
CUMULATIVE IMPACTS: The cumulative impacts are negligible as the size of the impact from the tower footings vs. the size of the resource is negligible.		
RESIDUAL IMPACTS: N/a		

**Table 2 Impacts to palaeontological material**

- Pre-colonial archaeology (Koeberg – Omega)

The association of Early Stone Age implements with fossil rich bone accumulations is comparatively rare in archaeological terms, and the Duinefontein 2 site is therefore highly significant. Only 3 very low grade archaeological sites have been recorded in the transmission line corridor between the R27 and the approach to Omega (Hart 2008), however archaeological sites have been documented at Groot Oliphants kop farm (Hart and Orton 2004). Impacts to these can be avoided in totality provided that tower footings are carefully placed. Details of this material is included in an excerpt from the specialist report in Appendix A.

*Deviation 1.* There are large dispersed scatters of Early Stone Age Material on the farm Vaatjie. Depending on where the towers are constructed, limited impacts are expected in the form of displacement of archaeological material.

*Nature of impacts:* The proposed activity may cause localised exposure and displacement of archaeological material, particularly within the Koeberg Nature Reserve, west of Omega and potentially in parts of deviation 1.

*Extent of impacts:* Given that the distribution of archaeological sites is generally sparse, and the fact that the chances of tower footings impacting them are low, only highly localised impacts at tower footings and also the service road alignment are possible, and most may through appropriate mitigation, be avoided altogether.

NATURE OF IMPACT: Impacts to archaeological material could involve localized displacement of material at tower footings or lateral disturbance of material by vehicles and service roads.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	N/a
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (6)
STATUS	Neutral – negative	Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Impacts can be avoided.
MITIGATION: An archaeologist should be involved with line design/walkdown phase to make sure that service roads and footings do not impact any of the 6 known archaeological sites in the corridor. Excavations for footings should be checked, especially within the Koeberg Reserve.		
CUMULATIVE IMPACTS: N/a		
RESIDUAL IMPACTS: N/a		

**Table 3 Impacts to archaeological material**

- Built environment (Koeberg – Omega)

Settlement of the landscape during the colonial period commenced during the 18th century with the establishment of loan farms close to rivers and springs, but rapidly expanded until all the land was sub-divided and under private ownership. Some of the old *werfs* in this area, such as Groot Oliphantskop, Brakkefontein (to the south outside of the study area) and Vaatjie (see figure 5) retain elements of their 19th century fabric such as farm houses, sheds, wells and family cemeteries. The early maps also indicate the location of old wagon tracks, however it is unlikely that any of these have survived agricultural practices.

*Nature of impacts:* Besides demolition (which is required for structures that may lie within the final servitude), the most profound impact a transmission line can cause is change to the sense of place – the rural qualities of an area, sense of remoteness, or feeling of history will be highly negatively affected by the massed presence of transmission lines with 1 km of the heritage site, depending on topography and context. Of concern in this respect is the effect of transmission lines (deviation 1) which is likely to pass within sight or even close to the historic farmstead at Vaatjie. Vaatjie still enjoys an open view to the west with minimal vertical disturbance of the visual space.

*Extent of Impacts:* The impact of destruction of heritage sites from the historical period can extend well beyond the immediate site. Views of transmission lines from vantages such as historic places and known scenic areas can result in significant changes in sense of place associated with an historic site and detract from the originality of the resource and its setting. Sense of place impacts will persist for as long as the transmission line is present. Fortunately only Deviation 1 sees transmission lines pass in potentially close proximity to a historic farm at Vaatjie (see figure 5) resulting in a negative visual impact to a potential grade 3a structure. The Omega substation combined with the effect of the 4 existing lines which approach and leave the area will make the approach to this farm a visually very busy area in terms of electrical infrastructure. The additional turn-in lines to Omega will add to this resulting in a high local accumulative impact. A large amount of electrical development has already been authorised at Omega with the result that the approach to Oliphants Kop farm will be highly cluttered.

NATURE OF IMPACT:		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Moderate (6)	Low (4)
PROBABILITY	Probable (3)	Possible (3)
SIGNIFICANCE	Medium (33)	Low (27)
STATUS	- negative	- negative
REVERSIBILITY	reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Exclusion of deviation 1 will avoid impacts to Vaatjie. Careful line design and tower placement will assist in keeping lines outside of the viewshed of Groot Oliphants Kop farm house. Keep tower forms consistent on existing corridors.		
CUMULATIVE IMPACTS: Yes. The amount of lines into the Groot Oliphants Kop areas will double, which together with the HV-yard infrastructure under development will create a maze of electrical apparatus.		
RESIDUAL IMPACTS: N/a		

**Table 4 Impacts to built environment**

- Cultural landscape and sense of place (koeberg – Omega)

Limited agriculture, primarily wheat farming is practiced in the area, but large parts of the landscape are still under strandveld and/or alien vegetation with some areas utilized for grazing. There has therefore been limited transformation of the rural landscape. This area is termed the Koeberg Farms Cultural Landscape and is characterised by a remote landscape, sparse historical farms (dating to as early as the 18th century) – predominantly stock farms, a sparse settlement pattern and a surrounding landscape of small holding subdivision. The area has a scruffy and fragmented quality in places with activities such as light industry, brick and clay mining, sand mining giving the area a slightly industrial feel.

*Nature of impacts:* In terms of both visual impact on the cultural landscape and sense of place, transmission lines on both alternatives will be highly intrusive as they approach the R27 (West

Coast Road) and the R307 (old Mamre Road). The old Mamre road is considered a scenic route with its historical avenue of trees.

The preferred route will result in an additional three 400kV transmission lines (in addition to the existing four lines) crossing both the R27 and R307. However, the existing route is preferred as it crosses the roads at a slight angle and is only visible for a short distance.

Deviation 1 will take the three 400kV lines through a rural landscape which is currently not bisected by power lines. In addition, the three lines will be visible to motorists traveling along the scenic route to/from Mamre (R307) for a longer period as the lines will travel parallel to the road.

*Extent of impacts:* The extent of the impacts will vary along the length of the corridor depending on the topography. Since the existing Eskom servitude (4 lines) is already established and now a familiar element of the landscape, the addition of further 3 transmission lines may aggravate existing impacts through cumulative affect. The effect of this will be felt at every viewpoint from which the corridor may be seen. Despite this the re-use of the existing alignment and consolidation of the electrical infrastructure is more preferable than creating a completely new corridor which will subject as yet un-impacted areas to a new visual intrusion. This will assist in conservation of unbroken expanses of countryside. Mitigation action (if needed) lies within the domain of visual impact assessment.

NATURE OF IMPACT: Impacts to archaeological material could involve localised displacement of material at tower footings or lateral disturbance of material by vehicles and service roads.		
	Without mitigation	With mitigation
EXTENT	Local (3)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Moderate (3)	Low-Moderate (2)
PROBABILITY	Probable (3)	Probable (3)
SIGNIFICANCE	Medium (36)	Low (24)
STATUS	- Negative	- Negative
REVERSIBILITY	Reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Impacts can be avoided.
MITIGATION: It is recommended that in the interests of the conservation of landscape, existing corridors are used. Tower designs should be kept consistent within corridors.		
CUMULATIVE IMPACTS: The massed transmission lines will be more visible from a distance, and dominating from close up.		
RESIDUAL IMPACTS: N/a		

**Table 5 Impacts to cultural landscape and sense of place**

- Assessment of alternatives (koeberg – Omega)

The existing corridor. The existing corridor is favoured as it will not result in new impacts although there may be some compounding of visual impact due to additional transmission lines. In the interests of the conservation of landscape this is supported.

Deviation 1. Utilisation of this option will result in further fragmentation of the landscape and have negative visual implication for the historic farm Vaatjie, as well as greatly increased visibility from Oliphants Kop. This alternative is not supported.

No-go Alternative. This study finds that there are not fatal flaws in terms of the proposed activity. In heritage terms the no-go alternative will maintain the status quo and not result in further negative impacts, however this will be detrimental for security of power supply.



**Figure 5 The main farm house at Vaatjie.**

### **5.1.2. Koeberg – Muldersvlei**

There are two identified corridors for the 2 new 400 kV transmission lines.

The existing corridor which carries 4x400 kV transmission lines on self-supporting lattice towers runs from Omega-Kalkfontein-Wegegund–Vrymansfontein (rolling wheatlands) then passes within 2km of the northern suburbs of Durbanville (just south of Fisantekraal), crosses the R302 and the Joostenberg Vlake, crosses the N1 at Joostenberg Farm and then passes Muldersvlei substation on the edge of the winelands on the eastern side of the N2. North of Durbanville the quality of the landscape degenerates from rolling wheatlands in the west to broken up farmlands marred by quadbike tracks, sand mining and poultry farming.

Deviation 1 which is a new alternative corridor splits off the existing corridor at Welgegund and runs roughly parallel to but north of the existing corridor. It passes Sondagsfontein, Rondeboschjeberg and then crosses Fisantekraal are just south of the Airport. It rejoins the existing Muldersvlei corridor at Damaraskloof. Once the corridor leaves the wheatlands and enters the Joostenberg Vlake, the integrity of the landscape changes. Off-road trails, sand mines and various non-agricultural activities are evident.

Both corridors pass a number of known heritage sites with varying degrees of impact. These are all significant farms with protected structures, some of which are Provincial Heritage Sites. The table presented hereafter summarises our observations with respect to these.

- Palaeontological Heritage

In terms of palaeontology, both corridors lie within the Malmsbury shale areas of the Cape. Being extremely ancient, the shales are non-fossiliferous, hence palaeontology is not identified as a heritage indicator.

*Nature of impacts:* The proposed activity will have no significant impact on palaeontology in both the existing corridor and deviation 1.

*Extent of Impacts:* In the unlikely event of an impact occurring, the impact will be local.

NATURE OF IMPACT: Disturbance of buried palaeontological material by tower footings.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (12)
STATUS	– Negative	+ Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	Yes
MITIGATION: No mitigation is suggested.		
CUMULATIVE IMPACTS: No cumulative impacts are expected.		
RESIDUAL IMPACTS: N/a		

**Table 6 Impacts to palaeontological material**

- Pre-colonial archaeology

In terms of archaeology, both proposed corridors pass through highly modified landscape. Although there is little doubt that the area was used by prehistoric people, especially cattle herding Khoekhoen groups, previous studies have shown that the ephemeral traces of habitation are mostly destroyed. Dispersed scatters of Early and Middle Stone age material survive the action of ploughing, however their heritage significance is diminished by context destruction. There is a possibility that historic middens may be found in areas where historic habitation took place, however these are relatively uncommon and not deemed to be a source of significant negative impact as like other archaeological sites, they can be identified and mitigated at the walk down phase.

*Nature of impacts:* The proposed activity may cause localised exposure and displacement of disturbed archaeological material.

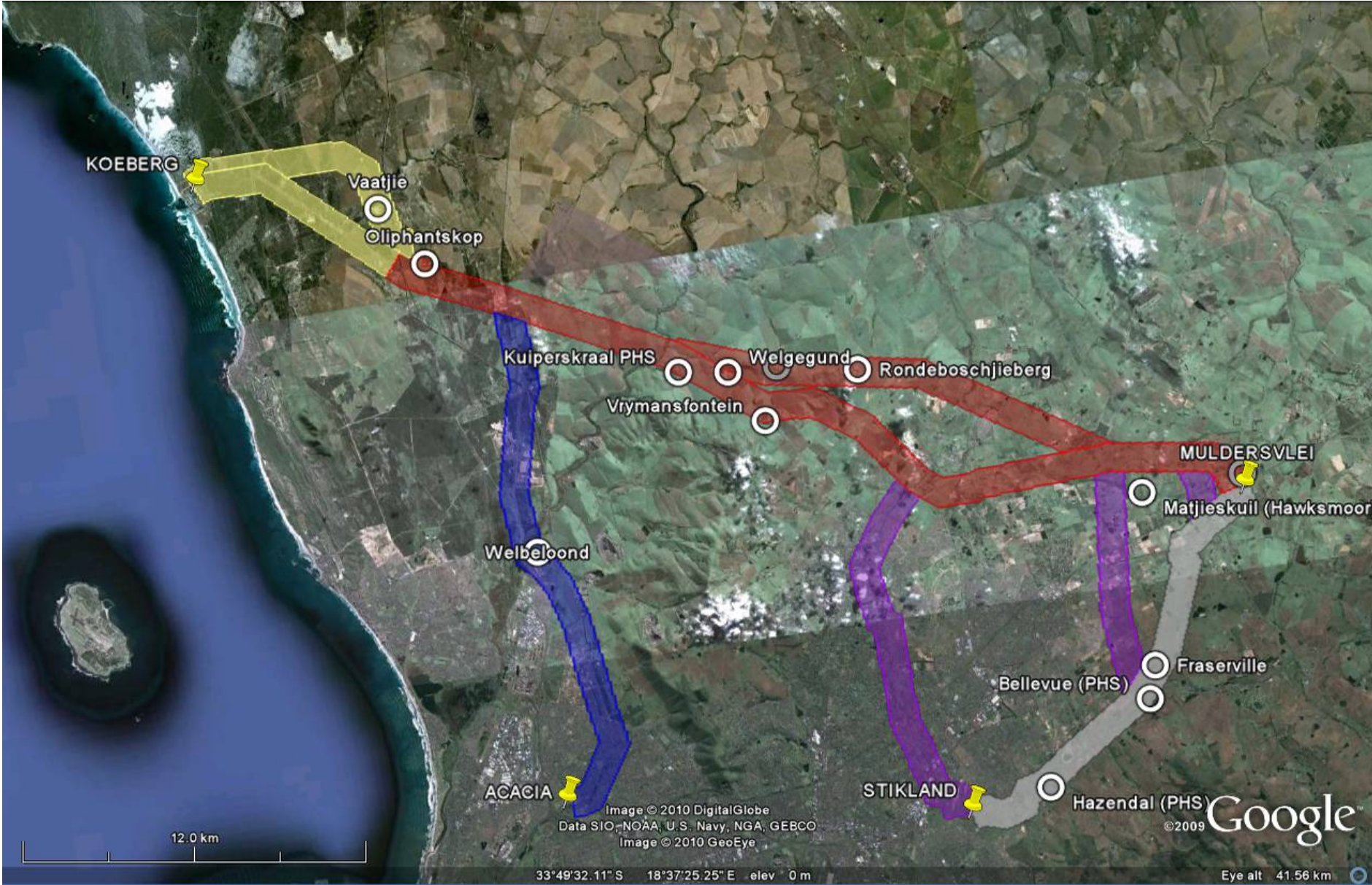
*Extent of impacts:* Given that the distribution of archaeological sites is generally sparse, and the fact that the chances of tower footings impacting them are low, only highly localised impacts at tower footings and also the service road alignment are possible, and most may through appropriate mitigation, be avoided altogether.

NATURE OF IMPACT: Impacts to archaeological material could involve localized displacement of material at tower footings or lateral disturbance of material by vehicles and service roads.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	N/a
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (6)
STATUS	Neutral – negative	Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Impacts can be avoided.
MITIGATION: An archaeologist should be involved with line design/walkdown phase to make sure that service roads and footings do not impact any archaeological sites in the corridor.		



CUMULATIVE IMPACTS: N/a
RESIDUAL IMPACTS: N/a

**Table 7 Impacts to archaeological material.**



**Figure 6 locations of identified built environment heritage sites within or close to the proposed corridors.**

- Built environment

The built environment heritage of both the existing corridor and deviation 1 consists of scattered farms (see figure 6), many of which have very early origins. Their attributes are summarised in the following table. These farms are integrally part of the cultural landscape which has its origins in the early land grants of the Dutch East India Company. All the farms listed below are considered heritage sites on account of the fact that they contain fabric and structures that date as far back as the 18th century. At least two of the farms were previously declared National Monuments under previous legislation, and are now grade 2 Provincial Heritage Sites (a Provincial Heritage Site is a heritage asset with regional significance).

TRANSMISSION LINE ALTERNATIVE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Omega – Muldersvlei	Oliphantskop	33°42'26.63"S 18°30'56.26"E	Farm complex, with associated cemetery, dating to 18th century with early 20th century additions. Linear werf layout, with evidence suggesting organic growth from pioneer style longhouse (ACO 2004: 10-12). 1930's remodelling of the outbuildings.  Rolling wheatland and grazing landscape. Omega substation authorised.  Proposed grading 3a (see appendix A for details)	Omega substation already authorised, existing 4x400kV 450 m from farm but screened by Oliphantskop Hill. Additional impacts of similar nature expected.
Omega – Muldersvlei	Kalkfontein (figures 6 and 7)	33°43'42.24"S 18°34'8.36"E	Falls just outside the transmission line corridor. Site inspection shows that farm has potential to contain historic material and barns, much 20th century layering.  Proposed grading: 3C	Impact of existing transmission lines 400 m to south well absorbed in rolling wheatland valleys. Suggest maintain this buffer.
Omega - Muldersvlei	Vrymansfontein	33°46'21.68"S 18°38'1.77"E	Granted in 1693 to BJ van Swol. Homestead altered, but origins in 18th century. (Buttgens 2005). A large farm complex with many out-buildings, some old. See Appendix B for plate.	4 x400 kV lines pass on the northern side of the farm 500 m from the farm buildings. To avoid cumulative impact, this buffer should

TRANSMISSION LINE ALTERNATIVE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
			Proposed grading: 3C	be maintained.
Omega – Muldersvlei	Lochlynn	33°46'27.23"S 18°38'58.14"E	Subdivision of Vrymansfontein (Buttgens 2005) Falls on the boundary of the transmission corridor.	Scenic landscape around farm could potentially suffer from cumulative impacts. Retain existing 500 m buffer to existing 4x400kV to the north.
Omega – Muldersvlei	Joostenberg  Provincial Heritage Site	33°48'42.77"S 18°48'34.09"E	Originally Weltevreden op Joostenbergvlakte. Granted to M Michielsen in 1694. Homestead dating to early half of 18th century. In 1752 farm acquired by Gerrit vd Byl of Vredenburg (Stb) who owned a number of farms in the area. Front gable one of oldest dated gables in the Cape and only remaining e.g. of processor of Holbol gable. Complex well restored (Fransen 2004: 209).	High status heritage site severely negatively affected by existing transmission lines entering Muldersvlei. 12 sets of transmission lines 200 m south, New transmission lines must enter Muldersvlei on south west side of existing lines.
Omega – Muldersvlei	Kuiperskraal  Provincial Heritage Site	33°45'11.23"S 18°36'11.83"E	Farm granted in 1702. Farm complex dates at least to early half of 18th century. Intact example of irregular werf, including slave quarters with horse mill. Has been restored by Fagans (Fransen 2004: 317, Buttgens 2005).	Existing 4x400kV transmission lines 350 m north east of the farm complex are noticeable but not intrusive due to absorbent valley setting. Additional transmission lines should come no closer than those existing.

TRANSMISSION LINE ALTERNATIVE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Omega – Muldersvlei_Dev 1	Welgegund	33°45'20.86"S 18°37'21.56"E	Complex dates to 1740s. Main house has been Victorianised (Buttgens 2005). The setting is attractive as the old farm complex looks out over vertically undisturbed rural landscape.  Proposed grading: 3A	Situated on the junction of Deviation and main proposed corridor. The existing power lines lie 380m behind the farm complex are not problematic as they are absorbed by the slope and screened in part by the complex of barns. The existing 300 m buffer should be maintained.  The proposed new northern corridor will cause direct visual impacts as experienced from the old farm complex.
Omega – Muldersvlei_Dev 1	Sondagsfontein	33°45'22.85"S 18°38'28.30"E	Originally granted as Rondebosje aan de Tygerberg in 1705. T-shaped main house (much rebuilt) and outbuildings with stone walls. Farmstead dates to c 1743, but much altered (Buttgens 2005; Fransen 2004: 318)  Proposed grading: 3B	Farm complex shielded from existing power lines by topography.  Existing corridor would be preferred as northern deviation will create visual heritage impacts.
Omega – Muldersvlei_Dev 1	Rondebosjeberg	33°45'40.15"S 18°40'16.80"E	Historical layering, 18th – 19th century (Buttgens 2005)  Proposed grading: 3B	Situated on the slopes of a hill over looking the wheat lands, this farm has the potential to be impacted by lines both in

TRANSMISSION LINE ALTERNATIVE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
				front and behind the complex due to high visual exposure. Existing corridor preferred.

**Table 8 Summary of heritage inventory for Omega - Muldersvlei**

*Nature of impacts:* The most profound impact a transmission line can cause (other than physical demolition of the heritage resource) is change to the sense of place – the rural qualities of an area, sense of remoteness, or feeling of history will be highly negatively affected by the massed presence of transmission lines within 1 km of the heritage site, depending on topography and context.

*Extent of Impacts:* The impact of transmission lines on heritage sites from the historical period can extend well beyond the immediate site. Views of transmission lines from vantages such as historic places and known scenic areas can result in significant changes in sense of place to a historic place and detract from the originality of the resource and its setting. The extent of the impacts is local in that changes to “sense of place” extend to up to a radius of 1 km from a given visual reference point. Indications are that transmission lines constructed within a distance of 400 m of a heritage building are visually intrusive unless screened by topography.

NATURE OF IMPACT: Change in the character of the context of a heritage building caused by intrusion of dominating industrial structures.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Moderate (6)	Low (4)
PROBABILITY	Probable (3)	Possible (3)
SIGNIFICANCE	Medium (33)	Low (27)
STATUS	– negative	- negative
REVERSIBILITY	reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Exclusion of deviation 1 will avoid new intrusive impacts to Welgegund, Sondagsfontein and Rondebosjeberg. No new transmission lines should be built any closer to any of the above listed structures, than the existing lines. A buffer of at least 500 m is desirable.		
CUMULATIVE IMPACTS: Yes. There will be a greater visual impact caused by transmission lines close together in the existing corridor, however this is more desirable than cumulative landscape fragmentation caused by proliferation of lines in the broader landscape, which can threaten the identity and character of an area/region.		
RESIDUAL IMPACTS: N/a		

**Table 9 Impacts to built environment**

- Cultural landscape and sense of place**

Limited agriculture, primarily wheat farming is practiced in the area between Koeberg and Omega, but large parts of the landscape are still under strandveld and/or alien vegetation with some areas utilized for grazing. There has therefore been limited transformation of the rural

landscape. This area is termed the Koeberg Farms Cultural Landscape and is characterised by a remote landscape, sparse historical farms (dating to as early as the 17th century) – predominantly stock farms, a sparse settlement pattern and a surrounding landscape of small holding subdivision. The area has a scruffy and fragmented quality in places with activities such as light industry, brick and clay mining, sand mining giving the area a slightly industrial feel.

Between Omega and Fisantekraal, the landscape is predominantly agricultural, moderately remote and characterized by low rolling hills almost entirely planted with wheat. Farmsteads, although relatively sparse are large and signaled by well defined werfs and a plethora of structures representing in many instances the layering of two or three centuries. The experience of road travel away from main routes brings forth a strong sense of country, the landscape is scenic in different ways depending on the time of year. The wheatlands are able to absorb the presence of transmission lines due to the undulating topography which creates backdrops and valleys (see figure 7). Both the existing corridor and deviation pass through similar landscapes.

East of Fisantekraal the landscape north of Durbanville takes on a different character, it is fragmented by small farms, many more structures and a variety of enterprises ranging from sand mining to 4x4 trails on disused land. Poultry batteries are common and conspicuous. The landscape is fairly flat which means that transmission line visibility is high. The corridors terminate at Muldersvlei on the edge of the Cape Winelands.

*Nature of impacts:* The kind of impact a transmission line can cause relates to change to the sense of place and the quality of the experience of passing through a given area. The rural qualities of an area, sense of remoteness, or feeling of history will be highly negatively affected by the massed presence of transmission lines from any point of visual reception from which the transmission lines are visible.

*Extent of impacts:* The extent of the impacts will vary along the length of the corridor depending on the topography but relate to the distance from which the transmission lines can be seen. The point at which transmission lines will be experienced as intrusive varies according to the individual and his/her values, however in terms of the experience of the authors of this report, lines are visible from a distance of 5 km, noticeable from a distance of 1 km and are experienced as 'intrusive' from 450 m distance.

NATURE OF IMPACT: Fragmentation of countryside and diminishing of the quality of experience of moving through it.		
	Without mitigation	With mitigation
EXTENT	Local (3)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Moderate (3)	Low-Moderate (2)
PROBABILITY	Probable (3)	Probable (3)
SIGNIFICANCE	Medium (36)	Low (24)
STATUS	- Negative	- Negative
REVERSIBILITY	Reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Yes
MITIGATION: The re-use of the existing alignment and consolidation of the electrical infrastructure is far more preferable than creating a completely new corridor which will subject as yet un-impacted areas to a new visual intrusion. This will assist in conservation of unbroken expanses of countryside. Mitigation action (if needed) lies within the domain of visual impact assessment. Tower designs should be kept consistent within existing corridors.		
CUMULATIVE IMPACTS: The massed transmission lines will be more visible from a distance, and dominating from close up.		
RESIDUAL IMPACTS: N/a		

**Table 10 Impacts to cultural landscape and sense of place**



- Assessment of alternatives

The existing corridor. The existing corridor is favoured as it will not result in new impacts although there may be some compounding of visual impact due to additional transmission lines. In the interests of the conservation of landscape this is supported.

Deviation 1. Utilisation of this option will result in further fragmentation of the landscape and have negative visual implication for at least 3 historic farm precincts.

No-go Alternative. This study finds that there are not fatal flaws in terms of the proposed activity. In heritage terms the no-go alternative will maintain the status quo and not result in further negative impacts, however this will be detrimental for security of power supply.



**Figure 7 Kalkfontein: A Swartland farm with early origins characterised by buildings representing several centuries.**



**Figure 8** 4x400 kV transmission lines close to Kalkfontein (above) are quite well absorbed by the rolling landscape despite the fact they are only 340 m from the visual reference point.

## 5.2 Koeberg 2 – Stikland.

The proposed alignment (2x400kV) leaves Koeberg 2 via the existing corridor but takes a new corridor southwards towards Durbanville at the point where it intersects with the R302. The alignment runs north-south for about for about 12.5 km through the Kuils River corridor (which contains existing transmission lines) past Wellway Park before reaching the Stikland substation at Brakenfell. For the main part this is a densely populated area and the corridor is fairly restricted. No significant heritage indicators are identified.

Deviation 1. The proposed corridor leaves the Koeberg-Stickland-Muldervlei corridor over undeveloped land (small holdings, chicken farms, some vines) past Wallacedene and the high density Bloekombos development before it connects with the Muldersvlei–Stickland corridor close to the Bellevue Wine Estate. The corridor passes through land characterized by small farms and small holdings.

Deviation 2. This short corridor departs from the Omega – Muldersvlei corridor via Damaraskloof and links with the Muldersvlei – Stikland corridor. It crosses a short span of agricultural land for approximately 2.5 km. No significant heritage indicators have been identified.

- Palaeontological Heritage

All three alternative corridors lie within the Malmsbury shale areas of the Cape. Being extremely ancient, the shales are non-fossiliferous, hence palaeontology is not identified as a heritage indicator.

*Nature of impacts:* The proposed activity will have no significant impact on palaeontology any of the three corridor alternatives.

*Extent of Impacts:* In the unlikely event of an impact occurring, the impact will be local.

NATURE OF IMPACT: Disturbance of buried palaeontological material by tower footings.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (12)
STATUS	– Negative	+ Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	Yes
MITIGATION: No mitigation is suggested.		
CUMULATIVE IMPACTS: No cumulative impacts are expected.		
RESIDUAL IMPACTS: N/a		

**Table 11 Impacts to palaeontological material**

- Pre-colonial archaeology

In terms of archaeology, the proposed corridors and deviations pass through highly modified landscape. Although there is little doubt that the area was used by prehistoric people, especially cattle herding Khoekhoen groups, previous studies have shown that the ephemeral traces of habitation are mostly destroyed. Dispersed scatters of Early and Middle Stone age material survive the action of plowing; however their heritage significance is diminished by context destruction. There is a possibility that historic middens may be found in areas where historic habitation took place, however these are relatively uncommon and not deemed to be a source of significant negative impact as like other archaeological sites, they can be identified and mitigated at the walk-down phase.

*Nature of impacts:* The proposed activity may cause localised exposure and displacement of disturbed archaeological material.

*Extent of impacts:* Given that the distribution of archaeological sites is generally sparse, and the fact that the chances of tower footings impacting them are low, only highly localised impacts at tower footings and also the service road alignment are possible, and most may through appropriate mitigation, be avoided altogether.

NATURE OF IMPACT: Impacts to archaeological material could involve localized displacement of material at tower footings or lateral disturbance of material by vehicles and service roads.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	N/a
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (6)
STATUS	Neutral – negative	Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Impacts can be avoided.
MITIGATION: An archaeologist should be involved with line design/walkdown phase to make sure that service roads and footings do not impact any archaeological sites in the corridor.		

CUMULATIVE IMPACTS: N/a
RESIDUAL IMPACTS: N/a

**Table 12 Impacts to archaeological material**

- Built environment heritage

There are no points of celebrated built environment heritage on any of the three proposed alternative corridors. It is noted however that Hawkmoor Manor (used as an exclusive guest house), a collection of vernacular Cape Dutch style buildings on the farm Matjieskuil, lies just outside of the 1 km radius that defines the study area.

It is also appropriate to note that the Bellevue wine estate, a Provincial Heritage Site lies close to the intersection of deviation 1 and the Muldersvlei – Stikland corridor. This site will be commented on in further detail in the Muldersvlei – Stikland section which follows.

TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Koeberg – Muldersvlei-Stikland and Koeberg – Stikland Deviation 1	Bellevue  Provincial Heritage Site	33°52'39.55"S 18°45'43.07"E	Previously farm Houdend Mond/Bek, granted in 1701 to Christoffel Groenewald. Dwelling and one outbuilding restored by Fagan and Raymond in 1990s (Fransen 2004:214). Irregular werf with T-shaped dwelling house and outbuildings.  Grade 2	Existing transmission lines impact on complex. Proposed transmission lines need to be positioned so as not to compound the negative effect on the complex – ie as far west of the buildings as possible.
Koeberg – Stikland Deviation 1	Hawkmoor at Matjieskuil	33°48'47.07"S 18°46'13.68"E	According to Fransen (2004:211) the farm Matjieskuil was originally granted as 'Warburg' to Rev Hercules van Loon. He was also granted the nearby Hercules Pilaar in 1701 (presumably the two farms were occupied at the same time)- the two farms have a long shared history). In 1704, the title deed for Warburg was signed, prior to its sale, and already a dwelling was shown on Warburg. The gable of the house is dated 1810, but according to Fransen, it is more likely to date to the mid 18th century. (This would	The buildings lie approximately 1.1 km west the center line of the proposed Deviation 1 corridor. This means that a low degree of visual impact may be experienced.

TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
			<p>be the H-shaped house on the werf. The property is used as guest house surrounded by spectacular landscaped garden. Buildings have undergone adaptation and change.</p> <p>Proposed grade 3b.</p>	

*Nature of impacts:* The construction of transmission lines and service roads, unless in an urban setting generally avoid above ground structures such as houses and they are unlikely to be physically impacted. Any buildings within servitudes would need to be demolished.

The most profound impact a transmission line can cause (other than physical demolition of the heritage resource) is change to the sense of place – the rural qualities around a heritage site, sense of remoteness, or feeling of history will be negatively affected by the massed presence of transmission lines with 1 km of the heritage site, depending on topography and context. Fortunately heritage buildings within 1 km of the proposed corridors (corridor and deviations) are relatively few, which means that impacts will be of comparatively low significance. Of concern is the farm Bellevue, a Provincial Heritage Site which lies some 350 m east of the proposed junction of Deviation 1 with the Muldervlei-Stikland corridor. Visual impacts are expected to occur.

*Extent of Impacts:* The impact of transmission lines on heritage sites from the historical period can extend well beyond the immediate site. Views of transmission lines from vantages such as historic places and known scenic areas can result in significant changes in sense of place to a historic place and detract from the originality of the resource and its setting. The extent of the impacts is local in that changes to “sense of place” extend to up to a radius of 1 km from a given visual reference point. Indications are that transmission lines constructed within a distance of 400 m of a heritage building (or similar reference point) are perceived as visually intrusive unless screened or absorbed by topography.

NATURE OF IMPACT: Change in the character of the context of a heritage building caused by intrusion of dominating industrial structures.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Moderate (6)	Low (4)
PROBABILITY	Probable (3)	Possible (3)
SIGNIFICANCE	Medium (33)	Low (27)
STATUS	– negative	- negative
REVERSIBILITY	reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Use of deviation 1 will result in a low impact to Matjieskuil so setting the transmissions lines on the west side of the corridor will help mitigate this. Similarly the presence of the Bellevue PHS will require a design solution to reduce visual impacts.		
CUMULATIVE IMPACTS: Yes. There is potential for cumulative impacts to occur at Bellevue as this is where existing and proposed power line corridors converge.		

**Table 13 Summary of impacts to built environment**

- Cultural landscape and sense of place.

The landscape north of Durbanville is fragmented by small farms, many structures and a variety of enterprises ranging from sand mining to 4x4 trails on disused land. Poultry batteries are common and conspicuous. The landscape is fairly flat which means that transmission line visibility is high. While the landscape has a predominately rural agricultural character, it is not particularly scenic and does not impart a sense of countryside to the extent that for example the wheatlands do.

*Nature of impacts:* The kind of impact a transmission line can cause relates to change to the sense of place and the quality of the experience of passing through a given area. The rural qualities of an area, sense of remoteness, or feeling of history will be highly negatively affected by the massed presence of transmission lines from any point of visual reception from which the transmission lines are visible.

*Extent of impacts:* The extent of the impacts will vary along the length of the corridor depending on the topography but relate to the distance from which the transmission lines can be seen. The point at which transmission lines will be experienced as intrusive varies according to the individual and his/her values, however in terms of the experience of the authors of this report, lines are visible from a distance of 5 km, noticeable from a distance of 1 km and are experienced as 'intrusive' from 450 m distance.

NATURE OF IMPACT: Fragmentation of countryside and diminishing of the quality of experience of moving through it.		
	Without mitigation	With mitigation
EXTENT	Local (3)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	Low-moderate (2)	Low (1)
PROBABILITY	Probable (3)	Probable (3)
SIGNIFICANCE	Low (27)	Low (21)
STATUS	- Negative	- Negative
REVERSIBILITY	Reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Yes
MITIGATION: The use of the proposed Kuils River corridor through Durbanville will have a very low impact on heritage as is therefore favoured. Deviation 1 will require particular planning attention to avoid impacts to Matjieskuil (Hawksmoor) and the Bellevue PHS.		
CUMULATIVE IMPACTS: With reference to Bellevue, the massed transmission lines will be more visible from a distance, and dominating from close up.		
RESIDUAL IMPACTS: N/a		

**Table 14 Summary of impacts to cultural landscape.**

- Assessment of alternatives

The proposed Omega-Stikland corridor will not result in significant heritage impacts and is therefore considered acceptable.

Deviation 1. Utilisation of this option will result some further fragmentation of the landscape and have negative visual implications for Matjieskuil and Bellevue. On these grounds it is not favoured.

Deviation 2. Already heavily impacted by the plethora of transmission lines entering Muldersvlei 1 km to the east and a large intersection on the N1, combined with the fact that there are no built environment heritage resources on this corridor, it is considered an

acceptable alternative.

No-go Alternative. This study finds that there are no fatal flaws in terms of the proposed activity. In heritage terms the no-go alternative will maintain the status quo and not result in further negative impacts, however this will be detrimental for security of power supply.

### 5.3 Muldersvlei – Stikland

This is an existing corridor (carrying 3 transmission lines on self-supporting towers) that runs along the edge of the Cape Winelands just outside the outskirts of Belville. It departs Muldersvlei and heads in a roughly south westerly direction. The corridor runs over parts of the farms Swartrivier, Fraserville, Bellevue and Hazendal, over the Kuils River golf course, into Brakenfell, then links with an existing servitude leading into Stikland substation from the east.

The proposed corridor contains an existing set of transmission lines which have resulted in moderate impacts to Bellevue Wine Estate, and severe impacts to Hazendal Estate. Both of these farms are Provincial Heritage Sites. Hence the landscape through which the proposed corridor runs includes some sensitive elements.

- Palaeontological Heritage

In terms of palaeontology, the corridor lies within the Malmsbury shale areas of the Cape. Being extremely ancient, the shales are non-fossiliferous, hence palaeontology is not identified as a heritage indicator.

*Nature of impacts:* The proposed activity will have no significant impact on palaeontology in both the proposed corridor.

*Extent of Impacts:* In the unlikely event of an impact occurring, the impact will be local.

NATURE OF IMPACT: Disturbance of buried palaeontological material by tower footings.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (12)
STATUS	- Negative	+ Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	No	Yes
MITIGATION: No mitigation is suggested.		
CUMULATIVE IMPACTS: No cumulative impacts are expected.		
RESIDUAL IMPACTS: N/a		

**Table 15 Impacts to palaeontological material**

- Pre-colonial archaeology

In terms of archaeology, the proposed corridor passes through highly modified landscapes. Although there is little doubt that the area was used by prehistoric people, especially cattle herding Khoekhoen groups, previous studies have shown that the ephemeral traces of habitation are mostly destroyed. Dispersed scatters of Early and Middle Stone age material survive the action of ploughing, however their heritage significance is diminished by context

destruction. There is a possibility that historic middens may be found in areas where historic habitation took place, however these are relatively uncommon and not deemed to be a source of significant negative impact as like other archaeological sites, they can be identified and mitigated at the walk-down phase.

*Nature of impacts:* The proposed activity may cause localised exposure and displacement of disturbed archaeological material.

*Extent of impacts:* Given that the distribution of archaeological sites is generally sparse, and the fact that the chances of tower footings impacting them are low, only highly localised impacts at tower footings and also the service road alignment are possible, and most may through appropriate mitigation, be avoided altogether.

NATURE OF IMPACT: Impacts to archaeological material could involve localized displacement of material at tower footings or lateral disturbance of material by vehicles and service roads.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	N/a
MAGNITUDE	Small (1)	Small (1)
PROBABILITY	Unlikely (2)	Unlikely (2)
SIGNIFICANCE	Low (12)	Low (6)
STATUS	Neutral – negative	Positive
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Impacts can be avoided.
MITIGATION: An archaeologist should be involved with line design/walkdown phase to make sure that service roads and footings do not impact any archaeological sites in the corridor.		
CUMULATIVE IMPACTS: N/a		
RESIDUAL IMPACTS: N/a		

**Table 16 Summary of impacts to archaeological material.**

- Built Environment

The proposed corridor passes over a number of farms of which two have acclaimed heritage significance. Three transmission line towers have been placed immediately behind Hazendal Provincial Heritage Site. Being 90 m from the historic farm complex they are highly intrusive and have dramatically impacted the aesthetic qualities of the property.

Bellevue has fared better than Hazendal in that the transmission lines lie 290 m to the north of the main house, a distance which has significantly diminished the intrusiveness of the towers and has helped retain the landscape setting.

The farm Frazerville lies in the centre of the proposed corridor. Its heritage status has never been described, no is it celebrated as a heritage site however it is possible that the complex includes structures greater than 60 years of age.

TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
Koeberg – Muldersvei-Stikland	Hazendal Provincial Heritage Site	33°54'1.54"S 18°43'10.58"E	Early 18th century farm with much historical layering. Irregular splayed werf layout: Outbuildings (slave quarters and	Existing transmission lines impact on the complex. They are visually dominant as a backdrop on the approach to the



TRANSMISSION LINE	FARM NAME	LOCATION	DESCRIPTION	IMPACT COMMENT
			stables) with sheep kraal opposite. Irregular H-shaped dwelling house (Fransen 2004:216; Winter 2002)	property. These should be relocated to 300m north along with any new transmission lines.
Koeberg – Muldersvlei-Stikland	Bellevue Provincial Heritage Site	33°52'39.55"S 18°45'43.07"E	Previously farm Hou den Mond/Bek, granted in 1701 to Christoffel Groenewald. Dwelling and one outbuilding restored by Fagan and Raymond in 1990s (Fransen 2004:214). Irregular werf with T-shaped dwelling house and outbuildings.	Existing transmission lines impact on complex. Proposed transmission lines need to be positioned so as not to compound the negative effect on the complex. Dedicated attention to line design and placement is required to avoid further impacts.
Koeberg – Muldersvlei-Stikland	Fraserville	33°52'2.98"S 18°45'56.72"E	Un-clear heritage significance, possible structures greater than 60 years of age.	Avoid placing transmission lines with 300 m of farm complex.

**Table 17 Built environment heritage, Muldersvlei – Stikland.**

NATURE OF IMPACT: Change in the character of the context of a heritage building caused by intrusion of dominating industrial structures.		
	Without mitigation	With mitigation
EXTENT	Local (1)	Local (1)
DURATION	Long term (4)	Long term (4)
MAGINITUDE	High (9)	Low (4)
PROBABILITY	Probable (3)	Possible (3)
SIGNIFICANCE	High (42)	Low (27)
STATUS	- negative	- negative
REVERSIBILITY	reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Correct line design at Hazendal to avoid future impacts. Locate new transmission lines as far away from Bellevue farm buildings as possible.		
CUMULATIVE IMPACTS: Yes. There is potential for cumulative impacts to occur at Bellevue and Hazendal.		
RESIDUAL IMPACTS: N/a		

**Table 18 Summary of impacts to built environment.**

- Cultural landscape and sense of place.

The proposed Muldersvlei-Stikland corridor is the route of an existing servitude carrying 3 transmission lines on self-supporting towers. The corridor lies on the eastern side of the N1 on the edge of the Cape Winelands and may be described as scenic. It is heavily cultivated, much of the land is used for viticulture and is owned by various wine estates. The presence of farms

with 18th century origin attests to a long history of agriculture. Towards Wallacedene and the urban edge of Brakenfell, the landscape loses its cohesion. Small holdings characterise the area and urban encroachment in the form of golf courses and non-agricultural activity is evident. The Botelary Road is the closest scenic route to the proposed corridor running roughly parallel or along the edge of the corridor (south east side).

*Nature of impacts:* The kind of impact a transmission line can cause relates to change to the sense of place and the quality of the experience of passing through a given area. The rural qualities of an area, sense of remoteness, or feeling of history will be highly negatively affected by the massed presence of transmission lines from any point of visual reception from which the transmission lines are visible. There is a danger that the cumulative impact of addition 2x400kV lines together with the existing three will be visible from the scenic drive.

*Extent of impacts:* The extent of the impacts will vary along the length of the corridor depending on the topography but relate to the distance from which the transmission lines can be seen. The point at which transmission lines will be experienced as intrusive varies according to the individual and his/her values, however in terms of the experience of the authors of this report, lines are visible from a distance of 5 km, noticeable from a distance of 1 km and are experienced as 'intrusive' from 450 m distance.

NATURE OF IMPACT: Fragmentation of countryside and diminishing of the quality of experience of moving through it.		
	Without mitigation	With mitigation
EXTENT	Local (3)	Local (2)
DURATION	Long term (4)	Long term (4)
MAGNITUDE	High (8)	Low (1)
PROBABILITY	Probable (3)	Probable (3)
SIGNIFICANCE	Medium (45)	Low (21)
STATUS	- Negative	- Negative
REVERSIBILITY	Reversible	Reversible
IRREPLACEABLE LOSS OF RESOURCES?	No	No
CAN IMPACTS BE MITIGATED?	Yes	Yes
MITIGATION: The proposed transmission lines should be placed as close to the north west edge of the corridor to decrease visibility from the Botelary Road.		
CUMULATIVE IMPACTS: Additional transmission lines parallel to the 3 existing lines will increase their visibility.		
RESIDUAL IMPACTS: N/a		

**Table 19 Summary of impacts to cultural landscape**

## 6. Mitigation of impacts

### 6.1 Archaeological and Palaeontological Heritage

Apart from the Koeberg 2 – Omega and Koeberg - Omega Deviation 1 all the corridors discussed in this report pass through highly transformed landscapes, and lie on Malmbury derived soils that are not palaeontologically sensitive. Indications are that Late Stone Age sites have been severely damaged by agriculture and are very difficult to identify in these environments. Dispersed scatters of Early and Middle Stone age material survive the action of years of ploughing, however their heritage significance is diminished by context destruction. There is a possibility that historic middens may be found in areas where historic habitation took place, however these are relatively uncommon and not deemed to be a source of significant negative impact as like other archaeological sites, they can be identified and mitigated at the walkdown phase.

The impact on archaeological material will be further disturbance of in all likelihood, already significantly disturbed material. There is however merit in avoiding any existing material if it has any apparent context.

**Mitigation:**

- As a general measure an archaeologist should be involved in the final walk-down phase of the line design to ensure that tower bases are not located on sensitive archaeological sites.

## **6.2 Built Environment**

All structures within transmission line servitudes (2x55 m wide) are demolished. For safety reasons the servitude has to be kept clear. Demolition of any of the heritage structures identified in this study must be avoided as they are protected by law for the reason that they are irreplaceable. Notwithstanding this, the visual impact of the lines on heritage structures constitutes a significant potential impact - the unfortunate existing impacts at Hazendal are a case in point.

**Mitigation:**

Under ideal circumstances there should be a 1 km buffer between heritage sites with aesthetic significance and transmission lines so that context is conserved, however in this densely farmed and populated landscape there is not enough space available to realistically enforce such a recommendation. In terms of the broader interests of conservation of landscape, this study supports as a general principle the re-use of existing corridors. The study has found that there are conservation-worthy buildings within or close to the existing corridors, most less than 500 m from the existing transmission lines. This is accepted as *fait de accompli* in most instances.

- It is recommended that no new transmission lines be constructed any closer to heritage structures than those that exist today.
- In new corridors, a buffer of 500 m is recommended around heritage buildings.
- It is recommended that a heritage specialist be brought onto the project at the design phase to help find solutions to visual impacts on significant heritage structures or any other tourism facility.

## **6.3 Cultural landscape and sense of place**

Since the existing Eskom power line servitudes are already established and a familiar element of the landscape, the addition of further transmission lines will be an additional visual impact to an already disturbed place. Re-use of existing alignments and consolidation of the electrical infrastructure is far more preferable than creating a completely new corridors.

Mitigation action lies within the domain of visual impact assessment, however it is suggested that tower designs be kept consistent within existing corridors to minimise visual clutter.

## **6.4 Cautionary: Un-identified archaeological material, fossils and fossil bone**

All archaeological material is protected by Section 38.5 of the National Heritage Resources Act and it is an offense to destroy material. If archaeological material (including graves) is uncovered, all work must cease in that area, while the relevant heritage authorities are notified. Rescue mitigation may be required, for the cost of the developer

## 7. Conclusions

In overall terms, the rich heritage landscape of the Western Cape is not conducive to the identification of transmission line corridors, as heritage structures/places are so densely distributed that that finding corridors that provide ideal visual buffer zones is extremely difficult. It is necessary to accept that the Province is experiencing growth and people need electrification of their homes and business. This cannot be achieved without the construction of large transmission lines so various forms of impact are inevitable. The best that can be achieved is to make such impacts as tolerable as possible.

Given the existing infrastructure and numerous environmental constraints, the corridor options that have been identified and are supported by this study are the only viable opportunities. Provided that the transmission lines are designed with sensitivity to heritage resources, the proposed activity is supported

No fatal flaws have been identified.

## 8. EMP – Heritage management planning

The objective of this section of the report is to provide a mechanism for the conservation of heritage and associated values within the context of the proposed activity. Management of impacts in terms of landscape is best dealt with in terms of mitigation of visual impacts as per the findings of the relevant specialist report.

The fact that the archaeological sites identified in almost all corridors are so already highly impacted and dispersed warrants no major action on the side of the proponent other than to take measure to avoid them during construction.

Mitigation Action/control	Responsibility	Timeframe
Palaeontology and buried archaeology – monitoring of tower footing excavations.	Eskom to contract an archaeologist or palaeontologist.	At commencement of construction.
Surface archaeology – undertake walkdown of near final alignments to steer impacts.	Eskom to contract archaeologist to preferably work with line design team.	At time of line design once near final route is selected.
Impact to built environment	Eskom to consult landscape architect with heritage experience to help find design solutions to visual impacts to built environment.	During line design phase.

Performance indicator	A record be kept of all instances of accidental disturbance of heritage material, as well as post construction review of anticipated impacts on landscape and built environment context. Near final route to be submitted to HWC Belcom committee for comment.
Monitoring	A daily log of monitoring be kept by the responsible archaeologist for submission to HWC for review by relevant committees. Compliance authority to check as per their discretion.

**Table 20 Summary of mitigation and control actions for the proposed activity.**

## 8.1 Emergency finds

Should any finds be unearthed during construction activity when an archaeologist is not present, an archaeologist and Heritage Western Cape should be informed immediately. The relevant contact person at Heritage Western Cape is Ms Celeste Booth (021 4839685). The person responsible for reporting any finds that evoke concern should be a senior person on site, or an environmental control officer who is on site during construction.

### 8.1.1 Human remains

Human remains can occur anywhere on the landscape. Most archaeologists retrieve several skeletons a year from various development projects around the province, so finds of this nature are not necessarily rare. Human remains are protected by several sets of legislation which means that certain protocols must be followed in the event of a find.

- leave the remains in place, nothing should be moved
- Cordon off the area
- Call the state archaeologist at SAHRA (021 4624509)
- Contact an archaeologist
- Once an archaeologist has examined the find, the archaeologist/SAHRA should contact SA Police services and the state pathologist to report human remains
- If the human remains are found to be a legitimate burial or a pre-colonial burial, an emergency exhumation permit will be issued by SAHRA or HWC (if exhumation is needed).
- If a crime is suspected, a police docket will need to be opened.

## 9. References

- ACO. 1998. Phase 1 Archaeological Assessment of a portion of Main Rd 174 N1 to Klipheuwel.
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## 10. Appendix A

**Koeberg – Omega** (Extracted from Hart T 2008 Heritage Impact Assessment for the proposed construction of 400 kV transmission lines between Ankerlig Power Station and the Proposed Omega sub station at Groot Oliphants Kop. HIA prepared by ACO for Savannah Environmental Pty (ltd).

Three archaeological sites were found. These were all on ploughed agricultural land towards the south. No material was seen on the sandy stretches of the servitude between Vaatjie and



**Figure 3** Site 1 (left), large silcrete chunk and patinated informal ESA material (right)

Atlantis. The area between Ankerlig and the entrance to the shooting range, where the lines turn south-west towards Koeberg is already heavily affected by construction of the railway line and station, the shooting range road and development of the industrial area. Site 1 (S 33 41 44.1 and E 18 29 26.7). This is an area of scattered silcrete chunks, varying in size up to 30 to 40cm, irregular cores and a number of flakes and bifaces of later ESA or perhaps MSA age. Conversation with the farmer revealed that it is very likely that the more finely made (and diagnostic) artefacts have been removed or collected some time ago. The silcrete is heavily patinated and iron-stained. There is no silcrete outcrop at this site although larger silcrete boulders up to a meter in diameter have been cleared from the field and piled to the one side, as is the general practice. It is likely that a silcrete raft once existed here, the material having been quarried to a minor extent by prehistoric people. The raft was probably removed by farmers while lands were being prepared. The site lies in a disturbed context and is not considered significant in heritage terms.

Site 2 (S 33 42 17.2 and E 18 30 17.7) A rather disturbed area extending from eastern end, site GO7 (ACO report 2004), intersected



**Figure 4** Disturbed area with silcrete boulder at site 2



**Figure 5** Silcrete boulders at site 3



by both the R304 and the Atlantis railway line, a distance of nearly 300 m. This area is underlain by "raft silcrete" which is exposed in places, particularly under the gum trees to the west of the railway line. There are some flakes on the surface and evidence of quarrying of the silcrete outcrops. No formal tools were seen but the size and patina of the artefacts suggest at least MSA age. Large silcrete boulders also occur alongside the R304.

The site lies in a disturbed context and is not considered significant in heritage terms.

Site 3 (S 33 42 11.5 and E 18 29 57.5)

Also associated with a low grade silcrete raft which has been quarried, the site extends along a low ridge for at least 200 m rarely reaching 50 m wide and overlain with sand in places. There are rather more artefacts here, but again, nothing formal or diagnostic was seen. This pattern is typical of quarry sites where formal artefact types are rare.

*Extracted from Orton J. 2006 Heritage scoping study conducted on the farm Kleine Zoute Rivier near Atlantis. Unpublished ACO report prepared for Atlantic Sands.*

No significant archaeological material has been located in the sand mining area itself. We did however find occasional silcrete artefacts throughout the search zone. Three sites, were noted on the periphery of the mining area but are not believed to be directly implicated in the proposed activities (but we as yet have no final layouts). We include the positions with very brief descriptions of content to be taken into account in the planning of infrastructure and mining. The positions of the sites are shown on Figure 2.

KZR 1

33° 39' 40.9S 18° 29' 15.3E

A Late Stone Age site lying in a jeep track immediately adjacent to the northern boundary fence close to the Donkergats River (plate 1). Both quartz, quartzite and silcrete flakes and chips were noted and are the most common artefacts. In addition, one irregular core and a small side scraper made on quartz were observed. One sherd of Khoe pottery, and a small amount of marine shell fragments were also noted. The silcrete includes both grey and red types and is fine grained.

The scatter is not particularly dense but has been disturbed by the jeep track and placement of fence posts. We estimate that it covers an area of approximately 30 meters in diameter.

Impact: It is not clear at this stage if the site will be impacted by the proposed mining activities (primary). The position must be taken into account when transport routes and mining are planned.

Significance: No Late Stone Age sites have ever been collected/excavated in the area. The presence of a formal tool (scraper) means that the site could contain a diagnostic assemblage.

Recommendation: If mining will impact the site, it must be mitigated by way of surface collection and limited excavation.



KZR 2 a&b

(a) 33° 39' 58.3 18° 29' 16.3E

(b) 33° 40' 01.0S 18° 29' 16.3E

These are both highly disturbed Early Stone Age artefact scatters occurring on the lower slopes of a ploughed hill immediately adjacent to the jeep track and Donkergats River (plate 2). The scatter is fairly continuous but slightly denser patches are represented by the GPS co-ordinates. The artefacts originate from the deflation zone above the Malmsbury series and have been brought to the surface by ploughing. None of this material is found in the bed of the Donkergats River, but probably dips below. We believe that the sands that line the bed of the Donkergats River are a fairly recent phenomenon probably supplemented by aeolian material. The



scatter covers a large area (approximately 70x 20 meters). The artefacts consist of flakes, chunks and cores. A single small sub-classic biface (plate 5) was also located. Virtually all the material is made on silcrete and is for the most part heavily patinated and are frequently orange in colour. Fresh scars are likely to be due to plough damage.



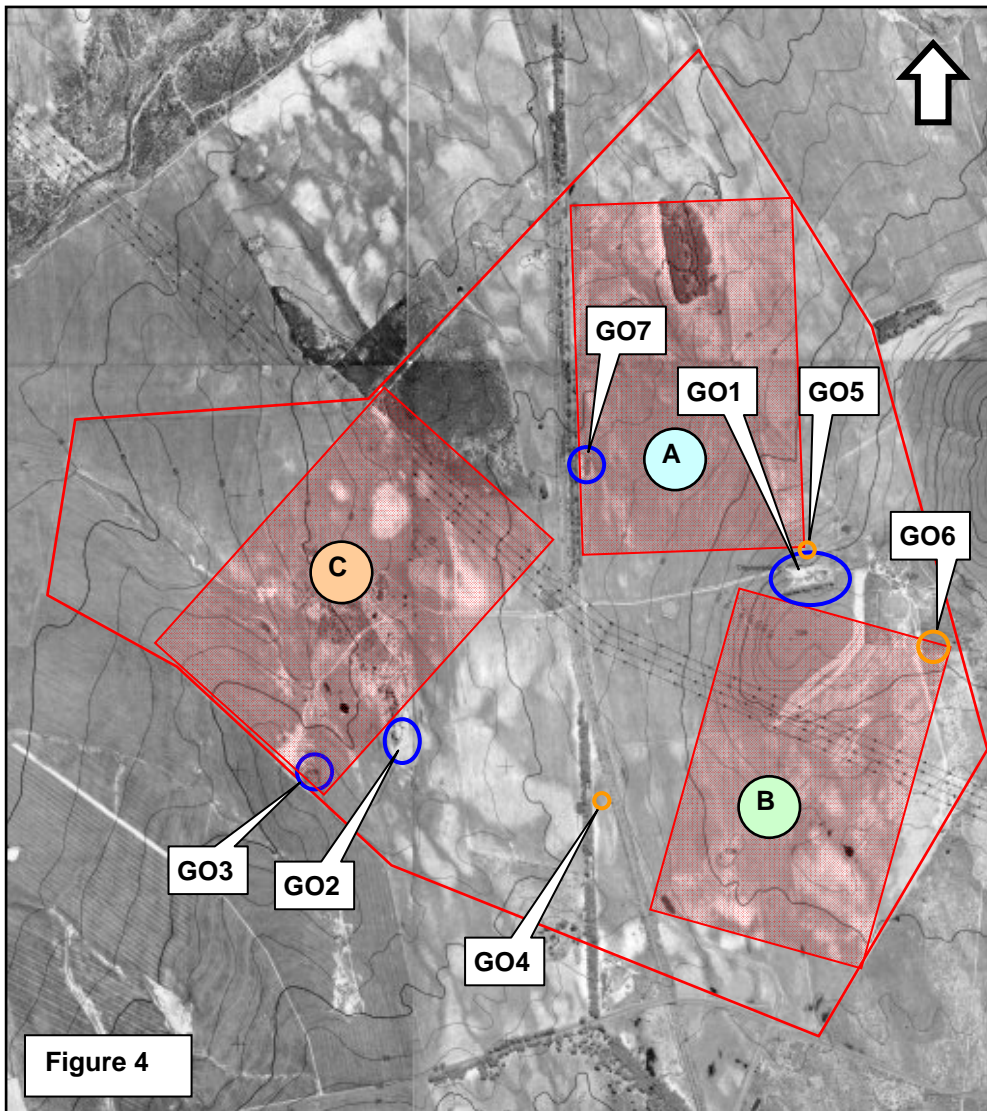
**Impact:** The site will not be impacted by the proposed mining activities (primary). The position must be taken into account when transport routes are planned.

**Significance:** Early Stone Age sites such as these are common and frequently found in cultivated land. Significance is low.

**Recommendation:** Take the position of the site into account during planning of transport and infrastructure. Although of low significance and disturbed by plowing, damage to the site should be avoided.

Extract from Orton, J. & Hart, T. 2004. *Heritage scoping study of the farm Groot Oliphantskop (Farm 81) for the proposed Omega substation, Western Cape*

Several sites of archaeological and historical interest are located on the Groot Oliphantskop property. These include both Stone Age artefact scatters and historical structures. The position of these sites and the footprints of the three alternatives are indicated on Figure 4 (sites discussed in this report are ringed in blue and others are in orange). The site numbering scheme used by Kaplan (1996) is maintained and extended in the current report. Some sites located by Kaplan (1996) and recorded as being of low significance and are well away from the proposed development areas. While these are listed here, no further discussion of these sites is presented. All heritage sites are protected under the National Heritage Resources Act (Act 25 of 1999), but Heritage Western Cape is considering a grading system of sites to indicate their importance. This system has not yet been formalised, but provisional gradings using this system are provided here as a guideline. Grade 2 refers to sites of provincial significance, while Grade 3 sites are of local significance. A subdivision within Grade 3 indicates significant sites worthy of conservation (3a) and sites that are not particularly valuable from a historical or archaeological point of view (3b).



**Figure 4**

3318CB Melkbosstrand & 3318DA Philadelphia (Mapping information supplied by - Chief Directorate: Surveys and Mapping. Website: w3sli.wcape.gov.za)

GO7

This site is located on the edge of the field identified as Alternative A (S 33° 42' 13.2" E 18° 30' 24.4"; Plate 5). It consists of a low bushy rise and sandy area (Plate 5) that have escaped ploughing and farming, and on which was found a very small selection of stone artefacts. These artefacts are made on silcrete and probably date to the Middle Stone Age (MSA), although a single ESA core in quartzite was also seen. This site has very low importance and could be assigned a provisional grading of 3b.



GO3

This site is located just within the southernmost part of the area earmarked as Alternative C (S 33° 42' 49.7" E 18° 29' 43.6"; Plate 6). Should this alternative be chosen the site would be directly impacted. The site is located on a small hill (Plate 6) capped with a layer of silcrete (Plate 7) from which



Stone

Age people have obtained raw material for the manufacture of stone artefacts. Numerous flakes, blades, cores and other débitage items are present lying on and around the hill (Plate 8), signifying frequent use of the outcrop as a stone source. Artefacts dating to the MSA and LSA (Later Stone Age) are common, although the former probably dominates. The vast majority of artefacts are on silcrete collected directly from the outcrop, although some quartz pieces are also present. A few silcrete artefacts attributable to the ESA, including one hand-axe (Plate 9), also occur. The deflated area to the northwest of the hill also contains numerous artefacts. This site could be assigned a grade of 3a.

GO2

This site lies just outside the southeastern margin of Alternative C and should not be directly impacted by the erection of the substation here. The site should, however, be incorporated into the management plan for the farm as a whole, both during and after the construction phase. It is

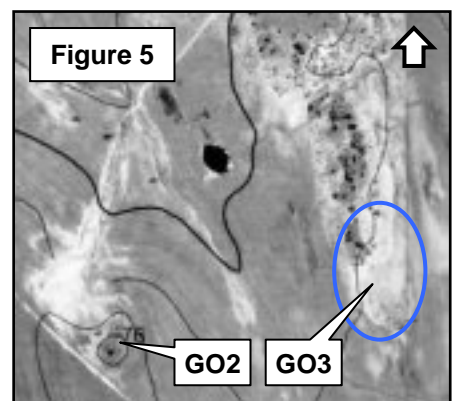
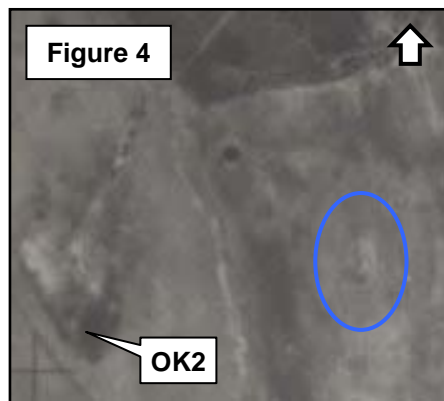


located immediately east of GO3 (S 33° 42' 49.5" E 18° 29' 59.1"; Plate 10) and consists of a sandy deflation containing a scatter of stone artefacts. These seem to be a mixture of MSA and LSA artefacts. Among the latter are three fragments of cobbles, each of which had been used as both a hammerstone and an upper grindstone (e.g. Plate 11), and one larger cobble that had been used as a lower grindstone and anvil (Plate 12). Plate 13 shows a single platform core, possibly of MSA origin. Kaplan (1996) reports that Mr D. Drury of the South African Museum excavated two human skeletons from this site, described as "a large sand dune" (Kaplan 1996: 3), sometime in the mid-20th century. It is interesting to note that the artefacts occur in a deflation which appears to be a relatively recent phenomenon as shown by the blue circles on Figures 4 and 5 (aerial photographs from 1938 and 2001 respectively). The hill (foreground in Plate 10) is currently entirely vegetated and has no archaeological material present on it at all. We are uncertain as to how to reconcile these facts with the site having been recorded as a sand dune in the past. With the current deflation of the site, it is thought that its integrity has been substantially altered by souvenir hunters, with many artefacts probably having been removed over the years. As such, the site could provisionally be graded 3b.



GO1

The built environment of the Groot Oliphantskop farm is here considered as one site since the impacts will be equally felt by all buildings concerned. The buildings lie immediately outside the south-eastern corner of Alternative A. As such they will not be

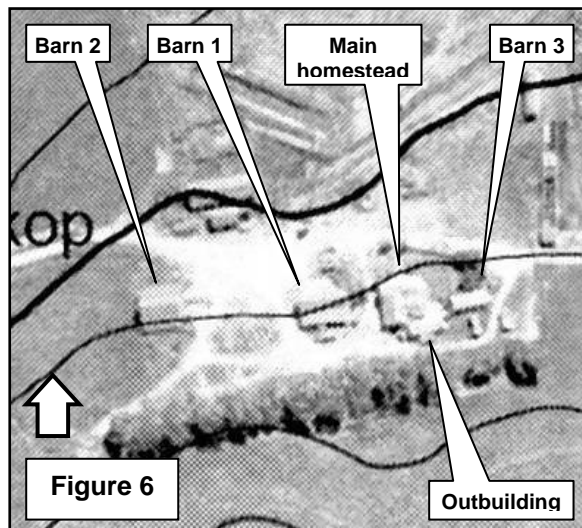


directly impacted by this alternative, but will receive indirect impacts. The built environment is undoubtedly the most significant and sensitive site on the farm and needs to be given careful consideration during the formulation of a management plan for the farm. The various buildings

will be discussed in turn. The GPS position (S 33° 42' 26.0" E 18° 30' 57.2") is taken next to the main homestead but all structures are indicated on Figure 6. The farm was originally granted in 1773 and a single dwelling is indicated on the survey diagram. It is possible that this original structure is contained within either the homestead or one of the other outbuildings.

### Main homestead

The main dwelling house (Plate 14) is architecturally very interesting. The previous report by Kaplan (1996) identified the building as late 18th or early 19th century, an estimate with which we agree. The essential form of the building is T-shaped indicating that it had its origins in the Dutch occupation period styles of the 18th century. The seemingly organic growth of this building suggests that it may even have originally started out as a longhouse, in the form of the current front portion. Although various additions were made to the building in later years (e.g. small room on the left in Plate 15 and second wing and later stoep on the left in Plate 17), the T-shaped core still exists. The front stoep (Plates



14 & 16) was probably added in the early 20th century and it is quite likely that the original thatched roof was replaced with corrugated iron at the same time. If the building ever had a front gable, it may well have been removed at this time. There is a solder in the roof space which is accessed by an outside staircase built in stone against the eastern end gable (Plates 17 & 18). Most of the openings in the building have 19th century fenestration ranging from Victorian to Georgian apart from the modern additions to the "T" form which contain contemporary joinery. The farm house has a neat garden bounded by a vernacular style yard wall.

This farmhouse is a significant structure protected by section 34 of the National Heritage

Resources Act and is rendered additionally interesting by the fact that its historical layering is intact and it has not been “restored”. It is probably very old by South African standards and could be provisionally assigned grade 3a or even grade 2 status. The building is certainly worthy of conservation.

#### Old outbuildings

At least four of the outbuildings are old. The dates of 1937 on the barn immediately west of the main homestead (Barn 1; Plate 18 & 19) and 1933 on the barn to the southeast of the main dwelling (Barn 3; Plate 20) do not reflect the true age of the buildings. Rather they date the addition of the Cape Dutch revivalist gables to the already existing structures. Some of the joinery and fabric in the barns certainly predates the end of the 19th century and in all likelihood is earlier. Both the original structures were re-roofed when the gables were added resulting in loss of the original roof joinery. The barn dated 1937 has a modern shed added to its southern side. The last and western-most barn (Barn 2; Plate 21) probably also dates to at least the mid- to late 19th century. Its straight gables are quite likely older than the curved gables of the other barns. This barn has had modern sheds attached to either side.



Immediately south-east of the main house is a small outbuilding with an oven attached to it (Plate 22). This building is also old and is “reputed to be older than the main house” (Kaplan 1996: 4). Prior to the installation of a kitchen in the main homestead, this outbuilding may well have functioned as the farm kitchen.



The outbuildings are protected by section 34 of the National Heritage Resources Act as applied by Heritage Western Cape. A permit must be applied for and issued for their alteration or destruction.

#### 20th century buildings

The other houses and farm outbuildings are clearly recent in origin and, although forming





part of the cultural landscape of the farm, are of no specific historical interest.

The following sites are listed and discussed by Kaplan (1996) and only briefly mentioned here. Their locations are indicated on Figure 4.