

Heritage Impact Assessment of a proposed Wind Energy Facility to be situated on portions of farms Koperfontein 346/25, Kerschbosch Dam 347/0 and Coeratenberg 307/3, Hopefield District, South Western Cape.

Prepared for

Savannah Environmental (Pty) Ltd

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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 the proponent Umoya Energy Pty Ltd to conduct a Heritage Impact Assessment of portions of the farms Koperfontein 346/25, Kerschbosch Dam 347/0 and Coeratenberg 307/3 situated about 4km south of the small town of Hopefield in the south Western Cape. Umoya Energy are proposing to establish a wind energy facility on the site consisting of up to 125 wind powered turbines.

Indications are:

- Pleistocene palaeontology and archaeology is known to exist in large quantities at Elandsfontein to the east of the study area. The field survey has revealed that there are no indications of similar material existing in a surface context in the study area,
- Historical sites and buildings are not present within the study area, however there is one ruined cottage with associated archaeological material just outside the border as well as historic buildings at Koperfontein village, Koperfontein farmyard, and notably Coeradenberg Farm (which is a known historical site with highly conservation-worthy vernacular structures). None of these localities will suffer any direct impact as a result of the proposed activity, however Coeratenberg must be considered to be an important visual receptor in heritage terms. It is anticipated that negative visual impacts will reduce the sense of history and ambience of the site.
- Probable impacts to cultural landscape are a concern and need to be followed up along with the completion of a Visual Impact Assessment.
- No significant archaeological material was found to exist in the study area. Close to the Zoute Rivier are thin scatters of Late Stone Age material which have been ploughed and dispersed by farming activities. None of these are considered to be significant.
- In heritage terms, no fatal flaws have been identified for the proposed turbine sites, access road or power lines and sub-station.

In terms of mitigation it is suggested that a 500m buffer zone be placed around Coeratenberg Farm and that monthly site inspections be carried out by an archaeologist once construction commences.

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.*

Calcrete: *A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.*

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.*

Midden: *A pile of debris, normally shellfish and bone that have accumulated as a result of human activity.*

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.*

Palaeosole: *An ancient land surface.*

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

Pliocene: *A geological time period (of 5 million – 3 million years ago).*

Miocene: *A geological time period (of 23 million - 5 million 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.*

Varswater Formation: *Sediments laid down under estuarine circumstances by the proto-Berg River during the Pliocene. Certain layers of this formation are highly fossiliferous.*

Velddrif Formation: *Shelly estuarine sands of the last interglacial (Pleistocene) that can be consolidated into calcrete.*

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

DEAT	Department of Environmental Affairs and Tourism
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
SAHRA	South African Heritage Resources Agency

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INTRODUCTION

The Archaeology Contracts Office of the University of Cape Town was appointed by Savannah Environmental (Pty) Ltd of behalf of the proponent Umoya Energy Pty Ltd to conduct a Heritage Impact Assessment of portions of the farms Koperfontein 346/25, Kerschbosch Dam 347/0 and Coeratenberg 307/3 situated about 4km south of the small town of Hopefield in the south Western Cape. The study area lies in the Hopefield magisterial district within the West Coast municipal jurisdiction. Umoya Energy, a private energy company is proposing to establish a wind energy facility on the site consisting of up to 125 wind powered turbines. This proposal has triggered a full EIA process, this report being the heritage component of the Environmental Impact Assessment. Two alternatives for turbine sizes and layout have been proposed.

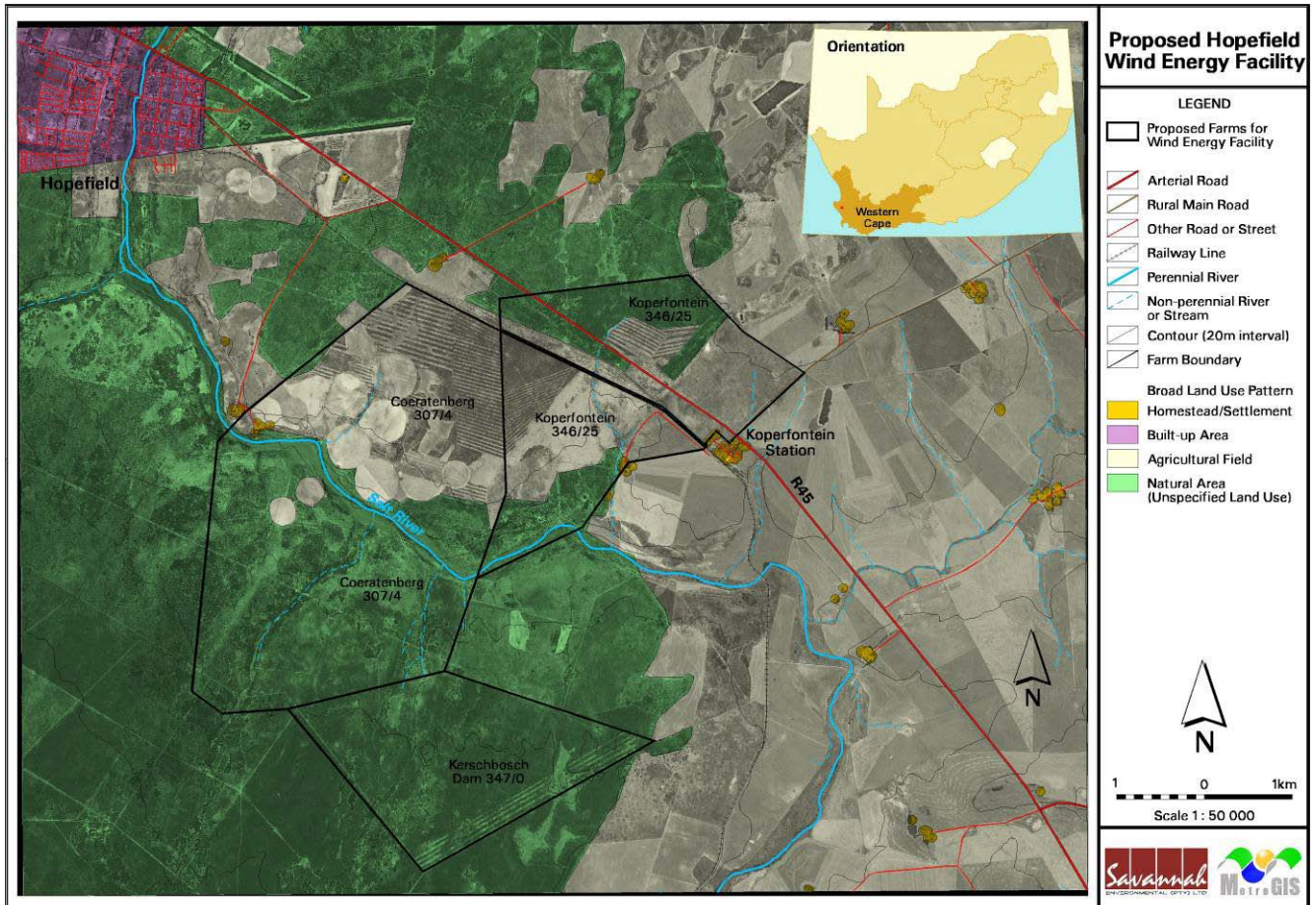


Figure 1 The study area (drawing supplied by Savannah Environmental Pty Ltd)

1.1 The need for the project

South Africa is currently experiencing an energy crisis with the national electricity provider (Eskom) being unable to produce enough power to serve the nation's peak demand. Rural areas are presently subject to frequent load shedding. In addition global warming caused by emissions of greenhouse gas has meant that the pressure is on to utilise clean and renewable energy resources. Wind turbines have been proven internationally to be able to produce an important electricity contribution that produces no emissions. Umoya Energy Pty Ltd is a private company that intends to produce electricity on a commercial basis which will be fed into the existing national electricity grid system.

1.1.1 The proposal

The turbines are proposed to be positioned over an area of approximately 18km². The scoping study recently completed by Savannah Environmental Pty Ltd has revealed that areas of the site on the southern side of the Sout River contain vulnerable plant communities and are best left undisturbed. The portion of the site on the northern side of the Sout River is therefore better suited to the proposed activity. Two alternative layouts and turbine sizes are being considered:

- Option 1 involves the construction of 50 large turbines, each with a hub height of 80 meters and a rotor diameter of 90 m. The turbines will be arranged in rows (about 500 m apart) about 300m between each turbine in the row (Figure 2).
- Option 2 involves the construction of up to 125 smaller turbines, each with a hub height of 60 m and rotor diameters of 50 m. Due to the fact that these smaller turbines produce less power than those of option 1, more turbines will be required representing a much denser coverage of the landscape – a greater amount of turbine rows with shorter spacing between the turbines (Figure 3).

Infrastructure associated with the wind energy facility will include:

- Concrete foundations set in the ground surface to support the turbine towers
- underground cables between turbines
- a substation
- overhead power line (132 kV distribution lines) feeding into the Eskom electricity distribution network
- an access road to the site from the main road/s within the area
- internal access roads to each wind turbine, the substation, as well as workshops
- during the construction period, corridors of landscape disturbance will occur as lay-down areas will need to be prepared, heavy lift cranes and abnormal load trucks brought on to the site.

While final specifications have yet to be determined, each turbine typically consists of a concrete foundation on to which a steel column is bolted. Each column will be 80 (option 1) or 50 (option 2) meters high. On top of each column is the nacelle which contains the generator and gear box. The generator is powered by the wind driven rotor, the blades which can be up to 45m in length (option 1). Turbines will be optimally positioned on the site to make the most of ambient wind conditions, but generally spaced several hundred meters apart. The length of the construction period for the wind energy facility is estimated to be approximately one year. The wind turbines respond most efficiently to wind speeds of 45-60 km per hour, but can produce reduced power at lower wind velocities. The orientation of the rotors and pitch of the blades is generally controlled by a computer that ensures that the turbine works at optimum efficiency and shuts down if wind speeds become high enough to pose an operational hazard. Typically the wind turbines are very low maintenance (once constructed) with very low on site staffing requirements. Hence they are a clean low impact form of energy. Once the construction period is over the surrounding landscape can continue to be farmed or managed to its most appropriate potential. The period in which impacts are most likely to occur in heritage terms relates to the physical disturbance of the landscape that will take place for the duration of the construction period.

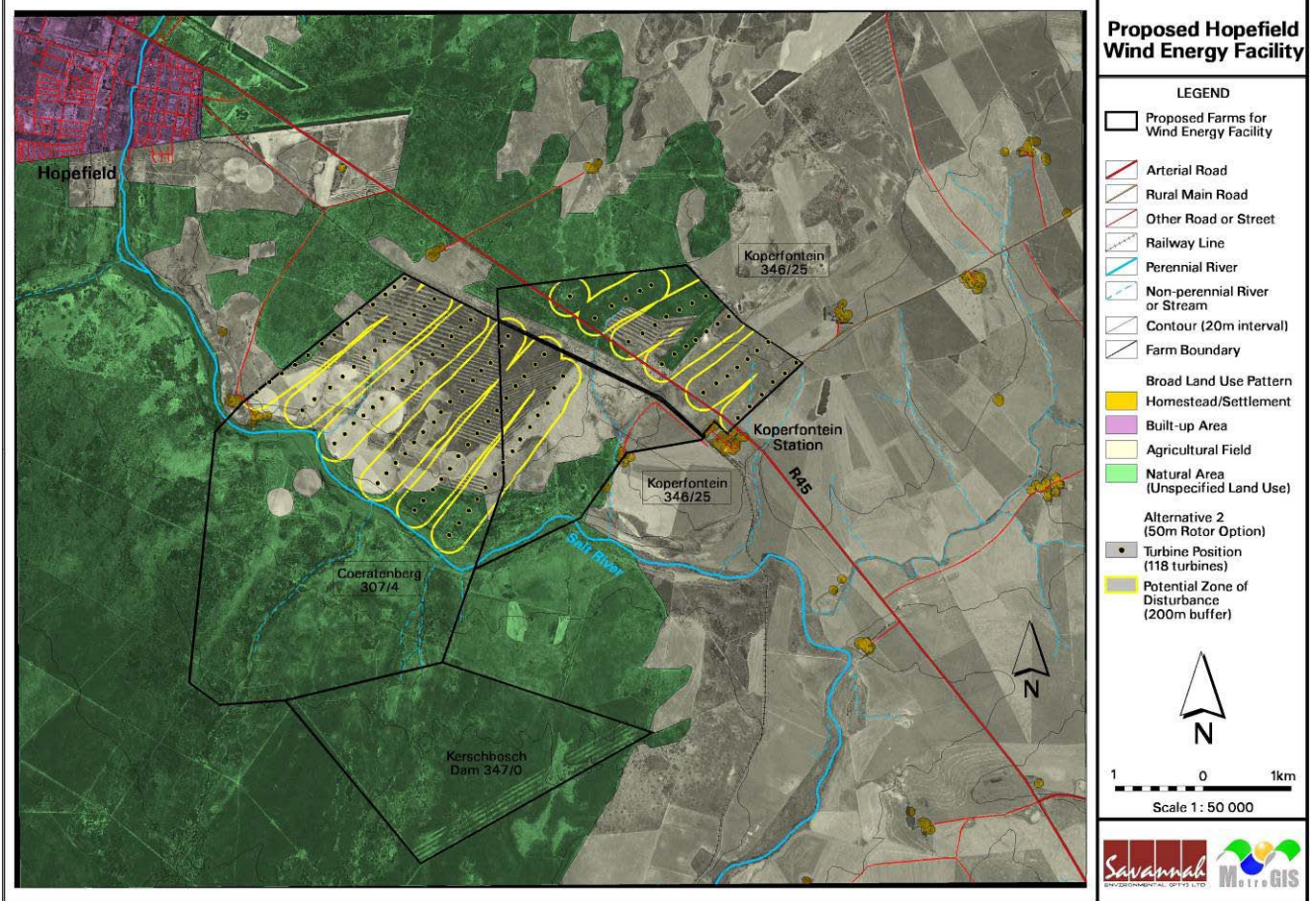
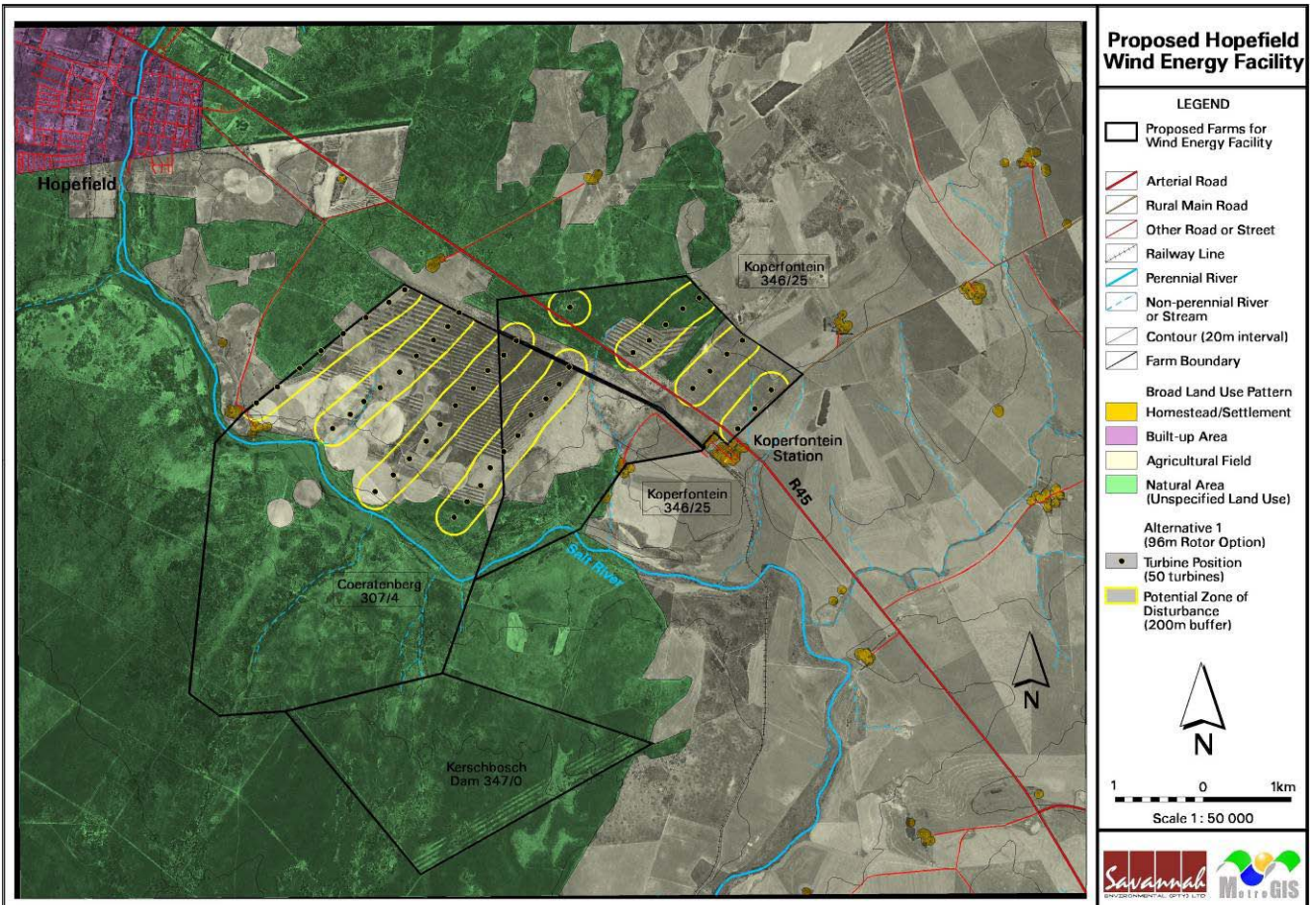


Figure 2 (above) Alternative 1 50 turbines and corridors of disturbance.
 Figure 3 (below) Alternative 2 125 turbines and corridors of disturbance.

1.2 The receiving environment

The study area is situated between the small settlement of Koperfontein Station and 4km south east of the town of Hopefield. The R45 runs through and divides the northern portion of the site. The 18 km² site is located at the interface of the rolling hills of the wheat lands (Swartland) and the *sandveld* area which extends from the Sout River to the coast which is relatively uncultivated, and partially conserved within the West Coast National Park and the Elandsfontein Private Nature Reserve. The study area itself which is partially cultivated lies mostly to the south of the R45 in what could be described as a gateway position to Hopefield. The Saldanha railway line passes through the northern edge. The Sout River, which is perennial, runs directly through the Coeratenberg section of the site in a low valley with reed beds and wetlands. On the farm Koperfontein is a powerful spring which in historic times supported a stock post (ruins are visible close to the site). The installation of center pivot irrigation schemes on parts of the Coeratenberg and Koperfontein portions of the site has resulted in large expanses of surface disturbance and landscape transformation (plate 2). At the time of site inspection, these areas have not been cultivated for some time with the result that several large deflated areas had developed through wind erosion of the soft sandy surface. Those parts of the site that had not been subject to cultivation were in a neglected state – dense stands of alien vegetation have taken hold (exacerbated by previous attempts at sand mining) in what would have been a fairly pristine *fynbos* dominated landscape.

The land on the southern site of the river is relatively wild and vegetated with *Hopefield sandveld fynbos* and occasional incursions of alien vegetation. The portion of the study area (Koperfontein 346/25) that lies on the northern of the R45 is in actual fact the western extreme of the Swartland wheat farming area. It is also partially cultivated however a large portion of the site towards the north is densely vegetated with *fynbos*.

The topography of the site is generally un-interesting and flattish (see plate 1). The Sout River runs through a low sandy valley devoid of any rock outcrops or hills of any significance apart from occasional vegetated dunes. On the northern part of the site (north of the R45) there are several silcrete outcrops, some of which have been quarried in recent years, possibly to supply building material for the mill building at Koperfontein Station. For the main part the underlying geology of the area is characterized by the ancient Malmsbury formation with overlying acid sands of the Springfontein formation. The farmer at Koperfontein (Mnr Chris Van der Merwe) has commented that much of the property is unproductive sand, however borehole test have revealed deep deposits of kaolinite clay underlying the property. On the south side of the Sout River (outside the study area) the geology is somewhat different in that there are more calcretes and sands of the Witsand formation which are potentially fossiliferous.

1.2.1 Historical overview

The pre-colonial heritage of the immediate area is not very well known, however the broader regional context is better described.

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. These include the material excavated from sites such as Elandsfontein near Hopefield (Klein 1988; Singer & Wymer 1968), Duinefontein 2 (Cruz-Urbe *et al.* 2003; Klein *et al.* 1999) and Langebaanweg (Halkett & Hart 1999; Hendey 1969, 1982; Singer 1961). Fossil bones were also seen at Bakoond (Orton 2007b) 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 and adjacent interior has also been recorded (Avery 1995, 2007; Broom 1909). These findings show that the fossil beds along this part of the Western Cape coast are very extensive.

Archaeology: The famous Hopefield skull (an ancient sub-species of human known as *Homo ergaster*) was found on the Elandsfonteyn Farm some 10 km to the west of the town of Hopefield

(Singer 1954). Also in the area were extensive scatters of fossil bones in deflations among the dunes. The finds from this site have attracted numerous analyses of various aspects of the bone assemblage with the research still continuing to this day (e.g. Ewer & Singer 1956; Hendey 1969; Hooijer & Singer 1960, 1961; Keen & Singer 1956; Klein 1988; Klein *et al.* 2007; Singer 1962; Singer and Boné 1960, 1966; Singer & Inskeep 1961, Singer & Keen 1965; Singer & Wymer 1968). Presently Dr David Braun of UCT's Archaeology Department has started a new initiative to research the west coast Pleistocene fossil and archaeological deposits of the Hopefield-Saldanha area.

Among the stone artefacts found at Elandsfonteyn were Early Stone Age Acheulian hand-axes (Goodwin & Van Riet Lowe 1929), as well as artefacts pertaining to the Middle and Later Stone Ages (G. Avery, pers. comm. 2007). Little other archaeology is known from the immediate area. Extensive archaeological research has, however, been carried out in the dunefields of Geelbek to the southeast of Langebaan Lagoon (Kandel & Conard 2003, 2005; Kandel *et al.* 2003). There both Middle and Later Stone Age material was recovered. Extensive archaeological deposits dating to the Later Stone Age occur on the Vredenburg and Churchhaven Peninsulas where rocky shores provide abundant shellfish for food and on the former rocky outcrops form natural foci on the landscape (Sadr *et al.* 2003; Smith 2006; Smith *et al.* 1991, 1992). However, inland areas have not been well described, however the frequency of archaeological sites is expected to be quite low. The archaeological potential of the Salt River catchment has never been archaeologically studied, although it is anticipated that it would have been an important resource for pre-colonial people, in particular, the Khoekhoen pastoralists of the Late Stone Age.

European travellers penetrated the interior of the country remarkably soon after the first settlement of the Cape. The main motivation for doing this was seeking opportunities to exploit mineral wealth, or expeditions to barter for cattle from the local "Saldanhars" – the Khoekhoen communities who lived on the Vredenberg Peninsula. Following this vanguard of explorers and hunters, followed transhumant Dutch farmers (trekboers) who established cattle posts deep into the heartland of the province. According to Fransen (2004) the farm Coenradenberg which makes up part of the study area, was first granted as a loan farm in 1712 when a *Freeburgher* was permitted to use the area for grazing for a period of six months. It is unlikely that there were any formal structures on the landscape at that time, perhaps a temporary kraal and simple wattle and daub dwelling. In 1749 the farm was granted to Pieter Smit. Members of the same family reside on the property to this day.

1.2.2 Built environment

Within the boundaries of the study area there are no standing structures.

Immediately south of the study area lies the small settlement of Koperfontein (Plate 3) – a collection of houses, barns railway siding and grain elevator. A visit to this settlement has revealed that many of its buildings are older than 60 years and therefore constitute protected heritage. Noted were a number of Victorian and wood and iron buildings (Plate 2) which give this little railway settlement a certain ambiance and sense of history. Also notable is the spectacular stone mill building, which to our knowledge has never been previously recorded or included in any heritage register despite that fact that it enjoys statutory protection under the NHRA. The settlement is situated outside the southern boundary of the study area.

Hopefield has its origins in the mid-19th century. Before 1850, when it was surveyed and laid out by two British Military Engineers (Hope and Field) it was a small informal settlement called Zoute Rivier (named after the river which flows through the town). Like many of the wheat land towns, the church was pivotal to its development in the mid-19th century. Hans Fransen has remarked on the survival of the riverine fields which in previous years were market gardens that were established in the flood zone of the river. Before the construction of the R27 to Saldanha Bay in the 1970's, Hopefield was a significant stop on the network of country roads that led to Port of Saldanha and therefore saw a fair amount of passing traffic. Today the town is slightly off the beaten track but nevertheless an easy drive from Cape Town. Authors such as James Walton (1989, 1995) and Hans Fransen (2006) have commented on the vernacular architecture of the town (*langhuisies and Hardebees Huisies*), but sadly much of it was demolished in the name of

the group areas act. Although the town does not enjoy quite the heritage status of the Cape Wine lands towns, it certainly has significance. Many Victorian and some vernacular buildings have survived throughout the town and along the edges of the Sout Rivier valley. These add interest to the place and certainly enhance its aesthetic qualities.

On the northern boundary of the study area, the Coeratenberg (Coenradenberg) farm house (Plate 3) is a known heritage site which has been studied and visited by the Vernacular Architecture Society of South Africa (undated Graeme Binckes & VASSA Team). This early 19th century (possibly older) building lies in a well preserved farmyard and is one of the best preserved examples of its type in the region (A Malan, pers comm.) and described by Han Franzen (2004) as one of the finest vernacular historic farms in the district. Also significant is its near-wilderness setting in the Sout River Valley with views towards Hopefield to the north and the various conservation areas towards the west.

2. Methodology for study

This study has been commissioned as a heritage impact assessment that attempts to identify the possible range of impacts and identify issues in terms of accumulated knowledge of the area as well as a physical survey of the study area and environs.

Due to the fact that very little has ever been published with respect to the study area, this assessment has relied heavily on field observations. The study area was visited over a three day period by archaeologists, Tim Hart (MA), Jayson Orton (MA), David Halkett (MA) and Nancy Child (Msc). A general survey of the entire landscape was completed. The survey was completed partly on foot, and when ambient temperatures exceeded 40 degrees, by slow driving with an off-road vehicle.

Any heritage sites encountered were mapped using a Garmin 60csx hand-held GPS. The contents of each site were noted and examples of the material photographed. Each site was evaluated for significance in the field.

2.1 Restrictions and assumptions

The study area was somewhat unforgiving to search due to extremely soft sand in places, dense alien vegetation in places. Vegetation cover in un-transformed land was fairly dense throughout, however there were enough open areas to allow for coverage of good representative samples of all areas of the site.

No trial excavations were conducted so it is assumed that surface observations and observations obtained from the old mining area representative of sub-surface conditions.

It is assumed that the farm buildings at Koperfontein Farm (which are more than 60 years of age and generally protected) will not be affected by the proposed activity.

2.2 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. In the case of Environmental Impact Assessments in the Western Cape, the guidelines published by the Provincial Department of Environment Affairs and Tourism are directly based on the provisions of the National Heritage Resources Act (Winter and Baumann 2005).

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.

Section 38 of the NHRA requires that Heritage Impact Assessments (HIAs) 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 HIAs" are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils Section 38 provisions.

Heritage Western Cape (HWC) is responsible for the management and protection of all provincial heritage sites (grade 2), generally protected heritage and structures (grade 3a-grade 3c) in the Western Cape Province. In terms of this particular project HWC is a commenting party but are not responsible for final compliance as this study forms part of an EIA process for which the Department of Environment Affairs and Development Planning is the compliance authority (in terms of section 38.10 of the National Heritage Resources Act).

3. FINDINGS

3.1 Palaeontology

The study has shown that the Pleistocene palaeontological deposits that have been described at Elandsfonteyn do not extend as far as the study area. No fossil material of any kind was noted anywhere within the study area. In addition, it is unlikely that any fossil occurs as the basal geology as this is pre-cambrian in age.

3.2 Pre-colonial archaeology

In total, only 5 occurrences of pre-colonial archaeology were found within the boundaries of the study area (Figure 4). All of these are Late Stone Age archaeological sites largely associated with deflated areas. One of these sites was located in the portion of land to the north of the R45, however it lies clear of the any of the turbine rows for both alternatives. The site contains a mere handful of quartz and silcrete waste. The 4 remaining sites all lie in the transformed land on the northern bank of the Sout River. The sites which contain ephemeral silcrete and quartz scatters (with at least one microlith noted) lie in recently deflated areas. It is possible that the presence of this material is not a function of individual prehistoric camps, but has become concentrated as a result of soil loss resulting from the recent farming activities. The material is so ephemeral and its context so disturbed that no mitigation is suggested.

3.3 Colonial period heritage

There are no historical sites or structures within the boundaries of the study area. No direct impacts are expected.

3.4 The cultural landscape

Impacts to the cultural landscape will result in visual change to places that will take place when the landscape is transformed by the creation of rows of wind turbines. These structures which are substantial in size will be highly visible for a radius of up to 10 km. The historic buildings at the farm Coeratenberg should be considered a sensitive visual receptor. For both alternatives it is noted that the closest wind turbine to this historic area is (line of sight) just over 300m from the main farm house, while many other will be extremely visible. It is likely that the site will lose its sense of isolation and the sense of history will be compromised by the intrusion.

The scoping visual impact assessment implied that much of the wind energy facility will be visible

from the town of Hopefield which is considered to be a potential negative impact. Similarly, the facility will also be highly visible from Koperfontein.

3.5 Other areas of concern

Koperfontein Farm. Mr Chris Van Der Merwe indicated that the residential building on the farm was built in 1929, however judging by the style, materials and fabric from which it is built, it is suggested that it was in actual fact constructed in the late 19th century. The house takes the form of a rectangular bungalow with a curvilinear corrugated iron roof, it has sash windows throughout, beamed ceiling and angled openings reminiscent of Dutch period vernacular architecture. Similarly outbuildings on the property are of similar age or older. While the farm lies outside the study area, concern is expressed as to its future use. It must be noted that the farm buildings are protected by the 60 year clause of the NHRA.

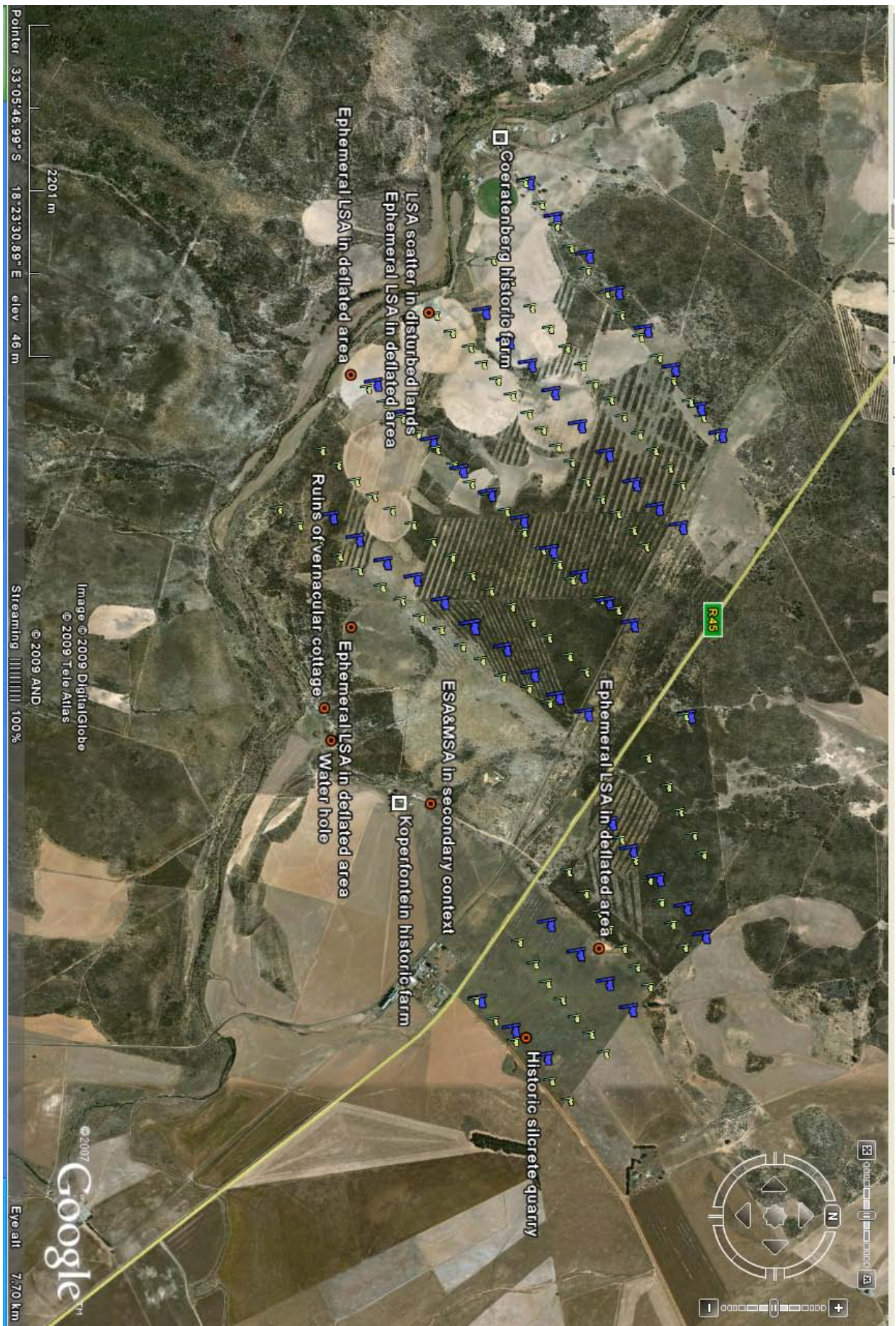


Figure 4. Location of heritage sites identified within or close to the study area (both turbine layouts are indicated)

4. ASSESSMENT OF IMPACTS

4.1 Palaeontological and archaeological material

The study has revealed that both archaeological and palaeontological material is sparse and does not constitute a major heritage concern. The few Late Stone Age sites found along the northern bank of the Sout River lie in a transformed landscape and are not considered to be of high heritage significance.

4.1.1 Nature of impacts

The main cause of impacts to archaeological and palaeontological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. In the case of the proposed activity the main source of impact is likely to be the construction of access roads, lay-down areas and excavation of the footings for the turbines. The construction of 132kV power lines is unlikely to cause a significant impact in this area which is generally not very sensitive in heritage terms.

4.1.2 Extent of impacts

In the case of the proposed wind energy facility, it is expected that impacts will be quite limited (local) but nevertheless possible. There is a chance that the deep excavations for the tower bases could potentially impact buried archaeological material, similarly excavation of cable trenches and clearing of access roads could impact material that lies buried in the surface sand. Potential impacts caused by a 132 kV power line and proposed access roads are similarly likely to be limited and local. The physical survey of the study area has shown that archaeological material is sparse, and very poorly contextualised, which means that the extent of impacts is likely to be highly localised with no regional implications for heritage of this kind.

4.1.3 Significance of impacts

In terms of the information that has been collected, indications are that impacts to pre-colonial archaeological material will be highly limited, and at worst affect a few already disturbed sites. In terms of palaeontological material, one can never be sure of what lies below the ground surface, however indications are that this is extremely sparse and that impacts caused by the construction of footings and other ground disturbance is likely to be negligible.

4.1.4 Status of impacts

The destruction of palaeontological and archaeological material is usually considered to be negative, however opportunities for the advancement of science and knowledge about a place can result provided that professional assessments and mitigation is carried out in the event of an unexpected find.

Table 1 Summary of Impacts for Archaeology and Palaeontology		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (1)	Low (1)
Probability	Possible (2)	Possible (2)
Significance	Low (14)	Very Low (14)
Status	Neutral	Neutral
Reversibility	Low reversibility	Low reversibility
Irreplaceable loss of resources?	No	No
Mitigation: No mitigation required prior to construction. Monthly site visits by archaeologist required during construction.		
Cumulative impacts: n/a.		
Residual Impact: n/a		

4.2 Colonial period heritage

Colonial period heritage – that is buildings and historical sites have not been identified within the boundaries of the study area, however it is known that this area has been subject to European settlement since before the 18th century. The presence of the historical farm Coeratenberg on the boundary of the study area raises concern that indirect impacts may occur (see cultural landscapes below). There remains the possibility that graves may exist on the landscape which are notoriously difficult to find once grave markers have disappeared.

4.2.1 Nature of impacts

Historic structures are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape will affect their significance.

4.2.2 Extent of Impacts

Direct impacts are not expected, however if the proposed activity stimulates changes in the way that historic structures are utilised both negative and positive impacts may result. For example change in landownership may result in changes to the way Koperfontein Farm (although outside the study area may be impacted) is used by future owners. It may be illegally modified, demolished or restored. The buildings themselves are not more than of local significance, however they are good examples of their kind and are relatively well preserved. The impact that could result will be local and confined to the site, with no wider heritage implications.

4.2.3 Significance of impacts

Given that there are no structures or historical sites within the study area, the significance of any impacts is very low. The indirect impacts that could occur to the farm buildings at Koperfontein are easily controllable provided that requirement of the NHRA are followed by any subsequent landowners.

4.2.4 Status of impacts

Within the boundaries of the proposed wind energy facility, impacts are considered improbable. The overall status is considered to be neutral. In terms of Koperfontein Farm future impacts may be negative or positive depending on how future owners treat the property.

Table 2: Summary of impacts on colonial period heritage (Koperfontein farm house)		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Temporary (2)
Magnitude	Low (1)	Low (1)
Probability	Possible (2)	Possible (2)
Significance	Low (14)	Low (8)
Status	Neutral - negative	Neutral-positive
Reversibility	Low reversibility	Reversible
Irreplaceable loss of resources?	No	No
Mitigation: Approach Heritage Western Cape for permit to alter a building more than 60 years of age, seek advice from conservation architect if alteration is envisaged.		
Cumulative impacts: No cumulative impacts as house, is a good heritage building but not unique.		
Residual Impact: n/a		

4.3 Cultural landscape and sense of place

The proximity of the historical farm at Coeratenberg, the fact that the proposed WEF will potentially be visible from both Hopefield and Koperfontein Station raises the concern that visual impacts will result in loss of sense of history and/or wilderness associated with the area.

4.3.1 Nature of impacts

Cultural landscapes are highly sensitive to accumulative impacts and large scale development activities that change the character and public memory of a place. In terms of the National Heritage Resources Act, a cultural landscape may also include a natural landscape of high rarity value and scientific significance. The construction of a large facility can result in profound changes to the overall sense of place of a locality, if not a region. The proposed activity is essentially a visual intrusion that is very difficult to measure due to the fact that there is no reference material (besides small wind energy facilities at Darling and Klipheuvall) or existing wind farms of this size on which the sense of change can be gauged in a local context. The effect of juxtapositioning wind turbines and historic structures (such as at Coeratenberg) is essentially a subjective aesthetic issue that is quite difficult to measure. It is acknowledged that under certain circumstances the combinations of old and new elements on a landscape can be aesthetically pleasing, however for the purposes of this study a conservative approach has been followed which sees the insertion of new elements in the landscape as a negative impact.

On a smaller scale comparatively minor factors such as ill-conceived and distasteful signage, "overpowering" entrance gates to sites or security fences adjacent to natural/country areas and scenic drives will constitute a bothersome aesthetic irritation that can cause serious accumulative damage to the qualities of a "place". These however are easily mitigated through sensitive use of materials and design.

4.3.2 Extent of impacts

Massed wind turbines, are without doubt conspicuous structures which will affect the atmosphere of the "place". While this impact may be considered local in terms of physical extent, there may be wider implications in terms of the change in "identity" of the area and the accumulative effect this could have on future tourism potential (not necessarily negative). The study area is situated in a somewhat marginal area that is difficult to characterise. In certain areas the site is invaded by alien species or disturbed.

4.3.3 Significance of impacts

The main area of concern relates to the visual impact that will be experienced from the historic structures at Coeratenberg. Coeratenberg is considered to be one of the most important collections of historic structures in the west coast region, and it is therefore important that the site and its context are left as unaltered as possible. It therefore stands that the site is sensitive to changes in its context, in particular its visual qualities. It is therefore determined that there will be a negative impact of medium significance caused by the intrusive and qualitatively alien presence of the wind turbines.

4.3.4 Status of impacts

The status of the impact is negative (without mitigation). The creation of a buffer zone around the historic precinct may buffer against the change of the qualities of the landscape, however the impact is still considered to be negative.

Table 3 Summary of Impacts on cultural landscape		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (5)	Medium (3)
Probability	Probable (4)	Possible (2)
Significance	Medium (40_)	Low (16)
Status	Negative	Negative
Reversibility	Reversible after closure of WEF	Reversible after closure of WEF.
Irreplaceable loss of resources?	No	No
Mitigation: A no-development buffer zone of a radius of 500m must be implemented around Coeratenberg historic farm yard.		
Cumulative impacts: No cumulative impacts are expected..		
Residual Impact: n/a		

4.4 Selection of alternative wind turbine configurations, and the no-go alternative

While indications are that neither alternative will result in significant impacts, it is argued that the 50 turbines of 2 MW (option 1) will result in a lesser impact than 125 smaller turbines. Although the smaller turbines are shorter in height, they represent a denser visual massing, greater ground surface disturbance and a greater threat to the ambience of the place caused by loss of open landscape.

It is suggested that the 50 turbine option is more desirable and will result in significantly less damage.

The no-go alternative will result in retention of the status-quo in heritage terms.

No accumulative impacts are expected.

5. Mitigation and conservation

5.1 Archaeological and palaeontological heritage

There is no surface archaeological and palaeontological material that requires any form of mitigation prior to construction work. Given that the below surface status of both archaeological and palaeontological material remains unknown, it is suggested that precautionary site

inspections are carried out when excavation of footings for wind turbines is underway. Initially it is suggested that site inspections are carried out at monthly intervals by an archaeologist, then increased or decreased in response to findings.

5.2 Built environment and colonial period sites

There are no protected sites or structures within the study area that require mitigation. Cautionary advice is offered in that the Koperfontein farm buildings that lie outside the proposed WEF boundary are greater than 60 years of age and fall under the protection of the NHRA. This means that any alteration or demolition of these structures will need to go through the Heritage Western Cape permitting process.

5.3 Cultural landscape

While the findings of the independent visual impact assessment apply, concern is expressed with respect to the proximity of wind turbines close to the historic farm yard at Coeratenberg. In terms of the current layout, it is noted that the closest wind turbine to the farm is roughly 300 m. Given the size and massing of the turbines, this will result in visual impacts and consequently a change in the sense of history and place of the area. It is suggested that a 500 m buffer zone should be placed around the farm to help retain the sense of place, and reduce visual impacts for this important receptor in the cultural environment.

5.4 Human remains

Human remains can occur at any place on the landscape. They are regularly exposed during construction activities along the west and south coasts. Such remains are protected by a plethora of legislation including the Human Tissues Act (Act No 65 of 1983), the Exhumation Ordinance of 1980 and the National Heritage Resources Act (Act No 25 of 1999). In the event of human bones being found on site, SAHRA must be informed immediately and the remains removed under an emergency permit. This process will incur some expense as removal of human remains is at the cost of the developer. Time delays may result while application is made to the authorities and an archaeologist is appointed to do the work.

6. CONCLUSION

Indications are that in terms of palaeontological and archaeological heritage the proposed activity is acceptable; impacts are will be limited and controllable. All the archaeological material found within the study area lies within transformed landscapes. Its heritage and research significance has been limited by the high degree of contextual disturbance.

In terms of the natural cultural landscape qualities of the site, impacts are expected. It is noted that the study area lies within view of both Koperfontein and Hopefield as well as close to at least Coeratenberg farm. The degree and nature of the impact is going to depend on how the wind turbines are arranged on the landscape, however it has been argued in this report that the 50 turbine option is more desirable in that it will cause fewer impacts, both in terms of visual massing and land surface disturbance. It is quite possible that the facility may benefit Hopefield by enhancing the profile of the area and creating an additional point of interest.

In general the mitigation requirements for the project are minimal requiring a little vigilance on the part of the construction team who must report any un-anticipated finds, and a series of site visits by an archaeologist during the construction period. To minimise impacts to the landscape around Coeratenberg, a 500m buffer zone has been proposed.

No fatal flaws are anticipated.

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Plate 1 View over the study area showing typical vegetations patterns, and ground surface visibility.



Plate 2 Transformed lands close to the Sout River contain thin scatters of LSA material.



Plate 3 View towards the study area from the R45. Koperfontein Station is visible in the middle ground.



Plate 4 Wood and Iron cottage at Koperfontein (late 19th-early 20th centuries)



Plate 5 The historic vernacular farm house at Coeratenberg



Plate 6 View to Hopefield down the Salt River Valley from Coeratenberg