HERITAGE IMPACT ASSESSMENT: PROPOSED WIND FARM AT KLAWER, VREDENDAL DISTRICT, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act as part of an EIA.)

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EXECUTIVE SUMMARY

ACO Associates CC have been appointed by ERM on behalf of the proponent, G7 Renewable Energies, to undertake a Heritage Impact Assessment, as part of the EIA process, for the establishment of a wind energy facility on two farms located approximately 6 km south-west of Klawer, Western Cape Province.

The fieldwork was conducted on the 1 October 2010. It involved a foot survey of the turbine positions, substation and underground electrical connections and a drive down of the access roads. No significant limitations were encountered during the survey.

Impact of Turbines:

Impacts on palaeontology will be insignificant.

1. The placement of Turbine 5 will have a negative impact on Hottentotskop located on Bird Field farm. This is because during a preliminary survey of the kopje, a number of *pre-colonial archaeological sites* were identified. A revised layout prepared by G7 (depicted in conclusion) which avoids Hottentotskop, which will result in no impacts is thus favoured.

It is recommended that no turbines should be located on the kopje, but rather situated toward the west, in other words closer to the test mast. It is preferable that the turbine should be placed west of the kopje, rather than to the east, as it would be less visible to motorists travelling along the N7. The visual impact of the turbine positions is a matter for the Visual Impact Assessment.

2. The potential impact of turbine 5 on Hottentotskop would also have a negative visual impact on the *cultural landscape* represented by the kopje and associated archaeology.

Mitigation may involve moving either the individual turbine (Turbine 5) or possibly the row of turbines (Turbine 1-8) some 100 m to the west of their present location.

There will be no negative impact of the Wind Energy Farm (WEF) on the *built environment*. A single, collapsing, unfired mud-brick shed is located 2.5 km to the west of Turbines 9-12.

Impact of access Roads:

Impact on palaeontology will be insignificant.

With regard the two alternate access roads, Access Road East is preferable as there is a short avenue of pine trees (probably less than 60 years of age) along Access Road West which may be impacted if the road is widened to accommodate larger trucks.

While no graves or cemeteries were recorded, it is possible that human remains/burials may be uncovered during the construction phase. If this happens, work in the immediate vicinity should cease, and Heritage Western Cape should be notified.

If mitigation, as outlined above, is implemented, then construction of the proposed WEF at Klawer is supported.

CONTENTS

1. INTRODUCTION

ACO Associates CC have been appointed by ERM on behalf of the proponent, G7 Renewable Energies, to undertake a Heritage Impact Assessment, as part of the EIA process, for the establishment of a wind energy facility on Klipheuvel (Farm 5/390) and Bird Field (Farm 99/306) approximately 6 km south-west of Klawer, Western Cape Province (Figure 1).

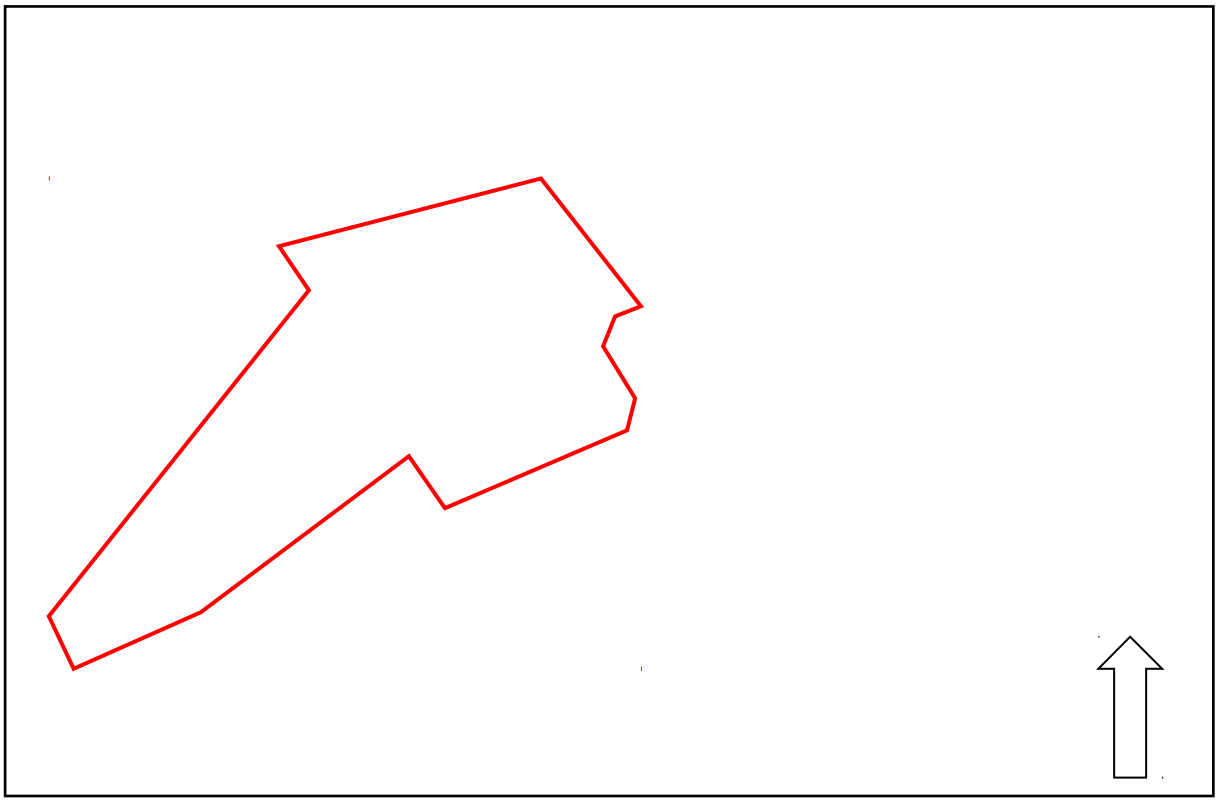

Figure 1: Map sheet 3118 DC Klawer (1: 50 000) with the Study Area highlighted in red. The N7 and the Olifants River are situated to the east. Mapping information supplied by: Chief Directorate Surveys and Mapping.

1.1 Development Proposals

- It is proposed to construct 12 wind turbines, each with a capacity of up to 3 MW, generating 36 MW of electricity which will be fed into the National Power Grid;
- The turbines will be approximately 105 m high, with a concrete foundation base of 15 m x 15 m x 3m.
- There will be a gravel standing area adjacent to each turbine of approximately 2500 m^2 that will be used during the construction and maintenance phase;
- Access roads will involve the up-grading of existing farm tracks but new tracks (with a maximum width of 6 m) may also need to be constructed;
- An office and storage building will be constructed on or close to site;
- Turbines will be connected to each other via underground electrical cables;

- A new sub-station will be built on site and it will connect to the National Grid via existing transmission lines;

- A temporary lay-down area of 150 m x 20 m will be required during the construction phase.

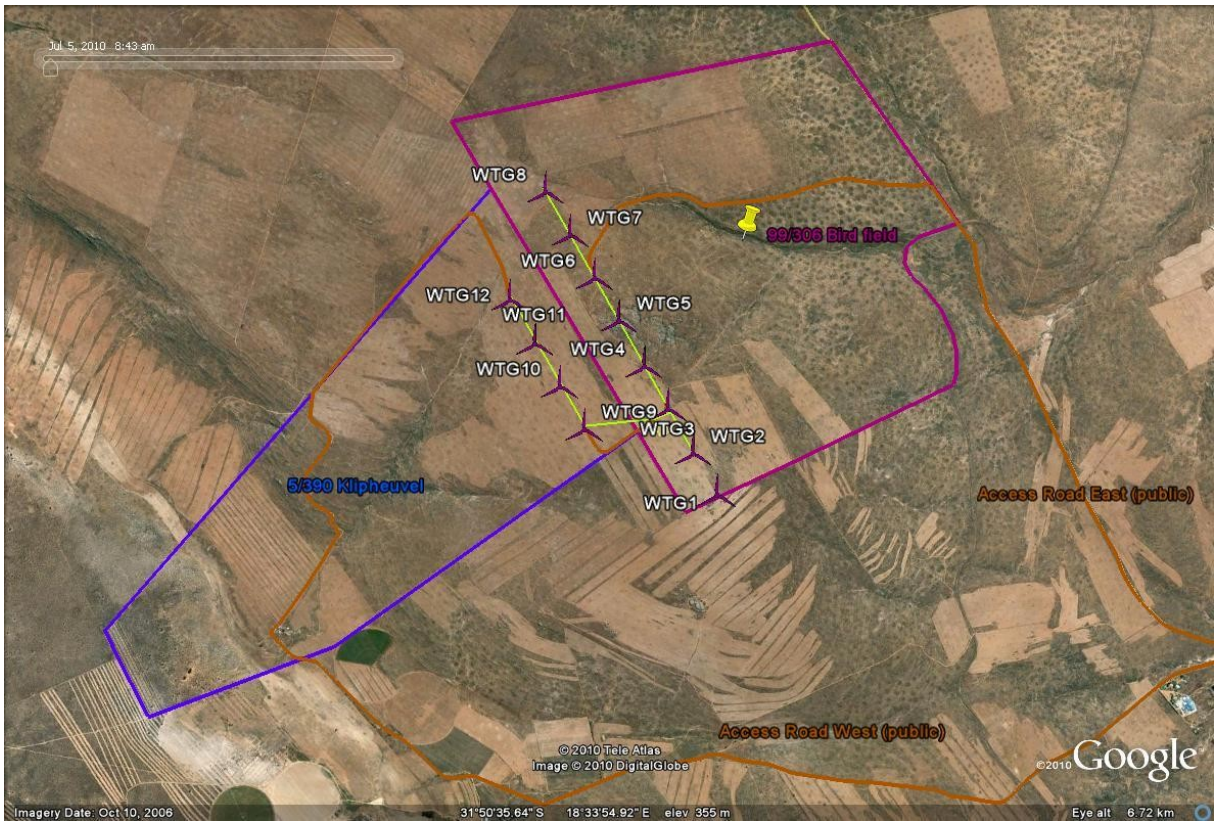

Figure 2: The initial proposed location of the proposed access roads, turbines, substation and underground electrical cable on Klipheuvel and Bird Field. This has since been revised in response to findings of specialist studies (see conclusion).

1.2 The heritage team

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

Lita Webley (PhD) is an archaeologist with 14 years of working experience in heritage consultancy. She is also accredited with Principal Investigator status with the Association of Professional Archaeologists of Southern Africa.

David Halkett (MA) is an archaeologist with 21 years of working experience in heritage consultancy. He is accredited with Principal Investigator status with the Association of Professional Archaeologists of Southern Africa.

Duncan Miller (Phd) is a geologist, an archaeologist and materials engineer. He has published widely on archaeology and palaeontology of the West Coast and has considerable knowledge of the geology, palaeontology and mineralogy of South Africa.

2. METHODOLOGY

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 in the Study Area and other unpublished reports on the history of the region. A survey of heritage resources has been conducted on site and heritage indicators (conservation-worthy buildings, archaeological sites and places celebrated as heritage) identified and mapped where appropriate. Definitions of heritage and criteria for assessment of heritage are indicated in the National Heritage Resources Act while the Provincial Guidelines for assessing heritage in the Western Cape applies. Both the NHRA and Provincial Guidelines require that cultural landscapes and areas of particular aesthetic and/or cultural heritage significance are included in the assessment.

The study reported on here has been significantly reliant on a physical survey of the Study Area and the body of background information (published and unpublished) about the area. An independent visual assessment forms part of the EIA specialist studies. Findings of various specialists were work-shopped with the proponent which result in a revised layout being developed (see conclusion).

2.1 Assessing heritage in the context of wind energy developments

Wind energy facilities have grown exponentially throughout the world in response to the international energy crisis and climate change. Initially communities enthusiastically accepted the presence of wind energy facilities, however web-based research of international experience has indicated that they are not without controversy. The impacts of clusters of massive wind turbines on cultural landscape can be severe, both in physical terms and with respect to the intangible and aesthetic qualities of a given locality. A pilot study commissioned by the Provincial Government of the Western Cape as part of its Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape and Report 6 in the series titled "Towards a Regional Methodology for Wind Energy Site Selection in the West Coast region" (2006) considered landscape character rather than the cultural landscape but they concluded that wind energy facilities have an impact on the surrounding landscape in terms of the natural qualities of places. In terms of landscapes and heritage, there are no pro-active detailed local regional studies that can be consulted, however the pilot study recognises that impacts can occur and suggests a buffer zone of 500 m from sensitive sites to avoid physical impacts.

Wind energy facilities are often big developments. Turbines (some facilities with several hundred turbines are proposed in parts of RSA) can be up to 100m high with blades up to 50m in radius. The structure has to be counterweighted by a concrete block (up to 675 cubic meters) sunk deep into the ground. Each turbine site needs road access that can be negotiated by a heavy lift crane which means that in undulating topography deep cuttings and numerous roads may be made into a landscape to create workable gradients. Due to their size the visual impacts are immitigable (they are easily visible from 10 km) in virtually all landscapes, however indications are (PGWC 2006) that they are perceived to be aesthetically more acceptable in agricultural or manicured landscapes.

The point at which a wind turbine may be perceived as being "intrusive" in terms of the aesthetics of an area is a subjective judgment, however it can be anticipated that the presence of such facilities close to wilderness and heritage areas will destroy many of the

intangible and aesthetic qualities for which an area is valued, or could be potentially valued in the future. Yet the circumstances are variable as in certain landscape forms the graceful shapes of the turbines and the sculptured twist of the rotors is perceived to be aesthetically pleasing.

The degree of physical landscape disturbance caused during the construction of turbines is such that the destruction of archaeological and palaeontological heritage is a very high likelihood. Hence, in the assessment of impacts of wind energy proposals it is necessary to assess both physical damage to heritage caused by the establishment of infrastructure, as well as focus on the way that such a facility can change the aesthetic and intangible values of the cultural landscapes in which the physical heritage resources exist.

The locations of the proposed turbines, access roads, electricity power lines, substations were loaded onto handheld GPS receivers (set to the WGS84 datum) to facilitate the identification of the search area during field work. Fieldwork was undertaken on 1 October 2010. Walk paths and site locations were recorded with GPS and finds were photographed and described.

- The proposed locations of the 12 proposed turbines, the substation and the underground power lines was surveyed on foot (Figure 2 & 3);
- A drive down was undertaken of the access roads (Figure 2 & 3);
- The Rossouwskraal farmhouse on the Klipheuvel farm was inspected (Figure 2 & 3) and recorded in order to assess the impact of the WEF on the built environment and possible farm graveyards;
- Interviews were held with Mr Liebetrau of Bird Field and Mr van Zyl of Klipheuwel. They were questioned about the history of their respective farms and the presence of any heritage resources on their properties.
- The impact of the proposed activity on the palaeontology of the area was assessed in terms of the known geology of the area.

2.1 Limitations

With regard to information gaps, there is very little published information on the archaeology of the area, with most archaeological research concentrated further south and west. This makes it difficult to compare the results of the survey or to infer the significance of the sites discovered during the field work.

The below surface conditions of the site are assumed in terms of the published geology of the area. Apart from a single sandstone kopje, the site is covered by ploughed sands.

There were no significant study limitations as all turbine and substation locations were accessible on foot.

It has been assumed that the concentration of archaeological remains around Hottentotskop reflects pre-colonial settlement of the kopje. The paucity of remains in the adjoining oats fields may reflect an absence of settlement but it is also possible that surface settlement may have been destroyed through many decades of ploughing and grain cultivation.

3. REGULATORY AND LEGISLATIVE OVERVIEW

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. 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 (described below)
- 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 (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.

3.1 Cultural Landscapes

A cultural landscape may be defined as the combined works of nature and human kind.

Section 3(3) of the NHRA, No 25 of 1999 defines the cultural significance of a place or objects with regard to the following criteria:

(a) its importance in the community or pattern of South Africa's history;
(b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
(c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
(d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
(f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) its strong or special association with a particular community or cultural group for social cultural or spiritual reasons;
(h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
(i) sites of significance relating to the history of slavery in South Africa.

3.2 Scenic Routes

While not specifically mentioned in the NHRA, No 25 of 1999, Scenic Routes are recognised by DEA&DP as a category of heritage resources. In the DEA&DP Guidelines for involving heritage specialists in the EIA process, Baumann & Winter (2005) comment that the visual intrusion of development on a scenic route should be considered a heritage issue. This is

also given recognition in the Notice of Intent to Develop (NID) application which is used by Heritage Western Cape.

3.3 Heritage Grading

Heritage resources are graded following the system established by Winter and Baumann (2005) in the guidelines for involving heritage practitioners in EIA's (Table 1).

Table 1: Grading of heritage resources (Source: Winter & Baumann 2005: Box 5).

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

3.4 Wind Energy Guidelines

A pilot study commissioned by the Provincial Government of the Western Cape "Towards a Regional Methodology for Wind Energy Site Selection in the West Cape region" (May 2006) is the only locally available draft policy guideline. The study looked at landscape character rather than at the "cultural landscape" or "heritage" but concluded that wind energy facilities can have an impact on the landscape in terms of quality of place. In general terms it recommends a buffer of at least 500 m from heritage sites. Neither SAHRA nor HWC have developed policies with respect to heritage and renewable energy and therefore the issue of distance of wind turbines from heritage resources has not been resolved.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Study Area is located in close proximity to the town of Klawer and the N7 highway. Klawer is located on the Olifants River which provides the separation between the Sandveld and the Knegtsvlakte (Knersvlakte) (Penn 1987), as well as between the Sandveld and the Cedarberg.

The farm of Bird Field is about 3 km west from the Olifants River. It is bounded on its eastern side by a gravel farm road and the railway line (Figure 1). The farm is bisected by the Groenkloof River, a tributary of the Olifants River. The land rises in the west to a granite kopje called "Hottentotskop" which reaches a height of 366 m. Bird field is partially transformed by agricultural land uses but a portion remains under indigenous vegetation. There are no farm buildings on Bird Field with the exception of a recently constructed store located in the centre of the property.

Plate 1: General view of landscape, showing Hottentotskop which is the most prominent feature in the Study Area; oats fields and patches of indigenous vegetation.

Klipheuwel is a long narrow property which rises in the east to the meet/adjoin the Bird Field boundary at Hottentotskop (Figure 1). A large portion of the farm has been ploughed and is under oats cultivation although a substantial portion is still under indigenous vegetation. There are a number of farm buildings on the western section of the farm, on the farm road.

4.1 Palaeontological heritage

The area is underlain by sandstones of the Peninsula Formation of the Table Mountain Group, Cape Supergroup, with loamy and sandy soil in the southwest

No fossiliferous deposits are exposed currently on the Klipheuval or Bird Field areas. The sandstones of the Peninsula Formation are not fossiliferous. Any excavations into the loamy and sandy soil in the southwestern portion of Klipheuvel may expose palaeosols with calcified roots and dune snails, as immediately north of the Olifants River, where these palaeosols also contain Early and Middle Stone Age artefacts (Roberts *et al.* 2006). If these are encountered they should be checked by a palaeontologist before construction or in-filling.

Figure 1 Geological map of the Klawer area, showing the approximate site boundary: Op = Peninsula Formation sandstone (from de Beer et al. 2002)

4.2 Pre-colonial Heritage

Little is known of the archaeology of the area around Klawer. The University of Cape Town was actively involved in archaeological research in the Sandveld region of the Western Cape during the 1970s and 1980s. However, the bulk of this work was in the Clanwilliam District and much of the research focussed on an area to the south of Lambert's Bay. Jayson Orton of the University of Cape Town is currently engaged on a doctoral study of the Knersvlakte area which is located to the north of the Study Area.

The Sandveld area between the mountains and the coast is characterised by deflation areas many of which contain evidence of Later Stone Age (LSA) occupation characterised by scatters of microlithic stone tools. Where small kopjes or rocky outcrops occur in the Sandveld, they often contain rock art images and some may have shallow archaeological deposit. Archaeologists (Manhire et al. 1984) have commented that there is evidence in the Sandveld for the impact of immigrant pastoralist groups on the hunter-gatherer populations between the 2nd and 1st millennium AD.

4.3 Colonial Heritage

The historian Nigel Penn is of the opinion that the Khoekhoen in the Western Cape would have confined themselves to certain resource rich areas, and one of these would have been the Olifants River Valley. However, Penn (1987:464) says "by 1705, the Khoi population of the Western Cape had been so badly affected by the open cattle trade that in a twelve day journey between the Berg River and the site of the present day Klawer, Starrenberg found only two kraals which, though they contained twelve Captains, had very few cattle".

Manhire et al. (1984:118) comment that "references to the diaries of seventeenth and eighteenth century travellers makes it clear that at least by then pastoralist groups were using the sandy plains for grazing their stock and that the mountains were the hideouts of 'Bosjesmans', a term used then to refer a heterogonous grouping of runaway slaves, destitute herders and genuinely residual hunter-gatherers".

The first European loan farms were allocated along the Olifants River Valley in 1725 and by 1732 these farms had reached the confluence of the Olifants and Doorn Rivers. There are numerous historic references to many Khoi kraals in the valley during the early part of the 18th century (Penn 1987).

History of the farms: According to the SG diagram 426/1834, the farm Klipheuval 390 was first surveyed in 1834 but the original title (Clan.Q. 3-22) is dated 1.11.1838. At this stage it stretched north-east to the farm Olifants River, east to the farm Birdfield (sic), north and north-west to waste government land and south to the farms Melkboom and Heeren Logement (sic). The division of the farm into six portions (Drie Hoek, Koe Vlei B, Koppies B, Rietrug, Roussouws Kraal and Ouplaas) dates to 1916. However, the SG 426/1834 diagram also indicates that there was a consolidation of properties in favour of AP van Zyl and others in 1937.

With respect to Bird Field 306 in the division of Van Rhynsdorp, the SG diagram 291/1821 has the following information "The Railways and Harbour Administration have secured certain water rights etc. over the property represented by this diagram. Vide Notarial deed dated 24.4.1928 and Plan A 2024-1927 annexed thereto filed with Transfer No 9206 dated 16.9.1928". An accompanying table to this figure shows the division of the farm Bird Field 306 between 1896 and 1987. The wind facility occurs on portion 99 of the farm 306.

5. RESULTS OF SITE INVESTIGATION

5.1 Palaeontology

No palaeontological material was observed during the course of the field survey however it is possible that excavation may produce evidence of evidence of invertebrates (snails), old land surface and mineralised bones of Pleistocene animals.

5.2 Pre-colonial Archaeology

Hottentotskop, on the farm Bird Field, is a large granite kopje which rises to a height of 366 m. It comprises a number of outcrops and there is archaeological evidence, in the form of stone artefact scatters, for pre-colonial settlement in various shelters and on rocky platforms around the kopje (Figure 2 & 3). Recorded sites are listed in *Table 5* at the end of this report.. Areas in and around Turbine 5 were examined to determine the potential impact of the construction of turbines and associated infrastructure on the kopje and its archaeological significance.

Isolated stone artefacts were found in the fields on both Bird Field and Klipheuvel but they were very sparsely distributed and did not constitute a defined archaeological site. They were not considered to be *in situ* and they were recorded as being of low significance.

Plate 1: View of Hottentotskop from the east. There are archaeological sites around the hill.

Plate 2: Site 34 comprising a scatter of stone tools lying on a rocky platform near the kopje.

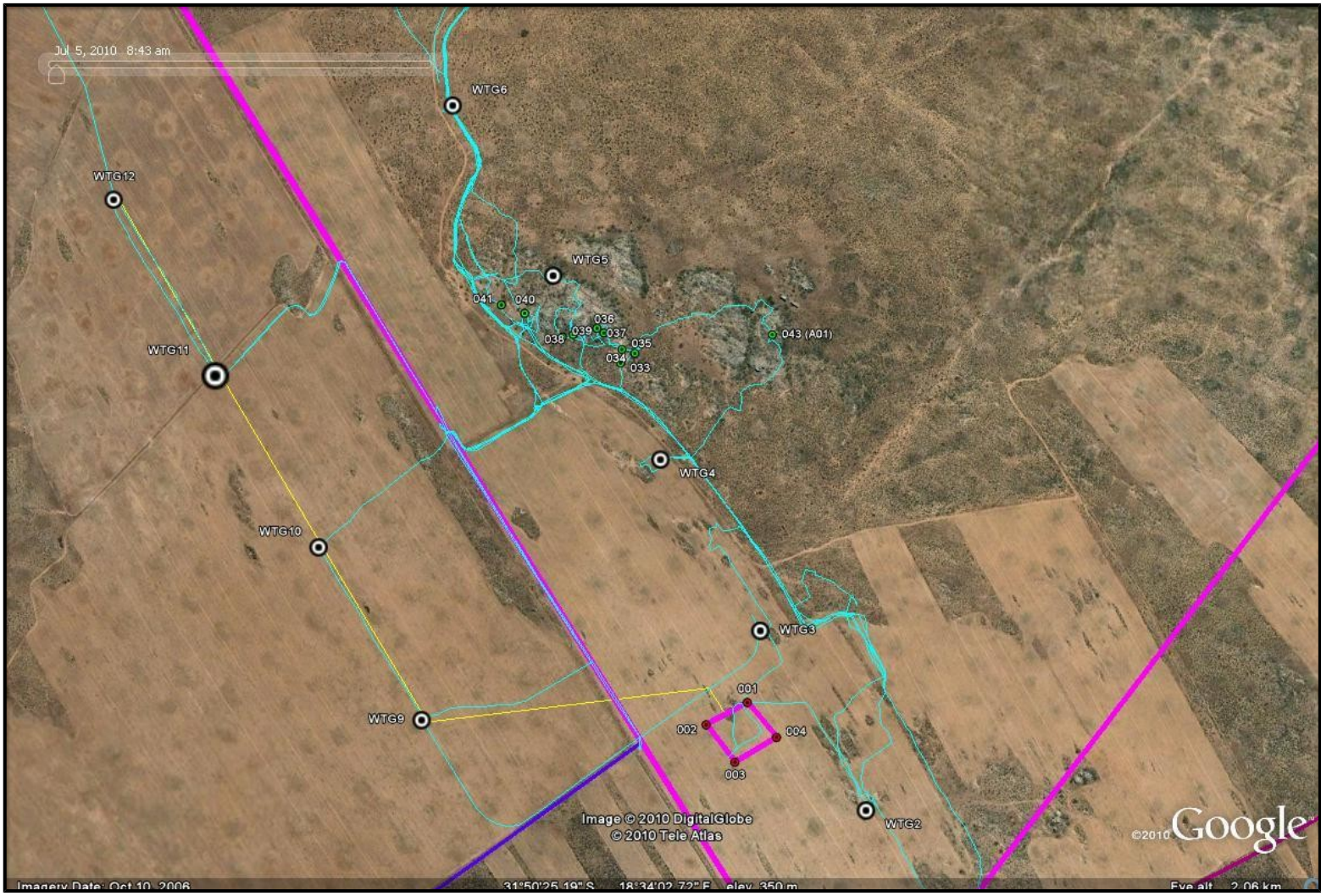
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Figure 2: Map of survey tracks (pale blue) and location of archaeological sites (green icons) situated around Hottentotskop in the middle of the photograph. The proposed location of Turbine (WTG 5) is in close proximity of the kopje and sites.

Plate 3: Site 37 is a small shelter under the beacon with evidence of pre-colonial settlement.

Plate 4: Stone artefacts on coarse-grained silcrete from Site 42; Plate 5: Stone artefacts from Site 34.

5.3 Built Environment

There is a single, recently constructed shed (Liebetrau pers comm.) on Bird Field associated with a fence kraal. It is situated on the farm road and is located to the east of Turbine 6.

The farm Klipheuvel (also known as Rossouwskraal) has a number of farm buildings situated on the farm road in the south-western corner of the farm (Figure 2). There are two recently constructed buildings (Van Zyl pers comm.) as well as an older unfired mud-brick building which is currently being used as a shed (Plates 6 & 7). The mud brick building has a more recent addition (Plate 6). Mr van Zyl indicated that he had considered restoring the building but that it was collapsing and was probably beyond repair. The building probably dates to the 19th century and is protected by the NHRA.

Landscape

The landscape of the farms Bird Field and Klipheuwel consists of rolling hills, covered in cereal crops, rising to the granite kopje of Hottentotskop (Plate 1). The only historic buildings on Klipheuwel are situated 2.5 km to the west of the proposed facility. The cultural landscape, as defined in Section 3.1 above, is considered to be of low significance. The only exception is Hottentotskop which could be considered to represent an archaeological landscape of moderate significance in terms of prehistoric inhabitants.

Plate 8: Short avenue of trees along the Western Access Road.

There is also a short avenue of pine trees (scenic but of no specific heritage value) along the Western Access Road which may be potentially negatively impacted if the road is widened for trucks. This makes the Eastern Access Road preferable.

6. IMPACT IDENTIFICATION AND ASSESSMENT

6.1 Turbines

Any deep excavation has the potential to impact palaeontological material, however it is expected that the trenches and foundations required will not go deep enough to intersect with any major fossil bearing sediments.

Wind Turbines 1-4 are all located to the south of Hottentotskop on the farm Bird Field (Figure 1 & 2). They are found in oats fields. There are a number of sandstone surfaces, covered in indigenous vegetation, located within the oats fields. Isolated stone artefacts will be impacted by the placement of the turbines and underground connecting cables.

- Wind Turbine 1 is located on the edge of an oats field, in an area with shallow bedrock rising to the surface. A single silcrete flake was identified on the turbine location (low significance);

- Wind Turbine 2 is located on a rocky platform with a covering of natural vegetation in an oats field. It is very close to the existing 66 kV power line. There are no artefactual remains around the turbine;

- Wind Turbine 3 is located in an oats field and there are no artefactual remains around the turbine;

- Wind Turbine 4 is located on a rocky platform in an oats field. There is one silcrete MSA flake with retouch and one quartz MSA flake (low significance).

There are no heritage issues relating to the placement of Wind Turbines 1-4. The occasional flaked stone artefact recovered from the oats fields have already been previously impacted by decades of agriculture.

The most significant impact of the turbines and associated infrastructure relates to the position of Wind Turbine 5 which is located in close proximity to Hottentotskop (Figures 2 & 3). A number of Later Stone Age artefacts scatters (Table 1) were found in the vicinity of this turbine. It is anticipated that the construction of the turbine, access road and underground electrical cable will impact negatively on the pre-colonial archaeology of the kopje as well as have a negative visual impact on the archaeological landscape of the kopje.

Wind Turbine 6 is located close to the Bird Field farm road (which is one of the access roads being considered), in indigenous vegetations. Similarly, Turbines 7 & 8 is also in old fields and/or patches of indigenous vegetation. There are no heritage issues with respect to the placement of these turbines.

Turbines 1-8 are positioned in a row crossing Hottentotskop from north to south, with only Turbine 5 located on the kopje itself. Apart from the direct (physical) impact of the turbine on the pre-colonial archaeology of the kopje, the placement of the turbines on the ridge line will have an impact on the archaeological landscape (see 5.3 above).

It is proposed to construct turbines 9 to 12 (four turbines) on the highest point of Klipheuvel, where it adjoins Bird Field (Figure 1 & 2). They are located in old fields and indigenous vegetation on the top of the hill. While a few stone artefacts were found in old ploughed lands (Site 42), these were of very low heritage significance.

6.2 Substation

The proposed location of the substation, in oats fields on Bird Field, will not impact on the pre-colonial or colonial heritage of the farms. There may, however, be a visual impact with respect to motorists travelling along the N7.

6.3 Connecting electrical lines

There are no heritage issues with respect the impact of the proposed construction of underground electrical lines connecting the turbines except for those lines connecting to turbine 5 which is situated on Hottentotskop. There may be isolated stone artefacts in the oats fields, but they have already been impacted by previous agricultural activities.

6.4 Access Roads

Access Road East and Access Road West are alternate public roads (Figure 2). No preference is expressed for either route, they are both acceptable. However, there is a short avenue of pine trees along Access Road West which may be impacted if the road is widened to accommodate larger trucks (Plate 8). The avenue does not appear to be 60 years old, but is nevertheless of interest as a feature on the landscape.

The access roads within the farm boundaries follow the existing farm roads except in a few cases where the sharp bends in the roads may be straightened out to accommodate the larger construction trucks. The access roads will not impact on the heritage of the farms.

Table 2 The potential impact of construction of turbines, substation, access roads and power line on the *palaeontological heritage* of the Study Area

	Without Mitigation	**With Mitigation**
Nature/Type	Negative & Direct	Positive
Extent	Local	On-site
Duration	Permanent	Long-term
Probability/likelihood	Unlikely	Unlikely
Significance	Minor	Minor - moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Mitigation of palaeontological heritage can be achieved by ensuring that trenches and excavations are checked by a palaeontologist. The collection of new scientific information is a positive impact.		
Operational Phase: n/a		
Decommissioning Phase: n/a		
Cumulative impacts: n/a		

Table 3: The potential impact of the construction of the turbines, substation, access roads and power line on the *pre-colonial archaeology* and *built environment* of the Study Area

	Without Mitigation	**With Mitigation**
Nature/Type	Negative & Direct	Neutral
Extent	Local	On-site
Duration	Permanent	Long-term
Probability/likelihood	Definite	Unlikely
Significance	Moderate	Minor
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: Mitigation of the pre-colonial archaeology should involve moving the position of turbine 5 either to the east or west of Hottentotskop to avoid destroying archaeological sites around the kopje. Moving the site to the west will have the additional advantage of shielding the turbine from the N7 highway. No mitigation required for the built environment.		
Operational Phase: Prevent access of workers to the kopje area, as well as old farmhouse, to ensure sites are not vandalized.		
Decommissioning Phase: Prevent access of workers to the kopje area, as well as old farmhouse, to ensure sites are not vandalized.		
Cumulative impacts: Minor		

Table 4: The potential impact of the construction of the turbines, substation, access roads and power line on *buried graves* in the Study Area

	Without Mitigation	**With Mitigation**
Nature/Type	Negative & Direct	Neutral
Extent	Local	On-site
Duration	Permanent	Permanent
Probability/likelihood	Unlikely	Unlikely
Significance	Major	Minor
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	yes	
Mitigation: Heritage Western Cape should be notified immediately if a burial/human remains is uncovered during the construction of the WEF. Work in the area must stop while an archaeologist investigates – mitigation may involve exhumation.		
Operational Phase: None		
Decommissioning Phase: None		
Cumulative impacts: The cumulative impact is not likely to differ from the above.		

Table 4: The potential impact of the construction of the turbines, substation, access roads and power line on the *Cultural Landscape (archaeological landscape)* of the Study Area

	Without Mitigation	**With Mitigation**
Nature/Type	Negative & Direct	Neutral
Extent	Local	On-site
Duration	Permanent	Permanent
Probability/likelihood	Definite	Unlikely
Significance	Moderate	Minor
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Mitigation should take the form of moving the position of turbine 5 off		

Hottentotskop – possibly to the test mast – where it will have less of an impact on the cultural landscape (archaeological) of the kopje. The substation could be built in an architectural style typical of the region
Operational Phase: See above
Decommissioning Phase: None
Cumulative impacts: There are two other facilities planned for within a 75 km radius. There will be a cumulative impact in that the quality of the Namakwaland country side may be affected, however the sites are fairly well spaced and do not lie within the more popular flower season areas. The significance of the cumulative impact is moderate. (Not all the projects under way at present will realise, due to constraints such as economic viability, environmental impacts, grid access limitations etc).

7. CONCLUSION AND RECOMMENDATIONS

Three areas of concern were identified:

- The potential impact of particularly Turbine 5 on Hottentotskop. This is because during a preliminary survey of the kopje, a number of *pre-colonial archaeological sites* were identified.

It is recommended that no turbines should be located on the kopje, but rather situated toward the south and west, in other words closer to the test mast. It is preferable that the turbine should be placed behind (south and west) of the kopje, rather than to the east as the latter means the turbine would be visible to motorists travelling along the N7. The visual impact of the turbine positions is a matter for the Visual Impact Assessment.

- Placing turbine 5 on Hottentotskop would not only have a physical impact on the archaeology of the kopje, but would also have a negative visual impact on the *cultural landscape* represented by the kopje and associated archaeology.

Mitigation may involve moving either the individual turbine (Turbine 5) or possibly the row of turbines (Turbine 1-8) some 100 m to the west of their present location.

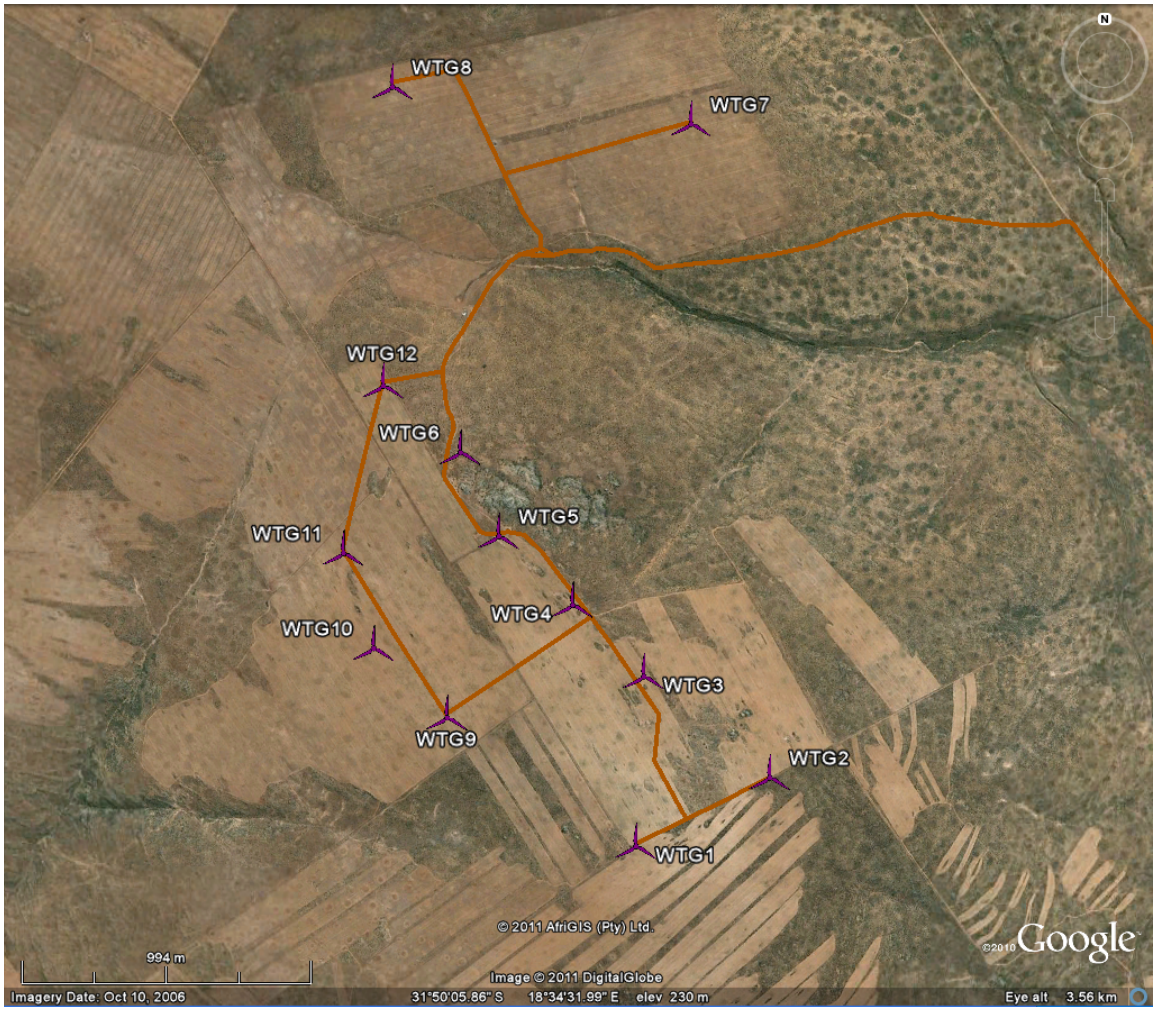
- The Study Area is of low palaeontological significance, however it is recommended that a palaeontologist conduct at least 1 site visit during excavation of foundations for turbines.

In the event that human remains/burials are uncovered during the construction phase, work in the immediate vicinity should cease, and Heritage Western Cape should be notified. They may request an archaeologist to investigate and further mitigation, in the form of exhumation, to take place. The mitigation of human remains requires a permit issued by the SAHRA Burials Unit.

7.1 Revised layout plan

A revised layout plan proposed by G7 in response to the preliminary findings of specialists will effectively eliminate impacts to archaeological material Turbine 5 has been moved from the outcrop known as Hottentotskop where most archaeological material was concentrated resulting in a low impact to heritage.

Figure 3. Revised layout plan with turbine 5 situated off Hottentotskop reduces heritage



impacts.

8. LIST OF DEFINITIONS AND ABBREVIATIONS

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

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

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

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

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

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

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

National Estate: *The collective heritage assets of the Nation.*

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

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.*

Acronyms

BP	Before the Present
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, No 25 of 1999
SAHRA	South African Heritage Resources Agency

9. REFERENCE LIST

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Table 5: List of heritage sites recorded during the survey

Site Number	GPS Co-ordinates	Type	Description	Significance
033	S31.83915 E18.56670	MSA	Small cluster of silcrete flakes on the edge of an open area near the kopje. The stone tools are weathered and are perhaps MSA. Some artefacts are on quartz.	Medium
034	S31.83902 E18.56692	LSA	Some LSA stone tools near the kopje, in front of the boulders and on a rocky platform; there is an abundance of grey silcrete flakes with some blade elements, 1 x adze, some radial cores,	Medium
035	S31.83897 E18.56672	Indeterminate	A swathe of soil covered in stone tools; one quartzite lower grindstone used as a core	Medium
036	S31.83875 E18.56643	LSA	One level up on kopje, rocky platform with stone tools in quartz, chert and silcrete, quartzite. An endscraper in red silcrete. There is a significant amount of material with excavation potential although no organic	High

			remains identified.	
037	S31.83869 E18.56632	LSA and contact	Small south-facing shelter located under the survey beacon. Some of the open gaps in the shelter have been roughly filled with stone walling. There is minimal deposit with a Cobra polish tin, some spoons and also some prehistoric pottery and stone artefacts.	High
038	S31.83877 E18.56596	Indeterminate	Stone tools	Medium
039	S31.83880 E18.56578	Indeterminate	Stone tools	Medium
040	S31.83849 E18.56519	Indeterminate	More stone tools in big swathe of soil next to distinctly shaped standing rock.	Medium
041	S31.83837 E18.56483	Indeterminate	More ephemeral scatter of stone tools	Low
042	S31.83408 E18.55734	MSA	Ephemeral stone scatter in ploughed lands on road alignment	Low
043	S31.855832 E18.543732	Historic	Collapsing unfired mud-brick building, possibly 19th century.	Low
043 (A01)	S31.83875 E18.56911	LSA?	Spread of small, grey chert flakes and cores located in a sheltered area between rocks.	Medium