Environmental Impact Assessment for the Establishment of the Wolseley Wind Farm, Western Cape Province

Heritage Impact Report (Draft)

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DECLARATION OF INDEPENDENCE

We, Lita Webley & David Halkett as duly authorised representative of ACO Associates cc, hereby confirm our independence (as well as that of ACO Associates cc) as the heritage specialist for the Wolseley Wind Farm and declare that neither we nor ACO Associates cc have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Arcus GIBB was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act) for the Wolseley Wind Farm. We further declare that we are confident in the results of the studies undertaken and conclusions drawn as a result of it. We have disclosed, to the environmental assessment practitioner, in writing, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act. We have further provided the environmental assessment practitioner with written access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not. We are fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 and any other specific and relevant legislation (national and provincial), policies, guidelines and best practice.

Signature: ______________________________

Full Name: Lita Webley & David Halkett
Title / Position: Principle Investigators: Heritage Impact Assessments
Qualification(s): PhD (Archaeology) & MA (Archaeology)
Experience (years/ months): 16 Years & 23 Years
Registration(s): Association of Southern African Professional Archaeologists
EXECUTIVE SUMMARY

ACO Associates cc was appointed by Arcus Gibb (Pty) Ltd, on behalf of the Applicant SAGIT, to undertake a Heritage Impact Assessment of the proposed Wolseley Wind Energy facility. The proposed facility comprising 20 - 35 turbines and associated infrastructure will be located on an area of approximately 1 961ha situated to the south of Wolseley and to the east of the R43 in the Worcester Magisterial District, Western Cape Province. The generated electricity will be fed directly into the existing sub-station on site.

Notice of Intent to Develop (NID) was submitted to Heritage Western Cape in February 2011, and the following Interim Comment received in July 2011: "An HIA is required consisting of an Archaeological study; Palaeontological study, Visual Study with an integrated set of recommendations".

This HIA integrates the findings of the Archaeological (Webley & Halkett), Palaeontological (Almond) and Visual (Cave Klapwijk and Associates cc) specialist studies which are appended at the end of this report (Appendices 1, 2 & 3). It also takes cognizance of the Built Environment where this is appropriate.

The closest registered Conservation Body to the proposed development is the Tulbagh Heritage Foundation which is only concerned with the heritage issues in Tulbagh.

Palaeontology (by John Almond)

- A letter of exemption from further palaeontological studies has been issued by Dr John Almond. It describes the Precambrian bedrocks of the Malmesbury Group as being highly deformed so that original fossil assemblages have been destroyed. The superficial sediments present at or near the surface are generally of low palaeontological sensitivity.

Archaeology (by Lita Webley & David Halkett)

The AIA was conducted by Webley & Halkett and the following conclusions made:

- Ephemeral scatters of Early Stone Age material were recorded in the area. They are of low significance and no mitigation is proposed;
- A few stone cairns were identified but are unlikely to represent graves. If unmarked graves are uncovered during construction, work should stop in the area and Heritage Western Cape must be notified. They will instruct on the procedures to be followed.

Provincial Heritage Sites

- The Provincial Heritage Site of Bain’s Kloof Pass is located some 3km to the south-west of the proposed wind energy facility;

Built Environment and Cemeteries

- There are two Boer War blockhouses on either side of the railway line, on the approach to Wolseley. They have a potential Grade 3A grading but are located some 2.5km north-west of the proposed facility. The turbines will not be visible as the blockhouses are surrounded by trees;
- The historic farmstead of Waboomsrivier, which is listed in Fransen (2004), with a potential Grade 3A grading, is located 2.5km to the south-east of the closest turbine and is outside the study area;
- A cemetery was recorded on the farm Romansrivier 320 in the study area. Although it is of high significance, it will not be impacted by the proposed wind farm and no mitigation is required;
- There are minimal Built Environment issues in the study area. There are some buildings older than 60 years at de Liefde and Romansrivier. They are not threatened by the proposed development and a buffer of 400m has been proposed around all farm buildings.
Visual Impact (by Cave Klapwijk Associates cc)

The VIA was conducted by Cave Klapwijk Associates and the following conclusions made:

Cave Klapwijk and Associates cc were appointed by Arcus GIBB (Pty) Ltd (GIBB) to prepare a Visual Impact Assessment report for the proposed Wind Energy Farm (WEF) on farm properties in the Wolseley District of the Western Cape.

The purpose of this Specialist Study is to determine the impact of the proposed wind energy farm and associated infrastructure, known as the Wolseley wind farm, on the visual and aesthetic character of the area. The rationale for this study is that the construction of the wind turbines may fundamentally alter the landscape character and sense of place of the local environment.

The objective of this specialist study is therefore to identify the magnitude and significance of the potential visual impact of the proposed wind farm on the character and sense of place of the site and the surrounding area.

This includes the following:

- The description of the visual character of the site and surrounding area by evaluating components such as topography and current land use activities. This will record the status quo of the visual environment;
- The identification of elements of particular visual quality that could be affected by the proposed project;
- The description of the visual intrusion of the proposed project from identified critical areas and view fields;
- The determination of the extent of visibility of the project from surrounding areas as well as the night time effect caused by the lighting of the site; and
- The assessment of the shadow flicker from the blades on homesteads in the vicinity of the turbines.

The WEF includes the wind turbines and other ancillary structures and temporary construction/laydown areas.

These are:

(a) Wind energy farm

The proposed wind energy farm will have a generating capacity of 45 – 110 MW and will comprise of 30 wind turbines, each of which will have between 2.5 – 3.6 MW generating capacity. The placement of these is determined by the wind speed over the site (this has been measured). The hub height will be approximately 90m and the blade length will be between 40-60m.

The turbine positions have been guided by the wind profile of the site and preliminary assessments by specialists in the scoping phase. The final positions of the turbines have been informed by the findings of the Environmental Impact Assessment (EIA) study and public comment received, as well as the recommended impact mitigation measures included in the specialists reports.

(b) Access and Service Roads

New roads will be required to provide access for vehicles to deliver, erect and maintain each wind turbine.
(c) Underground cables and Sub-stations

The turbines will be connected by underground power cables that will generally follow existing and new access roads to the expanded section of the existing Eskom Substation on the northern site boundary.

(d) Temporary Construction Laydown Area and Construction Camp

A temporary area used during the construction phase of the project will accommodate vehicles, machinery, equipment and facilities such as diesel storage, ablution and dining facilities. In addition each turbine will require a laydown area of 1 ha around its location to accommodate the cranes, components and assembly area.

(e) Wind energy farm control room

A monitoring control room would be sited away from the site in an area still to be determined.

(f) Staff accommodation

There will be no staff accommodation on the site. Staff will be housed in nearby towns.

RELEVANT LEGISLATION AND POLICY

The key legislation (national, provincial and local) and policy relevant to the specialist study are the South African Heritage Resources 1999 (Act 25 of 1999) (HRA).

The NHRA considers the visual attributes of scenic parts of the country as being an integral part of the heritage resources and therefore has relevance to the visual impact assessment study. While there are no specific clauses and permits that relate to visual aspects these are taken to be part of the Heritage Assessment that is required for projects of a certain scale.

The Department of Environmental Affairs and Development Planning (DEA&DP) commissioned documents that give guidance on the selection of sites for wind energy farms and the visual assessments required for Environmental Impact Assessments. These include:

- CNdV Africa Planning and Design and Provincial Government of the Western Cape, (2006) Strategic Initiative to Introduce Commercial Land Based Wind Energy Development in the Western Cape. Towards a Regional Methodology for Wind Energy Site Selection.

OBERHOLZER, B, and CSIR (2005) Guideline for involving visual and aesthetic specialists in EIA processes. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning

THE SITE IN CONTEXT

The preferred location for the wind turbine site was determined during the scoping phase and considered the following in addition to the existing constraints of slope, transmission lines, nature reserves and wetlands/drainage lines:

- The site would be east of the R43 due to the mountain backdrop that is higher and further away. The wind turbines would be less likely to break the horizon in views from the road.
- The distance from the R43 of the turbines should be a minimum distance of 500m from the road. This would reduce the visual scale in views from the road corridor.
- The position of turbines should be on the flatter land of the broad valley bottom with a limit to the extent of their placement up the foot slopes of the mountain.
- The established wind breaks for the ‘patchwork’ agricultural landscape assist in screening or obscuring views eastward of turbines from the R43, due to the gently eastward sloping valley floor.
- There is a limited number of residential units in the broad valley with the exception of the new residential estate De Vierde Liefde which is located within a narrow valley orientated...
approximately east-west, at the foot of the Waaihoekberge. This location will limit views over the nearby turbines. The residences lower down the valley will have no or limited view of the turbines while those at the upper end will have wider views but at a greater distance. Most existing houses face north to make full use of the solar radiation.

- There are other land uses along the R43 section of the site that include large areas of shade netting over orchards, chicken farm batteries and a prison all of which add to the visual complexity and diversity of the setting.

THE VISUAL ASSESSMENT METHOD

The visual assessment method includes the following:

- The definition of the visual characteristics of the project;
- The definition and analysis of the visual environment using topography and view shed analysis and the ability of the landscape to accept the scale and density of the wind turbines;
- The determination of the visual impacts on characteristics of the setting using defined criteria to arrive at the significance of the impact;
- The production of a visual simulation of the wind energy farm on photos from a viewpoint in the landscape; and
- The development of mitigation measures for the project to reduce the visual intrusion of the wind turbines in the landscape.

The affected environment is described. This includes the physical, the biophysical and the social attributes of the local setting and comment is made on the visual and other implications of the construction and operation stages of the project. The attributes that are described are: geology and soils, topography, vegetation, hydrology, climate, land use and the visual characteristics.

The visual quality included aspects of: Landscape Character, Visual Quality, the Visibility of the site and the Sense of Place. The latter is described as places that have a strong identity and character that is felt by local inhabitants and visitors. A sense of place is a social phenomenon that exists independently of any individual's perception yet is dependent on human engagement for its existence. Such a feeling is derived from the natural environment but is often made up of a mix of natural and cultural features in the landscape and generally includes the people who occupy the space. (adapted from Wikipedia)

IMPACT IDENTIFICATION AND ASSESSMENT

Impact Identification and Assessment was done according to the method specified for the construction and operation phases of the project. The decommission phase was included even although the activities are similar to the construction phase but in reverse order. The result on completion is different because of the removal of the large elements in the landscape setting.

The visual impacts of the proposed wind farm are divided into two categories namely those associated with the construction phase which is activity based and those associated with the operation of the wind turbines which is presence based.

The former is a primary impact of short duration and easily mitigated after this phase is complete and includes aspects such as road and area clearing for access and construction activities, trenching for underground cables and excavation for tower foundations.

The latter is a secondary impact (other impacts that are related to its presence or function) of long duration and which is not easily mitigated.

The two elements of the project that were assessed are the Wind Turbines and the On Site Substation.
The identified visual impacts will be experienced mainly by two types of receptors: The person in the nearby homestead and the motorist/tourist in the area. Each will have a different exposure time to the visual impact of the wind energy towers in the landscape.

The visual intrusion that will be experienced by the two receivers is of long duration by the inhabitants of the homesteads and of short duration by motorists/tourists. The former will always have a particular view intruded upon by one or many wind turbine towers and the latter, who move through the landscape, will have limited view exposure times of the wind turbine towers.

The visual intrusion will most likely be more intensely experienced by the motorist because more towers will be seen at different distances from the road.

The **Construction stage** activities that cause visual change are the following activities:

**Activity 1**: Clearance of vegetation for new roads, lay down areas and related dust generation, construction of foundations and platforms for the wind turbines, the excavation of trenches for cables, construction of local substation and erection of wind turbines. Visual clutter associated with construction related facilities such as temporary site or construction camps.

**Activity 2**: Erection of the onsite substation and related new or upgraded access roads and construction camp.

The identified visual impact for each activity is described and assessed in terms of the affect and change of the visual intrusion on views, the alteration of the visual quality, visual character and sense of place.

For the **Operational stage** the same process was followed but the visual impacts identified include the following activities:

**Activity 1**: The presence of the wind turbines towers which will result in local visual change in the landscape.

**Activity 2**: The rotation of the blades which will result in local shadow flicker on the ground or on nearby structures and trees.

**Activity 3**: The presence of the onsite electrical substation which will result in local visual change.

**Activity 4**: The presence of the red lights on the Nacelle that will result in a change in the night time view of the WEF site.

**ALTERNATIVES**

Two alternatives were considered namely alternative sites and the ‘No Go’ or ‘Do Nothing’ scenario. There are no alternative sites for the wind energy farm at this time in the project’s development. The site was chosen from a number of alternatives during the feasibility stage. Certain criteria were used, amongst them wind speed and wind frequency. Data from onsite measurements provided the confirmation that the site for this study was feasible and reasonable.

For the ‘Do Nothing’ option the assumption is that agricultural practices will continue as will be the case with the wind turbines in place but the access roads and substation extension will not be present in the landscape.

The significance of this option is that the status quo prevails and the scenic integrity of the area is retained. This is considered to be of Medium visual significance in the context of the setting and visual exposure that the site experiences because of its location relative to the R43 an acknowledged scenic route from Cape town to Wolseley, Tulbagh and Ceres.
DE VIERDE LIEFDE ESTATE

The View from the De Vierde Liefde residential estate.

This residential estate is located on either side of a drainage line in the foot slope of the Waaihoekberge. The stream lies in a shallow valley that is orientated East-North-East – West-North-West and enters the main valley through a ‘nek’ between the hill Kanonkop and the foot slope of the Waaihoekberge. Refer to Figure 5 Locality Plan De Vierde Liefde.

Most of the erven are accessed from the ‘spine’ road that runs approximately west to east up the small valley. This provides most erven the opportunity to orientate the houses’ living and bedrooms northwards to take advantage of the solar radiation which is an important consideration in the winter months. If this principle is followed the houses will look onto the Waaihoekberg’s side slope. However houses that are high up the slope of the small valley have changed the orientation of the entertainment area to have the view westwards to the main valley. This view is only available to the higher lying erven which are the eastern most erven. From this vantage area the proposed wind turbines will be seen in the valley in the gap between Kanonkop and the foot slope of the Waaihoekberge to the north. Views to the SW of turbines that are South of the transmission line will also be possible from some of the higher erven. Refer to figure 13 Photo point F view west from top erven of De Vierde Liefde.

The erven/houses lower down the valley westwards will not see the valley because their view is obscured by Kanonkop Hill and the intervening landform that raises the line of sight over the valley from that point A. Refer to figure 12 Photo point G view west from lower erven of De Vierde Liefde.

BAINSKLOOF PASS

The view from the Bainskloof Pass, a Heritage Site, of the wind turbine site in the valley is not possible while in the pass. The view of turbines will be visible on exiting the Pass in the vicinity of the Calabash Restaurant. The first possible view of the turbines is obscured by tall trees (approx.30m) that are located across the line of sight at the end of the valley where the Pass exits. The distance from this point to the nearest turbine is approximately 3.3km. Only once the motorist is at or north of the Calabash Restaurant will the turbines be visible above the Bergsig Cellar.

The view from the exit of the Bainskloof pass is not considered to be significant in terms of view intrusion from the exit due to the initial view obstruction and the distance.

MITIGATION

The nature of the wind energy farm is that the turbines are as tall as practical and are located where the wind flow is not turbulent. This is on the higher or prominent landforms or in valleys where the wind is funnelled by adjacent mountains as is the case for the Wolseley wind energy farm. The turbines will therefore be highly visible and intrusive in a landscape. This situation does not lend itself to any meaningful reduction in the visual impact on the surrounding area. This can only be achieved by reducing the density of the turbines and their height. Technical studies indicate that the larger the turbine the more efficient and the spacing between turbines is considered to be not closer than 500m but this depends on the size. 90m towers with 60m blade length will comply with this distance.

Construction stage

(g) Access roads

All the access roads to each wind turbine site, the temporary site camp and the permanent on site substation should be aligned along existing roads and in a pattern that fits the field configuration. The reason is to reduce rapid surface water runoff which will likely cause erosion but importantly to conform to the visual pattern of the fields.

The limitation of dust generation is to be controlled preferably by using a dust binding emulsion that is sprayed over the entire road surface. An alternative is to spray the road surface with water at time
intervals to ensure that dust does not become a visual intrusion, health hazard or crop growth retardant.

All access roads will be planned and no ad hoc or temporary short cuts will be permitted to be developed without approval of the Engineer’s Representative (ER).

(h) Laydown areas at turbine tower base

Where ever possible this 1 ha area (100m x 100m) where there is existing vegetation should not be cleared of vegetation but rather have it cut or rolled flat. The purpose is to limit dust and erosion.

Where the area has to be cleared for landform modification the surface must be stabilised by either a dust fixing emulsion or by water sprayed over the area regularly to ensure that dust is not generated by the activity in the area. Alternatively gravel could be used but would need to be removed afterwards.

(i) Site offices and stores area

The site must be selected to ensure that this will not be highly visible from main roads (R43) or nearby homesteads or residential estates. The perimeter shall be fenced with robust material and be at least 2m high. To reduce the visibility of the internal clutter the fence should be clad with a neutral coloured shade cloth or similar. The length of the fence that is covered will be determined by the position of the most sensitive receptor, for instance a road or homestead.

(j) Concrete batching plant

The site should be selected to ensure that it is not highly visible from surrounding main roads for nearby homesteads.

Screen fencing with shade cloth should surround the edges that are most visible to the homesteads and main roads.

Dust should be prevented by the use of emulsion sprayed on the ground or by regular spraying of water over the soil surface.

Operation stage

(k) Wind turbine location

Specific

All wind turbines should be located at least 500m from the R43 road reserve edge. The required mitigation has already been built into the proposed layout by applying this guideline buffer.

Relative to homesteads

The position of a wind turbine should ideally not be closer than 400m from the homestead and and preferably in an arc from East-South-East to West-South-West. The reason for this is to eliminate the nuisance of flicker at certain times of the day and year due to the low sun angle.

(l) Onsite Substation

The scale, form and style and colour of the components of the structure should be compatible with existing Eskom Substation.
(m) Colour of the wind turbine

While the standard colour of the wind turbine tower is off white the visual scale can be reduced slightly by the lower 6 metres being painted in equally spaced vertical stripes in four tints of green while leaving the original turbine colour as strips in between. The colour sequence is repeated around the tower. This striped colour variation will visually reduce the vertical scale of the turbines in view. It is noted however that the CAA’s marking requirements for structures outside of aerodromes (CATs 139.01.33) states that all turbines should be painted bright white. The use of different colours will have to be confirmed possible with them.

(n) Wind turbine density

The density of wind turbines in the landscape will determine the intensity of visual intrusion. The spacing of the towers was determined from observation of the scale of existing transmission line towers in the similar scenic conditions. The distance was arrived at by scaling the tower in the landscape and by referring to the guidelines for country road buffers, the distance that was considered reasonable was 500m that would also apply to homesteads. In discussion the noise impact assessment recommended 400m as a buffer. It was agreed upon that this distance would also apply to the distance from homestead.

(o) Wind turbine height

The wind turbine height is directly proportional to the visibility in the landscape. However size is related to efficiency and the technical assessment selected the 100m tower which would also reduce the density of towers in the landscape.

CONCLUSION

The Site

The site analysis considered the suitable areas for turbine location and reviewed this in the context of the 2006 Strategic Assessment by the Provincial Government of the Western Cape (DEA&DP). The buffers recommended in this document were applied to the site with the result that limited suitable areas remained for wind turbine location. However the location of the turbines, that was informed by on site constraints, natural and imposed by motivated buffers, that were discussed and agreed with team members and the Applicant, was assessed. Some constraints /buffers originated from the Strategic Assessment.

The site area is visually contained by the mountains and the agricultural character and sense of place are mainly derived from the pattern of vineyards, orchards and the mountains. However visual change is occurring within the valley evidenced by the practice of shade cloth protection over orchards, chicken farm batteries and a residential estate in a hanging valley of the Waaihoekberge.

The site’s low position provides views toward the mountains on both sides and along the valley that contains the landscape and adds to the enclosed sense of place. The views eastward to the site from the R43 are interrupted by wind breaks between which views across the valley to the Waaihoekberge are experienced by the motorists, thereby affording many the pleasure of the scenic landscape.

Visual Impacts

With regard to the assessment of the visual impacts the construction and the decommissioning phases are primary impacts, of short duration and are easily mitigated and therefore have a low significance visual impact.

However it is the operational phase (a long term secondary impact) that will have the high visual impacts on visual quality, landscape character of the setting and sense of place of the area due to the tall wind turbines.
While the turbines do not block the view they add a vertical element to the scene that still allows distant vistas to be appreciated.

The high visual intrusion zones of views are recognised to be within 500m of roads, homesteads and sensitive land uses. This buffer has been used along the R43 and is in accord with that used in the Strategic Assessment Guideline for local roads. The positions of wind turbines reflect this spacing as shown on the Analysis map Figure 3a.

The finding is that the medium density and tall scale of the wind turbine towers in the landscape will have a high impact on the views from within and towards the site. The assessment method used shows the significance of the visual impact as medium (refer to the Visual Impact Assessment Criteria) which means that according to the assessment criteria the visual aspect and the mitigation measures will require consideration in the decision making.

Shadow Flicker

The aspect of shadow flicker caused by the rotating blade’s shadow over ground, structures and trees was researched (Wind Turbine Shadow Flicker Study. Dept. of Energy and Climate Change, UK 2011) and the conclusion is that it has no risk to health but that where problems exist these can be mitigated by shut down of the turbine for certain periods. This phenomena is considered to be of low impact and low significance by correct positioning relative to homesteads, as a mitigation measure.

The Night scene

The night scene will be altered by the double red lights on the top of the turbine housing (Nacelle). This is not considered a high visual impact although the area of the site will be more visible from further at night as a result of the glowing lights. On cloudy or moonless nights the towers will not or hardly be visible and therefore the significance is rated as low. The red lights will have similar intensity as those on tall masts or telecom towers.

This visual intrusion or impact will not alter the night scene significantly but the matter will require consideration in decision making.

De Vierde Liefde

The residential estate De Vierde Liefde is orientated east / west and therefore will not have their main view as westward across the valley where the turbines are located. The lower erven (most erven are vacant) on the western side are closest to wind turbines 21 and 10 , which, are approximately 1.8km and 1.5km distant. Turbine 21 will not be seen because the landform and the vegetation will screen this view while Turbine 10 on the higher level to the north will be partially visible from properties on the southern edge of the estate due to the local ridge line that visually screens the lower portion of the tower. However the erven higher up the valley to the east and south will have distant views of the wind turbines in the valley and of the turbine 10 to the north west , at a distance of approximately 2.4km. This level of visual intrusion in views is not considered to be significant.

Bainskloof Pass

The view from the Bainskloof Pass, a Heritage Site, of the wind turbine site is not possible while in the pass. The turbines will be visible on exiting the Pass in the vicinity of the Calabash Restaurant. The first possible view of the turbines is obscured by tall trees ( approx.30m) that are located across the line of sight at the end of the valley where the Pass exits. The distance from this point to the nearest turbine is approximately 3.3km. Only once the motorist is at or north of the Calabash Restaurant will the turbines be visible above the Bergsig Cellar. The view from the exit of the Bainskloof Pass is not considered to be significant in terms of view intrusion from the exit due to the initial view obstruction and the distance from the nearest turbines.
Mitigation Proposals

The medium density of wind turbines with an approximate spacing of 500m does reduce the visual intrusion in views toward and within the site.

The mitigation of the visual impact of such tall animated structures in a scenic setting is confined to cosmetic methods, micro siting and the reduction of the height and density of the towers. The reduction of the visual scale can be achieved at close range, 100 to 300m by painting vertical broad stripes of 4 shades of green with the off white or grey of the tower between each stripe. This to be done to a height of 6 metres and will visually fuse the base with the landscape. It is noted however that the CAA’s marking requirements for structures outside of aerodromes (CATs 139.01.33) states that all turbines should be painted bright white. The use of different colours will have to be confirmed possible with them.

The recommendation to relieve the visual impact of scale in views of the site from the R43 is that the minimum distance from the road reserve edge is to be 500m.

The layout of the turbines on the site has responded to the visual aspects identified in the ‘implications for the project’ comment and the constraints shown on the Analysis Plan. Mitigation measures have therefore been incorporated by the micro siting of the towers. The remainder of the mitigation will relate to the construction and decommissioning phases. This will have to do with dust suppression, surface water management to reduce erosion and siltation of drainage lines and the stripping and stockpiling of topsoil for the rehabilitation of road edges and temporary laydown and working. The selection of existing roads for access routes and cable trenches will limit the physical change to the land and detail planning with this in mind must be promoted and implemented.

Conclusion

In conclusion while the wind turbines have high visual intrusion in views from roads and homesteads the significance of this impact is medium with mitigation in place. In addition the monitoring of the implementation of the mitigation measures is most important as the attention to detail will significantly reduce visual impact of the construction phase and later of the decommissioning phase. The medium significance rating requires that the visual aspects must be considered in the decision process because of the scenic nature of the setting, the landscape character and the sense of place.
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Figure 2: The proposed location of the wind energy facility, showing the location of the turbines and associated infrastructure.

Figure 3: The farmsteads described in the text. Note the location of the historic Waboomsrivier farmstead to the south of the study area.

APPENDICES

Appendix 1: Palaeontological Assessment for the proposed Wolseley Wind Energy Facility near Wolseley, Tulbagh & Worcester Magisterial Districts, Western Cape by John Almond.

Appendix 2: Pre-colonial and Historical Archaeology for the Wolseley Wind Farm by Lita Webley & David Halkett.

Appendix 3: Visual Impact Assessment for the establishment of the Wolseley Wind Farm by Alan Cave & Reuben Heydenrych.

ABBREVIATIONS

DEA&DP  Department of Environmental Affairs and Development Planning
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

GLOSSARY

Archaeology: Remains resulting from human activities 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.

**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 20 000-300 000 years ago associated with early modern humans.

**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.

**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.
Details of specialist and expertise

Dr Lita Webley has a Masters Degree in Archaeology from the University of Stellenbosch and PhD in Archaeology from the University of Cape Town. She has lectured in archaeology at a number of universities and has worked in museums for 17 years. Her research interests are concerned with the archaeology of Khoekhoen groups in the Northern Cape. She is an archaeologist with 15 years of working experience in heritage consultancy. She is accredited with Principal Investigator status with the Association of Professional Archaeologists of Southern Africa.

Mr David Halkett has a Masters degree in Archaeology from the University of Cape Town. He is a founder member of the Archaeology Contracts Office and a Director of ACO Associates cc. He has 22 years of working experience in heritage throughout southern Africa. His research interests are concerned with the archaeology of hunter-gatherer groups in the Western Cape. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and a member of IACOM. He is accredited with Principal Investigator status with the Association of Professional Archaeologists of Southern Africa.

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany. For eight years he was a scientific officer (palaeontologist) for the Geological Survey in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company Natura Viva cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA.

Alan Cave of Cave Klapwijk Associates cc holds a BSc in Mining Engineering, a MPhil in Landscape Design and has 38 years experience in the field of landscape planning, design and environmental impact assessment. He is a member of the Certification Board of the profession of Impact Assessors, a member of IAIAasa, a Fellow of the Institute of Landscape Architects and a Pr LA with the South African Council for the Landscape Architectural Profession SACLAP. His experience in the gold mining field in SA and abroad (5years) reinforces his input of his chosen field of specialisation in environmental planning, assessment and landscape design. His pioneering work in Visual Impact Assessment in RSA has assisted in the understanding of this aspect as a tool for planning and design. He has gained experience in large scale internationally funded projects by acting as project leader for the environmental impact assessment for the new Letsibogo Dam in Botswana and the new N3 Toll Road in South Africa. Donors for the former included Sweden, Denmark, the UK and the EU while the latter included the African Development Bank. Both of the reports received favourable reviews.

He has experience in large and small project visual analysis and impact assessment. Recent examples include Nuclear 1 three sites for future nuclear power stations, the Pebble Bed Modular Reactor and the .Perseus -.Hydra 400kv line Dealesville to De Aar (approximately 300km).
2 INTRODUCTION

2.1 Background

ACO Associates cc was requested by Arcus Gibb (Pty) Ltd, on behalf of the Applicant, South African General Investment and Trust (SAGIT), to undertake a Heritage Impact Assessment to assess the impacts to heritage of a proposed wind farm consisting of approximately 20 - 35 wind turbines and associated infrastructure spread across a number of farms in the Breede River Valley. The proposed facility will be located on an area of approximately 1 961ha situated to the south of Wolseley and to the east of the R43 in the Worcester Magisterial District (Figure 1).

A pre-feasibility study was conducted in January 2011 (Webley & Halkett 2011) and a Notice of Intent to Develop was submitted to Heritage Western Cape (HWC) in February 2011. HWC issued an Interim Comment in July 2011, requesting:

“An HIA is required consisting of an Archaeological study; Palaeontological study, Visual Study with an integrated set of recommendations”.

The following farms form part of the proposed wind farm (Figure 1):
- The RE of Romansrivier 320
- Portion 22 of Romansrivier 320
- Portions 5 and RE of De Liefde 334
- Portion 6 of De Liefde 323 and Portion 7 of Koppies 323
- Portions 64 and 72 of Kleineberg 208
- The RE of Vaalvlei 324 and the RE of Vaalvlei 355

Figure 1: The boundaries of the farms discussed in the text (1:50 000 map sheets 3319AC and 3319CA). Map supplied by the Applicant.
2.2 Project Description

The project is expected to generate approximately 50 – 110MW and will comprise:

- Between 20 and 35 wind turbines with permanent red marker lights;
- The hub height of the turbines will be 90 - 100m and the turbine blade lengths will be approximately 50 – 60m;
- Internal access roads of 6m in width from the N1/R43 to the site and turbines;
- Underground cabling between the turbines and to the substation at Romansrivier;
- A control room;
- A temporary camp and lay down areas around each turbine;
- The existing substation of Romansrivier will be used;
- Overhead transmission lines will not be required.

The final placement of the turbines will be confirmed through wind modelling and refined during the micro-siting process.

Figure 2: The proposed layout of the wind turbines. Map supplied by the Applicant.

The “Do-Nothing” alternative comprises the option of not establishing the wind energy facility on the farms. The turbines and associated infrastructure will not be constructed and farming activities will continue.

However, the “do-nothing’ alternative is not considered to be the preferred alternative.
2.3 Legislative and Policy Context

The basis for all heritage impact assessments (HIA) is the National Heritage Resources Act 25 of 1999 (NHRA), which in turn prescribes the manner in which heritage is assessed and managed. In the case of Environmental Impact Assessments (EIA) in the Western Cape, the guidelines published by the Provincial Department of Environment Affairs and Development Planning (DEA&DP) are directly based on the provisions of the NHRA.

The NHRA 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 NHRA 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; and
- Graves and grave yards.

The Interim Comment of Heritage Western Cape (HWC) on the Notice of Intent to Develop (NID) the Wolseley Wind Farm (14-07-2011) called for:

"An HIA is required consisting of an Archaeological study, Palaeontological Study; Visual Study with an integrated set of recommendations".
Interim Comment

Heritage Western Cape hereby notifies:

Mich Nieuwoudt
Po Box 4441
CLAREMONT
7735

of its Comments and Recommendations in terms of

Section 31(2) of the National Heritage Resources Act, 1999 (Act 25 of 1999)

For: Proposed Wind Farm

At: Rombousier 306; De Liefde 334; Renn of Ptn 6 of De Liefde 323; Ptn 6 of Kleineberg 208, Vaalrivier 324; Ptn 21 of Tevrede and Ptn 18 of Kleineberg 208, Breede River Valley, Wolseley.

INTERIM COMMENT:

An HIA is required consisting of an Archaeological study; Paleontological study; Visual study with an integrated set of recommendations.

Please feel free to contact this office for any other information.

Andrew Hall
Chief Executive Officer/Director
Heritage Western Cape
2.3.1 Cultural Landscape

Section 3(3) of the NHRA 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.

2.3.2 Scenic Routes

While not specifically mentioned in the NHRA, 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 comment that the visual intrusion of development on a scenic route should be considered a heritage issue.

2.3.3 Heritage Grading or Sensitivity Analysis

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

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

Any developments which may potentially impact on a Provincial Heritage site (PHS), a site of Grade 2 significance, must be submitted to the South African Heritage Resources Agency (SAHRA) – Western Cape, for comment. In this case, the only PHS in proximity to the proposed wind energy facility is Bain’s Kloof Pass.

2.3.4 Wind Energy Guidelines

Wind energy facilities which require vast amounts of landscape pose significant impacts in terms of loss of iconic vistas, and landscape character change, especially in the Western Cape Province where the identity of the region is strongly linked to its spectacular landscape character.

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” is the only locally available policy guideline with respect to wind farms by CNDV\(^5\). The study looked at landscape character rather than at the “cultural landscape” or “heritage” but concluded that wind energy facilities can have a profound impact on the landscape in terms of quality of place. In general terms it recommends a buffer of at least 500 m between a wind turbine and heritage sites, although the latter are not defined.

Neither SAHRA nor HWC have developed policies with respect to heritage and renewable energy.

Recent environmental authorisations issued by the DEA&DP with respect to Wind Energy Facilities in the Western Cape Province indicate that the Department is likely to implement the following recommendations with respect to heritage:

- 2km buffer around the Provincial Heritage Sites (Grade 2 sites) such as Bainkloof Pass;
- 2km buffer along roads which have high scenic value.

2.3.5 Permit requirements

A permit, issued by Heritage Western Cape, will be required if:

- Any houses or structures such as barns, kraals, etc. older than 60 years are intended to be altered or demolished (Section 34 (1) of the NHRA);
- Any archaeological or palaeontological sites are to be mitigated by excavation or destroyed during construction (Section 35 (4) of the NHRA).

Human remains from the colonial period are considered a national issue in terms of the NHRA. Section 36 of the Act and the regulations attached thereto are implemented by the SAHRA Burials Unit in Pretoria. They are the permitting authority and are responsible for the issuing of exhumation/grave relocation permits. Control with respect to pre-colonial human remains is devolved to the PHRA (HWC) and they oversee the process of either conservation in situ or exhumation.
2.3.6 Consultation with Registered Conservation Bodies

In terms of NHRA, registered conservation bodies need to be consulted during the EIA process. The closest registered Conservation Body to the proposed development is the Tulbagh Heritage Foundation which is only concerned with the heritage issues in the streets of Tulbagh.

2.4 Scope and limitations

This report integrates the results of the archaeology, palaeontology and visual assessments as requested in the Interim Comment issued by Heritage Western Cape (July 2011).

- It includes a description of the affected environment – obtained from the Visual Impact Assessment and from various site visits;
- It provides a description of the heritage (palaeontology, archaeology and visual) background of the area;
- It provides an assessment of potential of the proposed development to impact negatively on the heritage resources of the area;
- It provides recommendations for mitigation of potential impact;
- It provides recommendations for a heritage monitoring programme during the construction of the facility.

2.4.1 Limitations

There are no significant limitations with regard to the study. The area identified for the placement of the turbines, access roads, laydown areas, etc was accessible during the survey.

2.5 Assessment Methodology

The source of information used in this report is based on the database of published and unpublished information which is available for the area.

The pre-feasibility study comprised a short field trip undertaken in January 2011 and a brief desktop assessment. The desktop review summarised the background historical information on the study area as well as the archaeology of the valley.

A NID was submitted to HWC in February 2011 and they issued an Interim Comment on the 14 July 2011.

A desktop review of the palaeontological significance of the project area was prepared by Dr John Almond of Natura Viva cc (Appendix 1).

A further short site visit was undertaken by Jayson Orton of ACO Associates cc in August 2011 to determine if there were any fatal flaws which might impede the development of the wind facility.
This was followed by a more detailed site visit for the Scoping Report on the 2 April 2012. During this visit, ACO Associates undertook foot surveys in the fields and against the lower slopes of the mountains and visited farmsteads. They spoke to farm owners about the heritage of the area.

The second field assessment for the HIA report was conducted on the 23 August 2012, after the position of the turbine locations had been finalised, and the positions of the laydown areas, access roads and locations of the underground cabling had been determined.

The field surveys were conducted by Lita Webley and David Halkett of ACO Associates cc. Both vehicle and foot surveys were conducted to examine the position of the turbines and the access roads. The position of the turbines (towers) was pre-loaded onto a Garmin 60CSx. Tracks were recorded and digital photographs were taken in the field (Appendix 2).

The Visual Impact Assessment was undertaken by Alan Cave of Cave Klapwijk Associates cc and is attached as Appendix 3.

2.5.1 Study area sensitivity analysis

The study area is located in a valley which has high scenic qualities relating primarily to the natural landscape. It is this aspect of the heritage which is most sensitive to impact. In addition to being surrounded by high mountains, the base of the valley is covered in vineyards and orchards which further enhance the rural landscape. The area has been identified as having high tourism potential.

However, the scenic qualities of the valley have also been negatively impacted by recent developments in farming technologies which include the erection of large areas of shade cloth over fruit orchards and the introduction of chicken batteries.

The area is considered to have low sensitivity with regards Palaeontology and Archaeology which is assessed further in this report. The Built Environment aspects of the study area are further discussed in the report below to determine their sensitivity.

2.6 Description of any assumptions made, uncertainties or gaps in knowledge

It is assumed that during our fieldwork we will have identified the most significant above ground heritage resources.

However, due to the size of the study area, it is considered unlikely that our field surveys will have identified all the heritage resources in the area. It is possible that unidentified formal and informal graveyards may occur within the boundaries of the proposed facility. Similarly, it is anticipated that historical archaeological sites may exist in proximity to old farmsteads although none were identified during the fieldwork.

Oral histories relating to heritage resources and the historic use of the landscape may be available. However, due to time constraints, no interviews were conducted with farm workers.
3 DESCRIPTION OF AFFECTED ENVIRONMENT

The site for the proposed wind farm is located in the Breede River Valley some 9km south of the town of Wolseley and predominantly to the east of the R43. The Breede River Valley is surrounded by high mountains. The Witzenberg range lies to the east and the Hawequas/Elandsberg to the west. There are two prominent mountain passes, Michell’s Pass connecting Wolseley to Ceres, and Bainkloof Pass between Wellington and Wolseley. Bainkloof Pass enters the Breede River valley about 4km south of the middle of the proposed wind farm.

The current landscape in the valley is a mix of vineyards, orchards, old agricultural lands and some indigenous vegetation along the railway lines. There are numerous stands of windbreaks of blue gum and pine trees in the valley. Some of the trees are grouped into groves around homesteads.

A large portion of the farm Romansrivier is under netting to protect fruit trees from the impact of the wind which blows through the valley (Plate 1).

![Plate 1: View of the valley. Note the visual impact of the shade cloth covering the orchards and the transmission lines which cross the valley. The valley is covered in patchwork of agricultural fields and there are many tree lines lining the fields.](image-url)
3.1 Palaeontological Background

A letter of exemption from further palaeontological studies and mitigation has been issued by Dr John Almond of Natura Viva cc (Appendix 1). He notes that the proposed facility will be constructed on flat to undulating agricultural ground on the Tulbagh valley floor. The Breede River skirts the area to the north and west.

The study area is underlain by Late Precambrian meta-sediments of the Malmesbury Group, and in particular the Porterville Formation. The recessive weathering of the Malmesbury Group rocks results in a gently hilly topography with very few natural exposures of fresh bedrock. The Malmesbury Group rocks may contain trace fossils, stromatolites, microfossils, etc. However, extensive deformation of the rocks means that most of the organic fossils remains have been obliterated.

The Malmesbury Group bedrocks are covered by superficial sediments of Pleistocene to Recent age. These sandy soils and older alluvial gravels of the ancient Breede River system may reach depths of 20 to 40m. These sediments are only sparsely fossiliferous.

The foothills and lower slopes of the Waaihoekberge are covered by colluvial sediments including rocky scree, hillwash and debris flow deposits.

3.2 Pre-colonial Archaeological Background

The Archaeology of the area around Wolseley is described by Webley & Halkett in Appendix 2. Early Stone Age (ESA) artefacts are routinely found in proximity to old river terraces where the cobbles provided a good source of raw material for the manufacture of stone tools. Low densities scatters of ESA material have been reported further down the Breede River valley near Worcester. Generally though, little archaeology is found on the fynbos-clad mountain slopes, outside of rare rock shelters. Some Early and Middle Stone Age artefacts have been reported from close to Wolseley and also a rock art site some 13km to the north of the current study area.
Later Stone Age (LSA) artefacts have been reported from around sandstone outcrops and boulders on the farm Kleineberg to the south of the study area.

3.3 **Historical Background and Heritage sites**

The historical background of the valley stretches back to 1701 when the first freeburgers were grazing their livestock in the valley. By 1705 it appears there were no cohesive, indigenous groups left in the valley. Some Khoekhoen moved further into the interior, while others settled as indentured workers on farms.

Van der Stel named the valley, "Het Land van Waveren". Ideally suited for pasturage, agriculture and fruit orchards by the mid-1700’s it had become a prosperous farming district known as Roodezand, after the red sandstone cliffs in the north-western corner of the valley. From 1729 the valley was full of free burger livestock.

Work began on the church town at Roodezand in Het Land van Waveren (Tulbagh) in 1743. Today the town of Tulbagh contains a very high percentage of Grade 2 heritage sites.

The valley became more accessible with the completion of a number of passes through the mountains. The first pass, known initially as Roodezand Pass, but subsequently renamed the Oudekloof Pass, crossed the mountains further to the north of the study area. A few years later, settlers attempted to open an easier pass through the mountains, on the eastern side of the Tulbagh Kloof which became known as the Nieuwekloof Pass.

3.3.1 **Bainskloof Pass**

In 1849, Thomas Bain commenced a new pass through the Limietberge further to the south of the Oudekloof and Nieuwekloof Passes. It would provide a more direct route between Wellington and Ceres. Built primarily with convict labour, the pass eventually opened in 1853 and became known as Bainskloof Pass. It is regarded as a marvel of engineering and a significant technological achievement. It was declared a National Monument under the old National Monuments Council in 1980 (Gazette Number: 6861; Gazette Date: 22/02/1980). With the subsequent introduction of the NHRA in 1999, all National Monuments are automatically graded as Grade 2 (Provincial) heritage sites. Bainskloof Pass is located 4km south-west of the southern section of the proposed wind farm.

3.3.2 **Blockhouses at Wolseley**

There are two Boer War blockhouses on either side of the Breërivier and the railway line on the road to Wolseley, some 2.5km to the north-west of the proposed facility. They are of potential Grade 3A grading.

3.3.3 **Waboomsrivier**

The only historic farmstead in the vicinity of the study area which is listed in Fransen is Wagenboomsrivier (Waboomsrivier) which is located some 2.5km south-east of the closest turbine, near the Breede Rivier Station (Figure 3). It is described as a well-preserved T-shaped house dating to 1802. It would presumably be graded as a Grade 3A site.
4 SUMMARY OF HERITAGE FINDINGS

4.1 Palaeontology

A letter of exemption (Appendix 1) from further palaeontological studies has been issued by Dr John Almond. It describes the Precambrian bedrocks of the Malmesbury Group as being highly deformed so that original fossil assemblages have been destroyed. The superficial sediments present at or near the surface are generally of low palaeontological sensitivity.

4.2 Archaeology

The Archaeological Impact Assessment addresses the archaeological heritage of the area and is presented in greater detail in Appendix 2. Ephemeral scatters of Early Stone Age material were recorded in one section of the proposed wind energy facility.

A graveyard was recorded on the farm Romansrivier 320 near the Romansrivier farmstead (See Built Environment below).

A few stone cairns (heaps of river cobbles) were identified but are unlikely to represent graves.

4.3 Built Environment

Heritage Western Cape did not request a specialist Built Environment report in their interim comment to the Notice of Intent to Develop. However, the Built Environment is briefly outlined here for the sake of providing a complete heritage assessment.

Survey diagrams for Roomans Rivier 320, Vaalvlei 324, De Liefde 323, De Liefde 334 and Kleineberg 208 were examined (Figure 3).

Table 2: Location of Farm Buildings and Graveyards

<table>
<thead>
<tr>
<th>Name of Farm Buildings</th>
<th>Co-ordinates</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romansrivier farmstead</td>
<td>S33 28 10.6 E19 12 54.1</td>
<td>Grade 3c</td>
</tr>
<tr>
<td>Romansrivier family graveyard containing at least 4 graves</td>
<td>S33 28 10.9 E19 12 50.9</td>
<td>High</td>
</tr>
<tr>
<td>Werda farmstead</td>
<td>S33 29 00.3 E19 12 33.3</td>
<td>Ungraded</td>
</tr>
<tr>
<td>Vaalvlei farmstead</td>
<td>S33 29 17.2 E19 12 37.4</td>
<td>Ungraded</td>
</tr>
<tr>
<td>Koppies farmstead</td>
<td>S33 29 09.1 E19 13 05.1</td>
<td>Ungraded</td>
</tr>
<tr>
<td>De Liefde farmstead</td>
<td>S33 29 26.1 E19 13 31.2</td>
<td>Grade 3c</td>
</tr>
</tbody>
</table>
There are minimal Built Environment issues in the study area. A few of the properties contain buildings which are older than 60 years and which are protected in terms of the NHRA.

4.3.1 Romansrivier

The Surveyor General’s survey diagram for Roomans Rivier 320 (SG 441/1817) dates to 1817 (Figure 3). The early house is indicated in the same location as the present main house on the property. The property has been significantly sub-divided since that time and today portions of the farm contain a railway siding named Romansrivier, as well as a correctional facility. The complex of farm buildings includes an old farm building which has been significantly altered and used as an office (Plate 4), a recent farm manager’s house, an old shed and portions of a farm wall (“ring muur”) (Plate 5), and an old farm graveyard in poor condition (Plate 6).

Plate 4: The main house at Romansrivier has been significantly altered and is being used as an office. Plate 5: The late 19th century shed and portion of a farm wall on Romansrivier.
Plate 6: One of about 4 headstones in an unfenced graveyard behind the farmhouse at Romansrivier.

There is an overgrown graveyard behind the Romansrivier farm house belonging to the Conradie family (Plate 6).

4.3.2 Vaalvlei

The farm Vaalvlei 324 (L.G. 4128/66) was originally part of the farm De Liefde (S.G. 1868/1883). It contains two farmsteads, one called Vaalvlei and the other called Werda.

Plate 7: The farmhouse of Vaalvlei.

Plate 8 & 9: The farmhouse and old shed at Werda (on Vaalvlei 324).
The shed clearly predates the farm house and may be the oldest structure on this portion of Vaalvlei. It is in a poor condition and windows and doors have been inserted into the building with in an ad hoc manner (Plate 9).

4.3.3 De Liefde

The farm De Liefde 323 (SG 1868/1883) was part of a freehold originally granted to Coenraad Scheepers in 1723.

![De Liefde Farm House](image1)

De Liefde comprises a complex of buildings. At the front gate is a boulder with the date of 1894. Next to it is a memorial stone commemorating prayer meetings which commenced in 1845 and which were celebrated in 1926. Plate 10 is of the abandoned farmhouse in the Cape Dutch revival style.

4.3.4 Koppies

It is located on a portion of the farm De Liefde (Figure 3). The house on this property was destroyed in the 1969 earthquake.

4.3.5 Kleineberg

The farm Kleineberg 208 (SG 437/1817) dated 1817 show that the farm belonged to Veldkornet G Hugo and is referred to as a loan farm.

The survey diagrams therefore suggest that these farms had their origins in the mid-18th century.

4.4 Cultural Setting, Scenic Routes and Provincial Heritage sites

Cultural Landscape, as per the definition in Section 3(3) of the NHRA, includes landscapes of South Africa’s natural or cultural heritage. This particular part of the Breede River Valley encompasses both aspects of the heritage.

The natural wilderness represented by the Witzenberg Mountains provides the backdrop to the Wolseley valley which characterized by fruit orchards (some under shadecloth), vineyards, grazing lands and groves of trees with a dispersed pattern of homesteads. The agricultural production in the valley spans a period of 200 years and has high historical significance.
The landscape on the valley floors is covered in a network of roads, many of high scenic value, and associated historical mountain passes such as Bainskloof Pass, which have high scenic and technological significance. These scenic routes provide a range of views of the broader cultural landscape. The R46, which is one of the main access routes to Tulbagh through the Breede River Valley, has been given a Grade 3B rating in a previous study\(^\text{12}\).

The significance of the valley, the R46 and Bainskloof Pass is assessed in the Visual Impact Assessment.

The Witzenberg Municipality Spatial Development Framework (dated 11/05/2012) have identified the study area as falling within a Tourism Corridor and describe it in their SDF as being a ‘Cultural Landscape’.

4.4.1 **Bainskloof Pass**

The exit of the Pass into the Breede River Valley is positioned about 3km south-west of the most southerly turbine location. Since Bainskloof Pass is a PHS, the Western Cape branch of SAHRA is legally entitled to make comments if they are of the opinion that a development will have a negative impact on a provincial heritage site. The impact of the proposed development on the Pass is assessed in the impact assessment of the Visual Specialist (Appendix 3).
5 IMPACTS IDENTIFICATION AND ASSESSMENT

5.1 Introduction

Since certain kinds of heritage resources are finite, this means that any form of impact assessment automatically invokes the maximum scores in terms of the criteria of replace ability, reversibility and duration. The identification of heritage can be extremely difficult as it is often obscured under the ground surface, (particularly in archaeology and palaeontology) and a great many variables are unknown. This means that heritage specialists rely on their knowledge of published accounts as well as experience. Scientifically quantifying heritage impacts is problematic due to the fact that the resource being assessed is qualitatively and quantitatively unpredictable (in terms of methods that are available today).

Tangible heritage such as protected structures, archaeological sites, palaeontological material is finite. Once it is damaged or destroyed, that state endures forever. It can never be replaced, or reversed. It is possible to mimic or reconstruct certain kinds of heritage such as buildings and individual objects, and to an extent it may be possible to reinstate a cultural landscape but with loss of authenticity. The main sources of impact to heritage fall into two broad categories – a) the destruction of the physical heritage object itself, b) the destruction or change of its context.

5.2 Identification of Impacts

The impacts to Palaeontology, Archaeology and Visual are considered in detail in the specialist reports appended as Appendices 1, 2 & 3.

5.2.1 Construction phase

The destruction of tangible heritage (structures, archaeological sites, fossils) almost always takes place during the construction process of development activities rather than during the operational phases as the main source of impact to heritage is due to the disturbance of undisturbed ground or landscape and/or demolition of structures and places protected by the NHRA and/or valued by a community. Invariably the kinds of impacts resulting are irreversible, irreplaceable and of permanent duration as heritage resources are finite.

Palaeontological material is destroyed by bulk earthmoving, cutting and mining operations, however palaeontological resources tend to be extensive (depending on the resource) and are rather more resistant to impact than archaeological material for the simple reason is that there is more of it. Because palaeontological material is often very deeply buried, scientists often rely on human intervention in the land surface to collect data. In short, provided that palaeontologists can use the opportunity arising from major construction works to adequately sample and record profiles and exposed material as part of the environmental management process, a potential negative impact can be transformed into a positive opportunity to increase the levels of knowledge about a locality and the species of fauna and flora that were present in the past.
Archaeological sites and graves are highly fragile and context sensitive, which means that their value is very easily destroyed when the landscape in which they are situated is disturbed by bulk excavations and infrastructural development.

Cultural landscapes are highly sensitive to accumulative impacts and large scale development activities such as wind energy facilities may change the character and public memory of a place. In terms of the NHRA a cultural landscape may also include a natural landscape of high rarity value and scientific significance. The proposed development may have an impact on the natural wilderness of the Witzenberg Mountains as well as the agricultural landscape of the valley floors. It may also have a potential impact on the landscape setting of historical homesteads in the valley.

The proposed development may impact on the scenic qualities of the R46 which run through the Breede River valley.

It may be argued that it is possible to a degree to rectify damage to a cultural landscape through demolition of intrusive elements, however this seldom ever happens – the impacts to all intents and purposes are permanent.

5.2.2 Operational phase

During the operational phase of the facility, it is expected that impacts will be largely neutral. It is expected that any significant changes will independently trigger EIAs or HIAs.

5.2.3 Decommissioning phase

It is anticipated that the facility will be decommissioned after 20 years. Heritage impacts can occur during the decommissioning phases of large operations. The process of rehabilitation can involve surface disturbance and earthmoving operations. These impacts would be of a similar nature to those experienced during the construction phase.

5.2.4 Cumulative Impacts

There are no plans to build a similar facility in the vicinity of Wolseley and therefore the cumulative impacts are considered to be low.

5.3 Potential Mitigation Measures

Generally, with regard to Palaeontology and Archaeology, mitigation can be achieved through scientific recording, sampling or excavation of heritage material. Palaeontologists and Archaeologists aim to sample the heritage resources so that a portion of the find is conserved in perpetuity. The process is slow, exacting and expensive. The end result is always the loss of the heritage site as a permanent heritage resource; the gain is the rescue of knowledge provided that the sampling is done in according to suitable standards.

With respect to the Wolseley Wind Energy facility, the following mitigation measures are proposed:
- The Palaeontological specialist report has identified no impacts to the palaeontological heritage of the area and therefore no mitigation is required.

- The Archaeological specialist has identified scatters of Early Stone Age implements on portions of the study area. However, they are of low significance and no mitigation is required.

- There are no buildings or farm graveyards which will be demolished during the construction of the wind farm. A Buffer of 400m has been implemented around each farm complex. Mitigation proposals support the avoidance of these structures, namely a buffer zone.

5.4 Impact Assessment Methodology

The impact of particularly the construction of the wind energy facility may result in the physical destruction of heritage resources or in the displacement of heritage resources so that they loose their context, and thereby their value.

5.5 Impact Assessment – Proposed Development

5.5.1 Construction phase

The letter of exemption provided by Almond (Appendix 1) indicates that there will be no impact with regards the Palaeontological heritage of the valley.

With regards the Archaeological heritage of the area (Appendix 2), the ESA stone scatters have been given a low significance rating and their destruction will therefore not result in a high impact. Although the destruction of pre-colonial archaeological material is permanent and cannot be reversed, its destruction will not result in the loss of significant information. With regards Historical Archaeological material, it is recognised that the construction of the facility may potentially result in the loss of below ground material but mitigation is not possible prior to construction.

With respect to the Built Environment, it is recognized that the construction of turbines in close proximity to farmsteads which contain historical structures, may result in a loss of sense of place. This loss is not permanent but will extend for the lifetime of the project. It is recommended that the buffer of 400m be maintained around occupied farm buildings and that turbines should preferably be constructed behind or to the side of buildings, rather than in line of sight.

With regard Cemeteries and graves, they are generally given a very high significance rating and their destruction will result in a high negative impact. Mitigation in advance is not possible, but the correct procedures should be followed during construction to ensure that no permanent damage results should they be uncovered.
Impact 1: Archaeology (pre-colonial and historical)

Impact Description: The construction of turbines, underground cabling and access roads will result in scatters of ESA stone implements being moved from their position. This may potentially result in loss of information. The construction of turbines, underground cabling and access roads may potentially result in the destruction of below ground historical archaeological material. This may potentially result in loss of information.

Without Mitigation:
- Nature: Low
- Extent: Permanent
- Duration: Low
- Intensity: High
- Reversibility: Low
- Impact on Irreplaceable Resources: Medium
- Consequence: Low
- Probability: Medium
- Significance: Low
- Confidence: High

Mitigation Description: No mitigation is required as there is no evidence that the scatters of ESA stone artefacts are in their original context and that excavations would result in the generation of new information. No mitigation is proposed as no historical archaeological material was recorded during the field surveys. Mitigation is therefore not possible prior to the construction phase of the development.

Indicate if mitigation is possible: Mitigation would include the collection of stone tools for statistical analysis or the excavations of archaeological stone tool scatters. However, there is no reason to support this.

With Mitigation:
- Nature: Local
- Extent: Permanent
- Duration: Negligible
- Intensity: High
- Reversibility: Low
- Impact on Irreplaceable Resources: Low
- Consequence: Medium
- Probability: Improbable
- Significance: Low
- Confidence: High

Cumulative Impact: There is an abundance of ESA artefact scatters in the Breede River Valley and the destruction of a few scatters in a field at Wolseley would not materially impact on our knowledge of the archaeology of the area. The destruction of a number of historical archaeological sites in this area could result in significant loss of information.

Impact 2: Built Environment

Impact Description: The construction of the turbines, underground cabling and access roads will not impact directly on the Built Environment. However, they will have a visual impact on the sense of place of the farmsteads, particularly those with buildings older than 60 years. This impact is not permanent however but will end with the lifespan of the facility.

Without Mitigation:
- Nature: Low
- Extent: High
- Duration: Medium
- Intensity: Medium
- Reversibility: Low
- Impact on Irreplaceable Resources: Medium
- Consequence: Medium
- Probability: Medium
- Significance: High
- Confidence: High

Mitigation Description: Ensure a buffer of at least 400m is implemented around farmhouses and ensure that the turbines are not placed within the line of sight of occupied farmhouses.

Indicate if mitigation is possible: Place turbines behind occupied farmhouses.

With Mitigation:
- Nature: Low
- Extent: High
- Duration: Low
- Intensity: Medium
- Reversibility: Low
- Impact on Irreplaceable Resources: Medium
- Consequence: Low
- Probability: Medium
- Significance: Medium
- Confidence: High

Cumulative Impact: If more wind energy facilities are constructed in the vicinity, then the cumulative impact will be high on the Built Environment of the Breede River Valley.

Description of impact and significance: The impact will be of a visual nature on the Built Environment component of the valley, resulting in a loss of sense of place and therefore also impacting on heritage tourism.

Impact 3: Cemeteries and graves

Impact Description: The construction of turbines, underground cabling and access roads may impact on buried and hidden graves and cemeteries.

Without Mitigation:
- Nature: Medium
- Extent: High
- Duration: High
- Intensity: Not reversible
- Reversibility: High
- Impact on Irreplaceable Resources: Low
- Consequence: Medium to High
- Probability: Medium
- Significance: Medium
- Confidence: High

Mitigation Description: If human remains are uncovered, work should stop in that area and Heritage Western Cape must be notified.

Indicate if mitigation is possible: A series of procedures will follow which may result in different outcomes. These could include exhumation of human remains (although this is not recommended) or the re-siting of the development to avoid the graves, etc.

With Mitigation:
- Nature: Low
- Extent: High
- Duration: Low
- Intensity: Not reversible
- Reversibility: Medium
- Impact on Irreplaceable Resources: Medium
- Consequence: Medium
- Probability: Medium
- Significance: Low to Medium
- Confidence: Medium

Cumulative Impact: Description of impact and significance

5.5.2 Operational phase

No impacts are expected during the operational phase of the project.
5.5.3 Decommissioning Phase

While it is possible that physical impacts to heritage resources may occur during decommissioning of the project, it is expected that they will be of a similar nature to that of the construction phase.

5.6 Impact Assessment - Alternatives

No alternative layout designs have been proposed for the wind energy facility.

5.6.1 No Go Option

The No-Go option will result in the status quo. There will be no impact on the heritage resources of the valley.
6 HERITAGE MONITORING PROGRAMME

To reduce the impact on the Unidentified/Below ground Heritage Resources of the study area (as defined in the NHRA):

6.1 Palaeontology

However, should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, peat horizons or lenses) be encountered during development, such as within fresh excavations, these should be safeguarded, if possible in situ. These fossil finds should then be reported by the responsible Environmental Control Officer to Heritage Western Cape for recording, sampling and any appropriate further mitigation by a professional palaeontologist.

6.2 Archaeology

In view of the low significance rating ascribed to the pre-colonial archaeological material identified in the study area, no monitoring by an archaeologist is required during the construction phase.

However, during the construction phase of the development, significant pre-colonial and historical archaeological material buried below the soil surface, may be uncovered. If they are not adequately dealt with, they may be destroyed. If finds are accidentally uncovered, they must be reported to Heritage Western Cape by the environmental officer or senior person on site.

During the construction phase of the project, buried human remains may be uncovered. If they are not adequately dealt with, they may be accidentally destroyed. Human remains are protected by several sets of legislation which means that certain protocols must be followed in the event of a find.

If human remains are accidentally uncovered:

- Leave remains in place, do not remove anything;
- Cordon off the area;
- Notify the archaeologist at Heritage Western Cape;
- Contact an archaeologist who will indicate whether to inform the SA Police Services;
- If exhumation is required, a permit will have to be obtained from the SAHRA Burials Unit.
CONCLUSION

This HIA integrates the findings of the Archaeological, Palaeontological and Visual studies. It takes cognizance of the Built Environment where this is appropriate.

Palaeontology

- A letter of exemption from further palaeontological studies has been issued by Dr John Almond. It describes the Precambrian bedrocks of the Malmesbury Group as being highly deformed so that original fossil assemblages have been destroyed. The superficial sediments present at or near the surface are generally of low palaeontological sensitivity.

Archaeology

- Ephemeral scatters of Early Stone Age material were recorded in the area. They are of low significance and no mitigation is proposed;
- A few stone cairns were identified but are unlikely to represent graves. If unmarked graves are uncovered during construction, work should stop in the area and Heritage Western Cape must be notified. They will instruct on the procedures to be followed.

Provincial Heritage Site

- The Provincial Heritage site of Bainskloof Pass is located some 3km to the south-west of the proposed wind energy facility;

Built Environment & Cemeteries

- There are two Boer War blockhouses on either side of the railway line, on the approach to Wolseley. They have potential Grade 3A grading but are located some 2.5km north-west of the proposed facility. The turbines will not be visible as the blockhouses are surrounded by trees;
- The historic farmstead of Waboomsrivier, which is listed in Fransen (2004) and would presumably be graded as a Grade 3A building, is located 2.5km to the south of the closest turbine and is outside the study area;
- A graveyard was recorded on the farm Romansrivier 320. Although it is of high significance, it will not be impacted by the proposed wind farm and no mitigation is required;
- There are minimal Built Environment issues in the study area. There are some buildings older than 60 years at de Liefde and Romansrivier. They are not threatened by the proposed development and a buffer of 400m has been proposed around all farm buildings.

Visual Impact

The site analysis considered the suitable areas for turbine location and reviewed this in the context of the 2006 Strategic Assessment by the Provincial Government of the Western Cape. The buffers recommended in this document were applied to the site with the result that limited suitable areas remained for wind turbine location. However the location of the turbines that was informed by on site constraints, natural and imposed by motivated buffers, that were discussed and agreed with team members.
and the Applicant was assessed. Some constraints /buffers originated from the Strategic Assessment.

The site area is visually contained by the mountains and the agricultural character and sense of place are mainly derived from the pattern of vineyards, orchards and the mountains. However visual change is occurring within the valley evidenced by the practice of shade cloth protection over orchards, chicken farm batteries and a residential estate in a hanging valley of the Waaihoekberge.

The site's low position provides views toward the mountains on both sides and along the valley that contains the landscape and adds to the enclosed sense of place. The views eastward to the site from the R43 are interrupted by wind breaks between which views across the valley to the Waaihoekberge are experienced by the motorists thereby affording many the pleasure of the scenic landscape.

Visual Impacts

With regard to the assessment of the visual impacts the construction and the decommissioning phases are primary impacts, of short duration and are easily mitigated and therefore have a low significance visual impact.

However it is the operational phase (a long term secondary impact) that will have the high visual impacts on visual quality, landscape character of the setting and sense of place of the area due to the tall wind turbines.

While the turbines do not block the view they add a vertical element to the scene that still allows distant vistas to be appreciated.

The high visual intrusion zones of views are recognised to be within 500m of roads, homesteads and sensitive land uses. This buffer has been used along the R43 and is in accord with that used in the Strategic Assessment Guideline for local roads. The positions of wind turbines reflect this spacing as shown on the Analysis map Figure 3a.

The finding is that the medium density and tall scale of the wind turbine towers in the landscape will have a high impact on the views from within and towards the site. The assessment method used shows the significance of the visual impact as medium which means that according to the assessment criteria the visual aspect and the mitigation measures will require consideration in the decision making.

Shadow Flicker

The aspect of shadow flicker caused by the rotating blade’s shadow over ground, structures and trees was researched (Wind Turbine Shadow Flicker Study. Dept. of Energy and Climate Change, UK 2011) and the conclusion is that it has no risk to health but that where problems exist these can be mitigated by shut down of the turbine for certain periods. This phenomenon is considered to be of low impact and low significance by correct positioning relative to homesteads, as a mitigation measure.

The Night scene

The night scene will be altered by the double red lights on the top of the turbine housing (Nacelle). This is not considered a high visual impact although the area of the site will be more visible from further at night as a result of the glowing lights. On
cloudy or moonless nights the towers will not or hardly be visible and therefore the significance is rated as low. The red lights will have similar intensity as those on tall masts or telecom towers.

This visual intrusion or impact will not alter the night scene significantly but the matter will require consideration in decision making.

De Vierde Liefde

The residential estate De Vierde Liefde is orientated east / west and therefore will not have their main view as westward across the valley where the turbines are located. The lower erven (most erven are vacant) on the western side are closest to wind turbine 5, which, is approximately 1.7km distant will not be seen because the landform and the vegetation will screen this view. However the erven higher up the valley to the east will have distant views of the wind turbines, at a distance of approximately 2.6km. This level of visual intrusion in views is not considered to be significant.

Bainskloof Pass

The view from the Bainskloof Pass, a Heritage Site, of the wind turbine site is not possible while in the pass. The turbines will be visible on exiting the Pass in the vicinity of the Calabash Restaurant. The first possible view of the turbines is obscured by tall trees (approx.30m) that are located across the line of sight at the end of the valley where the Pass exits. The distance from this point to the nearest turbine is approximately 3.3km. Only once the motorist is at or north of the Calabash Restaurant will the turbines be visible above the Bergsig Cellar. The view from the exit of the Bainskloof pass is not considered to be significant in terms of view intrusion from the exit due to the initial view obstruction and the distance from the nearest turbines.

Mitigation Proposals

The medium density of wind turbines with an approximate spacing of 500m does reduce the visual intrusion in views toward and within the site.

The mitigation of the visual impact of such tall animated structures in a scenic setting is confined to cosmetic methods, micro siting and the reduction of the height and density of the towers. The reduction of the visual scale can be achieved at close range, 100 to 300m by painting vertical broad stripes of 4 shades of green with the off white or grey of the tower between each stripe. This is to be done to a height of 6 metres and will visually fuse the base with the landscape. It is however noted that the Civil Aviation Authority (CAA) specification for turbines is that they are to be “bright white” so as to ensure visibility. Any deviations from this requirement would have to be authorised by the CAA.

The recommendation to relieve the visual impact of scale in views of the site from the R43 is that the minimum distance from the road reserve edge is to be 500m.

The layout of the turbines on the site has responded to the visual aspects identified in the ‘implications for the project’ comment and the constraints shown on the Analysis Plan. Mitigation measures have therefore been incorporated by the micro siting of the towers. The remainder of the mitigation will relate to the construction and decommissioning phases. This will have to do with dust suppression, surface water
management to reduce erosion and siltation of drainage lines and the stripping and stockpiling of topsoil for the rehabilitation of road edges and temporary laydown and working. The selection of existing roads for access routes and cable trenches will limit the physical change to the land and detail planning with this in mind must be promoted and implemented.

Conclusion

In conclusion while the wind turbines have high visual intrusion in views from roads and homesteads the significance of this impact is medium with mitigation in place. In addition the monitoring of the implementation of the mitigation measures is most important as the attention to detail will significantly reduce visual impact of the construction phase and later of the decommissioning phase. The medium significance rating requires that the visual aspects must be considered in the decision process because of the scenic nature of the setting, the landscape character and the sense of place.

Summary

To summarise the palaeontology and archaeology reports, indications are that the proposed activity is viable and impacts are expected to be limited and controllable.

However, if there are any changes to the layout of the turbines, then additional survey work by a heritage specialist will be required in order to ensure that no sites are directly impacted.
8 REFERENCES


1 National Heritage Resources Act, No 25 of 1999.


APPENDIX 1: PROPOSED WOLSELEY WIND ENERGY FACILITY NEAR WOLSELEY, TULBAGH & WORCESTER MAGISTERIAL DISTRICTS, WESTERN CAPE by Dr John Almond

APPENDIX 2: ENVIRONMENTAL IMPACT ASSESSMENT FOR THE ESTABLISHMENT OF THE WOLSELEY WIND FARM, WESTERN CAPE: ARCHAEOLOGICAL IMPACT ASSESSMENT. By Lita Webley & David Halkett

APPENDIX 3: ENVIRONMENTAL IMPACT ASSESSMENT FOR THE ESTABLISHMENT OF THE WOLSELEY WIND FARM, WESTERN CAPE. SCOPING REPORT: VISUAL IMPACT ASSESSMENT By Alan Cave