

# HIA: PROPOSED AEOLUS SOLAR ENERGY FACILITY

## 1. INTRODUCTION & GENERAL BACKGROUND

On 17 September 2011, Jonathan Kaplan (ACRM) to Heritage Western Cape (HWC) submitted a Notice of Intent to Develop (NID) application for a proposed new photovoltaic electrical generation facility along the R27 outside Langebaan. This NID application was necessary given that the proposed activities will trigger Section 38(1) of the National Heritage Resources Act<sup>1</sup> (hereafter NHRA). The applicant recommended that an HIA would be required.

Because this development proposal is subject to an over-arching environmental impact assessment in terms of the National Environment Management Act<sup>2</sup>, an interim response was sought and duly received from HWC, being a significant Commenting Party. In this interim response of 28 June 2011, HWC noted the following:

- The total property covers 3792 ha of which 500 ha would be covered by photovoltaic (PV) panels.
- These PV panels would not extend higher than 2m above ground level.
- Service tracks and two structures of maximum 1,5 storeys would be included.
- No impacts on structures, historical settlements and landscapes is anticipated; and
- Potential impacts on archaeological and palaeontological material was identified.

Given these factors, and taking into consideration the recommendations by the applicant for an HIA, HWC concluded that a heritage impact assessment would be required, and that this should consist of archaeological and palaeontological impact assessments in terms of Section 35 of the NHRA, together with a visual impact assessment in terms of Section 38 of this same Act. HWC also requested that the assessment report contain a combined set of recommendations and appropriate mitigation measures.

In response, ARCON Architects & Heritage Consultants was engaged to prepare this combined report for Cape Lowlands Environmental Services on behalf of the developer, Aeolus Development Corporation.

### 1.1. Brief Historical Background of the Site.

The land parcels comprising the site were acquired approximately 30 years ago for industrial development as part of the Saldanha Steel project and is currently leased by a tenant farmer. The property comprises open, formerly cultivated cereal fields that proved uneconomical due to low crop yields. For the past approximately 10 years, the land has been limited to the seasonal fattening of cattle, as the land offers no feed value for animals other than on a seasonal basis (late winter to early summer).

### 1.2. Assumptions and Limitations of this Report.

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<sup>1</sup> More specifically: NHRA S38(1)(a) involving linear development exceeding 300m in length; and S38(1)(c) involving a development changing the character of a site exceeding 5 000sq m in extent and involving three or more erven or subdivisions thereof.

<sup>2</sup> More specifically: NEMA R544 Activity 38; R545 Activities 1, 8 & 15; and R546 Activities 4(ii) & 14(a).

The scope of this report is limited to the plan of study as required by HWC in its interim response to Cape Lowlands Environmental Services dated 28 June 2011, i.e. focusing on potential visual, archaeological and palaeontological impacts. The visual impact of services from elsewhere onto the property does not form part of this assessment.

## 2. SITE DESCRIPTION AND STATUTORY BACKGROUND

### 2.1. The Site and its Broader Spatial Context

The site is situated on the west side of the intersection between the R27 (West Coast Freeway) and Langebaan Road at the beginning of an open landscape character zone (**Figure 1** & attached **Diagram 1**) extending, with minor interruptions, from the R27/Langebaan Road intersection all the way to Velddrif. The area in the vicinity of the site is broadly characterized by expanses of low indigenous shrubland interspersed with copses of taller indigenous bushes and groups of mature exotic trees. These mostly include bluegums that have come to characterize settled portions of the West Coast landscape over a period of three centuries. (Attached images: **Viewpoints 01-12**). To the south and east, the spatial context is contained by a series of hills, the most prominent of which are the Karringberg and Wolwerug to the south, and a series of hills including the Kleinberg to the east.

The shoulder between the Karringberg and Wolwerug through which the R27 passes, becomes an important spatial threshold as motorists crest this hill and move north and down into the open plains below. (Attached image: **Viewpoint 01**). Despite this transition from the undulating landscapes along the more southerly stretches of the R27 to the more expansive low plains in the vicinity of the site, the nature of the vegetation is such that clear unobstructed views across this landscape are not possible along large parts of the 'valley' floor. This is particularly evident around the northern boundary of the site, which includes belts of trees in the vicinity of Kleinberg farm. (Attached images: **Viewpoints 2-4**).

As vehicles move south into the area along the R27 from the Velddrif side, the tree belts in the vicinity of Kleinberg farm define another spatial threshold. (Attached image: **Viewpoint 03**). Vehicular approaches from the northeast and southwest are along Langebaan/Langebaanweg road. Both of these approaches involve hill descents towards the intersection with the R27. (Attached images: **Viewpoints 06 & 07**).

A corridor of high voltage Eskom powerlines bisects the site, with steel lattice pylons forming prominent features in the landscape. (Attached images: **Viewpoints 7-10**).

The property comprises open, previously cultivated cereal fields that have proved uneconomical due to low crop yields. For the past approximately 10 years, the land has been limited to the seasonal fattening of cattle, given that the land offers no feed value for animals other than on a seasonal basis (late winter to early summer).



FIGURE 1: The site and its immediate context in relation to the macro topography. The un-shaded area represents the open plains with the shaded areas representing surrounding hill backdrops. The development site is located at the southern threshold of the open plains area.

## 2.2. Statutory & Policy Context

### 2.2.1. Heritage and environmental legislation

The proposed development is subject to assessment in terms of S35 and S38 of the National Heritage Resources Act (NHRA), as well as R544, R545 and R546 of the National Environment Management Act (NEMA) as referred to in Chapter 1 of this report. The overarching environmental process for this application is in terms of NEMA, making the Department of Environment Affairs (DEA) the consenting authority for issuing a Record of Decision on these proposals. Heritage Western Cape is therefore a commenting body for this application in terms of S38(8) of the NHRA.

### 2.2.2. Planning policy and legislation

The property is currently zoned Agriculture 1 and will require rezoning to either Industrial 2, or Renewable Energy Zone (a new zoning category currently under consideration). The proposed installation will, however, be located within a landscape rapidly transforming from rural agricultural to industrial. This is evident in the expanding development around Saldanha Steel approximately 6 km to the northwest, and back of Port developments around Saldanha Bay which include the fuel storage facility approximately 2,5 km away from the site.

In terms of the West Coast District Municipality Spatial Development Framework (May 2007), the site falls within an Urban Growth Area<sup>3</sup>, i.e. the largest of such identified areas in the entire West Coast District. Although beyond the Urban Edge, the property falls within the Saldanha Municipal Industrial Development Impact Zone. The proposed development is, therefore, not inconsistent with both local and regional planning policy.

### 3. ESTABLISHING CULTURAL SIGNIFICANCE

The property contains no structures or other elements of architectural/spatial significance. Indeed, it accommodates a high voltage power line corridor considered visually negative in terms of its impact on the site and its broader spatial context. It is, however, located along a major regional route that does have strong scenic qualities along certain of its stretches, hence HWC's need for this report to highlight (amongst others) potential visual impacts.

For the purposes of this report and in accordance with HWC's requirements as reiterated in Chapter 1 of this report, the establishment of cultural significance relates to:

- i) the potential impact of the proposed development on the scenic qualities of the site and its surrounding landscape; and
- ii) potential archaeological/palaeontological impacts on the site itself.

#### 3.1. Significance of the R27 and Langebaan Roads as Scenic Routes

The property occupies a strategic position on the west side of the intersection of the R27 and Langebaan/Langebaanweg roads. This means that vehicles moving along the R27, and approaching/leaving Langebaan town will pass within relatively close proximity to the site. It is therefore the view corridors of these two stretches of road that form the major focus of the visual impact component of this study. According to local municipal officials (Saldanha Municipality Planning Department), this stretch of the R27 is unlikely to form part of a scenic route. Official confirmation to this effect was however still outstanding at the time of this report going to print.

The World Heritage Committee has identified and adopted three categories of cultural landscape. These categories are used to assist in determining the significance of the cultural landscape within the study area as defined in **Diagram 1**. The categories are identified as:

- “a landscape designed and created intentionally by man”;

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<sup>3</sup> West Coast Municipal SDF: Figure 7.3

- an “organically evolved landscape” which may be a “relic (or fossil) landscape” or a “continuing landscape”;
- an “associative cultural landscape” which may be valued because of the “religious, artistic or cultural associations of the natural element”.<sup>4</sup>

The landscape of the site and its context falls within the second category i.e. it can be considered a “continuing” or evolving landscape.

### 3.1.1. *The R27 (West Coast freeway)*

Views moving both north and south along the R27 are varied. The landscape along the R27 from the main entrance to the West Coast National Park to just before the study area as defined in **Diagram 1** is undulating in character, whereas the topography around the site and extending northwards, is predominantly flat (**Figures 2 & 3**).



*FIGURE 2: The undulating, hilly landscape south of the study area with its continually unfolding horizons and rich blanket of uniformly scaled and distributed populations of indigenous vegetation.*



*FIGURE 3: The flat, open and largely featureless landscape characterizing much of the area around and on the site.*

<sup>4</sup> UNESCO (2005) Operational Guidelines for the Implementation of the World Heritage Convention UNESCO World Heritage Centre. Paris. Page 83.



The spatial transition between these two distinctly different landscapes occurs as one moves downhill along the R27 into the flat plains approximately 4km from the southern end of the site (refer **Diagram 1** and attached image **Viewpoint 01**). Neither of these landscape character zones have particularly distinctive features, although the more undulating landscapes to the south of the study area are arguably more varied, while clearly being richer in botanical resources. The stretch of the R27 falling within the study area can, however, be regarded as having some scenic quality in the sense that it affords wide, open vistas from a range of points within what is currently a largely undeveloped rural landscape. Given the lack of distinction of the landscape defining this stretch of the R27, it is regarded as having, at most, *moderate to low* significance as a scenic route.

### 3.1.2. *The Langebaan Road*

From the turnoff from the R27, the scenic quality of the approach road to Langebaan is much the same as along the R27, with the exception that it does not only traverse flat ground but also a hill before descending into Langebaan town itself. The scenic quality when cresting the hill from Langebaan towards the intersection of the R27 is therefore similar to that experienced from the R27 moving towards this same intersection. (Attached image: **Viewpoint 06**). The Langebaan Road is therefore also regarded as having, at most, *moderate to low* significance as a scenic route.

### 3.1.3. *Conclusions*

The study area lacks distinctive features and landmarks, other than the presence of high voltage power lines crossing the site and the Engen One Stop service station at the intersection of the R27 and the Langebaan road. This is not an area designed or intentionally created by man, nor is it a landscape that can be regarded as having religious, artistic or cultural associations of the natural element<sup>5</sup>. The landscape can therefore best be described as an “organically evolved” landscape lacking distinctive features of a visually positive nature. Consequently, this is not a landscape of great scenic quality and probably not worth grading in terms of S7, read in conjunction with S3(3) of the NHRA. Stated more bluntly, this it is a landscape for passing through rather than arriving at.

## 3.2. Archaeological & Palaeontological Significance

### 3.2.1. *Archaeological Significance*

An archaeological impact assessment of the property has recently been undertaken by Kaplan and Wiltshire. (ACRM: **Annexure A**). This involved a background study of other archaeological work done in the area, as well as a 1-day foot survey of the proposed development sites. Only a single isolated dark quartzite flake, marked as observation 002 (refer **Figure 4**), was found near a pile of ploughed calcrete at observation 001. Despite an intensive search of the immediate area near the flake, no other archaeological material was found. The flake was not diagnostic but certainly no older than the Middle Stone Age. Various calcrete chunks were noted across the property (piles of calcrete are in fact ubiquitous on the property) but none were associated with

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<sup>5</sup> Given that there are no structures on the site apart from the high voltage power lines, and given that the environmental consultants, Cape Lowlands Environmental Services, have not found any significant botanical resources on the property.

granite, quartzite or other raw materials typical of artefact scatters in this area. It was therefore considered likely that most of these chunks were naturally broken or were broken by farming activities.

No granite outcrops occur on the site and no shell middens or other artefact scatters were documented along the length of the 13.06km survey. The site lies at least 4.2km from the nearest coastline and is therefore outside of the 0-500m zone from the beach where most of the known shell middens occur.

Given the above, a significance rating<sup>6</sup> of 3C was given to the quartzite flake and calcrete deposits found on the property. The ruin of the Ondervloer farm opstal was also commented on despite falling outside the proposed development area. This ruin is addressed further in **Section 3.3.3** of this report.

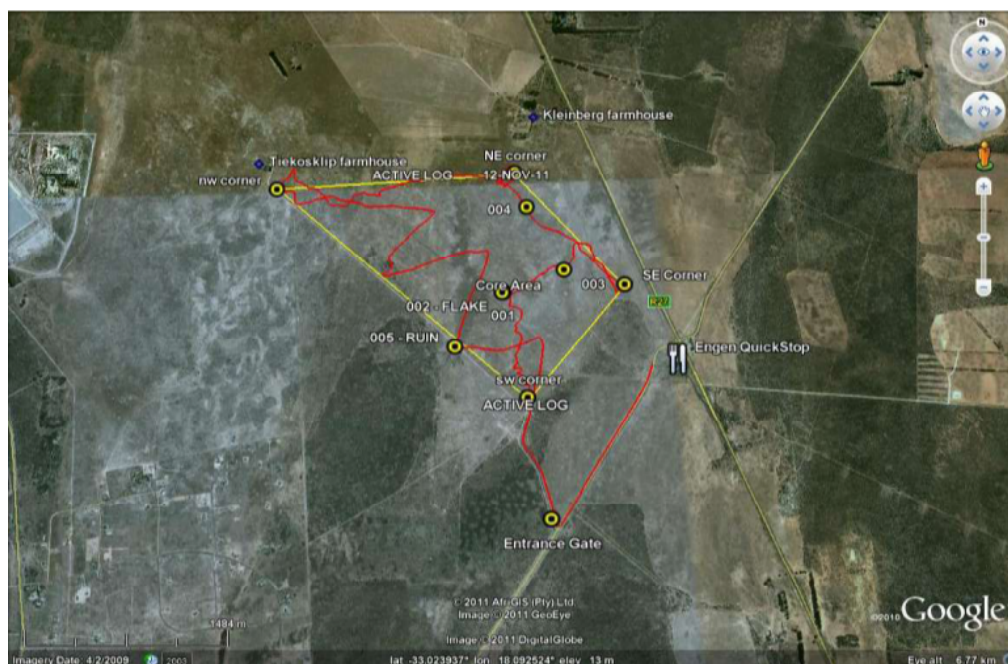


FIGURE 4: Track path of the archaeological site inspection (in red) with observation points in yellow, including the site of the quartzite flake discovery and the Ondervloer ruined opstal.

### 3.2.2. Palaeontological Significance

A palaeontological specialist study of the property was undertaken very recently by Dr John Almond. (Almond: **Annexure B**). This study found the development area to be entirely underlain by highly calcretised calcareous dune deposits of the Langebaan Formation (Sandveld Group) of probable Pleistocene age. These sediments form an extensive hard limestone pan exposed at or near the surface throughout the area, locally mantled by thin, unconsolidated quartzose sands and soils. In other parts of the West Coast, these formations are known to host rich assemblages of Pleistocene mammalian and marine fossils, microfossils, plant root traces, as well as some human skeletal remains and trackways (E.g. “Eve’s Footprints” at Langebaan Lagoon). Overlying silica sands are of low palaeontological sensitivity.

<sup>6</sup> In terms of the SA Heritage Resources Agency’s significance ratings for heritage sites.

While field assessment of the property did reveal abundant fossil shells of tiny non-marine snails and some trace fossils (e.g. plant root structures) embedded within the surface calcretes, no vertebrate remains were seen. Given the flat nature of the terrain, the prospect of bone beds associated fossil hyaena dens appears to be low. Therefore, pending the possible discovery of vertebrate material associated with buried palaeosurfaces, the fossil heritage on the property has been rated of low local significance.

### 3.2.3. *Conclusions*

The site appears to have low archaeological and palaeontological potential. The archaeological consultants therefore recommend that development of the solar farm can proceed subject to the recommendations in **Chapter 8** of this report.

## 3.3. Other Resources with potential Visual Impact Implications

A number of farmsteads fall within the viewshed of the proposed development. These include the Kleinberg, Tiekosklip and ruined Ondervloer farm werfs. The architectural/aesthetic significance of these werfs are examined in order to determine whether or not they constitute heritage settings that would be negatively affected by visual impacts from the proposed development.

### 3.3.1. *Kleinberg Farm werf*

The Kleinberg opstal comprises a number of scattered buildings including two much altered (suspect early 1900's) modest corrugated iron roofed dwellings, two barns, a number of kraals and animal pens. (**Figure 5** overleaf). Most of the structures have been built using roughly dressed and plastered calcrete (limestone rag), which is plentiful in the area as confirmed in the palaeontological specialist study (refer **Section 3.2.2**). The werf has no particular spatial significance although one of the barns, parts of which are now in a semi-ruinous state, does have architectural/historical significance. This building is recommended for grading as Grade 3B with the animal pens and kraals recommended as Grade 3C. The dwelling closest to the R27 is not recommended for grading. Recommended grading for the werf as a whole: Grade 3C.

The modest werf setting will not be negatively impacted on by the proposed PV installations due to: i) screening vegetation between this werf and the proposed development; and ii) due to the low heritage significance of the werf as a whole.

### 3.3.2. *Tiekosklip Farm werf*

The Tiekosklip farmstead is a relatively recent 'Prairie Style' house stylistically dating back to the 1960's. (**Figure 6**). This building is architecturally unexceptional and therefore not regarded as being of heritage significance. It has not been graded. Due to there being no heritage significance, there can be no visually negative heritage impacts from the proposed new development, even though parts will be visible from the homestead.





FIGURE 5: Kleinberg werf with examples of its scattered buildings. Clockwise from the top left: a much altered dwelling -early 20thC fanlight survives (not graded); Old barn: architecturally and historically the most interesting building on the werf: deteriorating. (Graded 3B); Stone kraal walls and animal pens (graded 3C). The werf as a whole is recommended as Grade 3C. O



FIGURE 6: The Tiekosklip farm homestead, which is not older than 60 years, and has not been recommended for grading.

### 3.3.3. Ondervloer Farm opstal (ruined).

This site consists of a single ruined homestead with no other structures evident. (Figure 7 overleaf). This building contains surviving elements that date, stylistically, to the late 1800's, but also include some subsequent 20thC additions. It has an interesting plan configuration with animal stalls attached to the dwelling in the tradition of earlier pioneer dwellings (which this is not). External rebates in the late 19thC window frames indicate the previous presence of shutters, while the positions of the rafter pockets in the single surviving end gable suggest a previous thatched roof. The quality of the dressed calcrete is of considerably better quality than that found at Kleinberg.



FIGURE 7: Top: the Ondervloer farm homestead located close to the site boundary but off the site. The building is most likely older than 100 years. Bottom: Image taken from the loft door opening looking down into the interior towards the kitchen hearth. The walls are constructed from semi-dressed calcrete of good quality. This structure is regarded as an interesting (historical) archaeological site and could quite probably be graded 3B in these terms. It has not been graded as an architectural heritage resource.

This site has clearly been uninhabited for decades. Given that the building is ruined and likely to be older than 100 years, it is regarded as an archaeological, rather than architectural heritage resource in terms of the NHRA. It has therefore not been graded as such, although it may well deserve grading as an archaeological resource.

It is the building, rather than any particular setting that is therefore of interest. Consequently, this site is not regarded as sensitive to visual impacts from proposed new development on the adjacent property provided that access to the ruin for research purposes is not inhibited.

Given the age of this ruin and its remote location, the presence of human burials in its vicinity (including on the development site itself) cannot be discounted.

### 3.4. Heritage Statement Summary

i) *Architectural, Historical, Social, Spiritual & Technological significance:* The property constitutes vacant, formerly cultivated farmland in the process of repopulation by non-endangered pioneer botanical species. It contains no structures (other than a number of high voltage Eskom pylons), and has never been developed. A number of historical

structures and one ruin exist just beyond its boundary. The property is therefore regarded as having no architectural and technological significance, and no particular historical, social significance. There is also *no evidence to suggest that the site has any form or spiritual significance*.

ii) *Aesthetic/Spatial Significance*: Although the property occupies a strategic position along the west side of the R27, this report finds that this stretch of the R27 and the surrounding landscape as identified in **Diagram 1** is not considered to be of any particular scenic value, other than that large portions remain open and largely undeveloped. Consequently, the site has no particular aesthetic significance, while the surrounding landscape is considered as being of *moderate to low aesthetic significance*.

iii) *Scientific & Archaeological Significance*: A botanical specialist investigation has revealed no botanical resources of particular scientific significance or of an endangered status. A Phase 1 AIA and a palaeontological study have found *no significant* material of archaeological/palaeontological interest.

#### 4. IMPLICATIONS RELATING TO DEVELOPMENT IMPACTS

Given that the spatial (aesthetic) context of the property and the stretch of the R27 within the study area is considered of moderate to low significance, it therefore follows that the receiving environment will have low to moderate sensitivity to visual impacts from development on the site, i.e. assuming that such development would not contrast dramatically with the character of the surrounding landscape.

#### 5. DESIGN INFORMANTS

Given the nature of the proposed development in which the design of the solar installation is largely predetermined by scientific and technical constraints, design informants for guiding context-sensitive development are understandably limited and can only be of a generalized nature. Flexibility in influencing the design of the installation to minimize visual impacts therefore relates largely to:

- location of the installation on the site;
- distribution pattern of the solar panels on the site;
- height of solar panels above mean ground level;
- design of perimeter fencing and landscaping, particularly as relating to the R27 and Langebaan road;
- lighting design on the site and its perimeter;
- billboard advertising and signage; and
- the general use of colour.

##### 5.1. Recommended General Design Informants

###### 5.1.1. *Location of the Installation on the Site*

The proposed installation should be set back sufficiently from the R27 and Langebaan road to enable sustainable perimeter buffer planting of at least 10m deep to be introduced. The setback of the proposed development relative to the common boundaries along the north and southwest boundaries is less critical, i.e. where such vegetation already exists. The introduction into these setbacks of new indigenous



vegetation to provide a naturally vegetated ground cover where sparsely populated, or where not existing at all, would be strongly encouraged.

#### 5.1.2. *Distribution of Solar Panels*

Where not affected by topographical or environmental constraints, the distribution of solar panels should be concentrated as tightly as possible so as to minimize the extent of the total development area. (This would probably be required anyway in order to maximize generation efficiencies).

#### 5.1.3. *Height of Solar Panels above Mean Ground Level*

The overall maximum height of solar panels should not exceed that of mature perimeter screening vegetation recommended for use within the study area. Given the largely flat nature of the terrain, this provision is seen as adequate.

#### 5.1.4. *Design of Perimeter Fencing and Landscaping*

The use of security walls and other solid perimeter barriers are to be avoided in favour of see-through fencing such as Betafence, Barker's Intesteel, or similar coated welded mesh security fencing systems finished to merge with the surrounding landscape. Perimeter landscaping should be designed to include sustainable vegetation reaching a mature height of at least 2m, as found within the study area landscape. This would include local indigenous bush species such as *Lyceum Afrum* (bokdoring) and *Euclea Racemosa* (kersbos), both of which have climatically adapted to a height of 2m on the West Coast. The use of perimeter berms would be discouraged as such features would be out of place within the context of the flat plain of the study area.

#### 5.1.5. *Operational and Security Lighting*

The use of external lighting should be carefully controlled to avoid spillage into surrounding areas, and to minimize impacts on nighttime views from the hilltops within the West Coast National Park. Operational free-standing lighting should be in the form of low-level light bollards or other low-level forms not exceeding 1m above ground level. All lighting is to be indirect, i.e. shaded or baffled to avoid lateral spread. High-level mast lighting and naked lights are to be avoided at all costs. Night security surveillance employing infra-red technology rather than orthodox incandescent/LED security lighting would be strongly encouraged.

#### 5.1.6. *Billboard Advertising and Signage*

Apart from a sign not exceeding 1,8 in overall height x 1,5m in width identifying the entrance to the installation off Langebaan Road, all other signage including billboard advertising is to be avoided throughout the site. This includes illuminated signage at night.

#### 5.1.7. *General Use of Colour*

The creative use of colour is an effective and relatively low cost means of reducing visual impacts on surrounding areas and would therefore be encouraged. The following should be considered:

i) The use of muted tones on external surfaces of ancillary buildings rather than high contrast colours (*including white*) would be encouraged. Roof surfaces would also benefit from such treatment in order to reduce visual impacts where looked down on from above.

ii) The use of colour to break up and/or scale down large masses, particularly where units would be more than single storey.

#### 5.1.8. *Services*

Overhead wiring and other similarly exposed services within the proposed development footprint should be avoided at all cost. The assessment of visual impacts from services onto the site from elsewhere is not considered in this report.

## 6. DESCRIPTION OF THE PROPOSED SOLAR INSTALLATION (As summarized from the EIA Final Scoping Report by CLES)

### 6.1. General Background to Solar Electricity Generation Facilities

The overarching objective for the solar park is to maximize electricity production through exposure to the solar resource, while minimizing infrastructure, operational and maintenance costs, as well as social and environmental impacts. The final design of the facility will be the product of site-specific assessments forming part of the over-arching EIA process.

The Renewable Energy Feed-in Tariff Process as advised by the National Energy Regulator of South Africa, selection processes, IRP from government, and the economics of the solar plant will be key in determining the final technology combination and the schedule of implementation for the facility.

Solar Photovoltaic Panels make use of the semi-conductor characteristics of Silicon to convert Solar Irradiation (sunlight) directly into electricity. This technology is proven and has been used both in photovoltaic applications as well as the electronic industry for the last 40 years, with major improvements in both reliability and cost, resulting from large-scale application especially in the computer industry over the last 20 years.

For large-scale installations such as proposed for the site, panels are typically configured in arrays forming grids within an open field condition to enable maximum sunlight to be harvested. (Refer to typical samples in **Figure 8** overleaf).

Solar PV electricity generation is said to be the most reliable of all the renewable energy technologies. It is the only solid-state technology i.e. directly converting sunlight into electricity. All other renewable technologies, including wind, biomass and other solar technologies are indirect technologies that must first be converted from sunlight to thermal or mechanical energy before producing electricity.

### 6.2. Description of the Solar Electrical Generation Park proposed for the Site

The proposed photovoltaic (PV) electricity generation park will include the following:





FIGURE 8: Examples of large solar park installations similar to what is proposed for the site. Panels are mounted on frames and located close to ground level at a fixed angle facing north to maximize solar exposure. Bottom image: the reflectivity of these panels is lower than that of water (compare to water surface of round dam on the right).

- One on-site substation per phase with the necessary infrastructure to feed the electricity generated into the Blue Water Bay, or alternatively advised Eskom substation;
- Solar panels angled at 25° at between 1,8m and 2,0m (maximum) above ground level; arranged in units with a generating capacity of approximately 300 MW. To be constructed in four phases;
- An initial 2 x 75MW installations constructed simultaneously and, possibly a further two installations of 75MW each thereafter. However, the preferred alternative is for the implementation of the initial two 75MW installations only. The total footprint would be approx. 500 ha if all four 75MW are implemented, and half of that for the two 75MW installations as preferred;
- An operations building to be contained within a 10000m<sup>2</sup> lay down area for each 75MW phase which could include a repair workshop, security office, O & M office, lunchroom, change room, and stores;
- A substation to consolidate the PV farm electricity feed prior to it going into the Eskom system.

The facility is proposed to include several arrays of photovoltaic (PV) panels using

Polycrystalline and thin-film solar cell technology with an ultimate generating capacity of approximately 300 MW. These arrays are to be constructed in phases, together with associated infrastructure. The units comprise blocks of photovoltaic arrays, mounted on pedestals, with a converter unit. These are supported by associated infrastructure, both permanent and temporary. Electricity will be fed to the ESKOM network on the northern edge of the park.

A double track management road, 6m wide and surfaced with gravel will surround each block of solar arrays. These roads will be used as access to service and maintain structures and to serve as fire breaks. The facility and associated infrastructure will be accessed via a 6 m wide paved road with direct access off the Langebaan to R27 tar road. An access gate and entrance with security will be constructed off the access from the Langebaan road.

Services will be obtained as follows:

- Water will be sourced from the Municipal water reticulation system
- Harvesting of rainwater from the PV panels was pursued but ultimately rejected as a serious option.
- All waste, including sewerage will be stored on site in closed temporary facilities and transported to the local authority licensed waste facility for disposal and treatment regularly.
- Incoming Electricity will be obtained from ESKOM.

It is anticipated that a full-time security, maintenance and control room staff will be required on site.

## 7. ASSESSMENT OF VISUAL & ARCHAEOLOGICAL IMPACTS

### 7.1. General Nature of Visual Impact on the Receiving Environment

In terms of DEADP's Guideline for VIA specialists in the EIA process, the proposed development is categorized as a Category 3 Development, i.e. of low density involving low-medium scale infrastructure.<sup>7</sup> Thus, the visual impacts from the proposed solar farm are considered, at most, to be *Moderate* (refer **Diagram 9** overleaf) given that the overall landscape context is regarded as of moderate to low scenic significance (re: Section 3.4 iii)). This means that one or more of the following visual impacts can be expected:

- i) Potentially some effect on protected landscapes or scenic resources; and/or
- ii) Some change to the visual character of the area; and/or
- iii) The introduction of new development, or additions to existing development in the area.

It is in fact argued that all of the abovementioned impacts would apply to some degree in that the development would constitute a recognizable feature within the

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<sup>7</sup> As per DEADP's Guideline for VIA specialists p11. Box 3: Key to Categories of Development. In fact, the development cannot be considered of medium or higher density as it involves structures not exceeding double storey, with more than 50% of the area retained as natural (undisturbed) open space (i.e. as per the definition for Category 3 development in the Guideline).

viewframe and experience of the receptor<sup>8</sup>.

Type of environment	Type of development (see Box 3) Low to high intensity				
	Category 1 development	Category 2 development	Category 3 development	Category 4 development	Category 5 development
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance / disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

FIGURE 9 indicating the nature of the receiving environment in relation to the development proposals. The shaded box indicates the overall nature of impact anticipated for a Category 3 development within an area of medium (to low) scenic significance.

## 7.2. Visual Absorption Capacity of the Development Area and its Spatial Context

The visual absorption capacity of the area is the potential of the landscape to conceal the project. A High VAC means that the area has a high capacity to absorb the visual impacts, e.g. by effectively screening the proposed development through the presence of natural vegetation, hilly topography etc.. A Moderate VAC means that the area has a moderate capacity to absorb visual impacts e.g. by partially screening the proposed development. A Low VAC means that the area has no, or low capacity to absorb visual impacts e.g. by offering little or no screening from the proposed development. The development area has a VAC ranging from High (at its northern end) to Low (along the southern parts of the R27 and parts of the Langebaan Road. This is indicated in **Figures 10 & 11**.

## 7.3. Description & Visual Impacts resulting from the Proposed Development Alternatives

Various development proposal alternatives involving different layouts have been proposed for the site over the past two years. These have now been refined to form two development alternatives, viz the Preferred Development Alternative (attached **Diagram 2**) and the Prior Development Alternative (attached **Diagram 3**).

### 7.3.1. Consideration of the No-Go Option

Should the PV generation farm not be constructed, there would obviously be no new visual impacts within the study area. However, the potential for generating much needed

<sup>8</sup> Without mitigation.

electricity through renewable, ecologically low-impact technology would then most likely go unrealized within the sub-region – particularly given that there appear to be new severe constraints on the placement of wind generation facilities in the area<sup>9</sup>. It should also be noted that even without the proposed development, the site is already visually compromised by a series of highly visible Eskom transmission towers crossing the site. The visual impact from these towers is considerably more than what would result from the proposed solar park.

Section 38(iii)(d) of the NHRA requires that impacts on heritage resources be measured against the sustainable social and economic benefits to be derived from the proposed development. Taking this into account, it is important to note that the current shortage of electrical power is a major constraint to industrial expansion within the substantial back of port and industrial development zones around Saldanha. Consequently, the lack of new power generation facilities within the Saldanha Bay area will have negative social and economic consequences for the sub-region and the country as a whole.

Given the above factors, the overall flat nature of the topography and the relatively low visual profile of the proposed installations, the no-go option is not regarded as a realistic option. It should also be noted that none of the other expert studies informing this HIA regard the proposed development as being fatally flawed.

### 7.3.2. The Prior Development Alternative (Diagram 3)

The Prior Development Alternative comprises four major development phases extending over four farms, viz. Phase A: Farm 183 (Waschklop), Phase B: Rem Farm 190 (Everts Hope); Phase C: Farm 191 Ptn 4 (Oliphantskop) and Farm 191 Ptn 5 (Oliphantskop). All farms affected are owned by Iscor Ltd (for Arcelor Mittal). Total coverage of the installation: 429,28 ha.

#### i) Visual Impacts:

LOCATION (Re: Diagram 01)	VISUAL ABSORPTION CAPACITY (VAC)	VISUAL IMPACTS (UNMITIGATED)	VISUAL IMPACTS (MITIGATED)
<b>R27 FREEWAY</b>			
VP 08	<b>Low</b>	<b>High</b>	Low-Moderate (with east and southeast perimeter planting) Confidence: <i>High</i>
VP 05	<b>Low</b>	<b>High</b>	Low-Moderate (with east perimeter planting) Confidence: <i>High</i>
VP 03&04	High	None (screened by existing vegetation)	None
<b>LANGEBAAAN ROAD</b>			
VP 06	<b>Low-Moderate</b>	<b>Moderate-High</b>	Moderate (with east, southeast and southwest perimeter planting). Confidence: <i>High</i>
VP 09	<b>Low</b>	<b>High</b>	Low-Moderate (with southeast and

<sup>9</sup> For example, recent objections from the Chief of the SA Air Force to any wind generation facilities within air force training airspace west of the R27.

			southwest perimeter planting). Confidence: <i>High</i>
<b>LANGEBAAWEG ROAD</b> VP 07 to intersection	<b>Low-Moderate</b>	<b>Moderate-High</b>	Moderate (with east, southeast and southwest perimeter planting). Confidence: <i>High</i>
<b>KLEINBERG WERF</b>	High	Low (setting of low-no heritage significance)	Low Confidence: <i>High</i>
<b>TIEKOSKLIP WERF</b>	Low	None (setting of no heritage significance)	None Confidence: <i>High</i>
<b>ONDERVLOER OPSTAL RUIN</b>	Low	None (setting of no heritage significance)	None Confidence: <i>High</i>

FIGURE 10. *Prior Development Alternative: Table summarizing visual impacts with and without mitigation.*

### 7.3.3. The Preferred Development Alternative (Diagram 2)

The Preferred Development Alternative is regarded as a considerable improvement on the Prior Development Alternative for the following reasons:

- This development layout allows for the retention of two low dunes (shaded green in **Diagram 02**) shaped through centuries of wind action and now stabilized by vegetation. Although not populated by botanical species of any significance, this is nonetheless considered a net environmental benefit.
- The EIA preferred development layout involves a reduction in development coverage from about 500Ha to about 250Ha and, therefore, a reduced development footprint. This will, however, only be apparent from the air and from the (relatively limited) reasonably accessible elevated viewpoints in the surrounding landscape.
- The reconfigured development footprint allows for greater setbacks from the R27 and Langebaan road, thereby presenting better opportunities for buffer planting as well as reduced visual impacts from two significant thoroughfares.

The reduced footprint affects two farms, viz: Farm 183 (Waschkclip) and Rem Farm190 (Everts Hope) as opposed to the four farms of the Prior Development Alternative.

#### i) Visual Impacts:

LOCATION (Re: Diagram 01)	VISUAL ABSORPTION CAPACITY (VAC)	VISUAL IMPACTS (UNMITIGATED)	VISUAL IMPACTS (MITIGATED)
<b>R27 FREEWAY</b> VP 08	<b>Low</b>	<b>Moderate-High</b>	Low-Moderate (with east and southeast perimeter planting)



VP 05 VP 03&04	<b>Low</b> High	<b>Moderate-High</b> None (screened by existing vegetation)	Confidence: <i>High</i> Low (with east perimeter planting) Confidence: <i>High</i> None
<b>LANGEBAAAN ROAD</b> VP 06 VP 09	<b>Low-Moderate</b> <b>Low</b>	<b>Moderate-High</b> <b>Moderate-High</b>	Moderate (with east, southeast and southwest perimeter planting). Confidence: <i>High</i>  Low (with southeast and southwest perimeter planting). Confidence: <i>High</i>
<b>LANGEBAAANWEG ROAD</b> VP 07 to intersection	<b>Low-Moderate</b>	<b>Moderate-High</b>	Moderate (with east, southeast and southwest perimeter planting). Confidence: <i>High</i>
<b>KLEINBERG WERF</b>	High	Low (setting of low-no heritage significance)	Low Confidence: <i>High</i>
<b>TIEKOSKLIP WERF</b>	<b>Low</b>	None (setting of no heritage significance)	None Confidence: <i>High</i>
<b>ONDERVLOER OPSTAL RUIN</b>	<b>Low</b>	None (setting of no heritage significance)	None Confidence: <i>High</i>

FIGURE 11. Preferred Development Alternative: Table summarizing visual impacts with and without mitigation.

#### 7.3.4. General Observations

- i) Although the VAC of the development area as experienced from certain viewpoints is high, this can be dramatically increased with perimeter mitigation planting given the low visual profile of the proposed development and the general flatness of a large part of the terrain.
- ii) The study area and its surrounding landscapes are not regarded as being of great heritage significance. Consequently, it can be argued that visual impacts for *both* alternatives can be brought within acceptable levels with appropriate mitigation.
- iii) The Preferred Alternative is nonetheless favoured because mitigation would be more easily achieved. This is because the greater road setbacks would provide better opportunities for buffer planting. Other advantages of this alternative over the Prior Alternative are lower development coverage (although this would only be appreciated from the air or from very high ground); and the retention of certain naturally evolved dune forms on the site (although this latter advantage is not strictly heritage-related).
- iv) Visual impacts on areas within the flat open plains spatial system will not be difficult to mitigate given the low visual profile of the development (maximum 2m for solar panels and 1,5 storeys for buildings) making them relatively easy to screen from ground level.

- v) The widespread presence of exotics such as blue gums and indigenous bushes including kersbos, mean that screen planting using these and other tall local species will not be at odds with the overall landscape character, particularly once reaching maturity.
- vi) Given the largely flat topography of the study area, the development layout associated with the Preferred Alternative would be discernable from surrounding high ground, rather than from within the flat plains on and around the site itself (assuming appropriate mitigation and adherence to the design informants in Section 5.1 of this report).
- vii) The site is by no means pristine in terms of its botanical populations, and taking into account the presence of high voltage Eskom power lines crossing the site. This is an important point in favour of considering the property for the proposed PV generation facility.
- viii) The reflecting properties of the PV panels that will make up most of the installation will be minimal (they are designed to absorb light, not reflect it). Consequently, they do not constitute an aviation hazard and are, indeed, installed around a number of airports in the USA and Europe without incident.

#### 7.4. Archaeological and Palaeontological Impacts

Specialist archaeological impact assessment and palaeontological studies has found the site to have low archaeological/palaeontological potential. This is elaborated on as part of the heritage statement in Section 3.2 of this study. Copies of the relevant studies are attached in **Annexures A&B**.

#### 7.5. Cumulative Visual Impacts

The proposed Aeolus solar energy facility earmarked for the site is one of a number of renewable energy generation facility applications considered for the West Coast region within the past few years. These are illustrated in **Figure 12** overleaf.

i) *The proposed Uyekraal Wind Farm*: The renewable energy generation application closest to the site is for a wind farm on the farm Uyekraal immediately adjacent on the northern boundary of the site, and west of the R27. (**Figure 13**). Although wind generators on Uyekraal would be visible from the site, the future of that application is in question given a directive from the Chief of the Air Force that no wind farms in this area would be tolerated, as they would fall within the training airspace of the SAAF's main flight training center at Langebaan. This has resulted in the Uyekraal application being suspended<sup>10</sup>. However, even if the Uyekraal project were to proceed, the Aeolus solar park would not be a significant factor contributing to cumulative visual impacts from the R27 and Langebaan roads. This can be stated with confidence, given the low physical profile of the solar park, the nature of the topography which would screen much of the Uyekraal project from the Langebaan road, and given the high probability that visual impacts from the solar park will be successfully screened by a combination of existing vegetation and planted buffer vegetation forming part of the recommended mitigation

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<sup>10</sup> As confirmed by Aurecon SA to the environmental consultants for this project, Cape Lowlands Environmental Services.

measures.

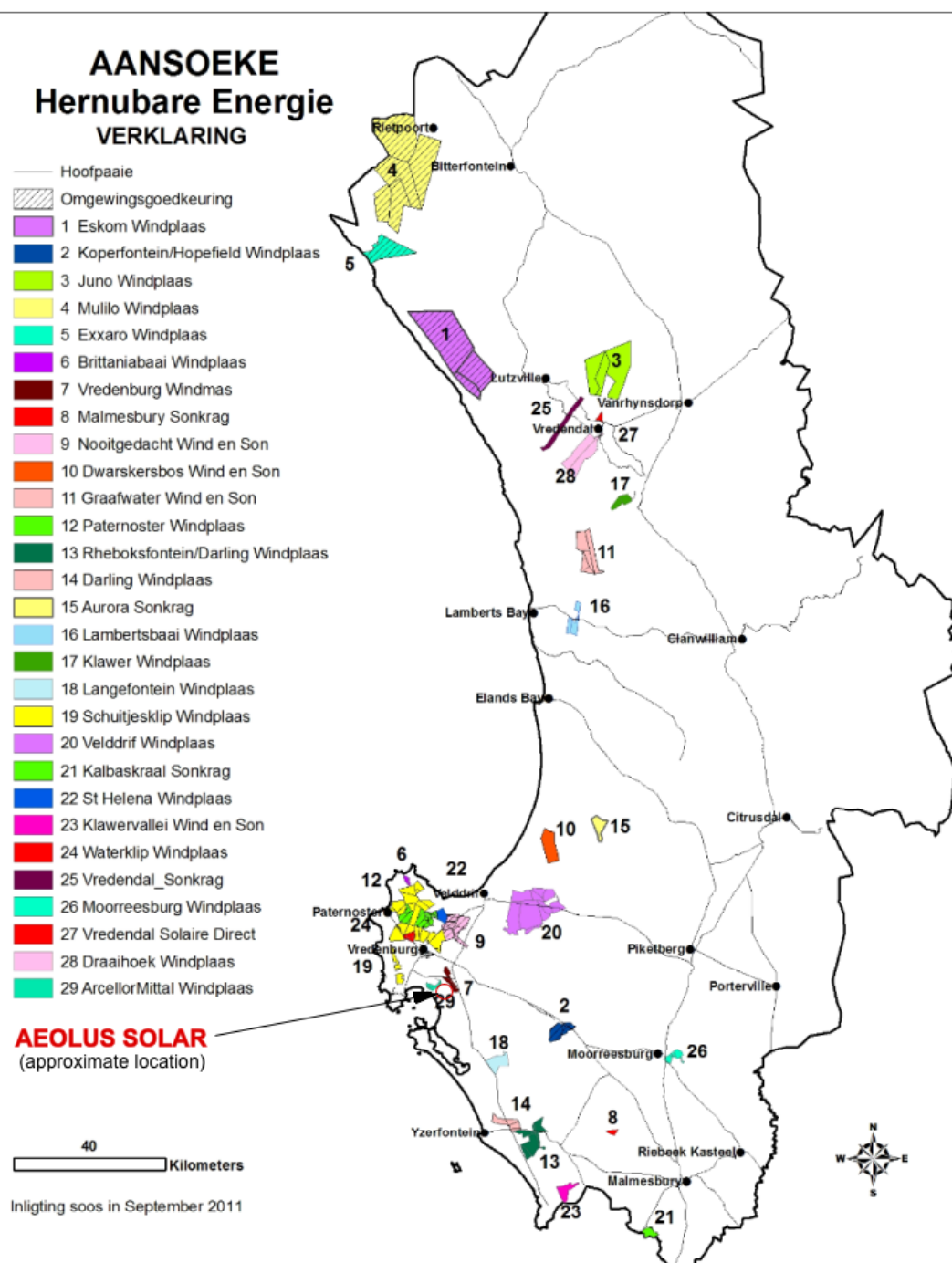


FIGURE 12: Map illustrating the locations of all renewable energy applications as of September 2011. The location of the site in question (Aeolus Solar) has been added in red. It should be noted that this map appears to indicate the full extent of each landholding affected and not the actual extent of the relevant development proposals. This is certainly the case with application No29 (Arcellor Mittal Windplaas) just north of the Aeolus site, and application No7 (Vredenburg wind mast). Both of these applications cover considerably less area than the relevant coloured in areas shown on the map above.

ii) *The Vredenburg Wind Mast*: Another application to be considered is that for a wind mast (presumably on Langberg Farm) on the opposite (east) side of the R27. This would involve the erection of a mast for wind monitoring purposes only, and does not involve another wind generation facility as proposed for Uyekraal. For similar reasons to those

provided above, the solar park will not contribute significantly to cumulative visual impacts within the area although this wind mast would probably contribute to the cumulative visual impacts associated with the Uyekraal project, should it ever proceed.

iii) *Schutjesklip Wind Farm*: This application is for a wind farm on property that, at its closest point, would be approximately 10 or more km from the northern extremity of the Aeolus solar park. Given the distance involved, and considering the factors already considered in i) above, the solar park cannot be regarded as contributing to cumulative visual impacts associated with this wind farm.

iv) *Nooitgedacht Wind Farm & Solar Park, Vredenburg*: The distance of this proposal would be at least 12 km, if not further, from the Aeolus solar park. Cumulative visual impacts are therefore not considered a factor for similar reasons provided in i), ii) and iii) above.

## 7.6. Visual Impacts on the West Coast National Park & other Protected Areas

The northern boundary of the West Coast National Park is just over 5km from the southern extremities of the site and, therefore beyond its 5km buffer zone<sup>11</sup>. However, the site does fall within the West Coast National Park Viewshed Protection Zone, albeit that the site is visible only from a very limited portion on the high ground overlooking the study area between the Karringberg and Wolwerug hilltops. This is likely to impact on nighttime rather than daytime views from the WCNP. Consequently, careful use of lighting and limitation of light spillage are important mitigation factors to be addressed.

In terms of the Saldanha Bay Municipal Spatial Development Framework (SBM SDF), the solar park is sited within a Transition Area (i.e. between Urban Area and Buffer Zones protecting Core Conservation Areas) (**Figure 13** overleaf). The nearest (and only) Core Conservation Area within the study area is the WCNP. Apart from nighttime views from limited portions of the national park, visual impacts from the solar park on conservation/protected areas as identified within the SBM SDF would be Low, with proper implementation of mitigation measures.

## 8. OVERALL CONCLUSIONS AND RECOMMENDATIONS

### 8.1. Conclusions

i). This study concludes that the development site, while occupying a strategic position at the intersection of the R27 and Langebaan roads, has some heritage significance only in as far as it forms part of a broader, largely undeveloped and largely open landscape of unexceptional aesthetic significance. Archaeological investigations so far indicate the site as having low archaeological significance.

ii). Visual impacts from the proposed Aeolus solar park on heritage resources (effectively the broader landscape, a few individual buildings and a ruin) can be kept comfortably within acceptable limits provided that mitigation as recommended in this study's design informants is properly implemented. This applies to both the Preferred and Prior Alternatives, although the Preferred Option is favoured. This is because its

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<sup>11</sup> In terms of SANParks's Management Plan for the West Coast National Park prepared in terms of NEMA, and the DEA Guidelines for Buffer Zones for National Parks.

reduced development footprint further mitigates visual impacts when viewed from higher surrounding areas. This applies in particular to views from the West Coast National park, even though such views are very limited.

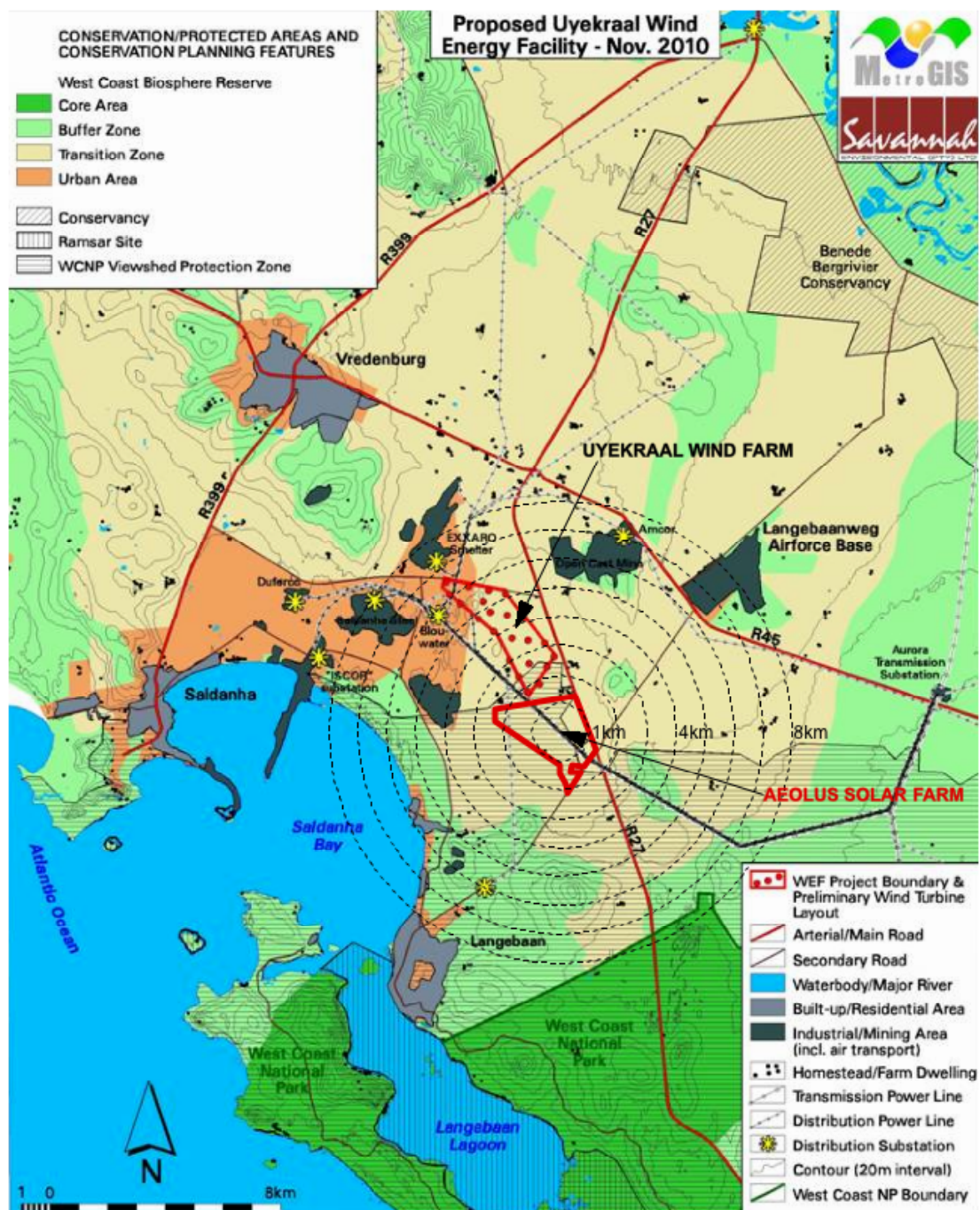


FIGURE 10: Map showing the location of the site in relation to the Uyekraal wind farm application and the boundary of the West Coast National Park. Note that the red boundary lines of the Aeolus Solar Farm indicate the boundary of the entire landholding and not the extent of the proposed solar farm. The extent of this is considerably less. (Superimposed onto a map prepared for the Uyekraal wind farm visual impact assessment: November 2010: Acknowledgements: MetroGIS (Pty) Ltd.). Conservation and protected areas are from the current Saldanha Bay Municipal SDF: approved: February 2011.

iii). Mitigation measures, as recommended in this report would be applicable from



the operational phase onwards. No mitigation of visual impacts on heritage resources is envisaged during the construction phase.

iv). No significant archaeological remains were found on the site by the consultant archaeologists, although the possibility of encountering further archaeological material on the site does exist. Full time archaeological monitoring is not considered necessary, given the shallow installation depth of the solar panels.

v). Cumulative visual impacts from the proposed Aeolus solar park on heritage resources are regarded as low, given the low physical profile of the development, and on the understanding that mitigation, as recommended in this study's design informants, is properly implemented.

vi). Visual impacts on the protected viewshed of the West Coast National Park is anticipated as low, provided that mitigation of potential nighttime light spillage, as recommended in this study's design informants, is properly implemented.

## 8.2. Recommendations

It is therefore recommended that this combined visual impact and archaeological/palaeontological assessment report for the proposed Aeolus solar park supporting the Preferred Alternative, be endorsed by HWC subject to the following conditions:

### 8.2.1. *Site Development Plan*

That the final site plan for the solar park be substantially in accordance with the Preferred Development Alternative as submitted in this report, in which case HWC should not deem it necessary to review further site development proposals for the property.

### 8.2.2. *Landscaping*

i). That a landscape plan be prepared by a qualified landscape architect with particular attention to the design and execution of sustainable perimeter buffer planting capable of screening the proposed solar park on all outer perimeters where not already adequately populated with such vegetation; and that this buffer planting, where recommended, should form an uninterrupted perimeter band of at least 10m deep, maturing at a height of at least 2m above ground level using local bush and tree species traditionally characteristic of the sub-region (i.e. including both indigenous and exotic species);

ii). That setbacks between road reserves and the new buffer planting be repopulated with indigenous ground cover where sparsely populated, or where no such vegetation currently exists; and

iii). That the landscape plan include proposals for security fencing that is visually permeable and designed to be sympathetic in scale, and merge visually with the surrounding landscape and vegetation.

### 8.2.3. *Plant & Services*

i). That the solar panels comprising the solar park not exceed 2m in height above

ground level;

ii). That all service buildings not exceed 1,5 storeys be finished in muted tones (including roof surfaces) to merge with the surrounding area, including vegetation; with flat roofs covered in natural stone chips or planted with vegetation to similarly merge with the broader context; and

iii). That no overhead wiring is to be permitted within the development footprint.

#### 8.2.4. *Lighting (including Security Lighting)*

i). That all lighting installations for the solar park be subject to a specially drawn up lighting policy aimed at minimizing unnecessary illumination and preventing light spillage; and that this include:

ii). Provisions for all lighting to be shielded to prevent light escaping upwards or out (laterally) over surrounding landscape;

iii). Ensuring that no light sources, i.e. naked globes, are visible away from the area they are meant to illuminate, with only reflected light being visible (this to include security lighting in particular);

iv). Placing emphasis on low level lighting such as bollard lighting with baffles, as well as lighting mounted on buildings, rather than mast-mounted lighting; and

v). Avoiding the use of translucent shielding, as well as high-mast lighting.

#### 8.2.5. *Billboard and Advertising Signage*

No billboard or advertising signage (including illuminated signage of any kind) will be permitted on the property, apart from a sign not exceeding 1,8 in overall height x 1,5m in width identifying the entrance to the installation off Langebaan Road.

#### 8.2.6. *General Use of Colour*

High contrast colours (including white) applied to the installation whether as a paint coating or other finish, are to be avoided.

#### 8.2.7. *Archaeological Considerations*

Should any burials, fossils or other archaeological material be encountered during the constructions, work must cease immediately and HWC archaeologists are to be contacted for further instructions.

GRAHAM JACOBS 20 January 2012

## 9. REFERENCES

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