

# **HERITAGE IMPACT ASSESSMENT: PROPOSED JUNO WIND ENERGY FACILITY ON DE BOOM 273/REMAINDER, VREDENDAL MAGISTERIAL DISTRICT, WESTERN CAPE**

HWC Case No.: 18030613AS0308E

*Report for:*

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On behalf of:

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1<sup>st</sup> draft: 03 October 2018  
Draft for comment: 16 October 2018  
Final report: 26 November 2018  
Revised report: 11 June 2019

# EXECUTIVE SUMMARY

## 1. Site Name

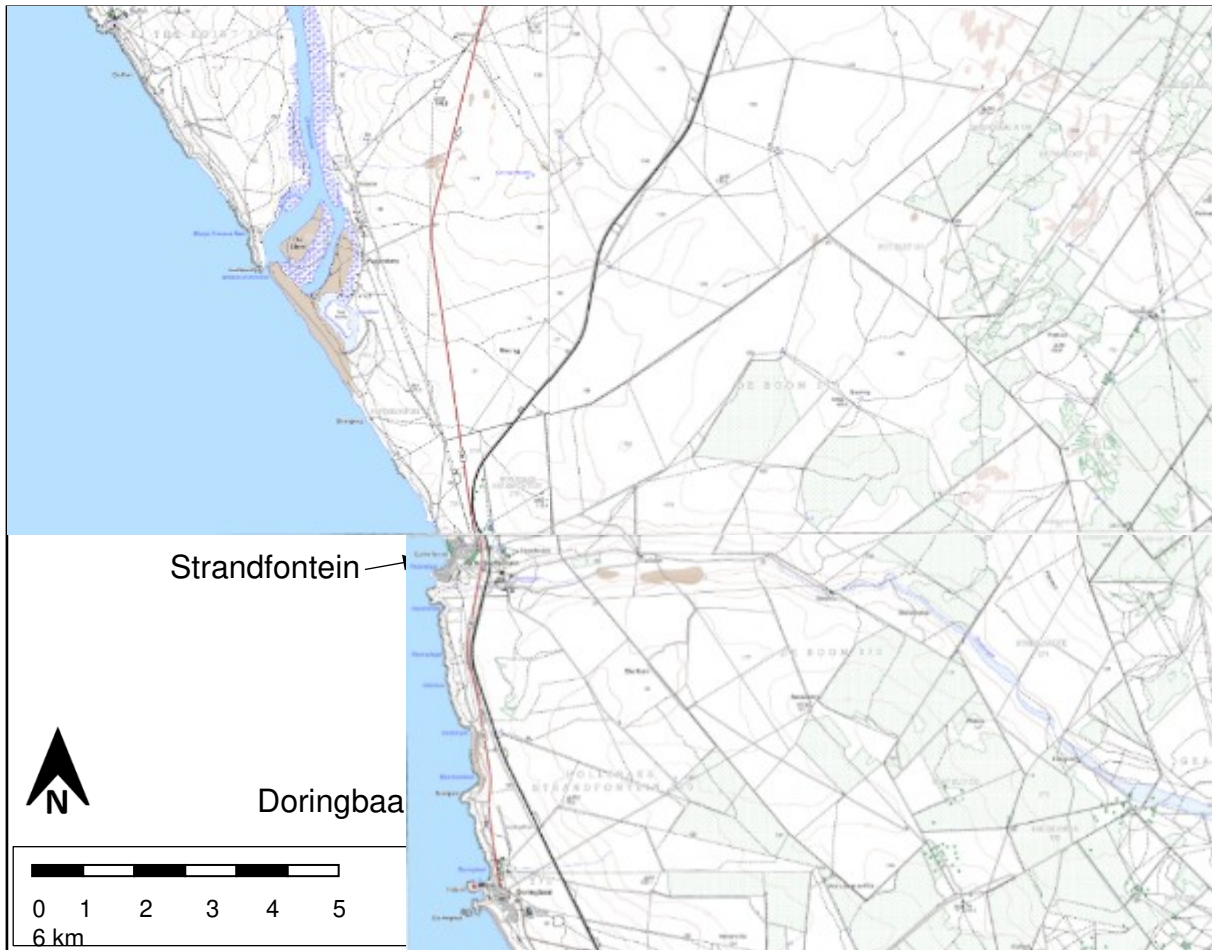
De Boom

## 2. Location

Remainder of De Boom 273, off R362 near Strandfontein, Vredendal Magisterial District.

The site would be centred on S31° 44' 00" E18° 18' 00".

## 3. Locality Plan



The site (Farm 273/rem) is shown by the red polygon.

## 4. Description of Proposed Development

It is proposed to construct a wind energy facility and associated on site infrastructure. The project is expected to have a 25 year life span, but with possible refurbishment this could be extended if deemed feasible at the time. The various components of the project are to be as follows:

- 49 wind turbines will be constructed depending on the generation output of the model chosen for implementation. Their capacities would be from 2.6 to 3.4 MW each with the a combined generation capacity for the facility of 140 MW:
  - o Maximum hub height to be 114 m high;
  - o Blade length to be up to 64.5 m and maximum rotor diameter 132 m;
  - o Maximum height at the tip of the blades to be up to 180 m;
  - o Turbine base area including hardstanding crane pads to be 0.6 ha;
  - o Navigation lights on top of turbines (if required);
- A 33/132 kV substation and transformers of 200 by 200 m and with a 2.4 m high enclosing wire mesh fence (two alternative locations have been proposed);
- An operations and maintenance building with parking of 2 ha;
- A permanent laydown area of 2 ha;
- A temporary laydown area of 2 ha;
- Internal roads totalling 50 km in length and 5.5 m width; and
- Internal power lines linking the turbines to be laid beneath the ground along the roads.

## 5. Heritage Resources Identified

No significant archaeological or palaeontological heritage resources were found to occur within the WEF footprint, although isolated background scatter artefacts were noted in places. A few archaeological sites of low or low-medium significance were found to occur within deflations in a dune field in the eastern part of the study area but all are avoided by the proposed development. Of more concern are a series of sites among rocky outcrops in the far south of the study area and which include several rock art sites. The northernmost ones are about 700 m from the nearest turbine. This area is treated as a precolonial cultural landscape which would experience visual/contextual impacts. Other cultural landscapes of concern are the Olifants River Valley with its extensive vineyards, the coastal cliffs and the historic settlements of Ebenhaeser and Papendorp. The most significance (Grade II) is the Olifants River valley agricultural area but it is largely screened by local topography and is about 12 km at it's nearest from the proposed facility and a ridge of high-lying ground lies between them providing partial screening.

## 6. Anticipated Impacts on Heritage Resources

No highly significant direct impacts to heritage resources are anticipated, although it is possible that isolated fossils or possibly unmarked graves might be uncovered during excavations. These cannot be predicted. The main impacts of concern relate to the two cultural landscapes identified in the vicinity of the study area. The precolonial landscape of occupation sites and rock paintings will be impacted contextually through the addition of wind turbines and related infrastructure. This landscape is not deemed to be highly significant because of the relatively limited archaeology present and the poor state of preservation of the rock art. Nevertheless, a 500 m buffer was placed on it from the river. This has resulted in a minimum 700 m distance between the sites and the turbines, the impacts are expected to be of fairly low intensity. Visual impacts to the cultural landscapes of the area are the key impacts of concern here. The historical cultural landscape of the Olifants River

Valley is highly significant but will be subjected to impacts of low intensity since the agricultural landscape is some distance away from the proposed project and separated from it by a ridge of high ground which provides screening. The Olifants River estuary, coastal cliffs and historic settlements of Ebenhaeser and Papendorp are viewed almost exclusively with the proposed WEF site behind the viewer, but some of these views would be towards the existing Eskom Sere WEF to the north of the Olifants River. While the project would be at least partially visible from both of these villages, there is a swathe of land in between them from which the project would not be visible.

## 7. **Recommendations**

From a heritage point of view, it is found that the project is acceptable and it is recommended that it can proceed. The following conditions should be included in the conditions of authorisation:

- The Sandlaagte River Valley should be avoided in totality with no infrastructure placed within 500 m of the centre of the valley;
- Any changes to the layout assessed in the EIA Phase should be evaluated from the desktop by an archaeologist prior to construction with any sensitive areas (e.g. deflation hollows) that might be impacted then being examined in the field;
- Best practice measures to reduce the visual impacts to the landscape should be implemented (e.g. minimising disturbance, minimising lighting, ensuring rehabilitation);
- A fossil chance finds procedure must be included in the EMP and any fossil finds made during construction must be reported to a palaeontologist for further assessment;
- If the need to reduce turbine numbers arises because of improvements in technology, then those nearest the R362 should be removed first; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist or palaeontologist as appropriate. Such heritage is the property of the state and may require excavation and curation in an approved institution.

## 8. **Author/s and Date**

Heritage Impact Assessment: Jayson Orton, ASHA Consulting (Pty) Ltd, 12 June 2019

Archaeological specialist study: Jayson Orton, ASHA Consulting (Pty) Ltd, 26 November 2018

Palaeontological specialist study: John Pether, 14<sup>th</sup> September 2018

Visual Impact Assessment: Zone Land Solutions, June 2019



## **CONTENTS OF THE SPECIALIST REPORT – CHECKLIST**

<b>Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6</b>	<b>Section of Report</b>
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a <i>curriculum vitae</i> ;	Section 1.4 & Appendix 1
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	page vi
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3
(cA) an indication of the quality and age of base data used for the specialist report;	Sections 3.1 & 3.2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 7.7, 7.8 & 7.9
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Sections 3.2, 3.3 & 3.4
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1.1.1
(g) an identification of any areas to be avoided, including buffers;	Section 11
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 44 & 45
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 6
(k) any mitigation measures for inclusion in the EMPr;	Section 7 & 8
(l) any conditions for inclusion in the environmental authorisation;	Section 12
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Sections 7 & 8
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 12
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 10
(p) any other information requested by the competent authority	n/a
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	n/a



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


### DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

### PROJECT TITLE

The Proposed 140MW Juno Wind Energy Facility, Western Cape Province

Specialist:	ASHA Consulting (Pty) Ltd		
Contact person:	Dr Jayson Orton		
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Professional affiliation(s) (if any)	ASAPA CRM Section member No. 233 APHP Professional Member No. 043		

Project Consultant:	ARCUS Consultancy Services South Africa (Pty) Ltd		
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E-mail:	021 412 1529	<a href="mailto:ashlinb@arcusconsulting.co.za">ashlinb@arcusconsulting.co.za</a>	

4.2 The specialist appointed in terms of the Regulations\_

I, Jayson Orton, declare that -- General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:



ASHA Consulting (Pty) Ltd

Name of company (if applicable):

12th June 2019

Date:

## Glossary

**Background scatter:** Artefacts whose spatial position is conditioned more by natural forces than by human agency

**Early Stone Age:** Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

**Handaxe:** A bifacially flaked, pointed stone tool type typical of the Early Stone Age.

**Hardpan:** A hardened soil horizon generally buried beneath the topsoil.

**Holocene:** The geological period spanning the last approximately 10-12 000 years.

**Hominid:** a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

**Heuweltjie:** An ancient termitarium.

**Later Stone Age:** Period of the Stone Age extending over the last approximately 20 000 years.

**Midden:** Essentially a refuse heap, with coastal examples being strongly dominated by marine shells.

**Middle Stone Age:** Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

**Pleistocene:** The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

## Abbreviations

**AMSL:** Above mean sea level

**APHP:** Association of Professional Heritage Practitioners

**ASAPA:** Association of Southern African Professional Archaeologists

**CRM:** Cultural Resources Management

**ECO:** Environmental Control Officer

**EIA:** Environmental Impact Assessment

**ESA:** Early Stone Age

**GPS:** global positioning system

**HIA:** Heritage Impact Assessment

**HWC:** Heritage Western Cape

**LSA:** Later Stone Age

**MSA:** Middle Stone Age

**NEMA:** National Environmental Management Act (No. 107 of 1998)

**NHRA:** National Heritage Resources Act (No. 25) of 1999

**NID:** Notification of Intent to Develop

**PPP:** Public Participation Process

**SAHRA:** South African Heritage Resources Agency

**SAHRIS:** South African Heritage Resources Information System

**VIA:** Visual Impact Assessment

**WEF:** Wind Energy Facility

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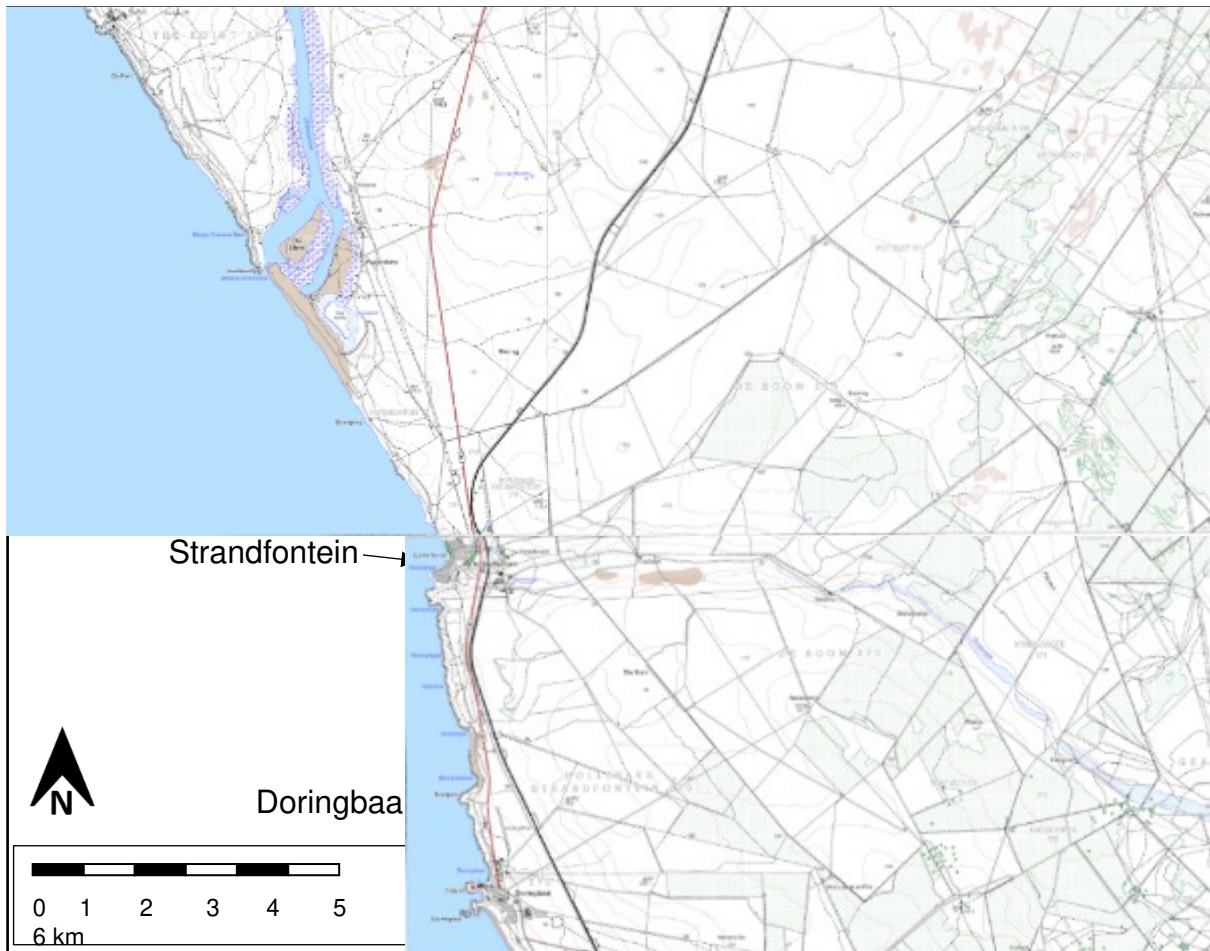
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# 1. INTRODUCTION

ASHA Consulting (Pty) Ltd (hereafter ASHA) was appointed by ARCUS Consultancy Services South Africa (Pty) Ltd (hereafter ARCUS) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of the Juno Wind Energy Facility (WEF) just inland of Strandfontein on the north-western coast of Western Cape (Figure 1). The site lies on the farm De Boom 273/remainder and is within the Vredendal Magisterial District. It would be centred on S31° 44' 00" E18° 18' 00". The assessment was to be conducted within the context of a full Scoping and Environmental Impact Assessment (EIA)<sup>1</sup>.



**Figure 1:** Extract from 1:50 000 topographic mapsheets 3118CA, 3118CB and 3118CC&CD showing the location of the study area (red polygon). Source: Chief Directorate: National Geo-Spatial Information. Website: [www.ngi.gov.za](http://www.ngi.gov.za).

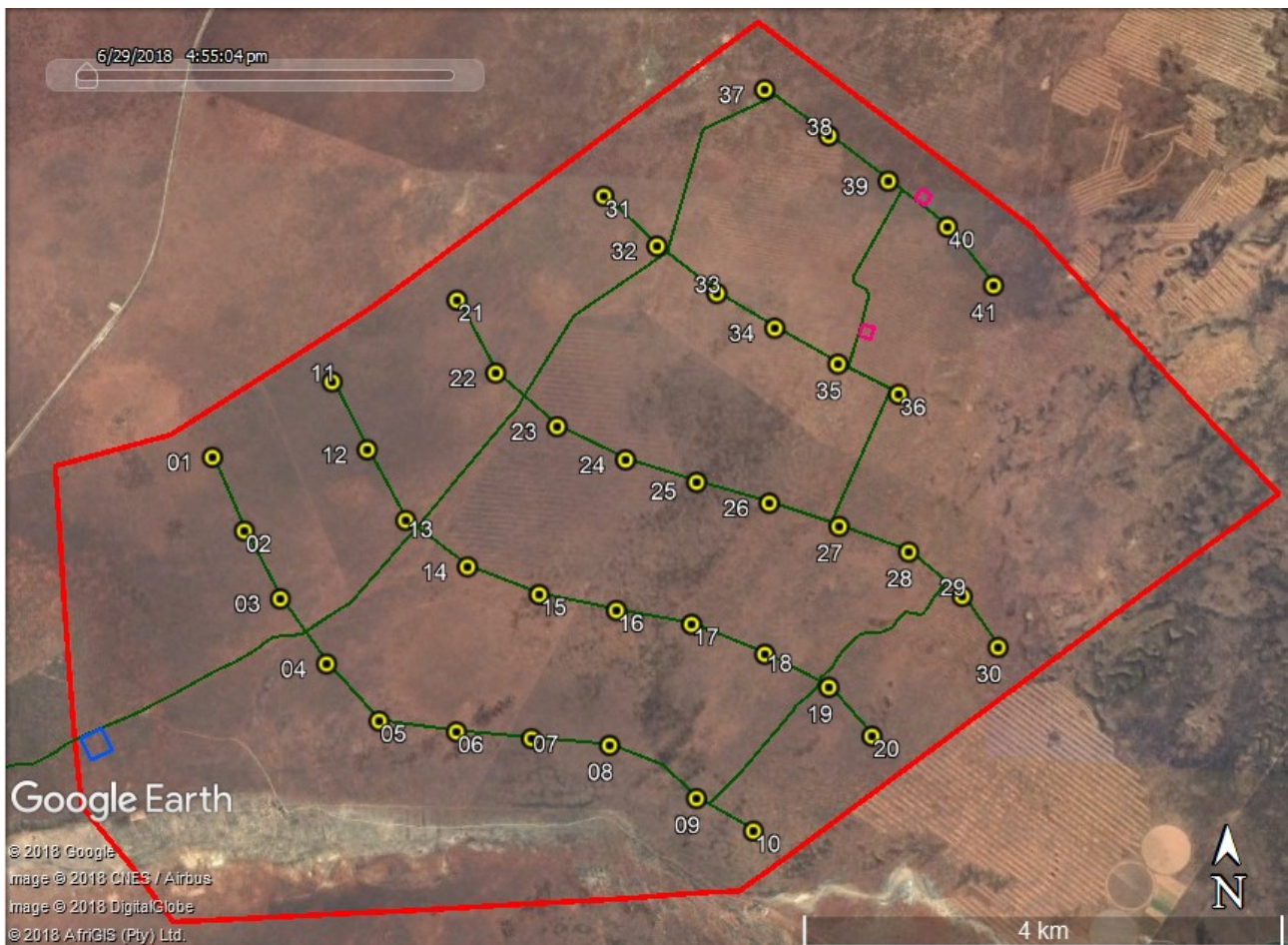
## 1.1. Project description

It is proposed to construct a wind energy facility and associated on site infrastructure. The project is expected to have a 25 year life span, but with possible refurbishment this could

<sup>1</sup> Note that this report has been revised after an appeal against the Environmental Authorisation issued for the project by the Department of Environmental Affairs on 30 April 2019.

be extended if deemed feasible at the time. The various components of the project would be as follows:

- 49 wind turbines will be constructed depending on the generation output of the model chosen for implementation. Their capacities would be from 2.6 to 3.4 MW each with the a combined generation capacity for the facility of 140 MW:
  - Maximum hub height to be 114 m high;
  - Blade length to be up to 64.5 m and maximum rotor diameter 132 m;
  - Maximum height at the tip of the blades to be up to 180 m;
  - Turbine base area including hardstanding crane pads to be 0.6 ha;
  - Navigation lights on top of turbines (if required);
- A 33/132 kV substation and transformers of 200 by 200 m and with a 2.4 m high enclosing wire mesh fence (two alternative locations have been proposed);
- An operations and maintenance building with parking of 2 ha;
- A permanent laydown area of 2 ha;
- A temporary laydown area of 2 ha;
- Internal roads totalling 50 km in length and 5.5 m width; and
- Internal power lines linking the turbines to be laid beneath the ground along the roads.



**Figure 2:** Aerial view of the study area (red polygon) showing the proposed layout. Black and yellow dots represent turbine locations, green lines are roads, the pink squares are substation alternatives and the blue square in the west is a laydown area and construction camp.

### 1.1.1. Aspects of the project relevant to the heritage study

All aspects of the proposed development are relevant since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

## 1.2. Terms of reference

ASHA was appointed by ARCUS to produce a heritage impact assessment (HIA) for the proposed development. The study was to include desktop research as well as a field study. Fieldwork was to be undertaken at scoping phase so as to identify early on and constraints that should be accounted for in devising a final layout for the EIA phase of the project.

As part of the scoping phase a Notification of Intent to Develop (NID) was submitted to HWC. Their response indicated the following:

**CASE NUMBER: 18030613AS0308E**

The matter above has reference.

Heritage Western Cape is in receipt of your application for the above matter received on 07 March 2018. This matter was discussed at the Heritage Officers meeting held on 19 March 2018.

You are hereby notified that, since there is reason to believe that the proposed development will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of section 38(3) of the NHRA be submitted. This HIA must have specific reference to the following:

- Impacts to archaeological heritage resources
- Impact to palaeontological heritage resources
- Visual impacts to the cultural landscape

The required HIA must have an integrated set of recommendations.

The comments of relevant registered conservation bodies and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

## 1.3. Scope and purpose of the report

An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the Department of Environmental Affairs (DEA) who will review the EIA and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

## 1.4. The author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting HIAs and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

## 1.5. Declaration of independence

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

## 2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “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”;
- Palaeontological material: “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”;
- Archaeological material: a) “material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures”; b) “rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof,



which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;

- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value; some of these speak directly to cultural landscapes.

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. HWC is required to provide comment on the proposed project in order to facilitate final decision making by the DEA.

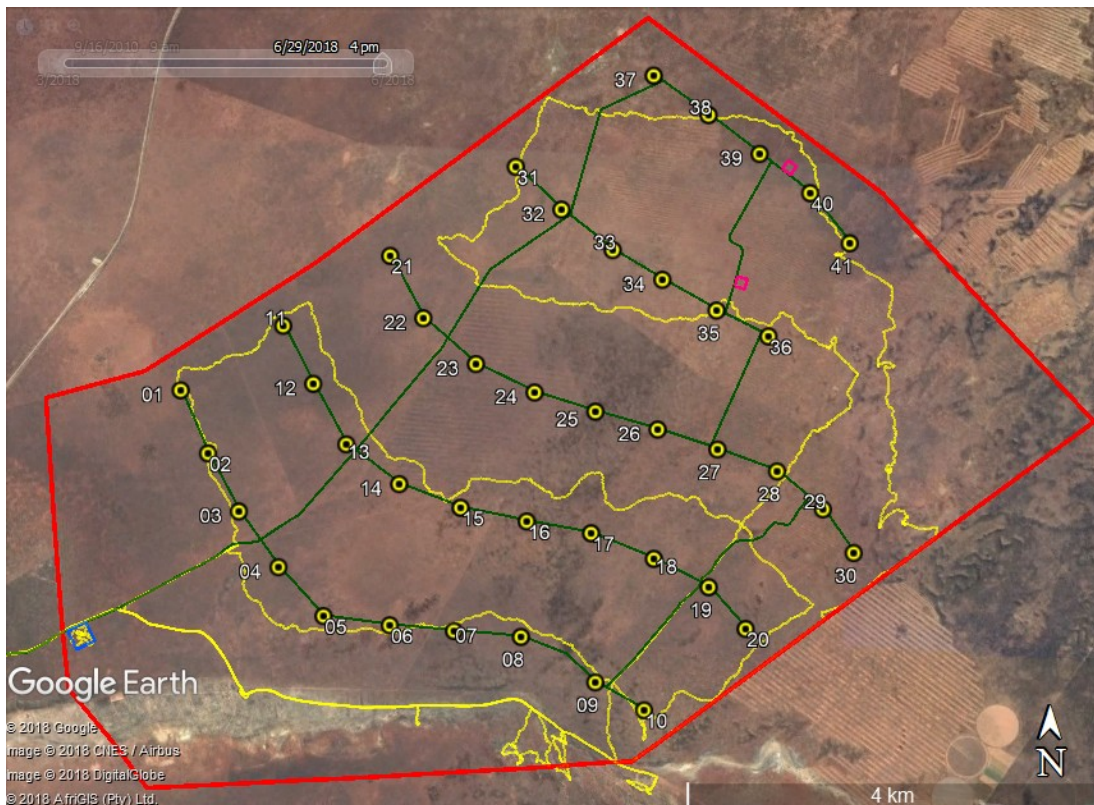
## **3. METHODS**

### **3.1. Literature survey and information sources**

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 map and historical aerial images were sourced from the Chief Directorate: National Geo-Spatial Information, while CapeFarmMapper was also used for current aerial imagery and cadastral details.

### **3.2. Field survey**

The preliminary layout was subjected to a detailed foot survey on 13<sup>th</sup> and 14<sup>th</sup> March 2018 (Figures 3 & 4). This was in late summer, although in this relatively dry part of the country seasonality makes little or no difference to the vegetation cover and hence ground visibility. During the survey the positions of finds were recorded on a hand-held Global Positioning System (GPS) receiver set to the WGS84 datum. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development. It should be noted that the survey focused strongly on the supplied layout with relatively little work in other areas. However, extra emphasis was placed on looking at more ground in the east (where dunes and deflations were noted to occur) and in the far south (where rocky outcrops along the valley margin were likely to be sensitive).



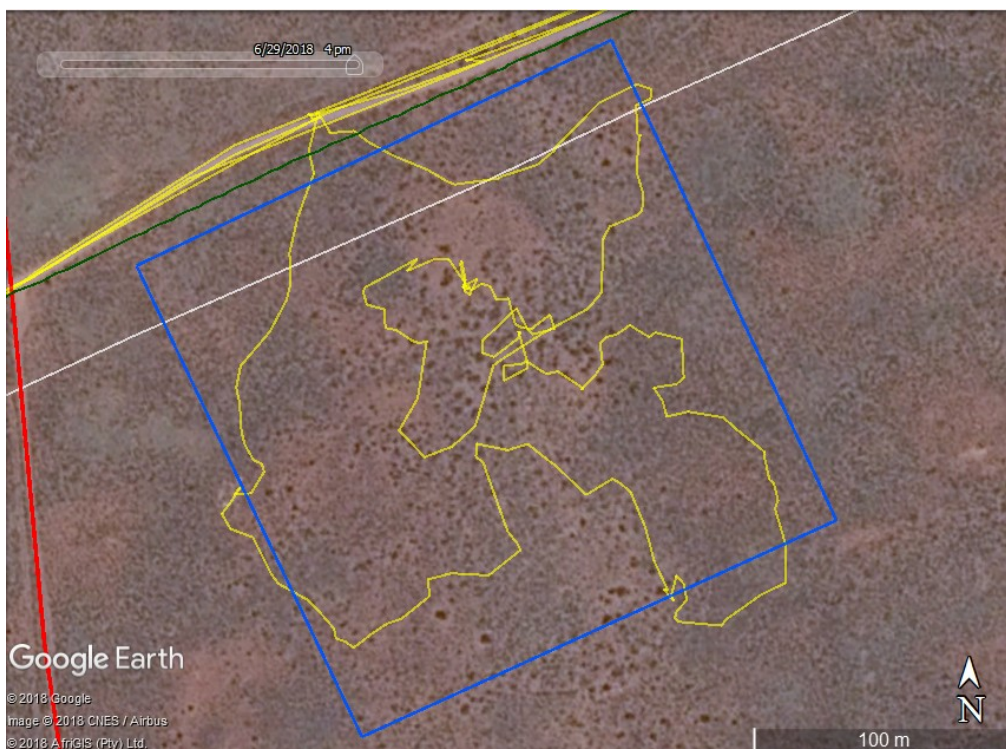
**Figure 3:** Aerial view of the study area (red polygon) showing the proposed facility layout (black and yellow dots and green lines) and the walk paths (yellow lines). Note that the survey tracks do not match the layout because the layout was revised based on scoping inputs.

### 3.3. Specialist studies

Three specialist studies were requested by HWC. The archaeological study was carried out by the present author and is included within the body of the HIA. The palaeontological study was carried out from the desktop by John Pether and includes both the wind energy facility (assessed in this report) and its grid connection which will be assessed in a separate application. The visual impact assessment was done by Claasen & Voschenk. Both of the latter reports are summarised within the HIA and appended in full.

### 3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a scale supplied by ARCUS.



**Figure 4:** Aerial view of the construction camp and laydown area (pink polygon) with the survey paths (yellow lines).

### 3.5. Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. Heritage Western Cape (2016), however, uses a system in which resources of local significance are divided into Grade IIIA, IIIB and IIIC. These approximately equate to high, medium and low local significance, while sites of very low or no significance (and generally not requiring mitigation or other interventions) are referred to as Not Conservation Worthy (NCW).

### 3.6. Consultation



The draft HIA was submitted to relevant interested and affected parties as required by HWC in their response to the NID application (Section 10). The report was also included in the main public participation process (PPP) required under NEMA as part of the EIA.

### **3.7. Assumptions and limitations**

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The site was very large and largely quite uniform. For these reasons the provided layout was assessed in the field with very little survey carried out away from the layout. An effort was made, however, to examine landscape features identified from aerial imagery as potentially more sensitive. The distribution of sites found is assumed to be representative of the area in general with the data suitable for assessing impacts.

## **4. PHYSICAL ENVIRONMENTAL CONTEXT**

### **4.1. Site context**

The study area lies between 2.3 and 12.6 km inland of the coast. The town of Strandfontein lies on the coast immediately west of the study area. At its closest point it is 6.5 km southeast of the Olifants River mouth. The area is rural in nature and comprised of a combination of old disused lands and unploughed terrain. It is presently only used as grazing for small stock. Existing infrastructure on the site is limited to a large asbestos/fibre cement shed, some water tanks and troughs, fences and farm tracks. Between the study area and Strandfontein town lies the Sishen-Saldanha Railway, the R362 road, the town refuse dump and water treatment works.

### **4.2. Site description**

The site is on a relatively flat, sandy plain. Parts of the site were ploughed in the past, as revealed by aerial photography, but this is not at all evident on the ground. The vegetation cover over most of the site is quite homogenous and is largely waist-high and sparsely distributed (Figure 5). There is a belt of low 'dunes' running from north to south in the central part of the study area. These are almost certainly in fact ancient termitaria (*heuweltjies*) that are covered in more recent aeolian sand. These varied in the density of vegetation, perhaps dependent on the depth of covering sand (Figures 6 & 7). In the eastern part of the study area there was a belt of proper sand dunes, a very few of which had developed deflation hollows in them (Figure 8).

While the vast majority of the study area is mantled in sand, there are patches in the southern part, along the north bank of the Sandlaagte River, where calcrete is exposed. This was always present as crumbled fragments with no solid outcrops noted at all (Figure 9). Within the Sandlaagte Valley the vegetation was slightly denser than over the remainder of the study area.

The vicinity of the construction camp and laydown area was comprised of harder soil (probably exposed hardpan) with occasional tiny dunes and more succulent vegetation that was seldom more than knee-height (Figure 10).



**Figure 5:** View towards the southeast across the north-western part of the site showing the very uniform vegetation cover there.



**Figure 6:** View towards the southwest in the central part of the study area showing lighter vegetation cover on an area with low dunes (very likely sand covered heuweltjies).



**Figure 7:** View towards the west in the central part of the study area showing denser vegetation cover on an area with low dunes (very likely sand covered heuweltjies).



**Figure 8:** View towards the southeast of one of the more prominent deflation hollows in the eastern part of the site.



**Figure 9:** Some parts of the WEF area in the south were noted to have exposed calcrete.



**Figure 10:** Construction camp and laydown area.



## 5. ARCHAEOLOGICAL AND HISTORICAL CONTEXT

This section of the report contains the desktop study and establishes what is already known about the archaeological heritage in the vicinity of the study area. This will assist in the interpretation and understanding of the newly reported material.

### 5.1. Archaeological aspects

While the Namaqualand coastline to the north (Dewar 2008; Dewar & Orton 2013; Orton 2012b, 2016a) and Elands Bay to Lamberts Bay area to the south (e.g. Buchanan 1988; Jerardino 2003, 2010, 2012; Orton 2006; Parkington 1988, 1990; Parkington & Porraz 2016) are very well researched, the vicinity of the present study area is very little known. Yates (2003) documented a set of shell sites on a low hill with outcropping bedrock 800 m west of the western boundary of the study area and, although he did not survey there, noted the high probability that archaeological sites might be found along the Sandlaagte River valley which falls within the southern edge of the present study area. The sandy slopes leading northwards towards the Olifants River were found to have very little archaeology on them but close to the river a silcrete outcrop was found to have been extensively quarried by Stone Age people.

Just north and south of Doringbaai another survey revealed extensive disturbance of the coastal zone but that many LSA shell scatters and middens were present on the southern of the two headlands at Doringbaai (Webley & Halkett 2016). Halkett (2000) also reported several sites from the same general area. These include shell and artefact scatters that include MSA artefacts as well as a small rock shelter with an LSA midden deposit in it located on the coast 2.5 km south of Strandfontein. Further south of Doringbaai, Halkett and Hart (1995) reported a number of sites with most being relatively ephemeral occurrences. However, a rocky hill with disturbed rock shelters and an extensive artefact scatter over it were recorded 6.5 km southeast of the town while a large but thin shell midden was found 0.6 km from the southern edge of town. They also noted the presence of Pleistocene-aged material on the hardpan around the margins of borrow pits in the area.

Midway between Doringbaai and Lambert's Bay Kaplan (2016) noted the presence of shell scatters and middens along the coast. A little further south, Jerardino *et al.* (2014) recorded and described a number of sites associated with a rocky outcrop 3.5 km inland. These included shell middens, artefact scatters and rock art sites. The latter included both fine-line tradition and geometric tradition paintings. Interestingly, the latter was present in four sites with the same image (circle/square enclosing vertical lines) painted in each case. On the coast in the same area several shell middens have been sampled and described (Kaplan 1994; Orton 2013).

To the north Orton (2013) documented two rock art sites and noted the destruction of a large rock shelter deposit containing human remains on the north bank of the Olifants River. The rock art consisted largely of finger dots and can be ascribed to the geometric tradition (Eastwood & Smith 2005; Smith & Ouzman 2004). Surveys along the coastal cliffs to the north of the Olifants River have revealed many sites of varying age (Halkett 2000; Van Schalkwyk & Wahl 2007), although one survey found no sites at all (Hutten & Fourie 2009). Inland of this area Hart (2007) documented many shell scatters, some of which

were clustered around small pans some 3.5 km inland. Further north again, at Brand-se-Baai about 60 km northwest of the present study area, deflation hollows in dune fields have revealed a multitude of LSA stone artefact scatters dating throughout the last 6000 years (Orton 2015a, 2015b, 2015c, 2017a). An extremely important observation from this area consists of large numbers of Early Stone Age (ESA) artefacts visible on large areas of exposed hardpan. These scatters included numerous handaxes on a variety of materials and represented a unique opportunity to study this period of the Stone Age (Orton 2017b).

In the area north of Vredendal and Lutzville a few surveys have revealed the presence of artefacts associated with heuweltjies. Artefacts are generally found around the eroded bases of heuweltjies but sometimes are also stuck into them (Orton 2011, 2012a). The relationship between human occupation and heuweltjies remains unstudied, although it can be said that most artefacts stuck into the heuweltjies seem to be from the ESA. Also in the southern Knersvlakte, some important LSA and MSA sites have been documented along the Varsche River, some of them associated with limestone outcrops (Mackay *et al.* 2010; Orton, submitted; Orton *et al.* 2011; Steele *et al.* 2016), while ESA material is also known to occur in the area (Orton, personal observation).

## 5.2. Historical aspects

The area tends to have relatively few historical structures with Fransen (2004) only listing two – at Vredendal and to the southeast of Lutzville – in his book dealing largely with structures older than about 100 years. The primary town of the region, Vredendal, only dates back to 1933 with the wine and grape industry only taking off in the area shortly afterwards. Its name relates to the farm on which it was laid out. It became a municipality in 1963. Lutzville is a smaller town but is slightly older, dating to 1923, and is named after its founder Johan Lutz but was laid out on Vlermuisklip. Ebenhaezer is the oldest village in the area having begun as a Rhenish Mission Station in 1831 (Figure 11; Raper n.d.). It was later taken over by the Dutch Reformed Church (Burman 1970). Doringbaai and especially Strandfontein appear to be more recent towns, while the history of Papendorp, a small fishing village near the mouth of the Olifants River, could not be traced<sup>2</sup>.

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<sup>2</sup> Winter & Oberholzer (2013) cite Fransen (2004, 2006) in noting Papendorp to be a c. 1820 fishing/mission settlement but this reference could not be traced in either book.



**Figure 11:** View of Ebenhaezer as it was in 1840. Source: Africana Museum (in Burman 1970: opp. p.60).

The agricultural development of the area was only possible after the construction of the Bulshoek Dam which was completed in 1919. Canals built from this dam all the way to Ebenhaezer were completed in 1923 and allowed for the irrigation of huge tracts of land along the margins of the river. Although they were largely unlined at first, from 1952 the authorities began lining them with concrete and adding various improvements to the system as a whole. This canal was a major feat for it includes deep excavations into bedrock in places and long tunnels in others (Burman 1970). Although only a 20<sup>th</sup> century landscape, the agricultural landscape of the lower Olifants River valley is an important component of local history.

## 6. FINDINGS OF THE HERITAGE STUDY

### 6.1. Palaeontology

The surface geology in this area is expected to be largely of low palaeontological sensitivity which generally does not call for any specialist study of palaeontological impacts. Figure 12 shows that the project layout area is all of low sensitivity with the only more sensitive areas of the property being along its southern periphery where valley infill sediments of moderate to high sensitivity may be found. However, these low sensitivity surface sediments can overlie more sensitive sediments, especially in coastal and near-coastal environments. As such, HWC has requested a specialist assessment of palaeontological impacts.



**Figure 12:** Extract from the SAHRIS Palaeosensitivity map showing the surface sediments in the study area to be of generally low palaeontological sensitivity (blue shading). The river valley section along the southern boundary has moderate (green) and high (orange) sensitivity sediments but is excluded from the development footprint.

Pether (2018) notes that various surficial aeolian formations would potentially be affected by the proposed development. These include the Q2 heuweltjiesveld soil, the Koekenaap Formation coversands and the Hardevlei Formation dunes, varying thicknesses of the underlying “Dorbank” Formation semi-lithified aeolianites and, in places, the relatively-old, pedocreted Pliocene or early Quaternary aeolianites such as the Olifantsrivier Formation. All of these may contain fossil bones but they are expected to be rare. Due to this expected rarity, all of the formations are assigned a low palaeontological sensitivity by Pether (2018). Nevertheless, individual bones can still be of great scientific value as a record of the middle and late Quaternary fauna of the Namaqualand coast.

## 6.2. Archaeology

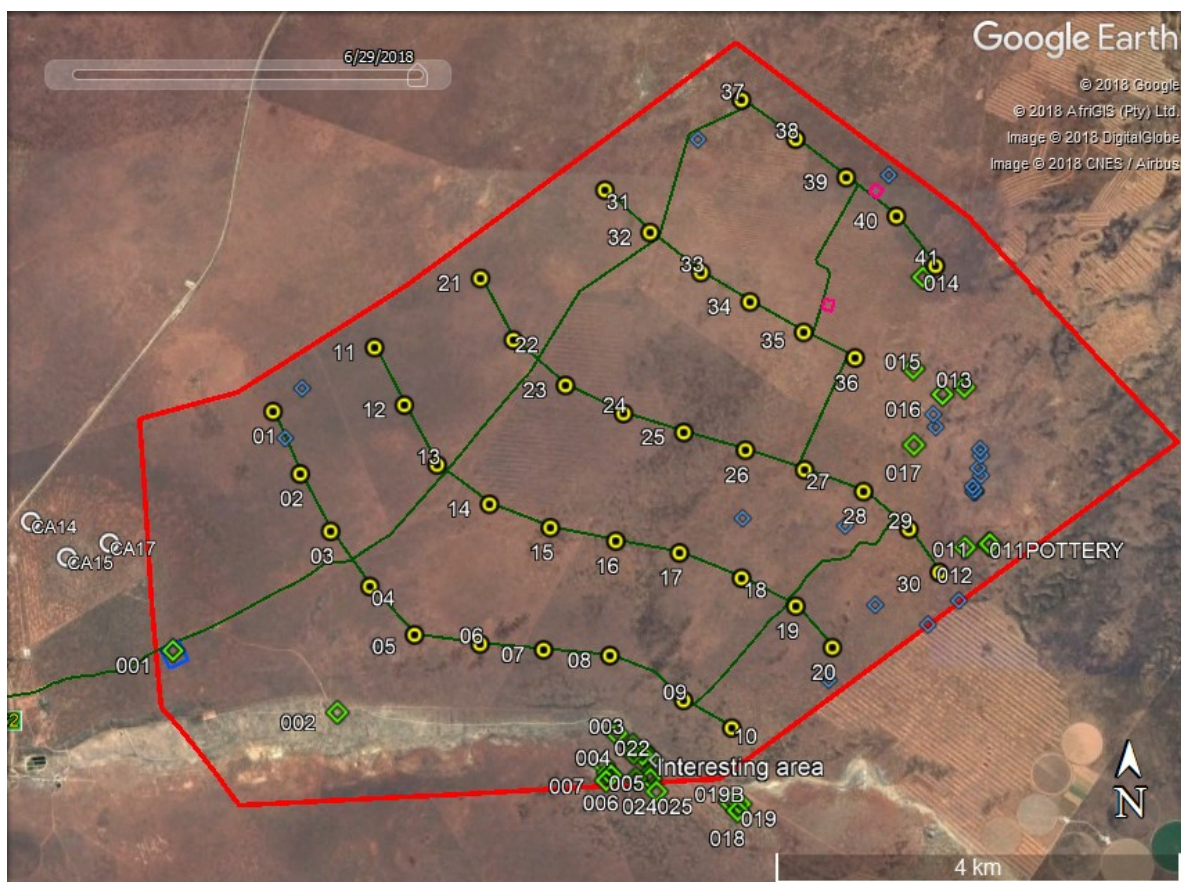
A full listing of archaeological resources recorded during the survey is provided in Appendix 2. This includes all locations and descriptions. Figures 13 to 15 show the distribution of recorded finds.

The vast majority of the proposed WEF site was found during the survey to be of very low archaeological sensitivity. The open sandy plains were not attractive for settlement because of the lack of landscape features to focus repeat visits, although the small artefact scatter at DBM2018/012 (waypoint 14) does show that some archaeology can be found in flat, open areas. It is clear that even isolated artefacts were rare over much of the layout



area but were more common in the east where the dunes were located. Nothing that could be deemed an archaeological site was found anywhere outside of this same eastern area, although just outside the western edge of the site and slightly closer to the coast Yates (2003) did report some shell scatters and middens focused around and on the slopes of a low hill with a rocky outcrop at its summit.

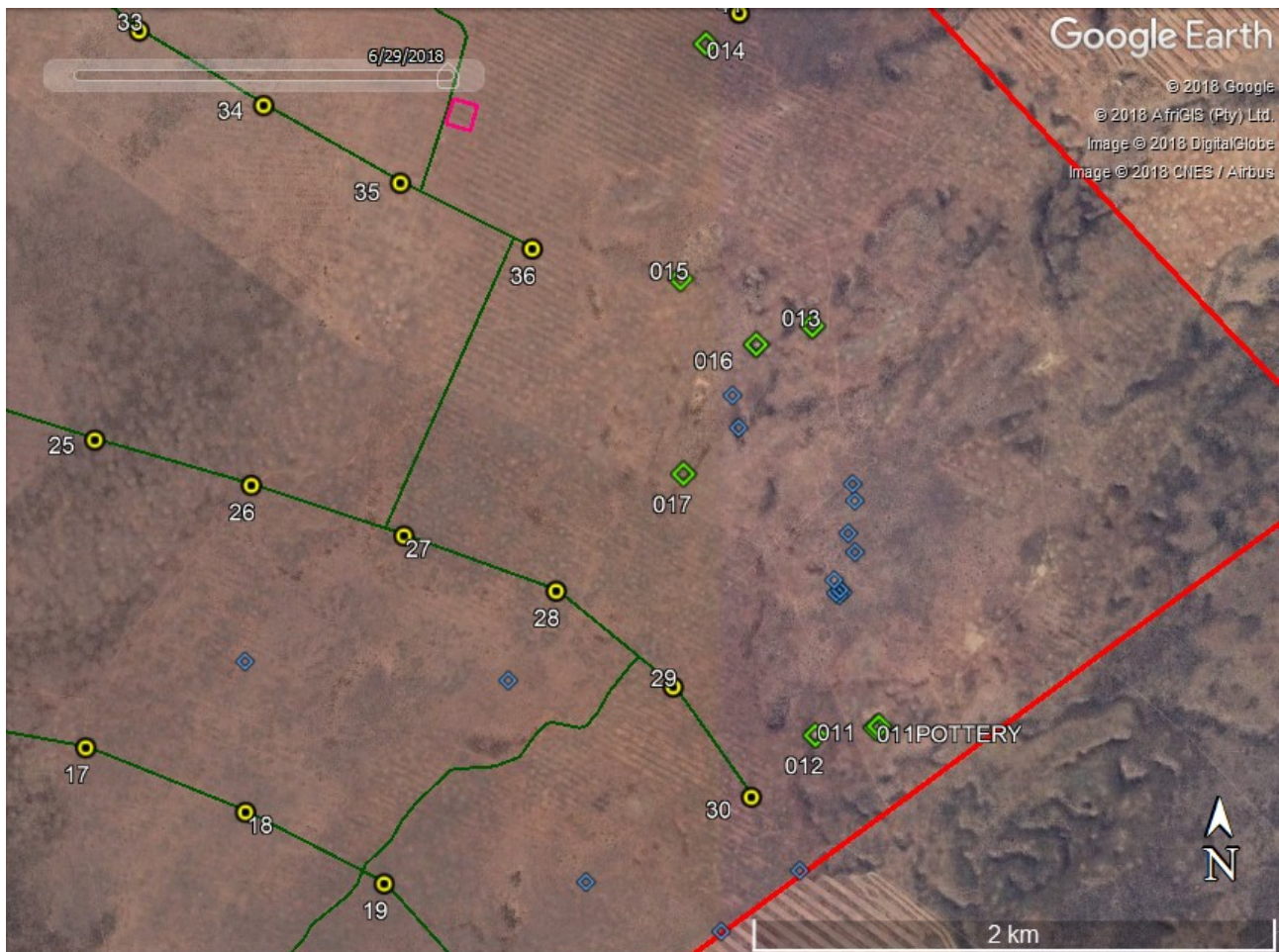
The sites recorded by the present survey within the WEF layout area are generally within deflation hollows which is what would be expected in sand dune areas. None are highly significant. These sites consist of relatively low to very low density artefact scatters, generally with no other associated materials – just one deflation hollow had five ostrich eggshell fragments in it. The flaked stone artefacts were largely of quartz, but some in crypto-crystalline silica (CCS) and silcrete were also noted.



**Figure 13:** Aerial view of the study area showing the locations of finds. Green numbered symbols indicate sites or areas with multiple artefacts, while the light blue symbols mark isolated artefacts. The three white symbols in the west are sites recorded by Yates (2003). The most interesting find was at one of the deflation hollow sites (DBM2018/010; waypoint 011). Along the southern margin of the site there was a collection of potsherds that no doubt originated from the same pot that was either buried and then lost, with natural degradation leading to its break up, or else broken on site and was subsequently abandoned. The fragments were located in loose sand around a dune with a *restio* growing on it (Figure 16). The pottery included the base of the pot but no rim or other diagnostic sherds were seen (Figure 17). The only other site of any significance was a deflation hollow that had a scatter of at least 100 quartz artefacts in it (DBM2018/011; waypoint 012; Figure 18). It also had a double-sided lower grindstone on a sandstone

cobble and a hammer stone hammered on both ends and made on an igneous cobble. The lower grindstone displayed only light use (Figures 19 & 20).

The isolated artefacts found within the WEF study area were variable in age with some clearly being recent LSA quartz flakes and others much older, Pleistocene-aged flakes in various materials. The latter are likely to have been brought to the surface through the activity of burrowing animals over the millennia. Such artefacts are known to occur on the harder surface that occurs below the cover sands throughout the Namaqualand region and are generally of very low significance because of their very low densities.



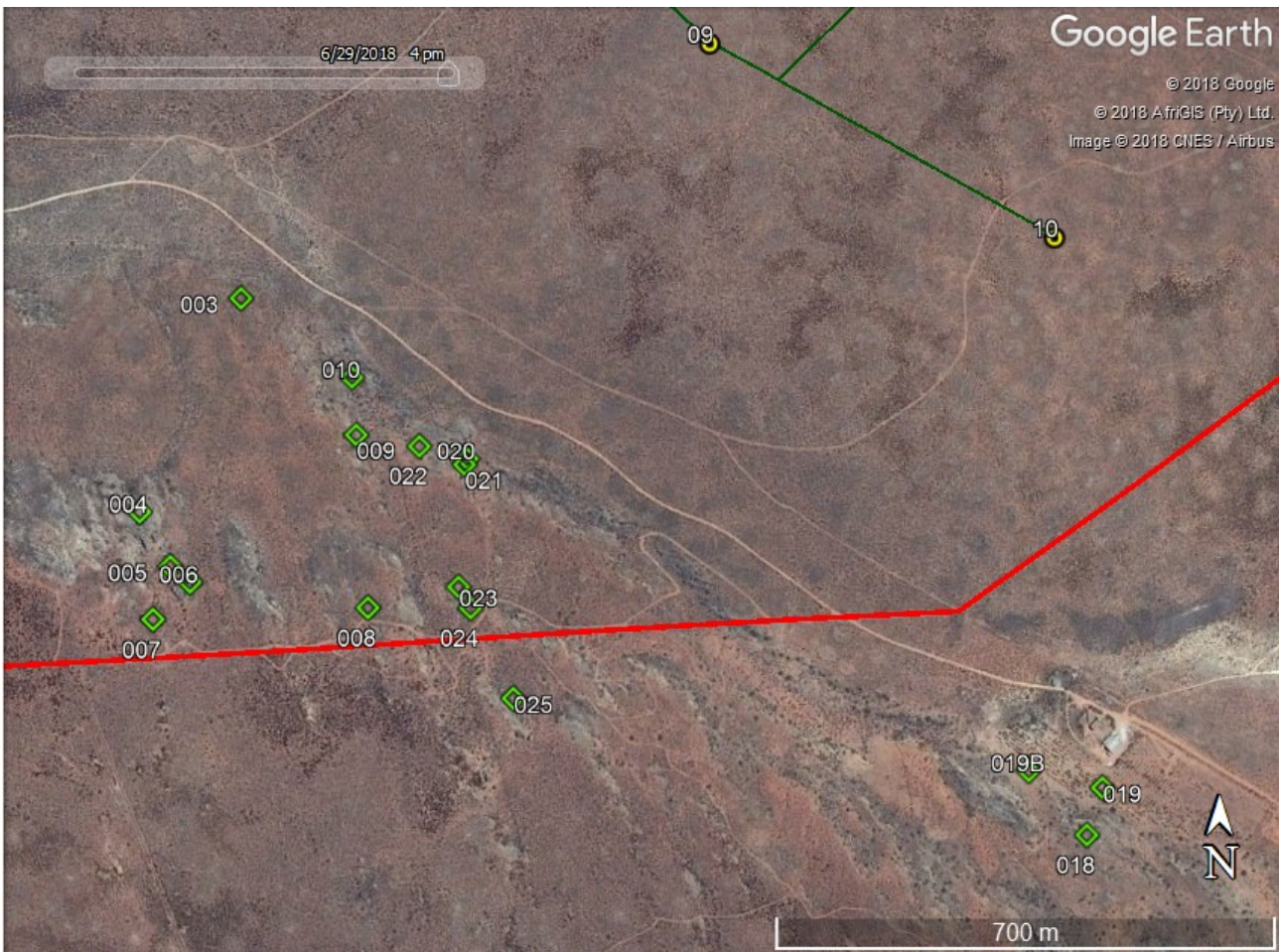
**Figure 14:** Close-up of the eastern part of Figure 13.

There was one occasion in the present study area where a pan had formed on this harder layer (DBM2015/013; waypoint 015; Figure 21). This has resulted in a concentration of artefacts, either because of the visibility or else, if the pan is old, because people were attracted to it. However, the overall density is still low, too low to be of research value.

In the far west of the study area, at the location proposed for the laydown area and construction camp, a number of artefacts were noted spread about in very low density. These are what is usually termed background scatter. However, in one area there was a concentration of artefacts with a number of associated shell fragments (Figure 23). This spot was likely used as a brief campsite during the LSA, although some of the artefacts



may well be older background scatter items that are spatially associated through chance. This was the only shell scatter seen outside of the Sandlaagte valley.



**Figure 15:** Close-up of the southern part of Figure 14.



**Figure 16:** View of the deflation hollow at DBM2018/010 (waypoint 011). The turquoise oval marks the location of the pottery scatter.





**Figure 17:** Photograph of the potsherds eroding from the base of a dune at DBM2018/010 (waypoint 011). The large piece at the right is the base of the pot. Scale in cm intervals.



**Figure 18:** View of the deflation hollow at DBM2018/011 (waypoint 012).



**Figure 19:** The lower surface of the sandstone lower grindstone at DBM2018/011 (waypoint 012).



**Figure 20:** The upper surface of the sandstone lower grindstone at DBM2018/011 (waypoint 012).



**Figure 21:** View of the pan located amongst the dunes in the eastern part of the study area (DBM2015/013; waypoint 015).



**Figure 22:** A selection of stone artefacts found at DBM2018/013 (waypoint 015). They include a quartzite flake (left), a silcrete radial core (2<sup>nd</sup> from left), a quartzite irregular core on a cobble (3<sup>rd</sup> from left) and two cores on cobbles of quartzite and 'other' (right). All are likely to be MSA.



**Figure 23:** Stone artefacts and marine shell fragments found at DBM2018/001 (waypoint 001). The shells are at upper right. Scale in cm intervals.



Because of the potential for rock art – which is visually sensitive- to occur in the southern part of the property, this area was also searched for archaeological remains. A number of sites were documented in this area, including several with rock art. The rock art was generally very poorly preserved for three reasons:

- The sites are north-facing and exposed to sun which results in faster deterioration;
- Chemical precipitates have formed on the rock surface in many areas resulting in parts of some paintings being obscured or erased; and
- The quality of the Piekenierskloof Formation sandstone is relatively poor with some sections lightly exfoliating in places.

Seven sites were found to contain rock art. All but one also had shell and/or artefact scatters of varying density but no deposits were found. Many other sites in the same area had only scatters on the ground. Animal bones and ostrich eggshell fragments were also frequently seen in all these sites. One site had the potential to contain a deposit though. The artefactual components of these sites are not described further here because they are not relevant to the project. The rock art, however, is visual in nature and thus susceptible to visual impacts. The art is therefore described further.

Two types of rock art were observed. The majority of images belong to the so-called ‘fine-line tradition’ which includes representational images of humans, animals and various objects of material culture. It also includes geometric images referred to as ‘entoptic phenomena’ which relate to trance. A number of these fine-line images were recorded. These included a faded but still fairly well-preserved right-facing eland torso (Figure 24) and a poorly preserved human figure from site DBM2018/018 (waypoint 021), a human figure, possibly clad in a kaross (Figure 25) from DBM2018/020 (waypoint 020), a large but poorly preserved panel with two moderately preserved, human figures from DBM2018/003 (waypoint 004, Figure 26) and another larger panel from the same site that includes some relatively fine finger painted imagery that may be entoptic phenomena (waypoint 004, Figure 27).

Some sites also contained examples of geometric tradition rock art which is known to occur in the west coast area (Orton 2013b). These included a plain circle from DBM2018/005 (waypoint 006; Figure 28), another poorly preserved circular image, possibly of concentric circles from DBM2018/006 (waypoint 007), an image of a square or circle (unclear) containing vertical lines that extend beneath the enclosing shape as what are referred to as tassels from DBM2018/003 (waypoint 004; Figure 29) and a large composition (c. 1.5 m by 1.5 m) of black finger dots in three unusual ‘images’ that may represent human figures (waypoint 021; Figure 30).



**Figure 24:** Eland torso from DBM2018/018 (waypoint 021, panel 3). Scale in cm intervals.



**Figure 25:** Human figure from DBM2018/020 (waypoint 023). Scale in cm intervals.



**Figure 26:** Small section of a large panel from DBM2018/003 (waypoint 004, panel 1) showing two discernible human figures. Scale in cm intervals.



**Figure 27:** Small section of a large panel from DBM2018/003 (waypoint 004, panel 4) showing finger painted imagery. Scale in 2 cm intervals.



**Figure 28:** Finger-painted circular image from DBM2018/005 (waypoint 006). Scale in cm intervals. Brightness and contrast



**Figure 29:** Finger-painted geometric image from DBM2018/003 (waypoint 004, panel 4). Scale in cm intervals. Brightness and contrast

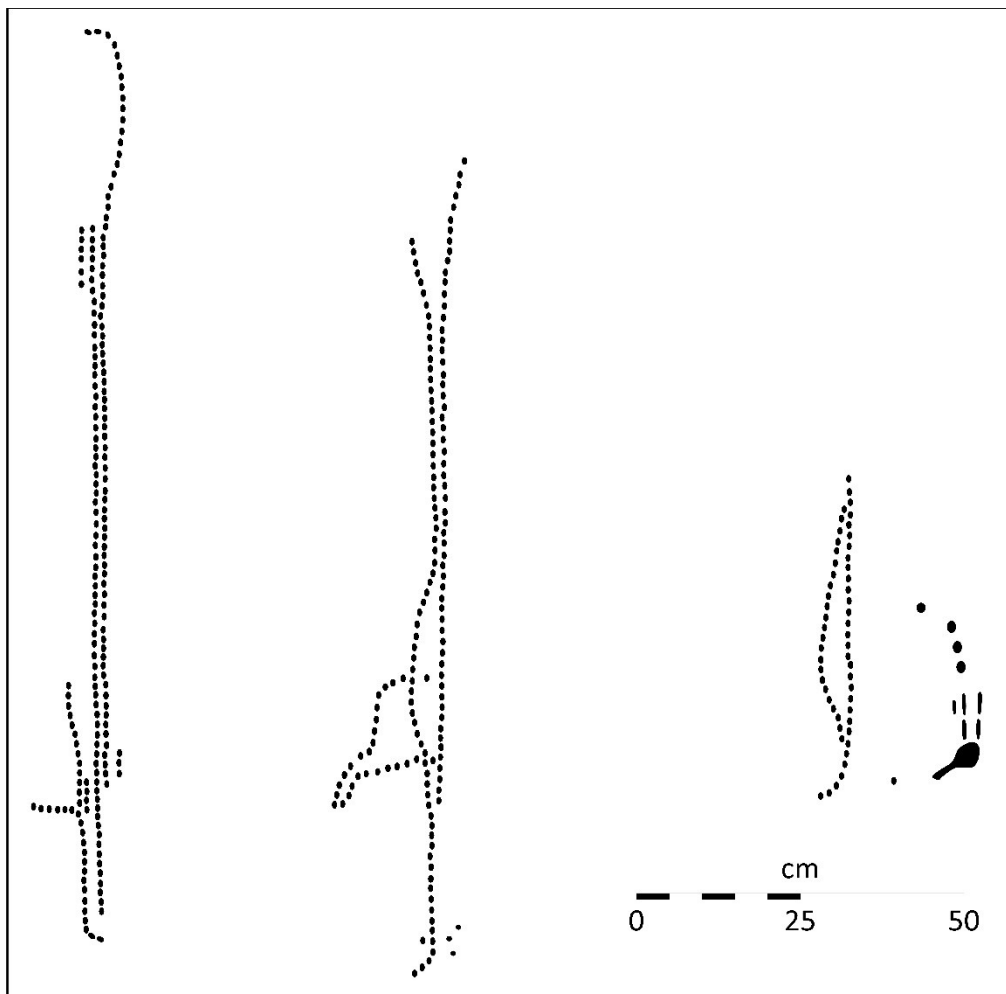


*adjusted to emphasize art.*

*contrast adjusted to emphasize art.*

The painted sites themselves varied in form. DBM2018/003 (Figure 31) was a fairly large rock shelter (by regional standards), while DBM2018/018 (Figure 32) and DBM2018/020 (Figure 33) are examples of smaller rock shelter and boulder sites respectively.

The circular and square shapes are classic geometric tradition motifs (Eastwood & Smith 2005; Smith & Ouzman 2004) but finger dots are more often used to make more variable compositions. It is possibly significant that site ON001, located 23 km to the north, includes large images composed entirely of finger dots (Orton 2013), while other similar images are as yet unknown from western South Africa.



**Figure 30:** Schematic representation of the black finger dot composition at DBM2018/018 (waypoint 021, panel 1). Their scale and spatial relationship are approximately correct but the individual dots comprising the long chains are neither correct in scale nor in number.



**Figure 31:** The rock shelter at DBM2018/003 (waypoint 004). The numbers show the locations of the four painted panels.



**Figure 32:** The painted rock shelter at DBM2018/018 (waypoint 021). The numbers show the locations of the three painted panels.



**Figure 33:** The painted boulder at DBM2018/020 (waypoint 023). The oval encloses the painted human figure.

The last archaeological site to be described is a historical farm complex at DBM2018/002 (waypoint 002; Figure 34). It is the original farm complex for the De Boom farm and is located in the Sandlaagte valley in the far south of the study area some 4 km from the coast. The site consists of three buildings (Figures 35 to 38) built via the 'twos skins and a rubble fill' technique. There was a large amount of artefactual material spread around the cottage and main house (Figure 39). The finds included glass, ceramics (refined white earthenware and stoneware), metal fragments (including a rifle cartridge), some writing slate fragments, some leather, ostrich eggshell fragments, marine shells and animal bones. There was no evidence of a dump in close proximity to the structures but there may be one present further afield in the surrounding bushes.





**Figure 34:** View of the old De Boom farmstead looking towards the southwest and seen from the high ground to the north of the Sandlaagte. The yellow, red and orange arrows mark the cottage, main farm house and outbuilding respectively.



**Figure 35:** View of the northwest corner of the cottage ruin at De Boom 2018/002 (waypoint 002). Most walls are still standing but all joinery is absent.



**Figure 36:** View of the southeast corner of the main house at De Boom 2018/002 (waypoint 002) showing the last remaining standing wall at left and a small cement reservoir towards the right.





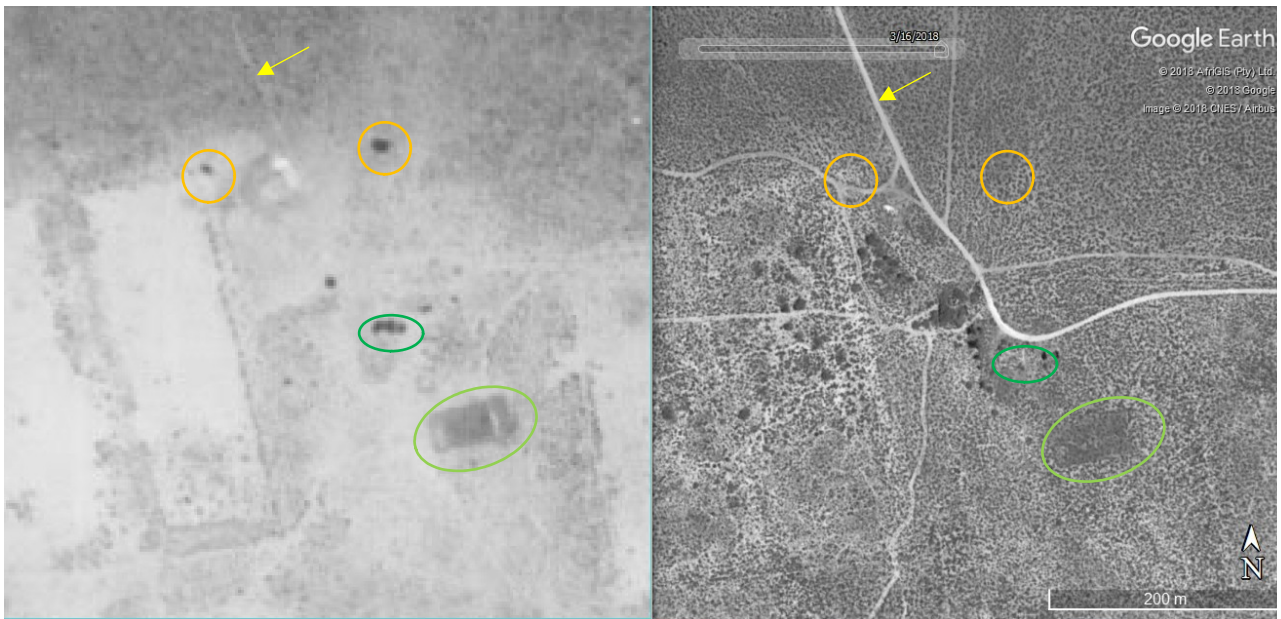
**Figure 37:** View Towards the northwest of the third ruin, presumably an outbuilding, at De Boom 2018/002 (waypoint 002).



**Figure 38:** View of a section of fallen brick wall from the main house at De Boom 2018/002 (waypoint 002) showing locally made sundried bricks containing wheat stalks.



**Figure 39:** Artefacts from around the ruins at De Boom 2018/002. Scale in cm.



**Figure 40:** Aerial views from 1942 (Job 11, strip 27, photograph 425) and 2016 (Google Earth) showing the De Boom farm complex. Features marked are as follows: yellow arrow: access road; orange circles: old trees no longer present and not visited; dark green oval: historic trees now present as dead stumps only; light green oval: old agricultural feature not visited.

### 6.3. Graves

No graves were seen during the survey. There is always the chance that unmarked precolonial graves could occur in the sand dunes in the area but such finds cannot be predicted. There may be historical graves associated with the farm complex at DBM2018/002 (waypoint 002). Because this site was not going to be impacted, the survey did not attempt to locate graves in the surrounding bushes.

### 6.4. Built environment

Only one structure, a modern asbestos shed not visible on 1958 aerial photography, was found on the property. Although not visited, the group of structures adjacent to the railway line to the west of the study area may contain historic structures since some structures are visible on the 1942 aerial photograph of the area.

### 6.5. Cultural landscapes

Cultural landscapes are the product of the interactions between humans and nature in a particular area. Sauer (1925) defined them thus: “The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result”. There are three aspects that require discussion here. The first is the historical cultural landscape which is generally very weakly developed on and around the site since the historical human imprint on the land has been light, although a large part of the study area was ploughed in the past (after 1942 but before



1958) as revealed by aerial photography (Figure 41). Interestingly, although visible on modern aerial photography, there is no evidence of this ploughing on the ground today. Some of the fields made along the Sandlaagte Valley – those on the slopes rather than in the valley bottom – are only discernible on modern aerial photographs when directly compared with the historical imagery. A few sandy vehicle tracks, farm fences and infrastructure related to animal watering are the main historical cultural landscape components on and around the site. Because of this light human imprint, the wider landscape, excluding the Olifants River Valley located 11 km away to the northeast, is quite strongly natural in character.



**Figure 41:** Aerial views of the study area from 1958 (Job 409, strip 24, photograph 6736) and 2016 (Google Earth) showing ploughed land that was not present in the 1942 aerial photograph. The main area is outlined by a black dashed line, while a second ploughed area to the southwest is clear in 1958 but virtually invisible today. Note also the deflation hollows in the southwest of this view that have revegetated today and were not recognised during the survey.

The second cultural landscape aspect is the precolonial one. While the majority of the study area is extremely sparse in terms of archaeology, it is clear that the rocky outcrops along the Sandlaagte River valley were well-frequented during the LSA (Figure 42). As a result there is a dense concentration of sites which creates a precolonial cultural landscape that could be classified as a Type 3 landscape where many archaeological sites are located in close proximity to one another (Orton 2016b). This landscape has higher archaeological significance than any other part of the study area because of the high density of sites. The landscape is not sensitive to physical impacts but, because rock art is a visual form of heritage, this component of the cultural landscape is visually sensitive to intrusions into its context. The most important rock art sites (given provisional grades of IIIB/IIIA and IIIA) are located 1.02 and 0.67 km away from the nearest turbine. There are five turbine placements located within about 2.2 km of these rock art sites.



**Figure 42:** View towards the southwest across the Sandlaagte River valley towards the rocky area considered to be a Type 3 precolonial cultural landscape.

The third aspect relates to the main roads in the wider area. They are regarded as scenic routes because of the aesthetically pleasing landscapes through which they pass. The R363 is more important and follows the heavily cultivated Olifants River Valley before turning north at Koekenaap. This road is part of the Olifants River Valley Wine Route. This valley is a significant cultural landscape with high scenic qualities, largely because of the strong juxtaposition of the intensely cultivated river floodplain and the semi-desert plains beyond (Figure 43). Its significance also derives from its early frontier conflict, its settlement patterns and the water-related feats of engineering in relation to the Olifants River Valley irrigation scheme. Winter and Oberholzer (2013) have assigned the valley a provisional Grade II. The R362 follows the northern side of the valley but at a distance from the agricultural landscape. It crosses the R363 and Olifants River at Lutzville and continues southwards past the western side of the study area, some 3.1 km from the nearest wind turbine. Although briefly crossing the scenic Olifants River Valley, it provides somewhat less impressive scenery to the south. The typical flat, wind-swept landscape prevails and, although the road runs close to the sea, the spectacular shoreline is seldom visible from the road. The Olifants River Estuary, also a significant landscape (Grade III according to Winter & Oberholzer 2013) is also viewed from this road. Importantly from the point of view of the present project, the vast majority of scenic elements of aesthetic value lies on the opposite side of the various roads to the proposed project which means that impacts to the scenic routes are reduced. Only from the R362 to the north of the Olifants River would significant views of the cultural landscape be backed by the proposed WEF. At its closest point, however, the R362 in this area is 15.0 km from the north-easternmost turbines. Figure 44 shows a view taken from the southern end of one of the side roads that leads south from the R362. Much less of the valley is visible from most of the R362 in this area.

Figure 45 maps the various cultural landscape elements and scenic routes comprising this third aspect. The arrows on the map indicate the primary views from the roads (white arrows) and settlements (orange arrows). These are based on the author's knowledge of the area and are determined by local topography and the locations of significant and visually appealing landscapes. The most important cultural landscape – the cultivated Olifants River floodplain – is a minimum of 11 km from the nearest turbines, while the Olifants River estuary area is at least 5.5 km distant. The coastal cliffs are the third important landscape element but are very difficult to see and appreciate from anywhere



other than directly on the coast. The nearest turbines to the coast are 4.2 km inland. The four proximate settlements are also shown. The structures of Ebenhaeser, which has historical significance, lies between 12 and 15 km from the nearest turbines, while the tiny settlement of Papendorp lies between 6.0 and 6.8 km from the nearest turbine. Significantly, the views from both settlements are focused away from the WEF. Strandfontein and Doringbaai are essentially modern towns with their only cultural value lying in their scenic coastal locations. Strandfontein, whose nearest houses are 3.8 km from the westernmost turbines, has been described by Oberholzer (2019) as follows:

“...most of the residences are orientated towards the sea, away from the WEF site. The town's growth and layout have eroded the scenic and amenity value of the coastline, with houses jockeying for position to the very water's edge. Even the once beautiful rocky headland is a crowded assortment of disparate architectural styles, creating an unmemorable townscape.”

Strandfontein has little to no heritage value aside from the views of the coastline which largely need to be appreciated from relatively close to or at the coast. The WEF would not be visible from such locations and would be behind the viewer, very often fully screened due to the rapid rise in elevation that occurs just inland of the coast. Doringbaai, too, has little heritage value with the prime position in the town occupied by fishing industry buildings. The lighthouse, however, is a significant structure for its tourism value (it was built in 1963 and is thus not yet a protected heritage structure) but, because it is located west of the town, cannot be viewed facing the WEF.

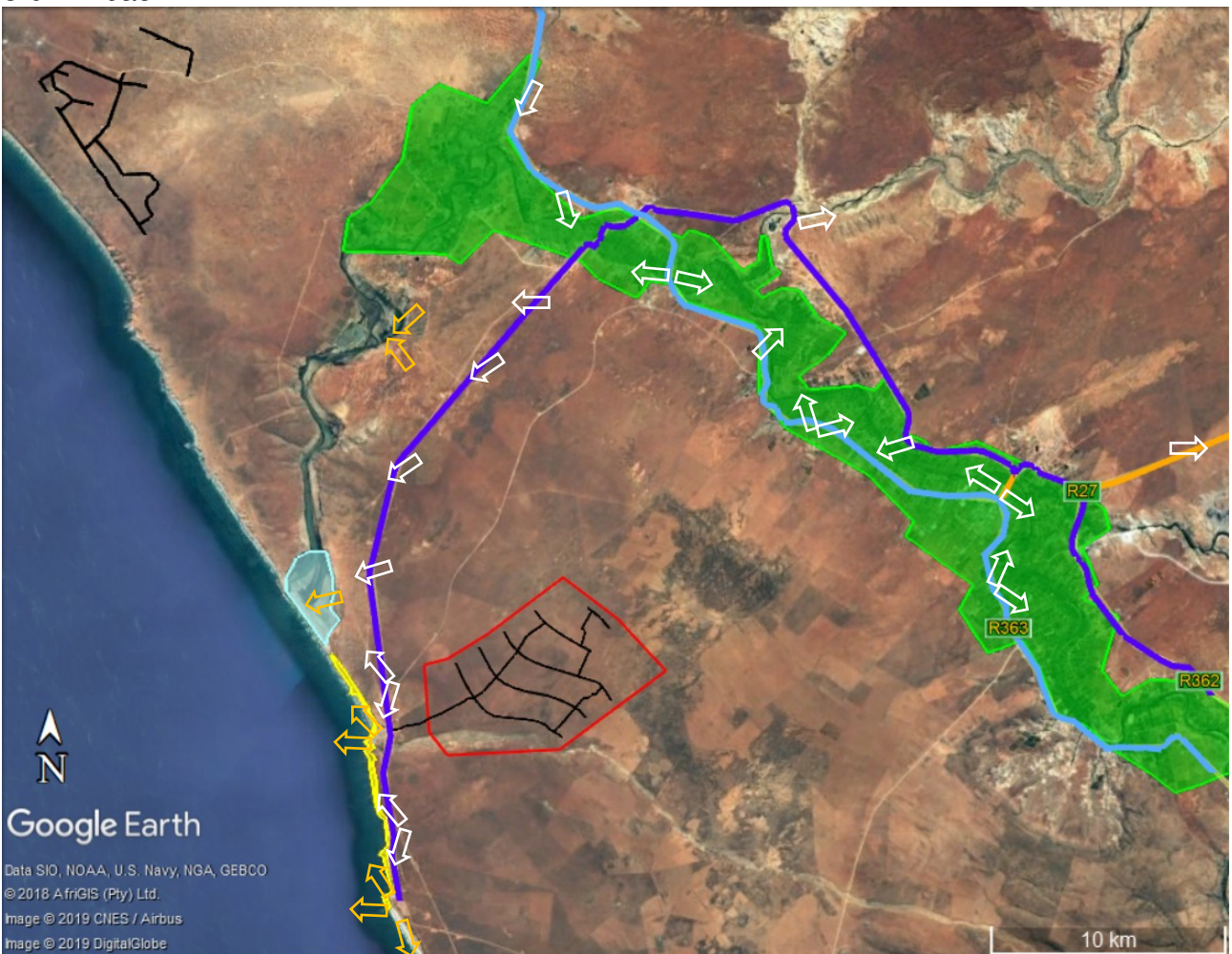


**Figure 43:** Aerial view of the study area (red polygon with WEF roads in black) and surroundings showing the starkly contrasting agricultural lands along the Olifants River and the surrounding semi-desert.





**Figure 44:** View towards the southwest across the Olifants River Valley. The WEF would be located just beyond the skyline (but protruding well above it) in the centre of the photograph. The skyline in this view is 8.5 km distant and the nearest turbines a further 5.0 km back.



**Figure 45:** Aerial view of the study area (red polygon with proposed WEF roads in black) and its surroundings with settlements and heritage features mapped. The following are marked: R27 (orange line), R362 (purple line), R363 (blue line), settlement of Ebenhaezer, Papendorp, Strandfontein and Doringbaai (pink areas), the Olifants River Valley

*agricultural landscape (green area), the Olifants River Estuary (turquoise area) and the coastal cliffs (yellow area). The white (for routes) and orange (for towns) arrows indicate the direction of the primary views from various points across the area. The black lines in the northwest are road layout of the existing Eskom Sere WEF.*

Travelling through the area on the R362 and/or R363 allows one to experience a variety of landscape types. These include, from east to west to south:

- Views across the relatively enclosed and intensely cultivated floodplain of the Olifants River passing the towns of Vredendal and Lutzville;
- Long views westwards across the veld towards Ebenhaeser and the Olifants River with the Eskom Sere WEF in the distance (the turbines are between 14.5 and 22.0 km from the R362);
- Long views to the west towards Papendorp (which is not readily visible from the road owing to its small size) and the Olifants River estuary in the distance;
- Long views over the coastal cliffs (not visible from the road) over the ocean passing Strandfontein and Doringbaai; and finally
- Long views towards the southeast across farmlands with dryland agriculture and livestock grazing, and the many small sandstone koppies that dot the Sandveld.

The proposed WEF would certainly be visible on one side of the road when close enough to it. However, views towards it would generally be into the relatively drab vegetated dunes of the Sandveld. They would also be very slightly uphill which reduces one's sight distance and the relative attractiveness of the view when the option to look slightly downhill towards the sea is also available.

## **6.6. Visual study**

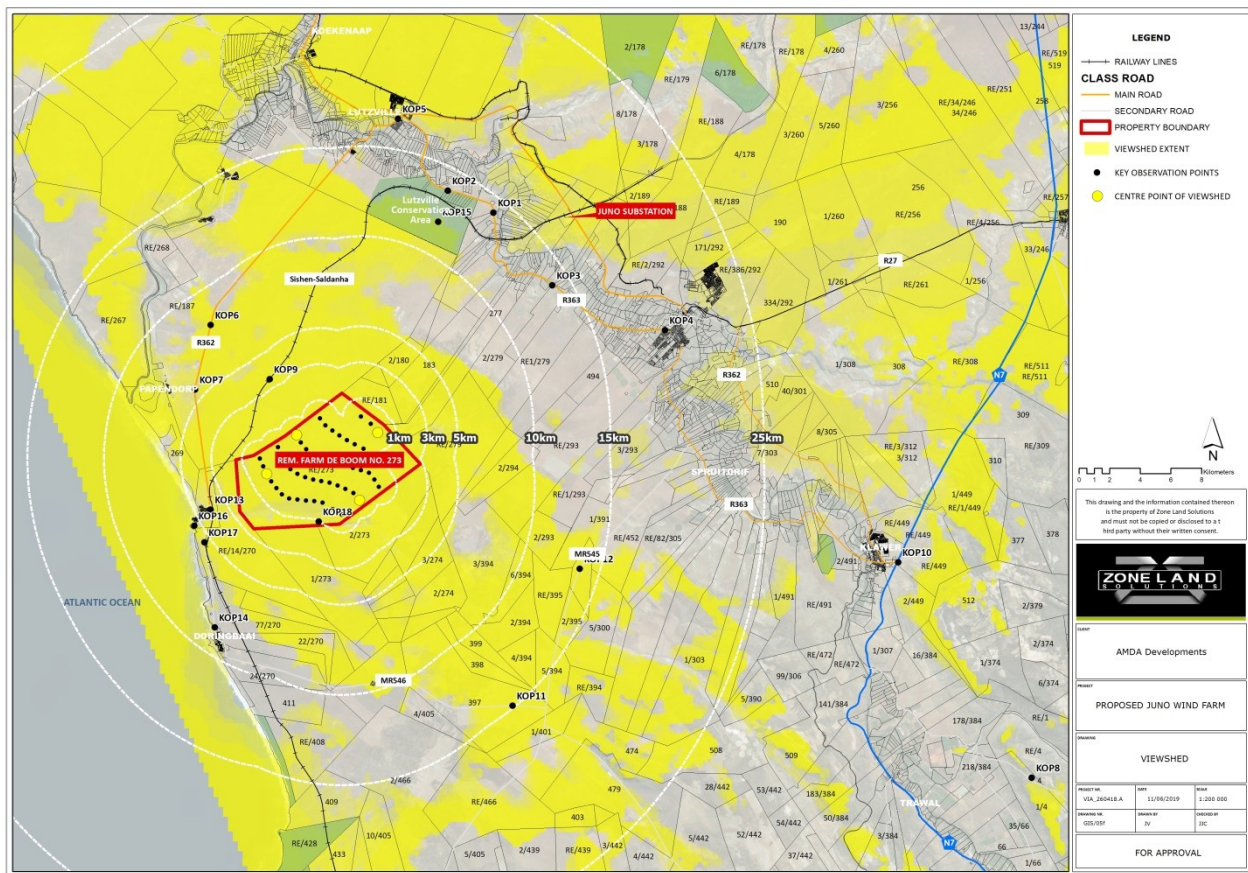
The Visual Impact Assessment (VIA) carried out for the project (Claasen & Volschenk 2019) lists sensitive components of the landscape. These include the various towns and settlements of the area, the coastal environment (with a 4 km buffer), the R362 as a scenic route (with a 3 km buffer), the Sishen-Saldanha Railway Line (with a 250 m buffer), and the two significant rock art sites identified above (with 500 m buffers). The physical landscape itself is also sensitive with the main distinct landforms on and around the site being the Olifants and Sandlaagte River valleys. To these can be added the coastal cliffs which lie further to the west.

A viewshed shows the area from which the proposed WEF would be visible (Figure 46). This viewshed was calculated using a height of 180 m above natural ground level (the maximum anticipated tip height) and four points located around the perimeter of the project area were used in the generation of the map. It shows that the project will be visible from much of the surrounding landscape but importantly, due to landforms, the significant agricultural landscape of the Olifants River Valley will be largely protected from view. Parts of the lowermost Olifants River valley – between Ebenhaeser and Papendorp – also appear to be protected. Due to the coastal cliffs, a narrow band of the landscape running along the coast is also screened with this band getting broader towards the south in the vicinity of Doringbaai but with the western part of this town being able to see the project. Ebenhaeser and Papendorp as well as the higher-lying easternmost houses of Strandfontein would be able to see the wind turbines. Vredendal North, Lutzville and

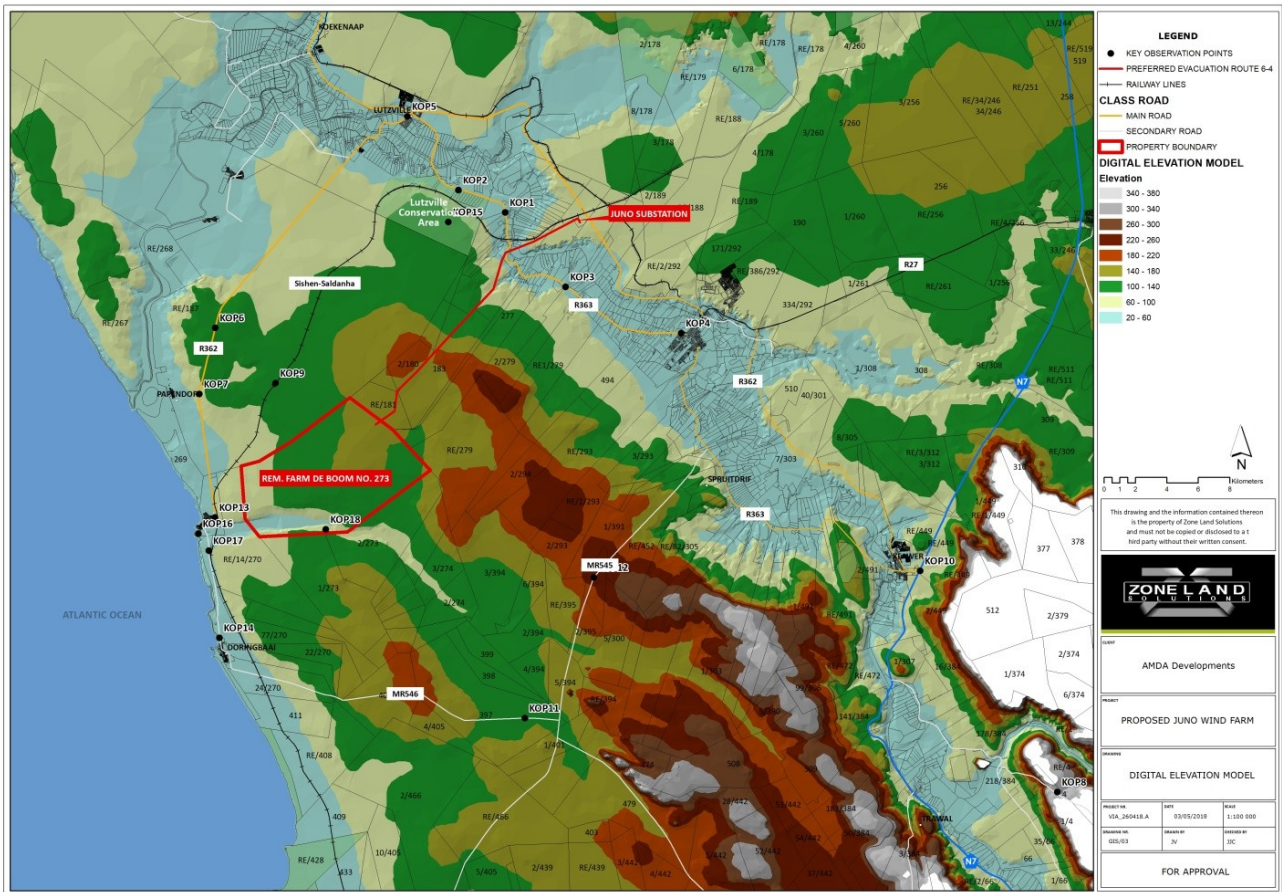


Koekenaap would all be able to see turbines, but all are located more than 15 km from the project site.

The digital elevation model included as Figure 12 in the VIA indicates the high and low ground nicely but with relatively coarse height resolution (Figure 47). It is clear that the primary topography lies to the east of the project site and it is this that is responsible for screening the major part of the Olifants River valley, including the southern part of the town of Vredendal. Local features such as buildings, trees and small steep sections of topography such as road cuttings (located at the edges of the Olifants River floodplain) are responsible for further localised screening that cannot be captured by the viewshed. Distance will be important here with the nearest turbines to the Olifants River agricultural landscape being some 12 km distant.



**Figure 46:** Viewshed generated for the project site. Source: Claasen & Volschenk (2019: fig. 13).



**Figure 47:** Digital elevation model of the area around the project site. Source: Claasen & Volschenk (2019:fig. 12). Note that from the topographic maps the highest point within the project site is 169.9 m and the high point to the northeast of the project site is at 278.9 m amsl.

The VIA finds the landscape character to be of moderate sensitivity. Claasen and Volschenk (2018:37) state the following:

The sense of place of the wider region is commonly associated with natural resources and intensive and extensive agriculture uses. The sense of place of the region is, to a large degree, intact and the landscape character of the area can be considered to be moderate sensitivity as the landscape only has moderately prominent landforms that could provide some form of enclosure; it has been affected by some man-made features (i.e. existing powerlines); has little inter-visibility with adjacent landscapes; and exhibit a moderate density of sensitive landscape features.

Several photomontages are provided by Claasen and Volschenk (2019 Annexure 2) to assist with understanding the degree of impact likely to be experienced. Figures 48 to 52. It is clear that localised topography is important in offering at least partial screening from various parts of the wider landscape but it is generally the case that some parts of the turbines will be visible.





**Figure 48:** Photomontage showing the visibility of the proposed WEF from a point on the R362 midway between Ebenhaeser and Papendorp. The nearest turbines are 7.7 km away and the project is openly visible (Source: Claasen & Volschenk 2019 Annexure 2: photograph 1).



**Figure 49:** Photomontage showing the visibility of the proposed WEF from a point on the R362 at the turnoff to Papendorp. The nearest turbines are 6.2 km away but localised topographic screening means the project would not be visible (Claasen & Volschenk 2019 Annexure 2: photograph 2).





**Figure 50:** *Photomontage showing the visibility of the proposed WEF from a point on the R362 at the turnoff to Strandfontein. The nearest turbines are 4.3 km away but localised topographic screening means that only the tops of the turbines would be visible (Claasen & Volschenk 2019 Annexure 2: photograph 3).*



**Figure 51:** *Photomontage showing the visibility of the proposed WEF from a point above the cliffs immediately south of Strandfontein. The nearest turbines are 5.9 km away but localised topographic screening means that only the tops of the turbines would be visible (Claasen & Volschenk 2019 Annexure 2: photograph 4).*



**Figure 52:** *Photomontage showing the visibility of the proposed WEF from a point just west of the R362 and a short distance to the south of Strandfontein. The nearest turbines are 5.9 km away but localised topographic screening means that only the tops of the turbines would be visible (Claasen & Volschenk 2019 Annexure 2: photograph 5).*

## **6.7. Summary of heritage indicators**

Archaeology and palaeontology are not expected to be significant issues. Unmarked graves, while possibly present, cannot be predicted or considered any further. The primary concern is the visual impacts to the historical and precolonial cultural landscapes, to the historical settlements of Ebenhaeser and Papendorp, as well as to natural landscapes of aesthetic value. Key here is the significance of these landscapes, their proximity to the development and whether views of them are backed by the WEF or not. The historical cultural landscape of the Olifants River Valley is considered to be regionally significant for many reasons but may be partially screened from the development in localised areas by topography, trees and buildings. The tops of the turbines are likely to be widely visible, perhaps even from within the parts of the Olifants River Valley. The natural landscapes of the Olifants River estuary and coastal cliffs are aesthetically pleasing (although the latter are not visible except from very close to the coast), while the historical cultural landscape within and immediately surrounding the study area is of far lesser local significance. Although not studied in detail, the settlements of Ebenhaeser and Papendorp are likely to retain several older structures but both villages are focused towards the Olifants River and are largely experienced facing the river and not the WEF site, but some of these views would be towards the existing Eskom Sere WEF to the north of the Olifants River. The precolonial cultural landscape is only of local significance but is located in close proximity to the project with direct line of sight to all turbines.

## **6.8. Statement of significance and provisional grading**

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. Following Section 3(3), such significance can be because of:

- 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.

The archaeological resources, especially the rock paintings, are deemed to have medium to high cultural significance for their aesthetic, scientific and spiritual value. Provisional gradings for the most significant sites are in the IIIB to IIIA range.

Palaeontological resources may have high significance for their scientific value. Most common fossils related to the dune environments are likely to be Grade IIIC but certain rarer finds such as larger mammalian bones) may be of greater significance and worthy of IIIB or higher depending on what is found.

The historical landscape of the Olifants River Valley has high cultural significance for its aesthetic, historical, social and technological value and, following Winter & Oberholzer, is regarded as a Grade II resource. The other significant landscapes of the area – the Olifants River estuary and the coastal cliffs – are deemed to be of high local significance for their aesthetic value and can be Graded IIIA. The Olifants River estuary also has social value as a fishing ground for the traditional residents of Papendorp. The historical settlements of Papendorp and Ebenhaeser are considered to be of high local heritage significance and, depending on their intactness, could possibly be graded as IIIA resources.

## **7. ASSESSMENT OF IMPACTS**

Archaeological resources, palaeontological resources and graves are only likely to experience direct impacts during the construction phase, while rock art and the cultural landscape may be impacted visually/contextually throughout the lifetime of the project.

### **7.1. Impacts to archaeological resources (construction phase)**

Archaeological materials can be present either on or below the surface of the study area. Impacts would be felt during construction when equipment moves around on site, when roads are built and when foundations are excavated. Archaeological sites and artefacts

can be damaged and/or destroyed during development activities. None of the archaeological sites within the various alternative alignments are deemed to be of great significance which means that the intensity of impacts would be low with the extent also low. The alternatives layout has sought to avoid known sites of any cultural significance. Because archaeological sites are unique, non-renewable and irreplaceable the duration of any impacts is always high. With a low probability of impacts actually occurring (because of the locations of known sites relative to the proposed layout), the overall impact significance is **low**. Although most impacts occur during construction, contextual impacts to rock art sites would occur throughout the lifetime of any development but, being non-destructive, these would generally be of lesser significance. They are also reversible. Because no culturally significant sites are known to occur in the layout footprint, there are no specific pre-construction mitigation requirements. Relevant management measures would need to be implemented, however, but the post-mitigation impact significance would remain at the **low** level (Table 1). There are no fatal flaws in terms of archaeology.

**Table 1: Assessment of impacts to archaeology**

<b>Impact Phase: Construction</b>							
<b>Potential impact description:</b> Impacts to archaeological resources							
Archaeological resources on the ground (artefacts, occupation debris) can be damaged and/or destroyed during construction activities.							
Archaeological resources with visual significance (rock art) can have their visual context altered during all phases of development through the presence of foreign/inappropriate structures in the landscape.							
	<b>Intensity</b>	<b>Extent</b>	<b>Duration</b>	<b>Status</b>	<b>Probability</b>	<b>Significance</b>	<b>Confidence</b>
Without Mitigation	L	L	H	Negative	L	L	H
With Mitigation	L	L	H	Negative	L	L	H
Can the impact be reversed?			NO.				
Will impact cause irreplaceable loss of resources?			YES.				
Can impact be avoided, managed or mitigated?			YES, archaeological mitigation can be easily implemented.				
Mitigation measures to reduce residual risk or enhance opportunities:							
<ul style="list-style-type: none"> <li>- Protect and report any dense concentrations of artefacts found during excavation of pylon foundations.</li> </ul>							

### 7.1.1. Mitigation and Management

No specific pre-construction mitigation requirements exist. However the Environmental Management Programme (EMPr) should make provision for the reporting of any chance finds made during the construction period. Such finds, if made, should be left in place and protected from further harm. The find would need to be reported to HWC and/or an archaeologist for further evaluation and decision-making.

### 7.2. Impacts to palaeontological resources (construction phase)

Although likely to be sparse, significant palaeontological materials may possibly occur in the area. Impacts would be felt during construction when deep excavations for turbine and



substation foundations are excavated. Palaeontological materials can be damaged and/or destroyed during such development activities. Due to the expected very sparse distribution of significant fossils, the intensity of impacts is expected to be low and the extent also low. Because palaeontological materials are unique, non-renewable and irreplaceable the duration of any impacts is always high. With a low chance of impacts actually occurring (because of the likely sparse distribution of subsurface fossils), the overall impact significance is **low**. Because no fossils are actually known to occur in the layout area, there are no specific pre-construction mitigation requirements. During the construction phase relevant management and mitigation measures would need to be implemented. The post-mitigation impact significance would, however, remain at the **low** level (Table 2). There are no fatal flaws in terms of palaeontology.

**Table 2: Assessment of impacts to palaeontology**

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to palaeontological resources							
Detailed description of impact: Palaeontological materials (fossils) can be uncovered, disturbed and/or destroyed during excavation of foundations for any components of the development.							
	Intensity	Extent	Duration	Status	Probability	Significance	Confidence
Without Mitigation	L	L	H	Negative	L	L	H
With Mitigation	L	L	H	Positive	L	L	H
Can the impact be reversed?			NO, because palaeontological resources are unique and their loss is irreversible.				
Will impact cause irreplaceable loss of resources?			YES, valuable fossils may be lost in spite of management actions to mitigate such loss.				
Can impact be avoided, managed or mitigated?			Although they cannot be avoided, impacts can be managed and/or mitigated during the construction phase.				
Mitigation measures to reduce residual risk or enhance opportunities:							
<ul style="list-style-type: none"> <li>- Monitoring of all construction-phase excavations by project staff and ECO.</li> <li>- Inspection, sampling and recording of selected exposures in the event of fossil finds.</li> <li>- Fossil finds and the compiled contextual report deposited in a curatorial scientific institution.</li> </ul>							

### 7.2.1. Mitigation and Management

No specific pre-construction mitigation requirements exist. However the Environmental Management Programme (EMPr) should make provision for the reporting of any chance finds made during the construction period. Such finds, if made, should be left in place and protected from further harm. They would need to be reported to HWC and/or a palaeontologist for further evaluation and decision-making.

### 7.3. Impacts to graves (construction phase)

Graves can be present anywhere in the study area but the chances are higher in sand dunes which would have been more readily excavated by hand. Graves can be very shallow (maybe 0.2 m below surface or even exposed at the surface if cover sands have been eroded or deflated) and could be impacted during construction when equipment



moves around on site and when roads are built and foundations excavated. Graves can be damaged and/or destroyed during development activities. None are known within the study area though and the chances of uncovering graves are always very small. Graves are always deemed to be significant heritage resources, however, so the potential intensity of impacts is regarded as high. The extent would be low. Because graves are unique, non-renewable and irreplaceable the duration of any impacts is always high. With a low probability of impacts actually occurring (because of the very low likelihood of uncovering graves), the overall impact significance is **medium**. Because no graves are known to occur in the layout area, there are no specific pre-construction mitigation requirements. With appropriate management measures in place, however, the post-mitigation impact significance would be **low** (Table 3). There are no fatal flaws in terms of graves.

**Table 3: Assessment of impacts to graves**

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to graves							
Detailed description of impact: Unmarked graves can be uncovered, disturbed and/or destroyed during excavation of foundations for any components of the development.							
	Intensity	Extent	Duration	Status	Probability	Significance	Confidence
Without Mitigation	H	L	H	Negative	L	M	H
With Mitigation	L	L	H	Negative	L	L	H
Can the impact be reversed?			NO.				
Will impact cause irreplaceable loss of resources?			YES.				
Can impact be avoided, managed or mitigated?			YES, when found graves can be exhumed and the remains moved to safety.				
Mitigation measures to reduce residual risk or enhance opportunities:							
- Protect and report any graves found during excavation of pylon foundations.							

### 7.3.1. Mitigation and Management

No specific mitigation requirements exist. However the Environmental Management Programme (EMPr) should make provision for the reporting of any chance finds made during the construction period. Such finds, if made, should be left in place and protected from further harm. The find would need to be reported to HWC and/or an archaeologist for further evaluation and decision-making. Exhumation would certainly be required if the grave could not be avoided and protected.

### 7.4. Impacts to cultural landscapes (construction phase)

This section considers the indirect or contextual impacts to the historical and precolonial cultural landscapes during construction when much activity would be occurring on site. Both are assessed together but with the higher ratings being applied in Table 1. Impacts to the historical landscape will be of medium intensity due to distance and screening as well as because most significant views are away from the proposed WEF. The precolonial landscape is of generally lower cultural significance due to the content and preservation of

the rock art but being very close to the proposed facility it will experience a greater degree of visual intrusion. The intensity of impacts is thus likely to be high. Because of the great distances over which wind turbines are visible in this gently undulating landscape and the fact that construction activity and machinery is not likely to be visible (except for the tall cranes), the extent of impacts to the cultural landscapes is deemed to be medium. The construction phase impacts are expected to be of relatively short duration and this aspect is thus rated to be low. Because impacts would definitely occur, the probability is high and the overall impact significance is **medium**. Mitigation measures essentially involve reducing and minimising visual impacts to the landscape, since it is not possible to hide such large structures. With mitigation and management measures in place the intensity would reduce to medium but overall the significance of the impacts would remain at the **medium** level (Table 4). Given the medium significance rating and the presence of an existing WEF in the vicinity – 22.5km away to the north of the Olifants River – the proposed land use is not altogether unacceptable and the impact to the cultural landscape is not deemed to be a fatal flaw.

Note that the VIA has assessed all three phases at once so that assessment has been compared with the operation phase assessment provided below. However, the mitigation measures from the VIA are reproduced here for consistency, but with two additions.

**Table 4: Assessment of impacts to the cultural landscape (construction).**

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to the cultural landscape							
Detailed description of impact: The rural/agricultural cultural landscape is affected by the visual intrusion into it of electrical infrastructure and construction equipment and machinery.							
	Intensity	Extent	Duration	Status	Probability	Significance	Confidence
Without Mitigation	H	M	L	Negative	H	M	H
With Mitigation	M	M	L	Negative	H	M	H
Can the impact be reversed?			YES.				
Will impact cause irreplaceable loss of resources?			YES, in the sense that every landscape and every view across those landscapes is unique. No, in the sense that there are other areas where similar (but never identical) landscapes occur. However, one cultural landscape can never replace another.				
Can impact be avoided, managed or mitigated?			YES, but only slightly since the structures and machinery cannot be hidden or screened, although from a distance the construction work is unlikely to be openly visible.				
Mitigation measures to reduce residual risk or enhance opportunities:							
<ul style="list-style-type: none"> <li>- Keep disturbed areas (i.e. roads, footprint and laydown areas) to a minimum.</li> <li>- New road construction must be kept to a minimum. Utilize existing roads and tracks to the extent possible. Roads should maintain rural appearance and feel (i.e. two-track path). No hardened road surfaces to be established.<sup>3</sup></li> <li>- No clearing of land to take place outside the demarcated footprints (bar the access roads).</li> <li>- The contractor should maintain good housekeeping on site to avoid litter and minimize waste.</li> <li>- Ensure effective rehabilitation of any areas not required during operation<sup>2</sup>;</li> <li>- Minimise lighting.<sup>4</sup></li> </ul>							

<sup>3</sup> It is not known whether this measure would be feasible in terms of the access requirements for heavy machinery and this measure is thus not seen as compulsory by the present specialist.

### 7.4.1. Mitigation and Management

Mitigation measures would include:

- Minimising the amount of surface that gets disturbed during the construction phase;
- Minimising the amount of new road construction with the reuse of existing tracks being effected where possible;
- Avoiding land clearance outside of the authorised project footprint;
- Maintaining the site in tidy condition to avoid litter;
- Ensuring that effective rehabilitation measures are put in place after construction for any disturbed area not required during operation; and
- Minimising lighting of the facility so as to retain the remote character of the site at night.

Moving turbines has no heritage merits and has not been considered here or under operation and decommissioning phase impacts. The reasons are that:

- The site is well contained with the turbines not widely spread out which means that moving them from one side of the study area to another, or even removing some completely, will not have any meaningful effect on the overall visibility and appearance of the WEF;
- The turbines are far enough from the roads that a suitable buffer exists and significant views from the roads tend to be away from the turbines; and
- While it is acknowledged that there may be an argument for moving turbines eastwards based purely on visual considerations of local residents, this is not deemed to be a heritage issue. This is because the eastern part of the modern town of Strandfontein (from which the turbines would be visible) has no heritage value.

### 7.5. Impacts to cultural landscapes (operation phase)

The indirect or contextual impacts to the historical and precolonial cultural landscapes during the operation phase are assessed together since they are deemed to be similar (Table 1). The intensity of the impacts will be less than those expected during the construction phase because they relate purely to the existence of the completed facility in the landscape with only minimal vehicular traffic and with the construction areas having been rehabilitated. It must also be remembered that most significant views of the landscape are away from the proposed WEF. Impacts to the cultural landscapes will be of medium intensity. Because of the great distances over which wind turbines are visible in this gently undulating landscape, the extent of impacts to the cultural landscapes is deemed to be high, although it is noted that key parts of the landscape, especially the Olifants River Valley, will be screened. The operation phase impacts are expected to be of relatively long duration (but not permanent) because they will continue to apply throughout the lifetime of the facility. Because impacts would definitely occur, the probability is high and the overall impact significance is **high**. Note that the VIA rates this as medium but that this is because some non-heritage related receptors are included. The high probability of impacts to at least some parts of the cultural landscape and local scenic routes means the impacts significance in terms of heritage resources would be high. No particular mitigation measures can be applied during the operation phase because the status quo will have

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<sup>4</sup> These measures were not included by the visual specialist and are added here.



been set at the end of construction. With time, however, the facility would become an ‘acceptable’ component of the cultural landscape as the Eskom Sere Wind Farm to the north has done which allows for a reduction in intensity to low. The overall significance of impacts would thus be at the **medium** level (Table 5). Despite the medium significance rating, the presence of an existing WEF in the vicinity – to the north of the Olifants River – means that the proposed land use is not altogether unacceptable and the impacts to the cultural landscapes, although undesirable, are not deemed to be a fatal flaw. Importantly, the project site is located some distance from the culturally important Olifants River Valley landscape – the nearest turbines to agricultural lands are more than 10 km distant. Also important is that the turbines are quite tightly clustered which reduces the horizontal extent from which the development would be visible in the broader landscape. The facility would gradually become an accepted part of the landscape which may result in the perceived intensity of the impact reducing to a degree over time.

**Table 5: Assessment of impacts to the cultural landscape (operation).**

Impact Phase: Operation							
<b>Potential impact description:</b> Impacts to the cultural landscape							
Detailed description of impact: The rural/agricultural cultural landscape is affected by the visual intrusion into it of electrical infrastructure.							
	Intensity	Extent	Duration	Status	Probability	Significance	Confidence
Without Mitigation	M	H	H	Negative	H	H	H
With Mitigation	L	H	H	Negative	H	M	H
Can the impact be reversed?			YES.				
Will impact cause irreplaceable loss or resources?			YES, in the sense that every landscape and every view across those landscapes is unique. No, in the sense that there are other areas where similar (but never identical) landscapes occur. However, one cultural landscape can never replace another.				
Can impact be avoided, managed or mitigated?			YES, but only slightly since the structures cannot be hidden or screened.				
Mitigation measures to reduce residual risk or enhance opportunities:							
- None required.							

### 7.5.1. Mitigation and Management

None required since the status quo will have been established by the end of the construction phase and mitigation in the form of screening is not feasible.

### 7.6. Impacts to cultural landscapes (decommissioning phase)

The indirect or contextual impacts to the historical and precolonial cultural landscapes during the decommissioning phase are also assessed together since they are deemed to be similar, although again for slightly different reasons (Table 1). The intensity of the impacts will once more increase as many vehicles will be required on site during the decommissioning of the facility and rehabilitation of the land but is moderated by the fact that the turbines will be removed. Impacts to the cultural landscapes are expected to be of

medium intensity. Because of the distances over which wind turbines are visible in this gently undulating landscape, the extent of impacts to the cultural landscapes is deemed to be medium. The decommissioning phase would not last long so the duration is rated as low. Because impacts would definitely occur, the probability is high and the overall impact significance is **medium**. Mitigation measures should aim to reduce the visual intrusion in the landscape and ensure effective rehabilitation of the project footprint. Because the impact would be incrementally reducing during this phase, the intensity is expected to be low. The overall significance of impacts would remain at the **medium** level (Table 6). There are no fatal flaws.

**Table 6: Assessment of impacts to the cultural landscape (decommissioning).**

Impact Phase: Decommissioning							
<b>Potential impact description:</b> Impacts to the cultural landscape							
Detailed description of impact: The rural/agricultural cultural landscape is affected by the visual intrusion into it of electrical infrastructure and construction equipment and machinery.							
	Intensity	Extent	Duration	Status	Probability	Significance	Confidence
Without Mitigation	M	M	L	Negative	H	M	H
With Mitigation	L	M	L	Negative	H	M	H
Can the impact be reversed?			YES.				
Will impact cause irreplaceable loss or resources?			YES, in the sense that every landscape and every view across those landscapes is unique. No, in the sense that there are other areas where similar (but never identical) landscapes occur. However, one cultural landscapes can never replace another.				
Can impact be avoided, managed or mitigated?			YES, but only slightly since the structures and machinery cannot be hidden or screened. Decommissioning is effectively a mitigation measure of sorts because the intrusive wind turbines would be removed from the landscape.				
Mitigation measures to reduce residual risk or enhance opportunities:							
- Ensure effective rehabilitation of disturbed areas.							

### 7.6.1. Mitigation and Management

Mitigation measures would include:

- Ensuring that the rehabilitation measures are effectively applied after decommissioning.

### 7.7. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological artefacts.

### 7.8. Cumulative impacts

The impact assessment descriptions provided above apply to cumulative impacts as well. However, relevant differences are highlighted here.

#### 7.8.1. Impacts to archaeological resources (construction phase)

Archaeological resources appear to be fairly sparse in the vicinity of the study area except in close proximity to rocky outcrops which tend to be avoided during renewable energy developments. The study area is far enough from the coast to not contain shell middens which are generally highly susceptible to impacts. Projects built or planned in the Knersvlakte will likely result in the most archaeological impacts but these impacts would be of low significance owing to the nature of the remains and the ease with which mitigation could be carried out. This means that the cumulative impact significance before mitigation would likely be of **medium** significance but after mitigation this would reduce to **low** (Table



7). Although most impacts occur during construction, contextual impacts to rock art sites would occur throughout the lifetime of any development but, being non-destructive, these would generally be of lesser significance. They are also reversible. Because so little is known about the archaeology in the immediate area, there could, in fact, be minor positive impacts (benefits) if the opportunity to sample archaeological sites in the area arose as a result of development.

**Table 7: Cumulative impacts to archaeological resources**

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to archaeological resources							
Archaeological resources on the ground (artefacts, occupation debris) can be damaged and/or destroyed during construction activities.							
Archaeological resources with visual significance (rock art) can have their visual context altered during all phases of development through the presence of foreign/inappropriate structures in the landscape.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	H	M	Negative	M	H	H
With Mitigation	L	H	L	Negative	L	H	H
Can the impact be reversed?			NO, because archaeological resources are unique and cannot be recreated.				
Will impact cause irreplaceable loss or resources?			YES, because archaeological resources cannot be recreated.				
Can impact be avoided, managed or mitigated?			YES, because development layouts can often be altered to avoid important resources or else archaeological mitigation work can be conducted.				
Mitigation measures to reduce residual risk or enhance opportunities:							
<ul style="list-style-type: none"> <li>- Ensure that necessary archaeological mitigation measures have been implemented prior to the start of construction; and</li> <li>- Ensure that any archaeological material discovered during the course of the construction phases is immediately reported to HWC or an archaeologist.</li> </ul>							

### 7.8.2. Impacts to palaeontological resources (construction phase)

Significant palaeontological resources are likely to be very sparsely distributed in the study area and its surroundings. Because fossils are sparse this raises the potential significance of each fossil and thus increases the possibility of cumulative impacts occurring should other renewable energy facilities be built in the area. The significance of cumulative impacts without mitigation could be of **medium** significance but with mitigation this would be reduced to **low** (Table 8).

**Table 8: Cumulative impacts to palaeontological resources.**

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to palaeontological resources							
Fossils can be damaged and/or destroyed during construction activities.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without	L	H	M	Negative	M	L	H

Mitigation							
With Mitigation	L	H	L	Positive	L	L	H
Can the impact be reversed?	NO, because palaeontological resources are unique and cannot be recreated.						
Will impact cause irreplaceable loss or resources?	YES, because palaeontological resources cannot be recreated.						
Can impact be avoided, managed or mitigated?	YES, because although it is impossible to locate deeply buried fossils prior to the commencement of construction (i.e. cannot be avoided), they can be reported when found, temporarily protected and subsequently assessed and/or collected by a palaeontologist.						
Mitigation measures to reduce residual risk or enhance opportunities: <ul style="list-style-type: none"> <li>- Ensure that the necessary measures are in place for the construction phase including monitoring (if recommended by the specialist) and reporting of chance finds.</li> </ul>							

### 7.8.3. Impacts to graves (construction phase)

Graves are very seldom encountered during development activities in this area. The majority of graves are likely to be in sand dune contexts, especially close to the coast. Although graves are important, which means the intensity and significance of impacts are **high** before mitigation, the successful rescue of human remains would reduce the overall significance rating to **low** after mitigation. This latter rating is also affected by the very low probability of actually impacting graves (Table 9).

**Table 9:** Cumulative impacts to graves.

Impact Phase: Construction							
<b>Potential impact description:</b> Impacts to graves Graves may be damaged or destroyed during construction activities.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	H	H	Negative	H	L	H
With Mitigation	L	H	L	Negative	L	L	H
Can the impact be reversed?	NO, because once a grave is disturbed it can never be recreated as it was.						
Will impact cause irreplaceable loss or resources?	YES, because every human is unique, even after death.						
Can impact be avoided, managed or mitigated?	YES, because although impacts cannot be avoided if graves are revealed during construction, they can be reported, exhumed and stored in a safe repository.						
Mitigation measures to reduce residual risk or enhance opportunities: <ul style="list-style-type: none"> <li>- Ensure that any graves discovered during construction are immediately protected in situ and reported to HWC and/or an archaeologist for further assessment and exhumation.</li> </ul>							

### 7.8.4. Impacts to cultural landscapes (all phases)

Impacts to cultural landscapes can vary substantially from place to place and hence from project to project because of the great variability within these landscapes. For this reason, all phases are assessed together here; the operation phase is generally likely to have the most significant impacts, purely because it would last for the longest period of time, and these impacts are reflected below. Because of the high visibility of large structures such as wind turbines, the extent of cumulative impacts is regarded as medium. The intensity can vary dramatically depending on the nature of the cultural landscape being impacted and the proximity of the development to it. Many landscapes proposed to host renewable energy facilities in this area tend to have very limited anthropogenic features (e.g. the existing Eskom Sere WEF to the northwest of the Olifants River). Highly developed landscapes, such as the Olifants River Valley, tend to be located somewhat away from renewable energy developments so the intensity is regarded as being medium. The valley is also sunken into the wider landscape with the result that views in the valley are shorter and often contained. Because mitigation can never hide renewable energy facilities and generally only improves the visual/contextual impacts at the very local level, the significance of impacts is rated as **medium** before mitigation and **medium** after mitigation (Table 10).

**Table 10:** Cumulative impacts to cultural landscapes (all phases).

Impact Phase: All phases							
<b>Potential impact description:</b> Impacts to cultural landscapes Intrusion into the cultural landscape of structures and/or land uses that are either foreign or inappropriate to that landscape. Such structures or land uses result in visual/contextual degradation of the cultural landscape.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	H
With Mitigation	M	M	M	Negative	M	H	H
Can the impact be reversed?			YES, with decommissioning and rehabilitation the landscapes can be restored to their former condition.				
Will impact cause irreplaceable loss or resources?			YES, in the sense that every landscape and every view across those landscapes is unique. No, in the sense that there are other areas where similar (but never identical) landscapes occur. However, one cultural landscapes can never replace another.				
Can impact be avoided, managed or mitigated?			NO, impacts to the cultural landscape are generally unavoidable because if a renewable energy facility is built then there will be an impact to the cultural landscape. However, impacts can be mitigated to a small degree.				
Mitigation measures to reduce residual risk or enhance opportunities:							
<ul style="list-style-type: none"> <li>- Minimise the amount of land that gets disturbed;</li> <li>- Minimise cut and fill operations which result in increased landscape scarring;</li> <li>- Ensure effective rehabilitation; and</li> <li>- Follow any other recommended visual mitigation measures.</li> </ul>							

## 7.9. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if



necessary, whether pre-construction or, in the case of accidental discovery, during construction. Impacts to cultural landscapes are difficult to quantify but in general a development that visually dominates the cultural landscape from many vantage points is undesirable. Because of the height of the majority of the proposed development, such an impact is expected to occur within close proximity of the actual facility. The significant Olifants River agricultural landscape occurs at some distance from the facility which makes the presence of the facility more acceptable in the context of that landscape because the proposed WEF can never dominate views within or into the valley. The same applies to the Olifants River Estuary and the coastal cliffs, both of which can only be viewed with the proposed WEF behind or well to the side of the viewer. The precolonial cultural landscape, however, is very close to the facility. The area is best viewed and appreciated facing away from the wind turbines, but in the past the views out from painted rock shelters may have also been important. This is something we can never fully appreciate and is thus difficult to quantify. Perhaps the best we can do is to evaluate the content and preservation of the rock art and whether the sites are likely to be significant from a research and/or tourism point of view in the future. In this case this seems relatively unlikely and the expected change to the landscape through the introduction of wind turbines is thus likely to be moderately acceptable. The change is, of course, reversible in the long term.

## **8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM**

In general, heritage mitigation measures (especially those for archaeological resources) would be conducted before the start of construction. The environmental control officer (ECO) would need to ensure that all such measures have been complied with. These include:

- Ensure that the final layout is considered by an archaeologist and any as yet unsurveyed sections examined prior to construction;
- Ensure that relevant no-go areas are respected (at present all sensitive areas are far enough from the development footprint that none need to be cordoned off or monitored);
- Ensure that project staff are aware of the possibility of finding fossils and that a chance finds procedure is included in the EMPr;
- Ensure that visual mitigation measures (as specified by the visual specialist) are implemented during all phases of the project.

## **9. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS**

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. The present project aims to provide renewable energy to South Africa. Electricity is needed for further development of the economy and for electrification of homes. Renewable energy is desirable in order to reduce the impacts on human health from non-renewable sources. Some jobs will be created, with the majority being during the construction phase and thus of temporary duration. The impacts to heritage resources from the present proposal are relatively limited due to the distance between the project

and the most significant resource and the sustainable social and economic benefits are deemed to outweigh the impacts to heritage.

## 10. CONSULTATION

HWC requires that heritage impact assessments be submitted to relevant registered heritage conservation bodies as well as to the relevant local municipality for comment. There are no registered conservation bodies with an interest in this area but the report was sent to the Matzikama Municipality for comment on 25<sup>th</sup> October 2018. They responded on 29<sup>th</sup> October 2018 via an e-mail from Mr Denovan Cupido acknowledging my request for comment but did not send any further comment<sup>5</sup>.

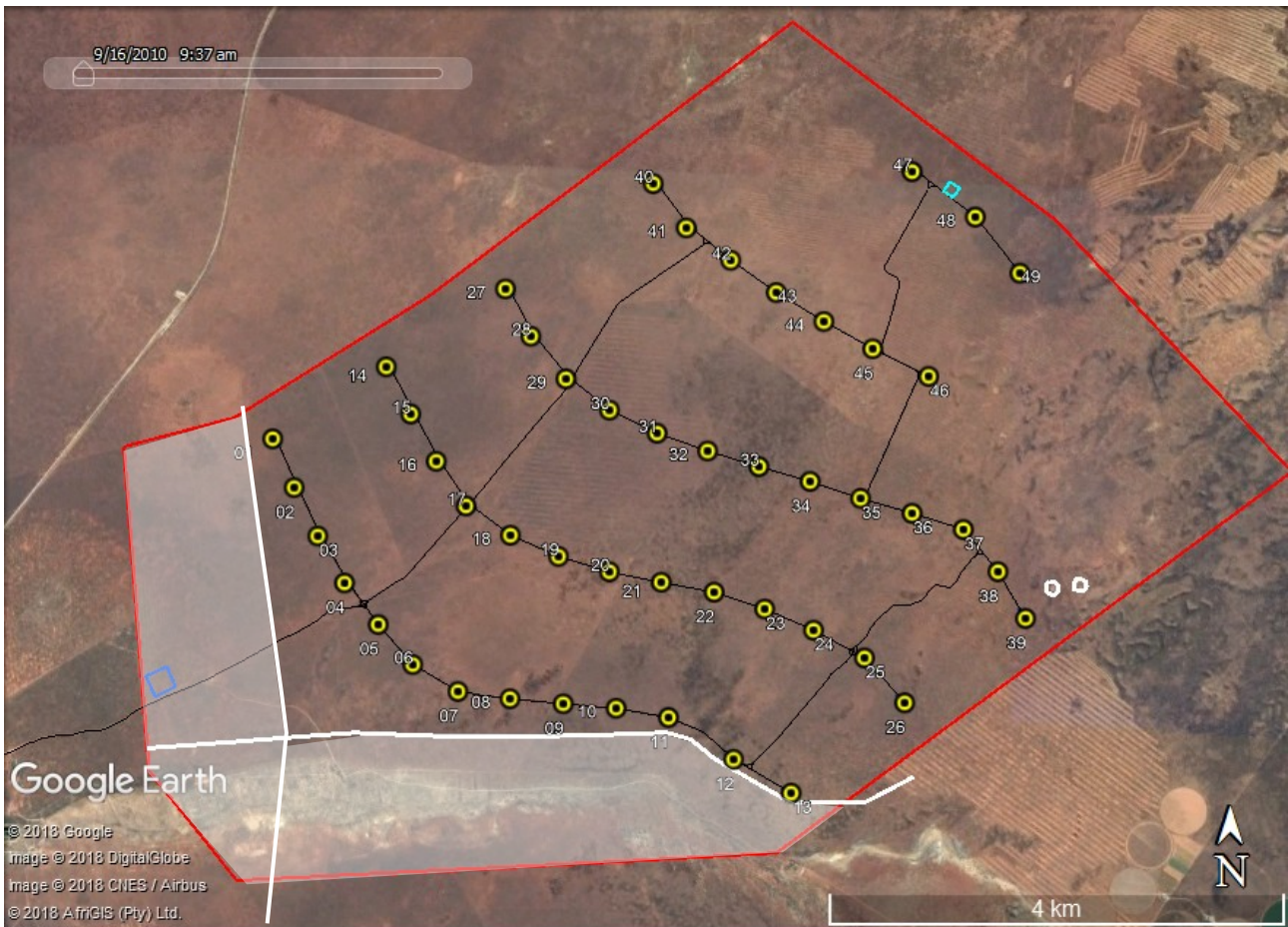
## 11. CONCLUSIONS

Impacts to ground-based archaeology and palaeontology are expected to be minimal and of low significance. The vast majority of the study area is of very low sensitivity and would not require further study. The final layout devised after the conclusion of all specialist studies is shown in Figure 44. This revised layout eliminated turbines from the sensitive sand dune area which effectively protects the two significant sites in this area. The rock art sites within the southern part of the study area are part of a sensitive landscape located to the south of the river and a buffer of 500 m from the river has been implemented (Figure 53). The Olifants River Valley is also a sensitive cultural landscape but is located at some distance (>10 km) from the proposed WEF. The Olifants River estuary and coastal cliffs are also significant landscapes but occur downslope and more than 4 km from the nearest turbines. Impacts to the cultural landscapes are the only real concerns here but the experience of these landscapes will be only minimally impacted by the presence of the proposed WEF. The impacts are, to a large degree, outweighed by the sustainable economic and social benefits to be obtained by the proposed WEF construction. It is also pertinent to note that the majority of sensitive views would be seen with the WEF behind the viewer when viewed from the R362 and R363 (e.g. towards the coast, towards the Olifants River estuary, towards the historic settlements of Ebenhaeser and Papendorp [which are focused towards the river] and towards the agricultural lands). Views within the Olifants River valley tend to be relatively short and contained and, because of the valley's alignment relative to the location of the WEF, they generally will not include the WEF. The viewshed has shown that most of the valley floor is screened by local topography. Some views of all these landscapes might, however, be towards the existing Eskom Sere WEF to the north of the Olifants River. The impacts to cultural landscapes are potentially reversible with effective rehabilitation.

The substation and laydown areas are acceptable.

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<sup>5</sup> Both the request email and the acknowledgement e-mail were submitted to HWC digitally for the record.



**Figure 53:** Aerial view of the study area showing the suggested on site heritage no-go areas for turbines (white shading) relative to the final turbine and road layout. The turquoise square is the final substation layout and the blue square the laydown area. All land within 500 m of the centre of the Sandlaagte (south of white line) has been avoided as have the two significant archaeological sites each with a minimum 30 m buffer (white circles).

## 12. RECOMMENDATIONS

From a heritage point of view, it is found that the project is acceptable and it is recommended that it can proceed. The following conditions should be included in the conditions of authorisation:

- The Sandlaagte River Valley should be avoided in totality with no infrastructure placed within 500 m of the centre of the valley;
- Any changes to the layout assessed in the EIA Phase should be evaluated from the desktop by an archaeologist prior to construction with any sensitive areas (e.g. deflation hollows) that might be impacted then being examined in the field;
- Best practice measures to reduce the visual impacts to the landscape should be implemented (e.g. minimising disturbance, minimising lighting, ensuring rehabilitation);



- A fossil chance finds procedure must be included in the EMPr and any fossil finds made during construction must be reported to a palaeontologist for further assessment;
- If the need to reduce turbine numbers arises because of improvements in technology, then those nearest the R362 should be removed first; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist or palaeontologist as appropriate. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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# APPENDIX 1 – Curriculum Vitae



*Curriculum Vitae*

**Jayson David John Orton**

ARCHAEOLOGIST AND HERITAGE CONSULTANT

## Contact Details and personal information:

**Address:** 40 Brassie Street, Lakeside, 7945  
**Telephone:** (021) 788 8425  
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**Email:** jayson@asha-consulting.co.za

**Birth date and place:** 22 June 1976, Cape Town, South Africa  
**Citizenship:** South African  
**ID no:** 760622 522 4085  
**Driver's License:** Code 08  
**Marital Status:** Married to Carol Orton  
**Languages spoken:** English and Afrikaans

## Education:

SA College High School	Matric		1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997	
University of Cape Town	B.A. (Honours) (Archaeology)*		1998
University of Cape Town	M.A. (Archaeology)		2004
University of Oxford	D.Phil. (Archaeology)		2013

\*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

## Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

## Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233

CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)  
Stone Age archaeology (awarded 2007)  
Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)  
Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP) membership number: 43

- Accredited Professional Heritage Practitioner

### ➤ **Memberships and affiliations:**

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 –
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –
Kalk Bay Historical Association	2016 –
Association of Professional Heritage Practitioners member	2016 –

### **Fieldwork and project experience:**

Extensive fieldwork and experience as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

#### Feasibility studies:

- Heritage feasibility studies examining all aspects of heritage from the desktop

#### Phase 1 surveys and impact assessments:

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 archaeological test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

#### Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda, Namaqualand
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

### **Awards:**

Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.

## APPENDIX 2 – LIST OF ARCHAEOLOGICAL RESOURCES

Note that an estimated amount of time on site for mitigation purposes is indicated in the final column where appropriate.

Way-point	Site name	Co-ordinates	Description	Significance Grade Mitigation
001	DBM2018/001	S31 44 54.1 E18 15 08.5	Light artefact scatter with a few shell fragments. Stone materials include quartz, quartzite, silcrete, sandstone and 'other'.	Low NCW
002	DBM2018/002	S31 45 14.3 E18 16 09.9	Old farm complex with a cottage in the east (walls largely still standing), a main house (essentially present at floor level only) and an outbuilding to the west. There are dumped artefacts (glass, ceramic, writing slate, metal), marine shell, ostrich eggshell and bone (tortoise and other animals) throughout the area around the cottage and main house. It was notable that almost all the ceramics were plain white. Just two decorated rims were seen along with one maker's mark. It was evident from the ruined structures that various phases of cement work were present suggesting repairs, and maintenance (replastering) at various times.	High IIIB
003	---	S31 45 20.9 E18 17 55.6	Light and very widespread scatter of quartz artefacts. It continues up the slope towards the rock shelter at 004 and as it does so other materials are notable as well. On further survey it was found that the entire area among the rock outcrops has a light scatter of artefacts becoming denser at the various sites as described below.	Low IIIC
004	DBM2018/003	S31 45 30.7 E18 17 50.7	Large rock shelter with a sloping rock floor. There is a light scatter of artefacts over the floor tapped in small pockets of sediment or in hollows in the rock. These include quartz and silcrete. There are four rock art panels (from left to right) all painted in red: <ol style="list-style-type: none"> <li>1. Fair amount of paint but poorly preserved. Just two fineline figures are readily discernible.</li> <li>2. Seems to be two or three 'images' composed of many vertical lines. Poorly preserved and coated by a white precipitate and much dust.</li> <li>3. Very small amount of paint evident as a cluster of 'dots' very low down on the wall. They were probably part of something else no longer preserved.</li> <li>4. The largest panel with many images. Most of what is visible is parallel lines but much finer than expected for geometric tradition art. They may represent entoptic phenomena. There are also four circular images at the base of the panel on the right. At far left is what appears to be a geometric tradition motif of a square or circle (unclear) containing vertical lines that extend beneath the enclosing shape</li> </ol>	High IIIB/IIIA



Waypoint	Site name	Coordinates	Description	Significance Grade Mitigation
			('tassles').	
005	DBM2018/004	S31 45 33.2 E18 17 52.4	Dense artefact scatter with some shell. Stone materials include quartz, quartzite, silcrete and CCS. A silcrete radial core and a silcrete notched piece were seen. The scatter extends to waypoint 006.	Medium IIIC
006	DBM2018/005	S31 45 33.9 E18 17 53.5	Rock shelter with a rock (east side) and gravel (west side) floor. There may be a very small deposit in the gravel but it lacks fines because it has probably been washed by water. The surface of the back wall is poorly preserved and is flaking off over much of its area. There is only one clear painting which is of a circle (presumably geometric tradition) in red. On the floor there is pottery, ostrich eggshell, bone, quartz, silcrete and a surprisingly large amount of fine-grained black rock. The pottery is grey/green colour with brownish colouring applied to the outside. The sherds are 7-8 mm thick. Also notable was a bedrock slab that had been used as a lower grindstone in the eastern part of the shelter.	Medium IIIB
007	DBM2018/006	S31 45 35.5 E18 17 51.6	A boulder with a dense artefact and shell scatter on its north (downslope) side. There could be a sandy deposit here. Around the northeast side there is a possible circle (or even concentric circles) painted in red in an alcove in the back wall where it forms a slight shelter (likely geometric tradition art) and further around, facing southeast, is a low cave – now largely filled in with wind-blown sand and used by animals – with artefacts on its surface. There may be a good deposit.	Medium IIIB
008	DBM2018/007	S31 45 35.0 E18 18 02.9	A boulder with a small amount of paint on it. Seems to just be some lines.	Low NCW
009	DBM2018/008	S31 45 27.2 E18 18 02.0	A low cliff with a light artefact and shell scatter below it. This continues and becomes far thicker below a second section of cliff about 15 m to the north. The shell is very heavily fragmented. On the southern cliff there is what appears to be a geometric image (square with a cross in it) painted in red.	Medium IIIC/IIIB
010	DBM2018/009	S31 45 24.6 E18 18 01.7	A small rock shelter in a little valley bottom with a light shell and artefact scatter outside it. One fragment of thin-walled grey stoneware also seen.	Low-medium NCW
011	DBM2018/010	S31 44 19.7 E18 20 15.6	Deflation hollow with an ephemeral quartz scatter in it but a dense cluster of pottery in one place. The pottery appears to be eroding out of a sandy mound with a bush in it. Pottery has coarse quartz grit of up to 5 mm length. The body is grey but there is a brown slip applied to the exterior surface. The walls are c. 8 mm thick. There is the rounded base of a pot here. Pottery shows coil manufacture. Also a scatter of five ostrich eggshell fragments in western part of hollow (three fragments are unusually large). In the deepest part	Low-medium IIIC <b>4 hours</b>

Way-point	Site name	Co-ordinates	Description	Significance Grade Mitigation
			of the hollow there is a light artefact scatter with flakes of quartz and 'other' and one in hornfels. Also a CCS core, an 'other' cobble core (single platform core, possibly quartzite), several fragments of sandstone, a sandstone lower grindstone/anvil (lightly ground on both sides), a sandstone hammer stone/upper grindstone (lightly ground).	
012	DBM2018/011	S31 44 20.9 E18 20 06.3	Deflation hollow with a light quartz artefact (c. 100 seen) scatter in the southern end only. Also a sandstone lower grindstone with a small hollow on each side and an 'other' hammer stone (igneous rock; hammered on both ends).	Low-medium IIC <b>4 hours</b>
013	---	S31 43 29.8 E18 20 05.7	Deflation hollow with one quartz flake, one CCS thumbnail scraper and one grindstone fragment. The hollow is heavily sheep-trampled and may have other artefacts now buried.	Low NCW
014	DBM2018/012	S31 42 54.8 E18 19 50.1	A light scatter of quartz artefacts (12 seen) in a flat, open area with no landscape focus.	Low NCW
015	DBM2018/013	S31 43 24.0 E18 19 46.4	A pan with artefacts scattered on its surface. There are artefacts of quartz, silcrete, sandstone and also several hammer stones in sandstone or quartzite. No obvious ESA artefacts but certainly many are MSA. This is the kind of occurrence expected on the hardpan below the sand and may just be an exposure of this. Equally, it could be here because of the pan with the surrounding buried scatter of far lower density.	Low NCW
016	DBM2018/014	S31 43 32.1 E18 19 57.5	Deflation hollow with an ephemeral scatter of stone artefacts (12 seen; quartz, quartzite, silcrete), a sandstone cobble fragment and various other fragments of rock (5 seen; quartz, 'other').	Low NCW
017	---	S31 43 48.2 E18 19 46.8	A bush-filled deflation hollow with one quartz core and five other pieces of rock (quartz, 'other'). There may be more artefacts buried here because the hollow will be accumulating sand around all the bushes.	Low NCW
018	DBM2018/015	S31 45 45.4 E18 18 41.2	Rock shelter with a shell and stone artefact scatter in front of it. There is no nice floor as the entire surface is covered in blocks of rock. This also makes it unlikely that a good deposit would be present.	Low-medium IIC
019	DBM2018/016	S31 45 43.3 E18 18 42.2	Extensive artefact scatter below the cluster of rocks and cliffs. It seems to be restricted to the area downslope of 018 though and does not extend towards the northwest where the cliff line continues. Two points are at east and west ends of the scatter.	Low-medium IIC
019B		S31 45 42.6 E18 18 38.2		
020	DBM2018/017	S31 45 28.3 E18 18 07.9	Boulder with an extensive light artefact scatter in front of it.	Low-medium IIC
021	DBM2018/018	S31 45 28.6 E18 18 07.8	Rock shelter with an extensive moderate density scatter of artefacts in front of it. It may even be the	High IIIA

Way-point	Site name	Co-ordinates	Description	Significance Grade Mitigation
			<p>same scatter as 020. There is pottery (black inside and brown outside, quartz temper, wall about 7 mm thick), stone artefacts (quartz, CCS, sandstone), lots of ostrich eggshell and bone. There is a very dense cluster of bone (much burnt, looks quite recent but nothing to suggest modern) below Panel 2 of the rock art. There are three rock art panels from left to right as follows:</p> <ol style="list-style-type: none"> <li>1. Three sets of vertically oriented finger dots in black paint on a steeply overhanging section of wall (probably 30° at the top and 45° at the bottom of the strips of dots).</li> <li>2. 2 m right of Panel 1 there is a single human figure painted in red.</li> <li>3. 3 m right of Panel 2 and beyond a large crack in the back wall there is a fairly well preserved eland torso painted in red.</li> </ol>	
022	DBM2018/019	S31 45 27.7 E18 18 05.4	Area of boulders backed by cliffs with a moderate density artefact scatter among the boulders. The artefacts are of quartz, quartzite and silcrete. There is a low, wide 'ledge' on the cliff and on this the artefact scatter is far denser and includes some shell.	Medium IIIB
023	DBM2018/020	S31 45 34.1 E18 18 07.6	Boulder with a moderate density artefact scatter in front of it. There is a single red-painted human figure under a low overhang towards the southeast side of the boulder.	Medium IIIB
024	DBM2018/021	S31 45 35.1 E18 18 08.3	A low wall with a light artefact scatter in front of it that includes a piece of ground ochre.	Low NCW
025	DBM2018/022	S31 45 39.1 E18 18 10.6	A light shell scatter located about 20 m in front of a cliff. There are also a few artefacts present.	Low- medium IIIC

# APPENDIX 3 – PALAEOONTOLOGICAL SPECIALIST STUDY



# APPENDIX 4 – VISUAL IMPACT ASSESSMENT