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**MAHOEBE EIENDOMME: PROPOSED 2MW  
PHOTOVOLTAIC POWER PLANT DEVELOPMENT ON A  
PORTION OF THE FARM DE HOEK 32, PIXLEY KA SEME  
DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE**

**Archaeological Impact Assessment**



**EOH**

Prepared for: **Mahoebe Eiendomme**

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## **ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF AREAS DEMARCTED FOR A PROPOSED 2 MW PHOTOVOLTAIC POWER PLANT (MAHOEBE EIENDOMME SOLAR PARK) ON A PORTION OF THE FARM DE HOEK 32, PRIESKA, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE**

### **Conducted on behalf of:**

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**DECLARATION**

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I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Mahoebe Eiendomme Solar Park Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA, AMAFA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, 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 declaration are true and correct.



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Signature of specialist

**Company:** Exigo Sustainability

**Date:** 28 September 2015

## EXECUTIVE SUMMARY

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This report details the results of an Archaeological Impact Assessment (AIA) study on a portion of the farm De Hoek 32 north-east of the town of Prieska, subject to an Environmental Impact Assessment (EIA) process for the proposed Mahoebe Eiendomme Solar Park Project in the Pixley Ka Seme District Municipality, Northern Cape Province. The proposed project includes the construction of a 2MW PV power plant covering a footprint of up to **3ha**. The report includes background information on the area's archaeology, its representation in southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed.

A number of archaeological and historical studies have been conducted in the Prieska area along the Vaal and Orange Rivers and many of these studies infer a varied and rich heritage landscape. The history of the Northern Cape Province is reflected in a rich archaeological landscape, mostly dominated by Stone Age occurrences. Most of our knowledge of the archaeology of the region is largely dependent on the work undertaken by Humphreys & Thackeray (1983) on the Ghaap escarpment, as well as that of Beaumont (1990). A number of Archaeological Impact Assessments (e.g. Beaumont, Morris, Kaplan, Becker & Kruger) have been done in the larger Kimberley area. Material representative of the Earlier, Middle and Later Stone Age occur frequently in low lying areas on plains and calcrete exposures in Hutton sands along the banks of the Orange River. This presence of Stone Age people in the landscape can probably be attributed to the abundance of locally available raw material for the manufacture of stone tools. During this study it was found that cultural material in this area occurs in lower lying areas, predominantly in association with exposed decomposing calcrete horizons in Hutton Sands. The occurrence of these Stone Tools strongly suggests that similar sites could be located elsewhere in the study area, potentially sub-surface. This is due to the area's close proximity to the Orange River which renders it is prone to alluvial deposits that could burry potential Stone Age material. In addition, a wealth of Later Stone Age rock art sites, most of which are in the form of rock engravings are to be found in the larger landscape. These sites occur on hilltops, slopes, rock outcrops and occasionally in river beds. Sites dating to the Iron Age occur in the extreme north eastern part of the Province and environmental factors delegated that the spread of Iron Age farming westwards from the 17th century was constrained mainly to these areas. However, evidence of an Iron Age presence as far as the Upington area in the eighteenth century occurs in this area. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments at Kimberley, which herald the modern era in South African history.

For the Mahoebe Eiendomme Solar Park Project, two footprint areas (a preferred site and a site alternative) were identified for development. Specimens from the entire span of the Stone Age were identified across the study areas, particularly within the footprint of the site alternative and this site alternative proved to be unsuitable from a heritage sensitivity perspective. Stone Age occurrences were also noted around the preferred site but the final design was adjusted to incorporate initial recommendations pertaining to sensitive heritage receptors and to avoid impact on heritage occurrences. The following recommendations are made based on general observations in the proposed Mahoebe Eiendomme Solar Park Project development areas:

- Three low density Middle Stone Age Scatters (**Exigo-DH32-SA01 - Exigo-DH32-SA03**) along the footprint of the alternative site, and directly southeast and northwest of the footprint of the preferred site are of low scientific value due to the mixing of artefacts and the low density of the

lithics. The author is confident that the study has captured adequate information on these archaeological occurrences and no further action is required in terms of mitigation. Three medium density lithic scatters (**Exigo-DH32-SA04 - Exigo-DH32-SA06**) directly north-west of the preferred site are considered to be of medium significance due to the presence of higher amounts of formal diagnostic tools. In addition, three high density scatters of Earlier and Middle Stone Age material within the alternative site footprint and in the general vicinity of the preferred site (**Exigo-DH32-SA04 - Exigo-DH32-SA06**) are of high significance due to the presence of large numbers of formal tools such as side scrapers, points and blades. Since the footprint of the preferred site was specifically designed cognisant of these sensitive heritage receptors, to avoid impact on heritage receptors, no impact on the resources is foreseen. However, it is recommended that a suitably qualified Heritage Specialist conduct at least one site inspection of during construction phases of the solar facility, and that an Environmental Control Officer (ECO) appointed by the developer for the general monitoring of the development during all stages of the project in order to regularly assess and ensure the preservation and conservation of these features, and to to avoid any possible impact on previously undetected heritage remains. Should any previously undetected subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately. As noted previously, the final layout for the solar park was designed to specifically avoid heritage sensitive areas but to compensate for potential future cumulative impacts, it is recommended that medium and high significance Stone Age localities be avoided by the implementation 10m conservation buffers around each of the locations. Should any of the sites be directly impacted by development activities, it is recommended that they be recorded and that the cultural and archaeological context of the heritage resources be established by means of a limited Phase 2 Specialist Study. This study should minimally include a surface sampling and consequent analysis of the stone artefacts by a qualified Stone Age specialist, in order to elucidate the understanding of the development and spread of the MSA in the area. The Specialist should obtain the necessary permits from SAHRA for the in-situ analysis, possible collection and photography of the artefacts during the study.

- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the Solar Park.

According to the SAHRA Palaeontological Sensitivity Map the site falls within a moderately sensitive fossiliferous zone and a Palaeontological Desktop Assessment should be considered for the project, subject to recommendations from the heritage authority. Should fossil remains such as fossil fish, reptiles or vitrified wood be exposed during construction, these objects should be carefully safeguarded and the heritage resources authority should be notified immediately so that the appropriate action can be taken by a professional palaeontologist. It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. Here, care should be taken

around rock faces and outcrops in the larger landscape, as rock art is known to occur on these outcrops. Water sources such as salt pans, drainage lines and rivers should also be regarded as potentially sensitive in terms of possible Stone Age deposits. The possible existence of Historical Period resources deriving from the area's more recent history should also be considered. Ultimately, it is essential that the archaeological and cultural heritage of the Northern Cape Province be respected.

It is essential that cognisance be taken of the larger archaeological landscape of the Northern Cape Province and the Prieska region in order to avoid the destruction of previously undetected heritage sites. Should any previously undetected heritage resources be exposed or uncovered during construction phases of the proposed project, these should immediately be reported to SAHRA. Since the intrinsic heritage and social value of graves and cemeteries are highly significant, these resources require special management measures. Should human remains be discovered at any stage, these should be reported to the Heritage Specialist and relevant authorities (SAHRA) and development activities should be suspended until the site has been inspected by the Specialist. The Specialist will advise on further management actions and possible relocation of human remains in accordance with the Human Tissue Act (Act 65 of 1983 as amended), the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), the National Heritage Resources Act (Act no. 25 of 1999) and any local and regional provisions, laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.

***Heritage resources have been documented in the Mahoebe Eiendomme Solar Park Project area. However, it is the opinion of the author of this Archaeological Impact Assessment Report that the proposed Mahoebe Eiendomme Solar Park Project on a portion of the farm De Hoek 32 will have a very limited impact on these archaeological heritage resources. The author is confident that the study has captured adequate information on the archaeological heritage present. The project should be allowed to proceed from a culture resources management perspective, provided that mitigation measures provided in this assessment (avoidance, monitoring), endorsed by the relevant Heritage Resources authority, are implemented where applicable.***

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

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## NOTATIONS AND TERMS/TERMINOLOGY

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**Absolute dating:**

Absolute dating provides specific dates or range of dates expressed in years.

**Archaeology:**

The study of the human past through its material remains.

**Archaeological record:**

The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

**Artefact:**

Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artefact are not altered by removal of the surroundings in which they are discovered. In the southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

**Assemblage:**

A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

**<sup>14</sup>C or radiocarbon dating:**

The <sup>14</sup>C method determines the absolute age of organic material by studying the radioactivity of carbon. It is reliable for objects not older than 70 000 years by means of isotopic enrichment. The method becomes increasingly inaccurate for samples younger than ±250 years.

**Ceramic Facies:**

In terms of the cultural representation of ceramics, a facies is denoted by a specific branch of a larger ceramic tradition. A number of ceramic facies thus constitute a ceramic tradition.

**Ceramic Tradition:**

In terms of the cultural representation of ceramics, a series of ceramic units constitutes as ceramic tradition.

**Context:**

An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context*, disturbance or displacement by later ecological action or human activities occurred.

**Culture:**

A contested term, "culture" could minimally be defined as the learned and shared things that people have, do and think.

**Cultural Heritage Resource:**

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

**Cultural landscape:**

A cultural landscape refers to a distinctive geographic area with cultural significance.

**Cultural Resource Management (CRM):**

A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.

**Ecofact:**

Non artefactual material remains that has cultural relevance which provides information about past human activities. Examples would include remains or evidence of domesticated animals or plant species.



**Excavation:**

The principal method of data acquisition in archaeology, involving the systematic uncovering of archaeological remains through the removal of the deposits of soil and the other material covering and accompanying it.

**Feature:**

Non-portable artefacts, in other words artefacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features

**GIS:**

Geographic Information Systems are computer software that allows layering of various types of data to produce complex maps; useful for predicting site location and for representing the analysis of collected data within sites and across regions.

**Historical archaeology:**

Primarily that aspect of archaeology which is complementary to history based on the study of written sources. In the South African context it concerns the recovery and interpretation of relics left in the ground in the course of Europe's discovery of South Africa, as well as the movements of the indigenous groups during, and after the "Great Scattering" of Bantu-speaking groups – known as the *mfecane* or *difaqane*.

**Impact:** A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**Iron Age:**

Also known as "Farmer Period", the "Iron Age" is an archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture.

**Lithic:**

Stone tools or waste from stone tool manufacturing found on archaeological sites.

**Management / Management Actions:**

Actions – including planning and design changes - that enhance benefits associated with a proposed development, or that avoid, mitigate, restore, rehabilitate or compensate for the negative impacts.

**Matrix:**

The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

**Megalith:**

A large stone, often found in association with others and forming an alignment or monument, such as large stone statues.

**Midden:**

Refuse that accumulates in a concentrated heap.

**Microlith:**

A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

**Monolith:**

A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

**Oral Histories:**

The historical narratives, stories and traditions passed from generation to generation by word of mouth.

**Phase 1 CRM Assessment:**

An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.

**Phase 2 CRM Study:**

In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including

historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

**Phase 3 CRM Measure:**

A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

**Prehistoric archaeology:**

That aspect of archaeology which concerns itself with the development of humans and their culture before the invention of writing. In South Africa, prehistoric archaeology comprises the study of the Early Stone Age, the Middle Stone Age and the greater part of the Later Stone Age and the Iron Age.

**Probabilistic Sampling:**

A sampling strategy that is not biased by any person’s judgment or opinion. Also known as statistical sampling, it includes systematic, random and stratified sampling strategies.

**Provenience**

Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association*, the co-occurrence of an artefact with other archaeological remains; and *superposition*, the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

**Random Sampling:**

A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

**Relative dating:**

The process whereby the relative antiquity of sites and objects are determined by putting them in sequential order but not assigning specific dates.

**Remote Sensing:**

The small or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing device(s) that is not in physical or intimate contact with the object (such as by way of aircraft, spacecraft or satellite). Here, ground-based geophysical methods such as Ground Penetrating Radar and Magnetometry are often used for archaeological imaging.

**Rock Art Research:**

Rock art can be "decoded" in order to inform about cultural attributes of prehistoric societies, such as dress-code, hunting and food gathering, social behaviour, religious practice, gender issues and political issues.

**Scoping Assessment:**

The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision making is expected to focus and to ensure that only key issues and reasonable alternatives are examined. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialist involvement.

**Sensitive:**

Often refers to graves and burial sites although not necessarily a heritage place, as well as ideologically significant sites such as ritual / religious places. *Sensitive* may also refer to an entire landscape / area known for its significant heritage remains.

**Site (Archaeological):**

A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

**Slag:**

The material residue of smelting processes from metalworking.

**Stone Age:**

An archaeological term used to define a period of stone tool use and manufacture.

**Stratigraphy:**

This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

**Stratified Sampling:**

A probabilistic sampling strategy whereby a study area is divided into appropriate zones – often based on the probable location of archaeological areas, after which each zone is sampled at random.

**Systematic Sampling:**

A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

**Tradition:**

Artefact types, assemblages of tools, architectural styles, economic practices or art styles that last longer than a phase and even a horizon are describe by the term *tradition*. A common example of this is the early Iron Age tradition of Southern Africa that originated ± 200 AD and came to an end at about 900 AD.

**Trigger:** A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input. Legal requirements of existing and future legislation may also trigger the need for specialist involvement.

**Tuyère:**

A ceramic blow-tube used in the process of iron smelting / reduction.

**LIST OF ABBREVIATIONS**

<b>Abbreviation</b>	<b>Description</b>
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
CRM	Culture Resources Management
NC-PHRA	Northern Cape Provincial Heritage Resources Agency
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MRA	Mining Right Area
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authorities
SAFA	Society for Africanist Archaeologists
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

**TABLE OF CONTENTS**

---

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>1 BACKGROUND.....</b>	<b>15</b>
1.1 SCOPE AND MOTIVATION .....	15
1.2 PROJECT DIRECTION .....	15
1.3 PROJECT BRIEF .....	15
1.4 TERMS OF REFERENCE .....	18
1.5 CRM: LEGISLATION, CONSERVATION AND HERITAGE MANAGEMENT.....	18
1.5.1 <i>Legislation regarding archaeology and heritage sites</i> .....	18
1.5.2 <i>Background to HIA and AIA Studies</i> .....	20
1.6 ASSESSING THE SIGNIFICANCE OF HERITAGE RESOURCES.....	21
- CATEGORIES OF SIGNIFICANCE .....	22
<b>2 REGIONAL CONTEXT.....</b>	<b>24</b>
2.1 AREA LOCATION .....	24
2.2 AREA DESCRIPTION: RECEIVING ENVIRONMENT .....	24
2.3 SITE DESCRIPTION .....	24
<b>3 METHOD OF ENQUIRY.....</b>	<b>26</b>
3.1 SOURCES OF INFORMATION .....	26
3.1.1 <i>Desktop Study</i> .....	26
3.1.2 <i>Aerial Representations and Survey</i> .....	26
3.1.3 <i>Field Survey</i> .....	26
3.1.4 <i>General Public Liaison</i> .....	27
3.2 LIMITATIONS.....	27
3.2.1 <i>Access</i> .....	27
3.2.2 <i>Visibility</i> .....	27
3.2.3 <i>Limitations and Constraints</i> .....	31
3.3 IMPACT ASSESSMENT .....	31
<b>4 ARCHAEO-HISTORICAL CONTEXT.....</b>	<b>32</b>
4.1 THE ARCHAEOLOGY OF SOUTHERN AFRICA.....	32
4.1.1 <i>The Stone Ages</i> .....	32
4.1.2 <i>The Iron Age Farmer Period</i> .....	34
4.1.3 <i>Pastoralism and the last 2000 years</i> .....	35
4.1.4 <i>Historical and Colonial Times and Recent History</i> .....	35
4.2 THE PRIESKA AREA: SPECIFIC THEMES.....	36
4.2.1 <i>The Earlier and Middle Stone Ages in the Northern Cape</i> .....	36
4.2.2 <i>Rock Markings</i> .....	38
4.2.3 <i>The Iron Age / Farmer Period</i> .....	38
4.2.4 <i>Later History: Colonial Period</i> .....	39
4.2.5 <i>Burial Sites / Human Remains</i> .....	39
<b>5 RESULTS: ARCHAEOLOGICAL SURVEY .....</b>	<b>39</b>
5.1 THE STONE AGE .....	39
5.2 THE IRON AGE FARMER PERIOD .....	53
5.3 HISTORICAL / COLONIAL PERIOD AND RECENT TIMES.....	53
5.4 GRAVES .....	53
<b>6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING .....</b>	<b>55</b>

---

6.1	POTENTIAL IMPACTS AND SIGNIFICANCE RATINGS .....	55
6.1.1	<i>General assessment of impacts on resources</i> .....	55
6.1.2	<i>Direct impact rating</i> .....	55
6.1.3	<i>Discussion: Evaluation of Results and Impacts</i> .....	57
6.2	MANAGEMENT ACTIONS .....	57
<b>7</b>	<b>RECOMMENDATIONS</b> .....	<b>58</b>
<b>8</b>	<b>GENERAL COMMENTS AND CONDITIONS</b> .....	<b>60</b>
<b>9</b>	<b>BIBLIOGRAPHY</b> .....	<b>61</b>
<b>10</b>	<b>ADDENDUM 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE</b> .....	<b>63</b>
10.1	SITE SIGNIFICANCE MATRIX .....	63
10.2	IMPACT ASSESSMENT CRITERIA.....	63
10.3	DIRECT IMPACT ASSESSMENT CRITERIA .....	65
10.4	MANAGEMENT AND MITIGATION ACTIONS.....	66

**LIST OF FIGURES**

---

Figure 1-1: Aerial map representation of the general locality of the Mahoebe Eiendomme Solar Park project.....	16
Figure 1-2: Infrastructure layout plan of the proposed Mahoebe Eiendomme Solar Park project in relation to sensitive heritage areas (see later reference). .....	17
Figure 2-1: 1:50 00 Map representation of the location of the Mahoebe Eiendomme Solar Park Project Areas (sheet 2923AD). The preferred site is indicated in red and the alternative site is indicated in green).....	25
Figure 3-1: Garmin GPS Track log for the site survey of the Mahoebe Eiendomme Solar Park footprint (the preferred site is indicated in red, alternative site is indicated in green).....	27
Figure 3-2: View of general surroundings on the farm De Hoek along the western periphery of the study area, looking south.....	28
Figure 3-3: View of general surroundings on the farm De Hoek along the western periphery of the study area, looking south.....	28
Figure 3-4: View of general surroundings in the study area at the site alternative. ....	29
Figure 3-5: View of general surroundings in the study area at the preferred site, looking west.....	29
Figure 3-6: View of general surroundings of general surroundings in the study area at the preferred site.....	30
Figure 3-7: View of an access road to the preferred site. ....	30
Figure 3-9: Trench excavation in the area of the preferred site indicating the absence of sub-surface deposits .....	31
Figure 4-1: Stone Age exposures along a large Salt Pan on the farm Vlakpan, north-east of the study area.....	37
Figure 4-2: Earlier Stone Age tools occurring along a large salt pan on the farm Vlakpan .....	37
Figure 5-1: View of general surroundings at Exigo-DH32-SA01.....	41
Figure 5-2: View of general surroundings at Exigo-DH32-SA02.....	41
Figure 5-3: MSA artefacts from Exigo-DH32-SA01.....	42
Figure 5-4: View of general surroundings at Exigo-DH32-SA04.....	43
Figure 5-5: View of calcrete exposures at Exigo-DH32-SA04.....	44
Figure 5-6: A broken point from Exigo-DH32-SA05.....	44
Figure 5-7: Highly weathered points from Exigo-DH32-SA06.....	45
Figure 5-8: Surface stone and lithic occurrences at Exigo-DH32-SA06.....	45
Figure 5-9: View of general surroundings at Exigo-DH32-SA08.....	47
Figure 5-10: View of general surroundings at Exigo-DH32-SA09.....	47
Figure 5-11: View of general surroundings at Exigo-DH32-SA08.....	48
Figure 5-12: Core tools from Exigo-DH32-SA07.....	48
Figure 5-13: Secondary retouch visible on side scrapers from Exigo-DH32-SA08.....	49
Figure 5-14: A weathered point (left) and a broken blade (right) from Exigo-DH32-SA09.....	49
Figure 5-15: A crude chopper with secondary retouch visible (left and centre) and a broken point from Exigo-DH32-SA09.....	50
Figure 5-16: Surface stones and lithics at Exigo-DH32-SA08.....	50
Figure 5-17: An Earlier Stone Age cleaver from Exigo-DH32-SA09.....	51
Figure 5-18: A selection of side scrapers from Exigo-DH32-SA09.....	51
Figure 5-19: A selection of side scrapers from Exigo-DH32-SA09. Note use wear marks and secondary retouch along edges.....	52
Figure 5-20: MSA oints from Exigo-DH32-SA09.....	52
Figure 5-21: Broken points from Exigo-DH32-SA08.....	53
Figure 5-22: Map of heritage sites discussed in the text .....	54

## 1 BACKGROUND

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### 1.1 Scope and Motivation

Exigo Sustainability was commissioned by Mahoebe Eiendomme for an Archaeological Impact Assessment (AIA) study on a portion of the farm De Hoek 32, subject to an Environmental Impact Assessment (EIA) process for the proposed Mahoebe Eiendomme Solar Park project in the Pixley Ka Seme District Municipality, Northern Cape Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

### 1.2 Project Direction

Exigo Sustainability's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for Exigo Sustainability, Mr Neels Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA) as well as a Master's Degree candidate in archaeology at the University of Pretoria.

### 1.3 Project Brief

Mahoebe Eiendomme is of the intention to establish a renewable energy generation facility. The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant having a generation capacity up to **2 MW**. The footprint of the solar park will be up to **3ha**. Two sites were identified namely a preferred site; and an alternative site, both located to the west of the dirt road that bisect the farm De Hoek. Stone Age occurrences were noted around the preferred site but the final design was adjusted to incorporate initial recommendations pertaining to sensitive heritage receptors and to avoid impact on heritage occurrences (refer to Figure 1-2).

The Photovoltaic (PV) Power Plant together with their connection infrastructure will require the installation of the following equipment:

- Photovoltaic modules (monocrystalline, polycrystalline or thin-film solar modules)
- Mounting systems (fixed or single-axis horizontal trackers) for the PV arrays and related foundations
- Internal cabling and string boxes
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers
- Medium voltage receiving station(s)
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Access road and internal roads
- Fencing of the site and alarm and video-surveillance system





Figure 1-1: Aerial map representation of the general locality of the Mahoebe Eiendomme Solar Park project.

Mahoebe Eiendom: Solar Park Project

Archaeological Impact Assessment Report

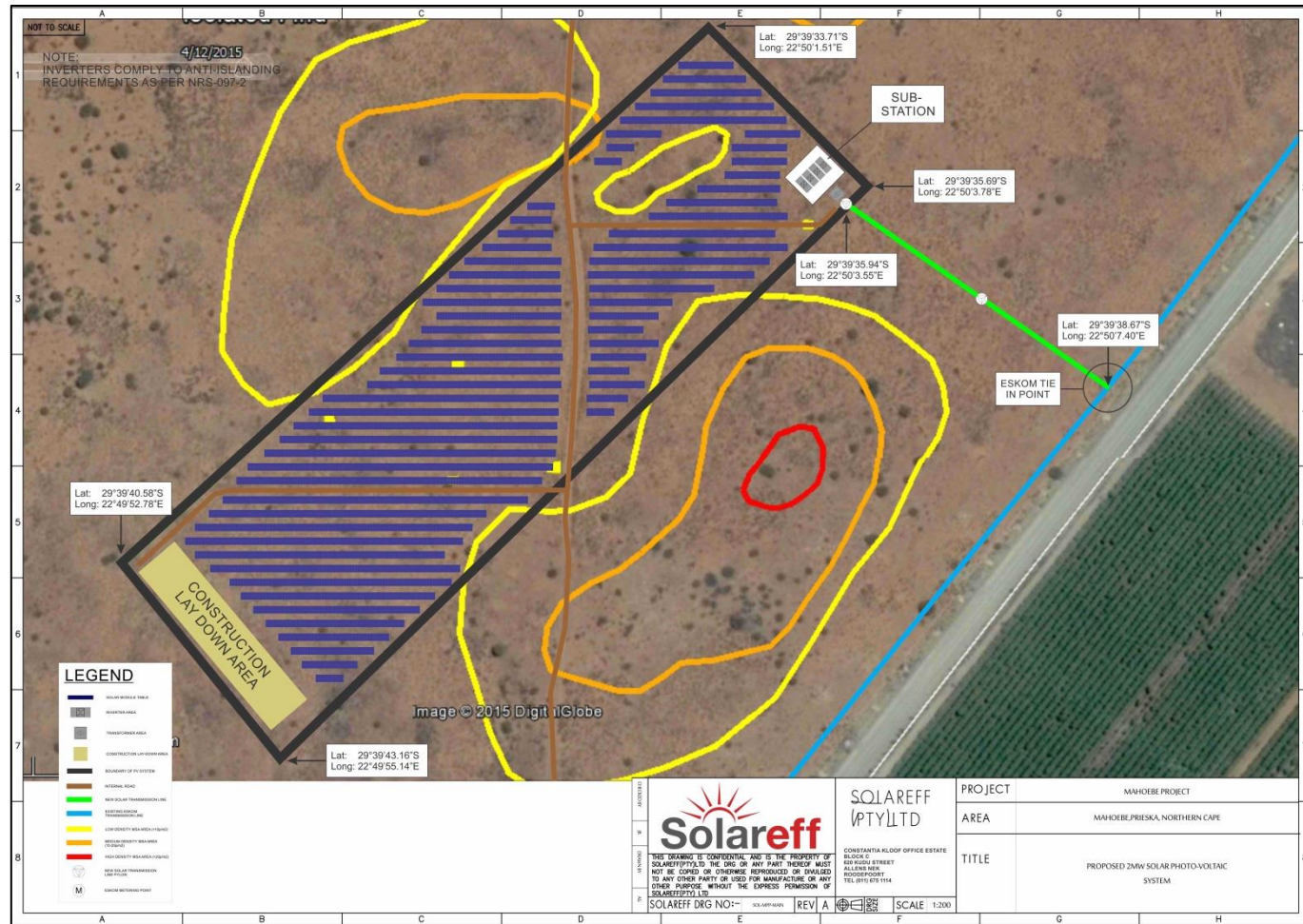


Figure 1-2: Infrastructure layout plan of the proposed Mahoebe Eiendom Solar Park project in relation to sensitive heritage areas (see later reference).

#### 1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that through the management of change, developments still conserve our heritage resources. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain development categories which may have an impact on heritage resources (Refer to Section 2.5.2).

Thus, EIAs should always include an assessment of Heritage Resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)** and the **KwaZulu-Natal Heritage Act (KZNHRA - Act of 2008)**. In addition, the NHRA and the KZNHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources. Based hereon, this project functioned according to the following **terms of reference** for heritage specialist input:

- *Provide detailed updated description of all additional archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance.*
- *Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Obtain a comment from the EC-PHRA.*

#### 1.5 CRM: Legislation, Conservation and Heritage Management

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

##### 1.5.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

###### a. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known

as the “60-years clause”. Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. “Tell” refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

With regards to activities and work on archaeological and heritage sites this Act states that:

*“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58)*

and

*“No person may, without a permit issued by the responsible heritage resources authority-*

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”*

and

*“No person may, without a permit issued by SAHRA or a provincial heritage resources agency-*

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*

- (b) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

**b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925**

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

**1.5.2 Background to HIA and AIA Studies**

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

**"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:**

- (a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) *the construction of a bridge or similar structure exceeding 50m in length;*
- (c) *any development or other activity which will change the character of a site:*
  - (i) *exceeding 5 000 m<sup>2</sup> in extent; or*
  - (ii) *involving three or more existing erven or subdivisions thereof; or*
  - (iii) *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - (iv) *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

- (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

*must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”*

And:

*“The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:*

- (a) The identification and mapping of all heritage resources in the area affected;*
- (b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) an assessment of the impact of the development on such heritage resources;*
- (d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64).”*

**Consequently, section 35 of the Act requires Heritage Impact Assessments (HIAs) or Archaeological Impact Assessments (AIAs) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects. Heritage resources management and conservation**

### **1.6 Assessing the Significance of Heritage Resources**

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities.

Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable*. Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

#### - Categories of significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

##### - *Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

##### - *Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

##### - *Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

##### - *Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

#### **Formally protected sites:**

- Grade 1 or national heritage sites, which are managed by SAHRA

- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (EC-PHRA).
- Grade 3 or local heritage sites.

**Generally protected sites:**

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 70 years.
- Structures older than 60 years.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories.

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, augering), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

**A fundamental aspect in assessing the significance and protection status of a heritage resource is often whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data / information, which would otherwise be lost.**



## 2 REGIONAL CONTEXT

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### 2.1 Area Location

The study area is located on a portion of the farm De Hoek 32, Prieska, Siyancuma Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province. The proposed project is situated approximately 8km north-east of the town of Prieska and directly north of the Orange River. The site is situated at **S29°39'40.66" E22°49'58.76"** on 1:50 000 map sheet 2923AD (see Figure 2-1).

The R357 regional road passed south of the farm across the Orange River and the R380 routes west of the property. The region lies approximately 180km south-west of the Northern Cape Town of Kimberley (see Figure 2-1).

### 2.2 Area Description: Receiving Environment

The development site lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). The environmental factors delimiting the biome are complex and include altitude, rainfall, geology and soil types, with rainfall being the major delimiting factor. Fire and grazing also keep the grassy layer dominant. The topography across the site is slightly to moderately undulating. The major land use of the study area as classified by the Environmental Potential Atlas of South Africa (2000) is vacant / unspecified land. The bulk of surface sediments consist of orange-red windblown Hutton Sands that are moderately disturbed by human related activities, animal trampling, Aardvark and porcupine burrowing and termite activity. Underlying the Hutton Sands, and also exposed in places is a calcrete deposit/surface that sometimes includes clasts and stone artefacts. Also exposed in places are pebble to boulder sized sub-angular to rounded gravels including mostly quartzite - but also andesite - clasts and these alluvial deposits are referred to as Older Gravels. The Orange River transects the landscape directly south of the study area.

### 2.3 Site Description

The farm De Hoek is constituted mostly out of open and sparse plains dominated by Karoo shrubs, grasses – including “Bushman” grass - and small/short trees of mostly Acacia species. However, a slight vegetation change, indicated by the occurrence of a ridge that slopes towards the Orange River occurs at the site where larger rocks, deep red sands and scrub vegetation are more prevalent. Numerous termite hills and burrows of Aardvark and porcupine occur across the site. Evidence for modern human related activities include single vehicle tracks, fencing, wind mills and associated pipes, free-standing dams and animal feeding and watering troughs. The current land-use of the proposed development site is grazing by livestock. Neighbouring farms are being used for livestock grazing and game farming, with mining further away from the site. The chosen site is suitable for the installation of a photovoltaic (PV) power plant. It is appropriate morphologically (flat terrain) and regarding the favourable radiation conditions. The available radiation allows a high rate of electric energy production, as a combination of latitude-longitude and climatic conditions.

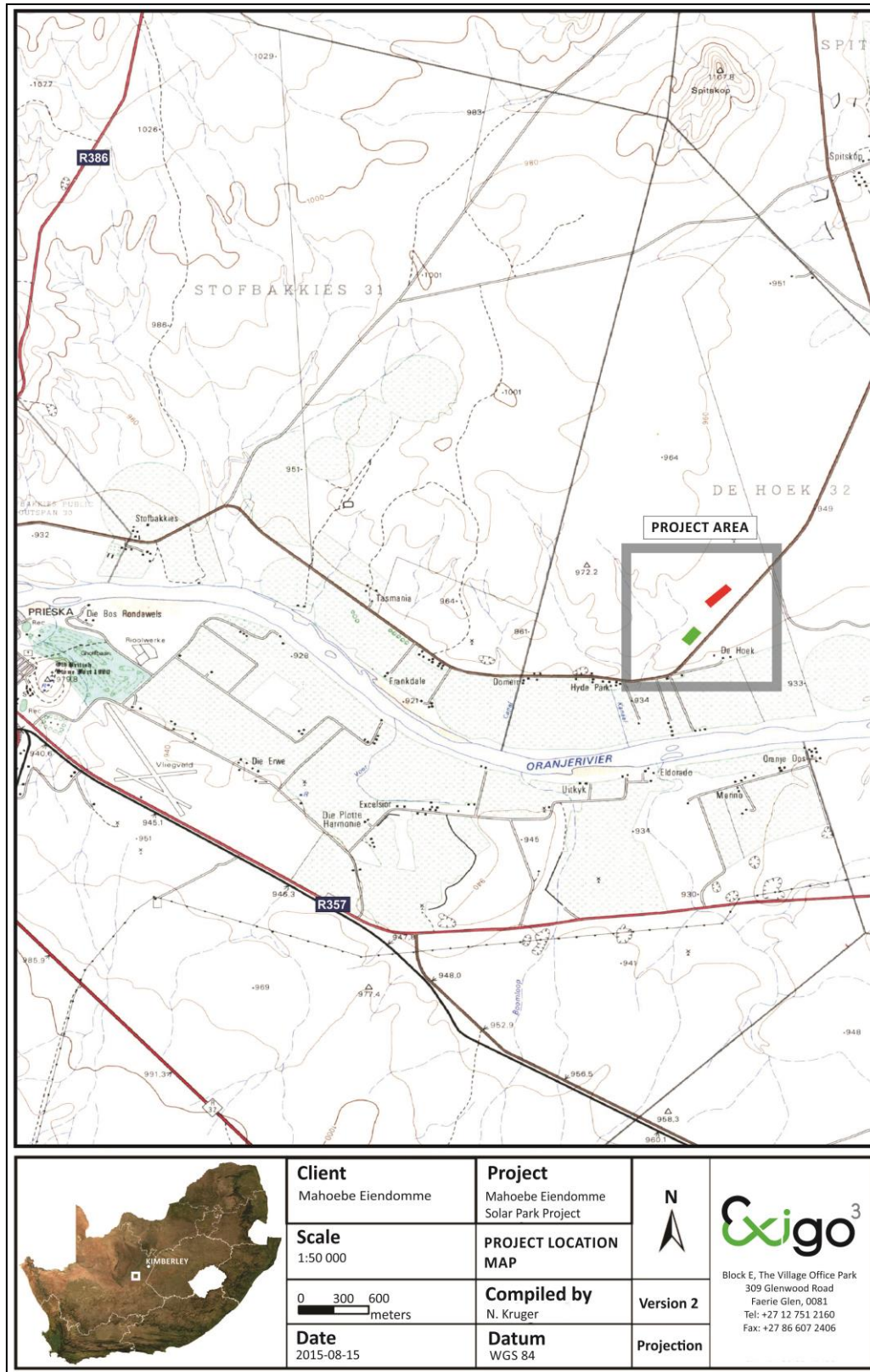


Figure 2-1: 1:50 00 Map representation of the location of the Mahoebe Eiendomme Solar Park Project Areas (sheet 2923AD). The preferred site is indicated in red and the alternative site is indicated in green)

### 3 METHOD OF ENQUIRY

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#### 3.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage site recording.

##### 3.1.1 Desktop Study

A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies, archaeological and archival sources, aerial photographs, historical maps and local histories, all pertaining to the Prieska area and the larger landscape of this section of the Northern Cape Province.

##### 3.1.2 Aerial Representations and Survey

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. This method was applied to assist the foot site survey where depressions, variation in vegetation, soil marks and landmarks were examined. Specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. By superimposing high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as referenced points from where further pedestrian surveys were carried out. From the aerial survey it is evident that some surface areas subject to the Mahoebe Eiendomme Solar Park Project have been subjected to historical and more recent disturbances and impacts as a result of natural agents as well as cattle grazing (see Figure 3-1).

##### 3.1.3 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the footprint area proposed for the Mahoebe Eiendomme Solar Park was conducted in July 2015. The process encompassed a systematic field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording, the Solar Park footprint was systematically surveyed on foot by means of a transect survey (see GPS Track log in Figure 3-1). GPS reference points identified during the aerial survey were also visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Legend GPS objects and structures of archaeological / heritage value were recorded and photographed with a Canon 450D Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.



Figure 3-1: Garmin GPS Track log for the site survey of the Mahoebe Eiendomme Solar Park footprint (the preferred site is indicated in red, alternative site is indicated in green).

**3.1.4 General Public Liaison**

Correspondence with the farm owner and his son provided information on the general history of the area, possible locations of heritage resources and brief commentaries on the recent history of the farm. He pointed to the fact that, according to his knowledge, no heritage resources was present on the farm portion subject to this AIA Study.

**3.2 Limitations**

**3.2.1 Access**

The farm De Hoek is accessed via the R386 regional road that connects to a smaller local road routing east along the Orange River to the property. Access control is applied to the farm portions relevant to this assessment but no restrictions were encountered during the site visit as the author of this report was granted access by the owner of the farm.

**3.2.2 Visibility**

The surrounding vegetation in the study area is mostly comprised out of mixed grasslands and scattered trees with the occurrence of semi-arid succulents in places. The general visibility at the time of the AIA survey (July 2015) ranged between high visibility in areas where human disturbance was prevalent (around cattle enclosures and drinking troughs), and moderate in portions of more pristine grassland in the study area (see Figures 3-2 to 3-8). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 3-2: View of general surroundings on the farm De Hoek along the western periphery of the study area, looking south.



Figure 3-3: View of general surroundings on the farm De Hoek along the western periphery of the study area, looking south.



Figure 3-4: View of general surroundings in the study area at the site alternative.



Figure 3-5: View of general surroundings in the study area at the preferred site, looking west.



Figure 3-6: View of general surroundings of general surroundings in the study area at the preferred site.



Figure 3-7: View of an access road to the preferred site.



Figure 3-9: Trench excavation in the area of the preferred site indicating the absence of sub-surface deposits

### 3.2.3 Limitations and Constraints

The pedestrian site survey for the Mahoebe Eiendomme Solar Project AIA primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the aerial survey) as well as areas of high human settlement catchment. The following constraints were encountered:

- **Visibility:** Visibility proved to be a minor constrain in areas with denser surface cover, as well as portions where vegetation is more pristine.

Thus, even though it might be assumed that survey findings are representative of the heritage landscape of the project area for the Mahoebe Eiendomme Solar Park, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

### 3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by Exigo Specialist are generally done using the Plomp<sup>1</sup> impact assessment matrix scale supplied by Exigo. According to this matrix scale, each heritage receptor in the study area is given an impact assessment. A cumulative assessment for the proposed project is also included.

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<sup>1</sup> Plomp, H.,2004



## 4 ARCHAEO-HISTORICAL CONTEXT

### 4.1 The archaeology of Southern Africa

Archaeology in southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

**Table 1 Chronological Periods across southern Africa**

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens sapiens</i> including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

#### 4.1.1 The Stone Ages

##### - The Earlier Stone Age (ESA)

The Earlier Stone Age from between 1.5 million and 250 000 years ago refers to the earliest that *Homo sapiens sapiens* predecessors began making stone tools. The earliest stone tool industry was referred to as the Olduvai Industry originating from stone artefacts recorded at Olduvai Gorge, Tanzania. The Acheulian Industry, the predominant southern African Early Stone Age Industry, replaced the Olduvai Industry approximately 1.5 million years ago, is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. Bifaces emerged in East Africa more than 1.5 million years ago but have been reported from a wide range of areas, from South Africa to northern Europe and from India to the Iberian coast. Earlier Stone Age deposits typically occur on the flood-plains of perennial rivers. These ESA open sites sometimes contain stone tool scatters and manufacturing debris ranging from pebble tool choppers to core tools such as handaxes and cleavers. These groups seldom actively hunted and relied heavily on the opportunistic scavenging of meat from carnivore fill sites. The most well-known Early Stone Age site in southern Africa is

Amanzi Springs, situated about 10km north-east of Uitenhage, near Port Elizabeth (Deacon 1970). In a series of spring deposits a large number of stone tools were found in situ to a depth of 3-4m. Wood and seed material preserved remarkably very well within the spring deposits, and possibly date to between 800 000 to 250 000 years old.

#### - **The Middle Stone Age (MSA)**

The Middle Stone Age (MSA) spans a period from 250 000-30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art and symbolism. Various stone artefact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean 2008). The large handaxes and cleavers were replaced by smaller stone artefacts called the MSA flake and blade industries. Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains. It is also common for these stone artefacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may in rare cases be associated with MSA occurrences (Gess 1969). These stone artefacts, like the Earlier Stone Age handaxes are usually observed in secondary context with no other associated archaeological material. The MSA is distinguished from the ESA by the smaller-sized and distinctly different stone artefacts and chaîne opératoire (method) used in manufacture, the introduction of other types of artefacts and evidence of symbolic behaviour. The prepared core technique was used for the manufacture of the stone artefacts which display a characteristic faceted striking platform and includes mainly unifacial and bifacial flake blades and points. The Howiesons Poort Industry (80 000-55 000 years ago) is distinguished from the other MSA stone artefacts: the size of tools are generally smaller, the range of raw materials include finer-grained rocks such as silcrete, chalcedony, chert and hornfels, and include segments, backed blades and trapezoids in the stone toolkit which were sometimes hafted (set or glued) onto handles. In addition to stone artefacts, bone was worked into points, possibly hafted, and used as tools for hunting (Deacon & Deacon 1999). Other types of artefacts that have been encountered in archaeological excavations include tick shell beads, the rim pieces of ostrich eggshell (OES) water flasks, ochre-stained pieces of ostrich eggshell and engraved and scratched ochre pieces, as well as the collection of materials for purely aesthetic reasons. The majority of MSA sites occur on flood plains and sometimes in caves and rock shelters. Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom remain preserved in the archaeological record. Limited drive-hunting activities are associated with the MSA.

#### - **The Later Stone Age (LSA)**

The Later Stone Age (LSA) spans the period from about 20 000 years ago until the colonial era, although some communities continue making stone tools today. The period between 30 000 and 20 000 years ago is referred to as the transition from the MSA to LSA; although there is a lack of crucial sites and evidence that represent this change. By the time of the Later Stone Age the genus *Homo*, in southern Africa, had developed into *Homo sapiens sapiens*, and in Europe, had already replaced *Homo neanderthalensis*. The LSA is marked by a series of technological innovations, new tools and artefacts, the development of economic, political and social systems, and core symbolic beliefs and rituals. The stone toolkits changed over time according to time-specific needs and raw material availability, from smaller microlithic Robberg, Wilton Industries and in between, the larger Albany/Oakhurst and the Kabeljous Industries. Bored stones used as part of digging sticks, grooved stones for sharpening and grinding and stone tools fixed to handles with mastic also become more common. Fishing equipment such as hooks, gorges and sinkers also appear within archaeological excavations. Polished bone tools such as eyed needles, awls, linkshafts and arrowheads also become a more common occurrence. Most importantly bows and arrows revolutionized the hunting economy. It was only within the last 2000

years that earthenware pottery was introduced, before then tortoiseshell bowls were used for cooking and ostrich eggshell (OES) flasks were used for storing water. Decorative items like ostrich eggshell and marine/fresh water shell beads and pendants were made. Hunting and gathering made up the economic way of life of these communities; therefore, they are normally referred to as hunter-gatherers. Hunter-gatherers hunted both small and large game and gathered edible plant foods from the veld. For those that lived at or close the coast, marine shellfish and seals and other edible marine resources were available for the gathering. The political system was mainly egalitarian, and socially, hunter-gatherers lived in bands of up to twenty people during the scarce resource availability dispersal seasons and aggregated according to kinship relations during the abundant resource availability seasons. Symbolic beliefs and rituals are evidenced by the deliberate burial of the dead and in the rock art paintings and engravings scattered across the southern African landscape. Sites dating to the LSA are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

#### **4.1.2 The Iron Age Farmer Period**

##### **- Early Iron Age (Early Farming Communities)**

The Early Iron Age (also Early Farmer Period) marks the movement of Bantu speaking farming communities into South Africa at around 200 A.D. These groups were agro-pastoralists that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Artefact evidence from Early Farmer Period sites is mostly found in the form of ceramic assemblages and the origins and archaeological identities of this period are largely based upon ceramic typologies and sequences, where diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. Early Farmer Period ceramic traditions are classified by some scholars into different “streams” or trends in pot types and decoration that, over time emerged in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). More specifically, in the northern regions of South Africa at least three settlement phases have been distinguished for prehistoric Bantu-speaking agropastoralists. The first phase of the Early Iron Age, known as Happy Rest (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of Diamant is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the Eiland tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. Early Farmer Period ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. The Early Iron Age continued up to the end of the first millennium AD.

##### **- Middle Iron Age / K2 Mapungubwe Period (early Later Farming Communities)**

The onset of the middle Iron Age dates back to ±900 AD, a period more commonly known as the Mapungubwe / K2 phase. These names refer to the well known archaeological sites that are today the pinnacle of South Africa’s Iron Age heritage. The inhabitants of K2 and Mapungubwe, situated on the banks of the Limpopo, were agriculturalists and pastoralists and were engaged in extensive trade activities with local and foreign traders. Although the identity of this Bantu-speaking group remains a point of contestation, the Mapungubwe people were the first state-organized society southern Africa has known. A considerable amount of golden objects, ivory, beads (glass and gold), trade goods and clay figurines as well as large amounts of potsherds were found at these sites and also appear in sites dating back to this phase of the Iron Age. Ceramics of this tradition take the form of beakers with upright sides and decorations around the base (K2) and shallow-shouldered bowls with decorations as well as globular pots with long

necks. (Mapungubwe). The site of Mapungubwe was deserted at around 1250 AD and this also marks the relative conclusion of this phase of the Iron Age.

- **Later Iron Age (Later Farming Communities)**

The late Iron Age of southern Africa marks the grouping of Bantu speaking groups into different cultural units. It also signals one of the most influential events of the second millennium AD in southern Africa, the difaqane. The difaqane (also known as “the scattering”) brought about a dramatic and sudden ending to centuries of stable society in southern Africa. Reasons for this change was essentially the first penetration of the southern African interior by Portuguese traders, military conquests by various Bantu speaking groups primarily the ambitious Zulu King Shaka and the beginning of industrial developments in South Africa. Different cultural groups were scattered over large areas of the interior. These groups conveyed with them their customs that in the archaeological record manifest in ceramics, beads and other artefacts. This means that distinct pottery typologies can be found in the different late Iron Age groups of South Africa.

- **Bantu Speaking Groups in the South African interior**

*It should be noted that terms such as “Nguni”, “Sotho”, “Venda” and others refer to broad and comprehensive language groups that demonstrated similarities in their origins and language. It does not imply that these Nguni / Sotho groups were homogeneous and static; they rather moved through the landscape and influenced each other in continuous processes marked by cultural fluidity.*

Ethnographers generally divide major Bantu-speaking groups of southern Africa into two broad linguistic groups, the Nguni and the Sotho with smaller subdivisions under these two main groups. Nguni groups were found in the eastern parts of the interior of South Africa and can be divided into the northern Nguni and the southern Nguni. The various Zulu and Swazi groups were generally associated with the northern Nguni whereas the southern Nguni comprised the Xhosa, Mpondo, Thembu and Mpondomise groups. The same geographically based divisions exist among Sotho groups where, under the western Sotho (or Tswana), groups such as the Rolong, Hurutshe, Kwena, Fokeng and Kgatla are found. The northern Sotho included the Pedi and amalgamation of smaller groups united to become the southern Sotho group or the Basutho. Other smaller language groups such as the Venda, Lemba and Tshonga Shangana transpired outside these major entities but as time progressed they were, however to lesser or greater extent influenced and absorbed by neighbouring groups.

#### **4.1.3 Pastoralism and the last 2000 years**

Until 2000 years ago, hunter-gatherer communities traded, exchanged goods, encountered and interacted with other hunter-gatherer communities. From about 2000 years ago the social dynamics of the southern African landscape started changing with the immigration of two 'other' groups of people, different in physique, political, economic and social systems, beliefs and rituals. One of these groups, the Khoekhoe pastoralists or herders entered southern Africa with domestic animals, namely fat-tailed sheep and goats, travelling through the south towards the coast. They also introduced thin-walled pottery common in the interior and along the coastal regions of southern Africa. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers.

#### **4.1.4 Historical and Colonial Times and Recent History**

The Historical period in southern Africa encompass the course of Europe's discovery of South Africa and the spreading of European settlements along the East Coast and subsequently into the interior. In addition, the formation stages of this period are marked by the large scale movements of various Bantu-speaking groups in the interior of South Africa, which profoundly influenced the course of European settlement. Finally, the final retreat of the San and Khoekhoen groups into their present-day living areas also occurred

in the Historical period in southern Africa.

#### **4.2 The Prieska Area: Specific Themes.**

The history of the Northern Cape Province is reflected in a rich archaeological landscape, mostly dominated by Stone Age occurrences. Most of our knowledge of the archaeology of the region is largely dependent on the work undertaken by Humphreys & Thackeray (1983) on the Ghaap escarpment, as well as that of Beaumont (1990). A number of Archaeological Impact Assessments (e.g. Beaumont, Morris, Kaplan, Becker & Kruger) have been done in the larger Kimberley area. Generally, numerous sites documenting Earlier, Middle and Later Stone Age habitation occur across the province, mostly in open air locales or in sediments alongside rivers or pans. In addition, a wealth of Later Stone Age rock art sites, most of which are in the form of rock engravings are to be found in the larger landscape. These sites occur on hilltops, slopes, rock outcrops and occasionally in river beds. Sites dating to the Iron Age occur in the extreme north eastern part of the Province and environmental factors delegated that the spread of Iron Age farming westwards from the 17th century was constrained mainly to these areas. However, evidence of an Iron Age presence as far as the Upington area in the eighteenth century occurs in this area. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments at Kimberley, which herald the modern era in South African history.

##### **4.2.1 The Earlier and Middle Stone Ages in the Northern Cape**

The archaeological record of this region involves the timespan from the Earlier Stone Age (1 500 000 to about 270 000 years ago), through the Middle Stone Age (about 270 000 - 40 000 years ago), to the Later Stone Age. Towards the east the last 2000 years showed an increase in ceramic sites as well as Iron Age expansions sometimes in conjunction with Stone Age communities (Morris & Beaumont 2004). Of particular interest are Pleistocene sites along the Vaal and Orange Rivers (e.g. Helgren 1979; Beaumont & Morris 1990; Beaumont & McNabb 2000). Late Holocene material with pottery is also known to occur on the river banks, while rock engravings are richly distributed in the region, inter alia at Kgatlane and Blaauwboschdrift near Douglas (Wilman 1933; Morris 1988).

The Stone Age record contains material spanning the Early, Middle and Later Stone Age periods and rock engravings are relatively common and were also recorded in the surroundings of Prieska (Morris 2005 and Rossouw 2007). Acheulian and LSA collections from Douglas and Hopetown are housed in the Iziko and McGregor Museums. Stone artefacts are made in a variety of raw materials including banded ironstone, andesite, quartzite, dolerite and hornfels, but banded ironstone is notably the most common (Beaumont 2005, 2006, 2007 & 2008 and Rossouw 2007).

Although Early Stone Age (ESA) artefacts have been recorded, these mainly consist of flakes and cores commonly based on quartzite cobbles, but formal ESA tools such as hand axes and cleavers are absent (Beaumont 2005, 2006 & 2007). An extensive surface scatter of small hand axes is supposed to occur some 10km upstream from Prieska (Beaumont 2007). It is possible that this is Fauresmith material, which is a transitional stone tool industry between the ESA and Middle Stone Age (MSA). The presence of stone artefacts representing this transitional Fauresmith industry and/or late phase of the Acheulian is frequently identified in the surrounding environment (Beaumont 2005 & 2008 and Rossouw 2007). Stone artefacts of MSA origin appear to be the most commonly occurring archaeological materials in the surrounding landscape (Beaumont 2005 & 2008, Dreyer 2005, Rossouw 2007 and Van Ryneveld 2005 & 2006). Typically the MSA material consists of isolated stone artefacts and low density artefact scatters that include Levallois cores, flakes and blades with faceted or prepared platforms, and the dominant formal tools are

irregular scrapers (Van Ryneveld 2006). Banded ironstone is the most commonly used raw material. Although stone artefacts of Later Stone Age (LSA) origin are reported to occur in the surrounding area, these seem to be less common than specimens of MSA age (Rossouw 2007 and Van Ryneveld 2005). Overall, Stone Age materials are scattered thinly over the modern land surface and to date, the Stone Age finds are considered to be of low to no archaeological significance (see all references below). This is due to the low frequencies of occurrences, temporally mixed assemblages, and the fact that artefacts are found in disturbed, derived and unstratified contexts.

Beaumont (2005) describes Early, Middle and Later Stone Age material north of Prieska, and van Ryneveld (2006) describes MSA and LSA lithics dominated by banded ironstone near Prieska. Relatively large numbers of MSA and LSA tools, including some enigmatic pieces, were documented about 5 kms north east of Prieska alongside the Prieska-Douglas road (Kaplan 2011). At Bundu near Copperton (about 60 west of Prieska), a series of dried up deflated pans have been excavated by Kiberd (2002, 2006). Pans would have acted as focal points for grazing animals, but also a source of water. A complex series of sedimentary features and horizons in these pans may be broadly coeval with periods of climatic change in the region (Kiberd 2006). Archaeological material was recovered from throughout the sedimentary sequence. Large numbers of LSA tools occur on the surface of the pan and within the upper red sands and include micro-lithic tools, while below the red sands, MSA lithics mainly in quartzite, and preserved fauna were found. ESA tools, preserved fauna and even the possible discovery of an ESA hearth, which may be older than 300 000 years, was also excavated. Similarly, large quantities of ESA tools and material was noted in, and around the large deflated pan on the farm Vlakpan (see Image 5-1 & Image 5-2).



Figure 4-1: Stone Age exposures along a large Salt Pan on the farm Vlakpan, north-east of the study area.



Figure 4-2: Earlier Stone Age tools occurring along a large salt pan on the farm Vlakpan

#### 4.2.2 Rock Markings

Rock engravings are mostly situated in the semi-arid plateau with most of these engravings situated at the Orange – Vaal basin, Karoo and Namibia. The upper Vaal, Limpopo basin and eastern Free State regions have a small quantity of rock engravings as well. Generally, rock paintings exist at cave areas and rock engravings at open surface areas. The Cape interior consists of a technical, formal and thematic variation between and within sites (Morris 1988). Two major techniques existed namely the incised and pecked engravings. Morris (1988) indicated technical and formal characteristics through space and a sharp contrast exists between engravings positioned north of the Orange River that are mostly pecked and those in the Karoo where scraping was mostly used. According to Morris (1988) hairline engravings occur at the North and the South, but they are rare at the Vryburg region. Finger painting techniques mostly occur at the Kuruman Hills, Asbestos Mountains, Ghaap Escarpment, Langeberg, Koranaberg ranges, scattered sites at the Karoo and the Kareeberge (Morris 1988). The development petroglyphs (i.e. carving or line drawing on rock) were associated with three different types of techniques, namely incised fine lines, pecked engravings and scraped engravings. According to Peter Beaumont the pecked and scraped engravings at the Upper Karoo are coeval (i.e. having the same age or date of origin) (Beaumont P B et al. 1989). Dating of rock art includes the use of carbonate fraction dating of ostrich eggshell pieces, dating of charcoal and ostrich eggshell at various rock art shelters. Unifacial points, double segments and thin – walled sherds may indicate the presence of the Khoikhoi at the Northern Cape during 2500 BP (years Before the Present) (Beaumont 1989).

#### 4.2.3 The Iron Age / Farmer Period

The beginnings of the Iron Age (Farmer Period) in southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture of pottery. Stone ruins indicate the occurrence of Iron Age settlements in the Northern Cape specifically at sites such as Dithakong where evidence exists that the Tlhaping used to be settled in the Kuruman – Dithakong areas prior to 1800 (Humphreys 1976). Here, the assessment of the contact between the Stone Age, Iron Age and Colonial societies are significant in order to understand situations of contact and assimilation between societies. As an example, Trade occurred between local Tlhaping Tswana people and the Khoikhoi communities. It means that the Tswana traded as far south as the Orange River at least the same time as the Europeans at the Cape (Humphreys 1976).

Morris (1990) reports that the area to the west of the Langeberg was once settled by the BaTlhaping. He notes that 35 km due north of Witsand lies the modern farm of Nokanna, which he says equates with the former BaTlhaping capital of Nokana or Nokaneng. Historically, the Trekboers traversed this area during the late 19<sup>th</sup> century. More recent research by Jacobs shows occupational Tswana site to occur during the later "Bantu Expansion" and "Proto-Difiqane between c1750 and 1830 in the study area. Specifically the Tlhaping and Tlharo chiefdoms are referred to here (N. J. Jacobs, 199). It is even suggested that some Sotho-Tswana people might have preceded the Tlhaping and Tlharo in this region. This is however not a recent postulations since Ellenberger and MacGregor already proposed earlier Iron Age communities in these areas as early as 1912 (Ellenberger & MacGregor, 1912).

#### 4.2.4 Later History: Colonial Period

Evidence for the Anglo-Boer Wars that occurred between around 1880 and 1902 comes in the form of stone wall ruins and associated tin cans (Dreyer 2005). Prior to this, and of significance to the national economy, was the discovery of diamonds in the Kimberley area in 1866. This event is commemorated by a National Heritage Site where the "Eureka" diamond was discovered by a young boy on the farm De Kalk 37 (Van Ryneveld 2005). Other remains from these early diamond mining activities that were undertaken between the latter part of the 19<sup>th</sup> century and the early 1900s include graves, glass, tins and calcrete foundations for tents (Beaumont 2006). The town of Prieska developed from a place to which farmers migrated when the pans were full, after rains. It was administered by a village management board from 1882 and attained municipal status in 1892. The name is derived from Korana and means 'place of the lost she-goat'. The farm De Hoek, as with other farms in the Prieska area was founded in the late 1800's.

#### 4.2.5 Burial Sites / Human Remains

Human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500).

### 5 RESULTS: ARCHAEOLOGICAL SURVEY

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In terms of heritage resources, the landscape around Prieska is primarily well known for the occurrence of Stone Age and Colonial Period heritage remains. Similarly, Stone Age occurrences were noted on the farm De Hoek. These heritage occurrences / areas were arbitrarily coded **Exigo-DH32-SAxx** (Exigo De Hoek 32 Stone Age xx).

#### 5.1 The Stone Age

Material representative of the Earlier, Middle and Later Stone Age occur frequently in low lying areas on plains and calcrete exposures in Hutton sands along the banks of the Orange River. This presence of Stone Age people in the landscape can probably be attributed to the abundance of locally available raw material for the manufacture of stone tools. Similarly, during the site investigation Stone Age specimens from the entire span of the Stone Age were identified, in the survey area, in most cases in association with exposed decomposed calcrete deposits, but those of Middle Stone Age (MSA) origin are more common than Earlier Stone Age (ESA) and Later Stone Age (LSA) artefacts. The density of the scatters were arbitrarily estimated by placing a one-meter drawing frame, sub-divided into quadrants, on a randomly-selected area displaying higher amounts of surface lithics. By plotting the counts of all lithic elements present in the 1x1 metre square relative density per m<sup>2</sup> was established and rated on a scale of low (<10), medium (10-20) and high (>20). This method has been adapted as expedient and non-invasive sampling technique that is particularly useful in value assessment of lithic occurrences during Phase 1 AIA's (see Van Der Ryst 2012).



- **Exigo-DH32-SA01: Low Density MSA Scatter**

Western extremity: S29.66498° E22.82791°  
 Northern extremity: S29.66277° E22.83172°  
 Eastern extremity: S29.66532° E22.83132°  
 Southern extremity: S29.66728° E22.82845°  
 Relative midpoint: S29.66508° E22.82972°

- **Exigo-DH32-SA02: Low Density MSA Scatter**

Western extremity: S29.66002° E22.83181°  
 Northern extremity: S29.65916° E22.83277°  
 Eastern extremity: S29.66011° E22.83270°  
 Southern extremity: S29.66069° E22.83193°  
 Relative midpoint: S29.66000° E22.83230°

- **Exigo-DH32-SA03: Low Density MSA Scatter**

Western extremity: S29.66000° E22.83230°  
 Northern extremity: S29.66030° E22.83403°  
 Eastern extremity: S29.66084° E22.83467°  
 Southern extremity: S29.66210° E22.83306°  
 Relative midpoint: S29.66109° E22.83356°

Three low density Middle Stone Age Scatters were identified in the study area along the footprint of the alternative site, and directly southeast and northwest of the footprint of the preferred site. The lithic remains are scattered as individual artefacts where precipitation and groundwater have exposed the stone tools. A number of side scrapes and flakes were noted here. Typologically, the artefacts can tentatively attribute to the Middle Stone Age. The occurrences are of limited scientific value due to the mixing of artefacts and the low density of the lithics. This low density artefact scatters are in a temporally mixed and secondary or derived context and therefore, is considered to be of low archaeological significance.



Figure 5-1: View of general surroundings at Exigo-DH32-SA01.

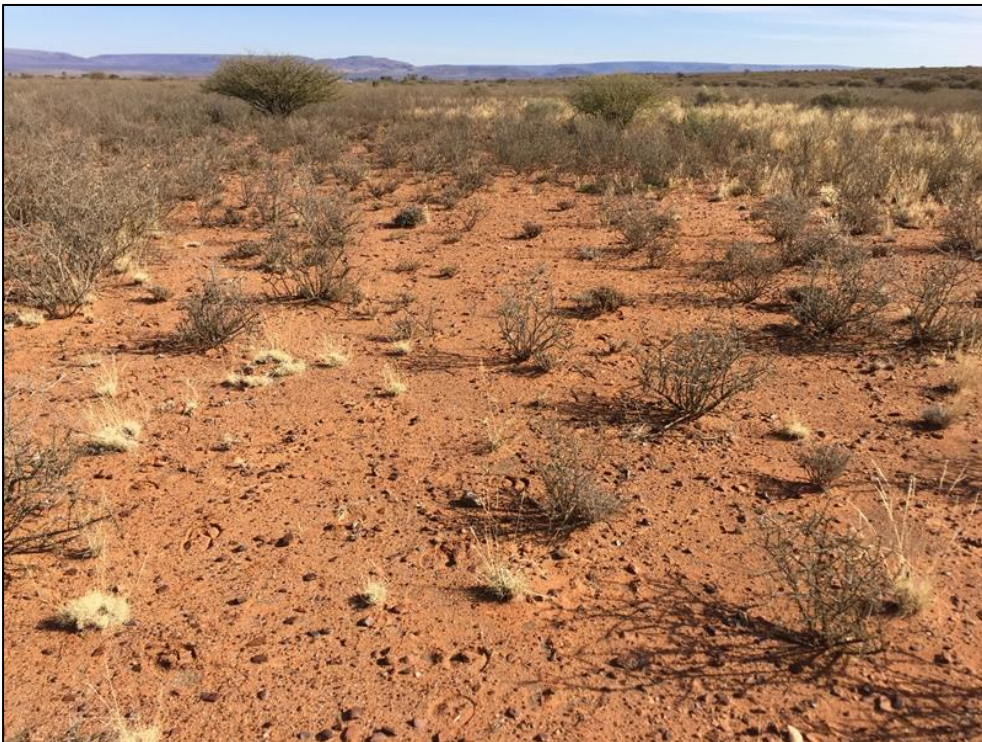


Figure 5-2: View of general surroundings at Exigo-DH32-SA02.



Figure 5-3: MSA artefacts from Exigo-DH32-SA01.

- **Exigo-DH32-SA04: Medium Density MSA Scatter**

Western extremity: S29.65973° E22.83223°

Northern extremity: S29.65959° E22.83286°

Eastern extremity: S29.65960° E22.83329°

Southern extremity: S29.66000° E22.83255°

Relative midpoint: S29.65977° E22.83270°

- **Exigo-DH32-SA05: Medium Density MSA Scatter**

Western extremity: S29.65910° E22.83372°

Northern extremity: S29.65889° E22.83422°

Eastern extremity: S29.65922° E22.83447°

Southern extremity: S29.65932° E22.83414°

- **Exigo-DH32-SA06: Medium Density MSA Scatter**

Western extremity: S29.66150° E22.83309°

Northern extremity: S29.66040° E22.83434°

Eastern extremity: S29.66097° E22.83444°

Southern extremity: S29.66172° E22.83337°

Relative midpoint: S29.66124° E22.83385°

Three medium density lithic scatters were identified in the study area. **Exigo-DH32-SA04** measuring approximately 110m x 30m occurs directly north-west of the preferred site and **Exigo-DH32-SA05** measuring approximately 110m x 30m occurs 70m x 40m north of the preferred site. The third scatter, **Exigo-DH32-SA06** measuring approximately 160m x 60m occurs directly southeast of the footprint for the preferred site. In all cases, the scatters seem to occur in areas where decomposed calcrete rock layers covered with deep red sands have been exposed. Although there may be some mixing of an earlier MSA assemblage with a few lithics from the more recent LSA utilization, the surface collection shows a predominant MSA signature. Preliminary examinations of some of the lithics, which includes formal tools

such as scrapers, blades and points, and a possible adze, indicated that a number of flakes displayed faceted platforms, characteristic of the MSA. Here, prepared cores show evidence of the use of the Levallois technique, where surfaces on the core are shaped in order to generate a specific formal tool when flaked from the core. Use wear and marks are clearly visible on formal tools. The raw material used in the production of the lithics is mostly hornfels but fine-grained lithologies such as jasper and chalcedonies were also used. Due to their temporally mixed and contextually derived nature, these archaeological occurrences are considered to be of medium significance but it should be noted that they are considered to be representative of the archaeological record of the immediate surroundings.



Figure 5-4: View of general surroundings at Exigo-DH32-SA04.



Figure 5-5: View of calcrete exposures at Exigo-DH32-SA04.



Figure 5-6: A broken point from Exigo-DH32-SA05.



Figure 5-7: Highly weathered points from Exigo-DH32-SA06.



Figure 5-8: Surface stone and lithic occurrences at Exigo-DH32-SA06.

- **Exigo-DH32-SA07: High Density MSA Scatter**

Western extremity: S29.66502° E22.83052°

Northern extremity: S29.66317° E22.83274°

Eastern extremity: S29.66451° E22.83168°

Southern extremity: S29.66544° E22.83061°

Relative midpoint: S29.66424° E22.83134°

- **Exigo-DH32-SA08: High Density MSA Scatter**

Relative midpoint: S29.65910° E22.83387°

Relative midpoint: S29.65918° E22.83429°

- **Exigo-DH32-SA09: High Density MSA Scatter**

Relative midpoint: S29.66091° E22.83408°

Three high density scatters of Middle Stone Age material occur within the alternative site footprint and in the general vicinity of the preferred site. **Exigo-DH32-SA07** measuring approximately 350m x 100m, occurs along the footprint of the alternative site, **Exigo-DH32-SA08** is indicated by two small scatters directly north of the preferred site and **Exigo-DH32-SA09**, a scatter of approximately 5m x 5m occurs directly southeast of the footprint for the preferred site. In all cases, the scatters seem to occur in areas where decomposed calcrete rock layers covered with deep red sands have been exposed. Here, a heavily weathered Earlier Stone Age (ESA) cleaver with reddish-brown patination were noted. Previous research by the McGregor Museum in Kimberly, attributed related occurrences in the area to the Earlier Stone Age, specifically the Fauresmith – Acheulean timespan at about 600 000 years ago (e.g. Beaumont & Morris 1990). However, the surface scatters shows a predominant MSA signature. Preliminary examinations of some of the lithics, which includes formal tools such as scrapers, blades and points indicated that a number of flakes displayed faceted platforms, characteristic of the MSA. Prepared cores show evidence of the use of the Levallois technique, where surfaces on the core are shaped in order to generate a specific formal tool when flaked from the core. Use wear and marks are clearly visible on formal tools. The raw material used in the production of the lithics is mostly hornfels and fine-grained lithologies such as jasper and chalcedonies were also used. The open-air collections represent a palimpsest of visits by prehistoric groups up to the MSA. A large number of diagnostic formal tools is present at the site and the presence of core tools, flakes and debris suggest that the area was a lithic manufacturing site. These archaeological occurrences are considered to be of high significance.



Figure 5-9: View of general surroundings at Exigo-DH32-SA08



Figure 5-10: View of general surroundings at Exigo-DH32-SA09.





Figure 5-11: View of general surroundings at Exigo-DH32-SA08.



Figure 5-12: Core tools from Exigo-DH32-SA07.



Figure 5-13: Secondary retouch visible on side scrapers from Exigo-DH32-SA08.



Figure 5-14: A weathered point (left) and a broken blade (right) from Exigo-DH32-SA09.



Figure 5-15: A crude chopper with secondary retouch visible (left and centre) and a broken point from Exigo-DH32-SA09.



Figure 5-16: Surface stones and lithics at Exigo-DH32-SA08.



Figure 5-17: An Earlier Stone Age cleaver from Exigo-DH32-SA09.



Figure 5-18: A selection of side scrapers from Exigo-DH32-SA09.



Figure 5-19: A selection of side scrapers from Exigo-DH32-SA09. Note use wear marks and secondary retouch along edges.



Figure 5-20: MSA oints from Exigo-DH32-SA09.



Figure 5-21: Broken points from Exigo-DH32-SA08.

## 5.2 The Iron Age Farmer Period

No Iron Age (Farmer Period) occurrences were observed in the survey area.

## 5.3 Historical / Colonial Period and recent times

No Historical / Colonial Period occurrences were observed in the survey area. No Historical / Colonial Period occurrences were observed in any of the survey areas. In terms of the built environment, the area has no significance, as there are no old buildings, structures, or features, old equipment, public memorial or monuments in the footprint areas.

## 5.4 Graves

No human burials were observed in any of the survey areas. Should any unmarked human burials/remains or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Burials must not be removed or disturbed until inspected by the archaeologist

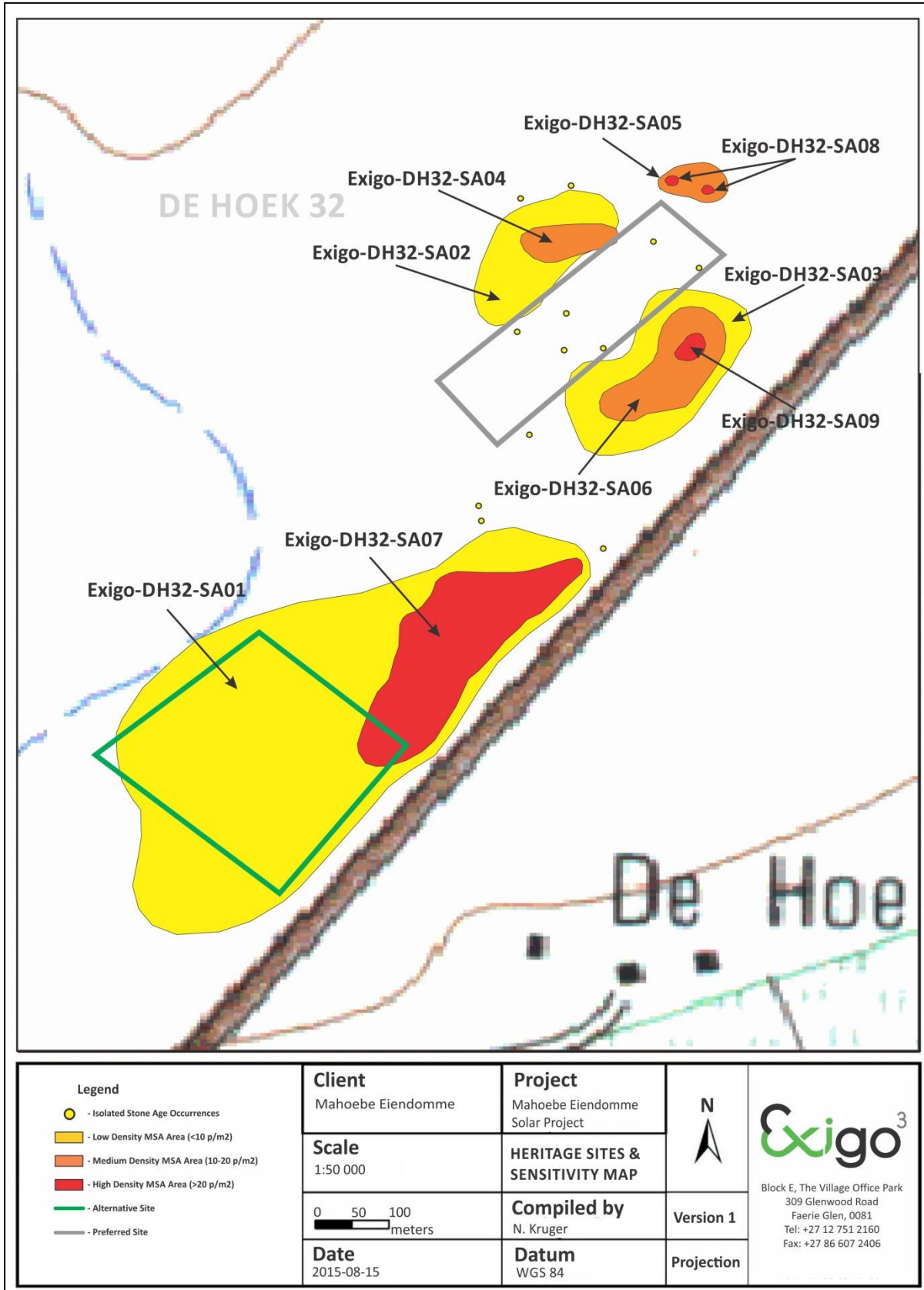


Figure 5-22: Map of heritage sites discussed in the text

**6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING**

**6.1 Potential Impacts and Significance Ratings<sup>2</sup>**

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the study area is supplied in Section 10.2 of the Addendum.

**6.1.1 General assessment of impacts on resources**

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

**6.1.2 Direct impact rating**

**Direct or primary effects** on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected).

**EXIGO-DH01-SA01 - EXIGO-DH01-SA03**

<b>NATURE OF IMPACT:</b> Impacts could involve displacement or destruction of Stone Age material in the Mahoebe Project area.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>EXTENT</b>	Local	Local
<b>DURATION</b>	Permanent	Permanent
<b>MAGNITUDE</b>	Minor	Minor
<b>PROBABILITY</b>	Improbable	Very improbable
<b>SIGNIFICANCE</b>	Low	Low
<b>STATUS</b>	Negative	Neutral
<b>REVERSIBILITY</b>	Non-reversible	Non-reversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	Yes	No
<b>CAN IMPACTS BE MITIGATED?</b>	Yes	

<sup>2</sup> Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*



<b>MITIGATION:</b> No further action required.
<b>CUMULATIVE IMPACTS:</b> No cumulative impact is anticipated.
<b>RESIDUAL IMPACTS:</b> n/a

**EXIGO-DH01-SA04 - EXIGO-DH01-SA06**

<b>NATURE OF IMPACT:</b> Impacts could involve displacement or destruction of Stone Age material in the Mahoebe Project area.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>EXTENT</b>	Local	Local
<b>DURATION</b>	Permanent	Permanent
<b>MAGINITUDE</b>	Minor	Minor
<b>PROBABILITY</b>	Very improbable	Very improbable
<b>SIGNIFICANCE</b>	Medium	Low
<b>STATUS</b>	Negative	Neutral
<b>REVERSIBILITY</b>	Non-reversible	Non-reversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	Yes	No
<b>CAN IMPACTS BE MITIGATED?</b>	Yes	
<b>MITIGATION:</b> Avoidance, site monitoring by Heritage Specialist & ECO.		
<b>CUMULATIVE IMPACTS:</b> No cumulative impact is anticipated.		
<b>RESIDUAL IMPACTS:</b> n/a		

**EXIGO-DH01-SA07 - EXIGO-DH01-SA09**

<b>NATURE OF IMPACT:</b> Impacts could involve displacement or destruction of Stone Age material in the Mahoebe Project area.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>EXTENT</b>	Local	Local
<b>DURATION</b>	Permanent	Permanent
<b>MAGINITUDE</b>	Minor	Minor
<b>PROBABILITY</b>	Very improbable	Very improbable
<b>SIGNIFICANCE</b>	High	Low
<b>STATUS</b>	Negative	Neutral
<b>REVERSIBILITY</b>	Non-reversible	Non-reversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	Yes	No

<b>CAN IMPACTS BE MITIGATED?</b>	Yes
<b>MITIGATION:</b> Avoidance, conservation buffer, site monitoring by Heritage Specialist & ECO.	
<b>CUMULATIVE IMPACTS:</b> No cumulative impact is anticipated.	
<b>RESIDUAL IMPACTS:</b> n/a	

**6.1.3 Discussion: Evaluation of Results and Impacts**

Previous studies conducted in the larger Prieska area suggest a rich and diverse archaeological landscape and cognisance should be taken of archaeological material that might be present in surface and sub-surface deposits along drainage lines and at water pans. The study area for the proposed Mahoebe Eiendomme Solar Park Project included two footprint areas (a preferred site and a site alternative). Stone Age material was identified across the study areas, particularly within the footprint of the site alternative and this site proved to be unsuitable from a heritage sensitivity perspective. Stone Age occurrences were also noted around the preferred site but the final design was adjusted to incorporate initial recommendations pertaining to sensitive heritage receptors and to avoid impact on heritage occurrences (refer to Figure 1-2). The following impact assessment discussion summarises the extent of heritage significance and impact on resources, cognisant of this rich larger archae-historical landscape.

Stone Age material, most of which date to the MSA occurs across the study area. These occurrences of low to high densities (**Exigo-DH32-SA01 - Exigo-DH32-SA09**), as well as their cultural contexts range in scientific value where sites with high frequencies of lithics and formal diagnostic tools are most significant. Stone Age occurrences of high significance are located outside demarcated development areas for the Solar Park and the impact thereon by proposed activities is anticipated to be none, provided that the site be monitored by a qualified Stone Age Specialist and an informed ECO.

*Heritage resources have been documented in the Mahoebe Eiendomme Solar Park Project area. However, it is the opinion of the author of this Archaeological Impact Assessment Report that the proposed Mahoebe Eiendomme Solar Park Project on a portion of the farm De Hoek 32 will have a very limited impact on these archaeological heritage resources. The author is confident that the study has captured adequate information on the archaeological heritage present. The project should be allowed to proceed from a culture resources management perspective, provided that mitigation measures provided in this assessment (avoidance, monitoring), endorsed by the relevant Heritage Resources authority, are implemented where applicable.*

**6.2 Management actions**

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of the Addendum. The following management measures would be required during implementation of the proposed Mahoebe Eiendomme Solar Park Project.

**OBJECTIVE:** prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

- *For the multiple Stone Age occurrences (Exigo-DH32-SA01 - Exigo-DH32-SA09) the following are required in terms of heritage management and mitigation:*

<b>PROJECT COMPONENT/S</b>	All phases of construction.		
<b>POTENTIAL IMPACT</b>	Damage/disturbance of previously undetected heritage remains.		
<b>ACTIVITY RISK/SOURCE</b>	Digging foundations and trenches into sensitive deposits that are not visible at the surface, have not been detected prior to development.		
<b>MITIGATION: TARGET/OBJECTIVE</b>	To adequately document the historic fabric of previously undetected heritage remains as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>TIMEFRAME</b>	
Fixed Mitigation Procedure ( <b>required</b> )			
<b>Site Monitoring:</b> Site inspection by a Stone Age archaeologist familiar with the archaeological sequence of the area in order to monitor possible impacts one Stone Age receptors.	Stone Age archaeologist	At least once during construction phases of the proposed development.	
<b>Site Monitoring:</b> Site inspection by an informed ECO in order to monitor possible impacts one Stone Age receptors.	ECO	Monitor as frequently as practically possible.	
<b>Avoidance:</b> Implement a heritage conservation buffer of at least 10m around the heritage resources of medium and high significance.	DEVELOPER	Construction and operational phases.	
<b>PERFORMANCE INDICATOR</b>	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
<b>MONITORING</b>	Successful location of sites by person/s monitoring.		

## 7 RECOMMENDATIONS

The larger landscape around Prieska is rich in pre-historical and historical remnants. Material representative of the Earlier, Middle and Later Stone Age occur frequently in low lying areas on plains and calcrete exposures in Hutton sands along the banks of the Orange River. This presence of Stone Age people in the landscape can probably be attributed to the abundance of locally available raw material for the manufacture of stone tools. During this study it was found that cultural material in this area occurs in lower lying areas, predominantly in association with exposed decomposing calcrete horizons in Hutton Sands. The occurrence of these Stone Tools strongly suggests that similar sites could be located elsewhere in the study area, potentially sub-surface. This is due to the area's close proximity to the Orange River which renders it is prone to alluvial deposits that could burry potential Stone Age material. Similarly, during the site investigation Stone Age specimens from the entire span of the Stone Age were identified, in the survey area, in most cases in association with exposed decomposed calcrete deposits, but those of Middle Stone Age (MSA) origin are more common than Earlier Stone Age (ESA) and Later Stone Age (LSA) artefacts. The following recommendations are made based on general observations in the proposed Mahoebe Eiendomme Solar Park Project development areas:

- According to the SAHRA Palaeontological Sensitivity Map the site falls within a moderately sensitive fossiliferous zone and a Palaeontological Desktop Assessment should be considered for the project, subject to recommendations from the heritage authority. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Three low density Middle Stone Age Scatters (**Exigo-DH32-SA01 - Exigo-DH32-SA03**) along the footprint of the alternative site, and directly southeast and northwest of the footprint of the preferred site are of low scientific value due to the mixing of artefacts and the low density of the lithics. The author is confident that the study has captured adequate information on these archaeological occurrences and no further action is required in terms of mitigation. Three medium density lithic scatters (**Exigo-DH32-SA04 - Exigo-DH32-SA06**) directly north-west of the preferred site are considered to be of medium significance due to the presence of higher amounts of formal diagnostic tools. In addition, three high density scatters of Earlier and Middle Stone Age material within the alternative site footprint and in the general vicinity of the preferred site (**Exigo-DH32-SA04 - Exigo-DH32-SA06**) are of high significance due to the presence of large numbers of formal tools such as side scrapers, points and blades. Since the footprint of the preferred site was specifically designed cognisant of these sensitive heritage receptors, to avoid impact on heritage receptors, no impact on the resources is foreseen. However, it is recommended that a suitably qualified Heritage Specialist conduct at least one site inspection of during construction phases of the solar facility, and that an Environmental Control Officer (ECO) appointed by the developer for the general monitoring of the development during all stages of the project in order to regularly assess and ensure the preservation and conservation of these features, and to avoid any possible impact on previously undetected heritage remains. Should any previously undetected subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately. As noted previously, the final layout for the solar park was designed to specifically avoid heritage sensitive areas but to compensate for potential future cumulative impacts, it is recommended that medium and high significance Stone Age localities be avoided by the implementation 10m conservation buffers around each of the locations. Should any of the sites be directly impacted by development activities, it is recommended that they be recorded and that the cultural and archaeological context of the heritage resources be established by means of a limited Phase 2 Specialist Study. This study should minimally include a surface sampling and consequent analysis of the stone artefacts by a qualified Stone Age specialist, in order to elucidate the understanding of the development and spread of the MSA in the area. The Specialist should obtain the necessary permits from SAHRA for the in-situ analysis, possible collection and photography of the artefacts during the study.
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the Solar Park.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.

## 8 GENERAL COMMENTS AND CONDITIONS

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This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Mahoebe Eiendomme Solar Park Project Development area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognisance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools.
- Formal MSA stone tools.
- Formal LSA stone tools.
- Potsherds
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such site were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by AMAFA, SAHRA, the National Resources Act and the CRM section of ASAPA will be required.

It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (**cf. NHRA (Act No. 25 of 1999), Section 36 (6)**). It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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**10 ADDENDUM 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE**

**10.1 Site Significance Matrix**

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

2. SITE EVALUATION			
2.1 Heritage Value (NHRA, section 2 [3])	High	Medium	Low
It has importance to the community or pattern of South Africa's history or pre-colonial history.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

**10.2 Impact Assessment Criteria**

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.



**Significance of the heritage resource**

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. sitespecific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

**Nature of the impact**

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

**Extent**

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

**Duration**

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention; or
- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

**Intensity**

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

**Probability**

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will definitely occur regardless of any mitigation measures

**Confidence**

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.

- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

**Impact Significance**

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

**10.3 Direct Impact Assessment Criteria**

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
<b>CONTEXT 1</b> High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
<b>CONTEXT 2</b> Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
<b>CONTEXT 3</b> Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
<b>CONTEXT 4</b> Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected

**NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.**

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
<p><b>Context 1:</b> Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources</p> <p><b>Context 2:</b> Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.</p> <p><b>Context 3:</b> Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources</p> <p><b>Context 4:</b> Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.</p>	<p><b>Category A: Minimal intensity development</b></p> <ul style="list-style-type: none"> <li>- No rezoning involved; within existing use rights.</li> <li>- No subdivision involved.</li> <li>- Upgrading of existing infrastructure within existing envelopes</li> <li>- Minor internal changes to existing structures</li> <li>- New building footprints limited to less than 1000m2.</li> </ul> <p><b>Category B: Low-key intensity development</b></p> <ul style="list-style-type: none"> <li>- Spot rezoning with no change to overall zoning of a site.</li> <li>- Linear development less than 100m</li> <li>- Building footprints between 1000m2-2000m2</li> <li>- Minor changes to external envelop of existing structures (less than 25%)</li> <li>- Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%).</li> </ul> <p><b>Category C: Moderate intensity development</b></p> <ul style="list-style-type: none"> <li>- Rezoning of a site between 5000m2-10 000m2.</li> </ul>

	<ul style="list-style-type: none"> <li>- Linear development between 100m and 300m.</li> <li>- Building footprints between 2000m2 and 5000m2</li> <li>- Substantial changes to external envelop of existing structures (more than 50%)</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%)</li> </ul> <p><b>Category D: High intensity development</b></p> <ul style="list-style-type: none"> <li>- Rezoning of a site in excess of 10 000m2</li> <li>- Linear development in excess of 300m.</li> <li>- Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven.</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)</li> </ul>
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### 10.4 Management and Mitigation Actions

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

<p><b>No further action / Monitoring</b></p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p><b>Avoidance</b></p> <p>This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</p> <p><b>Mitigation</b></p> <p>This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.</p> <p><b>Compensation</b></p> <p>Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.</p> <p><b>Rehabilitation</b></p> <p>Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</p> <ul style="list-style-type: none"> <li>- The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.</li> <li>- Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.</li> <li>- Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource.</li> </ul> <p><b>Enhancement</b></p> <p>Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources. In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should, however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored</p>
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