



**AGES LIMPOPO: PROPOSED NEW HOPE 1, 2, 3, 4 SOLAR  
PARKS ON THE REMAINING EXTENT OF THE FARM  
N'ROUGAS ZUID 121, ZF MGCAWU DISTRICT  
MUNICIPALITY, NORTHERN CAPE PROVINCE**

**Archaeological Impact Assessment**

A 3D rendering of a globe with water splashing over it, symbolizing sustainability and innovation. The globe is positioned in the center of the page, with a large, faint "E" watermark overlaid on it.

**Innovation in  
Sustainability**

Prepared for: **AGES Limpopo**

Prepared by: **Exigo Sustainability**



## ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE DEVELOPMENT OF THE NEW HOPE 1, 2, 3, 4 SOLAR PARKS ON THE REMAINING EXTENT OF THE FARM N'ROUGAS ZUID 121, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

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**EXECUTIVE SUMMARY**

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the proposed New Hope 1, 2, 3, 4 Solar Parks Project on the Remaining Extent of the farm N'Rougas Zuid 121 in the ZF Mgcawu District Municipality of the Northern Cape Province. The proposed project entails the construction of 4 renewable energy generation facilities (Photovoltaic Power Plants) with associated infrastructure and structures. 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.

Project Title	New Hope 1, 2, 3, 4 Solar Parks
Project Location	New Hope 1 Solar Park: S29.15402° E21.18556° New Hope 2 Solar Park: S29.16031° E21.20320° New Hope 3 Solar Park: S29.18150° E21.18563° New Hope 4 Solar Park: S29.17746° E21.17062°
1:50 000 Map Sheet	2921AA
Farm Portion / Parcel	The Remaining Extent of the farm N'Rougas Zuid 121
Magisterial District / Municipal Area	ZF Mgcawu District Municipality
Province	Northern Cape Province

A number of archaeological studies, most of these commercially motivated, have been conducted in the larger Kenhardt area but these studies all infer a varied and rich heritage landscape. Even though the landscape of this section of the Northern Cape seems to have been relatively sparsely populated by humans in the past, Earlier Stone Age (ESA), Middle Stone Age (MSA) and Later Stone Age (LSA) scatters and quarries occur frequently in low lying areas on plains between dune straights, exposures and outcrops along the Orange River. Sites dating to the Iron Age occur in the north eastern part of the Province but environmental factors delegated that the spread of Iron Age farming westwards from the 17th century was constrained mainly to the area east of the Langeberg Mountains. 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 to the east, which herald the modern era in South African history.

The landscape around the project area is primarily well known for the occurrence of Earlier and Middle Stone Age occurrences as well as a Colonial Frontier. Cognisant thereof, the following observations and recommendations are made based on general observations in the proposed New Hope 1, 2, 3, 4 Solar Parks in terms of heritage resources management.

- Wide-spread scatters of Stone Age artefacts were documented across the project footprint areas in medium to low densities, often along eroded calcrete surfaces and around quartzite outcrops. Most of the artefacts are probably Middle Stone Age (MSA) lithics such as blades, scrapers, chunks and cores produced on quartzite. Single possible Later Stone Age (LSA) microlithic tools were noted. Similar MSA

occurrences were noted at various localities around Kenhardt on other HIA projects and the bulk of these studies indicate limited archaeological value of MSA scatters due to the absence of associated organic material, the lack of discrete individual sites as well as the fact that thousands of square kilometers of Bushmanland are covered by these artefacts scatters. In addition, these studies point to a pattern where sensitive Stone Age localities are commonly clustered around existing and ancient drainage lines, pans, and ridges with rocky outcrops in this landscape. The footprint areas for the New Hope 1, 2, 3, 4 Solar Parks project have been designed around ecologically sensitive drainage lines and pans, mostly over sandy surface sediments and this implies that areas of potential high heritage sensitivity have potentially been avoided. MSA localities occurring within the footprints are regarded as low-medium significance and, even though it is almost certain that additional Stone Age materials will occur in affected areas, these will probably be of similar provenance and of lesser importance. It is recommended that application should be made for a permit prior to the destruction of archaeological material. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.

- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any 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.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the project landscape at archeological sites, 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 development.

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).

**New Hope 1, 2, 3, 4 Solar Parks Heritage Occurrences**

Waypoint	Latitude	Longitude	Description	Significance	Mitigation Action
WPT01	-29.15975357	21.1947728	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	<p><b>Site Monitoring:</b> Frequent monitoring during construction by the heritage consultant or an ECO familiar with the heritage occurrences of the site.</p> <p><b>Permitting:</b> Apply for relevant destruction permits before site impact.</p>
WPT02	-29.15230307	21.18112723	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT03	-29.15013308	21.1798236	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT04	-29.15155264	21.17361177	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT05	-29.15590653	21.17398082	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT06	-29.15569975	21.16899652	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT07	-29.16052965	21.19425748	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT08	-29.15891337	21.19701211	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT09	-29.16455347	21.20114288	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT10	-29.16744975	21.19498931	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT11	-29.16497198	21.18452325	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT12	-29.17577642	21.18431403	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT13	-29.18235957	21.18161037	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT14	-29.1741935	21.175233	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT15	-29.16650478	21.16657323	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	
WPT16	-29.16670385	21.16474715	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	
WPT17	-29.16799634	21.16747035	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	
WPT18	-29.17058031	21.16966657	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT19	-29.17830541	21.17461131	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT20	-29.17927612	21.17456596	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	
WPT21	-29.18594317	21.17898867	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	
WPT22	-29.18476593	21.1760136	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT23	-29.17745842	21.16865161	Area in an ephemeral watercourse with pale quartzite MSA flakes probably from the same source.	Low-medium	
WPT24	-29.18815959	21.17297508	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT25	-29.18707171	21.17107767	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT26	-29.18524554	21.17660142	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	
WPT27	-29.16817898	21.18937938	Area in an ephemeral watercourse with pale quartzite MSA flakes probably from the same source.	Low-medium	

## NOTATIONS AND TERMS/TERMINOLOGY

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

**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.

**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.

**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.

**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

**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.

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

**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.

**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.

**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.

**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.

**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.

**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,

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

**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.

**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.

**LIST OF ABBREVIATIONS**

<b>Abbreviation</b>	<b>Description</b>
<b>ASAPA</b>	Association for South African Professional Archaeologists
<b>AIA</b>	Archaeological Impact Assessment
<b>BP</b>	Before Present
<b>BCE</b>	Before Common Era
<b>BGG</b>	Burial Grounds and Graves
<b>CRM</b>	Culture Resources Management
<b>EIA</b>	Early Iron Age (also Early Farmer Period)
<b>EIA</b>	Environmental Impact Assessment
<b>EFP</b>	Early Farmer Period (also Early Iron Age)
<b>ESA</b>	Earlier Stone Age
<b>GIS</b>	Geographic Information Systems
<b>HIA</b>	Heritage Impact Assessment
<b>ICOMOS</b>	International Council on Monuments and Sites
<b>K2/Map</b>	K2/Mapungubwe Period
<b>LFP</b>	Later Farmer Period (also Later Iron Age)
<b>LIA</b>	Later Iron Age (also Later Farmer Period)
<b>LSA</b>	Later Stone Age
<b>MCLWHS</b>	Mapungubwe Cultural Landscape World Heritage Site
<b>MIA</b>	Middle Iron Age (also Early later Farmer Period)
<b>MRA</b>	Mining Right Area
<b>MSA</b>	Middle Stone Age
<b>NHRA</b>	National Heritage Resources Act No.25 of 1999, Section 35
<b>OUV</b>	Outstanding Universal Value
<b>PFS</b>	Pre-Feasibility Study
<b>PHRA</b>	Provincial Heritage Resources Authorities
<b>SAFA</b>	Society for Africanist Archaeologists
<b>SAHRA</b>	South African Heritage Resources Association
<b>SANParks</b>	South African National Parks
<b>SoOUV</b>	Statement of Outstanding Universal Value
<b>YCE</b>	Years before Common Era (Present)
<b>UNESCO</b>	United Nations Education, Scientific and Cultural Organisation
<b>WHS</b>	World Heritage Site



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## 1 BACKGROUND

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### 1.1 Scope and Motivation

Exigo Sustainability (Pty) Ltd (Exigo) was commissioned by AGES Limpopo to conduct an Archaeological Impact Assessment (AIA) study subject to an Environmental Basic Assessment (BA) process for the proposed New Hope 1, 2, 3, 4 Solar Parks Project in the 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'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

AGES Limpopo (Pty) Ltd has been appointed by Apus Energy (Pty) Ltd and Lacerta Energy (Pty) Ltd to undertake the environmental Basic Assessment process for the proposed New Hope 1, 2, 3, 4 Solar Parks on the Remaining Extent of the farm N'Rougas Zuid 121, ZF Mgcawu District Municipality in the Northern Cape Province. In view of the growing electricity demand and in an effort to use renewable energy resources, Apus Energy and Lacerta Energy are assessing the feasibility of energy generation facilities for each project consisting of the construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a maximum generation capacity up to 300 MW at the point of connection (Export Capacity). The purpose of the proposed Solar Photovoltaic Plants is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the REIPP Procurement Programme and to the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) and in order to meet the "sustainable growth" of the Western Cape Province. The use of solar radiation for power generation is considered as a non-consumptive use and a renewable natural resource which does not produce greenhouse gas emissions. The generation of renewable energy will contribute to the growth of South Africa's electricity market, which has been primarily dominated up to this date by coal-based power generation. With specific reference to photovoltaic energy, and the proposed projects, it is important to consider that South Africa has one of the highest levels of solar radiation in the world. The proposed solar parks will assist the Eskom grid to meet the high energy demand related to the industrial activities conducted in the Kenhardt area. Furthermore, being renewable energy projects, which doesn't generate greenhouse gases - it will assist to compensate the greenhouse gas emissions arising from these industrial activities.

The project site is the Remaining Extent of the farm N'Rougas Zuid, 121, Registration Division Kenhardt RD where 4 footprint areas have been identified measuring:

- New Hope 1 Solar Park: **240ha**
- New Hope 2 Solar Park: **241ha**
- New Hope 3 Solar Park: **230ha**
- New Hope 4 Solar Park: **238ha**

The project site is located within the Renewable Energy Development Zone 7 (also known as “Upington REDZ”), published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018. The Eskom Nieuwehoop Main Transmission Substation (MTS) is located ±13 km East of the project site. Access to the project site would be from the regional road R27 from Kenhardt, which traverses the project site. The expected operational life of the plants is deemed of approximately 30 years. The construction and the commissioning of the PV plants are expected to last approximately **18 months**

The PV plants will mainly consist of the following components:

- **Photovoltaic cells and photovoltaic modules:** PV cells are made in silicone and act as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic module. The facility will use mono/polycrystalline photovoltaic (PV) modules or bi-facial modules with high efficiency.
- **Support structures:** PV modules will be assembled on steel or aluminium frames. The preferred technical solutions for the proposed solar park entail PV modules mounted on **single-axis horizontal trackers** (alternative option 1) or on **fixed mounting systems** (alternative option 2), or a combination of both of them. As depicted in Figures 1 and 2, each tracker is composed by several PV arrays North-South oriented and linked by a horizontal axis, driven by a motor. The horizontal axis allows the rotation of the PV arrays toward the West and East direction, in order to follow the daily sun path. In the case of fixed mounting systems, as depicted in Figures 3 and 4: each mounting frame hosts PV modules along parallel rows of PV modules placed side by side, with the position of the panels northwards and an optimized tilt angle (between 20° and 30°). The rows of PV modules are mounted horizontally one on top of the other, with an overall mounting structure height up to 4.5 meters above ground level.
- **Strings and string boxes:** the PV modules are connected in series in order to form PV strings, so that the string voltage fits into the voltage range of the DC/AC inverters. PV strings are devised in order to be connected to DC-connection boxes (string boxes) with a parallel connection solution (PV sub-field). String Boxes monitor the currents in photovoltaic modules and can promptly diagnose faults. String boxes are also designed with a general circuit breaker in order to disconnect the photovoltaic sub-fields from the DC/AC inverters.
- **Medium-voltage stations:** each medium-voltage station is designed to host one or more DC/AC inverters, and one or more medium-voltage power transformers. The DC/AC inverters are deemed to convert the direct current (DC) to alternating current (AC) at low voltage; subsequently the AC will pass through a medium-voltage power transformer in order to step-up the voltage up to 22 kV or 34 kV.
- **Medium-voltage receiving station:** the energy from the medium voltage stations will be collected into one medium voltage receiving stations, linking in parallel all the PV fields of the PV generator.
- **On-site high-voltage substation and switching station:** from the medium-voltage receiving station, the electrical energy will be delivered to one small on-site high-voltage substation with two or more high-

voltage power transformers (one as spare), stepping up the voltage to the voltage of the Eskom grid (400 kV or 132 kV). Furthermore, the on-site high-voltage substation will be equipped with a control building and one busbar with metering and protection devices (also called “switching station”).

- **Up to two (2) x 400 kV (or 132 kV) circuits**, approximately 12 km to 15 km long (depending on the selected location of the project footprints), for the connection of the on-site substation to the **Eskom Nieuwehoop Main Transmission Substation (MTS)** located on Portion 3 of the Farm GEMSBOK BULT 120, Kenhardt RD, 13 km East of the project site.
- **Battery Energy Storage Systems (BESS)** for each of the PV Power Plants, with a Maximum Export Capacity up to 300 MW and a 5-hour storage capacity up to 1250 MWh, with a footprint up to 10 ha, next to the on-site high-voltage substation, within the PV plant footprint / fenced areas.
- Interventions on the Eskom Nieuwehoop Main Transmission Substation (MTS).

During the construction phase, the site may be provided with additional (to be removed at the end of construction):

- Water access point, water supply pipelines, water treatment facilities
- Pre-fabricated buildings
- Workshops & warehouses

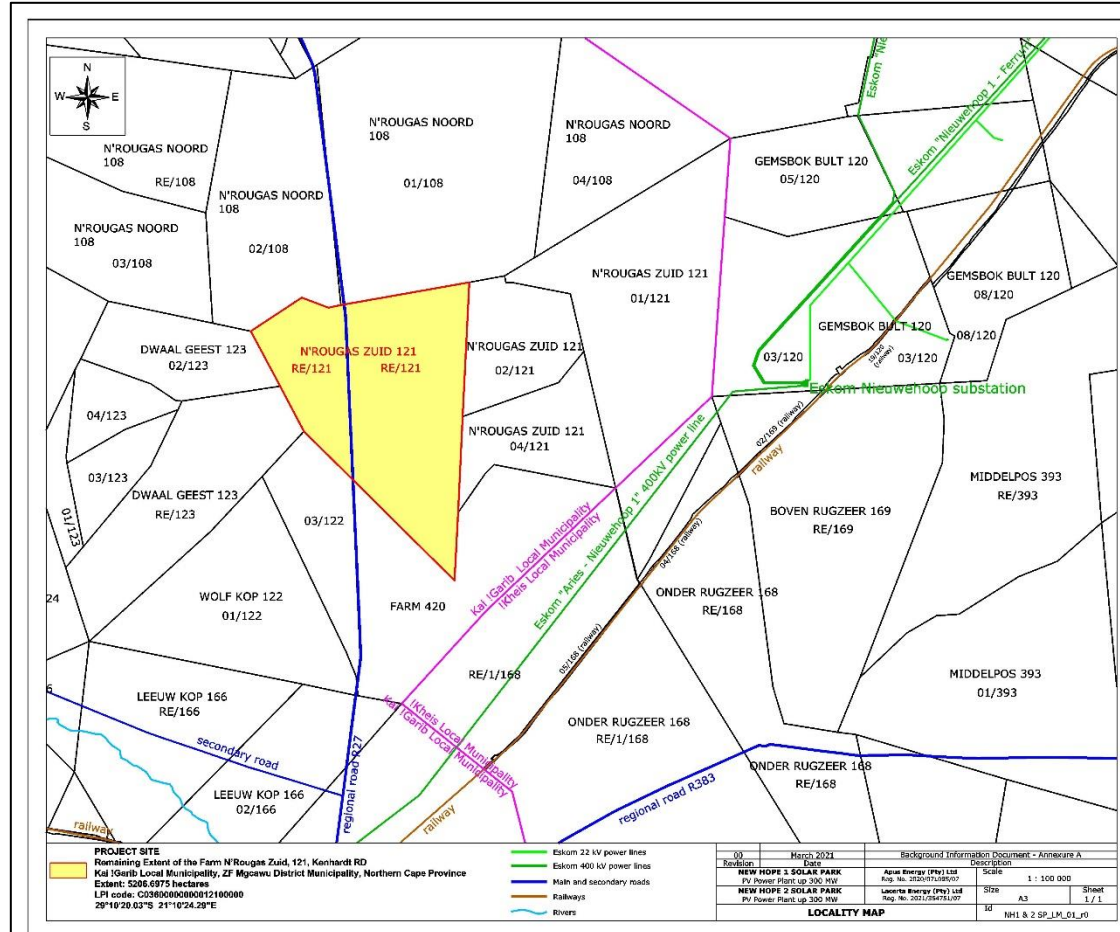


Figure 1-1: Map indicating the farm portions subject to the New Hope 1, 2, 3, 4 Solar Parks.

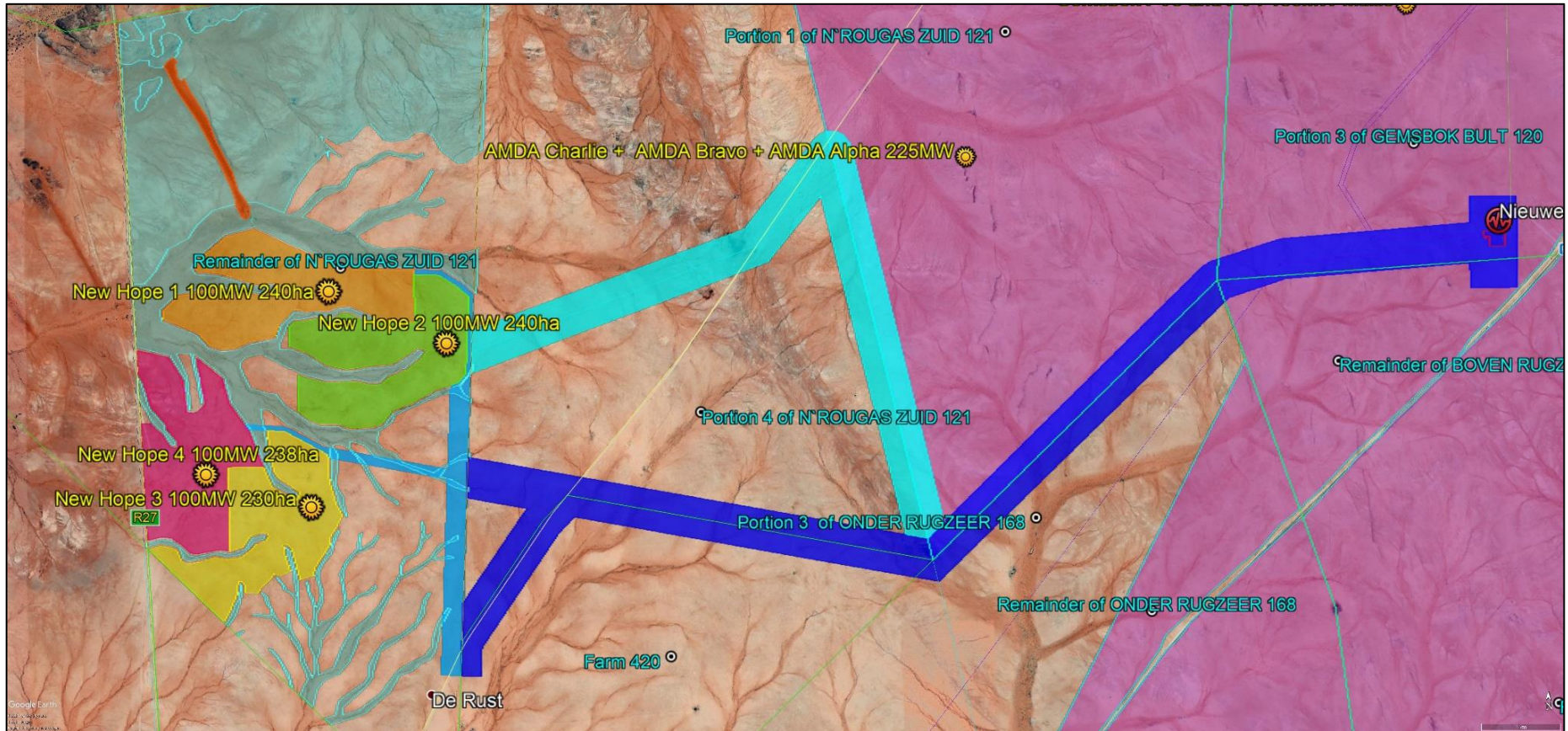


Figure 1-2: Aerial plan indicating the proposed development components of the New Hope 1, 2, 3, 4 Solar Parks.



## 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. It is also a legal requirement for certain development categories which may have an impact on heritage resources. Thus, EIAs should always include an assessment of heritage resources where development is “socially, culturally, environmentally and economically sustainable and where unnatural disturbance is unavoidable, it must be mitigated to enhance the cultural and natural heritage”. 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)**. The NHRA 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 a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assessment of the potential impact (both positive and negative as well as short and long term) of the proposed project and its associated activities on the local heritage landscape.*
- *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 and rate 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.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA). A Notification of Intent to Develop (NID) will be submitted to SAHRA at the soonest opportunity.*

## 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 its 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 No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

- a. Archaeological artefacts, structures and sites older than 100 years
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance
- b. Places to which oral traditions are attached or which are associated with living heritage
- c. Historical settlements and townscapes
- d. Landscapes and features of cultural significance
- e. Geological sites of scientific or cultural importance
- f. Archaeological and paleontological sites
- g. Graves and burial grounds
- h. Sites of significance relating to the history of slavery
- i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

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 and burial grounds are commonly divided into the following subsets:

- a. ancestral graves
- b. royal graves and graves of traditional leaders
- c. graves of victims of conflict
- d. graves designated by the Minister
- e. historical graves and cemeteries
- f. human remains

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 Ordinance on Excavations (Ordinance no. 12 of 1980) 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.

**c. National Heritage Resources Act No 25 of 1999, section 35**

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation’s cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

**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.

**A detailed guideline of statutory terms and requirements is supplied in Addendum 1.**

## 2 REGIONAL CONTEXT

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### 2.1 Area Location

The proposed New Hope 1, 2, 3, 4 Solar Parks occurs on the Remaining Extent of the farm N'Rougas Zuid 121 in the ZF Mgcawu District Municipality, Northern Cape Province. The town of Kenhardt occurs approximately 20km south of the project area and Keimoes lies 70km to the north, within the Renewable Energy Development Zone 7 (also known as "Upington REDZ"). The R27 regional road traverses the project site. The Eskom Nieuwehoop Main Transmission Substation (MTS) is located ±13 km East of the project site. More specifically, key locations along the proposed development footprints are situated at:

- **New Hope 1 Solar Park: S29.15402° E21.18556°**
- **New Hope 2 Solar Park: S29.16031° E21.20320°**
- **New Hope 3 Solar Park: S29.18150° E21.18563°**
- **New Hope 4 Solar Park: S29.17746° E21.17062°**

The site is located on 1:50 000 map sheet **2921AA**.

### 2.2 Area Description: Receiving Environment

The development site lies within the Green Kalahari bordering the Nama Karoo biome which occurs on the central plateau and western half of South Africa, at altitudes between 500 and 2000 m, with most of the biome. The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. The geology underlying the biome is varied, as the distribution of the biome is determined primarily by rainfall. This also determines the predominant soil type with over 80% of the area covered by lime-rich weakly developed soil over rock (Low & Rebelo, 1996). The most recent classification of the area by Mucina & Rutherford (2006) shows that the site is classified as Bushmanland Arid Grassland. The landscape features of the Bushmanland Arid Grassland vegetation type are extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses. An ecological assessment and wetland delineation will be conducted and included in the EIA Report.

### 2.3 Site Description

The farm N'Rougas Zuid is characterized by generally flat plains with a number of small hills in the northern section of the property. Most of the project footprint areas are surfaced by windblown sand covered in sparse scrub vegetation and Quiver Trees with shallow calcareous soils and quartzite outcrops occurring sporadically. A number of shallow watercourses and drainage lines traverse the landscape and the property. The current land-use of the proposed development site is grazing by game. Neighbouring farms are being used for livestock grazing and game farming. Existing infrastructure comprises concrete dams, boreholes, concrete drinking troughs, sheds and a farmstead situated away from the project site. The chosen footprint sites are 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.

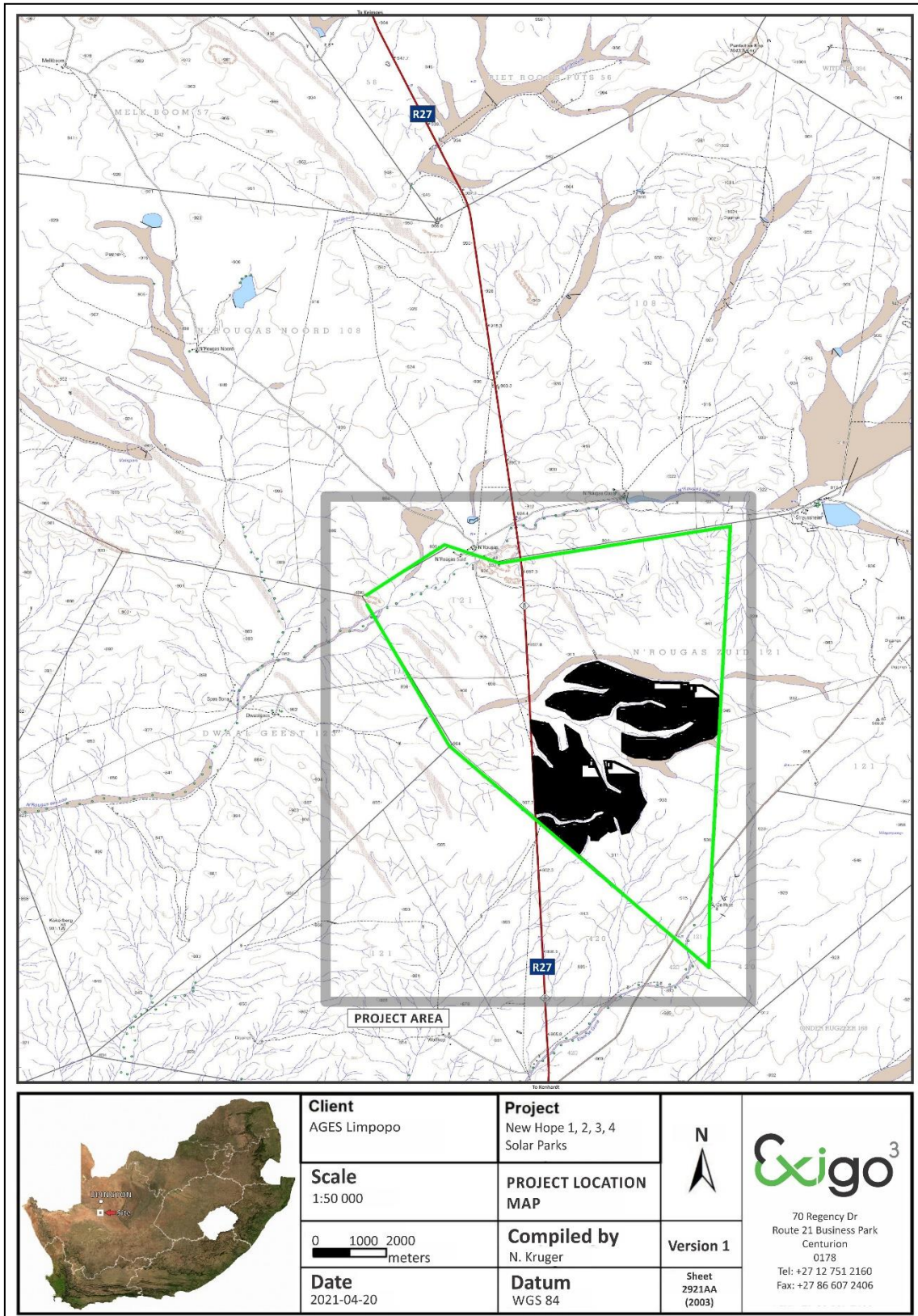


Figure 2-1: 1:50 00 Map representation of the location of the proposed New Hope 1, 2, 3, 4 Solar Parks (sheet 2921AA).

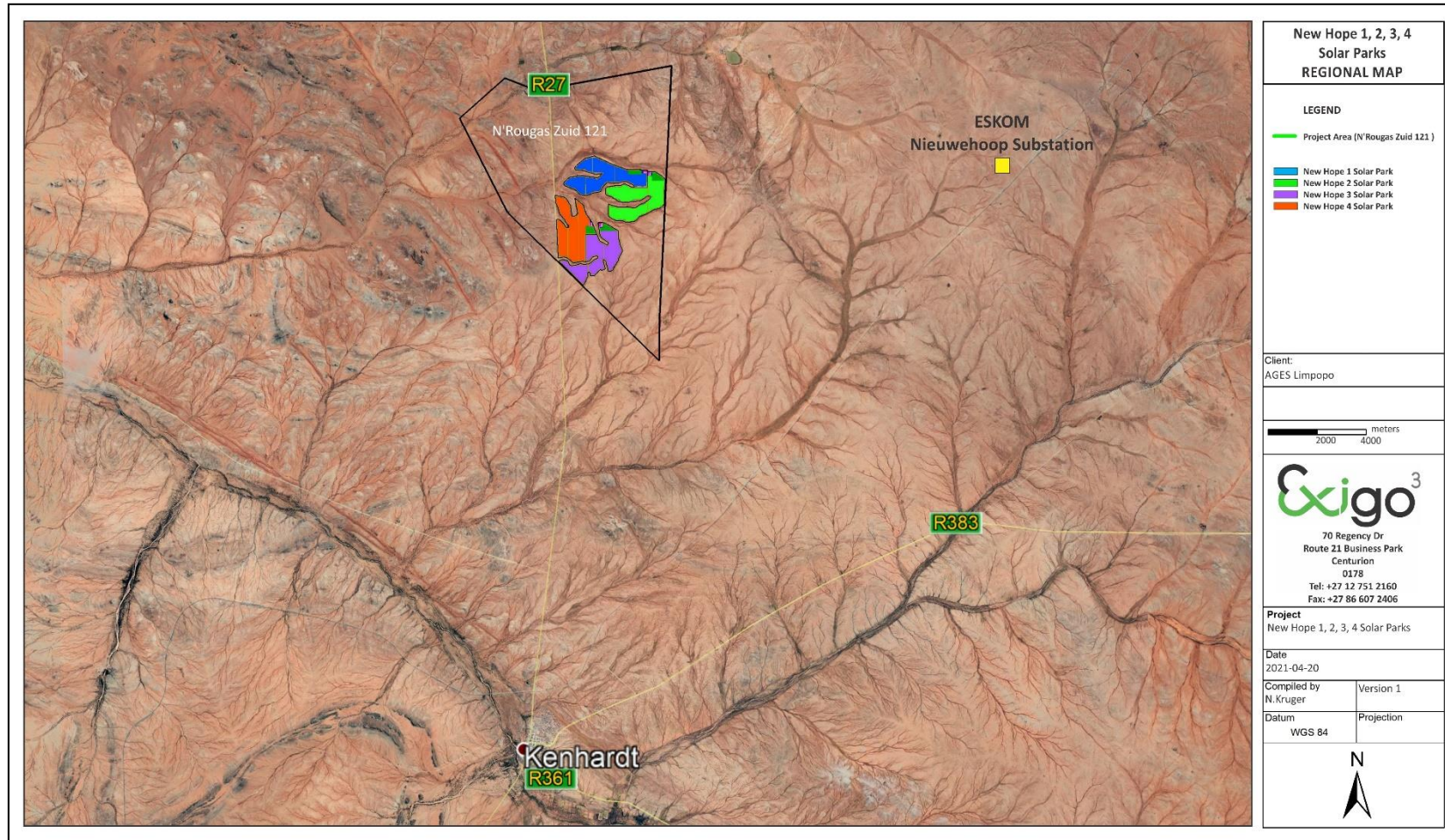


Figure 2-2: Aerial map providing a regional context for the proposed New Hope 1, 2, 3, 4 Solar Parks project.

### 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

The larger project area has been well documented in terms of its archaeology and history. A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. Numerous academic papers and research articles supplied a historical context for the proposed project and archival sources, aerial photographs, historical maps and local histories were used to create a baseline of the landscape's heritage. In addition, the study drew on available unpublished Heritage Assessment reports to give a representation of known sites in the study area. These include:

- Nilssen, P. 2016. Phase1a Archaeological Impact Assessment Proposed development of the AMDA Charlie PV (Solar Energy Facility) on Portion 1 of N' Rougas Zuid No 121, Strausheim, and Overhead Power Line Grid Connection to the Eskom Nieuwehoop MTS Sub-Station across Portion 3 of Gemsbok Bult No 120, Kenhardt Registration Division, Northern Cape Province.
- Webley & Halkett, 2012. Heritage Impact Assessment for the construction of a 70MW solar facility on 350ha of land on the farm Klein Zwart Bast 188, in the Siyanda District Municipality, Northern Cape Province. ACO & Associates
- De Jong, R & Associates. 2011. Heritage Impact Assessment Report: Proposed solar power station on the remainder of Portion 1 (known as Die Hoek) and a portion of Portion 2 of the farm Klein Zwart Bast 188, Kenhardt Registration Division, Siyanda District Municipality, Northern Cape Province. Unpublished report for eScience Associates (Pty) Ltd.
- Halkett, D. & Orton, J. 2011. Heritage Impact Assessment (Archaeology and Palaeontology): Proposed Olyven Kolk Solar Power Plant, Northern Cape. Unpublished report for AES Solar Energy Limited.
- Morris, David. 2006. Archaeological Specialist Input to the EIA Phase for the proposed Aries-Garona ESKOM Transmission Power Line, Northern Cape and Comment on the Garona Substation Extension. Unpublished Report September 2006 for Tswelopele Environmental.
- Pelsler, A.J. 2011 A report on an archaeological impact assessment (aia) for the proposed solar energy plant on Klein Zwart Bast 188, Kenhardt district, northern Cape. Unpublished report AE1104 prepared for Robert De Jong & Associates. Archaetnos.
- Webley, L. & Halkett, D. 2010. An Archaeological Impact Assessment (Report 3): Proposed construction of a substation between Aries-Helios and associated loop in and loop out lines, west of Brandvlei in the Northern Cape. Unpublished report for Nzumbululo Heritage Solutions
- Heritage Impact Assessment of the proposed Hydropower station on the Orange River at Neus Island on the farm Zwartbooisberg, east of Kakamas, Northern Cape
- HIA for the construction of five substations along the Sishen-Saldanha railway line.
- Report on a Phase 1 Archaeological Assessment of the site of proposed Borrow Pits for road- building purposes along Road MR 897 in the vicinity of Swartkop, Jooste Island, near Upington, Northern Cape.

- Archaeological Impact Assessment for the Environmental Impact Management Plan for the Proposed Upington Solar Thermal Plant, Northern Cape Province.
- Heritage Impact Assessment for the Proposed Kangnas Wind and Solar Energy Facilities, Namakwa Magisterial District, Northern Cape
- Proposed Kwartelspan PV Power Station I and Associated Infrastructure, Pixley ka Seme District Municipality, Northern Cape Province).
- Heritage Impact Assessment for the Proposed Establishment of the Ilanga Solar Thermal Power Plant, near Upington, Northern Cape

### 3.1.2 Aerial Survey

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. Site assessment of the project properties relied heavily on this method to assist the foot and automotive site survey. Here, depressions, variation in vegetation, soil marks and landmarks were examined and 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. In addition, historical aerial photos obtained during the archival search were scrutinized and features that were regarded as important in terms of heritage value were identified and if they were located within the boundaries of the project area they were physically visited in an effort to determine whether they still exist and in order to assess their current condition and significance. By superimposing high frequency aerial photographs with images generated with Google Earth as well as historical aerial imagery, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as reference points from where further vehicular and pedestrian surveys were carried out.

### 3.1.3 Mapping of sites

Similar to the aerial survey, the site assessment of the project properties relied on archive and more recent map renderings of the properties to assist the challenging foot and automotive site survey where historical and current maps of the project area were examined. By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the larger project area using GIS software. These maps were then superimposed on high-definition aerial representations in order to graphically demonstrate the geographical locations and distribution of potentially sensitive landscapes.

### 3.1.4 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the New Hope 1, 2, 3, 4 Solar Parks area was conducted over two 3-day field work periods in April 2021. The process encompassed a systematic field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. As the project area is relatively large, particular focus was placed on GPS reference points identified during the aerial and mapping survey. Where possible, random spot checks were made and potentially sensitive heritage areas were investigated. Using a Garmin GPS, the survey was tracked and general surroundings were photographed with



a Samsung 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.

### 3.2 Limitations

#### 3.2.1 Access

The project property is accessed via the R27 regional road. Access control is applied to the farm but no restrictions were encountered during the site visits as the author of this report as site access was arranged with the owners. A number of farm service roads provided vehicular access to all areas relevant to this assessment and no access constraints were encountered.

#### 3.2.2 Visibility

The surroundings of Kenhardt are sparsely vegetated with small shrubs and occasional Quiver Trees. Similarly, the study areas were not densely overgrown at the time of the AIA site inspections (April 2021) and visibility was high (see Figures 3-1 to 3-10). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no apparent cultural stratification or archaeological deposits.



Figure 3-1: Panoramic view of the project area on N'Rougas Zuid, looking south.



Figure 3-2: View of the sparsely vegetated project area.



Figure 3-3: View of windblown sands capped with scatters of quartzite occurring over much of the project area.



Figure 3-4: View of vegetation and windblown sands occurring over much of the project area.



Figure 3-5: View of scatters of quartzite occurring over sands occurring in much of the project area.



Figure 3-6: View of low scrubs in the project area.



Figure 3-7: View of the project area, looking south.



Figure 3-8: View of vegetation along a drainage line in the project area.



Figure 3-9: Another view of scatters of quartzite occurring over sands occurring in much of the project area.



Figure 3-10: View of general surroundings in the project area.

### 3.2.3 Summary: Limitations and Constraints

The foot survey for the New Hope 1, 2, 3, 4 Solar Parks 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. Visibility proved to be a minor constraint, where surface cover obscured features and surface occurrences. Yet, even though it might be assumed that survey findings are representative of the heritage landscape of the project area, 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. The significances of the impacts were determined through a synthesis of the criteria below:

## 4 ARCHAEO-HISTORICAL CONTEXT

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 <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	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 <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	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 <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	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.

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

#### 4.1 Discussion: The Northern Cape Cultural Landscape

The history of the Northern Cape Province is reflected in a rich archaeological landscape, mostly dominated by Stone Age occurrences. 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 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 traces of the Anglo-Boer war, indigenous and colonial contact sites and more recent historic occupation and development of the region, which herald the modern era in South African history. Except for a number of Heritage Assessment studies predominantly for renewable energy projects, little systematic archaeological work has been done in the Kenhardt area. Most of these studies point to an Earlier, Middle and Later Stone Age presence in the area.

##### 4.1.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings in the Bankeveld at places such as Sterkfontein and Swartkrans near Krugersdorp. *Homo habilis*, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes and cleavers from as early as one and a half million years ago. Oldowan and Acheulian artefacts were also found four to five decades ago in some of the older gravels (ancient river beds and terraces) of the Vaal River and the Klip River in Vereeniging. The earliest ancestors of modern man may therefore have roamed the Vaal valley at the same time that their contemporaries occupied some of the dolomite caves near Krugersdorp. Middle Stone Age sites dating from as early as two hundred thousand years ago have been found all over South Africa. Middle Stone Age hunter-gatherer bands also lived and hunted in the Orange and Vaal River valleys. These people, who probably looked like modern humans, occupied campsites near water but also used caves as dwellings. They manufactured a wide range of stone tools, including blades and points that may have had long wooden sticks as hafts and were used as spears. The Late Stone Age commenced twenty thousand years ago or somewhat earlier. The various types of Later Stone Age industries scattered across the country are associated with the historical San and Khoi-Khoi people. The San were renowned as formidable hunter-gatherers, while the Khoi-Khoi herded cattle and small stock during the last two thousand years. Late Stone Age people manufactured tools that were small but highly effective, such as arrow heads and knives.

Little is known about the archaeology along the Orange River with the exception of the Richtersveld and the Middle Orange River area. In his 2006 survey for the Solafrica Concentrated Solar Plant (CSP) located on Bokpoort 390 to the north and west of the Garona sub-station, Dreyer reported on a collection of stone flakes close to the existing power line. "Some of the flakes showed convergent flaking characteristic of the Middle Stone Age industry. Some lydianite cores were also found". He considered them to be of low significance and no mitigation was recommended. In his 2006 survey for the proposed Aries-Garona Eskom transmission line and extensions to the Garona sub-station, Morris (2006) commented in general on the archaeology of the area but did not report specific sites. Morris (2007) reported on Pleistocene material at

the base of dune sands exposed at the edge of borrow pits associated with the expansion of Loop 16 on the Sishen-Saldanha line, on the northern edge of the present study area. In the dune-covered plain near to Garona substation the calcrete substrate is exposed in old borrow pits between the service road and the railway, where several jaspilite flakes, points and blades were located, “but in very low density scattered over a large area” (Morris 2007). These were taken to be probably representative of Middle Stone Age or Fauresmith industries. A very substantial existing borrow pit some kilometres down the line from Loop 16 itself, also close to the route of the proposed pipeline, had also been examined (Morris 2007). A low-density scatter (up to, but mainly less than, about 1 artefact/m<sup>2</sup>) of possibly Middle Stone Age artefacts was found on the calcrete surface here and around the edges of the borrow pit. In his 2012 survey for the construction of a proposed water pipeline across sections of the farms Sand Draai 391 and Bokpoort 390, Morris (2012) recorded a single stone structure in the disturbed lands close to the Orange River. He notes that on the “slightly sloping calcrete capped plain extending eastward from the Orange River, there occurs a low “background scatter” of Stone Age traces. The material observed appeared to be consistently of Pleistocene age, mainly Middle Stone Age, and mostly utilizing jaspilite as raw material (probably derived from the Orange River gravels – some flaked nodules are river-rounded pebbles of jaspilite). Densities increase closer to the river from <1 per 10x10 m to up to >1 per m<sup>2</sup>. Preservation context is poor – these are essentially lag deposits on eroding surfaces and hence of low significance”. Closer to the Garona sub-station, the calcrete-capped plain is overlain by aeolian sands in linear dunes, sometimes with the older surfaces exposed between dunes and sometimes not. Occasionally, Later Stone Age is found on the dunes, particularly in situations of wind deflation. Morris recorded only one such occurrence was found, with just a few quartz flakes. Dreyer’s (2012) field survey for a proposed water pipeline following a section of the Sishen-Saldanha railway line identified a small stone tool assemblage near the Garona sub-station on the farm Bokpoort 390. The flake scars suggested that the stone tools were of Middle Stone Age origin and since there did not appear to be any focus to the distribution of stone tools, Dreyer (2012) did not recommend mitigation. Van Rhyneveld (2007) surveyed an area at Bokputs 118 some 40 km to the south-west of Kenhardt and recorded low density MSA artefact scatters at a number of quartz outcrops.

Morris (2012) characterizes the distribution of archaeological sites in the area as:

- Stone artefacts along the Orange River.
- Stone artefacts on sloping calcrete plain east of the Orange River
- Stone artefact scatters between sand dunes.

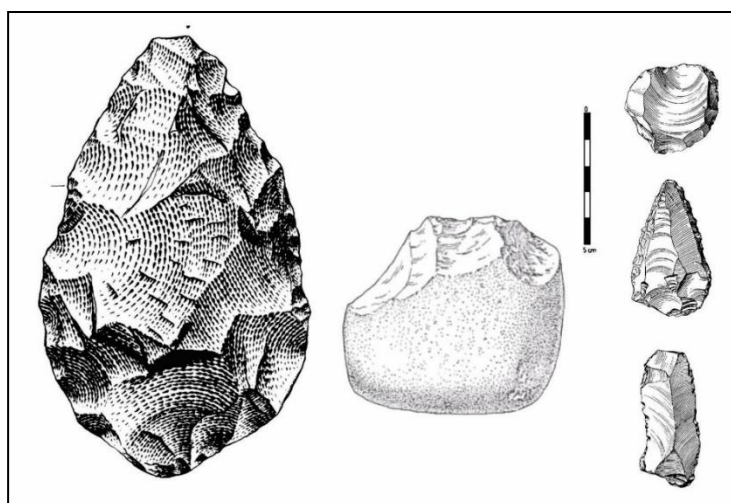


Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

#### 4.1.2 Rock art and 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).

#### 4.1.3 The Later Stone Age (LSA)

Later Stone Age (LSA) sites occur both at the coast and inland as caves deposits, rock shelters, open sites and shell deposits. 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).

#### 4.1.4 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 Thlaping 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 Thlaping 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 BaThlaping. He notes that 35 km due north of Witsand lies the modern farm of Nokanna, which he says equates with the former BaThlaping 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 Thlaping and Tlharo chiefdoms are referred to here (N. J. Jacobs, 199). It is even suggested that some Sotho-Tswana people might have preceded the Thlaping 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).

#### 4.1.5 Trade, Exploration and Recent History

The oral and written history of the Northern Cape pertaining to the last centuries is relatively abundant resulting from an assimilation of local folklore and Historical sources such as missionary accounts. The Historical period commenced when pioneers (in most cases, missionaries) arrived between the nineteenth century and early twentieth century, depending on the region. Later, larger populations established villages in the area, some of which are often still occupied today. During the 1930's some of the Tswana communities consisted of a wealth of cattle that could be used to gain capital and purchase additional land. The Khoisan and Khoikhoi communities were not so lucky, because they were mostly used as labourers at various Tswana and European households (Wylie 1989). The colonial footprint in this area tends to be extremely light with farm houses generally dating to the early 20th century. Most farms were only granted in the years just before or after 1900. On 27 December 1868, special magistrate Maximillian Jackson with a police contingent, was sent to act against the Griquas in the area that is today Kenhardt. The Griqua's anti-colonial resistance had erupted into an open conflict. Jackson arrived in Kenhardt and set up camp under a giant camelthorn tree. This has been for a long time the most remote settlement in the North-Western Cape. With time the town developed from under this tree, becoming a municipality in 1909. The Hartbees River, with its many sweet thorn trees, provides a green belt irrigated by the Rooiberg Dam. Kenhardt is famous for being at the heart of the Dorper sheep-farming area. The area also saw conflicts during the Anglo Boer War where, on 25th February 1900 Koos Jooste and Andries de Wet occupied Kenhardt with 12 men. They fired on the town guard when ordered to halt, but eventually took over the town and locked the town officials in jail for a few days before ordering them to leave town. On 1 March 1900, 200 recruits joined the Boer forces in Kenhardt. They were addressed by Commandant Lucas Steenkamp, after which they went into training. On hearing of the British approach, a group of 130 men under Field Cornet Borrius moved to Rietfontein, 2 km south of Kenhardt, to defend the town from British forces who were on their way to the lower Orange River Valley to suppress the Boers in the area. However, before the arrival of the British, the forces at Kenhardt decided to surrender due to a decision made by a Boer war council in Upington on 20th March to disband the rebel force. By the end of March the 6 week uprising of the Cape Afrikaners in the region had ended. On 31st March the British reoccupied Kenhardt, stationing a small garrison in the town. After a failed Boer uprising in the North Western Cape, many rebels were detained by the British and, with the jail in Upington totally full by April 1900, more than 100 rebel Boers where detained in a camp outside Kenhardt. As part of a string of executions across the Cape, two Boer rebels, H.L. Jacobs and A.C. Jooste,

were executed in Kenhardt by the British on 24 July 1901, on accusations of treason. In January 1902 a British force of about 800 men began gathering at Kenhardt. They left on 10 January to quell the Boer force in Kakamas. On 11 January the battle of Kakamas began and ended with a victory for the Boers when the British departed on 13 January (Orton 2014).



Figure 4-2: A monument in Kenhardt, memorializing H.L. Jacobs and A.C. Jooste who were executed in Kenhardt by the British on 24 July 1901, on accusations of treason.

## 5 RESULTS: ARCHAEOLOGICAL SURVEY

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### 5.1 The Off-Site Desktop Survey

Data on the history and archaeology of the surroundings are primarily captured in heritage and archaeological studies associated with environmental impact assessments, the bulk of which are associated renewable energy facilities and particularly solar energy facilities and associated infrastructure. In terms of heritage resources, the region is pointedly well-known for a widespread, but ephemeral scatter of Stone Age stone artefacts across the landscape that is of low heritage value due to its temporally mixed nature and the absence of faunal, organic and other cultural remains. Higher density scatters of stone artefacts are commonly associated with pans, drainage lines and rocky outcrops or ridges. The entire range of the Stone Age sequence including ESA, MSA and LSA materials is represented but MSA and ESA artefacts are more common than materials of LSA origin. Stone artefact scatters are usually located in areas with exposed gravels and decomposing calcretes. In general, archaeological resources seem to be rare in the surroundings of Kenhardt and the pattern of low hominin and human occupation of the surrounding environment is probably due to the lack of water sources.

An analysis of historical aerial imagery and archive maps of the project area reveals the following (see Figure 5-2 to Figure 5-6):

- The farm N'Rougas is indicated on early maps of the Kenhardt area and title deeds for the farm indicate that it was surveyed at the end of the 19<sup>th</sup> century.
- No man-made structures or features are indicated on historical topographic maps of the project footprint areas.
- Aerial imagery dating to 1938 indicate a landscape devoid of man-made structures and features but natural features such as drainage channels are visible throughout.

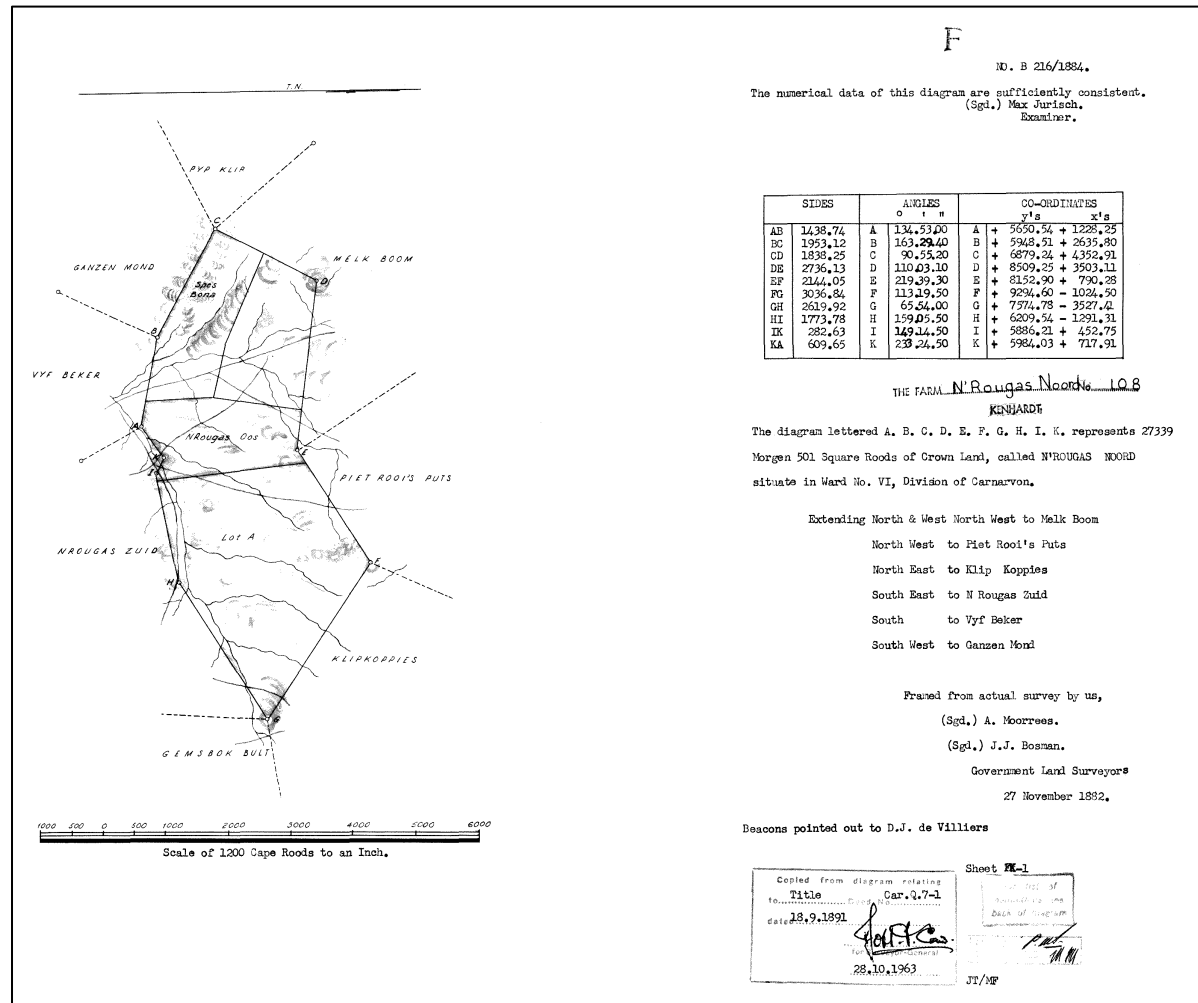


Figure 5-1: Original Title Deed for the farm N'Rougas Zuid dating to 1892.



Figure 5-2: Historical “South African War 1899-1902 Maps, Kenhardt Region” indicating the presence of the project property.

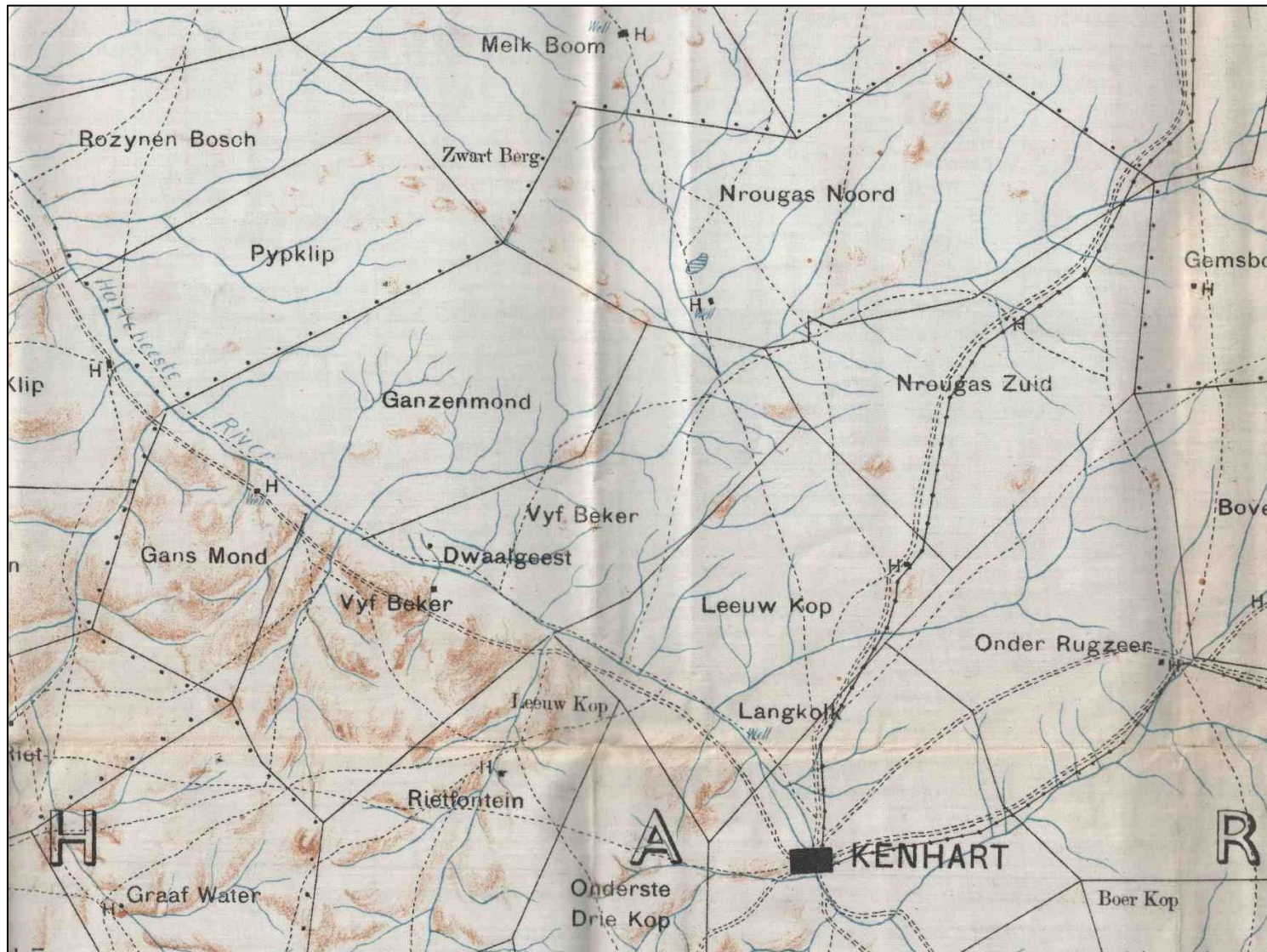


Figure 5-3: Cape of Good Hope Maps: Kenhardt Region dating to the first part of the 20<sup>th</sup> century.

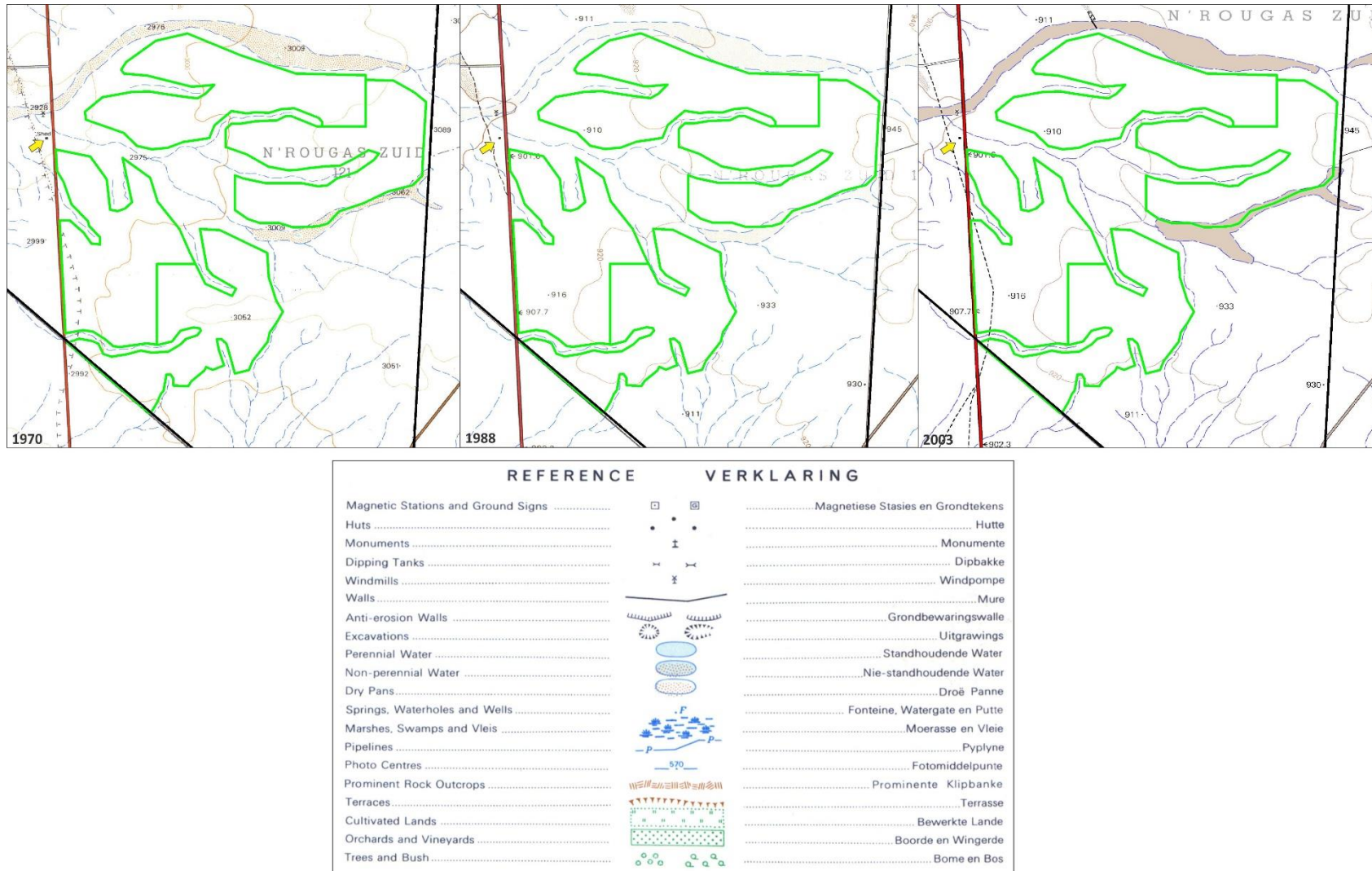


Figure 5-4: Historical topographic maps of the project area indicating the location of the project footprint areas (green outline) in the past decades. Man-made features are indicated by yellow arrows.

## 5.2 The Archaeological Site Survey

The field assessment subject to this study noted that the farm N'Rougas Zuid holds a rich heritage legacy. For example, it was noted that Hunter-Gatherer shelters occurred in a series of hills on the farm and it is said that conflicts related to the Anglo-Boer War occurred around these hills. In addition, a historically significant farmhouse building constructed in 1894 occur on the farm. These occurrences are all situated away from the project footprint areas.



Figure 5-5: The original N'Rougas Zuid Farm House dating to 1894.



Figure 5-6: A Hunter-Gatherer shelter occurring in a series of hills on the farm N'Rougas Zuid.



Figure 5-7: An informal graveyard near the farmstead on N'Rougas Zuid.

### 5.2.1 Stone Age Localities

Stone Age remains occur abundantly in the Bushmanland landscape where locally available raw material for the manufacture of stone tools is available in the geological setting. Within the project development areas ESA, wide-spread MSA and single LSA localities were encountered. In all instances, the density of the material scatters was 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).

Waypoint	Latitude	Longitude	Description	Significance	Field Rating
WPT01	-29.15975357	21.1947728	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT02	-29.15230307	21.18112723	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT03	-29.15013308	21.1798236	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT04	-29.15155264	21.17361177	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT05	-29.15590653	21.17398082	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT06	-29.15569975	21.16899652	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT07	-29.16052965	21.19425748	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT08	-29.15891337	21.19701211	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT09	-29.16455347	21.20114288	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT10	-29.16744975	21.19498931	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT11	-29.16497198	21.18452325	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
WPT12	-29.17577642	21.18431403	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance



<b>WPT13</b>	-29.18235957	21.18161037	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT14</b>	-29.1741935	21.175233	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT15</b>	-29.16650478	21.16657323	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	2a. Low Significance
<b>WPT16</b>	-29.16670385	21.16474715	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	2a. Low Significance
<b>WPT17</b>	-29.16799634	21.16747035	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	2a. Low Significance
<b>WPT18</b>	-29.17058031	21.16966657	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT19</b>	-29.17830541	21.17461131	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT20</b>	-29.17927612	21.17456596	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	2a. Low Significance
<b>WPT21</b>	-29.18594317	21.17898867	Quartz outcrop, largely reduced to relatively small pieces on the surface, with a large number of flakes around it.	Low-medium	2a. Low Significance
<b>WPT22</b>	-29.18476593	21.1760136	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT23</b>	-29.17745842	21.16865161	Area in an ephemeral watercourse with pale quartzite MSA flakes probably from the same source.	Low-medium	2a. Low Significance
<b>WPT24</b>	-29.18815959	21.17297508	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT25</b>	-29.18707171	21.17107767	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT26</b>	-29.18524554	21.17660142	Moderate density scatter of small to medium-sized quartzite artefacts on the surface.	Low-medium	2a. Low Significance
<b>WPT27</b>	-29.16817898	21.18937938	Area in an ephemeral watercourse with pale quartzite MSA flakes probably from the same source.	Low-medium	2a. Low Significance

Wide-spread scatters of Stone Age artefacts was documented across the project footprint areas in medium to low densities, often along eroded calcrete surfaces and around quartzite outcrops. Lithics seem weathered and observations remain equivocal but most of the artefacts can probably be attributed to the MSA. The most dominant raw material for manufacture of the blades, scrapers, chunks and cores was pale grey/white quartzite with single banded ironstone lithics also recorded. Single possible Later Stone Age (LSA) microlithic tools were noted. The lithics seem to be largely surface occurrences and mixing of artefacts caused by the erosion of the drainage lines probably compromised the context of artefacts. There were no indicators that would suggest there would be deeply stratified material and no associated organic remains (such as bone or ostrich eggshell) were noted with any of the stone scatters. Webley (2012) noted that scatters of ESA and MSA material in this landscape do not have discrete boundaries and it is not possible to record every artefact as there are “thousands scattered across the Bushmanland” (Beaumont et al 1995). In general, the stone scatters are considered to be of low – medium significance.

Single large implements were recovered outside the project footprint areas which resembled ESA bifaces. These artifacts, made from hornfels, seem weathered and they occur in isolation.



Figure 5-8: View of surfaces covered in fragmented quartzite occurring across much of the project areas.



Figure 5-9: Fragmented quartzite occurrences occurring across much of the project areas.



Figure 5-10: View of quartzite inclusions in decomposing calcrete exposures.



Figure 5-11: View of a quartz outcrop in the project area.



Figure 5-12: MSA and possible ESA lithics on quartzite from the project areas.



Figure 5-13: MSA points on quartzite from the project areas.



Figure 5-14: Weathered and broken MSA blades on quartzite from the project areas.



Figure 5-15: MSA points (left and center) and a possible ESA biface on quartzite from the project areas.



Figure 5-16: MSA chunks and cores on quartzite from the project areas.



Figure 5-17: MSA litchis on quartzite from the project areas.



Figure 5-18: MSA lithics on hornfels and banded ironstone from the project area.



Figure 5-19: ESA lithics on hornfels from areas surrounding the project area on the Farm N'Rougas Zuid.

#### - Discussion: Middle Stone Age Localities on N'Rougas

Previous work conducted in the larger Kenhardt landscape and in the wider region provides a good basis for comparison with observations made in this assessment. Nilsen (2018) conducted work on a portion on the Farm N'Rougas and he also worked extensively elsewhere around Kenhardt. He noted that large scatters of Early Stone Age artefacts that include many large cutting tools occurring in the landscape are of heritage importance but MSA artefacts are widespread and generally of little concern. He noted that occasional Later Stone Age sites along water courses and around pans are known to exist and these are of significance. Gaigher (2013) noted that most studies in the area reported a general scarcity of heritage resources in the surrounding environment and that scatters of Stone Age implements are the most common. Very low-density scatters of Stone Age implements mainly in quartz are considered to be of low significance. Stone artefact scatters of mainly LSA origin and that are associated with pans (water sources) are of medium significance. In addition, van Ryneveld (2007) indicated that very low densities of MSA artefacts identified at quartz outcrops, flake and blade technology suggests MSA age and the dominant artefact type are irregular scrapers. She noted that, due to their very low densities, these finds are considered to be of low significance and it was recommended that they can be disturbed without a permit from SAHRA. Finally, Webley & Halkett (2012) conducted an HIA for the proposed Kenhardt PV Solar Power Plant and they noted archaeological sites in the form of stone artefact scatters from the ESA and MSA are present in the landscape. Here, artefact scatters were widespread rather than discrete, occurring on extensive gravel pavements between scrub vegetation. It was indicated that the absence of associated organic material, the lack of discrete individual sites and the fact that thousands of square kilometers of Bushmanland are covered by these low density artefacts scatters reduced the significance of the material overall. It was recommended that mitigation of the material was considered unnecessary in view of collection of artefacts which has already been made during other assessments (for example Beaumont et al from the Farm Olyven Kolk and Lombard at Klein Zwart Bast 188). Finally, it was noted that a permit will be needed for the destruction of archaeological material.

From the above, a pattern emerges showing that archaeological resources are most commonly clustered around existing and ancient drainage lines, pans, and ridges with rocky outcrops, and that heritage resources are generally absent from flatlands that are some distance from existing or ancient water sources. The footprint areas for the New Hope 1, 2, 3, 4 Solar Parks project have been designed around ecologically sensitive drainage lines and pans, mostly over sandy surface sediments. This implies that areas of potential high heritage sensitivity have likely been avoided. Findings from studies noted above support an inference that Stone Age localities occurring within the footprints are regarded as low-medium significance. Even though it is almost certain that additional Stone Age materials will occur in affected areas, these will probably be of lesser importance.

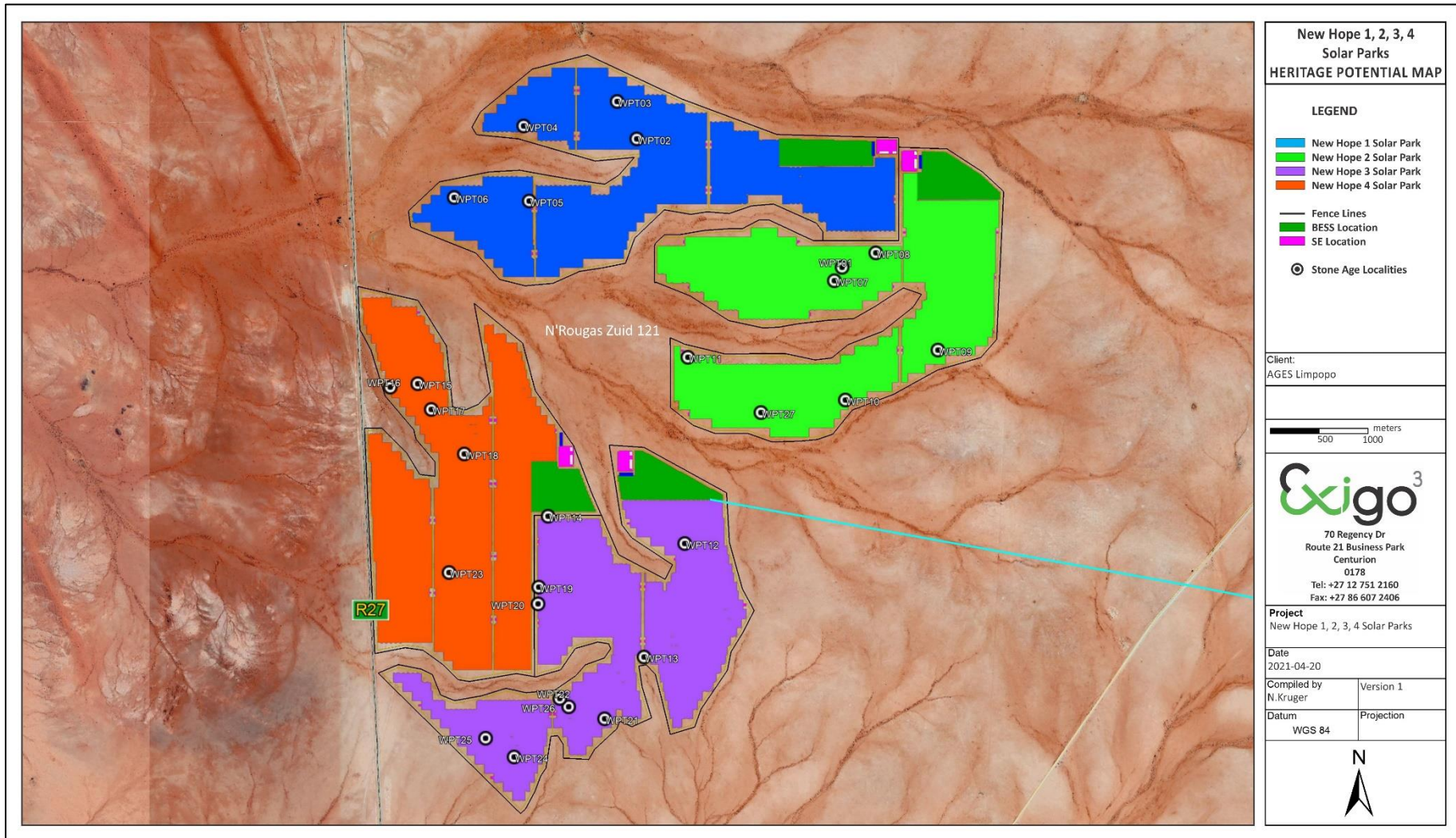


Figure 5-20: Aerial image indicating the locations of heritage occurrences and landscape features discussed in the text

## 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 Addendum 3.

#### 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, of 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). The significances of the impacts were determined through a synthesis of the criteria below:

<b>Probability:</b> This describes the likelihood of the impact actually occurring.	
Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.
<b>Duration:</b> The lifetime of the impact	
Short term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term:	The impact will last up to the end of the phases, where after it will be negated.
Long term:	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
<b>Scale:</b> The physical and spatial size of the impact	

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



Local:	The impacted area extends only as far as the activity, e.g. footprint
Site:	The impact could affect the whole, or a measurable portion of the above mentioned properties.
Regional:	The impact could affect the area including the neighbouring residential areas.
<b>Magnitude/ Severity:</b> Does the impact destroy the environment, or alter its function.	
Low:	The impact alters the affected environment in such a way that natural processes are not affected.
Medium:	The affected environment is altered, but functions and processes continue in a modified way.
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
<b>Significance:</b> This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	
Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate:	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
High:	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights were assigned to each attribute:

Aspect	Description	Weight
<b>Probability</b>	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
<b>Duration</b>	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
<b>Scale</b>	Local	1
	Site	2
	Regional	3
<b>Magnitude/Severity</b>	Low	2
	Medium	6
	High	8
<b>Significance</b>	<b>Sum (Duration, Scale, Magnitude) x Probability</b>	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity is rated without mitigation measures and with mitigation measures for both construction and operational phases of the development.

The following table summarizes impacts to heritage sites and receptors in the proposed New Hope 1, 2, 3, 4 Solar Parks area:

Nr	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance		Mitigation Measures	Mitigation Effect	Residual Impact
				Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude			
Heritage Impact Assessment																
Planning Phase																
1	Stone Age Occurrences	WOM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible	Apply for excavation / destruction permitting.	N/A	No
		WM	Negative	Improbable	1	Short term	1	Local	1	Low	2	4	Negligible			
Construction Phase																
2	Stone Age Occurrences	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	6	70	Low	Apply for excavation / destruction permitting.	Can be avoided, managed or mitigated	Yes
		WM	Positive	Probable	2	Short term	4	Site	2	Low	6	10	Negligible			
Operational Phase																
3	Stone Age Occurrences	WOM	Negative	Highly Probable	4	Permanent	5	Site	2	Low	2	36	Low	No mitigation. General site monitoring by informed ECO.	Can be avoided, managed or mitigated	No
		WM	Negative	Probable	2	Long term	4	Site	2	Low	2	16	Negligible			
Decommissioning and Rehabilitation Phase																
4	Stone Age Occurrences	WOM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	No mitigation. General site monitoring by informed ECO.	N/A	No
		WM	Negative	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible			

## 6.2 Evaluation of Significance and Impact

In general, archaeological resources seem to be relatively rare in the surroundings of Kenhardt and the pattern of low hominin and human occupation of the surrounding environment is probably due to the lack of water sources. The project landscape holds the entire range of the Stone Age sequence including ESA, MSA and LSA materials is represented but MSA and ESA artefacts are more common than materials of LSA origin. In addition, the landscape includes a Colonial frontier including signs of historical farming and battlegrounds.

### 6.2.1 Archaeology

Stone Age lithic occurrences occur widely across the project area and the general landscape. The general absence of associated organic material, the lack of discrete individual sites and the fact that thousands of square kilometers of Bushmanland are covered by these artefacts scatters support an inference that Stone Age localities occurring within the footprints are regarded as low-medium significance. The potential impact on the resource is considered to be LOW but this impact rating can be limited to a NEGLIBLE impact by the implementation of mitigation measures (site monitoring) for the sites, if / when required.

### 6.2.2 Built Environment

The study has not identified any buildings or structures which will be impacted by the proposed solar park. This is confirmed by an examination of aerial photographs of the area. No impact on built environment sites is therefore anticipated.

### 6.2.3 Cultural Landscape

The landscape along the Orange River has been transformed by intensive agriculture. Further away from the River, the landscape is typical of the Green Kalahari, with large areas of level veld under short grass, and occasional red vegetated Aeolian dunes. This landscape stretches over many hundreds of kilometres and the proposed Solar Park is unlikely to result in a significant impact on the landscape.

### 6.2.4 Graves / Human Burials Sites

No human burial sites were located within the project area and no impact on such resources are anticipated. In the rural areas of the Northern Cape Province, graves and cemeteries often occur around farmsteads in family burial grounds but they are also randomly scattered around archaeological and historical settlements. The probability of informal human burials encountered during development should thus not be excluded. In addition, 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). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA). Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met

### 6.3 Management actions

Recommendations for relevant heritage resource management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of Addendum 3.

**OBJECTIVE:** ensure conservation of heritage resources of significance, prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

*For the Stone Age localities of low-medium heritage significance within the project area the following are required in terms of heritage management and mitigation:*

<b>PROJECT COMPONENT/S</b>	Pre-construction, all phases of construction and operation.		
<b>POTENTIAL IMPACT</b>	Damage/destruction of sites / artefacts.		
<b>ACTIVITY RISK/SOURCE</b>	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
<b>MITIGATION: TARGET/OBJECTIVE</b>	To conserve the historical fabric of the sites and to locate 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>	
<b>Primary Mitigation Procedure</b>			
<b>Permitting Requirements:</b> Application for a permit from the relevant heritage authorities prior to destruction of the heritage resources.	HERITAGE ASSESSMENT PRACTITIONER	Site mitigation should be concluded prior to development site impacts.	
<b>Secondary Mitigation Procedure</b>			
<b>Site Monitoring:</b> Regular examination of trenches and excavations.	HERITAGE ASSESSMENT PRACTITIONER ECO	Prior to the commencement of construction and earth-moving.	
<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

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In terms of heritage probability, archaeological resources seem to be relatively rare in the surroundings of Kenhardt and the pattern of low hominin and human occupation of the surrounding environment is probably due to the lack of water sources. The project landscape holds the entire range of the Stone Age sequence including ESA, MSA and LSA materials is represented but MSA and ESA artefacts are more common than materials of LSA origin. In addition, the landscape includes a Colonial frontier including signs of historical farming and battlegrounds. Cognisant thereof, the following recommendations are made based on general observations in the proposed New Hope 1, 2, 3, 4 Solar Parks area:

- Wide-spread scatters of Stone Age artefacts was documented across the project footprint areas in medium to low densities, often along eroded calcrete surfaces and around quartzite outcrops. Most of the artefacts are probably Middle Stone Age (MSA) lithics such as blades, scrapers, chunks and cores produced on quartzite. Single possible Later Stone Age (LSA) microlithic tools were noted. Similar MSA occurrences were noted at various localities around Kenhardt during other HIA projects and the bulk of these studies indicate limited archaeological value of MSA scatters due to the absence of associated organic material, the lack of discrete individual sites as well as the fact that thousands of square kilometers of Bushmanland are covered by these artefacts scatters. In addition, these studies point to a pattern where sensitive Stone Age localities are commonly clustered around existing and ancient drainage lines, pans, and ridges with rocky outcrops in this landscape. The footprint areas for the New Hope 1, 2, 3, 4 Solar Parks project have been designed around ecologically drainage lines and pans, mostly over sandy surface sediments and this implies that areas of potential high heritage sensitivity have potentially been avoided. MSA localities occurring within the footprints are regarded as low-medium significance and, even though it is almost certain that additional Stone Age materials will occur in affected areas, these will probably be of similar provenance and of lesser importance. It is recommended that application should be made for a permit prior to the destruction of archaeological material. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any 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.
- It should be stated that it is likely that further undetected archaeological remains might occur elsewhere in the project landscape at archeological sites, 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 development.

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 occur in the larger landscape, such resources 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 New Hope 1, 2, 3, 4 Solar Parks 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 sites 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: HERITAGE LEGISLATION BACKGROUND

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### 10.1 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.

#### 10.1.1 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.

##### d. 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-*

- (d) *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (e) *destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*

- (f) *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*
- (g) *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-*

- (h) *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;*
- (i) *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;*
- (j) *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)."*

**e. 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.

**10.1.2 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:

- (k) The identification and mapping of all heritage resources in the area affected;
- (l) 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;
- (m) an assessment of the impact of the development on such heritage resources;
- (n) 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;
- (o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- (p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- (q) 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.

## 10.2 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 (MP-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 60 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, auguring), 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.

**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

**10.3 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. site-specific, 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.

#### 10.4 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

TYPE OF DEVELOPMENT				
HERITAGE CONTEXT	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
<b>NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.</b>				
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 1000m<sup>2</sup>.</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 1000m<sup>2</sup>-2000m<sup>2</sup></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 5000m<sup>2</sup>-10 000m<sup>2</sup>.</li> <li>- Linear development between 100m and 300m.</li> <li>- Building footprints between 2000m<sup>2</sup> and 5000m<sup>2</sup></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 000m<sup>2</sup></li> <li>- Linear development in excess of 300m.</li> <li>- Any development changing the character of a site exceeding 5000m<sup>2</sup> 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>		

### 10.5 Management and Mitigation Actions

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

No further action / Monitoring
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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.

**Avoidance**

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.

**Mitigation**

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.

**Compensation**

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.

**Rehabilitation**

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:

- The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
- Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
- Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource.

**Enhancement**