

HERITAGE IMPACT ASSESSMENT REPORT FOR
THE TAAIBOS NORTH WIND ENERGY FACILITY
(WEF) PROJECT, PIXLEY KA SEME DISTRICT
MUNICIPALITY, NORTHERN CAPE PROVINCE



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

**Heritage Impact Assessment Report for the Taaibos North Wind
Energy Facility (WEF) Project, Pixley ka Seme District Municipality,
Northern Cape Province**

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DECLARATION

I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Taaibos North Wind Energy Facility (WEF) Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA, AMAFA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

Signature of specialist

Company: Exigo Sustainability

Date: 17 January 2022

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CES promotes the conservation of sensitive archaeological and heritage resources and therefore uncompromisingly adheres to relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980). In order to ensure best practices and ethics in the examination, conservation and mitigation of archaeological and heritage resources, CES follows the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment as set out by the South African Heritage Resources Agency (SAHRA) and the CRM section of the Association for South African Professional Archaeologists (ASAPA).



This Archaeological Impact Assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the NEMA Table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page 3, Section 2 and Addendum 1 of Report.	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 and Addendum 1 of Report.	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page iii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 2: Introduction and Terms of Reference, Section 3: Description of the Project Activity	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 7: The Heritage Baseline Environment	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9: Expected Heritage Impacts of the Project	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 6: Methodology	-
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 6: Methodology	-
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 9: Expected Heritage Impacts of the Project	-
(g) An identification of any areas to be avoided, including buffers	Section 8: Findings and Results	-
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 8: Findings and Results	-
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 6.2: Assumptions and Limitations	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 9: Statement of Significance and Impact Rating	
(k) Any mitigation measures for inclusion in the EMPr	Section 10: Heritage Management Section 11: Conclusion and Recommendations	
(l) Any conditions for inclusion in the environmental authorisation	N/A	None required
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10: Heritage Management Section 11: Conclusion and Recommendations	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & Section 9	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10: Heritage Management Section 11: Conclusion and Recommendations	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process will be conducted as part of the EIA and EMPr process.
(p) A summary and copies if any comments that were received during any consultation process	N/A	Not applicable.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 4: CRM: Legislation, Conservation and Heritage Management	



1 EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the proposed Taaibos North Wind Energy Facility (WEF) Project in the Pixley ka Seme District Municipality of the Northern Cape Province. The proposed project entails the establishment of a WEF within the project area of approximately 10 000ha. 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	Taaibos North Wind Energy Facility (WEF) Project
Project Location	S31.56222° E22.55372°
1:50 000 Map Sheet	3122BC, 3122BCB, 3122DA
Magisterial District / Municipal Area	Pixley ka Seme District Municipality
Province	Northern Cape Province

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. 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.

Data on the history and archaeology of the surroundings of Victoria West is 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. An appraisal of previous AIA's and HIAs, published literature coupled with a detailed analysis of historical aerial imagery, archive maps and topographical maps of the project area was conducted in order to inform on the final layout for the Taaibos North WEF project during the **Scoping Phase**, based on potential heritage sensitivities. An archaeological site assessment was then conducted to identify heritage receptors on-site and the following observations are made for the proposed Taaibos North Wind Energy Facility (WEF) Project in terms of heritage resources management.

- Stone Age remains occur abundantly in the project landscape where locally available raw material for the manufacture of stone tools is available in the geological setting. 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. Stone artefact scatters are usually located in areas with fluvial gravels along drainage lines, pans and within decomposing calcretes, rocky outcrops or ridges. Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. The widespread but ephemeral scatters are often of low heritage value due to temporally mixed contexts and the frequent absence of faunal, organic and other cultural remains which is scattered over thousands of square kilometres of



the Karoo. The Stone Age localities are not conservation-worthy and even though the resources may be destroyed during construction, the impact is considered to be inconsequential.

- A small rock shelter containing cultural remnants is situated in a low ridge in a northern portion of the project area west of a planned access road (**TBN24**). The site has potential to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance. It is recommended that a 100m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Continuous site monitoring should be done in order to detect potential impact on the site at the earliest opportunity. Should impact on the site prove inevitable, a Phase 2 Assessment inclusive of site documentation, possible sampling and analysis must be conducted during the Preconstruction Phase. The necessary destruction permits from the relevant Heritage Resources Authorities should be obtained prior to site impact and destruction.
- The remains of a stone packed corbel building were documented at the area marked **TBN05** approximately 100m east of turbine position T38. The site has potential to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance. It is recommended that a 100m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Continuous site monitoring should be done in order to detect potential impact on the site at the earliest opportunity. Should impact on the site prove inevitable, a Phase 2 Assessment inclusive of site documentation, possible sampling and analysis must be conducted during the Preconstruction Phase. The necessary destruction permits from the relevant Heritage Resources Authorities should be obtained prior to site impact and destruction.
- A small graveyard holding 3 graves occurs along the regional access road bisecting the project area (**TBN21**) near the Spes Bona Farmstead. The burial site, which is of high heritage significance, occurs in close proximity of project development areas and it is recommended that a 50m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Frequent and continuous site monitoring should be done during all stages of the project in order to detect potential impact on the site at the earliest opportunity.
- Information on the layout of civil services such as access roads were made available to specialists at an advanced stage of this assessment and not all of these proposed access road alignments could be included in site investigations. It is recommended that a suitably qualified archaeologist be appointed during the Construction Phase to monitor vegetation clearing and excavation activities for the possible occurrence of archaeological material remains and features in these areas.
- 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 is the opinion of the Specialist that the proposed Taaibos North Wind Energy Facility (WEF) and its associated power line connection will have a low negative cumulative impact on the heritage value of the area for the following reasons:

- The low frequency of significant archaeological resources documented in the project area and in its immediate surroundings implies low-severity short and long-term impacts on the heritage landscape.
- The significance of the landscape in terms of its heritage is bound not to change during the course of construction, operation and decommissioning of the project.



- It should be noted that archaeological knowledge and the initiation of research projects into significant archaeological sites often result from Heritage Impact Assessments conducted for developments. Provided that significant archaeological sites are conserved and that appropriate heritage mitigation and management procedures are followed, the cumulative impact of development can be positive.

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).



NOTATIONS AND TERMS/TERMINOLOGY

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.

Collective Memory: The shared pool of information (stories, artefacts, symbols, traditions, images) held in the memories of two or more members of a group. As for individual memory, it is construed over time through the interpretation of past events (in the present case, interpreted by the group members). By the virtue of being shared among the group members, it creates a social group identity in the sense that it forms the ties that bind group members together.

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.

Intangible cultural heritage: UNESCO defines "intangible cultural heritage" as the practices, representations, expressions, knowledge and skills recognized by communities, groups and individuals as part of their cultural heritage. It is transmitted from generation to generation inconstant recreation, providing the communities with a sense of identity (Article 2).

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.

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.



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



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2 INTRODUCTION AND TERMS OF REFERENCE

CES was contracted to conduct an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the proposed Taaibos North Wind Energy Facility (WEF) 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.

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. 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)**. In addition, 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.
- 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.

As archaeologist for CES, Mr Neels Kruger acted as field director and specialist for this project. He was 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). Please refer to Addendum 1 for a Specialist CV.



3 DESCRIPTION OF THE ACTIVITY

3.1 PROJECT DESCRIPTION

WKN-Windcurrent SA (Pty) Ltd. plans to develop, construct and operate a Wind Energy Facility (WEF) approximately 20km southeast of Loxton in the Northern Cape Province. The project site is situated in the Ubuntu Local Municipality (LM) which forms part of the Pixley ka Seme District Municipality (DM). The proposed Taaibos North Wind Energy Facility (WEF) will consist of up to 40 turbines, with a total facility output of up to 270MW. The WEF will also include a powerline and switching station in order to connect the WEF to the existing Eskom Substation (this will be applied for in a separate environmental application). The WEF will also include a Battery Energy Storage System (BESS), temporary and permanent laydown areas, an IPP Substation (SS), Collector Substation (SS), a Concrete Tower Manufacturing Facility (CTMF), access roads and a construction compound (CC) area. The construction footprint of the proposed WEF will be up to 160ha (inclusive of roads), rehabilitated to an operational footprint of up to 100ha (inclusive of roads). The summary, the proposed Taaibos North WEF will include:

- Up to 40 turbines with a maximum nominal power output of up to 270MW, the proposed WEF will include turbines with a hub height of up to 200m, a rotor diameter of up to 240 m, blade length of up to 120m, and a total tip height of up to 320m;
- Permanent laydown areas adjacent to each wind turbine (up to 3 000 m²) and temporary laydown areas adjacent to each wind turbine (up to 3 000 m²);
- Foundations (up to 900 m²) for each wind turbine;
- IPP Substation (SS) of up to 3ha (inclusive of a 33/132kV SS, offices and parking and a permanent SS laydown area);
- Collector Substation (SS) of up to 10ha;
- Temporary laydown area, CTMF and CC of up to 10ha;
- BESS of up to 10ha (temporary laydown area, CTMF and CC area will be converted to the BESS facility post-construction phase);
- Medium voltage cabling between turbines and the switching stations, to be laid underground where technically feasible; and
- Internal access roads of up 40km constructed at up to 14m wide (construction phase), rehabilitated to 8m wide (operational phase). Existing roads will be used as far as possible. However, where required, internal access roads will be constructed between the turbines.

Technical details for the proposed Taaibos North WEF are provided in the following tables:

WEF DESIGN SPECIFICATIONS	
Number of turbines	Up to 40
Power output per turbine	Unspecified
Facility output	Up to 270 MW
Turbine hub height	Up to 200 m
Turbine rotor diameter	Up to 240 m
Turbine blade length	Up to 120 m
Turbine tip height	Up to 320 m
Turbine road width	14m to be rehabilitated to 8m
BESS Technology	Solid State (Li-Ion) or REDOX-Flow (High level risk assessment for both) – 10 ha / 2700 MWh



FACILITY COMPONENT	CONSTRUCTION FOOTPRINT	FINAL FOOTPRINT AFTER REHABILITATION
Permanent Laydown Area	<u>TOTAL</u> 3000 m ² x 40 turbines = 120 000 m ² which equates to 12.0 ha	<u>TOTAL</u> 3000 m ² x 40 turbines = 120 000 m ² which equates to 12.0 ha
Temporary Laydown Area	<u>TOTAL</u> 3000 m ² x 40 turbines = 120 000 m ² which equates to 12.0 ha	<u>TOTAL</u> 0 m ² x 40 turbines = 0m ² which equates to 0 ha
Turbine Foundation	<u>TOTAL</u> Up to 900m ² x 40 turbines = 36 000 m ² which equates to 3.6 ha	<u>TOTAL</u> Up to 900m ² x 40 turbines = 36 000 m ² which equates to 3.6 ha
WEF Substation	33/132kV Substation – 1.5ha Offices and parking – 0.5ha Permanent Laydown – 1ha	33/132kV Substation – 1.5ha Offices and parking – 0.5ha Permanent Laydown – 1ha
BESS	<u>TOTAL</u> 10ha / 2700MWh	<u>TOTAL</u> 10ha / 2700MWh
Temporary Laydown Area, Concrete Tower Manufacturing Facility and Construction Compound	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.	10 ha clearance includes Temporary laydown Construction compound Concrete batching plant Crusher plant All to become area cleared for BESS (above) afterwards.
Collector Substation	10ha	10ha
New Internal Access Roads (14 m construction, rehabilitated to 8 m during operation)	<u>TOTAL (better estimate coming with civil layout)</u> 40 000 m x 14m = 560 000 m ² which equates to 56.0 ha	<u>TOTAL (better estimate coming with civil layout)</u> 40 000 m x 8m = 320 000 m ² which equates to 32.0 ha
Upgraded Existing Internal Access Roads	<u>TOTAL (better estimate coming with civil layout)</u> 40 000 m x 14m = 560 000 m ² which equates to 56.0 ha	<u>TOTAL (better estimate coming with civil layout)</u> 40 000 m x 8m = 320 000 m ² which equates to 32.0 ha
TOTAL FOOTPRINT:	159.6 ha of clearing needed for the construction phase of the development of the proposed xx WEF	99.6 ha of clearing remaining during the post-construction operational phase (after rehabilitation) of the proposed xx WEF

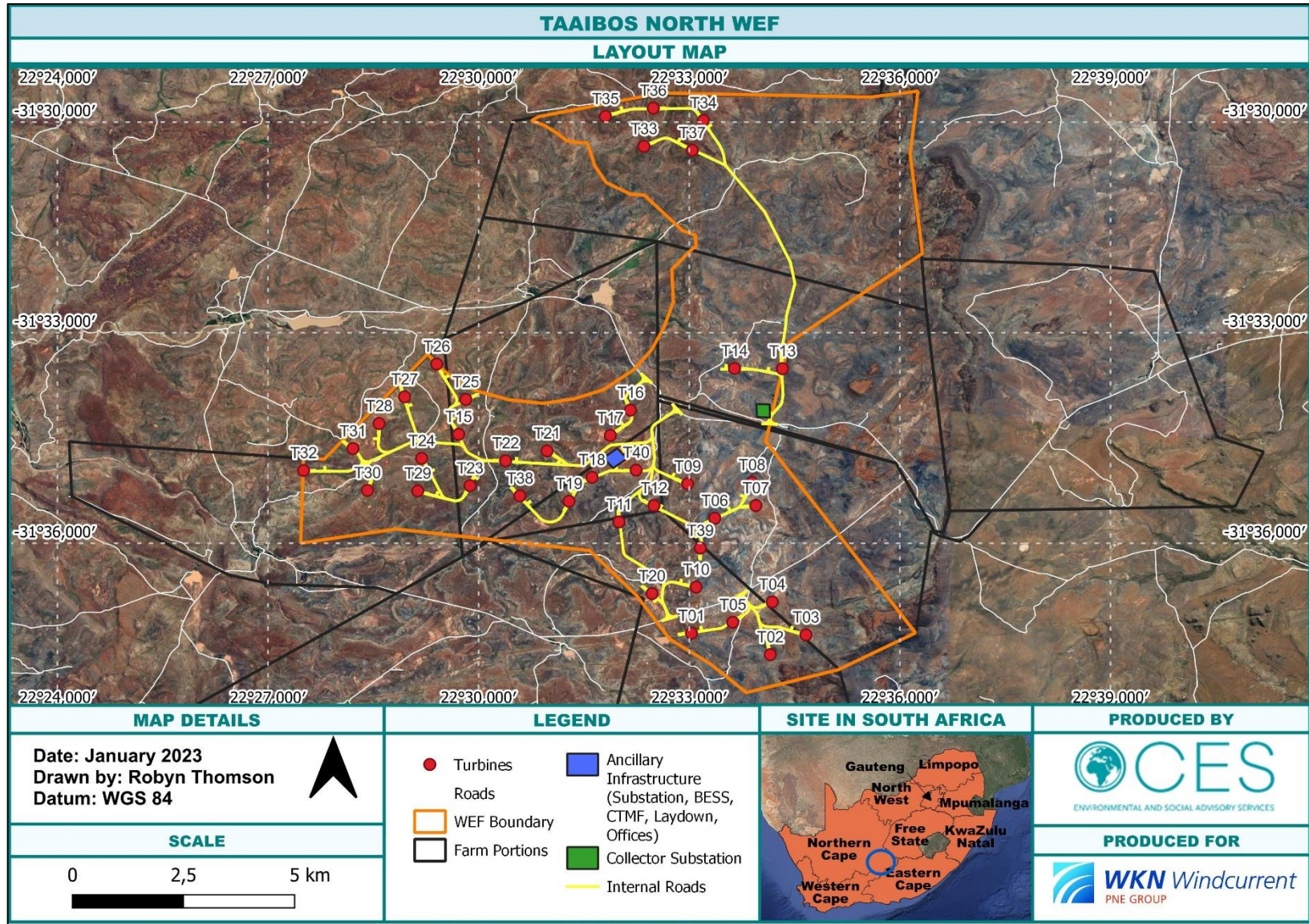


Figure 3-1: Aerial map indicating the proposed development areas subject to the Taaibos North Wind Energy Facility (WEF) Project.



4 LEGAL BASIS OF THE ACTIVITY

4.1 OVERVIEW

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.

4.2 LEGISLATION FOR THE PROTECTION OF 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

4.3 BACKGROUND TO HERITAGE IMPACT ASSESSMENTS

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 2.



5 REGIONAL CONTEXT

5.1 LOCATION

The Taaibos North WEF Project area is located southwest of the town of Victoria West in the Pixley ka Seme District Municipality, Northern Cape Province (see Figure 2-1). The study area appears on 1:50 000 Map Sheet 3122BC, 3122BCB, 3122DA and a key location point of the proposed project area is:

- **Relative Midpoint: S31.56222° E22.55372°**

5.2 RECEIVING ENVIRONMENT

The environment around Victoria West is characterised by flat undulating Karoo vegetation comprised out of relatively sparse scrub and grasses, with dolerite hills in the surrounding landscape. Large portions of the land are currently devoted to livestock farming but a number of solar and wind energy facilities are to be constructed on farms around Victoria West. Shallow soils cover a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone are present, while exotic rocks occur in the gravel across the landscape.

5.3 SITE DESCRIPTION

The project area south west of Victoria West is a Karoo landscape currently used for livestock farming. The specific segments of the landscape comprise relatively flat terrain with dolerite hills in the surrounding landscape. Relatively shallow soil veneers a combination of calcrete, Beaufort Group and dolerite substrates, with relatively sparse vegetation of Karoo scrub and grass. Surface archaeological traces are likely to be highly visible in such contexts. They should also give a good indication of what lies below the surface in situations where soil cover is shallow. Topographically, the development footprint is situated on relatively flat terrain with undulating hills and occasional dolerite koppies (dykes) defining the relief of the surrounding landscape. Where dolerite outcrops occur there is a possibility that rock engravings could be found.



Figure 5-1: View of general surroundings in the project area.



Figure 5-2: View of general surroundings in the project area.



Figure 5-3: View of general surroundings in the project area.



Figure 5-4: View of general surroundings in the project area.



Figure 5-5: View of general surroundings in the project area.



Figure 5-6: View of general surroundings in the project area.



Figure 5-7: View of general surroundings in the project area.



Figure 5-8: View of general surroundings in the project area.

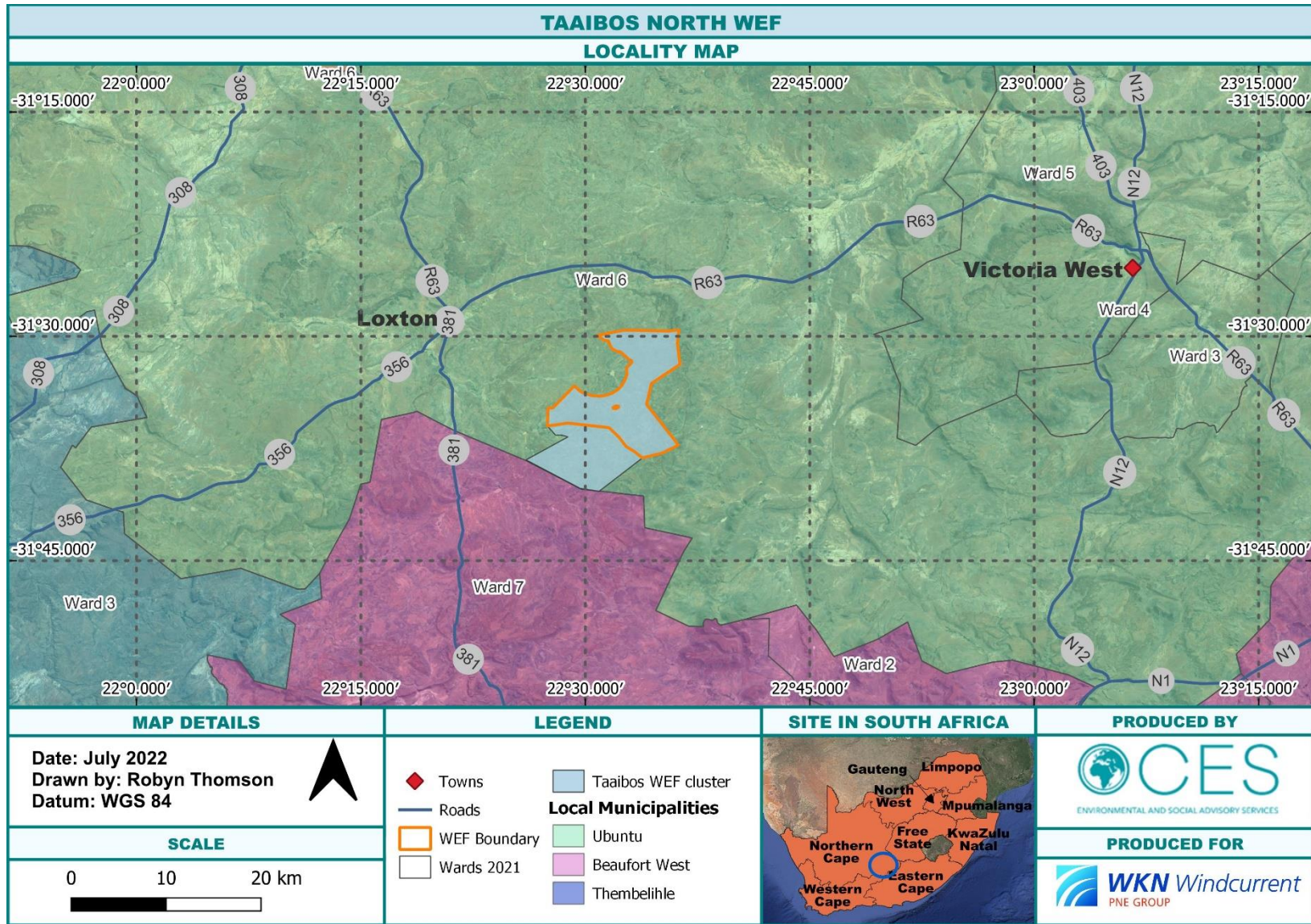


Figure 5-9: 1:50 00 Map representation of the location of the proposed Taaibos North Wind Energy Facility (WEF) Project (sheet 2826BB).

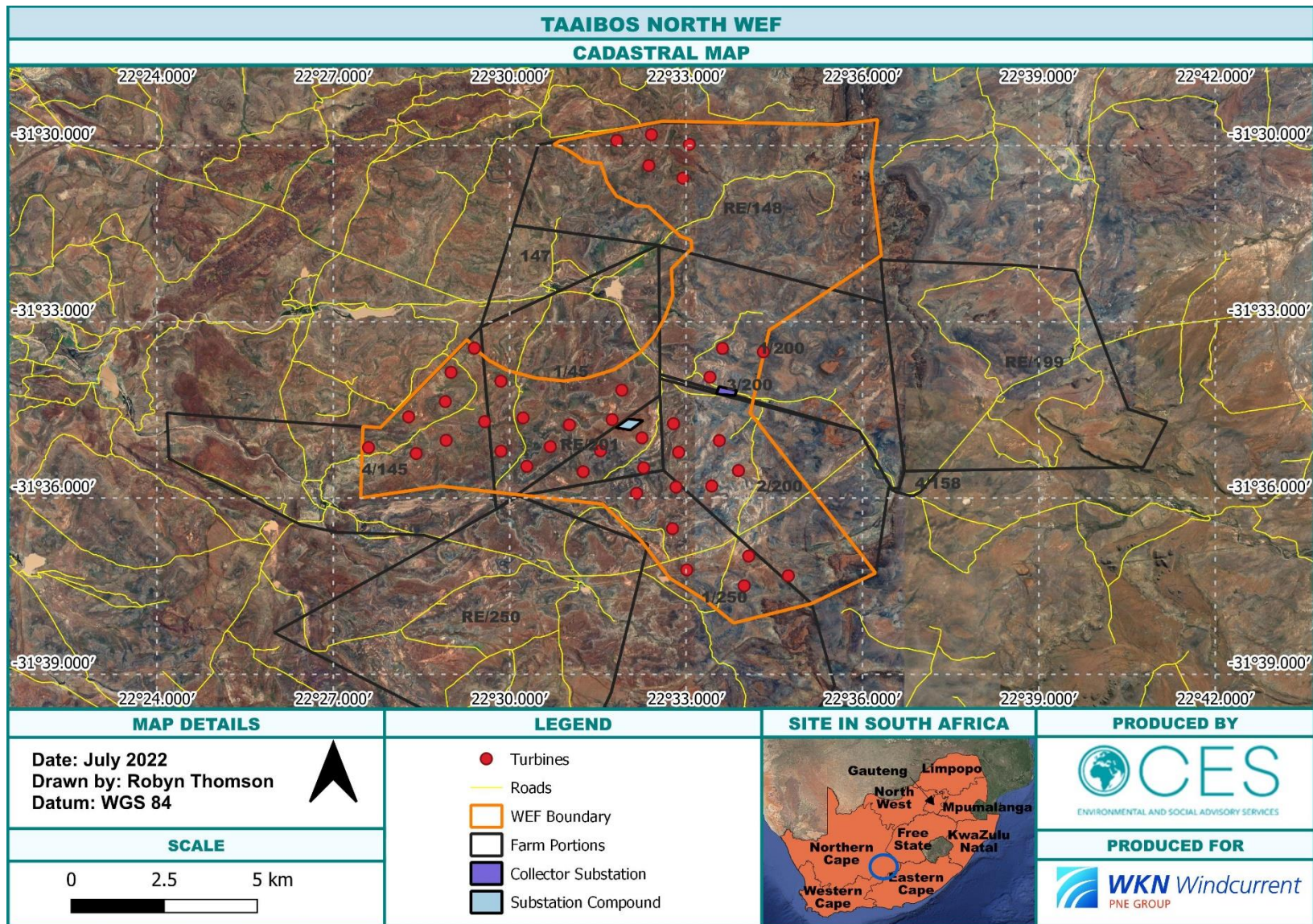


Figure 5-10: Aerial map providing a regional context for the proposed Taabos North Wind Energy Facility (WEF) Project.



6 METHODOLOGY

6.1 SOURCES OF INFORMATION

6.1.1 Desktop Work

The larger landscape of the Northern Cape has been relatively 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 comprehensive representation of known sites in the study area.

6.1.2 Remote Sensing

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. The site assessment for the project relied heavily on this method to assist the challenging 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. Similar to the aerial survey, the site assessment of the project areas relied heavily on archive and more recent map renderings of the landscape to assist the 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 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.

6.1.3 Site Surveys

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the Taaibos North Wind Energy Facility (WEF) Project area was conducted by the specialist and an assistant over a 7-day period in November 2022 and a 2-day period in January 2023. The process encompassed a field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. As the project area is large, particular focus was placed on turbine locations and infrastructure development areas as well as 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 the MapInr mobile application was also employed to investigate possible disturbed areas during the survey.

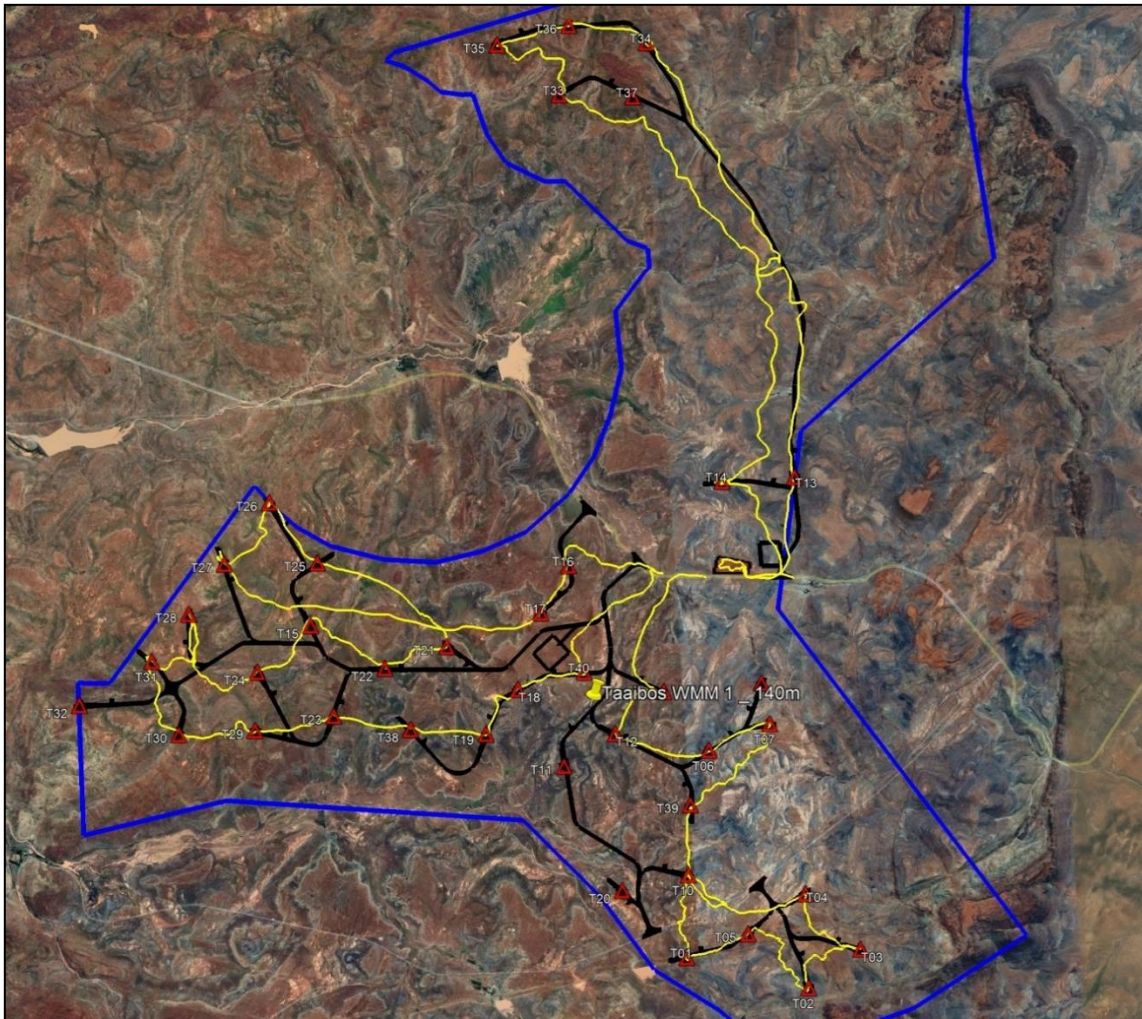


Figure 6-1: Track log (yellow lines) of the site survey. Turbine positions are indicated with red triangles and planned roads are indicated with black lines. The total project area is indicated by the blue polygon.

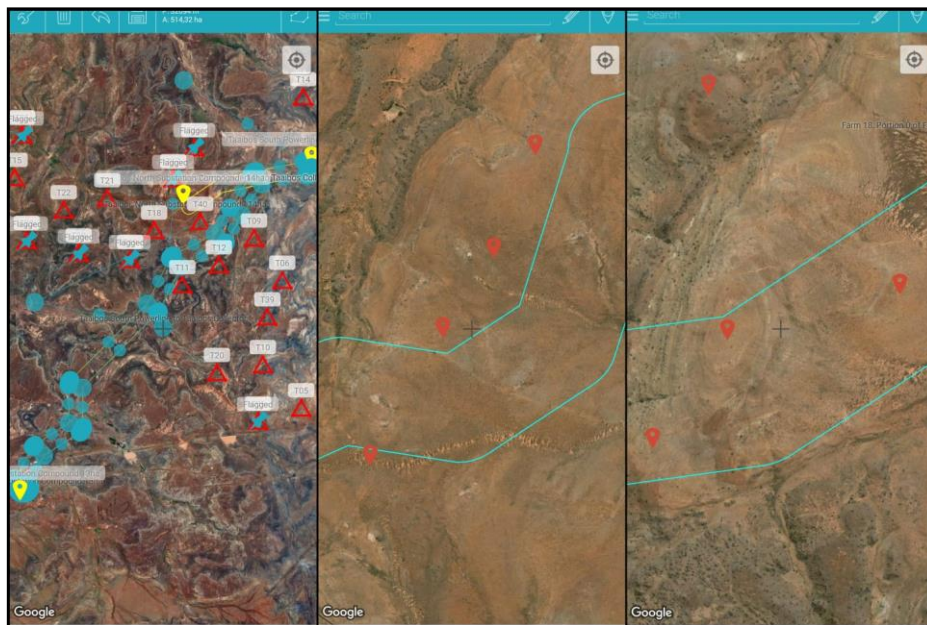


Figure 6-2: Screen captures of real time aerial orientation by means of the MapInr mobile application taken during the site surveys.



6.2 ASSUMPTIONS AND LIMITATIONS

The site survey for the Taaibos North Wind Energy Facility (WEF) Project AIA proved to be constrained and the investigation primarily focused around development areas and areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the mapping and aerial survey) as well as areas of potential high human settlement catchment. In summary, the following constraints were encountered during the site survey:

- The surrounding vegetation in the project area mostly comprised out of grassland, disused farmlands vegetated by occasional trees and mixed grasslands. Visibility proved to be a minor constraint in certain portions of the project area.
- Information on the layout of civil services such as access roads were made available to specialists at an advanced stage of this assessment and not all of these proposed development areas could be included in site investigations.
- Cognisant of the constraints noted above, 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.



7 THE HERITAGE BASELINE ENVIRONMENT

7.1 ARCHAEOLOGY AND THE CULTURAL LANDSCAPE

Archaeology in Southern and Central 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.

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 (commonly restricted to the interior and north-east coastal areas of Central and Southern Africa)	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 (commonly restricted to the interior and north-east coastal areas of Southern Africa)	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, traders, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

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.

7.1.1 Early History and Archaeology

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 at 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.

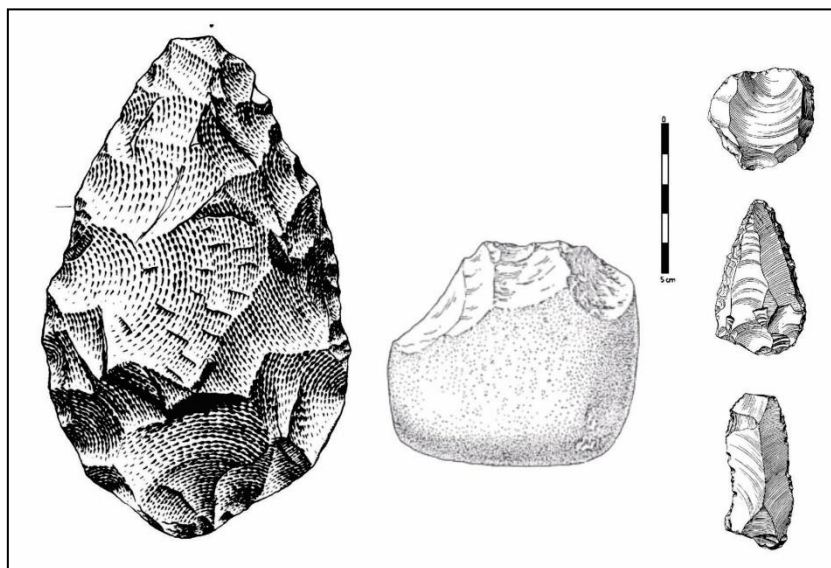


Figure 7-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).



The archaeology of the Northern Cape is rich and varied covering long spans of human history. Some areas are richer than others, and not all areas are equally significant. According to Humphreys (1987:117), 'the amount of archaeological research that has been undertaken in the Karoo is in no way proportional to its importance in terms of area in South Africa'. While it is true to say that this part of the Karoo has probably been relatively marginal to human settlement for most of its history, it is in fact exceptionally rich in terms of Stone Age and rock art (Beaumont & Morris 1990; Morris and Beaumont 2004). Archaeologists from the McGregor Museum in Kimberley have focussed much of their attention on the Upper Karoo region and the northern periphery of the Karoo, where most of their academic research has been done. A few Archaeological Impact Assessments have been undertaken (as part of the EIA process) in Victoria West and De Aar (Morris 2000, 2004, 2006, 2007, 2010, 2012, 2019), where these have been required.

Contrary to its arid appearance, the Karoo had a relatively high carrying capacity and teemed with game long before European Colonization. Hunter gatherers (mainly San) successfully occupied the central interior of South Africa during the last 4500 years, subsisting on the large herds of grazing animals that occurred during that time (Sampson 1985; Sampson et al 1989). Late Stone Age archaeological sites dating to the late Holocene (within the last 4000 years) are surprisingly common. Although the Karoo is presently more suited to the keeping of small stock such as sheep and goats, research in the Eastern Karoo has revealed that, at about 1200 – 1400 AD, a climatic fluctuation (known as the Little Ice-Age) may well have caused an increased rainfall in the central Karoo resulting in the area being more suitable for grazing of cattle and occupation by Khoekhoen pastoralist groups. They left behind an archaeological legacy that consists of stone kraal complexes of which several hundred have been recorded in the Zeekoe Valley in the eastern Karoo and the Riet River area in the Northern Cape (Hart 1989). The indigenous people of Karoo waged a bitter war against colonial expansion as they gradually lost control of their traditional land. With the implementation of the commando system in the late 18th and early 19th centuries, the Karoo "Bushmen" were eventually destroyed or indentured into farm labour (Hart 1989).

Remnants of Stone Age archaeology in this landscape are mainly MSA and LSA tools. These tool scatters are often found spread very thinly and unevenly on the surface. MSA tools comprise mainly thick chunky flakes, chunks, flaked chunks, blade tools and a few retouched flakes mostly on weathered hornfels/lydianite. LSA lithics often comprise mostly unmodified, utilized and retouched flakes, chunks and cores on un-weathered hornfels. Formal tools such as scrapers, points and adzes are found in these contexts. In certain instances, the stone tools occur in association with organic remains or other cultural remains such as pottery or ostrich eggshell or even portable art. Rock art in the form of engravings on large boulders – often dolerite – as well as stone "gongs" are often found in these areas on rock outcrops and koppies. For example, Kaplan (2010) located several rock engravings on the Swartkoppies Mountains near Britstown northeast of the project areas where imagery of eland and ostriches were pecked on dolerite boulders. Some 2 000 years ago Khoekhoen pastoralists entered into the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goat and cattle) and ceramic vessels to southern Africa. Often, these archaeological sites are found close to the banks of large streams and rivers. Large piles of freshwater mussel shell (called middens) usually mark these sites. Precolonial groups collected the freshwater mussel from the muddy banks of the rivers as a source of food. Mixed with the shell and other riverine and terrestrial food waste are also cultural materials. Human remains are often found buried in the middens (Deacon and Deacon 1999).

Depending on the range, extent and integrity of site and artefact contexts, the significance of archaeological remains ranges from low to high on a regional level.



7.1.2 The Cultural Landscape

The first "Trekboers" moved through the landscape during the early 19th century but it was only in 1843 that Victoria West was laid out on the bank of the Brakrivier watercourse when the Dutch Reformed Church bought the farm Zeekoegat from the estate of J.H. Classens. In 1859 the town acquired municipal status and it became an important staging point along the Diamond Way linking Cape Town with the diamond fields in Kimberley and later the gold fields along the Witwatersrand. In addition, the region became well known for sheep farming and the landscape was divided into farms towards the end of the 1800's. As a result, important historical remnant in this area are farmsteads and associated features. Farmsteads are complex features in the landscape made up of different yet interconnected elements. Typically, these farmsteads consist of a main house, gardens, outbuildings, sheds and barns, with some distance from that labourer housing and family cemeteries. Farm buildings are generally single storied but town houses often reached two floors. Walls are thick and built with stone and the ridged roof, thatched or tiled, are terminated at either end by simple linear parapet gables. In some instances, outbuildings would be in the same style as the main house, if they date to the same period. Roads and tracks, stock pens and wind mills occur on farms across the project landscape.

Farms also hold the remains of "veewagtershuise" or shepherd's huts, typically single roomed buildings constructed out of undressed sandstone blocks. The huts occur in the veld where they served as temporary shelter for livestock shepherds. Material culture such as glass, metal fragments and fragments of ceramics and earthenware are often found at these sites. Infrastructure and industrial heritage such as roads, bridges, railway lines, electricity lines and telephone lines are also feature in this landscape. In addition, infrastructure associated with the Anglo Boer War (fortifications, block houses – e.g. at Merriman, the remains of field hospitals, burial sites) occur around Victoria West. Historical / Colonial Period remnants are generally viewed to have a medium to high significance on a regional level. Currently the landscape is still occupied by European farmers, however, the area has changed hands from the original settlers taking away the generational heritage of the "family farm", however, creating a new culture of farmers continuing the historical use of landscape. The landscape is currently being used for agricultural and domestic grazing purposes accentuated by the easy access to water and irrigation. The railway adds to the use of landscape, historically, as the mainline between Cradock and De Aar.

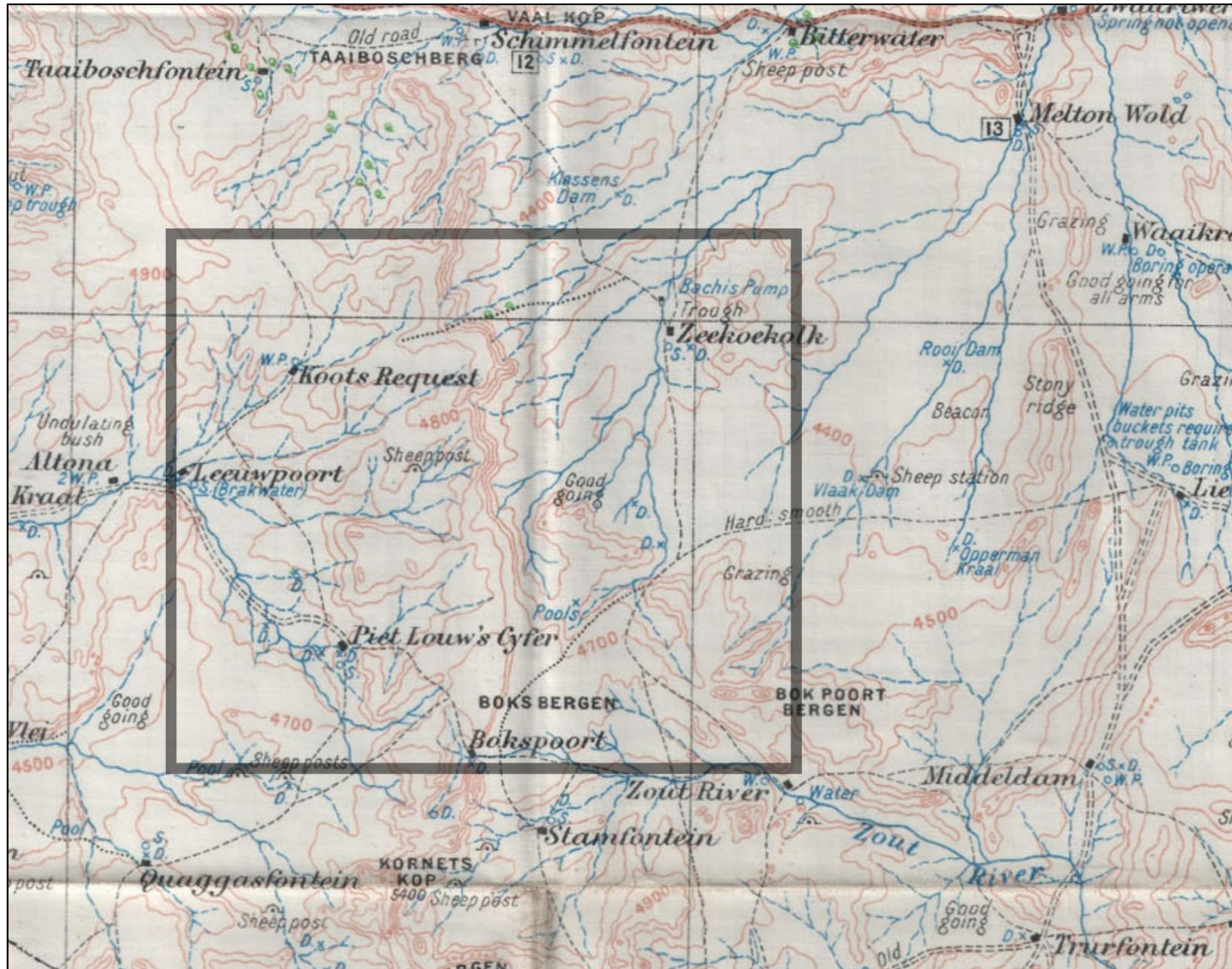


Figure 7-2: Map of the Cape of Good Hope, Loxton Region dating to 1913. The project area is indicated by the grey block.



8 FINDINGS AND RESULTS

8.1 ARCHAEOLOGY AND THE CULTURAL LANDSCAPE

8.1.1 Desktop Appraisal: Potential Heritage Sensitivities

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. An appraisal of previous AIA's and HIAs, published literature coupled with a detailed analysis of historical aerial imagery, archive maps and topographical maps of the project area was conducted in order to inform on the final layout for the Taaibos North WEF project during the Scoping Phase. As such, the following observations on the heritage potential of the project area were made on Scoping Level based on desktop observations (refer to Figure 8-2) :

Archaeology:

- In the project area, shallow soils cover a combination of calcrete, shale and dolerite substrates, and large sections in the landscape are exposed to sheet erosion, specifically along low lying areas and drainage lines. Dolerite and sandstone are present, while exotic rocks occur in the gravel of the Orange River bed and terraces. These provide suitable material for stone tool production during the Earlier, Middle and Later Stone Ages. MSA and LSA tool scatters are known to occur along water courses, pans and dry river beds and such material have been found in the project area. These tools might include formal tools such as blades, scrapers, adzes and points and microliths as well as debitage.
- Mountain crests, small hills and foothills and rock outcrops occur in the project area. Occupation sites dating to the Later Stone Age (LSA) associated with Hunter Gatherers and Herders are known to occur in such locales. Here, scatters of stone artefacts such as stone tools, ostrich eggshell, fragments of pottery and beads are common. Crudely built Herder stone wall enclosures might remain in these areas. In addition, Historical Period fortifications in the form of temporary stone barricades and defences are known to occur on low rises around Victoria West.
- MSA and LSA tool scatters are also known to be found near outcrops and geomorphological exposures where source rock was exploited for the manufacturing of stone tools. Large boulders, frequently dolerite occurring throughout the project area, are commonly associated with Hunter Gatherer and Herder rock art in the form of engravings. In addition, stone "gongs" are often found in these areas on koppies and rocky outcrops.
- All archaeological sites and artefacts are protected under the National Heritage Resource Act (NHRA 1999) and, depending on the range, extent and integrity of site and artefact contexts, the significance of archaeological remains in the project areas might range from low to high.

Colonial / Historical Period and Built Environment:

- In this landscape, farmsteads and werfs dating to the last centuries often hold historically significant buildings and features such as farm houses, corbelled huts, sheds, stone kraals, and "dorsvloers" (threshing floors). The old Spes Bona farmstead occurs in close proximity of the project area. An analysis of historical topographical maps and aerial photographs indicate the presence of the werf from at least 1950 and the compound is older than 60 years and generally protected under the National Heritage Resource Act (NHRA 1999). The site might afford a better understanding of architectural, settlement and social developments in the Victoria West landscape. Highly sensitive burial sites are also known to occur around farmstead complexes. Small-scale farming and agriculture are prevalent around farmsteads in the project areas. Here, potential historical farmscapes might be encountered.



- Occasional remains of “veewagterhuise” or shepherds’ huts dating to the Colonial Period are scattered across farms in this landscape. These buildings are usually constructed out of undressed sandstone blocks and glass, rusted metal fragments, fragments of ceramics, earthenware and bone are often found in middens associated with these huts. Even though these occurrences are often poorly preserved, they might be protected under the National Heritage Resource Act (NHRA 1999) if older than 60 years.
- The remains and remnants of Anglo-Boer War battlegrounds, field hospitals, concentration camps and cemeteries are found in this landscape and such sites are protected under the National Heritage Resource Act (NHRA 1999) where they are of Provincial heritage significance. Anglo-Boer War remnants might be present in the project area.
- Digging and / or quarrying seem to have occurred at single localities in the project area. Here, one might encounter remnants of historical mining and quarrying but the significance of such sites is not always apparent.

Cultural Landscape

- Generally, the proposed project area and its surrounds are characterized by rural Karoo farmlands, flatter grass plains and low mountain vegetation. Mountains, hills and other landscape features are often given vernacular and local names derived from prominent local individuals or often historical events. In the project area, landscape feature names such as Vaalpunt, Die Rooikoppie and Wildehondskop occur. Cognisance should be taken of the fact that these features might hold certain intangible heritage value or they might be regarded as sites of “Living Heritage” in the cultural landscape.

Cemeteries / Burial Sites

- Burial sites frequently occur around farmstead complexes within family cemeteries, for example possibly at the Spes Bona farmstead but in some instances packed stones or rocks indicate the presence of informal pre-colonial burials in this landscape. In addition, human remains and burials are often 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 therefore important to remember that the presence of archaeological human remains on the landscape is often detected with difficulty as these burials, in most cases, are not marked at the surface.
- Cemeteries, burial places and graves are viewed to have a high significance and they are protected under the National Heritage Resource Act (NHRA 1999).

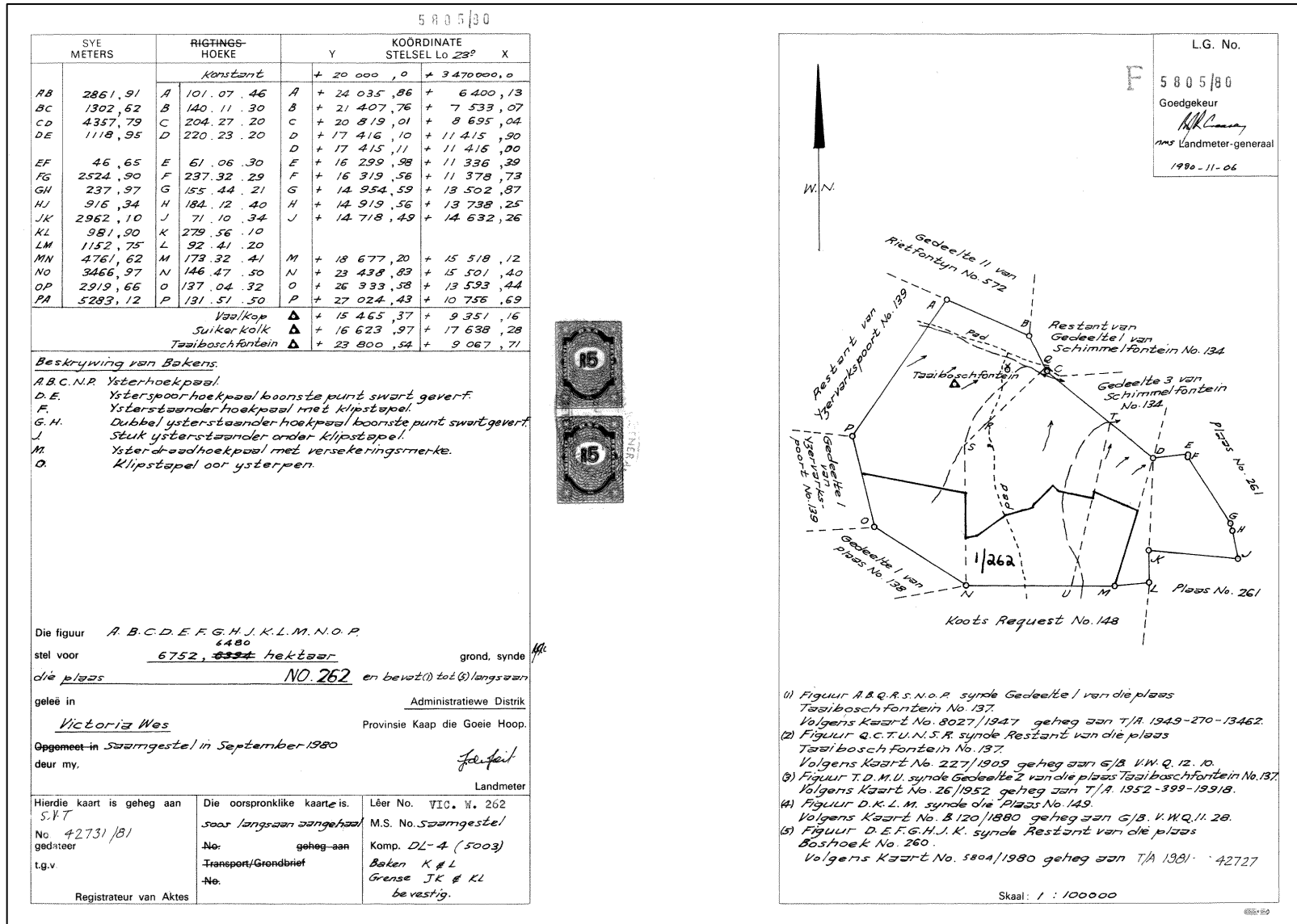


Figure 8-1: Title deed for the Taaiboschfontein.

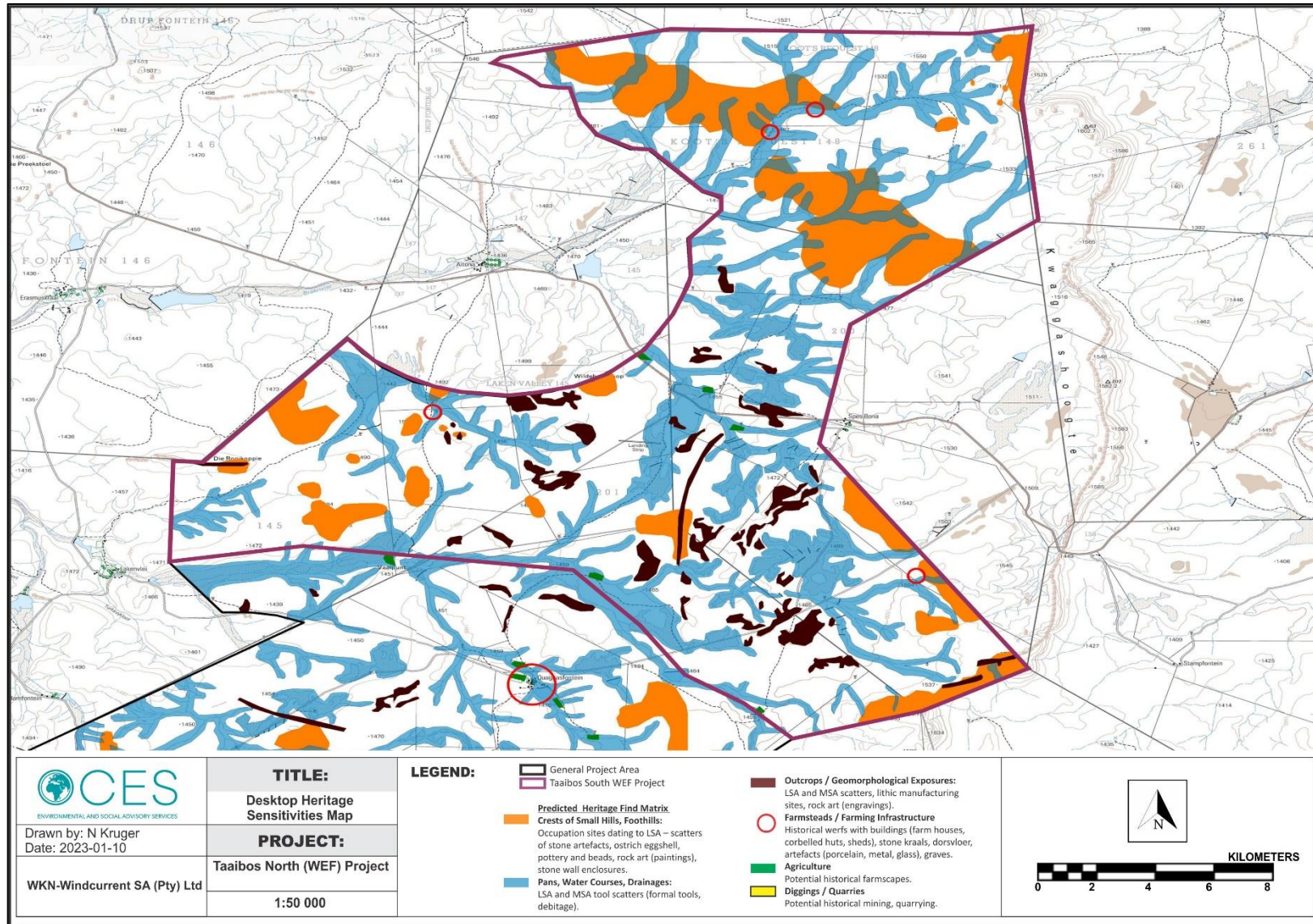


Figure 8-2: Map of the implied heritage potential of the Taaibos North WEF Project properties based on desktop appraisals.



8.1.2 Site Survey Findings

Stone Age remains occur abundantly in the project landscape where locally available raw material for the manufacture of stone tools is available in the geological setting. 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. Stone artefact scatters are usually located in areas with fluvial gravels along drainage lines, pans and within decomposing calcretes, rocky outcrops or ridges. Within the project development areas single ESA, wide-spread MSA and isolated 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 m² 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).

The Stone Age material was mainly produced on locally sourced hornfels cores where flakes and cores in greywacke and siltstones were also found. Many of the stone artefacts contained cortex and some of the stone artefacts showed evidence of secondary retouch and edge-damage, although some of the edge-damage is recent and may have been caused by external environmental factors. 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. Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. The widespread but ephemeral scatters are often of low heritage value due to temporally mixed contexts and the frequent absence of faunal, organic and other cultural remains which are scattered over thousands of square kilometres of the Karoo.

Despite a number of dolerite outcrops occurring in the project area, no engravings were found and the lack of sites found might possibly be due to the routes chosen for the access roads and turbine positions which was informed by desktop sensitivity data.



Figure 8-3: View of surfaces covered in MSA flakes and tools in the project areas.



Figure 8-4: View of quartzite MSA lithics occurring in the project areas.



Figure 8-5: MSA lithics noted in the project area.



Figure 8-6: MSA side scrapers noted in the project area.



Figure 8-7: MSA scrapers noted in the project area.



Figure 8-8: MSA adzes noted in the project area.



Figure 8-9: MSA lithics noted in the project area.

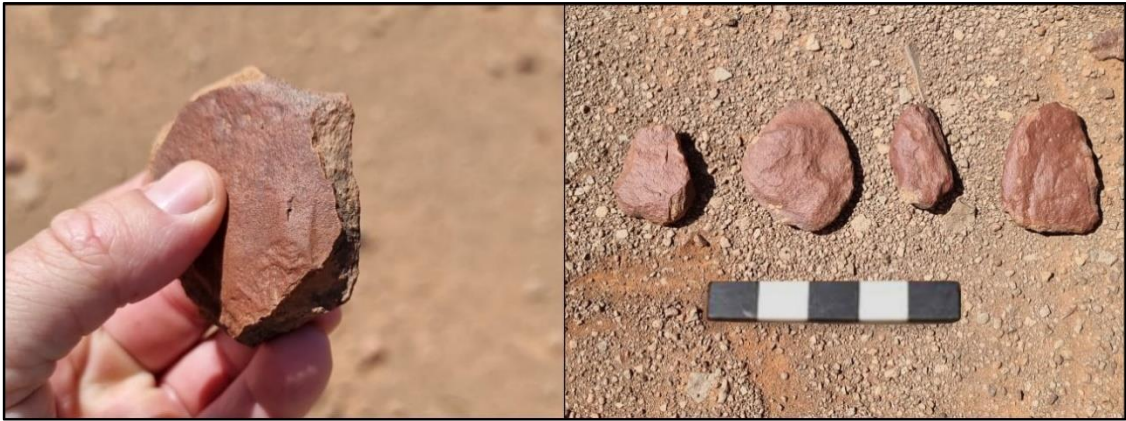


Figure 8-10: View of weathered MSA lithics noted in the project area.



Figure 8-11: View of weathered MSA lithics noted in the project area.



Figure 8-12: View of weathered MSA lithics noted in the project area.



Figure 8-13: View of a possible ESA handaxe noted in the project area.



Figure 8-14: View of weathered MSA scarpers noted in the project area.



Figure 8-15: View of weathered MSA lithics noted in the project area.

A small rock shelter containing cultural remnants is situated in a low ridge in a northern portion of the project area west of a planned access road (TBN24). Here, a hearth is placed in the middle of the shelter on top of a layer of organic soil containing cultural deposits which covers most of the shelter. The interior of the overhang forms a small rock passage leading into the ridge and it is possible that the occupation / activity areas of the shelter could extend into this passage. Few Stone Age artefacts were observed within and around the shelter but scatters of Ostrich eggshell litter the area. Material culture noted at the shelter suggest multiple - probably brief - occupational events by both Hunter Gatherers and Herder groups over many years. The site has potential



to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance.



Figure 8-16: View of the LSA shelter noted in the project area.



Figure 8-17: Ostrich eggshell and surface stone flakes noted at the LSA shelter.

The remains of a stone packed corbel building were documented at the area marked **TBN05** approximately 100m east of turbine position T38. The interior of the circular building seems to be raised within the main area and layered with two separate areas packed with stone walling. The features measures approximately 3m in diameter and its preservation condition is fair. The site has potential to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance.





Figure 8-18: View of the corbel building in the project areas.

Potential farmstead features of heritage value at the primary farm in the project area, Spes Bona will be unaffected but a small graveyard holding 3 graves occurs along the regional access road bisecting the project area (TBN21). Two of the graves are indicated by old marble headstones and other burials are marked with stone structures and cairns. The burial site, which is of high heritage significance, occurs in close proximity of project development areas and impact on the site is likely where potential direct impacts to the site should be mitigated and monitored (see Section 6).



Figure 8-19: View of the burial site in the project area.

The following table (Table 1) provides an inventory of heritage occurrences in the project area:

Table 1

Waypoint	Latitude	Longitude	Description	Significance	
TBN01	-31.5766	22.4695	MSA Localities	Low-medium	2a. Low Significance
TBN02	-31.5847	22.47067	MSA Localities	Low-medium	2a. Low Significance
TBN03	-31.5794	22.47715	MSA Localities	Low-medium	2a. Low Significance
TBN04	-31.5871	22.4948	MSA Localities	Low-medium	2a. Low Significance
TBN05	-31.5894	22.51206	Remains of a corbelled hut	Medium	3. Medium Significance
TBN06	-31.5888	22.51445	MSA Localities	Low-medium	2a. Low Significance
TBN07	-31.5855	22.52387	MSA Localities	Low-medium	2a. Low Significance
TBN08	-31.5817	22.53751	MSA Localities	Low-medium	2a. Low Significance
TBN09	-31.5748	22.54161	ESA / MSA Localities	Low-medium	2a. Low Significance
TBN10	-31.5696	22.54469	MSA Localities	Low-medium	2a. Low Significance
TBN11	-31.5744	22.52991	MSA Localities	Low-medium	2a. Low Significance
TBN12	-31.5647	22.49483	MSA Localities	Low-medium	2a. Low Significance
TBN13	-31.5584	22.48972	MSA Localities	Low-medium	2a. Low Significance
TBN14	-31.5926	22.54467	MSA Localities	Low-medium	2a. Low Significance
TBN15	-31.5934	22.55769	MSA Localities	Low-medium	2a. Low Significance
TBN16	-31.5917	22.56304	MSA Localities	Low-medium	2a. Low Significance
TBN17	-31.6075	22.55161	MSA Localities	Low-medium	2a. Low Significance
TBN18	-31.6151	22.56687	MSA Localities	Low-medium	2a. Low Significance
TBN19	-31.6213	22.57546	MSA Localities	Low-medium	2a. Low Significance
TBN20	-31.6264	22.56851	MSA Localities	Low-medium	2a. Low Significance
TBN21	-31.5717	22.5677	Burial Site	High	4b. High significance



TBN22	-31.559	22.57208	MSA Localities	Low-medium	2a. Low Significance
TBN23	-31.5543	22.57172	MSA Localities	Low-medium	2a. Low Significance
TBN24	-31.5317	22.56942	Rock Shelter	Medium	3. Medium Significance
TBN25	-31.5114	22.56033	MSA Localities	Low-medium	2a. Low Significance
TBN26	-31.4983	22.53305	MSA Localities	Low-medium	2a. Low Significance
TBN27	-31.6139	22.5429	MSA Localities	Low-medium	2a. Low Significance
TBN28	-31.6116	22.54332	MSA Localities	Low-medium	2a. Low Significance
TBN29	-31.5964	22.53346	MSA Localities	Low-medium	2a. Low Significance

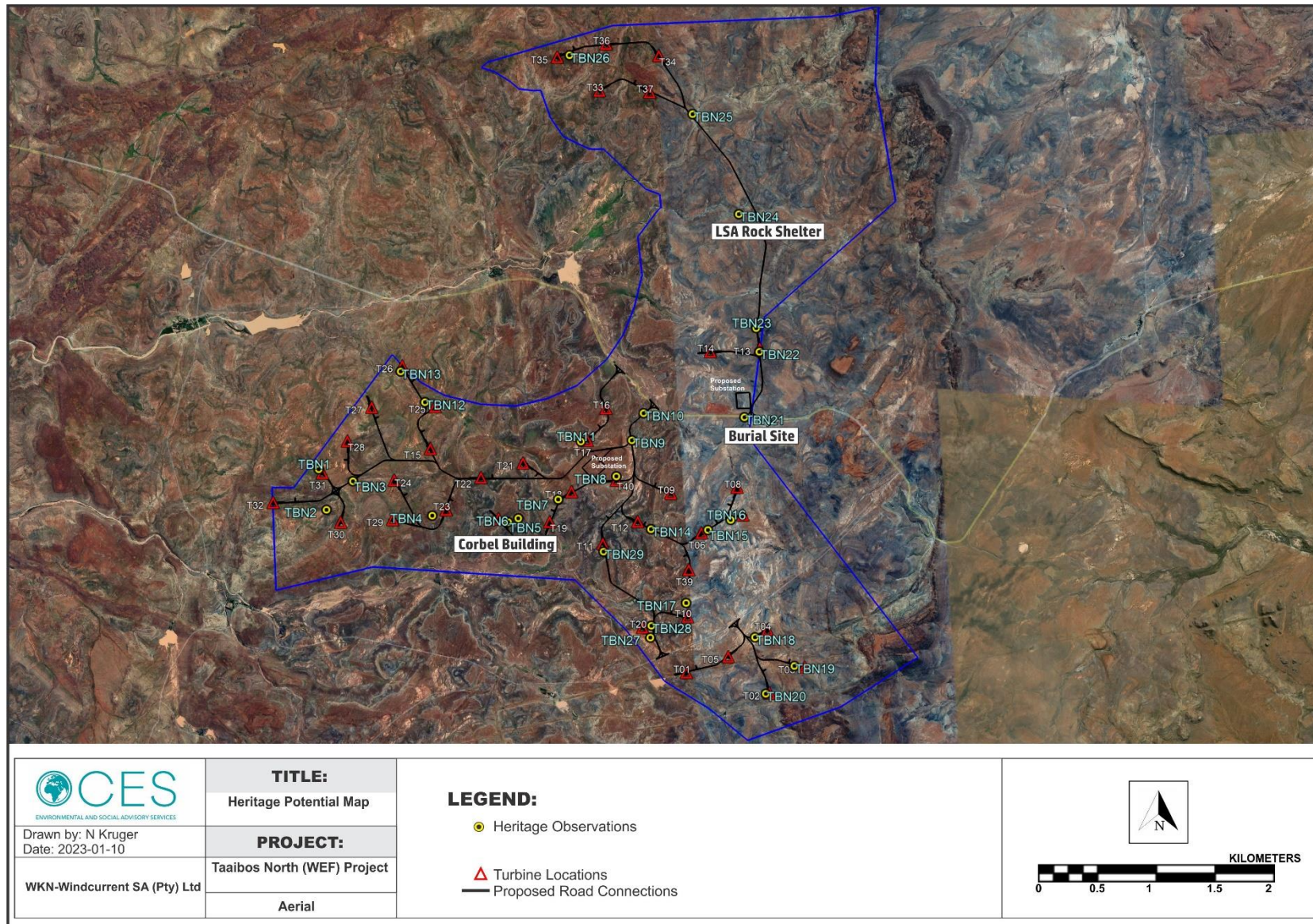


Figure 8-21: Aerial map indicating the location of heritage occurrences and landscape features discussed in the text..



9 EXPECTED HERITAGE IMPACTS OF THE PROJECT

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. 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 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. The following section provides a background to the identification and assessment of possible direct and indirect 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 Addendum 3.

9.1 PRECONSTRUCTION PHASE

Heritage risks and impacts are commonly associated with construction activities and no impact on archaeological sites, built environment features, human burials and the cultural landscape is foreseen during the preconstruction phase. However, some mitigation and management measures will require actioning during this phase, particularly the demarcation of a no-go development buffer for the burial site (TBN21), the corbel building (TBN5) and the rock Shelter (TBN24) prior to the commencement of construction or Phase 2 Assessments and destruction permitting for the corbel building and the rock shelter should be conducted should impact during the construction phase be inevitable.

9.2 CONSTRUCTION PHASE

Construction activities pose the greatest threat to tangible heritage resources within the cultural landscape and it is often during this Phase that heritage sites are lost. An array of archaeological areas occurs across the project landscape, many of which have been excluded from infrastructure development zones at Scoping Level. Still, wide spread Stone Age localities of low significance and not conservation-worthy occur in project footprints even though the resources may be destroyed during construction, the impact is inconsequential. More significant archaeological resources such as a rock shelter (TBN24) and a corbel building (TBN5) should managed - if retained - during the construction phase (no-go development buffer) to limit the impact on the archaeological landscape to low. Previously undetected cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction and the likelihood for encountering additional cultural heritage sites as the land clearing process commences, or during construction of infrastructure should be considered. A human burial site (TBN21) occurs in close proximity of project development areas and a potential high impact should be mitigated to low during the construction phase by means of a no-go development buffer. It should be noted that graves and cemeteries do not only occur around farmsteads in family burial grounds but



they are also randomly scattered around archaeological and historical settlements in the rural areas of the Northern Cape Province. The probability of informal human burials encountered during the construction phase should thus not be excluded. Monitoring activities will be required throughout the construction phase of the Project in order to avoid the destruction of previously undetected heritage sites and human burials.

9.3 OPERATIONS PHASE

It is understood that no new areas will be disturbed and/or impacted during the operations phase of the project and the risk and severity of heritage impacts should decrease once the projects activate. Furthermore, the majority of sites of archaeological and heritage significance would have been recorded and/or assessed in preceding phases. However, impact on previously undetected archaeological sites, human burials and the cultural landscape might occur as a result of operational activities (site access, movement, maintenance, trespassing, natural elements, hazards etc). During the Operations Phase, the continuation of management measures for the burial site (TBN21) as well as the rock shelter (TBN24) and a corbel building (TBN5) - should the sites be retained - should be tracked and continuous ECO site monitoring will be required.

9.4 DECOMMISSIONING AND POST-CLOSURE PHASE

The decommissioning phase will see the progressive downscaling and termination of operations. Similar to the Operations Phase, no new areas are expected to be disturbed and/or impacted and no additional sites of archaeological and heritage significance are expected to be impacted on during decommissioning. During the decommissioning and closure phase, it may be recommended that the ECO review management procedures for heritage sites and ensure that effective measures were implemented.

9.5 CUMULATIVE IMPACTS

It is the opinion of the Specialist that the proposed Taaibos North Wind Energy Facility (WEF) and its associated power line connection will have a low negative cumulative impact on the heritage value of the area for the following reasons:

- The low frequency of significant archaeological resources documented in the project area and in its immediate surroundings implies low-severity short and long-term impacts on the heritage landscape.
- The significance of the landscape in terms of its heritage is bound not to change during the course of construction, operation and decommissioning of the project.
- It should be noted that archaeological knowledge and the initiation of research projects into significant archaeological sites often result from Heritage Impact Assessments conducted for developments. Provided that significant archaeological sites are conserved and that appropriate heritage mitigation and management procedures are followed, the cumulative impact of development can be positive.

9.6 HERITAGE IMPACT ASSESSMENT MATRIX

The following table (Table 2) summarizes impacts to the heritage landscape of the study area:



**Table 2 Impact Assessment Matrix
Pre-Construction Phase**

Criteria	Nature	Temporal Scale	Spatial Scale	Severity	Probability	Overall Significance before mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Overall Significance after mitigation
Impact 1: Loss of Heritage Resources										
TBN21	Negative	Short term	Study area	Moderate / Moderately Beneficial	Unlikely	LOW NEGATIVE	Irreversible	Resource will not be lost	Achievable	LOW NEGATIVE
TBN05, TBN24	Negative	Short term	Study area	Slight/ Slightly Beneficial	Unlikely	LOW	Irreversible	Resource will not be lost	Easily achievable	LOW

Construction Phase

Criteria	Nature	Temporal Scale	Spatial Scale	Severity	Probability	Overall Significance before mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Overall Significance after mitigation
Impact 1: Loss of Heritage Resources										
TBN21	Negative	Permanent	Study area	Severe/ Beneficial	Probable	HIGH NEGATIVE	Reversible	Resource will not be lost	Easily achievable	LOW NEGATIVE
TBN05, TBN24	Negative	Permanent	Study area	Moderate / Moderately Beneficial	Probable	LOW	Reversible	Resource will not be lost	Easily achievable	LOW

Operation Phase

Criteria	Nature	Temporal Scale	Spatial Scale	Severity	Probability	Overall Significance before mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Overall Significance after mitigation
Impact 1: Loss of Heritage Resources										
TBN21	Negative	Short term	Study area	Moderate / Moderately Beneficial	Unlikely	LOW NEGATIVE	Irreversible	Resource will not be lost	Achievable	LOW NEGATIVE
TBN05, TBN24	Negative	Short term	Study area	Slight/ Slightly Beneficial	Unlikely	LOW	Irreversible	Resource will not be lost	Easily achievable	LOW

Closure / Decommissioning Phase

Criteria	Nature	Temporal Scale	Spatial Scale	Severity	Probability	Overall Significance before mitigation	Reversibility	Irreplaceable Loss	Mitigation Potential	Overall Significance after mitigation
Impact 1: Loss of Heritage Resources										
TBN21	Negative	Short term	Study area	Moderate / Moderately Beneficial	Unlikely	LOW NEGATIVE	Irreversible	Resource will not be lost	Achievable	LOW NEGATIVE
TBN05, TBN24	Negative	Short term	Study area	Slight/ Slightly Beneficial	Unlikely	LOW	Irreversible	Resource will not be lost	Easily achievable	LOW



10 HERITAGE MANAGEMENT

10.1 HERITAGE SITE MANAGEMENT

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 Burial Site of high significance (TBN21) the following are required in terms of heritage management and mitigation:

POTENTIAL IMPACT	Damage/destruction of sites.	
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	PROJECT COMPONENT/S
Conservation: Demarcate a 100m no-go development buffer with a fence or permanent construction barricade.	ECO, HERITAGE ASSESSMENT PRACTITIONER	Pre-Construction
Site Monitoring: Monitor the 100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	ECO	Construction
Site Monitoring: Monitor the 100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. General Site Monitoring	ECO	Operation
Site Monitoring: Monitor the 100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity. Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.	ECO, HERITAGE ASSESSMENT PRACTITIONER	Closure / Decommissioning
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	



Figure 10-1: Aerial image indicating the 100m no-go development buffer recommended for site TBN21 in relation to project infrastructure components.

For the Corbel Building and the Rock Shelter of medium significance (TBN05, TBN24) within the project area the following are required in terms of heritage management and mitigation:

POTENTIAL IMPACT	Damage/destruction of sites.	
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	PROJECT COMPONENT/S
<p>Permitting: If the sites are to be destroyed, initiate Phase 2 Assessments (documentation, sampling) and obtain the necessary destruction permits from the relevant Heritage Resources Authorities prior to site impact and destruction.</p> <p>Conservation: If the sites are to be retained, demarcate a 100m no-go development buffer with a fence or construction barricade.</p>	ECO, HERITAGE ASSESSMENT PRACTITIONER	Pre-Construction
<p>Site Monitoring: If the sites are to be retained, monitor the 100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity.</p> <p>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</p>	ECO	Construction
<p>Site Monitoring: If the sites are to be retained, monitor the</p>	ECO	Operation



<p>100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity.</p> <p>General Site Monitoring</p>		
<p>Site Monitoring: If the sites are to be retained, monitor the 100m no-go development buffer in order to detect potential impact on the site at the earliest opportunity.</p> <p>Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.</p>	<p>ECO, HERITAGE ASSESSMENT PRACTITIONER</p>	<p>Closure / Decommissioning</p>
<p>PERFORMANCE INDICATOR</p>	<p>Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.</p>	



Figure 10-2: Aerial image indicating the 100m no-go development buffer recommended for site TBN05 in relation to project infrastructure components.



Figure 10-3: Aerial image indicating the 100m no-go development buffer recommended for site TBN24 in relation to project infrastructure components.

For the wide-spread Stone Age occurrences and observations of low significance within the project area the following are required in terms of heritage management and mitigation:

POTENTIAL IMPACT	Damage/destruction of sites.	
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	
MITIGATION: TARGET/OBJECTIVE	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	PROJECT COMPONENT/S
Site Monitoring: General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	ECO	Construction
Site Monitoring: General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	ECO	Operation
Site Monitoring: General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	ECO, ASSESSMENT PRACTITIONER	Closure / Decommissioning
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	



11 CONCLUSION AND RECOMMENDATIONS

In terms of heritage potential, archaeological resources are abundant in the surroundings of Victoria West where the project landscape holds the entire range of the Stone Age sequence including ESA, MSA and LSA materials. 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 Taabos North WEF Project area:

- Stone Age remains occur abundantly in the project landscape where locally available raw material for the manufacture of stone tools is available in the geological setting. 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. Stone artefact scatters are usually located in areas with fluvial gravels along drainage lines, pans and within decomposing calcretes, rocky outcrops or ridges. Despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. The widespread but ephemeral scatters are often of low heritage value due to temporally mixed contexts and the frequent absence of faunal, organic and other cultural remains which is scattered over thousands of square kilometres of the Karoo. The Stone Age localities are not conservation-worthy and even though the resources may be destroyed during construction, the impact is inconsequential.
- A small rock shelter containing cultural remnants is situated in a low ridge in a northern portion of the project area west of a planned access road (**TBN24**). The site has potential to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance. It is recommended that a 100m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Continuous site monitoring should be done in order to detect potential impact on the site at the earliest opportunity. Should impact on the site prove inevitable, a Phase 2 Assessment inclusive of site documentation, possible sampling and analysis must be conducted during the Preconstruction Phase. The necessary destruction permits from the relevant Heritage Resources Authorities should be obtained prior to site impact and destruction.
- The remains of a stone packed corbel building were documented at the area marked **TBN05** approximately 100m east of turbine position T38. The site has potential to yield valuable archaeological information on the regional development of the LSA and it has been assigned a medium archaeological significance. It is recommended that a 100m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Continuous site monitoring should be done in order to detect potential impact on the site at the earliest opportunity. Should impact on the site prove inevitable, a Phase 2 Assessment inclusive of site documentation, possible sampling and analysis must be conducted during the Preconstruction Phase. The necessary destruction permits from the relevant Heritage Resources Authorities should be obtained prior to site impact and destruction.
- A small graveyard holding 3 graves occurs along the regional access road bisecting the project area (**TBN21**) near the Spes Bona Farmstead. The burial site, which is of high heritage significance, occurs in close proximity of project development areas and it is recommended that a 50m no-go development buffer be demarcated with a fence or construction barricade during the Preconstruction Phase. Frequent and continuous site monitoring should be done during all stages of the project in order to detect potential impact on the site at the earliest opportunity.
- Information on the layout of civil services such as access roads were made available to specialists at an advanced stage of this assessment and not all of these proposed access road alignments could be included in site investigations. It is recommended that a suitably qualified archaeologist be appointed



during the Construction Phase to monitor vegetation clearing and excavation activities for the possible occurrence of archaeological material remains and features in these areas.

- 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.

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.



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WEB SOURCES AND LEGISLATION

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13 ADDENDUM 1: SPECIALIST CV

NELIUS LE ROUX KRUGER

BHCS Hons. (Archaeology)

(Date compiled: 2023/01/10)

PERSONAL DETAILS

Nationality:	South African
Date of Birth:	3 April 1979
Postal Address:	Postnet Suite 74, Private Bag x04, Menlo Park, 0102
Work Address:	70 Regency Dr, Route 21 Business Park, Centurion, 0178
Telephone numbers:	W: +27 12 751 2160 C: +27 82 967 2131
Identity number:	790403 5029 087
Languages:	English, Afrikaans, Sepedi (Basic)

HIGHER EDUCATION

University Attended:	University of the Pretoria
Degree Obtained:	BA Archaeology (<i>Cum Laude</i>) 2002
Major Subjects:	Anthropology, Archaeology, English, Afrikaans
University Attended:	University of the Pretoria
Degree Obtained:	BHCS Hons. Archaeology (<i>Cum Laude</i>) 2004

PROFESSIONAL AFFILIATIONS

- Member of the Association for South African Professional Archaeologists (ASAPA).
- Member of the Council of the Association for South African Professional Archaeologists (ASAPA): CRM Portfolio
- Member of the CRM Section of the Association for South African Professional Archaeologists (ASAPA).
- Member of the Society of Africanist Archaeologists (SAFA).
- Member of the South African Museums Association (SAMA).
- Accredited Professional Archaeologist & CRM Practitioner by the Association for South African Professional Archaeologists (ASAPA) & Heritage Natal (AMAFA).

HONOURS AND AWARDS

- Aage V. Jensen Development Foundation (Denmark) grant for participation in the joint SAFA/PAA Congress, Dakar, Senegal (2010).
- Five Hundred Years Initiative (NRF) Research Grant (2008 – 2009).
- University of Pretoria post-graduate Merit Grant for MA studies in Archaeology (2004 – 2008).
- University of Pretoria (CINDEK) bursary for post-graduate studies awarded by the Centre of Indigenous Knowledge (2003).
- South African Archaeological Society's Hanisch Award for best graduate student in the Department of Anthropology and Archaeology at the University of Pretoria (2003).
- University of Pretoria Academic Honorary Colours (2002).



University of Pretoria Graduate Merit Grant (2002).

University of Pretoria honorarium for archaeological collections management at the Department of Archaeology and Anthropology (2001).

CURRENT STATUS

Heritage Resources Manager for Exigo Sustainability

Social impact Assessor and Research Associate for Exigo Sustainability

SPECIALITY FIELDS

- Integrated Heritage and Archaeological Impact Assessment (Phase 1, 2 & 3), complying to SAHRA, PHRA and industry standards for heritage impact assessments.
- Industry standard Heritage Resources Management Plans, complying to SAHRA & PHRA standards for heritage impact assessments.
- Heritage destruction / alteration / excavation permitting facilitation and associated research.
- General facilitation in consultation and negotiation with heritage resources authorities (SAHRA, PHRA's).
- Heritage-related social consultation and focus group facilitation (for example, with Interested and Affected parties).
- Historical and anthropological studies.
- Heritage and Social Spatial Development Frameworks & Strategic Development Area Frameworks for municipalities.
- Industry standard and compliant Social Impact Assessments (SIA's).
- Mine Social and Labour Plans (SLP's) and social facilitation.
- Socio-cultural baseline studies and research.
- GIS and geo-spatial referencing and data analysis, heritage and social mapping.

PROFESSIONAL SKILLS & EXPERIENCE

Nelius Le Roux Kruger is an accredited ASAPA (Association of Southern African Professional Archaeologists) archaeologist and Culture Resources Management (CRM) Practitioner with over 15 years' experience in the fields of heritage resources assessment, conservation management and social studies. In addition, he is involved in various aspects of social research and social impact assessment. He holds a BHCS (Hons) Archaeology degree from the University of Pretoria specializing in the Iron Age Farmer and Colonial Periods of South Africa. He has worked extensively on archaeological and heritage sites of the time periods and cultural contexts present in Southern Africa, both in the commercial and academics spheres and he holds vast experience in human remains relocation and related social consultation. Nelius has conducted social research projects across Southern Africa involving Social Impact Assessments as well as the compilation and monitoring of mining social and labor plans, public meeting facilitation and socio-cultural studies. His experience is not limited to South Africa and he has worked on archaeological and socio-cultural research projects across Africa and the Middle East. His publication record includes a number of academic publications in peer reviewed journals and books as well as a vast number of Heritage Management Reports. Nelius' expertise includes CRM assessment and management, applications in heritage legislation, Social Impact Assessment, social consulting as well as geospatial and Geographical Information Systems (GIS) applications in archaeology and CRM. Nelius is a conscientious and committed archaeologist and social scientist who is dedicated to the professionalism of the discipline of archaeology and social studies. He approaches all aspects of his specialist fields with enthusiasm, maintaining best practise at all times. When working with people, he strives to manage interpersonal communication and group dynamics with dedication, promoting positive group cohesion.

SELECTED PUBLICATIONS

- Kruger, N. In Prep. Living the frontier: Ritual and Conflict in Ha-Tshirundu.
- Kruger, N. 2016. Forthcoming. The Crocodile in his Pool: Notes on a significant find in the Ha-Tshirundu area, Limpopo Valley, South Africa. Nyame Akuma Bulletin of the Association of Africanist Archaeologists.
- Antonites, A. & Kruger, N. et al. 2014. Report on excavations at Penge, a first-millennium Doornkop settlement. Southern African Humanities 26:177-92
- Antonites, A. & Kruger, N. 2012. **A Preliminary Assessment of Animal Distribution on a 19th Century VhaVenda Settlement.** Nyame Akuma Bulletin of the Association of Africanist Archaeologists. 2012:77
- Kruger, N. In Prep. Living the frontier: Ritual and Conflict in Ha-Tshirundu.
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Kruger, N. 2008. Ha Tshirundu: Landscape, Lived experience and Land Reform. Poster presented at the South African Association for Archaeologists Biannual Congress, Cape Town, March 2008.

Mathers, K. & Kruger, N. 2008. The Past is another Country: Archaeology in the Limpopo Province in Smith, A. & Gazin-Schwartz, A (Eds.). 2008. Landscapes of Clearance: Archaeological and Anthropological Perspectives. California: Left Coast Press

SELECTED PROJECTS

NATIONAL

- Phase 1 Heritage Impact Assessment (HIA) and further heritage management for the upgrading of the Warrenton Anglo Boer War blockhouse, Warrenton, Northern Cape Province
- Phase 1 Heritage Impact Assessment (HIA) and Phase 2 Site Investigation for the restoration of the old Johannesburg Fort, Constitution Hill, Johannesburg, Gauteng Province
- Phase 1 Heritage Impact Assessment (HIA) and further heritage management for the upgrading/refurbishment of the Burgershoop MPCC, Mogale City, Gauteng Province
- Phase 1 Heritage Impact Assessment (HIA) of historical period heritage sites on the farm Roodekrans, Dullstroom area, Mpumalanga Province
- Phase 1 Heritage Impact Assessment (HIA) of a historical bridge on the farm Pienaarspoort 339jr at Delfsand, Gauteng Province
- Phase 1 Heritage Impact Basements (HIAs) for 20 PV Solar Parks on location at Upington, Kimberley, Vryburg, Kuruman, Kathu, Hotazel, Douglas, Groblershoop and Prieska, Northern Cape Province, South Africa.
- Phase 1 Heritage Impact Assessments (HIAs) for 18 large scale water supply projects on location at East London, Mthatha, Ngcobo, Barley East, Elliot, Cathcart, King Williams Town and Mdantsane, Eastern Cape Province, South Africa.
- Phase 1 Heritage Impact Assessments (HIAs) for more than 40 residential infrastructure developments across South Africa.

INTERNATIONAL

- Heritage Impact Assessment for the Kitumba Copper-Gold Project (KCGP), Zambia
- Heritage Scoping Study for the BTR Kitumba Project, Mumbwa, Zambia
- Heritage Scoping Study for the Buckreef Gold Project, Geita, Tanzania
- Phase 2 mitigation and heritage assessment of the Koidu Monkey Hill Iron Age metallurgy site, Koidu Diamond Mine, Sierra Leone
- Phase 2 heritage site mitigation of the Sessenge archaeological site, Kibali Gold Mine, Democratic Republic of the Congo.



14 ADDENDUM 2: HERITAGE LEGISLATION

14.1 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.

14.1.1 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.

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

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known as the “60-years clause”. Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. “Tell” refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

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

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

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

and

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

- (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)."*

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

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

14.1.2 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 m² 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 m² 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.

14.2 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.



15 ADDENDUM 2: IMPACT ASSESSMENT METHODOLOGY

15.1 ISSUES IDENTIFICATION MATRIX

Impacts were rated and assessed using an Impact and Risk Assessment Methodology provided by CES, for the Scoping Phase of the EIA process in accordance with the requirement of EIA Regulations. Here, two parameters and five factors are considered when assessing the significance of the identified issues, and each is scored. **Significance** is achieved by ranking the five criteria presented in Table 1 below, to determine the overall significance of an issue. The ranking for the “effect” (which includes scores for duration; extent; consequence and probability) and reversibility / mitigation are then read off the matrix presented in Table 2 below, to determine the overall significance of the issue. The overall significance is either negative or positive.

- **Duration** - The temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.

- **Extent** - The spatial scale defines the physical extent of the impact.

- **Consequence** - The consequence scale is used in order to, as far as possible, objectively evaluate how severe a number of negative impacts associated with the issue under consideration might be, or how beneficial a number of positive impacts associated with the issue under consideration might be.

- The **probability** of the impact occurring - The likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

➤ - **Reversibility / Mitigation** – The degree of difficulty of reversing and/or mitigating the various impacts ranges from easily achievable to very difficult. The four categories used are listed and explained in Table 1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

15.2 ASSESSING IMPACTS

The CES rating scale used in this assessment takes into consideration the following criteria, and includes the new criteria for assessing post mitigation significance (residual impacts), by incorporating the principles of reversibility and irreplaceability:

- **Nature of impact** (Negative or positive impact on the environment).
- **Type of impact** (Direct, indirect and/or cumulative effect of impact on the environment).
- **Duration, Extent, Probability** (see **Table 4** below)



Table 4: Duration, Extent, Probability

Duration (Temporal Scale)		Score
Short term	Less than 5 years	1
Medium term	Between 5-20 years	2
Long term	Between 20 and 40 years (a generation) and from a human perspective also permanent	3
Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there	4
Extent (Spatial Scale)		
Localised	At localised scale and a few hectares in extent	1
Study Area	The proposed site and its immediate environs	2
Regional	District and Provincial level	3
National	Country	3
International	Internationally	4
Probability (Likelihood)		
Unlikely	The likelihood of these impacts occurring is slight	1
May Occur	The likelihood of these impacts occurring is possible	2
Probable	The likelihood of these impacts occurring is probable	3
Definite	The likelihood is that this impact will definitely occur	4

- Severity or benefits

Table 5: Severity of Benefits

Impact Severity		Score
<i>(The severity of negative impacts, or how beneficial positive impacts would be on a particular affected system or affected party)</i>		
Very severe	Very beneficial	4
An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example the permanent loss of land.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. For example the vast improvement of sewage effluent quality.	
Severe	Beneficial	3
Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these. For example, the clearing of forest vegetation.	A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example an increase in the local economy.	
Moderately severe	Moderately beneficial	2
Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated. For example constructing the sewage treatment facility where there was vegetation with a low conservation value.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. For example a 'slight' improvement in sewage effluent quality.	
Slight	Slightly beneficial	1
Medium or short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example a temporary fluctuation in the water table due to water abstraction.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.	
No effect	Don't know/Can't know	
The system(s) or party(ies) is not affected by the proposed development.	In certain cases it may not be possible to determine the severity of an impact.	

* In certain cases it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know

The scores for the three criteria in Table 4 and Table 5 above are added to obtain a composite score. They must then be considered against the severity rating to determine the overall significance of an activity. This is because



the severity of the impact is far more important than the other three criteria. The overall significance is then obtained by reading off the matrix presented in the table below. The overall significance is either negative or positive (Criterion 1) and direct, indirect or cumulative (Criterion 2).

Table 6: Composite Duration, Extent, Probability Scores

SEVERITY	COMPOSITE DURATION, EXTENT & PROBABILITY SCORE										
	3	4	5	6	7	8	9	10	11	12	
Slight	3	4	5	6	7	8	9	10	11	12	
Mod severe	3	4	5	6	7	8	9	10	11	12	
Severe	3	4	5	6	7	8	9	10	11	12	
Very severe	3	4	5	6	7	8	9	10	11	12	

The **environmental significance** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Table 7: Overall Significance

OVERALL SIGNIFICANCE <i>(The combination of all the above criteria as an overall significance)</i>	
VERY HIGH NEGATIVE	VERY BENEFICIAL
These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects. <i>Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.</i> <i>Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.</i>	
HIGH NEGATIVE	BENEFICIAL
These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light. <i>Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</i> <i>Example: The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</i>	
MODERATE NEGATIVE	SOME BENEFITS
These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial. <i>Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</i>	
LOW NEGATIVE	FEW BENEFITS
These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect. <i>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</i> <i>Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</i>	
NO SIGNIFICANCE	
There are no primary or secondary effects at all that are important to scientists or the public. <i>Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</i>	
DON'T KNOW	
In certain cases it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information. <i>Example: The effect of a particular development on people's psychological perspective of the environment.</i>	



15.3 POST MITIGATION SIGNIFICANCE

Once mitigation measure is proposed, the following criteria are then used to determine the overall post mitigation significance of the impact:

- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.

Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 8 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 8: Mitigation Potential

Reversibility	
<i>Reversible</i>	<i>The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.</i>
<i>Irreversible</i>	<i>The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.</i>
Irreplaceable loss	
<i>Resource will not be lost</i>	<i>The resource will not be lost/destroyed provided mitigation measures are implemented.</i>
<i>Resource will be partly lost</i>	<i>The resource will be partially destroyed even though mitigation measures are implemented.</i>
<i>Resource will be lost</i>	<i>The resource will be lost despite the implementation of mitigation measures.</i>
Mitigation potential	
<i>Easily achievable</i>	<i>The impact can be easily, effectively and cost effectively mitigated/reversed.</i>
<i>Achievable</i>	<i>The impact can be effectively mitigated/reversed without much difficulty or cost.</i>
<i>Difficult</i>	<i>The impact could be mitigated/reversed but there will be some difficulty in ensuring effectiveness and/or implementation, and significant costs.</i>
<i>Very Difficult</i>	<i>The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.</i>

15.4 MANAGEMENT AND MITIGATION ACTIONS

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

<p>No further action / Monitoring</p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p>Avoidance</p>



This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.

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 an 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.