

HERITAGE IMPACT ASSESSMENT REPORT FOR  
THE BOSTON HYDRO POWER PLANT PROJECT,  
THABO MOFUTSANYANE DISTRICT  
MUNICIPALITY, FREE STATE PROVINCE



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

**Heritage Impact Assessment Report for the Boston Hydro Power  
Plant Project, Thabo Mofutsanyane District Municipality, Free State  
Province**

**Prepared for:**

**Boston Hydro Power Plant (Pty) Ltd**

**Prepared by:**



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**April 2023**



# REVISIONS TRACKING TABLE

*CES Report Revision and Tracking Schedule*

<b>Document Title:</b>	Heritage Impact Assessment for the Boston Hydro Power Plant Project, Thabo Mofutsanyane District Municipality, Free State Province		
<b>Client Name</b>	Boston Hydro Power Plant (Pty) Ltd		
<b>Status:</b>	Draft		
<b>Issue Date:</b>	April 2023		
<b>Lead Author:</b>	Mr Nelius Kruger		
<b>Reviewer:</b>	Me Robyn Thompson		
<b>Report Distribution</b>	<i>Circulated to</i>	<i>No. of hard copies</i>	<i>No. electronic copies</i>
	Me Robyn Thompson		1
<b>Report Version</b>	<i>Date</i>		
1	15 March 2023		
2	25 April 2023		





## 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 Boston Hydro Power Plant 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: CES

Date: 25 April 2023

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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 Heritage Impact Assessment (HIA) study for the proposed Boston Hydro Power Plant Project near Clarens in the Thabo Mofutsanyane District Municipality of the Free State Province. The proposed project entails the construction of a new Hydropower Plant in the Ash River over a surface area of approximately **2ha**. 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.

<b>Project Title</b>	Boston Hydro Power Plant Project
<b>Project Location</b>	S28.417361° E28.375472°
<b>1:50 000 Map Sheet</b>	2828AD
<b>Farm Portion / Parcel</b>	Boston 40, Botterkloof 541, Plasie, Kruis Vallei 190
<b>Magisterial District / Municipal Area</b>	Thabo Mofutsanyane District Municipality
<b>Province</b>	Free State Province

This section of the Free State Province is situated in a heritage-rich area and remnants from the Later Stone Age, San Rock Art, Iron Age Farmer and Colonial / Historical Period archaeology related to farming, rural expansion and warfare of the past century occur here. The archaeology of the Clarens area is dominated by Stone Age sites, Rock Art as well as Historical Period farms, associated farmsteads and labourer's houses which appeared in the 19<sup>th</sup> century. The larger landscape also holds remnants of various battles and skirmishes from the Anglo-Boer War towards the end of the 19<sup>th</sup> century. The farm subject to this assessment was portioned at the beginning of the 20<sup>th</sup> century and no particular reference to archaeological sites or features of heritage potential were recorded during an examination of literature thematically or geographically related to the property. An examination of historical aerial imagery and archive maps indicate that the project target property had been utilized for intensive agriculture during the last century and surface alterations and transformation during the last century is prevalent. This inference was confirmed during an archaeological site assessment which identified no heritage receptors and the following observations are made for the proposed Boston Hydro Power Plant Project in terms of heritage resources management.

- Portions of the project area and the baseline environment have been affected by historical, recent and ongoing farming activities which possibly sterilized the landscape of prehistorical archaeological and other remnants. As no archaeological sites, heritage remains, built environment features or burial sites were located during the site assessment no apparent impact on the heritage landscape is foreseen during the preconstruction, construction and operation phases of the project. However, since cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Graves and cemeteries are often scattered around archaeological and historical settlements in the rural areas of the Free State Province and the probability of informal human burials encountered during the construction phase should thus not be excluded. Site monitoring by an informed ESO and appointed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites.



- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ESO and appointed 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 Boston Hydro Power Plant Project will have a little to negligible negative cumulative impact on the heritage value of the area for the following reasons:

- The absence 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 transformed nature of much of the project landscapes and the presence of agricultural fields and existing power lines in development areas means that 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.
- The heritage context and sensitivity of the proposed development zones points to a landscape of limited heritage significance on a local level.
- 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)



## TABLE OF CONTENTS

<b><u>1</u></b>	<b><u>EXECUTIVE SUMMARY .....</u></b>	<b><u>V</u></b>
<b><u>2</u></b>	<b><u>INTRODUCTION AND TERMS OF REFERENCE.....</u></b>	<b><u>3</u></b>
<b><u>3</u></b>	<b><u>DESCRIPTION OF THE ACTIVITY .....</u></b>	<b><u>4</u></b>
3.1	Project Description .....	4
3.2	Technical Aspects.....	4
<b><u>4</u></b>	<b><u>LEGAL BASIS OF THE ACTIVITY .....</u></b>	<b><u>6</u></b>
4.1	Overview .....	6
4.2	Legislation for the protection of heritage sites.....	6
a.	<i>National Heritage Resources Act No 25 of 1999, section 35.....</i>	6
b.	<i>Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925 .....</i>	7
c.	<i>National Heritage Resources Act No 25 of 1999, section 35.....</i>	8
4.3	Background to Heritage impact Assessments .....	8
<b><u>5</u></b>	<b><u>REGIONAL CONTEXT .....</u></b>	<b><u>9</u></b>
5.1	Location .....	9
5.2	Receiving environment.....	9
5.3	Site description .....	9
<b><u>6</u></b>	<b><u>METHODOLOGY.....</u></b>	<b><u>14</u></b>
6.1	Sources of Information .....	14
6.1.1	<i>Desktop Work (Literature Review, Remote Sensing) .....</i>	14
6.1.2	<i>Remote Sensing.....</i>	15
6.1.3	<i>Site Surveys .....</i>	15
6.2	Assumptions and Limitations.....	16
<b><u>7</u></b>	<b><u>THE HERITAGE BASELINE ENVIRONMENT .....</u></b>	<b><u>17</u></b>
7.1	archaeology and the Cultural Landscape.....	17
7.1.1	<i>Early History and the Stone Ages .....</i>	18
7.1.2	<i>San Rock Art .....</i>	18
7.1.3	<i>Iron Age Farmers .....</i>	19
7.1.4	<i>The Cultural Landscape .....</i>	22
<b><u>8</u></b>	<b><u>FINDINGS AND RESULTS .....</u></b>	<b><u>25</u></b>
8.1	Archaeology and The Cultural Landscape .....	25
8.1.1	<i>Desktop Appraisal .....</i>	25
8.1.2	<i>Site Survey Findings .....</i>	25
<b><u>9</u></b>	<b><u>EXPECTED HERITAGE IMPACTS OF THE PROJECT .....</u></b>	<b><u>29</u></b>



9.1	Preconstruction Phase .....	29
9.2	Construction Phase .....	29
9.3	Operations Phase.....	30
9.4	Decommissioning and Post-closure Phase .....	30
9.5	Cumulative Impacts .....	30
9.6	Heritage Impact Assessment Matrix .....	30
<b>10</b>	<b><u>HERITAGE MANAGEMENT .....</u></b>	<b><u>32</u></b>
10.1	Heritage Site Management .....	32
<b>11</b>	<b><u>CONCLUSION AND RECOMMENDATIONS .....</u></b>	<b><u>33</u></b>
<b>12</b>	<b><u>REFERENCE LIST .....</u></b>	<b><u>34</u></b>
	Archive Sources and Maps .....	35
	Web Sources and Legislation .....	35
<b>13</b>	<b><u>ADDENDUM 1: SPECIALIST CV.....</u></b>	<b><u>36</u></b>
<b>14</b>	<b><u>ADDENDUM 2: HERITAGE LEGISLATION.....</u></b>	<b><u>39</u></b>
14.1	CRM: Legislation, Conservation and Heritage Management.....	39
14.1.1	Legislation regarding archaeology and heritage sites.....	39
a.	National Heritage Resources Act No 25 of 1999, section 35.....	39
b.	Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925 .....	40
14.1.2	Background to HIA and AIA Studies .....	40
14.2	Assessing the Significance of Heritage Resources .....	42
	- Categories of significance .....	42
<b>15</b>	<b><u>ADDENDUM 2: IMPACT ASSESSMENT METHODOLOGY .....</u></b>	<b><u>44</u></b>
15.1	Issues Identification Matrix .....	44
15.2	Assessing Impacts.....	44
15.3	Post Mitigation Significance .....	47
15.4	Management and Mitigation Actions .....	47



## 2 INTRODUCTION AND TERMS OF REFERENCE

CES was commissioned by the Boston Hydro Power Plant (Pty) Ltd to conduct a Heritage Impact Assessment (HIA) study for the proposed Boston Hydro Power Plant Project in the Free State 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 assessment 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

Boston Hydro is a 5MW run-of-river hydro power project located on the Ash River near Clarens. Power will be evacuated via a 22kV overhead powerline from Boston to the Eskom Node substation via the Stortemelk hydropower plant. The power evacuation scope, assessed in another HIA Study, will include the construction of a new 2.3 km long overhead powerline from Boston to Stortemelk and upgrading of the existing powerline from Stortemelk to Node over distance of 9km. The 22kV Boston - Stortemelk OHL powerline will therefore be 11.3 km in total length, utilizing Chickadee conductor, built on wooden pole structures with H-pole and double wood structures, and include ADSS for fibre communications. The following properties fall within the Powerline Study Corridor, depending on the final alignments:

- Boston 40

The assessment examines the proposed Boston Hydro Power Plant Project footprint of approximately **2ha**.

### 3.2 TECHNICAL ASPECTS

The Boston Hydropower Project is a proposed 5 MW run-of-river hydropower plant, located on the Ash River approximately 10km north of the town of Clarens in the Free State Province, South Africa. This location is approximately 3.5 km downstream of the Lesotho Highlands Water Project (LHWP) outfall into the Ash River. Access to the site is available off the existing S217 District Road. The site was subdivided from the local farm and Boston Hydro hold an option agreement to purchase the subdivided portion. The weir (earth embankment) extends some 136 m onto the neighbouring property (Farm Kruisvallei 190, Bethlehem).

There has been no previous physical development on the main portion of the site. The neighbouring farm, Kruisvallei 190, is currently being used for commercial agriculture in the form of Soya production. The project has a footprint of approximately 2ha on a site of approximately 13ha.

Part of the proposed infrastructure comprises a 10 m high concrete diversion weir which diverts the flow into a 270 m long concrete lined canal flowing into a headpond. A penstock conveys the water from the headpond into the power station located on the Western bank of the Ash River. The power station draft tube will be orientated to discharge the water back in line with the river channel to minimise erosion of the banks. A reject structure will be provided at the end of the canal, upstream of the headpond, in order to allow for the return of the water in the canal back to the river in case of a sudden load rejection. The preferred turbine technology for the small hydropower scheme includes a double regulated Kaplan turbine of 5 MW capacity. Electricity will be evacuated via a 22 kV powerline. Water for construction will be sourced from the river. Gravel will be purchased from a local licensed supplier. A septic or conservatory tank will be required to cater for ablutions. It is anticipated that 100-150 employment opportunities will be created during the 18-month construction period, two during operation and 20 during decommissioning. No onsite housing has been proposed.

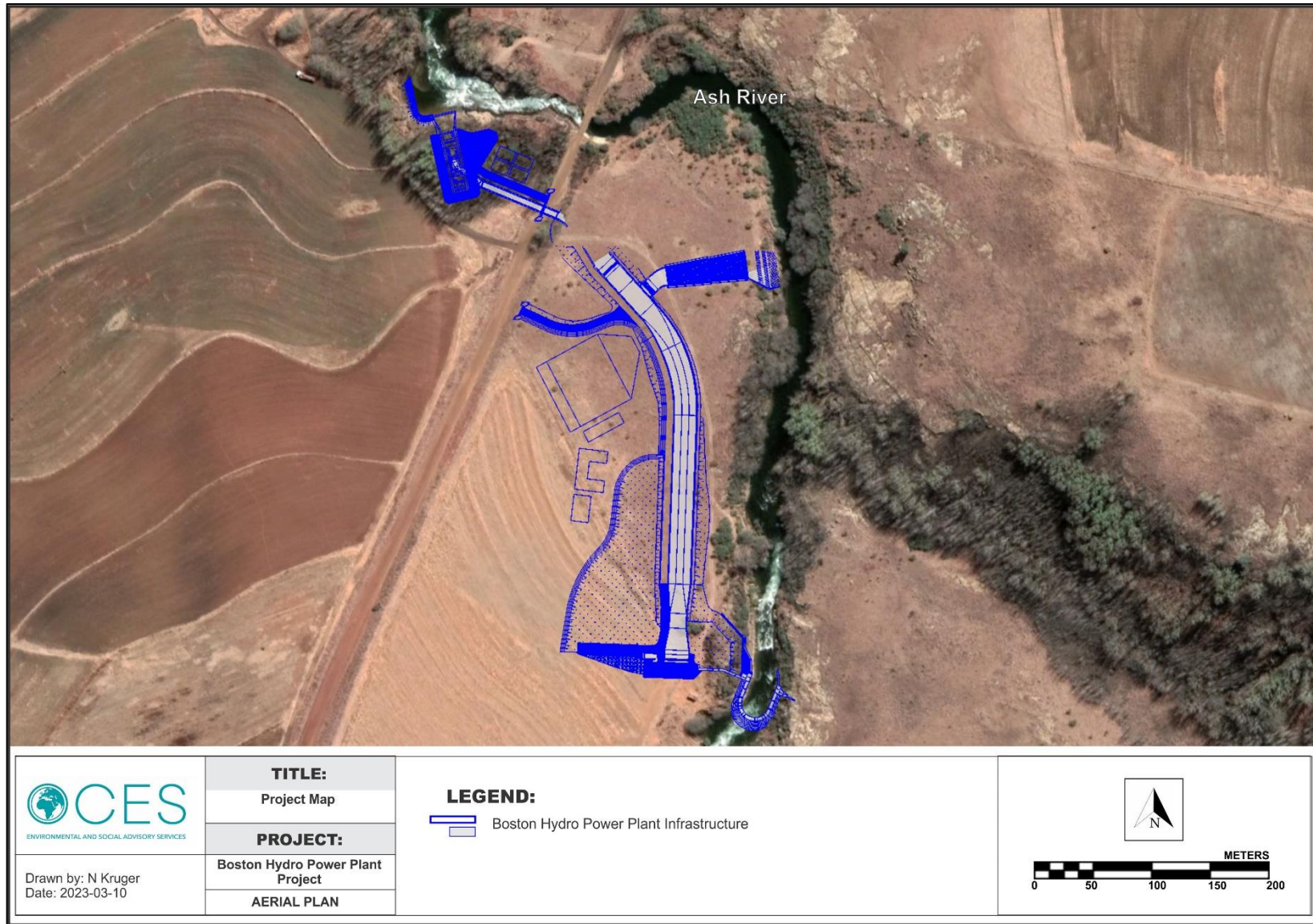


Figure 3-1: Aerial map indicating the proposed layout of the Boston Hydro Power Plant Project along the Ash River.



## 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 1**



## 5 REGIONAL CONTEXT

### 5.1 LOCATION

The proposed Boston Hydro Power Plant Project occurs on the southern banks of the Ash River on portions of the Farm Boston 40 in the Thabo Mofutsanyane District Municipality, Free State Province. The area is situated approximately 7km north of Clarens and 25km south-east of Bethlehem.

The study area appears on 1:50000 map sheet 2828AD (see Figure 5-1) and coordinates for the project area are as follows:

- **Relative Midpoint:** S28.417361° E28.375472°

### 5.2 RECEIVING ENVIRONMENT

The farm subject to this assessment lies within the Grassland Biome which is found chiefly on the high central plateau of South Africa. Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent except in a few localised habitats. Geophytes are often abundant. Frost, fire and grazing maintain the grass dominance and prevent the establishment of trees (Low & Rebelo, 1996). The project area is characterised by slightly undulating plains with scattered outcrops and the Ash River and Kroonspruit bisecting the area. Drainage occurs as sheet-wash towards the major rivers.

### 5.3 SITE DESCRIPTION

The landscape in the project area is generally open land with undulating rolling hills in and high outcrops sloping southwards to the Maluti foothills. The area is densely to sparsely grassed and can be described as typical Free State grasslands with regular rock outcrops on the ridges. Trees and shrubs occur throughout the landscape and around farmsteads and natural vegetation and landscape features remain relatively intact along drainage lines and rock outcrops. Vegetation remains relatively pristine along drainage lines and rivers such as the Ash River and the Kroonspruit. The current land-use of farms in the project area is intensive crop cultivation and livestock farming. Here, large cultivated fields and livestock enclosures occur on the properties. Existing infrastructure on the properties comprise farmhouses, sheds, warehouses as well as workers housing.



Figure 5-1: View of general surroundings in the project area. Note deep sands prevalent in the project area.



Figure 5-2: View of the project area along the Ash River.



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



Figure 5-4: View existing access roads in the project area.



Figure 5-5: View of cultivated fields in the project area.

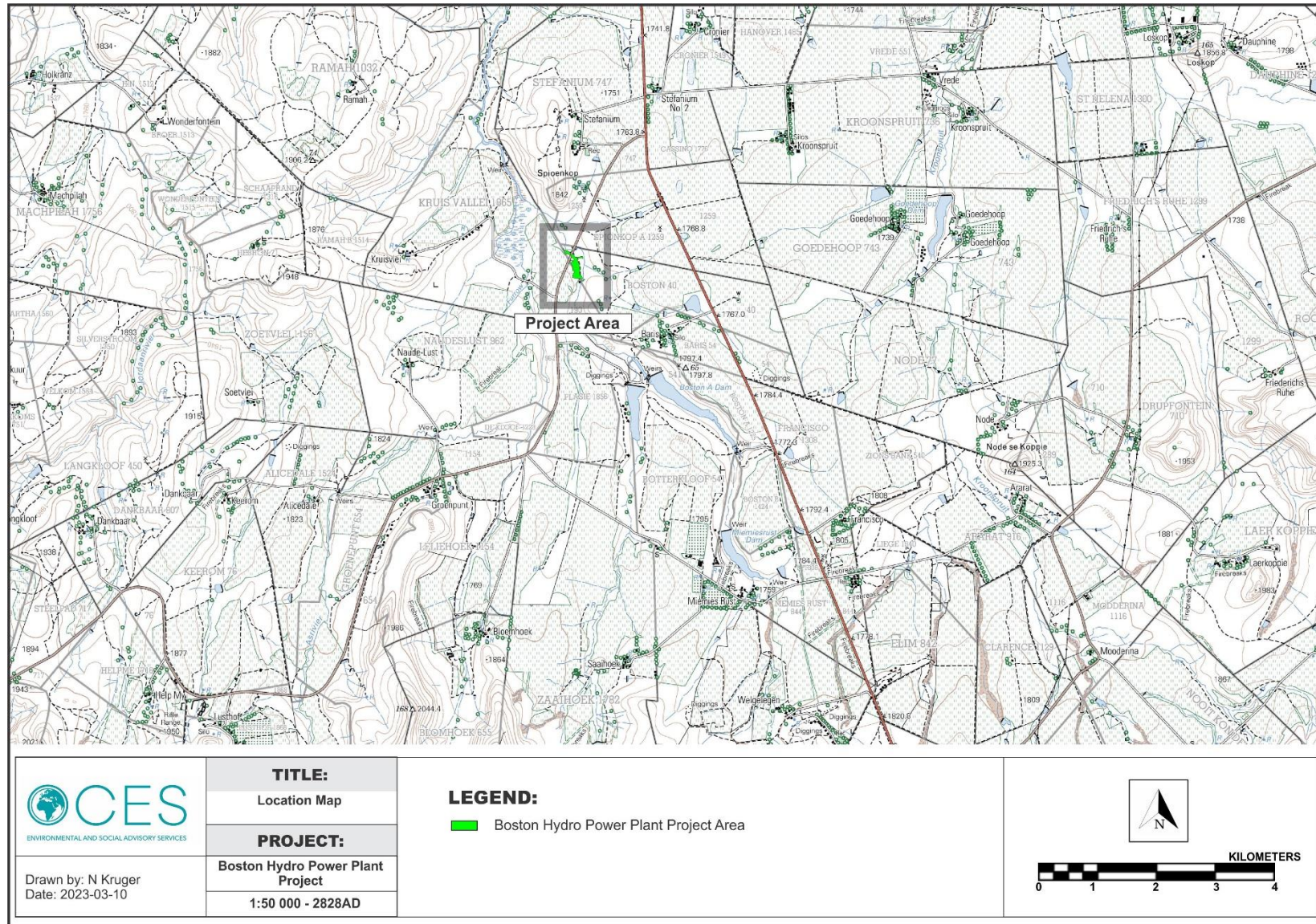


Figure 5-6: 1:50 00 Map representation of the location of the proposed Boston Hydro Power Plant Project (sheet 2828AD).

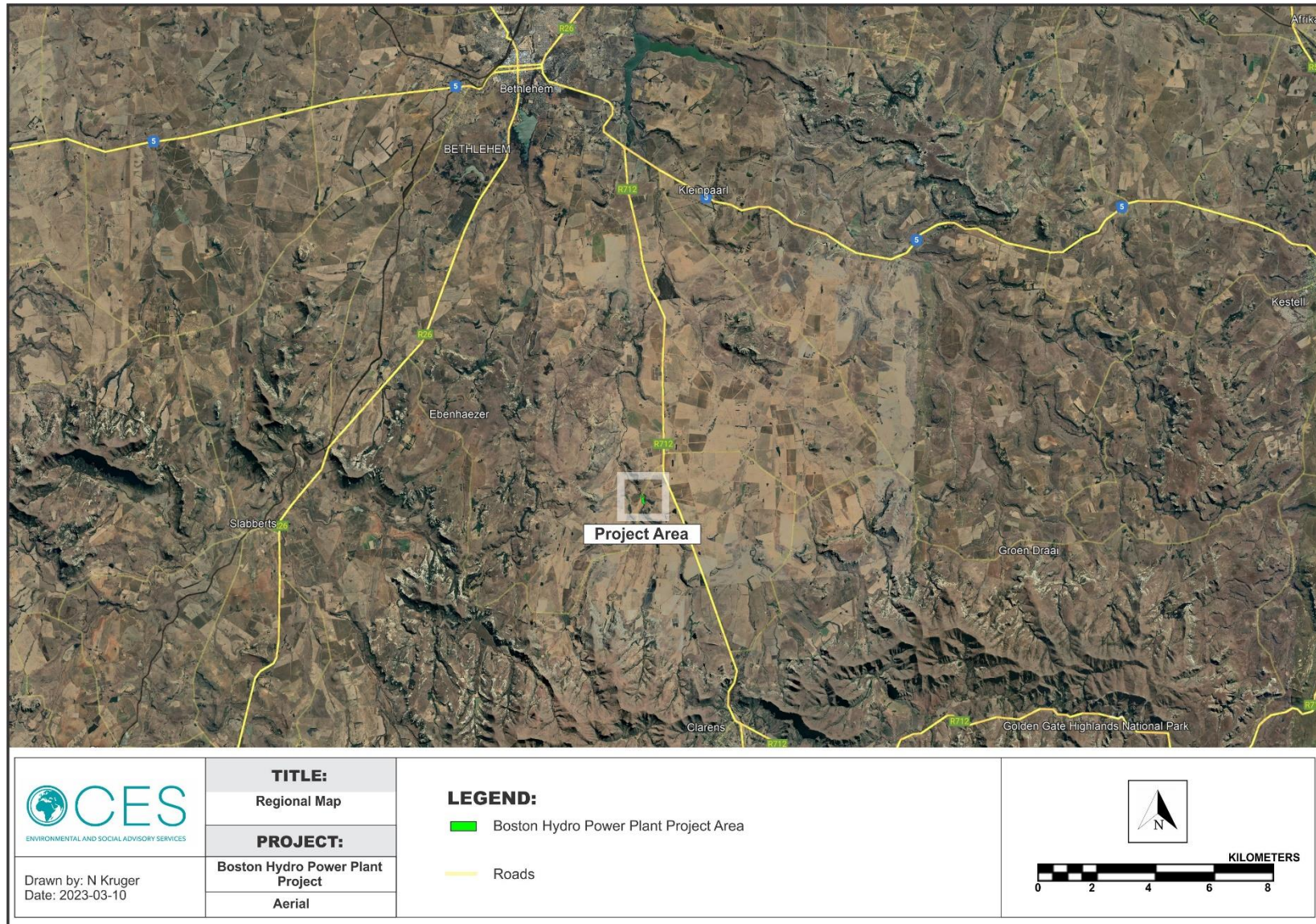


Figure 5-7: Aerial map providing a regional context for the proposed Boston Hydro Power Plant Project.



## 6 METHODOLOGY

### 6.1 SOURCES OF INFORMATION

#### 6.1.1 Desktop Work (Literature Review, Remote Sensing)

The larger landscape of the western Free State 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.

These included:

- Becker, E. 2008. Environmental Impact Assessment for the Proposed Majuba-Venus 765kv Transmission Power Lines (EIA: 12/12/20/1157), Turn-in at the Majuba Sub-station (EIA:12/12/20/1161),
- Birkholtz, P.D. & van der Walt, J. 2006. Phase 1 Heritage Impact Assessment for the Construction and Upgrading of the Proposed Access Roads to the Braamhoek Pumped Storage Scheme (SAHRA reference: 2006-SAHRA-0024);
- CTS Heritage, 2018. Heritage Impact Assessment for the proposed Kruisvallei Hydroelectric Power Generation Scheme. CTS Heritage, Cape Town.
- Dreyer, C. 2003. Archaeological and Historical Assessment of the Nuwejaarspruit Project, Harrismith (SAHRA reference: 2003-SAHRA-0145);
- Dreyer, C. . 2004. First Phase Archaeological and Cultural Heritage Investigation of the Proposed Residential Developments on the Townlands of Harrismith (SAHRA reference: 2004-SAHRA-0171)
- Dreyer, C. . 2005a. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm Grootkrans 238, Kasteel 106 and Bergplaats 120, Kestel, Free State (SAHRA reference: 2005-SAHRA-0298);
- Dreyer, C. 2005b. First Phase Archaeological and Historical Investigation of the Proposed Erection of a Lattice Mast on the Farm Murasie 542, Bethlehem, Free State (SAHRA reference: 2005-SAHRA-0155);
- Dreyer, C. 2005c. Archaeological Assessment of the Proposed Upgrading of the R57 Road (P9/2) between Reitz and Petrus Steyn, Free State (SAHRA reference: 2005-SAHRA-0145);
- Dreyer, C. 2006a. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Development of the Farm Krynauwlust 275, Vrede (SAHRA reference: 2006-SAHRA-0049);
- Dreyer, C. . 2006c. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Residential Developments at the Farm De Brug 1020, Warden, Free State (SAHRA reference: 2006-SAHRA-0047);
- Dreyer, C. . 2006c. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Housing Developments at the Farm Welgelegen, Clarens, Free State;
- Dreyer, C. . 2006c. First Phase Archaeological and Cultural Heritage Assessment of the Proposed Housing Developments at the Farm Ararat, Clarens, Free State;
- Dreyer, C. . 2008a. Archaeological and Culture Historical Assessment of the Proposed Residential Developments at Verkykerskop, near Harrismith, Free State (SAHRA reference: 2008-SAHRA-0117);
- Huffman, T.N. & Steel, R. (Archaeological Resource Management). 1995. Archaeological Ruins at Lancaster Quarry, Harrismith (SAHRA reference: 1995-SAHRA-0027);



- Nel, J. (Archaic Heritage Project Management). 2007. Recommendation of Exemption – Above Ground Sasol Fuel Storage Tanks Located at Grain Silos in Localities in the Eastern Free State (SAHRA reference: 2007-SAHRA-0204);
- Rossouw, L. (National Museum, BFN). 2008b. Phase 1 Archaeological Impact Assessment of a Proposed Water Pipeline adjoining the R712 between Sterkfontein Dam and Puthaditjhaba (SAHRA reference: 2008-SAHRA-0055);
- Van Schalkwyk, J.A. (National Cultural History Museum). 1998. A Survey of Cultural Resources for the Proposed Braamhoek Pumped Storage Scheme, Free State / KwaZulu-Natal Border Area (SAHRA reference: 1998-SAHRA-0007); and
- Van Schalkwyk, J.A. & van den Bos, J. (National Cultural History Museum). 1999. Scoping Report on Cultural Resources for the Proposed Clarens to Suikerbosrand Pipeline (SAHRA reference: 1999-SAHRA-0077).

### 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 of the Blomskraal property 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 Blomskraal farm relied heavily on archive and more recent map renderings of the property to assist the challenging foot and automotive site survey where historical and current maps of the project area were examined. By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the larger 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 Boston Hydro Power Plant Project area was conducted over a two-day period in February 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 large and in some instances is densely vegetated, particular focus was placed on GPS reference points identified during the aerial and mapping survey. Where possible, random spot checks were made and potentially sensitive heritage areas were investigated. Using a Garmin GPS, the survey was tracked and general surroundings were photographed with a Samsung Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.





## 6.2 ASSUMPTIONS AND LIMITATIONS

The site survey for the Boston Hydro Power Plant Project AIA proved to be constrained and the investigation primarily focused around 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, farmlands vegetated by occasional trees and mixed grasslands as well as riparian vegetation. Visibility proved to be a constraint in certain portions of the project area.
- Dense vegetation restricted free movement in some portions of the project area.
- 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  <b>(commonly restricted to the interior and north-east coastal areas of Central and Southern Africa)</b>	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD  <b>(commonly restricted to the interior and north-east coastal areas of Southern Africa)</b>	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	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.

A number of heritage studies have been conducted in the Warden area, most of which describe a rich and varied heritage landscape. Generally, sites documenting Earlier, Middle and Later Stone Age habitation occur across the Free State, mostly in open air locales or in sediments alongside rivers or pans. Sites dating to the Iron Age



occur on the Southern Highveld and the Free State where environmental factors and population density delegated that the spread of Iron Age farming. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, Colonial farming, and war events, which herald the modern era in South African history.

### 7.1.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of Australopithecine and *Homo habilis* have been found in dolomite caves and underground dwellings 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.

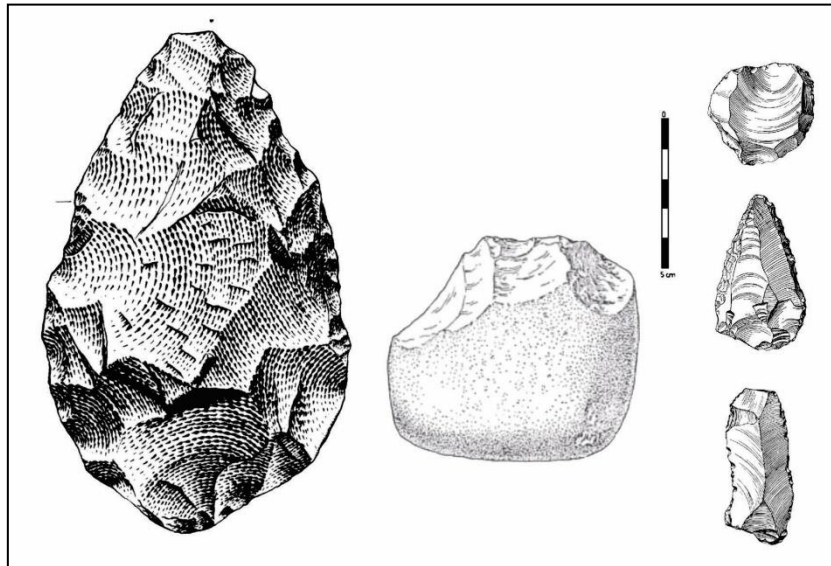


Figure 7-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

### 7.1.2 San Rock Art

Rock art is Africa's oldest artistic tradition and South African Bushman or San rock art is one of the finest, oldest and most enduring artistic traditions in the world. The renowned San rock paintings of the Drakensberg region belongs to the LSA period- although the majority were made between 4000 years ago and about 120 years ago.



Rock Art can be in the form of rock paintings or rock engravings. Rock paintings occur on the walls of caves and rock shelters across southern Africa and are prolific in the Southern Drakensberg, north-eastern Cape extending the entire Drakensberg range into KwaZulu-Natal and Lesotho. Rock engravings are limited to the Karoo and Northern Cape Regions and do not generally occur within the north Eastern Cape region and former Transkei region. Rock art is visual imagery painted onto or engraved out of the rock face. It is an archaeological artefact that tells us about its makers, who they were, where they lived and what they thought and did. Bushman rock art is also highly symbolic and religious. Shamanism centres on a belief in a spiritual world that exists behind the rock and which medicine people or shamans could travel to in order to heal, make rain, fight evil and so forth. Functioning as both homes and sacred spaces, the rock art shelters are monuments to the lives and spirituality of the San people. There are over 25 000 rock art sites throughout South Africa. Many of these are in the vicinity of Clarens, Golden Gate and the Maluti Mountains, with several exceptional rock art sites close to Clarens.

### 7.1.3 Iron Age Farmers

The beginnings of the Iron Age (Farmer Period) in Southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture of pottery. Iron Age people moved into Southern Africa by c. AD 200, entering the area either by moving down the coastal plains, or by using a more central route. From the coast they followed the various rivers inland. Being cultivators, they preferred rich alluvial soils. The Iron Age can be divided into three phases. The Early Iron Age includes the majority of the first millennium A.D. and is characterised by traditions such as Happy Rest and Silver Leaves. The Middle Iron Age spans the 10th to the 13th Centuries A.D. and includes such well known cultures as those at K2 and Mapungubwe. The Late Iron Age is taken to stretch from the 14th Century up to the colonial period and includes traditions such as Icon and Letaba.

The Iron Age archaeology of the Free State is characterised by a wide distribution of stone-walled sites along the flat-topped ridges and hills. Studies have revealed detail and consistency in the arrangement and design of the structures. People's expression of culture has left its imprint on the material environment. Thus, recognised settlement patterns display human perceptions with regard to social clustering, economic system and political organisation. Patterns are indicated by the arrangement of huts, byres and ash heaps in a particular order and in relation to one another. Spatial organisation in general is characterised by the central position of stock byres and the placing of the main dwelling area on the perimeter of the settlement. During the Later Iron Age, emphasis was not only on stone building, for additional structures of perishable materials, supplementing living space, have also been revealed. All the characteristics of settlement patterns allow the immediate recognition of specific cultural groups of people populating the landscape. Extensive surveying by Tim Maggs in the Free State during the 1970s culminated in an extensive framework for Late Iron Age stone-walled settlements characterised by connecting walls, surrounding walls and huts with bilobial courtyards.

Maggs established the following classification of sites (Maggs 1976):

- Type N (Ntuanatsatsi): Occurring mostly in the north eastern Free State.
- Type V (Makgwareng): Occurring mostly in the eastern Free State towards the Drakensberg.
- Type Z (OXF1): Occurring mostly in the north western regions of the Free State.
- Type R (OFD 1): Riet River area of the Free State.

The N-type settlements were built by the Fokeng and Kwena while the Taung were responsible for the construction of some of the V-type settlements. The Kubung built the Z-type settlements and Khoi groups, who lived near the Riet River, built R-type sites. The stone walled sites that have been identified in the project area constitutes mainly Z-type settlements. These types of settlement also occurred along the lower



reaches of the Renoster River. Large concentrations of V-type settlements are found along the upper reaches of the Renoster and Vals Rivers.

Maggs' research indicated that the division of sites based on layout is confirmed by associated pottery assemblages with different decoration styles. Different settlement patterns also produced huts of different materials in different styles. The classification of sites is based on the assumption that settlement layout is bound and prescribed by cultural perceptions. The identification of different ethnic groups is thus possible from the way in which these traditional peoples have organised their different living places in terms of space and time. The final result was directed by cultural preference (choice) and function. The importance of livestock, personal status, kinship, social organisation and the diverse roles of men, women and offspring have always been important in the understanding of settlement patterns. Pottery decorations associated with this settlement type are characterised by shallow line incisions in bands and triangles below the rim and on the shoulder, combined with straight or curved lines and areas of red ochre burnish on the body of clay vessels (Maggs 1976).

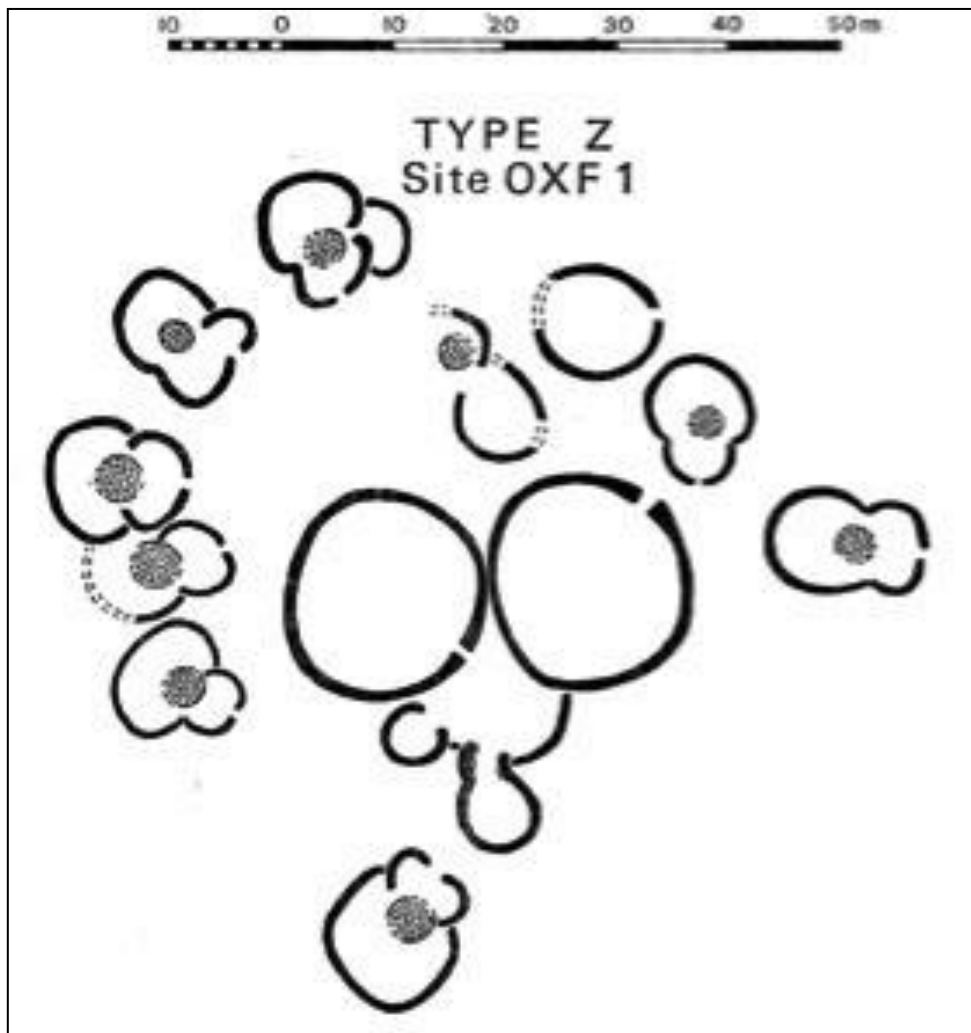


Figure 7-2: Plan of typical Type Z settlement pattern as classified by Maggs (1976).

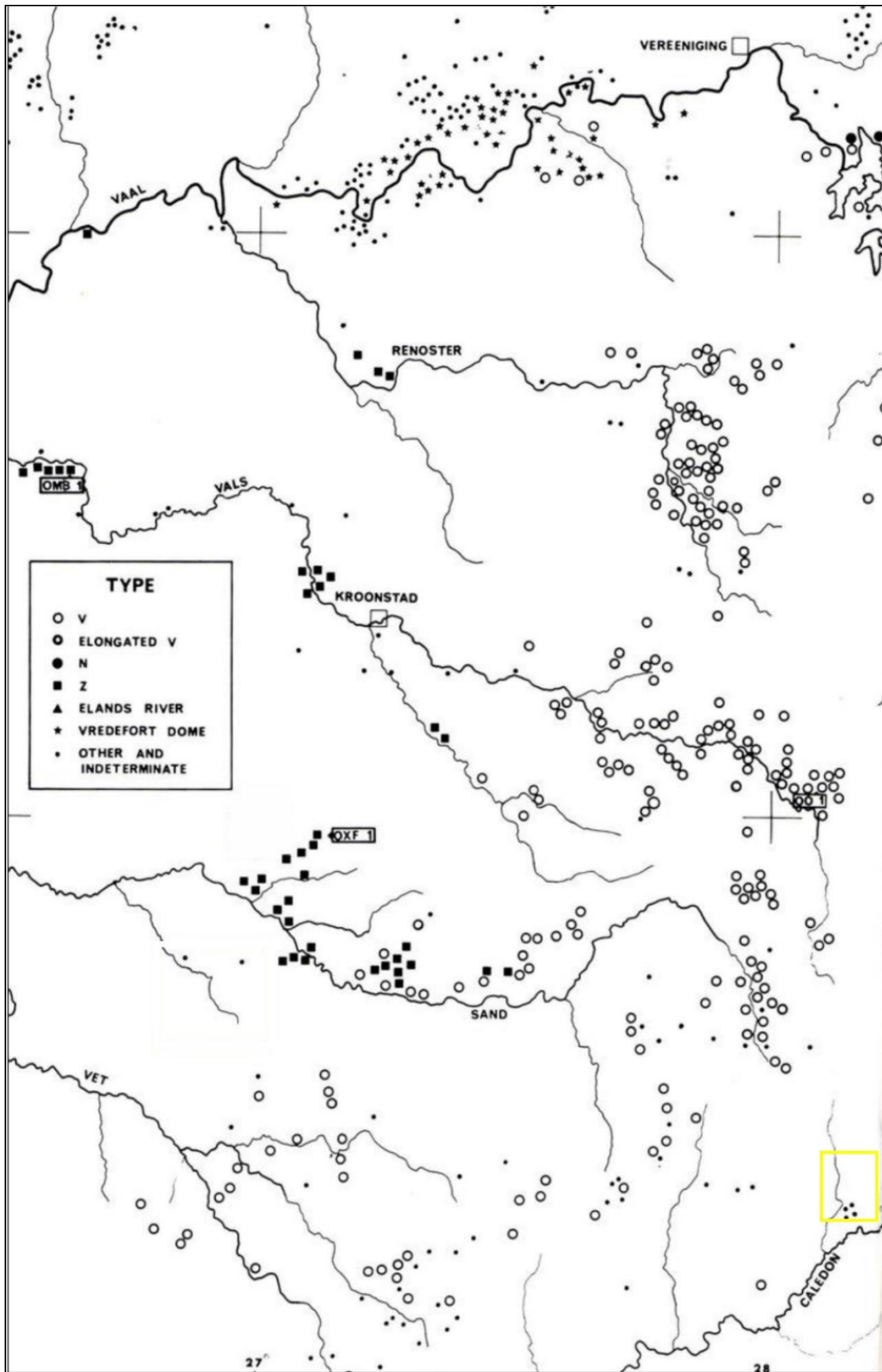


Figure 7-3: Distribution of Iron Age sites in the north western Free State (project area indicated by yellow outline) (Maggs 1976).



### 7.1.4 The Cultural Landscape

Clarens was established in 1912 on the farms Leliehoek and Naauwpoort. Leliehoek was bought from Hermanus Steyn in 1910, and in 1911 Piet de Villiers sold his farm Naauwpoort to a company wanting to establish a village there. These two farms were divided into erven and sold for fifty pounds each. A commission was appointed in 1912 to finalize negotiations, and a decision was made to name the village "Clarens" in honour of President Paul Kruger's influence in the area. This came about in the following way - during the Free State-Basotho War of 1865 - 1866, five "burgers" from the Transvaal were murdered in the Eastern Free State, and as a result war was declared against the Basotho leader, Moshoeshoe. Paul Kruger, together with a commando of burgers, defeated the Basotho at the Battle of Naauwpoortnek (near Titanic rock). President Kruger spent his last days as a voluntary exile in the attractive village of Clarens in Switzerland, and thus Clarens was named for this Swiss town. A monument was erected on the farm "Ararat" just outside Clarens, in honour of the five burghers murdered by the Basotho on 29 September 1865, during the siege of Naauwpoort. This monument was later moved to Clarens and placed in the central town square, where it stands to this day.

The As River is a tributary of the Liebenbergsvlei River in the eastern Free State, South Africa. Since 1968 it is impounded by the Sol Plaatje Dam (formerly Saulspoort Dam) at its confluence with the latter river, just east of Bethlehem. Its origin is some 35 km southeast of Bethlehem, on the northern slopes of the Rooiberge, near Clarens. The As River is one of the discharge points for the Lesotho Highlands Water Project. As of 2004, 18 cubic meters of water was released per second, and the river's flow is consequently not seasonally variable. With the opening of the northern delivery tunnel of the Lesotho Highlands Water Project in 1998, the once tiny stream was transformed to a strong-flowing river.



Figure 7-4: The Ash River Outfall in the project area.

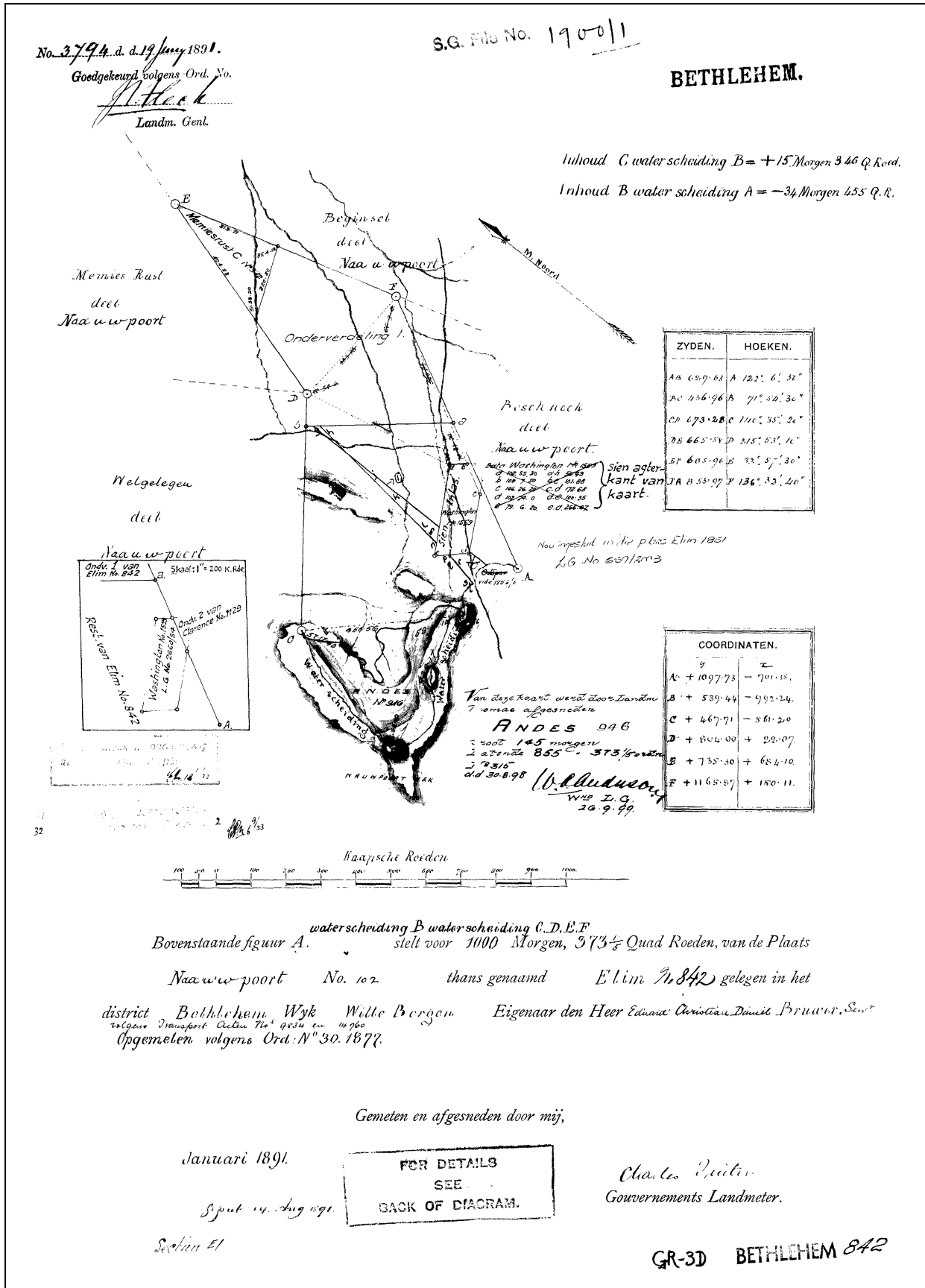


Figure 7-5: Title deed for the farm Naauwpoort on which the town of Clarens was established, dating to 1891.



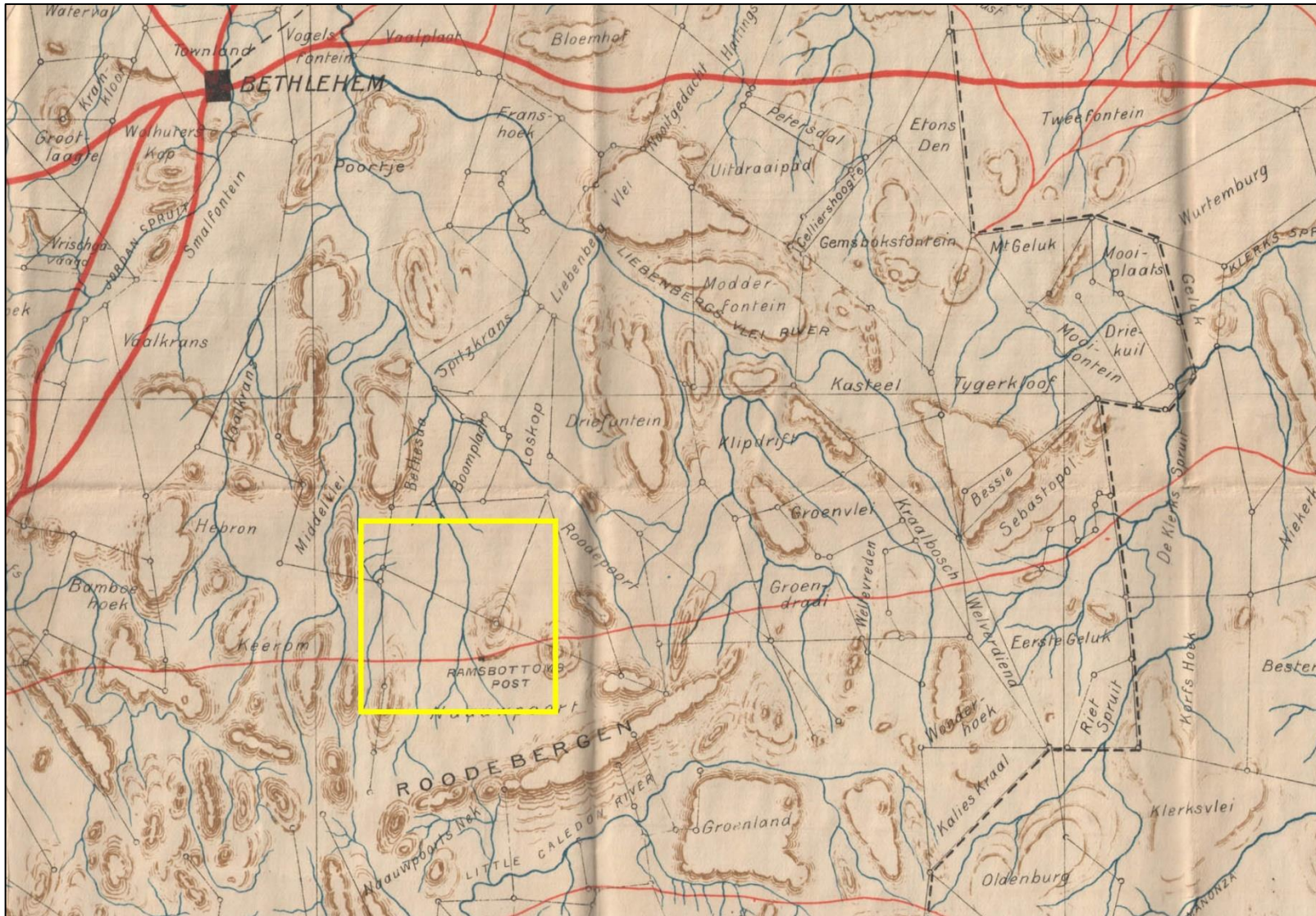


Figure 7-6: The South African War Map (1899-1902) of the Harrismith area dating to 1900. The relative position to the project area is indicated by the yellow square.



## 8 FINDINGS AND RESULTS

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### 8.1 ARCHAEOLOGY AND THE CULTURAL LANDSCAPE

#### 8.1.1 Desktop Appraisal

In terms of heritage resources, the general landscape around the project area is primarily well known for its Later Stone Age, San Rock Art, Iron Age Farmer and Colonial / Historical Period archaeology related to farming, rural expansion and warfare of the past century. An analysis of historical aerial imagery and archive maps reveals the following (see Figure 5-2 to Figure 5-6):

- The original farms "Leliehoek" and "Naauwpoort" on which the town of Clarens was later established, are indicated on the South African War Map (1899-1902) of the Harrismith area dating to 1900.
- A number of so-called "huts" as well as vast cultivated fields, "Wilgers" (Willow trees), Poplars and "Sipress" (Cypress trees) appear on a topographic map of the project area and the surrounding landscape dating to 1948.
- A number of dwellings and vast agricultural fields appear on a topographic map of the project area and the surrounding landscape dating to 1978.
- Historical farming and agriculture fields as well as dwellings and man-made structures are legible on aerial imagery dating to 1962 in areas subject to this assessment.
- Buildings and man-made structures appear outside the project area on these images which also indicated the presence of vast agricultural fields.

#### 8.1.2 Site Survey Findings

An analysis of historical aerial imagery and archive maps of areas subject to this assessment suggests a landscape which has been subjected to historical farming activities possibly sterilising the area of heritage remains. This inference was confirmed during an archaeological site assessment and no *in situ* heritage remains, archaeological sites, built environment features or burial sites were encountered in the project area.

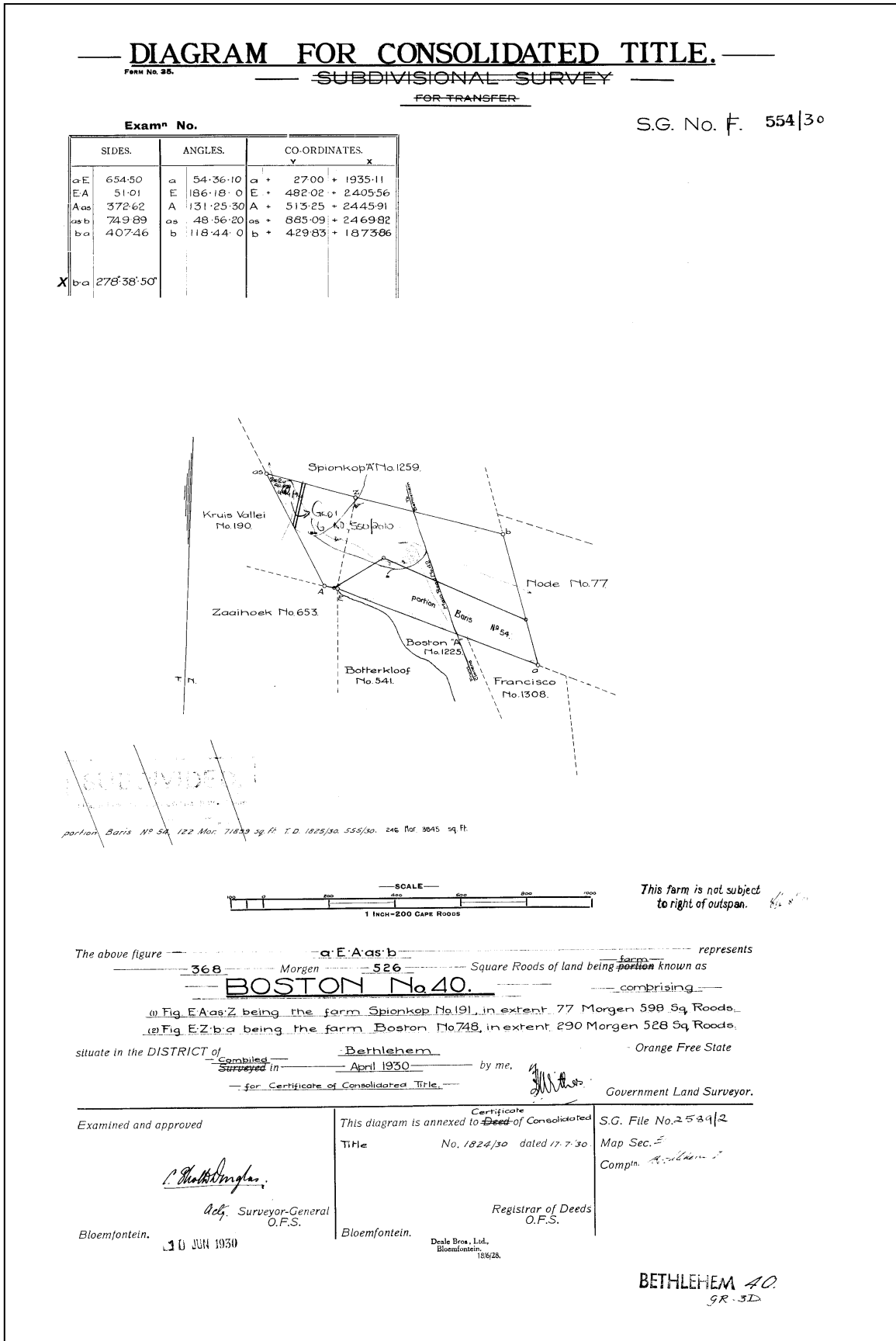


Figure 8-1: Title deed for the farm Boston in the project area, dating to 1930.



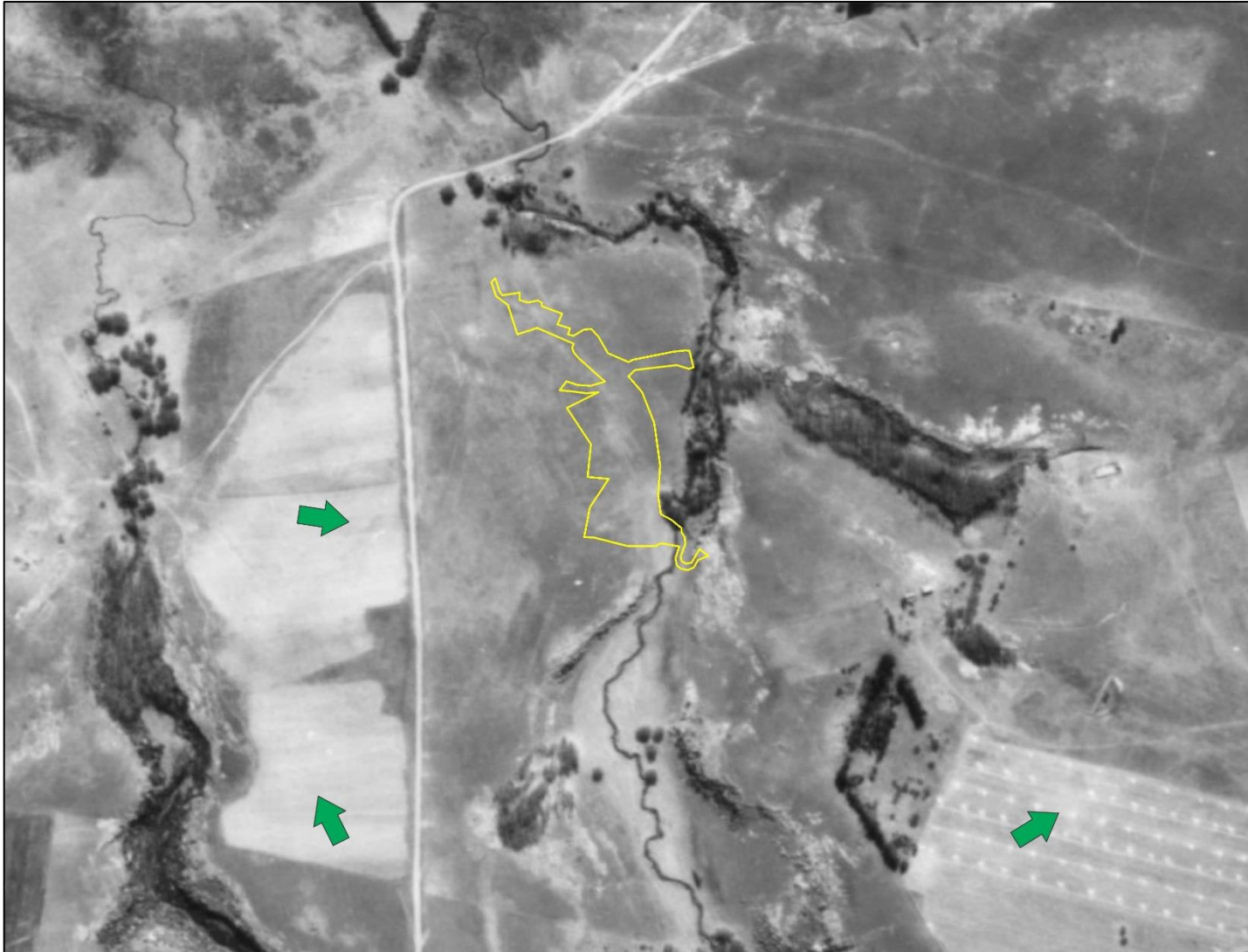


Figure 8-3: An aerial image of the power line corridor (yellow polygons) dating to 1962 indicating the presence of extensive agriculture activities (green arrows) as well as potential man-made structures or features of heritage potential (orange arrows).



## 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.

### 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. However, portions of the project area and the baseline environment have been affected by historical, recent and ongoing farming which possibly sterilized the landscape from prehistorical archaeological and other remnants. As no archaeological sites, heritage remains, built environment features or burial sites were located during the site assessment no apparent impact on the heritage landscape is foreseen during the construction phase. However, 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. It should also be noted that graves and cemeteries do not only occur around towns but they are also randomly scattered around archaeological and historical settlements in the rural areas of the Free State Province. The probability of informal human burials encountered during the construction phase should thus not be excluded. Generally, the construction of transmission lines are typically low impact activities but excavation holes may expose artefacts, sites or human remains and ECO monitoring activities will be required throughout the construction phase of the project. 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). 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 and ensure that effective measures were implemented.

### 9.5 CUMULATIVE IMPACTS

It is the opinion of the Specialist that the proposed Boston Hydro Power Plant Project will have a little to negligible negative cumulative impact on the heritage value of the area for the following reasons:

- The absence 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 transformed nature of much of the project landscapes and the presence of agricultural fields and existing power lines in development areas means that 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.
- The heritage context and sensitivity of the proposed development zones points to a landscape of limited heritage significance on a local level.
- 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 1) summarizes impacts to the heritage landscape of the study area:



**Table 1 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
<b>Impact 1: Loss of Heritage Resources</b>										
Archaeological sites, heritage remains, built environment features or burial sites	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
<b>Impact 1: Loss of Heritage Resources</b>										
Archaeological sites, heritage remains, built environment features or burial sites	Negative	Short term	Study area	Slight/ Slightly Beneficial	Unlikely	LOW	Irreversible	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
<b>Impact 1: Loss of Heritage Resources</b>										
Archaeological sites, heritage remains, built environment features or burial sites	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
<b>Impact 1: Loss of Heritage Resources</b>										
Archaeological sites, heritage remains, built environment features or burial sites	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.

*No archaeological sites, heritage remains, built environment features or burial sites were noted in the project area but the following general measures are recommended in terms of heritage management and mitigation:*

<b>POTENTIAL IMPACT</b>	Damage/destruction of sites.	
<b>ACTIVITY RISK/SOURCE</b>	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	
<b>MITIGATION: TARGET/OBJECTIVE</b>	To locate previously undetected heritage remains / graves as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	
<b>MITIGATION: ACTION/CONTROL</b>	<b>RESPONSIBILITY</b>	<b>PROJECT COMPONENT/S</b>
<b>Site Monitoring:</b> 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	<b>Construction</b>
<b>Site Monitoring:</b> 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	<b>Operation</b>
<b>Site Monitoring:</b> 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, HERITAGE ASSESSMENT PRACTITIONER	<b>Closure / Decommissioning</b>
<b>PERFORMANCE INDICATOR</b>	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	



# 11 CONCLUSION AND RECOMMENDATIONS

The larger landscape around the project area indicates a rich heritage horizon encompassing Stone Age, Rock Art, Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming, rural expansion and warfare of the past century. The following observations are made for the proposed Boston Hydro Power Plant Project:

- Portions of the project area and the baseline environment have been affected by historical, recent and ongoing farming activities which possibly sterilized the landscape of prehistorical archaeological and other remnants. As no archaeological sites, heritage remains, built environment features or burial sites were located during the site assessment no apparent impact on the heritage landscape is foreseen during the preconstruction, construction and operation phases of the project. However, since cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Graves and cemeteries are often scattered around archaeological and historical settlements in the rural areas of the Free State Province and the probability of informal human burials encountered during the construction phase should thus not be excluded. Site monitoring by an informed ESO and appointed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites.
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ESO and appointed 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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# 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 CES

## 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.
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- 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 m<sup>2</sup> in extent; or*
  - (ii) involving three or more existing erven or subdivisions thereof; or*
  - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;**
- (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

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

And:

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

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



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

## 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

<b>Duration (Temporal Scale)</b>		<b>Score</b>
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
<b>Extent (Spatial Scale)</b>		
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
<b>Probability (Likelihood)</b>		
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

<b>Impact Severity</b>		<b>Score</b>
<i>(The severity of negative impacts, or how beneficial positive impacts would be on a particular affected system or affected party)</i>		
<b>Very severe</b>	<b>Very beneficial</b>	<b>4</b>
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.	
<b>Severe</b>	<b>Beneficial</b>	<b>3</b>
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.	
<b>Moderately severe</b>	<b>Moderately beneficial</b>	<b>2</b>
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.	
<b>Slight</b>	<b>Slightly beneficial</b>	<b>1</b>
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.	
<b>No effect</b>	<b>Don't know/Can't know</b>	
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>	
<b>VERY HIGH NEGATIVE</b>	<b>VERY BENEFICIAL</b>
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>	
<b>HIGH NEGATIVE</b>	<b>BENEFICIAL</b>
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>	
<b>MODERATE NEGATIVE</b>	<b>SOME BENEFITS</b>
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>	
<b>LOW NEGATIVE</b>	<b>FEW BENEFITS</b>
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>	
<b>NO SIGNIFICANCE</b>	
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>	
<b>DON'T KNOW</b>	
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><b>No further action / Monitoring</b></p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p><b>Avoidance</b></p>
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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.