SISHEN IRON ORE COMPANY: PROPOSED SEKGAME ELECTRICITY INFRASTRUCTURE EXPANSION PROJECT ON THE FARM SEKGAME 461, SISHEN MINE, NORTHERN CAPE PROVINCE

Archaeological Impact Assessment

An EOH Company

Prepared for **Sishen Iron Ore Company**

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ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE PORTIONS ON THE FARM SEKGAME 461 FOR THE PROPOSED SEKGAME ELECTRICITY INFRASTRUCTURE EXPANSION PROJECT, SISHEN MINE, NORTHERN CAPE PROVINCE

December 2014

Conducted on behalf of:

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Exigo Sustainability 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, Exigo Sustainability follows the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment as set out by the South African Heritage Resources Agency (SAHRA) and the Culture Resources Management (CRM) section of the Association for South African Professional Archaeologists (ASAPA).

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 Sishen-Sekgame Electricity Expansion 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 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 client / 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.

_____

Signature of specialist
Company: Exigo Sustainability
Date: 10 November 2014.

EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study on the farm Sekgame 461, subject to an Environmental Impact Assessment (EIA) process for the proposed Sishen Sekgame Electricity Expansion Project at the Sishen Mine in the John Taolo Gaetsewe District Municipality of the Northern Cape Province. The report includes background information on the area's archaeology, its representation in southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed.

A large number of archaeological and historical studies have been conducted in the Kathu area. These studies all infer a rich and diverse archaeological landscape around the town and the Northern Cape Province, which encompasses a significant heritage legacy, mostly dominated by Stone Age occurrences. The abundance of locally available raw material implies a prominent Stone Age presence and specifically Earlier Stone Age (ESA) and Middle Stone Age (MSA) artefacts occur widely in the area along the northern banks of the Gamagara River on the farms Fritz, Gamagara and Sishen. In addition, the nationally important Kathu Pan, Kathu Townlands and Bestwood archaeological sites are all situated in close proximity of the town of Kathu. These sites are earmarked for registration as Grade 1 National Heritage status sites. A wealth of Later Stone Age rock art sites, most of which are in the form of rock engravings are also to be found in the larger landscape. These sites occur on hilltops, slopes, rock outcrops and occasionally in river beds. Sites dating to the Iron Age occur in the north eastern part of the Province but environmental factors delegated that the spread of Iron Age farming westwards from the 17th century was constrained mainly to the area east of the Langeberg Mountains. However, evidence of an Iron Age presence as far as the Upington area in the eighteenth century occurs in this area. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments at Kimberley, which herald the modern era in South African history.

Similarly, the heritage survey for the Sishen-Sekgame Electricity Expansion Project produced sensitive Stone Age heritage receptors, specifically along the southern section of the proposed electricity distribution line and in the area demarcated for the Sekgame switching yard:

- A low density MSA (**Site EXIGO-SG461-SA01)** scatter was identified along the proposed electricity distribution line in association with a shallow quarry, directly adjacent to the N14 road. Single formal tools, such as points, and scrapers as well as a number of worked cores produced on fine grained specularite and jaspilite were observed at the site. The occurrence is of limited scientific value within its local site context due to the general loss of context and site integrity for the artefacts at the quarry, and the low density of diagnostic formal tools. However, the site is situated within (and possibly part of) the larger Kathu Stone Age Complex and on a regional scale it might be of importance. It is therefore recommended that all construction activities be monitored by Stone Age archaeologist familiar with the archaeological sequence of the Kathu Archaeological Complex.
- Larger scatters of MSA material (**Site EXIGO-SG461-SA02, Site EXIGO-SG461-SA03)** were documented towards the southern offset of the proposed Sekgame switching yard as well as in the eastern sector of the proposed Sekgame switching yard site. Formal tools such as points, broken blades and scrapers as well as a number of cores, produced on fine grained specularite and jaspilite were noted. The occurrences are of interest due to the presence of formal stone tools, a higher density of artefacts as well as the position of the occurrence within the larger Kathu Stone Age Complex. It is primarily recommended that the infrastructure be realigned to avoid impact on the sites. Here, a conservation

buffer of at least 5m should be maintained around identified Stone Age scatters. However, should this mitigation measure prove unachievable it is recommended that these sites be subject to Phase 2 mitigation conducted by a professional archaeologist with experience in Stone Age archaeology, preferably a specialist that understands the archaeology of the area. A permit in terms of s.35 of the National Heritage Resources Act (NHRA Act No 25 of 1999) will have to be obtained from the responsible heritage authority

- A Palaeontological Impact Assessment and / or Desktop Study is recommended for the study area and, should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should be carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.

Sishen-Sekgame Electricity Expansion Project Heritage Sites Locations

Site Code	Coordinate S	Coordinate E
EXIGO-SG461-SA01	S27.76450	E23.06762
EXIGO-SG461-SA02	S27.77174	E23.06743
EXIGO-SG461-SA03	S27.77589	E23.06703

A number of Stone Age occurrences were identified along areas demarcated for development of the proposed Sishen Sekgame Electricity Expansion Project. These features are of significance in terms of heritage value and impact on sensitive heritage receptors is foreseen. As such, the heritage resources will require further mitigation measures in order to conserve the historical fabric of these features. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Sishen Sekgame Electricity Expansion Project may proceed from a culture resources management perspective, provided that all mitigation measures supplied in this Report is implemented prior to the commencement of construction on the site, and subject to the necessary approval from the relevant Heritage Resources Agency (SAHRA / Provincial Heritage resources Authorities - PHRA).

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

NOTATIONS AND TERMS/TERMINOLOGY

Absolute dating:

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

Archaeology:

The study of the human past through its material remains.

Archaeological record:

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

Artefact:

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

Assemblage:

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

^{14}C or radiocarbon dating:

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

Ceramic Facies:

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

Ceramic Tradition:

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

Context:

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

Culture:

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

Cultural Heritage Resource:

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

Cultural landscape:

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

Cultural Resource Management (CRM):

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

Ecofact:

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

Excavation:

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

Feature:

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

GIS:

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

Historical archaeology:

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

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

Iron Age:

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

Lithic:

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

Management / Management Actions:

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

Matrix:

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

Megalith:

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

Midden:

Refuse that accumulates in a concentrated heap.

Microlith:

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

Monolith:

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

Oral Histories:

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

Phase 1 CRM Assessment:

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

Phase 2 CRM Study:

In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or

collection (in terms of a permit) at sites that may be lost as a result of a given development.

Phase 3 CRM Measure:

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

Prehistoric archaeology:

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

Probabilistic Sampling:

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

Provenience

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

Random Sampling:

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

Relative dating:

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

Remote Sensing:

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

Rock Art Research:

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

Scoping Assessment:

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

Sensitive:

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

Site (Archaeological):

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

Slag:

The material residue of smelting processes from metalworking.

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

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

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

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

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

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

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

LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
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
PHRA	Provincial Heritage Resources Authorities
SAFA	Society for Africanist Archaeologists
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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1.1 Scope and Motivation

Exigo Sustainability was commissioned by Sishen Iron Ore Company for an Archaeological Impact Assessment (AIA) study on portions of the farm Sekgame 461, subject to an Environmental Impact Assessment (EIA) process for the proposed Sishen Sekgame Electricity Expansion Project at the Sishen Mine in the in the John Taolo Gaetsewe District Municipality of the Northern Cape Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

1.2 Project Direction

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

1.3 Project Brief

The scope of this project includes electricity distribution lines (6 – 8 distribution lines varying between 50Kv and 132kV) and servitude (100 meter wide) from the existing Ferrum Substation to the new proposed Sekgame Switching Station. The following dimensions have been planned for the proposed Sishen-Sekgame Electricity Expansion Project (see Figure 1-1):

- Electricity distribution line: 5.20km
- Segame switching station: 3ha

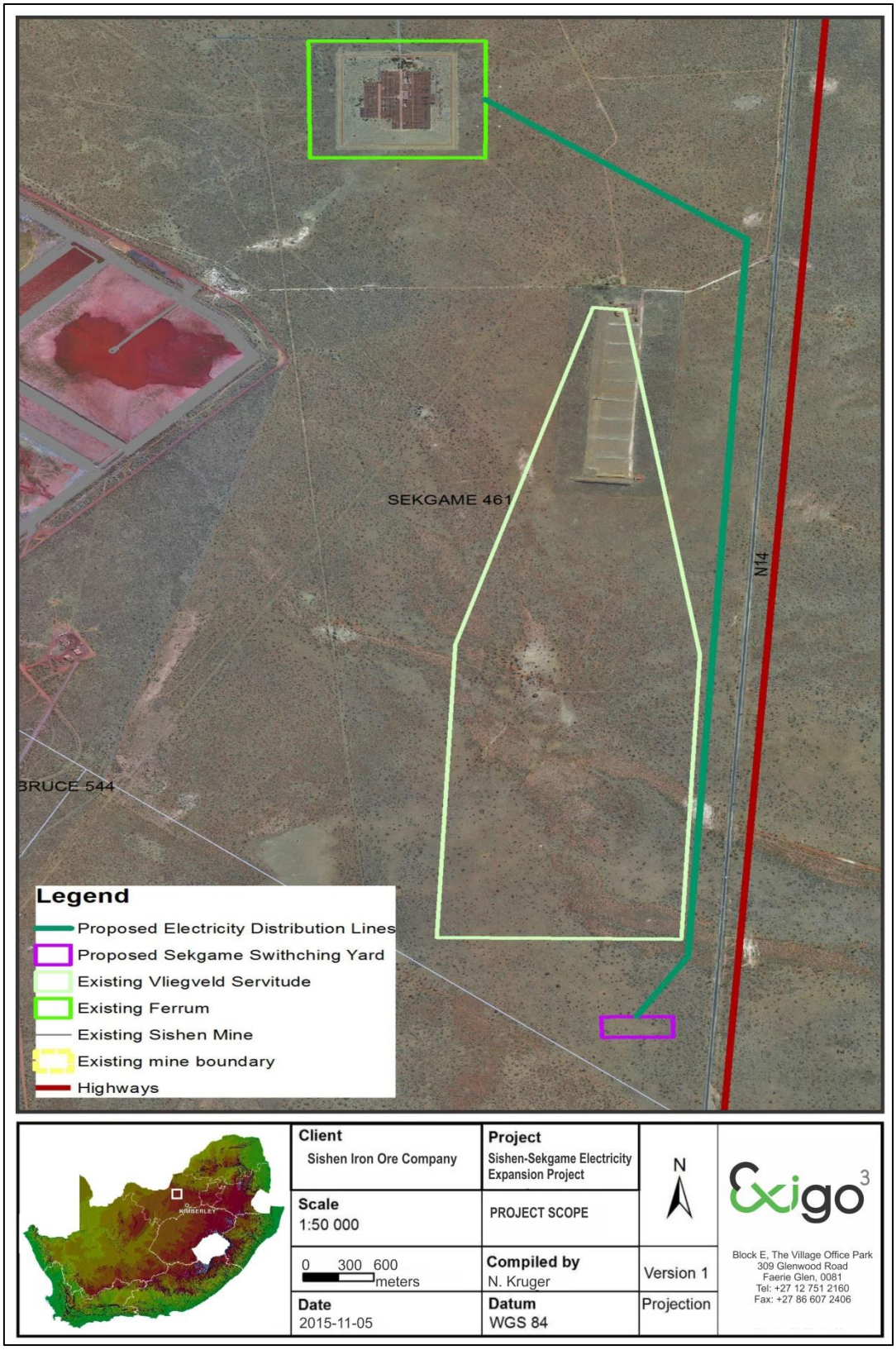

Figure 1-1: Aerial image indicating the extent of planned infrastructure for the Sishen Sekgame Electricity Expansion Project.

1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that through the management of change, developments still conserve our heritage resources. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain development categories which may have an impact on heritage resources. 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 (see Section 34 of the NHRA), archaeological sites and material (see Section 35 of the NHRA) and graves as well as burial sites (see Section 36 of the NHRA). 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 occur in the project area, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance.*
- *Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Obtain a comment from the relevant Heritage Resources Authority (SAHRA / PHRA).*

1.5 CRM: Legislation, Conservation and Heritage Management

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

1.5.1 Legislation regarding archaeology and heritage sites

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

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

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

above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

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

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

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

and

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

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."

and

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

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

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."

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

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

1.5.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (Heritage 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 to be 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^2 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^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

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

And:

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

(a) The identification and mapping of all heritage resources in the area affected;

(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;

(c) an assessment of the impact of the development on such heritage resources;

(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(g) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64)."

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

1.6 Assessing the Significance of Heritage Resources

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable.* Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites

have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

1.7 - 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.
- Grade 3 or local heritage sites.

Generally protected sites:

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

- Structures older than 60 years.

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

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

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

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

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

2 REGIONAL CONTEXT

2.1 General Location

The Sishen Sekgame Electricity Expansion Project study area occurs directly east of the Sishen Iron Ore Mine complex along the N14 National Route on surface portions of the farm Sekgame 461 in the John Taolo Gaetsewe district of the Northern Cape Province, generally at **S27.747623° E23.013198° (1:50 000 Map reference 2723CC)**.The town of Kathu occurs north-west of the study area. The Sishen Iron Ore Mine Complex is situated more or less 5km south-west of the town of Kathu and approximately 180km north-east of the Northern Cape town of Upington

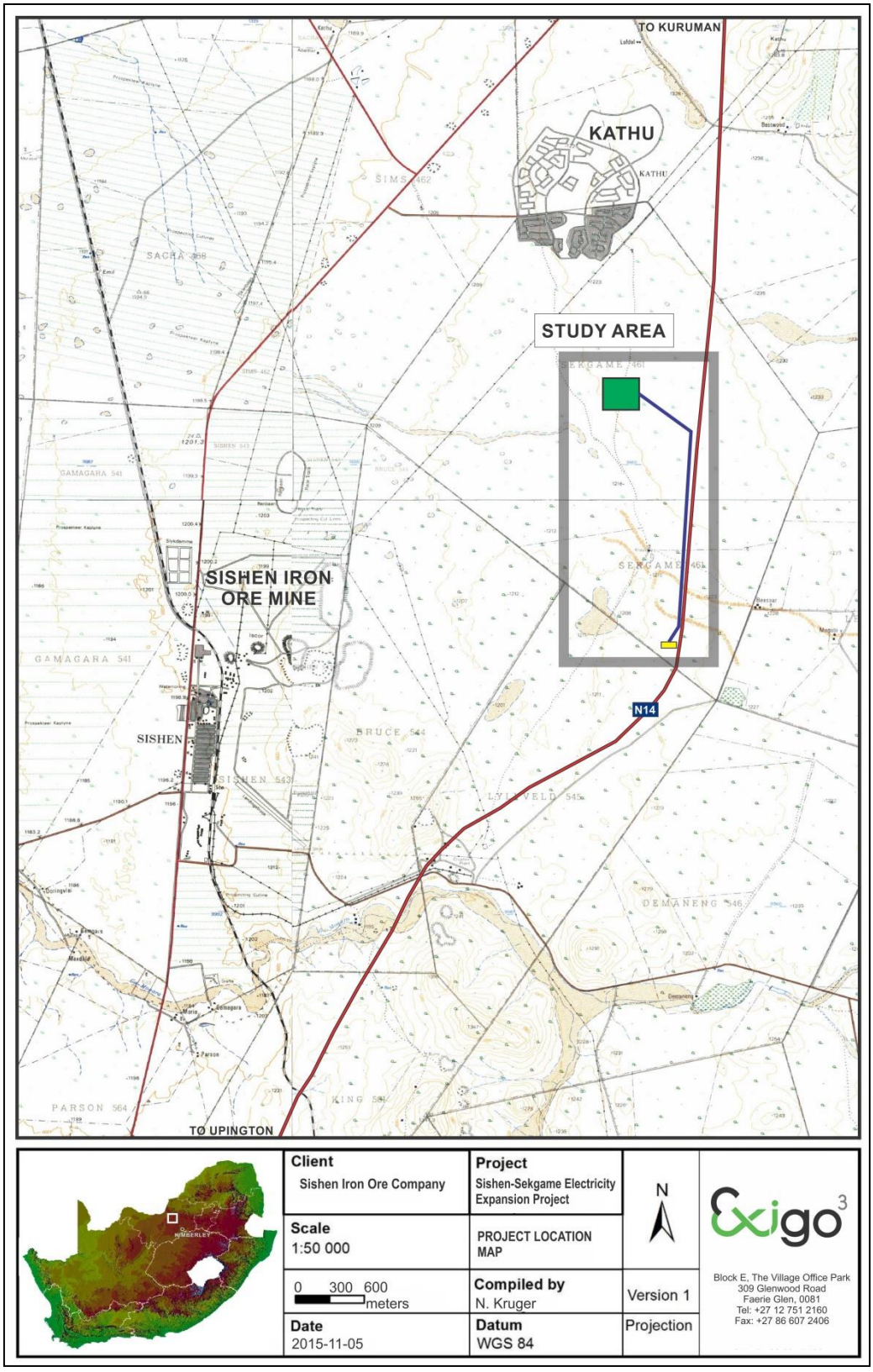

Figure 2-1: 1:50 00 Map representation of the location of the proposed Sishen Sekgame Electricity Expansion Project (2723CC). The existing Ferrum substation is indicated in green, the proposed electricity distribution line is indicated in blue and the proposed new Sekgame switching yard is indicated in yellow.

2.2 Area Description: Receiving Environment

The Northern Cape area around Kathu and the Sishen Iron Ore Mine receives around 200-400 mm of rain in the summer months. The local vegetation is classified as Karroid Bushveld where a transition occurs between trees in a mixed grassveld, typical to the Bushveld complex, to a Karoo landscape with more open grasslands and succulents (Acocks 1988). The geology of the region is underlain by older rocks and the overburden consists mainly of geologically recent Kalahari sand, which in turn is un-fossiliferous. Some quartzites also occur on area on the landscape. Previous studies in the area indicated that the area is underlain more specifically by Proterozoic-aged rocks belonging to the Asbestos Hills Subgroup of the Transvaal Supergroup (e.g. Beaumont 2004). The Gamagara River, a major non-perennial waterway transects the landscape south and west of the Sishen Iron Ore Mine. A number of small natural pans are scattered across the landscape.

Figure 2-2: General surroundings in the Study Area at the time of the field survey (September 2014). The Sishen Iron Ore Mine is visible in the distance and the Ferrum substation can be seen to the right.

2.3 Site Description

The Sishen Sekgame Electricity Expansion Project extends in a north-south orientation from the Ferrum substation in the north, southwards across the farm Sekgame 461 alongside the N14 road (See Figure 2-3). The majority of the study area is covered in natural vegetation but surface cover has been disturbed and altered at a large decommissioned quarry next to the N14. Generally, surface disturbances in the surroundings of the project area ranged from minor degradation as a result of natural agents such as erosion and animal burrowing, to major surface destruction at the quarry. The Kathu Pan, Kathu Townlands and Bestwood Archaeological Sites are situated within a radius of approximately 30km north-east, and northwest of the study area (See Section 4.2.8). Other archaeological occurrences have been documented at a number of locales in the landscape immediately surrounding the Project (Kruger 2012, Van Der Ryst 2012).

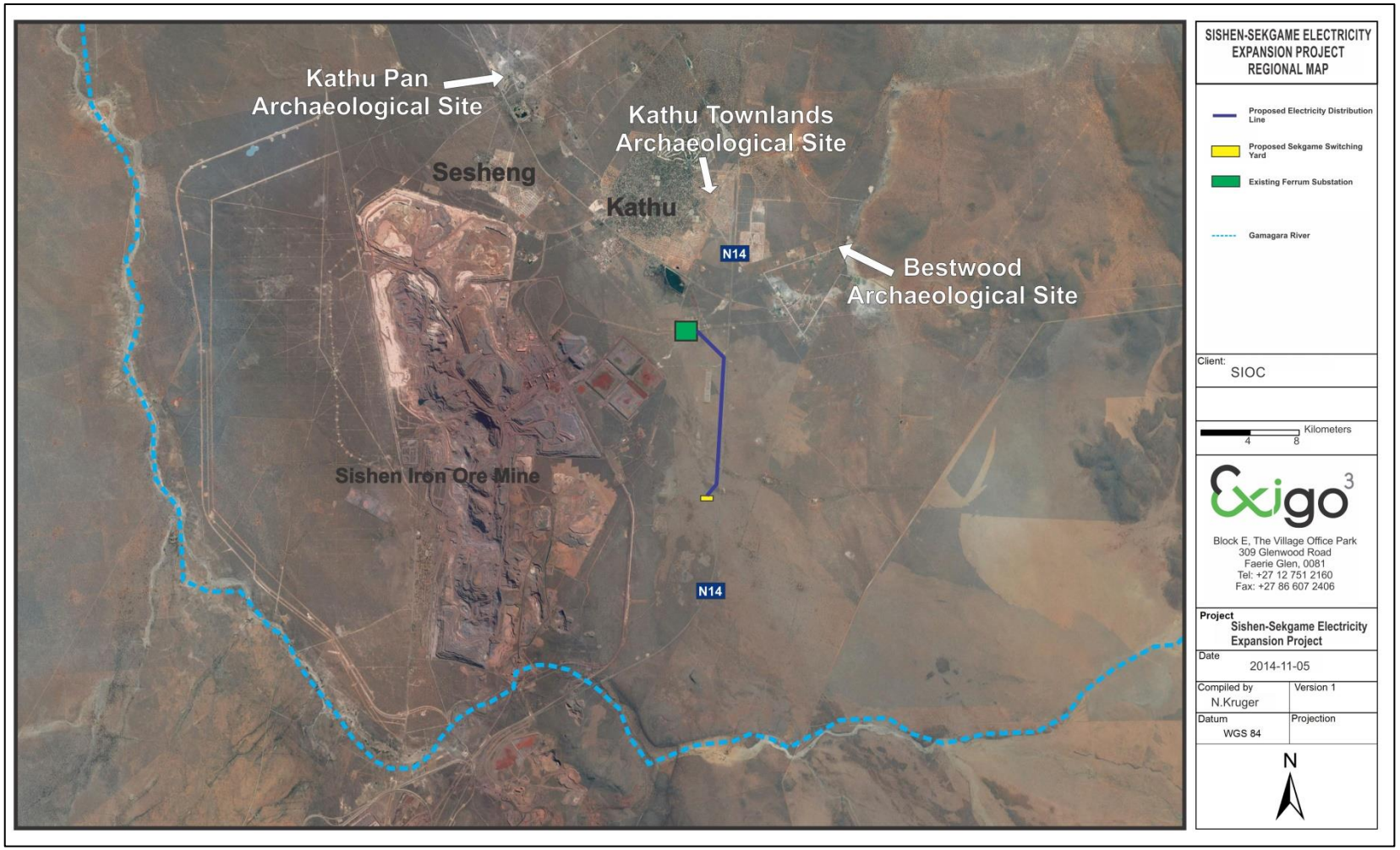

Figure 2-3: Aerial representation providing a regional setting of proposed Sishen-Sekgame Electricity Expansion Project.

3 METHOD OF ENQUIRY

3.1 Sources of Information

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

3.1.1 Desktop Study

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

3.1.2 Aerial Representations and Survey

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. This method was applied in the pedestrian survey for the project where depressions, variation in vegetation, soil marks and landmarks were examined. Specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. By superimposing high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as referenced points from where further vehicular and pedestrian surveys were carried out.

3.1.3 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the Sishen Sekgame Electricity Expansion Project area was conducted in September 2014. The process encompassed a systematic field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording,. The entire electricity distribution route and footprint for the Sekgame switching yard were systematically surveyed on foot, GPS reference points were visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Legend GPS objects and structures of archaeological / heritage value were recorded and photographed with a Canon 450D Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey.

As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was given to disturbances, both man-made such as roads and clearings, as well as those made by natural agents such as burrowing animals and erosion.

3.2 Limitations

3.2.1 Access

The study area is accessed directly via the N14 National road, and service roads to the Ferrum substation. Access control is applied to the property portions relevant to this assessment but no restrictions were

encountered.

3.2.2 Visibility

The surrounding vegetation in the study area is composed out of tall grass, trees and shrubs and in one area surroundings have been substantially altered where a top soil has been quarried. Generally, the visibility at the time of the AIA site inspection (September 2014) was moderate (see Figures 3-1 to 3-8). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.

Figure 3-1: View of general surroundings at the existing Ferrum substation, looking west.

Figure 3-2: View of general surroundings along a northern portion of the proposed electricity distribution line, looking west.

Figure 3-3: View of general surroundings along the central portion of the proposed electricity distribution lin. Note calcrete extrusions in deep red sands.

Figure 3-4: View of a large quarry along a central portion of the proposed electricity distribution line.

Figure 3-5: View of general surroundings along the southern portion of the proposed electricity distribution line, looking west.

Figure 3-6: View of general surroundings at the proposed site for the Sekgame switching yard, looking west.

Figure 3-7: View of general surroundings at the proposed site for the Sekgame switching yard, looking east towards the N14.

Figure 3-8: The eastern boundary of the proposed Sekgame switching yard site next to the N14 Ntaional road.

3.2.3 Limitations and Constraints

The pedestrian site survey for the Sishen Sekgame Electricity Expansion AIA Project primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the aerial survey) as well as areas of high human settlement catchment.

- **Visibility:** Visibility proved to be a minor constraint in more pristine areas, where documented features proved to be overgrown and obstructed by surface vegetation.

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

3.3 Impact Assessment

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

4 ARCHAEO-HISTORICAL CONTEXT

4.1 The archaeology of Southern Africa

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

Table 1 Chronological Periods across southern Africa

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: *Australopithecines* *Homo habilis* *Homo erectus*	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First *Homo sapiens* species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	*Homo sapiens sapiens* including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.

[1] Plomp, H.,2004

Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

4.1.1 The Stone Ages

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

Earlier Stone Age deposits typically occur on the flood-plains of perennial rivers and may date to between 2 million and 250 000 years ago. These ESA open sites sometimes contain stone tool scatters and manufacturing debris ranging from pebble tool choppers to core tools such as handaxes and cleavers. These stone tools were made by the earliest hominins. These groups seldom actively hunted and relied heavily on the opportunistic scavenging of meat from carnivore fill sites.

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

The majority of Middle Stone Age (MSA) sites occur on flood plains and sometimes in caves and rock shelters. Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom remain preserved in the archaeological record. Limited drive-hunting activities are also associated with the MSA.

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

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

4.1.2 The Iron Age Farmer Period

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

The Early Iron Age (also Early Farmer Period) marks the movement of Bantu speaking farming communities into South Africa at around 200 A.D. These groups were agro-pastoralists that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Artefact evidence from Early Farmer Period sites is mostly found in the form of ceramic assemblages and the origins and archaeological identities of this period are largely based upon ceramic typologies and sequences, where diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. Early Farmer Period ceramic traditions are classified by some scholars into different “streams” or trends in pot types and decoration that, over time emerged in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). More specifically, in the northern regions of South Africa at least three settlement phases have been distinguished for prehistoric Bantu-speaking agropastoralists. The first phase of the Early Iron Age, known as Happy Rest (named after

the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of Diamant is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the Eiland tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. Early Farmer Period ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. The Early Iron Age continued up to the end of the first millennium AD.

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

The onset of the middle Iron Age dates back to ±900 AD, a period more commonly known as the Mapungubwe / K2 phase. These names refer to the well known archaeological sites that are today the pinnacle of South Africa's Iron Age heritage. The inhabitants of K2 and Mapungubwe, situated on the banks of the Limpopo, were agriculturalists and pastoralists and were engaged in extensive trade activities with local and foreign traders. Although the identity of this Bantu-speaking group remains a point of contestation, the Mapungubwe people were the first state-organized society southern Africa has known. A considerable amount of golden objects, ivory, beads (glass and gold), trade goods and clay figurines as well as large amounts of potsherds were found at these sites and also appear in sites dating back to this phase of the Iron Age. Ceramics of this tradition take the form of beakers with upright sides and decorations around the base (K2) and shallow-shouldered bowls with decorations as well as globular pots with long necks. (Mapungubwe). The site of Mapungubwe was deserted at around 1250 AD and this also marks the relative conclusion of this phase of the Iron Age.

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

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

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

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

Ethnographers generally divide major Bantu-speaking groups of southern Africa into two broad linguistic groups, the Nguni and the Sotho with smaller subdivisions under these two main groups. Nguni groups were found in the eastern parts of the interior of South Africa and can be divided into the northern Nguni and the southern Nguni. The various Zulu and Swazi groups were generally associated with the northern Nguni whereas the southern Nguni comprised the Xhosa, Mpondo, Thembu and Mpondomise groups. The same geographically based divisions exist among Sotho groups where, under the western Sotho (or

Tswana), groups such as the Rolong, Hurutshe, Kwena, Fokeng and Kgatla are found. The northern Sotho included the Pedi and amalgamation of smaller groups united to become the southern Sotho group or the Basutho. Other smaller language groups such as the Venda, Lemba and Tshonga Shangana transpired outside these major entities but as time progressed they were, however to lesser or greater extend influenced and absorbed by neighbouring groups.

4.1.3 Historical and Colonial Times and Recent History

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

4.2 The Kathu Heritage Landscape: Specific Themes.

The history of the Northern Cape Province is reflected in a rich archaeological landscape, mostly dominated by Stone Age occurrences. Numerous sites, documenting Earlier, Middle and Later Stone Age habitation occur across the province, mostly in open air locales or in sediments alongside rivers or pans. In addition, a wealth of Later Stone Age rock art sites, most of which are in the form of rock engravings are to be found in the larger landscape. These sites occur on hilltops, slopes, rock outcrops and occasionally in river beds. Sites dating to the Iron Age occur in the north eastern part of the Province but environmental factors delegated that the spread of Iron Age farming westwards from the 17th century was constrained mainly to the area east of the Langeberg Mountains. However, evidence of an Iron Age presence as far as the Upington area in the eighteenth century occurs in this area. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments at Kimberley, which herald the modern era in South African history.

4.2.1 Palaeontology and Early History

As previously noted, the Kathu area is underlain by rocks older than 1000 million years, which makes them too old to contain hard-bodied fossils (Beaumont 2009). This overburden consists mainly of un-fossiliferous Kalahari sand, which is relatively recent in geological age. An indurated calcareous layer frequently occurs at the interface of the sandy overburden and the rock beneath. This layer may contain fossil remains in more suitable localities, although none have been reported from such contexts in this area.

4.2.2 The Early and Middle Stone Ages

The landscape around the town of Kathu is rich in archaeological material dating to Earlier and Middle Stone Ages. These are subject to on-going archaeological research Sites such as Wonderwerk Cave, Kathu Pan and Kathu Townlands have yielded significant Stone Age assemblages that all inform on our general understanding of the technological sequences of the Stone Age in the Northern Cape (e.g. see Beaumont 2008, 2009; Morris 2006; Morris 2007; Dreyer 2007). In addition, a large amount of Middle and Later Stone Age sites have been documented across the landscape on calcrete lined pans and road cuttings.

4.2.3 Rock Markings

Rock engravings are mostly situated in the semi-arid plateau with most of these engravings situated at the Orange – Vaal basin, Karoo and Namibia. The upper Vaal, Limpopo basin and eastern Free State regions have a small quantity of rock engravings as well. Generally, rock paintings exist at cave areas and rock

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

4.2.4 Iron Age / Farmer Period

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

4.2.5 Later History: Colonial Period

Areas south of Kathu and Kuruman played a strategic role during the Anglo-Boer and towns such as Postmasburg, situated about 100km south of Kuruman, acted as an important link between the Boer forces from Transvaal to the Cape Colony south of the Orange River, providing ammunition and horses (Snyman 1985). The oral and written history of the Northern Cape pertaining to the last centuries is relatively abundant resulting from an assimilation of local folklore and Historical sources such as missionary accounts. The Historical period commenced when pioneers (in most cases, missionaries) arrived between the nineteenth century and early twentieth century, depending on the region. Later, larger populations established villages in the area, some of which are often still occupied today. During the 1930's some of the Tswana communities consisted of a wealth of cattle that could be used to gain capital and purchase additional land. The Khoisan and Khoikhoi communities were not so lucky, because they were mostly used as labourers at various Tswana and European households (Wylie 1989).

The Northern Cape was subjected to a resettlement program during the apartheid years. Tswana families were divided into the men who had to live in a compound and the women who were sent to a relocation centre (Hallett 1984). Between 1960 and 1962 it was estimated that an average of 834,000 people were affected by the Group Areas Act (Hallett 1984). The farm Sekgame was proclaimed in 1912.

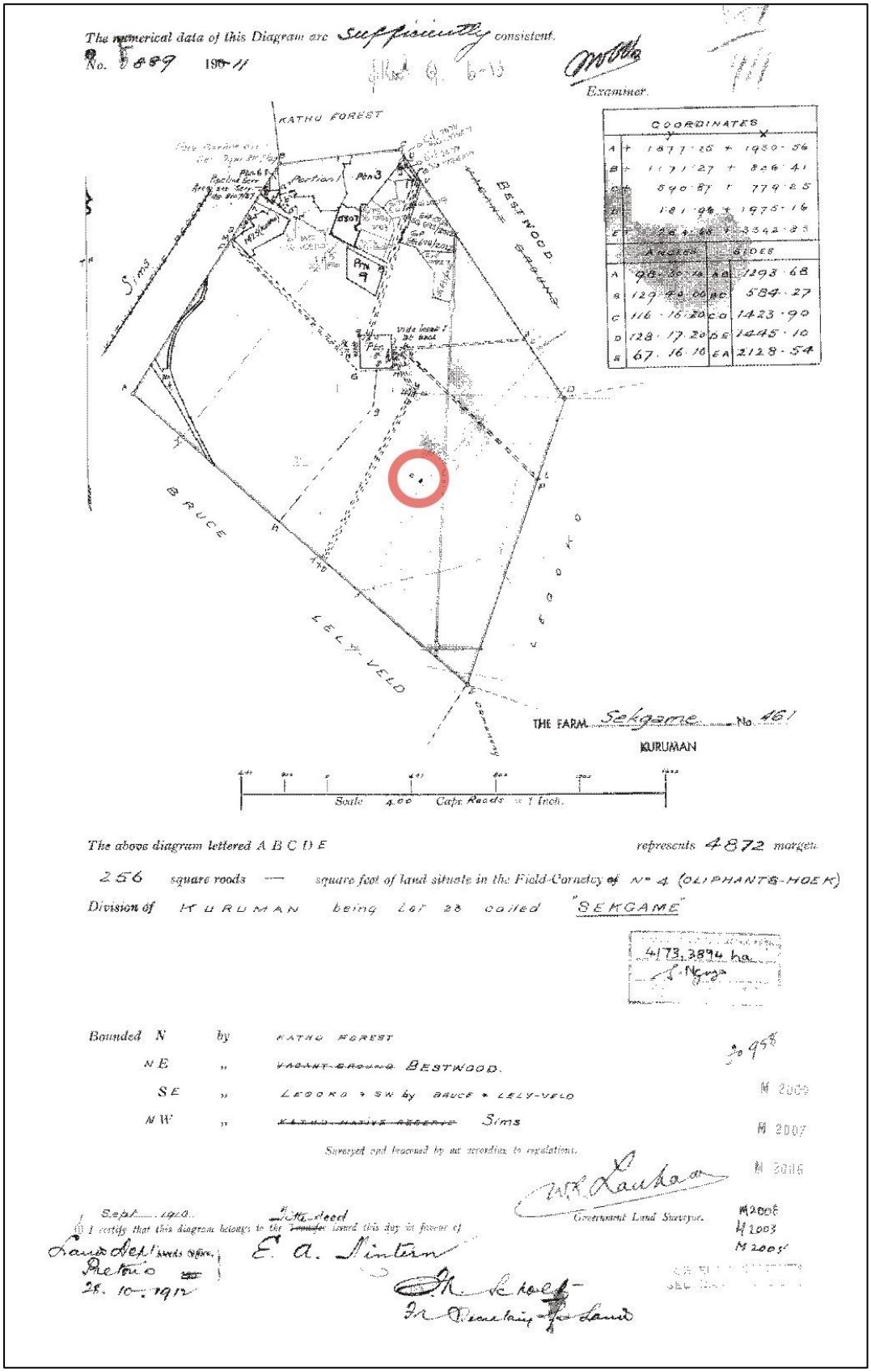

Figure 4-1: Original title deed of the farm Sekgame, dated 1912. The original Sekgame farmstead appear on the map (red circle).

4.2.6 Burial Sites / Human Remains

Human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500).

4.2.7 Other: Mining and Metallurgy

Surface occurrence of specularite (i.e. a variety of hematite) and prehistoric specularite workings are known to occur in the Northern Cape. One of these historic mines occurs at Doornfontein near Postmasburg, which dates to 1200 BP (Thackeray 1983). Specularite used to be transported in ostrich eggshells and pottery containers (Thackeray 1983). Various oral accounts indicate that Skeyfontein was visited by Khoi Herding people, Iron Age Tswana and San hunter – gatherers. More recently, asbestos mines were operated north-west of Kuruman on the farms Riries and Mt Vera during the 20th century.

4.2.8 Significant Heritage Sites in this section of the Northern Cape Province

The Northern Cape has a wealth of pre-colonial archaeological sites (Beaumont & Morris 1990; Morris & Beaumont 2004). Archaeological sites in the vicinity of the Sishen Iron Ore Mine are not randomly scattered within the landscape and they occur either near water or close to local source of highly-prized raw materials, banded iron formation (BIF), specularite and jaspilite. Besides the Gamagara River where numerous low density artefact scatters occur, another regional water source occurs below superficial sands on the bedrock plains around Kathu, where water was contained at times that gradually filled up with stratified sediments often containing massive calcretes of Tertiary age. Large tracts are far more widespread, where archaeological traces are almost non-existent with very occasional specimens of the Later Stone Age on the sand surface and thin scatters of specimens from the Earlier Stone Age (ESA) on calcrete below. Rock engravings previously occurred on the farms Bruce and Sishen, but as these were located in land that was to be mined, personnel of the McGregor Museum removed them prior to mining developments. The town of Kathu is the location of a cluster of highly significant ESA localities, which is known as the the **Kathu Archaeological Complex**. These sites are subject to on-going archaeological research by archaeologists from the University of Cape Town and the University of Toronto, in collaboration with the McGregor Museum in Kimberley. The most significant sites from the **Kathu Archaeological Complex** are:

- *Kathu Pan*

This site, situated between the town of Kathu and the SIOC airport, is a shallow water pan about 30ha in extent. The site was extensively studied from 1974 to 1990 by Humpreys and Beaumont, amongst others. Kathu Pan, which has been nominated for National Heritage status is an extremely significant site as it represents the major industries of the Stone Age, more specifically two phases of the Earlier Stone Age, two phases of the Middle Stone Age, and more or less the entire Later Stone Age (Beaumont 1990). The site yielded large amounts of hand axes and faunal remains, including the concentrated remains of large mammal remains. As such, the site has produced fossils of animals such as elephants and hippos, as well as the earliest known evidence of tools used as spears from a level dated to half a million years ago. Research by Jayne Wilkins revealed a hoard of stone points, each between 4 and 9 centimeters long, that they think belonged to the earliest stone-tipped spears yet found. The stone points are the right

shape and size for the hunting, and some have fractured tips that suggest they were used as weapons. Since stone points used on spears had been found only at sites that date back no more than 300 000 years, these discoveries in the 500 000-year-old deposits at Kathu is greatly significant. In addition, the site has yielded what is termed, the 'Master Hand-Axe' which dates to approximately 750 000 BP rendering it the oldest artifact which is indisputably aesthetic i.e. worked for beauty and symmetry, perfectly oriented, and worked considerably beyond the functional requirements of the hand-axe, which could have been achieved with half or fewer blows (see Fugure 4-2). The technology which produced it is known as the Acheulian, and the artifacts are thought to be made by *Homo ergaster* (*Homo erectus* in Africa), a diverse grouping of early humans commonly imagined as small-brained, small-jawed and robustly built, with heavy eyebrow ridges.

Figure 4-2: Early Stone Age (Acheulian) handaxe from the Kathu Pan site (http://www.museumsnc.co.za).

Figure 4-3: Left - Middle Stone Age hafted points, similar to those documented at the Kathu Pan site (http://www.newscientist.com/article/dn22508-first-stonetipped-spear-thrown-earlier-than-thought.html). Right - the 'Master Hand-Axe' from Kathu Pan.

- *Kathu Townlands*

The Kathu Townlands site, situated on the eastern periphery of the town close to the N14 national road is a component of the ESA localities designated as the Kathu Complex. This site, covering an estimated area of

250 000 m^2, was first excavated in 1982 and 1990, primary displays a large Earlier Stone Age horizon in deposits up to a metre below surface. This deposit dates to an estimated 700,000 to one million YBP and it forms part of the Acheul phase of the Earlier Stone Age. It is estimated that in total, the site holds more than 2 billion artefacts. This abundance of lithic debris could be ascribed to the protracted use of the high-grade banded ironstone (BIF) outcrop in the area, as a raw material source (Beaumont 1990). In addition, more recent excavations by archaeologists from the University of Cape Town and University of Toronto and the McGregor Museum in Kimberley have produced tens of thousands of Earlier Stone Age artifacts, including hand axes and other tools, making the site one of the richest early prehistoric archaeological sites in South Africa. As such, the site was designated a Grade 1 National Heritage site in 2013. The archaeological horizon is dense rubble of artefacts and unworked BIF in a sand matrix. This locality was evidently the site of ongoing intensive occupation and exploitation for stone tool manufacture. While one function of the site might have been as a quarry, rough-outs and primary flakes are rare, and there is a small component of finished tools (including rare handaxes made on non-local quartzite) suggesting that the site might have had a more diversified function. The Kathu Townlands site represents a complex and massive archaeological context and the site has been prioritized by heritage authorities in terms of long term protection and conservation.

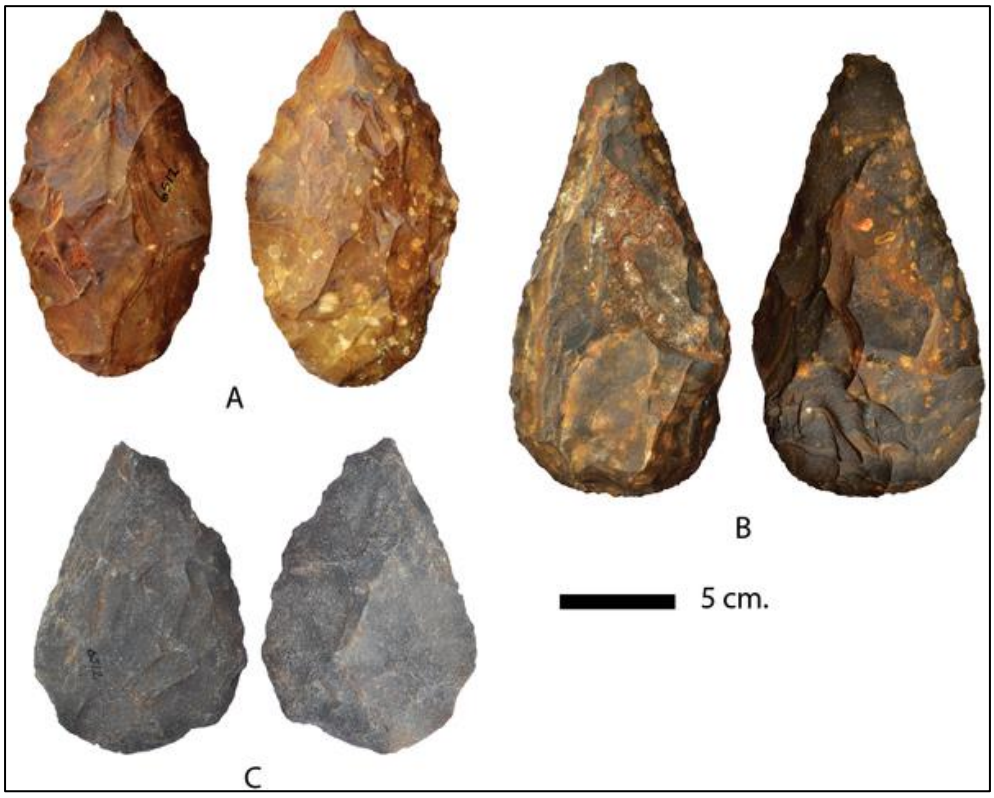

Figure 4-4: Handaxes from surface collections at Kathu Townlands: A–B. Banded Ironstone. C. Quartzite (Walker et al 2014).

- *Bestwood Stone Age Site*

The Bestwood Stone Age horizon, part of the Kathu Archaeological Complex, was first documented by J. Wilkins in 2010 as part of her dissertation research on the lithic industry of Kathu Pan. Her survey resulted in the discovery of three new localities on the Bestwood Farm approximately 3km east of Kathu Townlands. The first two, Bestwood 1 and Bestwood 2, are found in sand quarries in the valley between two hills at the northernmost edge of the western flank of the Kuruman Hills. The preliminary investigation

identified a lithic industry characterised by well-made handaxes, well retouched scrapers, occasional blades and a great diversity of core types, including choppers, polyhedrons, discoidal cores and unidirectional Levallois cores. Another dense and extensive ESA scatter, previously unreported and provisionally designated as Bestwood 3, was discovered on a hilltop 1km to the east of the Uitkoms locality, some 500m past Bestwood 1. Unfortunately, the rapid expansion of iron and manganese mining in the area has led to a development boom and a high demand for building materials. There is little evidence for the use of river cobbles and quartzite, the closest sources being an outcrop 14km to the south-west and the Gamagara River some 19km to the west. Bestwood 1 preserves an ESA living surface across a large area and holds the potential to provide broad horizontal exposures.

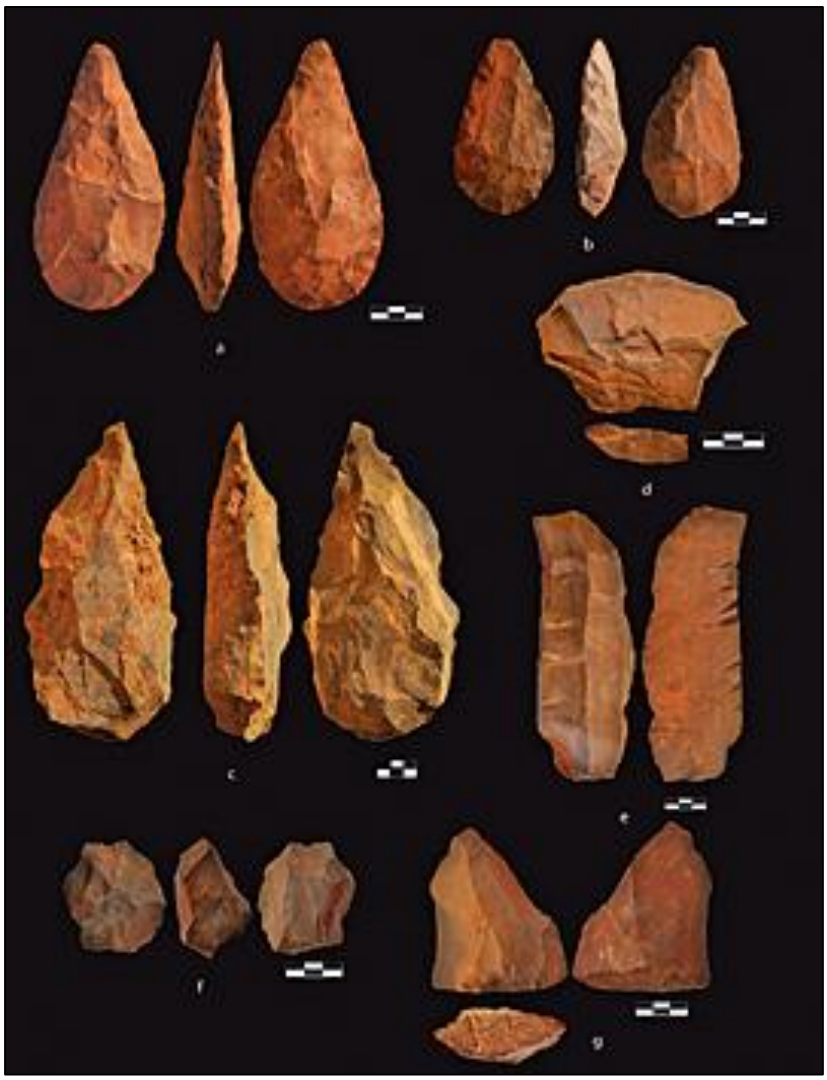

Figure 4-5: Artefacts collected at Bestwood 1: a & b) handaxes; c) large rough-out of a handaxe; d) transversal sidescraper; e) large blade; f) discoidal core; e) unidirectional Levallois core. All raw material is ironstone (Chazan et al 2012).

- *Wonderwerk Cave*

One of the most important archaeological sites in the region is the world renowned long-sequence Wonderwerk Cave, formed originally as an ancient solution cavity in Dolomite rocks of the Kuruman Hills. The cave, situated between Danielskuil and Kuruman, contains up to 6 m depth of archaeological deposits reflecting human and environmental history through the Earlier, Middle and Later Stone Ages to the present. Rock art occurs in the form of parietal paintings within the first 40 metres from the entrance,

possibly all less than 1000 years old, and small engraved stones found within the deposit, mainly from the Later Stone Age sequence where they date back some 10 500 years. The associations of older engraved or striated pieces have yet to be substantiated.

Figure 4-6: Interior of the Wonderwerk Cave

- *Dithakong*

Important farmer period Iron Age remnants occur at the major Tswana town and pre-colonial stone-walled settlements of Dithakong. Local BaTlhaping communities claimed not to have known who had made or lived in this earlier town but archaeological investigations have established Tswana affinities in the earlier settlement which includes features indicative of frontier complexity at this south-western edge of Tswana expansion. Early traveller accounts refer to an impressively large town consisting of mud houses, traces of which have yet to be located archaeologically.

- *Gamohana Shelters*

Two rock shelters on the northern and southern faces of GaMohaan (Gamohana), situated in the Kuruman Hills north-west of the town, contain Later Stone Age remains and rock paintings.

- *Moffat Mission Station and the Kuruman Mission*

Historically, Kuruman boasts one of the longest trajectories of African-colonial interaction centred on the nearly two-century old Moffat Mission. The Kuruman Mission was established by the London Missionary Society in 1816 at Maruping near Kuruman where a town of about 10 000 Batswana were resident. Robert Moffat (1795-1887) arrived in Kuruman from Scotland in 1820, and soon organised permission from Chief Mothibi to relocate it to the present position at Seodin in the valley of the Kuruman River. From here he preached Christianity to the local people. Moffat laboured at the mission for 50 years, and his period is considered the “golden age” of missionary work amongst the Batswana. He was a man of considerable talents and oversaw the building of staff houses, a school house, store rooms, and the “cathedral of the Kalahari”, the great Moffat Church (1838) which can seat 800 people. The mission is also well-known as the

first African home of Dr. David Livingstone. He arrived as an LMS missionary in 1841, and remained in contact with the mission due to his marriage to Moffat's eldest daughter Mary.

- *"Die Oog"*

Locally, "Die Oog" ("The Eye") and the water course springing from it have been a focus of utilization and settlement and it was in its immediate vicinity that Kuruman, as town, evolved from the late nineteenth century.

- *Other sites around the Sishen area*

Small McGregor Museum collections from the farm Lylyveld 545 comprise an Earlier Stone Age sample from along the Gamagara River and Earlier Stone Age plus Iron Age material from around specularite pits on the hillside, all collected by G & S Collins in 1967. The latter sites were destroyed by subsequent Iscor prospecting, as was another small Iron Age specularite working on a hill flanking the Gamagara River, on Demaneng 546, that they found in the same year. Another small Later Stone Age collection was documented in 1987 on southern Lylyveld 545, from the slopes around a shallow overhang, now mined away, directly south of the N14. Still intact is a low rise with many specularite pits on Mashwening 557, some 6 km to the south-east, where a test trench in 1989 yielded Ceramic Later Stone Age overlying sparse Acheulean, which included a cleaver. These studies also mention pecked engravings on off – white Gamagara Shale located on the farms Bruce 544 and Bruce 544. In addition, another Acheul quarry of similar extent to the Kathu Towlands Site occurs on the crest of Kathu Hill close to the town of Kathu.

Figure 4-7: Flaked MSA lithics on jasper from the farm Lylyveld, documented by Beaumont (2009).

5 RESULTS: ARCHAEOLOGICAL SURVEY

The heritage survey for the Sishen Sekgame Electricity Expansion Project produced sensitive heritage receptors, specifically along the southern section of the proposed electricity distribution line, and in the area demarcated for the Sekgame switching yard. Features of heritage potential identified during the survey were uniquely coded **EXIGO-SG461-SAxx** (Exigo Sekgame 461 Stone Age).

5.1 The Stone Age

The abundance of locally available raw material implies a prominent Stone Age presence and specifically Earlier Stone Age (ESA) and Middle Stone Age (MSA) artefacts occur widely in the area along the northern banks of the Gamagara River on the farms Fritz, Gamagara and Sishen. In all cases, the location of these scatters corresponds with a general Stone Age site distribution pattern in the area where archaeological sites in the landscape occur near water sources close to local sources of rare raw materials in lithic manufacture, namely specularite and jaspilite. In addition, the nationally important Kathu Pan, Kathu Townlands and Bestwood, situated within a radius of 30km from the project Loctaion, are earmarked for Grade 1 National Heritage status. Similarly, Stone Age occurrences have been documented in the study area and in all cases, the density of the scatters were arbitrarily estimated by placing a one-meter drawing frame, sub-divided into quadrants, on a randomly-selected area displaying higher amounts of surface lithics. By plotting the counts of all lithic elements present in the 1x1 metre square relative density per m^2 was established and rated on a scale of low (<10), medium (10-20) and high (>20). This method has been adapted as expedient and non-invasive sampling technique that is particularly useful in value assessment of lithic occurrences during Phase 1 AIA's (see Van Der Ryst 2012).

- **Site EXIGO-SG461-SA01: S27.76450 E23.06762 (Low density MSA lithic scatter)**

A low density Middle Stone Age (MSA) scatter was identified along the proposed electricity distribution line in association with a shallow quarry, directly adjacent to the N14 road. The area has been significantly altered as a result of digging at the quarry and the extent of the lithic scatter could not be established. As such, artefacts occur randomly on the quarry surface and it is evident that the context of the artefacts has been lost. Typologically, the artefacts can tentatively attribute to the Middle Stone Ages when compared to similar recorded assemblages in the area (e.g. Beaumont & Morris 1990). Single formal tools, such as points, and scrapers as well as a number of worked cores, produced on fine grained specularite and jaspilite were observed. Some of the formal tools have been smoothed and retouched and in some instances cores display peripheral preparation. The occurrence is of limited scientific value within its local site context due to the general loss of context and site integrity for the artefacts at the quarry, and the low density of diagnostic formal tools. However, the site is situated within (and possibly part of) the significant larger Kathu Stone Age Complex and on a regional scale it might be of importance.

Figure 5-1: View of a quarry at Site EXIGO-SG461-SA01.

Figure 5-2: Lithics from Site EXIGO-SG461-SA01; a point (left), side scraper (middle) and highly weathered blade (right).

Figure 5-3: Lithics on fine-grained jasperlite from Site EXIGO-SG461-SA01; a scraper (left) and a point (middle). Note secondary retouch on point, right.

- **Site EXIGO-SG461-SA02: S27.77174 E23.06743 (Low density MSA lithic scatter)**
- **Site EXIGO-SG461-SA03: S27.77589 E23.06703 (Low density MSA lithic scatter)**

A larger scatter of MSA material was documented towards the southern offset of the proposed electricity distribution line, as well as in the eastern sector of the proposed Sekgame switching yard site. Similar to related Stone Age occurrences in the area, these MSA scatters occur mainly as a single horizon within a shallow, decomposed calcrete formation, where precipitation and groundwater have exposed the stone tools. Formal tools such as points, broken blades and scrapers as well as a number of cores, produced on fine grained specularite and jaspilite were noted. A number of tools show signs of secondary retouch and in some instances cores display peripheral preparation. In addition, a number of flakes display facetted platforms, characteristic of the MSA. Here, prepared cores show evidence of the use of the Levallois technique, where surfaces on the core are shaped in order to generate a specific formal tool when flaked from the core. Use wear and marks are clearly visible on formal tools. Previous research by the McGregor Museum in Kimberly attributed related occurrences in the area to the Middle Stone Age (e.g. Beaumont & Morris 1990), dating to between 200 000 and 20 000 YBP. The Stone Age representations at the site are of interest due to the presence of formal stone tools, as well as its position within the larger Kathu Complex. A specialist analysis of lithics from the sites will provide an understanding of the development and spread of the already significant MSA in the Northern Cape and Karoo areas.

Figure 5-4: General surroundings at Site EXIGO-SG461-SA02.

Figure 5-5: General surroundings at Site EXIGO-SG461-SA03.

Figure 5-6: Lithics and natural stones set in a decomposed layer of calcrete at Site EXIGO-SG461-SA03.

Figure 5-7: Flaked lithics on jasperlite and specularite from Site EXIGO-SG461-SA02. Note secondary retouch along the edges of the side and end scrapers (middle and right).

Figure 5-8: MSA cores from Site EXIGO-SG461-SA02.

Figure 5-9: MSA cores from Site EXIGO-SG461-SA03.

Figure 5-10: MSA cores from Site EXIGO-SG461-SA03.

Figure 5-11: Retouched MSA side scrapers from Site EXIGO-SG461-SA03.

Figure 5-12: Retouched MSA side and end scrapers from Site EXIGO-SG461-SA03.

5.2 The Iron Age Farmer Period

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

5.3 Historical / Colonial Period

No Historical (Colonial Period) occurrences were observed in the survey areas.

5.4 Contemporary /Recent Period

No contemporary features of resources dating to the historical period were observed in the study area.

5.5 Graves / Human Burials

No graves or human burials were observed in the study area.

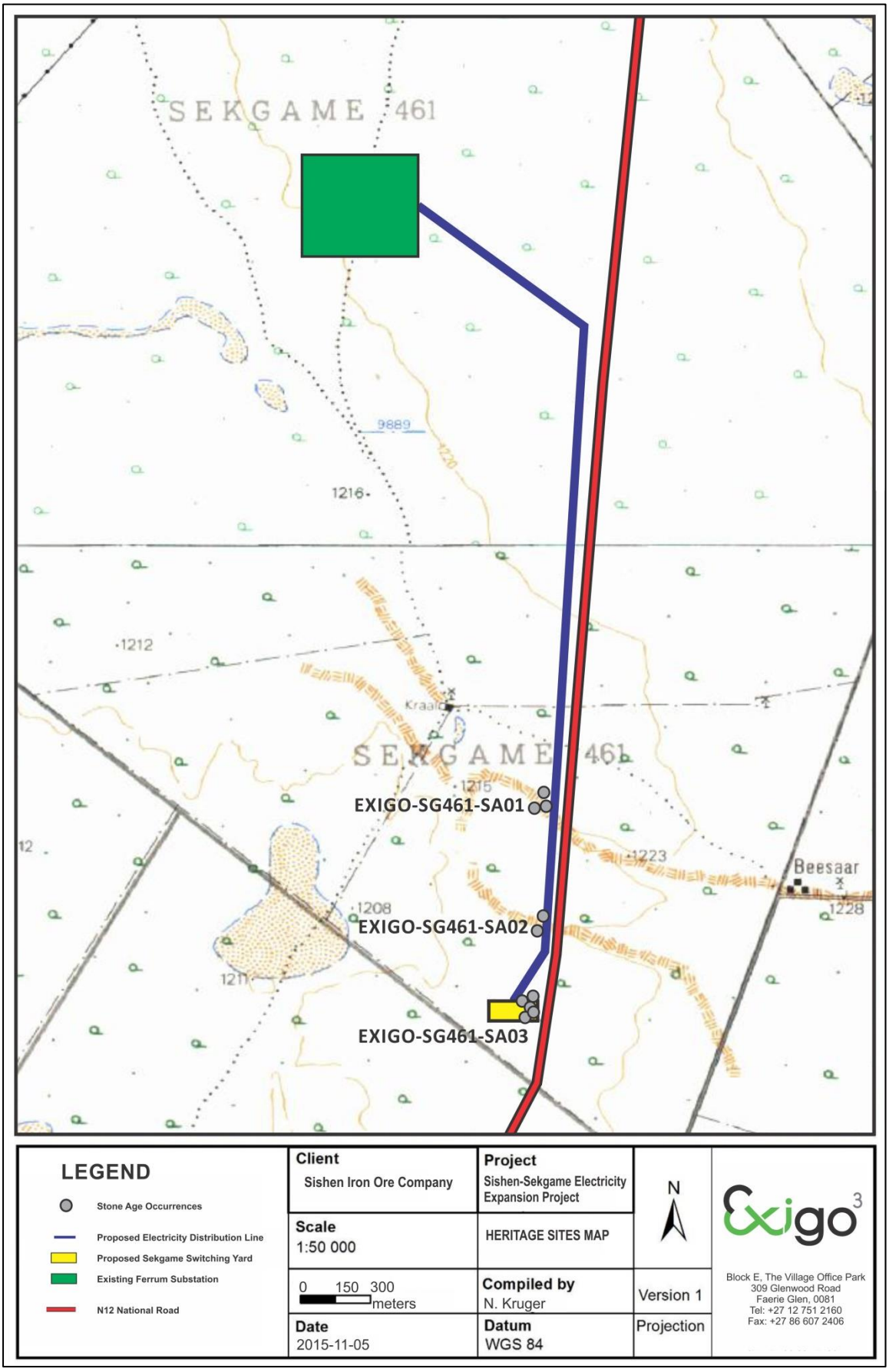

Figure 5-13: Map indicating the locations of archaeological and historical occurrences discussed in the text

6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

6.1 Potential Impacts and Significance Ratings[2]

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

6.2 General assessment of impacts on resources

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

6.2.1 Direct impact rating

Direct or primary effects on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected). Significant archaeological material was found within the study area and the potential impacts to archaeology are generally considered to be moderate. The following table summarizes impacts to archaeological material anticipated for the Sishen-Sekgame Electricity Expansion Project:

- **Site EXIGO-SG461-SA01**

NATURE OF IMPACT: Impacts could involve displacement or destruction of Stone Age material along the proposed electricity distribution line.		
	Without mitigation	**With mitigation**
EXTENT	Local	Local
DURATION	Permanent	Permanent
MAGINITUDE	Minor	Minor
PROBABILITY	Probable	Very improbable
SIGNIFICANCE	Low	Negligible
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible

[2] Based on: W inter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Site monitoring by ECO.		
CUMULATIVE IMPACTS: No cumulative impact is anticipated if site is mitigated.		
RESIDUAL IMPACTS: n/a		

- **Site EXIGO-SG461-SA02, Site EXIGO-SG461-SA03**

NATURE OF IMPACT: Impacts could involve displacement or destruction of Stone Age material along the proposed electricity distribution line and at the site proposed for the Sekgame switching yard.		
	Without mitigation	**With mitigation**
EXTENT	Local	Local
DURATION	Permanent	Permanent
MAGINITUDE	Minor	Minor
PROBABILITY	Probable	Very improbable
SIGNIFICANCE	Moderate	Negligible
STATUS	Negative	Neutral
REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	Yes	
MITIGATION: Phase 2 Investigation, Site monitoring by ECO.		
CUMULATIVE IMPACTS: No cumulative impact is anticipated if site is mitigated.		
RESIDUAL IMPACTS: n/a		

6.3 Discussion: Evaluation of Results and Impacts

Previous studies conducted in the larger Kathu area suggest a significantly rich and diverse archaeological landscape and cognisance should be taken of archaeological material that might be present in surface and sub-surface deposits along drainage lines, along hills and sources of water.

- **Stone Age Sites**

The low density Middle Stone Age (MSA) scatter (**Site EXIGO-SG461-SA01)** is of limited scientific value within its local site context due to the general loss of context and site integrity for the artefacts at the quarry, and the low density of diagnostic formal tools. However, the site is situated within (and possibly part of) the larger Kathu Stone Age Complex and on a regional scale it might be of importance. The site is situated in close proximity of the proposed electricity distribution line route and the impact on the sites by the proposed activity is anticipated to be direct and permanent duration where in essence, the impact might result in the possible destruction of sites. **The significance of the impact on the heritage resources is considered LOW but the threshold of the impact can be limited to a NEGLIBLE impact by the**

implementation of mitigation measures (site monitoring in order to avoid the destruction of previously undetected heritage remains) for the sites, if / when required

Two larger scatters of MSA material (**Site EXIGO-SG461-SA02, Site EXIGO-SG461-SA03)** are of interest due to the presence of formal stone tools, a higher density of artefacts as well as the position of the occurrence within the larger Kathu Stone Age Complex. The sites are situated within the proposed electricity distribution line route and at the site demarcated for the Sekgame switching yard, and the impact on the sites by the proposed activity is anticipated to be direct and permanent duration where in essence, the impact might result in the possible destruction of sites. **The significance of the impact on the heritage resources is considered MODERATE but the threshold of the impact can be limited to a NEGLIBLE impact by the implementation of mitigation measures (avoidance in order to avoid impact on sites, Phase 2 investigation, monitoring) for the sites, if / when required**

A number of Stone Age occurrences were identified along areas demarcated for development of the proposed Sishen-Sekgame Electricity Expansion Project. These features are of significance in terms of heritage value and impact on sensitive heritage receptors is foreseen. As such, the heritage resources will require further mitigation measures in order to conserve the historical fabric of these features. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Sishen-Sekgame Electricity Expansion Project may proceed from a culture resources management perspective, provided that all mitigation measures supplied in this Report are implemented prior to the commencement of construction on the infrastructure, and subject to the necessary approval from the relevant Heritage Resources Agency (SAHRA / PHRA).

6.4 Management actions

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of the Addendum. The following management measures would be required before, and during implementation of the proposed Sishen-Sekgame Electricity Expansion Project.

OBJECTIVE: prevent unnecessary disturbance and/or destruction of previously undetected archaeological material.

For the low density MSA scatter (*Site EXIGO-SG461-SA01 *the following is required in terms of heritage management and mitigation:

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/disturbance to surface and subsurface archaeology.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate Stone Age heritage as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL		**RESPONSIBILITY**	**TIMEFRAME**
Fixed Mitigation Procedure			
Site Monitoring: Regular examination of trenches and excavations.		QUALIFIED HERITAGE SPECIALIST	Monitor as frequently as practically possible.
Alterative Mitigation Procedure (if **fixed** mitigation procedures are not implemented)			

Avoidance: Implement a heritage conservation buffer of at least 20m around the heritage resource, realign the proposed electricity distribution line route to avoid the heritage resource and the proposed conservation buffer.	DEVELOPER	All phases of construction and operation.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	
MONITORING	Successful location and recording of sites by means of monitoring.	

For the medium density MSA scatters (*Site EXIGO-SG461-SA02, Site EXIGO-SG461-SA31) *the following is required in terms of heritage management and mitigation:

PROJECT COMPONENT/S	All phases of construction and operation.	
POTENTIAL IMPACT	Damage/disturbance to surface and subsurface archaeology.	
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.	
MITIGATION: TARGET/OBJECTIVE	To locate Stone Age heritage as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.	
MITIGATION: ACTION/CONTROL	**RESPONSIBILITY**	**TIMEFRAME**
Fixed Mitigation Procedure		
Phase 2 Investigation: Documentation of Stone Age locales by means of site mapping, surface artefact collection and possible sub-surface investigation, subject to relevant permitting from heritage authorities. A destruction permit should also be obtained subsequent to site documentation.	QUALIFIED HERITAGE SPECIALIST	Prior to the commencement of construction and earth-moving.
Site Monitoring: Regular examination of trenches and excavations.	QUALIFIED HERITAGE SPECIALIST	Monitor as frequently as practically possible.
Alterative Mitigation Procedure (if **fixed** mitigation procedures are not implemented)		
Avoidance: Implement a heritage conservation buffer of at least 20m around the heritage resource, realign the proposed electricity distribution line route and the proposed footprint area for the Sekgame switching yard to avoid the heritage resource and the proposed conservation buffer.	DEVELOPER	All phases of construction and operation.
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	
MONITORING	Successful location and recording of sites by means of monitoring.	

7 RECOMMENDATIONS

The heritage landscape around Kathu contains rich and significant sites such as the Kathu Pan, Kathu Townlands and Bestwood Stone Age site, which are all of notable scientific significance. The area's heritage spans at least 1.5 million years to the recent Historical Period. The following recommendations provide an outline for the conservation and management of the heritage landscape in the proposed Sishen-Sekgame Electricity Expansion Project Area:

- Since the project is located in a fossil-rich area, a Palaeontological Desktop Study will be required for the development. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- The low density Middle Stone Age (MSA) scatter (**Site EXIGO-SG461-SA01)** is of limited scientific value within its local site context due to the general loss of context and site integrity for the artefacts at the quarry, and the low density of diagnostic formal tools. However, the site is situated within (and possibly part of) the larger Kathu Stone Age Complex and on a regional scale it might be of importance. It is therefore recommended that all construction activities be monitored by a Stone Age archaeologist familiar with the archaeological sequence of the Kathu Archaeological Complex.
- Two larger scatters of MSA material (**Site EXIGO-SG461-SA02, Site EXIGO-SG461-SA03)** are of interest due to the presence of formal stone tools, a higher density of artefacts as well as the position of the occurrence within the larger Kathu Stone Age Complex. It is primarily recommended that the infrastructure be realigned to avoid impact on the sites. Here, a conservation buffer of at least 5m should be maintained around identified Stone Age scatters. However, should this mitigation measure prove unachievable it is recommended that these sites be subject to Phase 2 mitigation conducted by a professional archaeologist with experience in Stone Age archaeology, preferably a specialist that understands the archaeology of the area. A permit in terms of s.35 of the NHRA (Act No 25 of 1999) will have to obtained from the responsible heritage authority
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. Should any subsurface paleontological / archaeological / historical material and /or graves/human remains be uncovered, all activities should be suspended and the archaeological specialist should be alerted immediately.
- It should be noted that 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).

8 GENERAL COMMENTS AND CONDITIONS

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

- Formal Earlier Stone Age stone tools.

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

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

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

It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA). A permit may be required for the destruction of archaeological remains.

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

10.1 Site Significance Matrix

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

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

10.2 Impact Assessment Criteria

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

Significance of the heritage resource

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

Nature of the impact

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

Extent

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

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

Duration

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

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

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

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

Intensity

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

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

Probability

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

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

Confidence

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

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

Impact Significance

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

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

10.3 Direct Impact Assessment Criteria

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

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

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

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
Context 1: Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources **Context 2:** Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources. **Context 3:** Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources **Context 4:** Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible	**Category A: Minimal intensity development** - No rezoning involved; within existing use rights. - No subdivision involved. - Upgrading of existing infrastructure within existing envelopes - Minor internal changes to existing structures - New building footprints limited to less than 1000m2. **Category B: Low-key intensity development** - Spot rezoning with no change to overall zoning of a site. - Linear development less than 100m - Building footprints between 1000m2-2000m2 - Minor changes to external envelop of existing structures (less than 25%) - Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%).

damage.	**Category C: Moderate intensity development** - Rezoning of a site between 5000m2-10 000m2. - Linear development between 100m and 300m. - Building footprints between 2000m2 and 5000m2 - Substantial changes to external envelop of existing structures (more than 50%) - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) **Category D: High intensity development** - Rezoning of a site in excess of 10 000m2 - Linear development in excess of 300m. - Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven. - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)

10.4 Management and Mitigation Actions

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

No further action / Monitoring

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

Avoidance

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

Mitigation

This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.

Compensation

Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.

Rehabilitation

Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:

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

Enhancement

Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources. In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should,

however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored