Archaeological Impact Assessment

For the Mkuze Biomass Plant Associated Infrastructure, Near Mkuze, Kwazulu Natal

Prepared For

Savannah Environmental (Pty) Ltd

By

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I, Jaco van der Walt as duly authorised representative of Heritage Contracts and Archaeological Consulting CC, hereby confirm my independence as a specialist and declare that neither I nor the Heritage Contracts and Archaeological Consulting CC have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which the client was appointed as Environmental Assessment practitioner, other than fair remuneration for work performed on this project.

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EXECUTIVE SUMMARY

Site name and location: The site is located approx. 2.4km west of Mkuze on the Farm Alkmaar 13434, in Kwa-Zulu Natal. An area of approximately 69 hectares of the farm was assessed although only 50 ha is intended to be utilised for the establishment of the Biomass Storage Facility and associated infrastructure. A raw water pipeline from Clerkness dam to the plant was also assessed on a desktop level. The site is located within the Jozini Local Municipality and Umkhanyakude District Municipality.

Purpose of the study: Phase 1 Archaeological Impact Assessment to determine the presence of cultural heritage sites and the impact of the proposed project on these resources within the development footprint.

1:50 000 Topographic Map: 2732 CA

Environmental Consultant: Savannah Environmental (Pty) Ltd

Developer: Building Energy

Heritage Consultant: Heritage Contracts and Archaeological Consulting CC (HCAC).

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Findings of the Assessment:

The topography of the study area is relatively flat but gently sloping towards an intermittent stream located in the new storage area. Apart from this stream no other geographical features like pans or rocky outcrops occur and the entire area was previously used extensively for agricultural purposes but has been fallow for a number of years and as a result some sections especially in Site 2 is very overgrown. Due to the disturbed nature of the site the chances of recovering archaeological materials in situ, are limited. No buildings, cemeteries or archaeological sites of significance were recorded in the study area during the survey. Other heritage studies in the area (Fourie2012 & 2013, Van der Walt 2014) also recorded no sites of significance. Within the larger study area some sites of significance area on record like the site at Tshaneni Mountain that was occupied by the Ndwandwe in the early 1800's, this site is also a battlefield site where the Usutu under Dinizulu, aided by 300 mounted Boers, defeated the Mandlakazi under Zibhebu in 1884. The site is located approximately 8.4 km to the east of the study area and no impact is foreseen on the site.

The impacts of the proposed development on heritage resources such as archaeological sites, built structures over 60 years old, sites of cultural significance associated with burial grounds and graves, graves of victims of conflict, and significant cultural landscapes or viewscapes are considered to be low.

In terms of the KwaZulu Natal Heritage Act No. 4 of 2008 and the National Heritage Resources Act No.25 of 1999 (Section 38 (1), we have no objection to the proposed development (based on approval from AMAFA) if the following recommendations area adhered to:

»If during construction, any graves or archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped and Amafa should be contacted.

General

Due to the subsurface nature of archaeological material and unmarked graves the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

Disclaimer: *Although all possible care is taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. Heritage Contracts and Archaeological Consulting CC and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BIA: Basic Impact Assessment
CRM: Cultural Resource Management
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact Assessment Practitioner
EMP: Environmental Management Plan
ESA: Early Stone Age
GPS: Global Positioning System
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA: National Environmental Management Act
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 BACKGROUND INFORMATION

Kind of study	Archaeological Impact Assessment
Type of development	Biomass Storage Area
Developer:	Building Energy
Consultant:	Savannah Environmental (Pty) Ltd

The Archaeological Impact Assessment report forms part of the BIA for the proposed project.

The aim of the study is to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) and the KwaZulu Natal Heritage Act No. 4 of 2008.

The report outlines the approach and methodology utilized before and during the survey, which includes: Phase 1, a desktop study that includes collection from various sources and consultations; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey no heritage sites were identified within the proposed footprint of the development. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report.

This report must also be submitted to AMAFA for review.

1.1 Terms of Reference

Desktop study

Conducting a brief desktop study where information on the area is collected to provide a background setting of the archaeology that can be expected in the area.

Field study

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with Heritage legislation and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) and the KZN Heritage Act (Act 4 of 2008).

1.2. Archaeological Legislation and Best Practice

Phase 1, an AIA or a HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The KZN Heritage Act also applies (Act 4 of 2008) and stipulates that when a negative impact is foreseen the developer will have to apply for a permit from AMAFA.

The overall purpose of a heritage specialist input is to:

- » Identify any heritage resources, which may be affected;
- » Assess the nature and degree of significance of such resources;
- » Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- » Assess the negative and positive impact of the development on these resources;
- » Make recommendations for the appropriate heritage management of these impacts.

The AIA or HIA, as a specialist sub-section of the EIA, is required under the National Heritage Resources Act NHRA of 1999 (Act 25 of 1999), Section 23(2)(b) of the NEMA and section s.39(3)(b)(iii) of the MPRDA.

The AIA should be submitted, as part of the EIA, BIA or EMP, to the PHRA if established in the province or to SAHRA. SAHRA will be ultimately responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the EIA, BIA/EMP, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level).

Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is a legal body, based in South Africa, representing professional archaeology in the SADC region.

ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIAs are primarily concerned with the location and identification of sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for from SAHRA by the client before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare.

Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

1.3 Description of Study Area

1.3.1 Location Data

The site of the proposed Biomass Storage Facility is located approximately 4.3 km west of Mkuze on the Remainder of the Farm Alkmaar 13434 in KwaZulu-Natal. An area of approximately 50 hectares of the farm is intended to be utilised for the establishment of the facility and associated infrastructure. The site is located within the Jozini Local Municipality and Umkhanyakude District Municipality. The study area is directly accessible from the N2 via the P234 provincial road. The vegetation type of the area is classified as Zululand Lowveld within a Savannah Biome (Mucina & Rutherford 2006).

1.3.2. Location Map

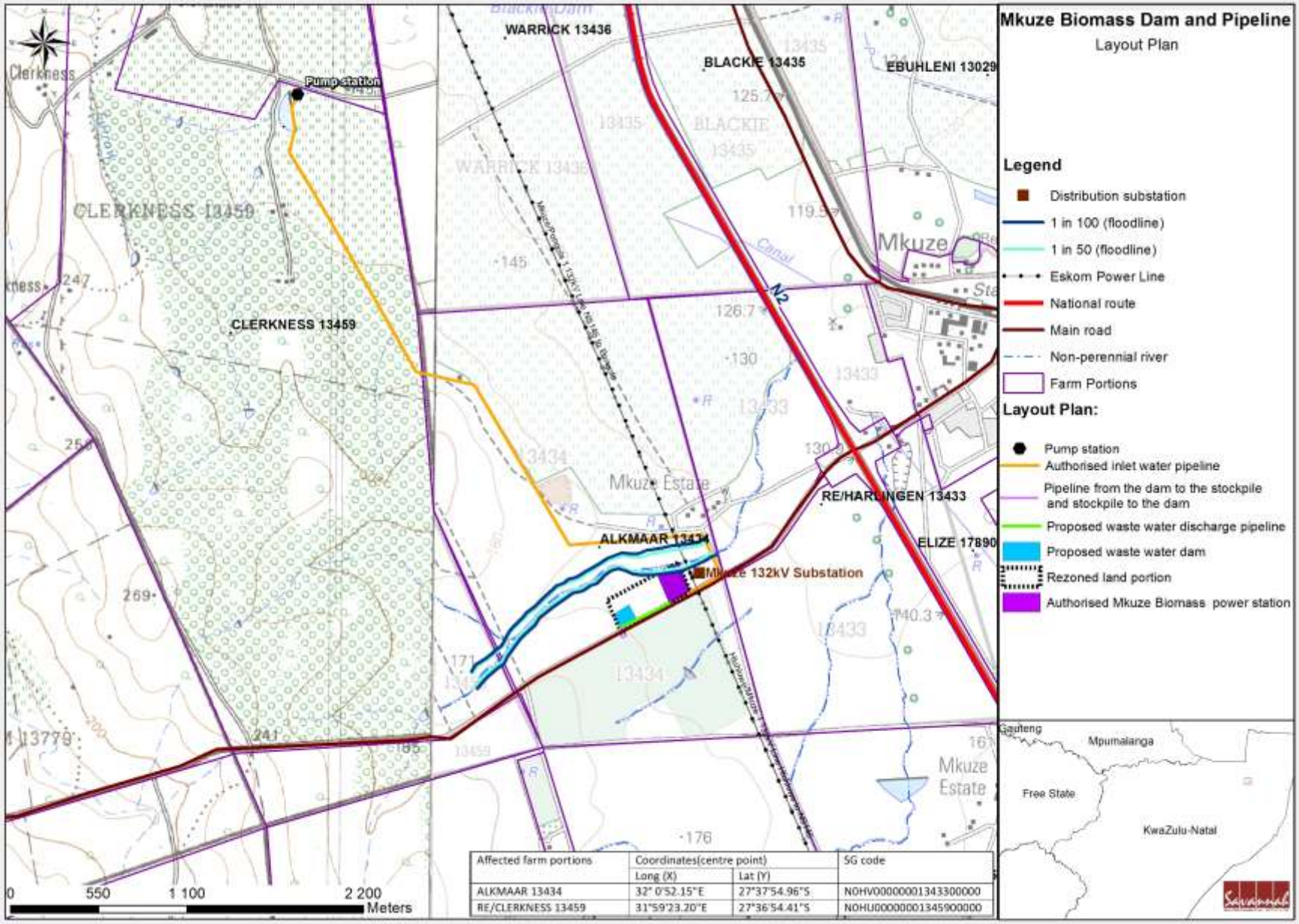

Figure 1: Location map

2. APPROACH AND METHODOLOGY

The aim of the study is to cover archaeological databases to compile a background of the archaeology that can be expected in the study area followed by field verification; this was accomplished by means of the following phases.

2.1 Phase 1 - Desktop Study

The first phase comprised a desktop study scanning existing records for archaeological sites, historical sites, graves, architecture (structures older than 60 years) of the area.

2.1.1 Literature Search

Utilising data for information gathering stored in the archaeological database at Wits and previous CRM reports done in the area. The aim of this is to extract data and information on the area in question.

2.1.2 Information Collection

The SAHRA report mapping project (Version 1.0) was consulted to collect data from previously conducted CRM projects in the region to provide a background of the history of the study area.

2.1.3 Consultation

The team consulted with the farm owner Mr Andre Senekal who is not aware of any heritage significant sites within the study areas.

2.1.4 Google Earth and Mapping Survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located.

2.1.5 Genealogical Society of South Africa

The database of the Genealogical Society was consulted to collect data on any known graves in the area.

2.2 Phase 2 - Physical Surveying

Due to the nature of cultural remains, the majority of which occurs below surface, a field survey of the study area of approximately 69 Ha was conducted. The study area was surveyed by means of vehicle and extensive surveys on foot by a professional archaeologist on the 15th of December 2014.

No sites of significance were discovered inside the proposed development area.

2.3. Restrictions

Due to the fact that most cultural remains may occur below surface, the possibility exists that some features or artefacts may not have been discovered/ recorded during the survey. Low ground visibility of the study area is due to high vegetation growth, and the possible occurrence of unmarked graves and other cultural material cannot be excluded. This study did not assess intangible heritage or palaeontology. Only the surface infrastructure footprint area was surveyed as indicated in the location map, and not the entire farm. The option for the pipeline were only provided after the conclusion of the field studies, hence the description and assessment of the route stems from superficial observations and a desktop study only.

Although HCAC surveyed the area as thoroughly as possible, it is incumbent upon the developer to stop operations and inform the relevant heritage agency should further cultural remains, such as stone tool scatters, artefacts, bones or fossils, be exposed during the process of development.

3. NATURE OF THE DEVELOPMENT

Building Energy proposes the development of a biomass storage area, wastewater dam and pipeline infrastructure for the authorised Mkuze Biomass Plant near the town of Mkuze.

The biomass storage area will have a footprint of approximately 19.5 hectares and will house sugar cane tops and trash (T & T) as fuel sources for the Mkuze biomass power station, providing a 9 month supply. A lined wastewater dam (1 hectare) and pipeline infrastructure is also proposed to be constructed.

The purpose of the lined dam is to:

- » To guarantee a strategic water reserve for firefighting system on the new 9 months Biomass storage park;
- » To guarantee a regular safety wetting of accumulated 9 months biomass;
- » To guarantee the irrigation and maintain a safe green (covered by grass) buffer area of a minimum of 50,00 m surrounding all new 9 months storage area.
- » A 4 km raw water pipeline from the Clerkness Dam to the plant will provide water to the facility.

This activity therefore relates to the following:

- » Storage area 1: Approx 13Ha, north of Kingfisher Road
- » Storage Area 2: Approx 36 Ha, South of Kingfisher Road
- » Lined Dam (1Ha) and pipeline infrastructure

4. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND OF THE STUDY AREA

4.1 Databases Consulted

The Natal museum Archaeological database was consulted, some MSA donga sites were recorded to the south of the Mkuze River, but no sites are on record for the study area.

Very few previous CRM surveys are on record for the larger study area (SAHRIS 2014). For this report studies by Fourie (2012 and 2013) and Van Schalkwyk (2013) who report on the Swaziland railway project was consulted. Anderson also recorded 7 sites consisting of stone walled features, graves and historical homesteads (personal communication 2014). Fourie recorded Stone Age material and also mentions the site of Magudu Hill. Van Schalkwyk recorded low significance Stone Age find spots and structures older than 60 years (bridges).

Genealogical Society and Google Earth Monuments

Neither the Genealogical Society nor the monuments database at Google Earth (Google Earth also include some archaeological sites and historical battlefields) have any recorded sites in the study area.

4.2 Archaeological and Historical Information Available on the greater study Area

The archaeology of KwaZulu-Natal can be divided in three main periods namely the Stone Age, Iron Age and Historical period.

Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases.

Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. - Recently to ~30 thousand years ago
- Middle Stone Age; associated with Homo sapiens and archaic modern human - . 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. - 400 000-> 2 million years ago.

A single ESA site is known for Pongola located north of the study area (personal communication Gavin Anderson 7 July 2014). The LSA is well represented in KwaZulu-Natal with an abundance of rock art, like the rock paintings at Giants Castle and Kamberg in the Drakensburg Mountains (Vinnicombe, 1976). Rock art sites have been also been documented in the areas around Estcourt, Mooi River and Dundee. Several caves in KZN contain significant archaeological deposits like the well-known MSA site of Sibudu Cave on the coast of KwaZulu-Natal, which shows evidence for early forms of cognitive human behavioural patterns (Wadley, 2005). Another well-known cave called Border Cave is situated some 40 kilometres to the north east of the study area at the Ingodini Border Cave Museum Complex. The site was first investigated by Raymond Dart in 1934 (Fourie 2013), here excavations exposed a thick deposit of archaeological material dating from the Iron Age overlaying MSA artefacts. Later excavations, by Beaumont in the early 1970's, revealed a complete MSA sequence succeeded by Early and Later Iron Age deposits (Klein 1977).

Iron Age and historical period

Bantu-speaking people moved into Eastern and Southern Africa about 2,000 years ago (Mitchell, 2002). These people cultivated sorghum and millets, herded cattle and small stock and manufactured iron tools and copper ornaments. Because metalworking represents a new technology, archaeologists call this period the Iron Age. Characteristic ceramic styles help archaeologists to separate the sites into different groups and time periods. The Iron Age as a whole represents the spread of Bantu speaking people and includes both the Pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to colonial period.

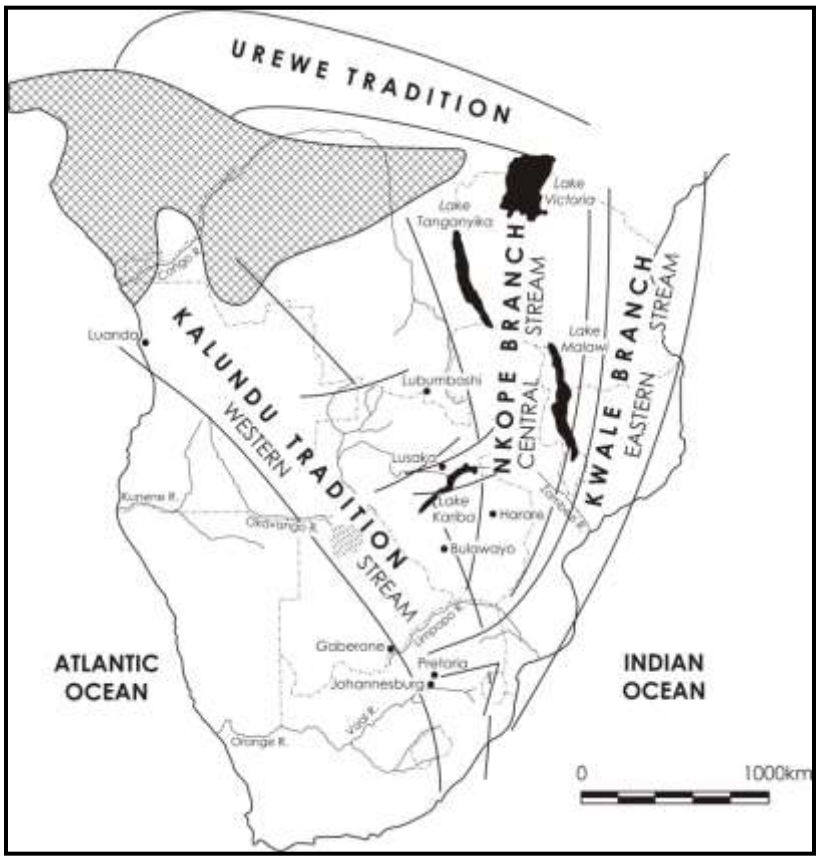

Figure 2: Movement of Bantu speaking farmers (Huffman 2007).

The first 1,000 years is called the Early Iron Age. Early Iron Age people made a living by mixed farming. They had the technology to work metals like iron. Existing evidence dates the Iron Age in southern Africa to the first millennium AD (Huffman, 2007). The site of Mzonjani, 15 km from Durban, is the oldest known Iron Age site in KwaZulu-Natal, dating to the 3rd Millennium AD (Huffman, 2007).

The area that was occupied by the Nguni speaking group of the Eastern Bantu language stream is characterised by settlement patterns defined as the Central Cattle Pattern (CCP) (Huffman, 2007). The earliest known type of stonewalling that characterises this settlement pattern (CCP) in the region is known as Moor Park, which dates from the 14th to 16th Centuries AD (Huffman, 2007). This type of stonewalling can be found in defensive positions on hilltops in the Midlands of KZN (Huffman, 2007) Archaeologists have concluded that the function of these structures was to serve mainly as defensive purposes (Huffman, 2007). Archaeologically, the Natal area was occupied by the Zulu people by AD 1050 (Huffman, 2007).

The Difaqane (Sotho), or Mfekane/Imfecane ("the crushing" in Nguni) was a time of bloody upheavals in Natal and on the Highveld, which occurred around the early 1820's until the late 1830's. (Berg 1999: 109-115) It came about in response to heightened competition for land and trade, and caused population groups like gun-carrying Griquas and Shaka's Zulus to attack other tribes. (Berg 1999: 14; 116-119). In KwaZulu-Natal, this commenced in the early 1800's when the amaZulu were still under Senzangakona (Omer-Cooper, 1993). One of the bigger chiefdoms that Shaka conquered is the Ndwandwe chiefdom of Zwide kaLanga, which was situated north of Shaka's territory around kwaNongoma (Knight, 1998). Shaka managed to achieve his kingdom by strategically expanding the traditional *amabutho* system. The *amabutho* were the brigades of young men of similar age gathered together for a period of national service (Wright, 1991). The *amabutho* were quartered at large royal homesteads, *amakhanda* which were sited strategically above the surrounding country to guard against both outside attack and internal dissension, like the site of Moor Park. During the times of need, *amabutho* would be organised into *impi* to fight and protect the Zulu kingdom. The *amabutho,* organised into *impi,* would be sent out to attack and take over rival chiefdoms that were opposed to King Shaka's rule and in the process extend his monarchy.

In the late 1400's, an Nguni group under the leadership of Dlamini settled in the Delagoa Bay area. By the late 1700's, the Dlamini clan moved into land settling on the banks of the Pongola River where it cuts through the Lebombo Mountains. An attempt was also made to occupy the area between the Pongola River and Magudu Hills (at that stage the area was under Ndwandwe rule), but they had to retreat back across the Pongola River (Bonner, 2002) (Fourie 2013).

Serious rivalry between the Ndwandwe under Zwide and the Ngwane (Swazi) under Sobhuza created a period of unrest and confrontation in the early 1800's. An attempt from Zwide to annex the grain fields on the south side of the Pongola River almost destroyed the Ngwane. These successive Ndwandwe attacks lead to the fleeing of the Ngwane to the far north (Bonner, 2002).

Magudu Hills situated approximately 17 km south of the study area (S27 32 03.8 E31 38 59.2) is one of the settlement areas of the Ngwane in the early 1800's and the scene of conflict with the Ndwandwe. Another conflict site is Tshaneni Mountain (S27 37 58.0 E32 04 18.2) that was also occupied by the Ndwandwe. When Shaka defeated the Ndwandwe, the head of the ruling Gaza family, chief Soshangane, was forced to flee to Mozambique where the Gaza became founder members of the Shangaan. They still continue to see Tshaneni Mountain as their spiritual home with their chiefs buried in a cave high on the slopes the mountain (von der Heyde 2013). On this site in 1884 the Usutu under Dinizulu, aided by 300 mounted Boers, defeated the Mandlakazi under Zibhebu. Hundreds of warriors died and the slopes of Tshaneni were littered with bones for many years.

Historical information

Since the 1830s, the KwaZulu-Natal landscape was divided into the north and the south; Natal in the south and Zululand in the north. Zululand can be broadly defined as the land between the uThukela River and the Pongola River and Swaziland to the north.

Initially this border was blurred and unmarked by any geographic or physical feature until colonial times (Knight, 1998).

Natal came to exist when, the Portuguese explorer, Vasco da Gama, noted the existence of the south-eastern seaboard in his log as he sailed around the Cape and up the east coast of Africa, searching for a route to the Indies. He called it Terra Natalis, in honour of the birth of Christ, and for centuries Natal was used to describe the country south of uThukela. Evidence for the formal proclamation of uThukela River as the political boundary dividing Zululand (in the north) and Natal (in the South) dates to the 1850's, during King Cetshwayo kaMpande's rule as the Zulu King (Fourie 2013).

5. HERITAGE SITE SIGNIFICANCE AND MITIGATION MEASURES

The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed quarry extension the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface.

This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites;
- Potential to answer present research questions.

Furthermore, The National Heritage Resources Act (Act No 25 of 1999, Sec 3) distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa's history;
- Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

5.1. Field Rating of Sites

Site significance classification standards prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 7 of this report.

FIELD RATING	***GRADE***	***SIGNIFICANCE***	***RECOMMENDED MITIGATION***
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

5.2 Assessment of Impacts

The following assessment criteria were provided by the client to determine the significance of the impact of the development on heritage resources.
This includes:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
» The **duration**, wherein it will be indicated whether:
  * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * medium-term (5–15 years) – assigned a score of 3;
  * long term (> 15 years) - assigned a score of 4; or
  * permanent - assigned a score of 5;
» The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
» The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
» the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
» the **status**, which will be described as either positive, negative or neutral.
» the degree to which the impact can be reversed.
» the degree to which the impact may cause irreplaceable loss of resources.
» the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

6. BASELINE STUDY-DESCRIPTION OF SITES

It is important to note that the entire farm was not surveyed and that only the footprint of the proposed development as indicated in Figure 1 was assessed. The new storage site, new dam and effluent pipeline from the authorised Biomass Storage Area are located north of the provincial P234 gravel road. South of the P234 is the new storage area –Site 2. The site is accessible from the P234 directly from the N2. The study area used to be cultivated but have been fallow for a number of years and as a result is highly overgrown especially new storage area – site 2 and archaeological visibility was limited in this area (Figure 4 & 5). North of the P234 the area is currently utilised as a game farm and as a result vegetation have been kept in check and archaeological visibility is higher in these areas (Figure 6 & 7). During the survey no sites or features of heritage significance were identified inside the study area. Isolated highly weathered miscellaneous MSA flakes was noted close to the intermittent stream in the new storage area. These widely dispersed isolated flakes are out of context and are highly weathered possibly due to secondary water deposition and are of no heritage significance. Heritage studies adjacent to the current area under investigation (Fourie 2012 & 2013, van der Walt 2014) also recorded no heritage sites.

The option for the pipeline was only provided after the conclusion of the field studies, hence the description and assessment of the route stems from superficial observations and a desktop study only. As the proposed option are located mostly next to existing roads in a largely cultivated area that are already disturbed it is assumed that very little remain of surface indicators of heritage sites Annexure A.

Figure 3: Google Image of the study area (in blue) with track logs of the area covered in black.

Figure 4. Site conditions in new storage area site 2.

Figure 5. Site conditions in new storage area site 2.

Figure 6. Site conditions in new storage area.

Figure 7. Site conditions in new storage area.

6.1 Impact Summary:

Storage Area 1

Nature:		
	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Small (0)	Small (0)
Probability	Very improbable (1)	Very improbable (1)
Significance	**Low (6)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: No mitigation is required for this development.		

Storage Area 2

Nature:		
	Without mitigation	**With mitigation**
Extent	**Low (1)**	**Low (1)**
Duration	**Permanent (5)**	**Permanent (5)**
Magnitude	**Small (0)**	**Small (0)**
Probability	**Very improbable (1)**	**Very improbable (1)**
Significance	**Low (6)**	**Low (6)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	**Low**	**Low**
Irreplaceable loss of resources?	**Yes**	**Yes**
Can impacts be mitigated?	**Yes**	
Mitigation: **No mitigation is required for this development.**		

Lined dam and pipeline

Nature:		
	Without mitigation	**With mitigation**
Extent	**Low (1)**	**Low (1)**
Duration	**Permanent (5)**	**Permanent (5)**
Magnitude	**Small (0)**	**Small (0)**
Probability	**Very improbable (1)**	**Very improbable (1)**
Significance	**Low (6)**	**Low (6)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	**Low**	**Low**
Irreplaceable loss of resources?	**Yes**	**Yes**
Can impacts be mitigated?	**Yes**	

Mitigation: **No mitigation is required for the dam area.**

Impact evaluation of the proposed pipelines on heritage resources

Nature: **During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.**		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	**Local (2)**	**Local (2)**
Duration	**Permanent (5)**	**Permanent (5)**
Magnitude	**Low (3)**	**Low (3)**
Probability	**Probable (3)**	**Probable (2)**
Significance	**30 (Medium)**	**20 (Low)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	**Not reversible**	**Not reversible**
Irreplaceable loss of resources?	**Yes**	**Yes unless any possible sites can be preserved.**
Can impacts be mitigated?	**Yes**	**Yes**
Mitigation: **It is recommended that prior to construction an archaeological walk down of the pipeline must be conducted or the possibility of graves must be investigated through a social consultation process.**		
Cumulative impacts: **Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive. Grave sites have high social significance.**		
Residual Impacts: N.A**.**		

Activity	Impact summary	Significance	Proposed mitigation
Storage area 1			
	Direct impacts:	**Low**	**No mitigation required**
	Indirect impacts:	**Low**	**No mitigation required**
	Cumulative impacts:	**Low**	**No mitigation required**
Storage area 2			
	Direct impacts:	**Low**	**No mitigation required**
	Indirect impacts:	**Low**	**No mitigation required**
	Cumulative impacts:	**Low**	**No mitigation required**
Lined dam and pipeline			
	Direct impacts:	**Low**	**No mitigation required for dam area. Possible grave sites along the pipeline route must be investigated in consultation with the land owners or subjected to a heritage walk down.**
	Indirect impacts:	**Low**	**No mitigation required**
	Cumulative impacts:	**Low**	**No mitigation required**

7. RECOMMENDATIONS AND CONCLUSIONS

The area earmarked for the proposed development consist of old agricultural fields and as such the chances of recovering archaeological surface material or buildings *in situ*, are limited. Isolated highly weathered miscellaneous MSA flakes was noted close to the intermittent stream in the new storage area. These widely dispersed isolated flakes are out of context and are highly weathered possibly due to secondary water deposition and are of little heritage significance. The study area is also located well away from the Tshaneni Battle site and Ndwandwe grave site. Previous CRM study's was conducted adjacent to the study area and similarly no heritage sites were recorded (Fourie 2012 & 2013, van der Walt 2014). Consultation with regards to heritage sites with the farm owner Mr. Andre Senekal was conducted on the 15th of December and he is also not aware of any sites in the study area.

The option for the pipeline (Annexure A) was only provided after the conclusion of the field studies, hence the description and assessment of the route stems from superficial observations and a desktop study only. Although the water pipeline option is acceptable from a heritage point of view, grave sites can be expected anywhere on the landscape and it is therefore recommended that when the final option is determined that possible grave sites along the pipeline route must be investigated in consultation with the land owners or subjected to a heritage walk down.

It is concluded that the impacts of the proposed development on heritage resources such as archaeological sites, built structures over 60 years old, sites of cultural significance associated with burial grounds and graves, graves of victims of conflict, and significant cultural landscapes or viewscapes are considered to be low.

In terms of the KwaZulu Natal Heritage Act No. 4 of 2008 and the National Heritage Resources Act No.25 of 1999 (Section 38 (1), we have no objection to the proposed development (based on approval from AMAFA) if the following recommendations area adhered to:

- If during construction, any graves or archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped and Amafa should be contacted.

8. PROJECT TEAM

Jaco van der Walt, Project Manager

9. STATEMENT OF COMPETENCY

I (Jaco van der Walt) am a member of ASAPA (no 159), and accredited in the following fields of the CRM Section of the association: Iron Age Archaeology, Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation. This accreditation is also valid for/acknowledged by SAHRA and AMAFA.

I have been involved in research and contract work in South Africa, Botswana, Zimbabwe, Mozambique, Tanzania and the DRC; having conducted more than 300 AIAs since 2000.

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Annexure A

Google Image of the proposed raw water pipeline indicated in blue.