# Phase 1 Heritage Impact Assessment Report

## Desktop Heritage Impact Assessment for the Proposed Development of a 4 Megawatt per hour Micro-Hydro Power Station in the Jozini Local Municipality, within the Umkhanyakude District of the KwaZulu–Natal Province.

Prepared By:

Prepared For:

# CREDIT SHEET


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***Disclaimer;*** *Although all possible care is taken to identify all 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. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

**Statement of Independence**

As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

SIGNED OFF BY: STEPHAN GAIGHER

# MANAGEMENT SUMMARY

**Site name and location:** Development of a 4 Megawatt per hour Micro-Hydro Power Station.

**Municipal Area:** Jozini Local Municipality within the Umkhanyakude District of the KwaZulu-Natal Province.

**Developer:** Pongolapoort Hydro

**Consultant:** G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa.
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**Date of Report:** 04 December 2018

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the Proposed Development of a 4 Megawatt per hour micro-hydro Power Station in the Jozini Local Municipality, within the Umkhanyakude District of the KwaZulu–Natal Province.

This study encompasses the heritage impact investigation. A preliminary layout has been supplied to lead this phase of this study.

**Scope of Work**
A Desktop Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Basic Paleontological Assessment) to determine the impacts on heritage resources within the study area from documented records.

The following are the required to perform the assessment:

- A desk-top investigation of the area;
- Identify possible archaeological, cultural, historic and built environment sites within the proposed development area;
- Evaluate the potential impacts of construction and operation of the proposed development on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical and built environment importance.

The purpose of this study is to determine the possible occurrence of sites with cultural heritage significance within the study area. The study is based on archival and document investigations.

**Findings & Recommendations**
No reference to any heritage sites with significance could be found. It is recommended that obscured, subterranean sites be managed, if they are encountered. Due to the highly altered state of the site as well as its small footprint it is recommended that it be exempt from a full HIA.

**Fatal Flaws**
No fatal flaws were identified.

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# List of Abbreviations

AMAFA.....aKwaZulu-Natali (Zulu for 'Heritage KwaZulu-Natal')

Bp..... Before Present

EIA .....Early Iron Age

ESA..... Early Stone Age

Fm..... Femtometre ($10^{-15}$m)

GPS ..... Geographic Positioning System

HIA ..... Heritage Impact Assessment

I&AP.....Interested and Affected Parties

KZN.....KwaZulu Natal

LIA.....Late Iron Age

LSA .....Late Stone Age

MYA ..... Million Years Ago

MSA .....Middle Stone Age

NHRA.....National Heritage Resources Act no 22 of 1999

SAHRA..... South African Heritage Resource Agency

S&EIR ..... Scoping & Environmental Impact Reporting

Um .....Micrometre ($10^{-6}$ m)

WGS 84 ..... World Geodetic System for 1984

Chapter 1

# PROJECT RESOURCES

## HERITAGE IMPACT REPORT

DESKTOP HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED DEVELOPMENT OF A 4 MEGAWATT P/HOUR MICRO-HYDRO POWER STATION.

## 1. INTRODUCTION

**Legislation and methodology**

G&A Heritage was appointed by Baboloki Geohub to undertake a desktop heritage impact assessment for the Proposed Development of a 4 Megawatt per hour Micro-Hydro Power Station in the Jozini Local Municipality, within the Umkhanyakude District of the KwaZulu–Natal Province.

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

*(a) Construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
*(b) Construction of a bridge or similar structure exceeding 50 m in length; and*
*(c) Any development, or other activity which will change the character of an area of land, or water –*
*(1) Exceeding 10 000 $m^2$ in extent;*
*(2) Involving three or more existing erven or subdivisions thereof; or*
*(3) Involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or*
*(d) The costs of which will exceed a sum set in terms of regulations; or*
*(e) Any other category of development provided for in regulations.*

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

(8) *The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

*(3) 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.*

(1) Ancestral graves,
(2) Royal graves and graves of traditional leaders,
(3) Graves of victims of conflict (iv) graves of important individuals,
(4) Historical graves and cemeteries older than 60 years, and
(5) Other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);

(h) Movable objects, including ;
(1) Objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
(2) Ethnographic art and objects;
(3) Military objects;
(4) Objects of decorative art;
(5) Objects of fine art;
(6) Objects of scientific or technological interest;
(7) Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
(8) Any other prescribed categories, but excluding any object made by a living person;

(i) Battlefields;
(j) Traditional building techniques.

A '**place**' is defined as:
(a) A site, area or region;
(b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
(c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'**Structures**' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'**Archaeological**' means:
(a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(b) Rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and
(c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

**'Paleontological'** means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

**'Grave'** means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by Baboloki Geohub is accurate.
- We assumed that the public participation process performed as part of the Basic Assessment process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Table 1. Impacts on the NHRA Sections

| Act | Section | Description | Possible Impact | Action |
|---|---|---|---|---|
| National Heritage Resources Act (NHRA) | 34 | Preservation of buildings older than 60 years | No | N/A |
| | 35 | Archaeological, paleontological and meteor sites | No | N/A |
| | 36 | Graves and burial sites | No | N/A |
| | 37 | Protection of public monuments | No | N/A |
| | 38 | Does activity trigger a HIA? | Yes | HIA |

Table 2. NHRA Triggers

| Action Trigger | Yes/No | Description |
|---|---|---|
| Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length. | Yes | Phongola Hydropower Plant |
| Construction of a bridge or similar structure exceeding 50m in length. | No | N/A |
| Development exceeding 5000 $m^2$ | Yes | Phongola Hydropower Plant study area |
| Development involving more than 3 erven or sub divisions | No | N/A |
| Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years | No | N/A |
| Re-zoning of site exceeding 10 000 $m^2$ | No | N/A |
| Any other development category, public open space, squares, parks or recreational grounds | No | N/A |

# 2. Background Information

## 2.1 Project Information and Location

Pongolapoort Hydro proposes to develop a 4 Megawatt per hour micro-hydro power station on Kaw-Zulu Natal Department of Water and Sanitation (DWS) land below the Pongolapoort Dam Wall on the south bank and connected to the existing DWS canal outlet pipe waterworks infrastructure. The proposed power station consists of a 65m$^2$ reinforced concrete building, a 120m x 2.7m diameter buried steel "penstock" pipeline, a 40m x 2m "tailrace" channel into the Pongola River, a 220m on-site 6.6/11kV powerline through Jozini town sub-station and a 5m x 65m gravel surface access road.


Figure 1. Google Earth © Image of the Proposed Pongolapoort Hydropower Plant

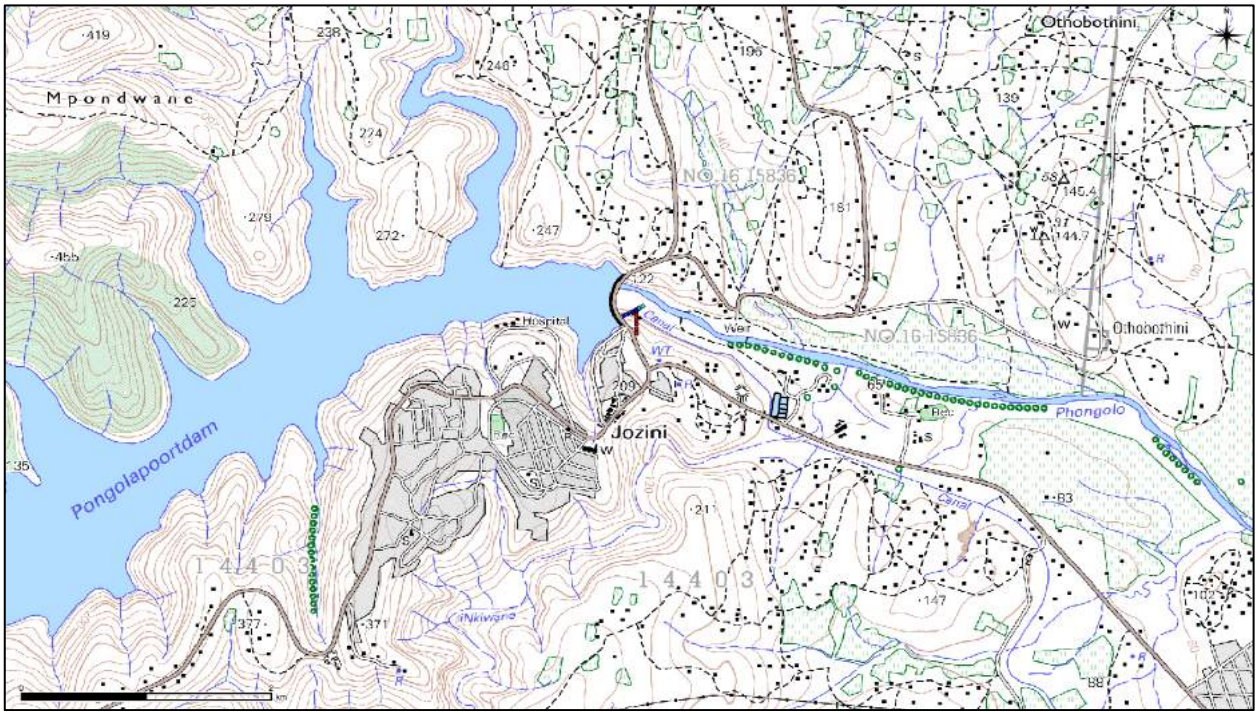


Figure 2. Topographical Map 2732 AC 2002

Chapter 2

# FINDINGS

# HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

## 3. REGIONAL CULTURAL CONTEXT

### 3.1 PALEONTOLOGY

The *PalaeoSensitivity* Map published by SAHRA on the SAHRIS website places this area within the "Blue" classification. This is described as a low significance area and therefore no specialist paleontological investigation is necessary, however a protocol for finds is required (see section within this report).

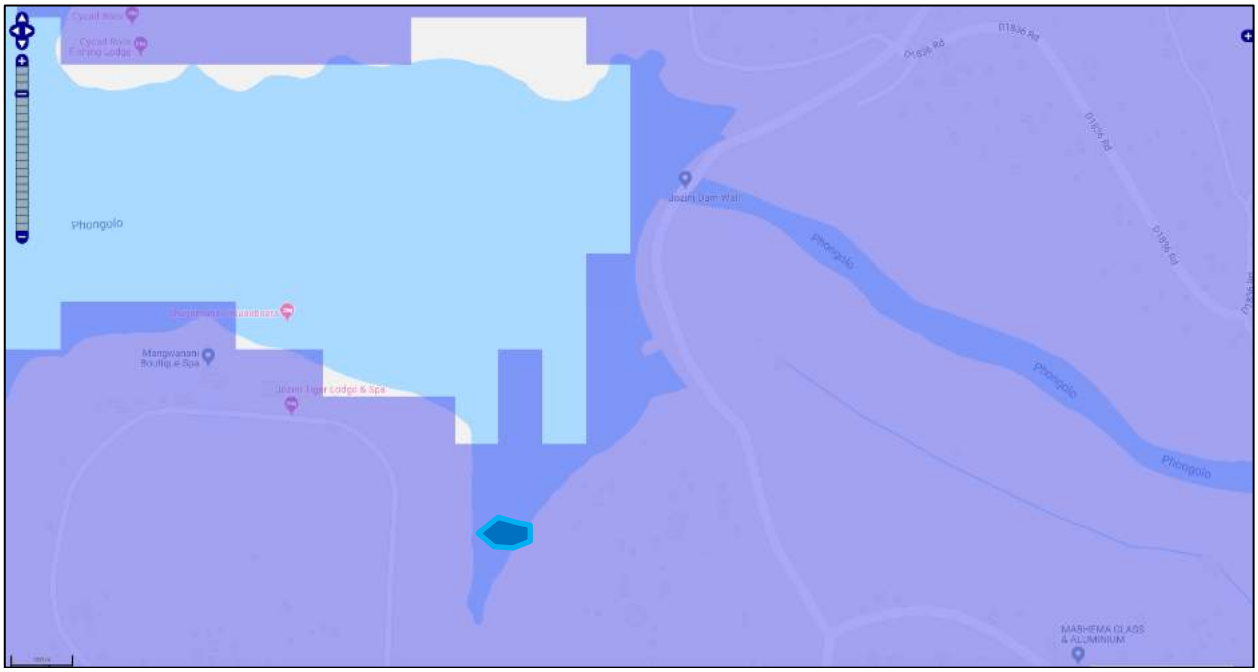


Figure 3. Paleo Sensitivity Map

| Colour | Sensitivity | Required Action |
|---|---|---|
| RED | VERY HIGH | field assessment and protocol for finds is required |
| ORANGE/YELLOW | HIGH | desktop study is required and based on the outcome of the desktop study, a field assessment is likely |
| GREEN | MODERATE | desktop study is required |
| BLUE | LOW | no palaeontological studies are required however a protocol for finds is required |
| GREY | INSIGNIFICANT/ZERO | no palaeontological studies are required |
| WHITE/CLEAR | UNKNOWN | these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map. |

Figure 4. PalaeoSensitivity Map Legend

## 3.2 Stone Age

This area is home to all three of the known phases of the Stone Age, namely: The Early- (2.5 million – 250 000 years ago), Middle- (250 000 – 20 000 years ago) and Late Stone Age (22 000 – 200 years ago). The Late Stone Age in this area also contains sites with rock art from the San and Khoekhoen cultural groups. Early to Middle Stone Age sites are uncommon in this area, however rock-art sites and Late Stone Age sites are much better known.

During the Middle Stone Age, 200 000 years ago, modern man or Homo sapiens emerged, manufacturing a wider range of tools, with technologies more advanced than those from earlier periods. This enabled skilled hunter-gatherer bands to adapt to different environments. From this time onwards, rock shelters and caves were used for occupation and reoccupation over very long periods of time.

The Middle Stone Age (MSA), as defined by Goodwin and Van Riet Lowe (1929), was viewed as a switch in technology from core tools to flake tools, and was thought to represent an intermediate technology between the Earlier and Later Stone Age (LSA). Triangular flakes with convergent dorsal scars and faceted butts distinguished the MSA, and radial and discoidal types, along with single and double platform examples, dominated cores. The 'type fossil' was considered to be the worked flake point. Due to both the relatively long time span encompassed by the MSA (c. 250 000-20 000BP) and the high degree of regional variation, it has proved difficult to include all MSA assemblages within Goodwin and Van Riet Lowe's criteria. More recent attempts have been made to revise the definition of the MSA (Klein 1970; Beaumont & Vogel 1972; Volman1984) and to establish a cultural sequence but with limited success. As a result identifying and understanding the end of the MSA is still difficult. Disagreement concerning the MSA/LSA transition in southern Africa centres on four issues: 1) the definition of what constitutes final MSA technology; 2) the existence of a transitional MSA/LSAindustry; 3) the dating of the MSA/LSA transition; and 4) the existence of an Early LSA (ELSA) which represents a distinct industry that is not part of the earliest recognized LSA, the Robberg (Clark, 1997).

1985 excavation at Umhlatuzana rock shelter in Natal by Kaplan yielded a long and detailed sequence of stone artefacts, which covered the time range from the Middle Stone Age (MSA) to the Later Stone Age (LSA), including the MSA/LSA transition, and early LSA microlithic bladelet assemblages. The change from the MSA to the beginning of the LSA took place between 35 000 and 25 000 BP. Robberg-like assemblages recovered from Umhlatuzana are the first to be positively identified in Natal. Pre-dating 18 000 BP and post-dating 12 000 BP, they show that assemblages of this nature were produced earlier and later in Natal than elsewhere in the country. Changes in the Umhlatuzana stone artefact assemblages were not the result of the introduction from elsewhere of new types of tools, but took place locally, as the result of a single evolving cultural tradition in a trajectory of cultural and social change (Kaplan, 1986).

Recent research by Wadley on the Middle Stone Age of Sibudu Cave north of Durban indicated that distinctions between the Middle Stone Age and the Late Stone Age based on backed blades could be misleading (Wadley, 2005). Although research on MSA sites is limited, this research illustrates the potential value of investigating Stone Age sites in KZN closer.

The Late Stone Age, considered to have started some 20 000 years ago, is associated with the predecessors of the San and Khoi Khoi. Stone Age hunter-gatherers lived well into the 19th century in

some places in SA. Stone Age sites may occur all over the area where an unknown number may have been obliterated by mining activities, urbanisation, industrialisation, agriculture and other development activities during the past decades.

A large representation of Rock-Art sites is located in this area. During 1981 Mazel completed a survey of the Drakensberg and Southern Natal and documented over 400 rock art sites with more than 20 000 paintings (Mazel, 1981). The occurrence of these sites is however subject to very specific environmental parameters, none of which are present in the study area.

## 3.3 Iron Age

During the third century AD, several groups of farming peoples from eastern and south central Africa began to settle along the east coast and river valleys that drain into the Indian Ocean (Maggs 1984a, 1989; Mitchell 2002). In eastern South Africa, these early farmers display a strong preference for settling a savannah environment along major water bodies where annual precipitation from 400 to over 1000mm provided adequate moisture for grain production. Over thirty EIA identified settlements in the Thukela Basin are clustered on discontinuous patches of rich colluvial soils within a short distance of the edge of the Thukela River or its tributaries. EIA settlements were initially established in the coastal forest in the fifth century AD and later in the savannah woodland belt alongside rivers in the (seventh century AD). The opening of riverine forest and woodlands by EIA farmers is apparent from the palaeobotanical record, current vegetation distribution (Hall 1981) and settlement distribution in the Thukela Basin. All documented sites are found within 100m of the relic canopy fringe (van Schalkwyk 1992).

EIA sites averaging 7 hectares in size are consistently located on the most productive nodes of soils confined to confluences and colluvial slip-off slopes along the major drainage courses, which comprise only about 9 per cent of the landscape (Maggs 1980: 7).

"*Interpretations of the internal spatial organization of EIA sites in southern Africa are complicated by the relatively long use and frequent reoccupation of sites, often over several hundred years (Maggs 1984b, 1989). These reoccupations of the same places have created a palimpsest of flat, expansive settlements, with both superimposed and laterally displaced stratigraphy (Greenfield et al. 2000). Despite this situation, several large-scale horizontal excavations of settlements in the region have demonstrated a spatial layout of features that are similar to homestead spatial organization derived from nineteenth- and twentieth-century Nguni and Sotho-Tswana ethnography (Kuper 1982), called the Central Cattle Pattern (CCP). This pattern is characterized by domestic residences of the senior man's wives placed in ranked order in an arc or circle around a central area containing livestock pens, the burials of high-status individuals and a court or assembly area where men gather to discuss political matters (Huffman 2001). Archaeologically, a similar pattern is represented by a series of domestic complexes (hut floors, grain bins or pits, ash and other refuse middens) surrounding a series of non-domestic activity areas, including livestock enclosures and specialist activity areas separated by an open space devoid of cultural materials. There is some variation in the size of the open space. At Broederstroom in north-eastern South Africa, the distance between hut floors and a livestock enclosure was as little as 10m (Huffman 1993). At KwaGandaganda in the Mngeni valley in KwaZulu-Natal, the open space was 90m across (Whitelaw 1994), and at Ndondondwane this open space was 60-100m*" (Greenfield and van Schalkwyk 2003) (Huskel J, Greenfield, Kent, D, Fowler, & Leonard O, van Schalkwyk, 2005).

As well, faunal evidence suggests that certain species, such as nyala antelope, were forced to shift the range of their habitat after the woodland was opened (Maggs 1995:175). A considerable number of Late Iron Age, stone walled sites, dating from the 18$^{th}$ and the 19$^{th}$ centuries (some of which may have been occupied as early as the 16$^{th}$ century), occur along and on top of the rocky ridges here These settlements and features in these sites, such as huts, were built with dry stone, reed and clay.

Stone walled settlements are concentrated in clusters of sites and sometimes are dispersed over large areas making them vulnerable to developments of various kinds. A site consists of a circular or elliptical outer wall that is composed of a number of scalloped walls facing inwards towards one or more enclosures. Whilst the outer scalloped walls served as dwelling quarters for various family groups, cattle, sheep and goat were stock in the centrally located enclosures. Huts with clay walls and floors were built inside the dwelling units. Pottery and metal items are common on the sites. However, iron and copper were not produced locally on these sites.

Many of the Iron Age sites are also associated with Zulu encampments. Due to the often semi-nomadic nature of these and the use of removable huts, these sites are often difficult to identify and short term occupational sites might only manifest in some stone circles, use to anchor these structures to the ground.

## 3.4 The Historic Era

KwaZulu-Natal is an amalgamation of the 'homeland' territory of KwaZulu (literally 'home of the Zulus') and the province of Natal. The latter was named after the Christmas Day 1497 sighting of the coast by the great Portuguese explorer and navigator, Vasco da Gama. At that time the territory was occupied by clans of the Nguni tribe who had migrated south from central Africa over the previous few centuries.

British settlers first arrived at Port Natal (Durban) in 1824 when Shaka, King of the Zulu was firmly in charge of the hinterland. Later, the Zulu King, Dingane, at first offered the Boers land but went back on his word killing their leader, Piet Retief. Revenge came on 16th December, 1838, when a vastly outnumbered contingent of Boers defeated the Zulus at the Battle of Blood River. A Republic of Natalia was declared the following year but was annexed by Britain in 1843.

The Great Trek (Afrikaans: *Die Groot Trek*) was an eastward migration of Dutch-speaking settlers who traveled by ox drawn wagons from the Cape Colony into the interior of modern South Africa from 1836 onwards, seeking to live beyond the Cape British colonial rule, resulting from mounting tension between the Cape's original European settlers, known collectively as the *Boers* and the British Empire. The Great Trek led directly to the founding of several autonomous Boer republics, namely the South African Republic (a.k.a. the Transvaal - an independent and internationally recognised country in Southern Africa from 1852 to 1902), the Orange Free State (recognized by the UK on 17 February 1854 and became independent on 23 February 1854 with the signing of the Bloemfontein or Orange River Convention) and Natalia Republic (established in 1839 by the local Boers after Pretorius entered into an alliance with Mpande, the new Zulu king), among others.

In January 1832 the Boer Leaders sent Dr. Andrew Smith and William Berg to investigate Natal for potential settlement. They reported that Natal would be well suited to establish settlements. In June 1834 Petrus Lafras Uys was chosen to be the Trek Leader to take a company of 14 wagons (the Boer *Kommissietrek*) of 20 men, a woman and their coloured employees towards Port Natal. They set off on the 8th of September 1834 from Grahamstown. Jan Gerritze Bantjies was among the men and he was instrumental in documenting their journey. They were welcomed by the Xhosa while moving through the Eastern Cape and passed unharmed into Natal. The party arrived in Port Natal in February 1835.

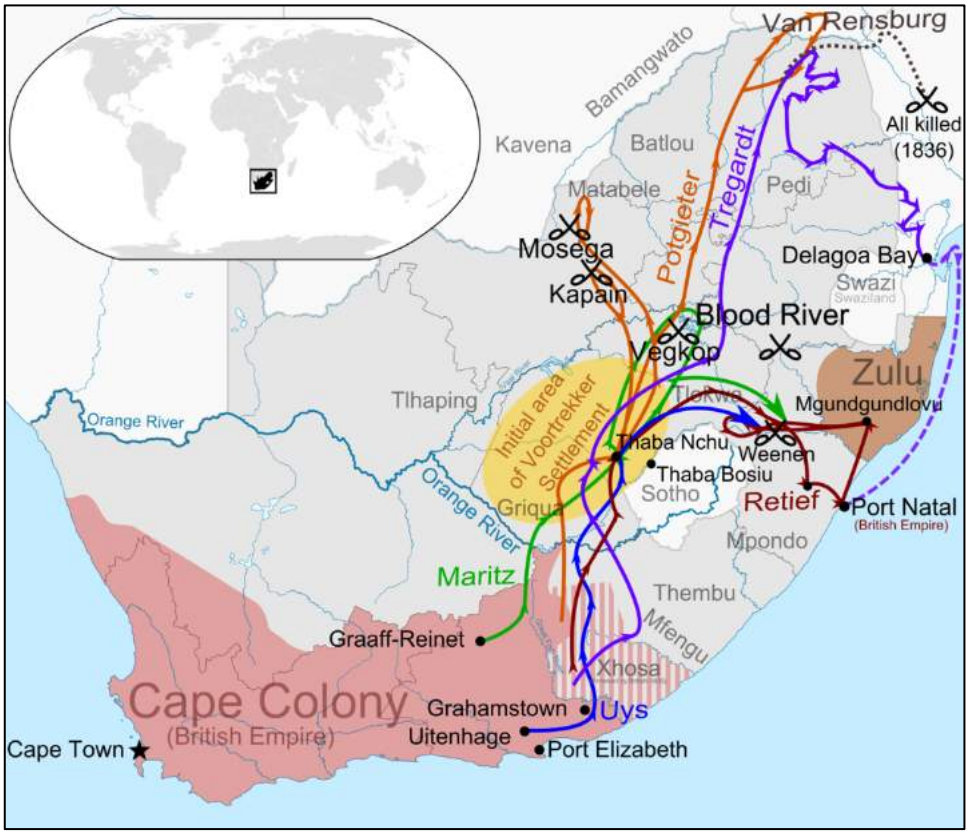


Figure 5. A map of the first wave of the Great Trek (1835-1840)

The map above illustrates the paths of the largest parties of *Voortrekkers* across South Africa. Based on the map in "The Great Trek" (1985) by B.P.J. Erasmus and the "Illustrated History of South Africa: The Real Story" by Reader's Digest (1988), pg. 115.

**Conflict with the Zulu**

Natal had been regarded as part of the British sphere of influence since the establishment of the first trading post in Port Natal in 1824, but the early English traders and hunters found themselves unable to secure a stable relationship with the then Zulu King Dingane after the assassination of Shaka (Dingane, 10 years previously, had murdered his half-brother, Shaka, to assume the chieftainship of the Zulu's). Numerous attempts were made by interested merchants in Cape Town and the Eastern Cape to pressurise the Imperial government into taking a more active role but nothing was done until 1837 when, in the shadow of the Great Trek, London appointed independent missionary Allen Gardiner as Justice of the Peace. Gardiner had no funds, no military resources and no clear mandate, and the tiny English community, numbering no more than 40 males, threw their weight behind the Voortrekker leader Piet Retief when he reached Natal in October 1837. Retief had to negotiate with the AmaZulu King Dingane over the ownership of land.

Sources cite that Retief paid a successful visit to the Zulu king at the beginning of November 1837, but sources differ greatly from this point on. Dingane supposedly declared that he was prepared to grant Retief an extensive area between the Tugela and the Umzimvubu as well as the Drakensberg, on condition that Retief restored to Dingane the cattle stolen from him by Sikonyela (the Tlokwa chief). Dingane felt that this would prove to him that Sikonyela and not the Voortrekkers had in fact stolen the cattle. Some sources claim that Dingane also demanded rifles.

As per the deal with Dingane, the Voortrekkers successfully obtained the cattle from Sikonyela and on 3 February 1838 Retief and his party reached the Zulu capital, Mgungundlovu, with the cattle. Retief surrendered the cattle but refused to hand over the horses and the guns he had taken from the Tlokwa. This could have been the reason for Dingane's suspicion of Retief, but other sources site additional reasons, one being that Dingane's agents, who had accompanied Retief to supervise the return of the cattle, also may have reported that even before the land claim had been signed,

Voortrekkers were streaming down the Drakensburg passes in large numbers. Despite the suspicions, Dingane supposedly put his mark on a land grant document sometime the next day.

On 6 February Dingane requested that Retief and his men visit his royal kraal without their guns to drink beer as a farewell gesture. It was strictly in accordance with Zulu protocol that nobody appeared armed before the King. Retief suspected no foul play and accepted the invitation. As soon as the Voortrekkers party was inside the royal kraal, Dingane gave the order and his regiments overpowered Retief and his men, and took them up to a hill to be killed. Francis Owen, the missionary at Dingane's kraal, who later described the scene in his diary, witnessed the murders from a distance. It was the murder of Retief and his 67 men, as well as the supposed 'land claim' that seems to have ignited the war between the Voortrekkers and the Zulu's.

After killing Retief's delegation, a Zulu army of 7000 impis were sent out and immediately attacked Voortrekker encampments in the Drakensberg foothills at that later was called Blaaukrans and Weenen, leading to the Weenen massacre in which 282 Voortrekkers (which included 185 children) were killed – nearly wiping out half of the Natal contingent of Voortrekkers.

The Voortrekkers retaliated with a 347 strong punitive raid against the Zulus, supported by new arrivals from the Orange Free State. They were defeated by 7000 warriors at Ithaleni, south west of uMgungundlovu. In November 1838 Andries Pretorius arrived with a commando of sixty armed men and two cannons to assist in the defence. On the 16th of December 1838 a force of 468 Voortrekkers, 3 Britons and 60 black allies fought against over 10 thousand Zulu impis at the Battle of Blood River. Pretorius's victory over the Zulu army lead to a civil wat within the Zulu nation as King Dingane's half-brother, Mpande kaSenzangakhona aligned with the Voortrekkers to overthrow the King when he send 10 00 impis to assist the Voortrekkers in follow-up expeditions against Dingane.

After the defeat of the Zulu forces, the Voortrekkers proclaimed the Natalia Republic. This Boer state was annexed by the British forces in 1843.

**History of Pongola**

Prior to the construction of the Pongolapoort Dam the land was Africa's first formally recognised conservation area. The Pongola Game Reserve was proclaimed in 1894 by the then President of the Transvaal Republic, Paul Kruger. (This would ultimately lead to the proclamation of the Hluhluwe-Imfolozi, Mkuze and Ndumo Game Reserves as well as one of Africa's greatest wildlife conservation parks, the Kruger National Park.)

During the Depression years of the 1930s, a government irrigation settlement was established on the west side of the Lebombo mountains. This settlement comprised 159 plots with a total area of 6 189 ha. A sugar mill was constructed in 1954 and water for irrigation was provided either by government-built gravity canals or was pumped directly from the Pongola river.

The town of Pongola was established during 1954.

By 1955, plans were well advanced for the construction of the dam, to be built in the Pongolapoort – the gorge between the Ubombo and Lebombo Mountains. The dam was planned to support 40 000 to 50 000 ha of irrigation on the Makatini Flats, a highly fertile area adjacent to the floodplain on both sides of the river. Apart from boosting commercial farming, the government also hoped to 'stabilise the frontier' bordering Mozambique and Swaziland.

Interestingly, merits of the scheme were a subject of debate even after construction started. One of the main grounds of criticism was that intensive soil and other tests, which would determine suitable land usage, were only undertaken after the project was given the go ahead. The plans for intensive agriculture never materialised.

Construction of the dam started in 1963.
The dam itself is a medium thin, double curvature arch dam with a gradual transition towards a gravity thrust block on the left flank. It has a maximum height of 89 m and a crest length of 515 m. The dam has a controlled and an uncontrolled spillway. The gross capacity of the reservoir is 2 500 million

cubic metres, which is more than twice the mean annual runoff. The chute spillways have a combined capacity of 2 010 cubic meters at high flood level. The thickness of the wall above the cushion is 18,3 m tapering to 8,2 m at the spillway and then flowing to 11 m to carry a road across it.

The foundations and abutments of the dam presented a number of challenges. During excavation for the foundation, great difficulty was experienced as a result of the sensitivity of the brittle dacite to blasting and stress relief and its reaction to changes in temperature. In the South African National Committee on Large Dams' publication "Large Dams and Water Systems in South Africa", it is written: "Whole layers of what appeared to be sound rock scaled off with a noise like a pistol shot and necessitated the use of 30 meter long rock anchors, line drilling and the use of hydraulic wedging for final excavations."

Work on the dam was on a 24-hour basis, requiring up to 764 cubic meters of concrete a day. The aggregate came from a site 20 km upstream and some two million tons had been stockpiled at the start of the project.

Another significant challenge was the high average air temperatures on the site. This was overcome by pre-cooling the aggregate with controlled amounts of crushed ice.

Pongolapoort Dam was the first dam in South Africa where this artificial cooling method was used. The dam went up in 1,8 m sections, the curvature of each one having to be separately calculated, taking about 30 hours on a manual calculation. Each vertical section is independent of the other. The gravity sections on the flanks induced blasting of some 500 000 t of rock. The dam was eventually completed in 1973.

In the early years following its completion, Pongolapoort Dam could not be filled as it would inundate part of Swaziland. While negotiations with Great Britain had solved this problem, these decisions were withdrawn by Swazi authorities following the country's independence. Both the political and engineering problems were overcome by 1982. This was none too soon because in 1984 the area was hit by tropical cyclone Domoina. A Department of Water Affairs report on the effects of the cyclone describes that on 31 January 1984 when **Domoina**hit, the catchment of the dam received more than 700 mm of rainfall (a record to this day) and a peak inflow of 1 600 cubic meters occurred into the Pongolapoort Dam. At the time the dam was only 13% full but the total inflow as a result of the cyclone was 2 000 million cubic meters or 87% of the total capacity of the dam.

Sources:


- Ashe, Major & Wyatt-Edgell, Capt E V. *The Zulu Campaign*, (1880).
- Barthorp, Michael. *The Zulu War: A pictorial history*, (Poole 1980).
- Clammer, David. *The Zulu War* (St Martin's Press, 1973).
- Clarke, Sonia. *Zululand at War: 1879: The conduct of the Anglo-Zulu War.*
- *SA Dept Forestry and Water Affairs, www.dwaf.gov.za*
- https://www.sahistory.org.za/article/origins-battle-blood-river-1838
- http://www.kznnorthhappenings.co.za/pongola_homepage.htm
- http://www.pongolagamereserve.co.za/history
- http://www.royaljozini.com/pongolapoort-dam-some-history/


## 3.5 Previous Studies

An extensive research into the SAHRIS database resulted in the identification of the following heritage related studies that have been performed over the last decade in the study area. Only studies within a radius of 50km from the study area were considered.

- Fourie, W. 2013. Pongola-Candover 132kV power line, upgrades to the Pongola Substation and Candover switching station, development of the Golela 132/22kV substation DBAR2.
- Van Der Walt, J. 2014. AIA for the Proposed Construction of the 2.5MW Pongola Solar Energy Facility near Ponogla, Kwazulu Natal.
- Anderson, G. 2004. Archaeological Survey of the Proposed Route for the Pongola-Vergenoeg Transmission Line.

- Millsteed, B. 2014. Desktop Palaeontological Heritage Impact Assessment Report on the site of a Proposed Solar Power Production Facility known as the Pongola Solar Energy Facility to be located on Portion 260 of the Farm Pongola 61, Kwazulu Natal Province.
- Prins, F. 2015. Heritage Impact Assessment of the Proposed Construction of Phongola (Mboza) River Bridge, Umhlabuyalingana Local Municipality, KwaZulu-Natal.
- Anderson, G. 2017. Heritage Survey of the Proposed N2 Upgrade Between Pongola and Mpumalanga Border.
- Anderson, G. 2009. Archaeological Survey of the Proposed Somopho Vodacom Tower, Pongola, KwaZulu-Natal.
- Anderson, G. 2009. Comment for a Heritage Survey of the Proposed Borrow Pits 4A and 4B, Pongola.
- Anderson, G. 2007. Archaeological Survey of the Proposed Itshelejuba Vodacom Tower, Pongola, KwaZulu-Natal.
- Prins, F. 2018. Phase One Heritage Impact Assessment of the Proposed Upgrade of the National Route 2, Sections 30, 31 and 32, from Kangela (N2.30 KM 14) to Pongola (N2/32 KM29.4)

## 3.6 Historical Maps and Results of Archival Study


Figure 6. Topographical Map 2732 AC 1969

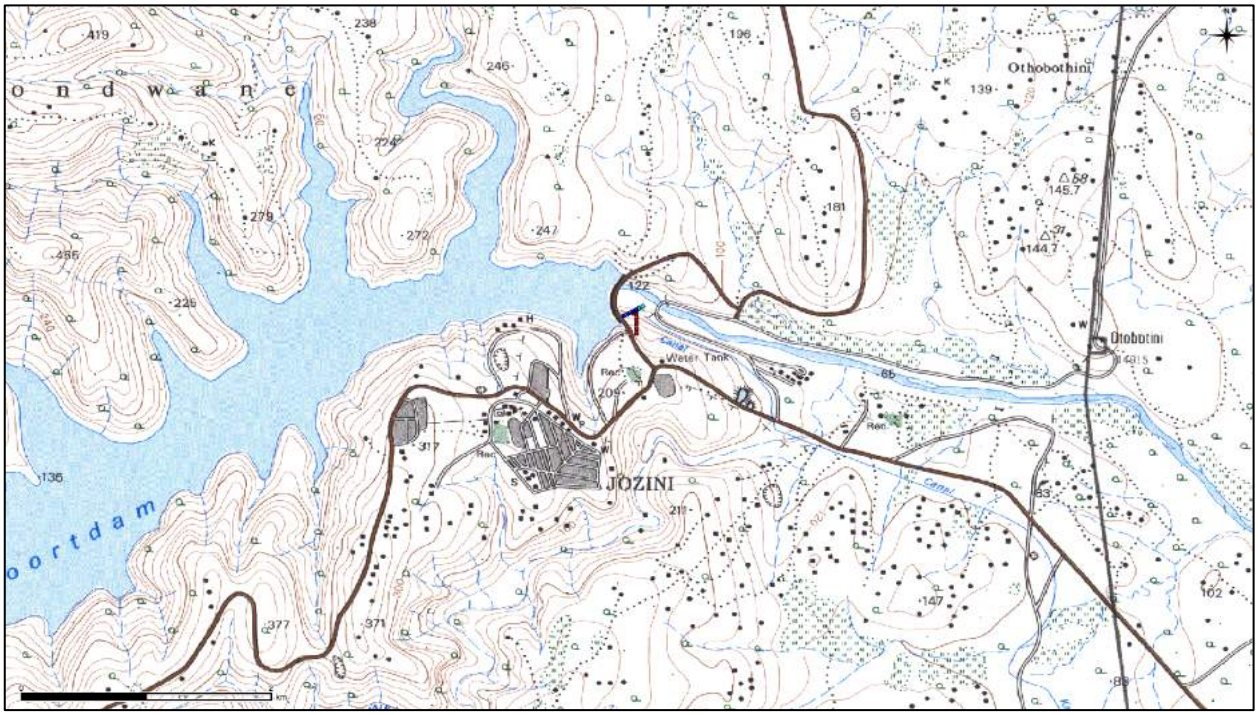


Figure 7. Topographical Map 2732 AC 1980

The 2732 AC 1969 and 1980 historical maps show no structures of historical significance.

## 3.7 Cultural Landscape

The cultural landscape in the study area is associated with the industrial nature of the reservoir and associated infrastructure.

# 4. Findings

No sites of heritage significance could be identified through the desktop study.

Figure 8. Pongola Dam Wall

Figure 9. Access Road

Figure 10. Vegetation along the access road

Figure 11. Pongolapoort Channel

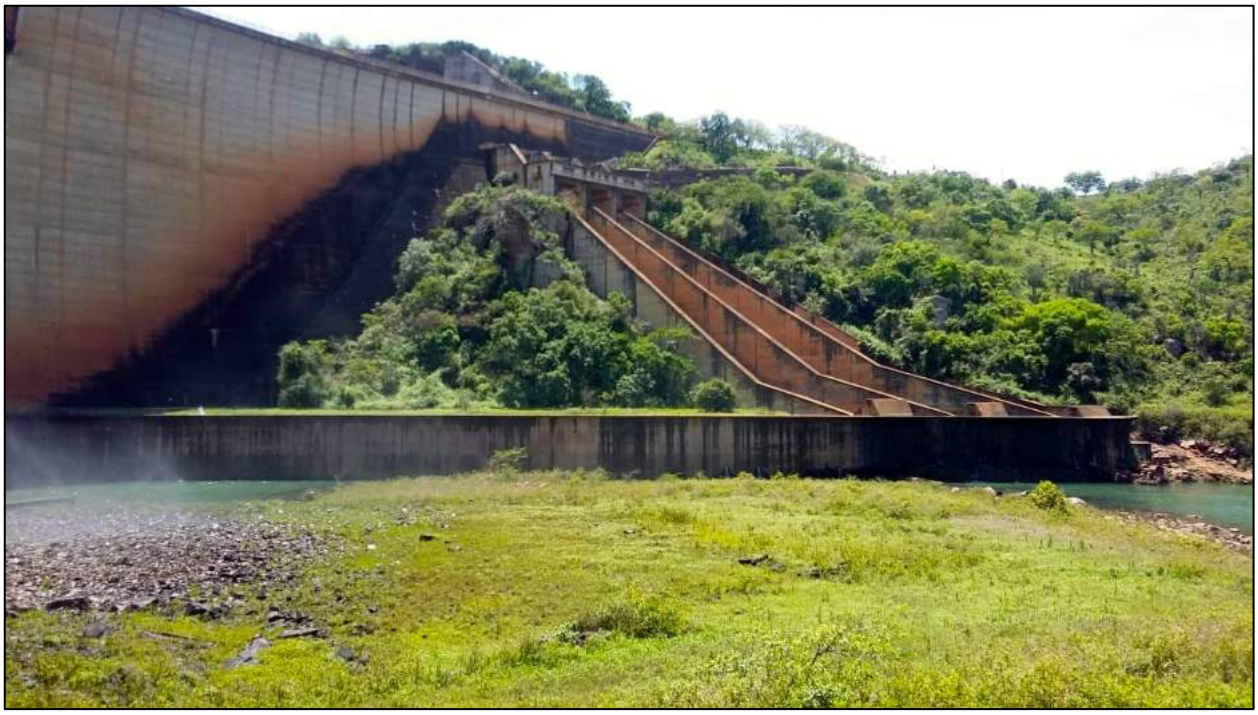

Figure 12. Pongola Dam Wall

Figure 13. Pongola Dam Wall

Figure 14. Pongolapoort Channel

Figure 15. Vegetation in the study area

Chapter 3

# IMPACT ASSESSMENT

## 5. METHODOLOGY

This study defines the desktop heritage component of the EIA process being undertaken for Proposed Development of a 4 Megawatt per hour Micro-Hydro Power Station in the Jozini Local Municipality, within the Umkhanyakude District of the KwaZulu–Natal Province.
It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

### 5.1 INVENTORY

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984)*.

### 5.2 EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

Known Information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA (South African Heritage Resource Agency) provincial databases.

This Desktop Heritage Impact Assessment relies on the analysis of written documents, maps, aerial photographs and other archival sources. Site investigations were not performed.

The following documents were consulted in this study;

- South African National Archive Documents
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Talana Museum Information
- Siege Museum, Ladysmith
- Internet Search
- Historic Maps
- 2732 AC 1969, 1980 and 2002 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2018 imagery
- Published articles and books
- JSTOR Article Archive

### 5.4 PUBLIC PARTICIPATION

The study was included in the public participation process advertisements of the lead consultant. Furthermore, posters were placed on site with information regarding the proposed development and its anticipated impact on the heritage of the area and IAP's were requested to respond. During the mandatory PP process time, no objections were received either in writing or by phone.

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# BACKGROUND INFORMATION DOCUMENT

## Purpose of this Document

The purpose of this Background Information Document (BID) is to provide Interested and Affected Parties (IAPs) with background information about the proposed project and introduce the Environmental Impact Assessment (EIA) process to be followed. It also aims to inform IAPs on how to fully participate in the EIA and encourages response to documents distributed for review and active attendance at meetings.

## What is Proposed and Where?

Pongolapoort Hydro proposes to develop a 4 MEGAWATT per hour micro-hydro power station on KwaZulu-Natal Department of Water & Sanitation (DWS) land below the Pongolapoort Dam Wall on the south bank and connected to the existing DWS canal outlet pipe waterworks infrastructure. The proposed power station consists of a 65m² reinforced concrete building, a 120m x 2.7m diameter buried steel 'penstock' pipeline, a 40m x 2m 'tailrace' channel into the Pongola River, a 220m on-site 6.6/11Kv powerline through Jozini town sub-station and a 5m x 65m gravel service road.

## Why is a Basic Assessment Required?

In terms of the National Environmental Management Act, 1998 (No.107 of 1998) [NEMA], as amended, and associated EIA Regulations published in 2014 (amended in 2017), an **Environmental Authorisation** must be obtained from the relevant competent authority, the KwaZulu Natal Department Of Economic Development, Tourism and Environmental Affairs (EDTEA), prior to the commencement of certain listed activities that may result in potential negative impacts on the environment. The proposed project involves, inter alia, the following listed activities;

**Activity 19 of GNR. 327:** The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from;
(i) a watercourse;

## Public Participation Process (PPP)

The PPP aims to inform a wide range of IAPs about the proposed development and the environmental process to be followed. It is a tool to allow the public to exchange information and to express their views and concerns on the proposed development for which the EIA is being conducted. The PPP assists in identifying potential issues and concerns that need to be addressed in the impact assessment by highlighting relevant information to be included in the assessment. PPP enables more accurate and descriptive analysis and helps to focus and enhance decision-making.

The EIA will be open and transparent to the public through this process with all registered IAPs continuously updated on events throughout the process. All contributions from IAPs must be fully documented, evaluated and responded to in the EIA.

## Activities of the PPP

The public is invited to register as an IAP and take part in the PPP through:

- Media Notices placed in newspapers:
- Distribution of the BID
- Site notice boards
- Public meeting and Stakeholder meetings (if necessary)
- Submission of comments on the media notices, BID and Draft Basic Assessment Reports

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**How to Register as an Interested and Affected Party?**

IAPs may forward their written comments along with their name, contact details and an indication of any direct business, financial, personal or other interest which they have in the application by telephone or email to:

**EAP:**

Miss Kuda Zhandire
Baboloki Geohub
C: 079 962 1987
E: babolokigeohub@gmail.com

*Note: All information is available on request*

**ALL COMMENTS TO BE SUBMITTED ON OR BEFORE 31ST JANUARY 2019.**

# 6. Measuring Impacts

In 2003 the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

## 6.1 Type of Resource

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

## 6.2 Type of Significance

### 6.2.1 Historic Value

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

### 6.2.2 Aesthetic Value

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

### 6.2.3 Scientific Value

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.

- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

(a) Does the site contain evidence, which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas
- tool types indicative of specific socio-economic or religious activity
- cultural features such as burials, dwellings, hearths, etc.
- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

### 6.2.4 Social Value / Public Significance

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site

- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

### 6.2.5 Ethnic Significance

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

### 6.2.6 Economic Significance

(a) What value of user-benefits may be placed on the site?

- visitors' willingness-to-pay
- visitors' travel costs

### 6.2.7 Scientific Significance

(a) Does the site contain evidence, which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?
(b) Does the site contain evidence, which can make important contributions to other scientific disciplines or industry?

### 6.2.8 Historic Significance

(a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?
(b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?
(c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?
(d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

### 6.2.9 Public Significance

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- visibility and accessibility to the public
- ability of the site to be easily interpreted
- opportunities for protection against vandalism
- economic and engineering feasibility of reconstruction, restoration and maintenance
- representativeness and uniqueness of the site
- proximity to established recreation areas
- compatibility with surrounding zoning regulations or land use
- land ownership and administration
- local community attitude toward site preservation, development or destruction

- present use of site

(b) Does the site receive visitation or use by tourists, local residents or school groups?

### 6.2.10 Other

(a) Is the site a commonly acknowledged landmark?
(b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?
(c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?
(d) Is the site representative of a particular architectural style or pattern?

## 6.3 Degrees of Significance

### 6.3.1 Significance Criteria

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information, which, if properly recovered, will enhance understanding of Southern African human history, is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population *(Smith, L.D. 1977)*.

### 6.3.2 Rarity

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.
- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

### 6.3.3 Representivity

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

# 7. Assessment of Heritage Potential

## 7.1 Assessment Matrix

### 7.1.1 Determining Archaeological Significance

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

**Estimating site potential**

Table 4 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Table 4: Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deaon, NMC as used in Morris)

| Class | Landform | Type 1 | Type 2 | Type 3 |
|---|---|---|---|---|
| L1 | Rocky Surface | Bedrock exposed | Some soil patches | Sandy/grassy patches |
| L2 | Ploughed land | Far from water | In floodplain | On old river terrace |
| L3 | Sandy ground, inland | Far from water | In floodplain or near features such as hill/dune | On old river terrace |
| L4 | Sandy ground, coastal | >1 km from sea | Inland of dune cordon | Near rocky shore |
| L5 | Water-logged deposit | Heavily vegetated | Running water | Sedimentary basin |
| L6 | Developed urban | Heavily built-up with no known record of early settlement | Known early settlement, but buildings have | Buildings without extensive basements over known historical |

| | | | | |
|---|---|---|---|---|
| | | | basements | sites |
| L7 | Lime/dolomite | >5 myrs | <5000 yrs | Between 5000 yrs and 5 myrs |
| L8 | Rock shelter | Rocky floor | Loping floor or small area | Flat floor, high ceiling |
| Class | Archaeological traces | Type 1 | Type 2 | Type 3 |
| A1 | Area previously excavated | Little deposit remaining | More than half deposit remaining | High profile site |
| A2 | Shell of bones visible | Dispersed scatter | Deposit <0.5 m thick | Deposit >0.5 m thick; shell and bone dense |
| A3 | Stone artefacts or stone walling or other feature visible | Dispersed scatter | Deposit <0.5m thick | Deposit >0.5 m thick |

Table 5: Site attributes and value assessment (adopted from Whitelaw 1997 as used in Morris)

| Class | Landforms | Type 1 | Type 2 | Type 3 |
|---|---|---|---|---|
| 1 | Length of sequence /context | No sequence<br>Poor context<br>Dispersed distribution | Limited sequence | Long sequence<br>Favourable context<br>High density of arte / ecofacts |
| 2 | Presence of exceptional items (incl. regional rarity) | Absent | Present | Major element |
| 3 | Organic preservation | Absent | Present | Major element |
| 4 | Potential for future archaeological investigation | Low | Medium | High |
| 5 | Potential for public display | Low | Medium | High |
| 6 | Aesthetic appeal | Low | Medium | High |
| 7 | Potential for implementation of a long-term management plan | Low | Medium | High |

## 7.2 Assessing site value by attribute

Table 5 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

## 7.3 Impact Statement

### 7.3.1 Assessment of Impacts

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

(a) destruction or alteration of all or part of a heritage site;

(b) isolation of a site from its natural setting; and

(c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.
Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.
Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

## 7.4 Indicators of Impact Severity

**Magnitude**
The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

**Severity**
The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

**Duration**
The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

**Range**
The spatial distribution, whether widespread or site-specific, of an adverse impact.

**Frequency**
The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

**Diversity**
The number of different kinds of project-related actions expected to affect a heritage site.

**Cumulative Effect**
A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

**Rate of Change**
The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. *(Zubrow, Ezra B.A., 1984).*

## 7.5 Post-Contact Sites
No sites associated with the post-contact era will be affected by the proposed development.

## 7.6 Built Environment
Several structures associated with industrial activities (dam wall) was identified on site. None of these held any heritage significance.

## 7.7 Historic Significance

Table 7: Built Environment

| No | Criteria | Significance Rating |
|---|---|---|
| 1 | ***Are any of the identified sites or buildings associated with a historical person or group?***<br>No | N/A |
| **2** | ***Are any of the buildings or identified sites associated with a historical event?***<br>No | N/A |
| **3** | ***Are any of the identified sites or buildings associated with a religious, economic social or political or educational activity?***<br>No | N/A |
| **4** | ***Are any of the identified sites or buildings of archaeological significance?***<br>No | N/A |
| **5** | ***Are any of the identified buildings or structures older than 60 years?***<br>No | N/A |

## 7.8 Architectural Significance

Table 8: Architectural Significance

| **No** | **Criteria** | **Rating** |
|---|---|---|
| 1 | ***Are any of the buildings or structures an important example of a building type?***<br>No | N/A |
| **2** | ***Are any of the buildings outstanding examples of a particular style or period?***<br>No | N/A |
| **3** | ***Do any of the buildings contain fine architectural details and reflect exceptional craftsmanship?***<br>No | N/A |
| **4** | ***Are any of the buildings an example of an industrial, engineering or*** | |

| | | |
|---|---|---|
| | ***technological development?***<br>No | N/A |
| **5** | ***What is the state of the architectural and structural integrity of the building?***<br>No | N/A |
| **6** | ***Is the building's current and future use in sympathy with its original use (for which the building was designed)?***<br>N/A | - |
| **7** | ***Were the alterations done in sympathy with the original design?***<br>N/A | - |
| **8** | ***Were the additions and extensions done in sympathy with the original design?***<br>N/A | - |
| **9** | ***Are any of the buildings or structures the work of a major architect, engineer or builder?***<br>No. | N/A |

## 7.9 Spatial Significance

Even though each building needs to be evaluated as a single artefact the site still needs to be evaluated in terms of its significance in its geographic area, city, town, village, neighbourhood or precinct. This set of criteria determines the spatial significance.

Table 9: Spatial Significance

| No | Criteria | Rating |
|---|---|---|
| **1** | ***Can any of the identified buildings or structures be considered a landmark in the town or city?***<br>No | - |
| **2** | ***Do any of the buildings contribute to the character of the neighborhood?***<br>No | - |
| **3** | ***Do any of the buildings contribute to the character of the square or streetscape?***<br>No | - |
| **4** | ***Do any of the buildings form part of an important group of buildings?***<br>No | - |

# 8. Impact Evaluation

This HIA Methodology assists in evaluating the overall effect of a proposed activity on the heritage environment. The determination of the effect of a heritage impact on a heritage parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the heritage practitioner through the process of heritage impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

## 8.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics, which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity if the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

### 8.1.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the heritage environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

### 8.1.2 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 10: Classification of Impacts

| | | |
|---|---|---|
| **NATURE** | | |
| Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity. | | |
| **GEOGRAPHICAL EXTENT** | | |
| This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined. | | |
| 1 | Site | The impact will only affect the site. |
| 2 | Local/district | Will affect the local area or district. |
| 3 | Province/region | Will affect the entire province or region. |
| 4 | International and National | Will affect the entire country. |
| **PROBABILITY** | | |
| This describes the chance of occurrence of an impact | | |
| 1 | Unlikely | The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence). |
| 2 | Possible | The impact may occur (Between a 25% to 50% chance of occurrence). |
| 3 | Probable | The impact will likely occur (Between a 50% to 75% chance of occurrence). |
| 4 | Definite | Impact will certainly occur (Greater than a 75% chance of occurrence). |
| **REVERSIBILITY** | | |
| This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity. | | |
| 1 | Completely reversible | The impact is reversible with implementation of minor mitigation measures. |

| | | |
|---|---|---|
| 2 | Partly reversible | The impact is partly reversible but more intense mitigation measures are required. |
| 3 | Barely reversible | The impact is unlikely to be reversed even with intense mitigation measures. |
| 4 | Irreversible | The impact is irreversible and no mitigation measures exist. |
| **IRREPLACEABLE LOSS OF RESOURCES** | | |
| This describes the degree to which heritage resources will be irreplaceably lost as a result of a proposed activity. | | |
| 1 | No loss of resource. | The impact will not result in the loss of any resources. |
| 2 | Marginal loss of resource | The impact will result in marginal loss of resources. |
| 3 | Significant loss of resources | The impact will result in significant loss of resources. |
| 4 | Complete loss of resources | The impact is result in a complete loss of all resources. |
| **DURATION** | | |
| This describes the duration of the impacts on the heritage parameter. Duration indicates the lifetime of the impact as a result of the proposed activity. | | |
| 1 | Short term | The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years). |
| 2 | Medium term | The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years). |
| 3 | Long term | The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years). |
| 4 | Permanent | The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite). |
| **CUMULATIVE EFFECT** | | |
| This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question. | | |
| 1 | Negligible Cumulative Impact | The impact would result in negligible to no cumulative effects. |
| 2 | Low Cumulative Impact | The impact would result in insignificant cumulative effects. |
| 3 | Medium Cumulative impact | The impact would result in minor cumulative effects. |

| | | |
|---|---|---|
| 4 | High Cumulative Impact | The impact would result in significant cumulative effects. |
| **INTENSITY / MAGNITUDE** | | |
| Describes the severity of an impact. | | |
| 1 | Low | Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible. |
| 2 | Medium | Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity). |
| 3 | High | Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation. |
| 4 | Very high | Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation. |
| **SIGNIFICANCE** | | |
| Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the heritage parameter. The calculation of the significance of an impact uses the following formula:<br><br>**(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.**<br><br>The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating. | | |
| **Points** | **Impact Significance Rating** | **Description** |
| 6 to 28 | Negative Low impact | The anticipated impact will have negligible negative effects and will require little to no mitigation. |
| 6 to 28 | Positive Low impact | The anticipated impact will have minor positive effects. |
| 29 to 50 | Negative Medium impact | The anticipated impact will have moderate negative effects and will require moderate mitigation measures. |
| 29 to 50 | Positive Medium impact | The anticipated impact will have moderate positive effects. |
| 51 to 73 | Negative High impact | The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact. |

| | | |
|---|---|---|
| 51 to 73 | Positive High impact | The anticipated impact will have significant positive effects. |
| 74 to 96 | Negative Very high impact | The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws". |
| 74 to 96 | Positive Very high impact | The anticipated impact will have highly significant positive effects. |

# 9. Anticipated Impact of the Development

## 9.1 Obscured or Buried Heritage sites of significance Including Palaeontology

Table 11: Mitigation of Impacts

| IMPACT TABLE FORMAT | | |
|---|---|---|
| Issue/Impact/Heritage Impact/Nature | *Heritage sites of significance including Palaeontology* | |
| *Extent* | *Local (2)* | |
| *Probability* | *Unlikely (1)* | |
| *Reversibility* | *Partly reversible (2)* | |
| *Irreplaceable loss of resources* | *Insignificant loss of resources (1)* | |
| *Duration* | *Medium term (2)* | |
| *Cumulative effect* | *Low cumulative effect (2)* | |
| *Intensity/magnitude* | *Low (1)* | |
| *Significance Rating of Potential Impact* | *10 points: Positive Low impact. The anticipated impact will have minor positive effects.* | |
| | Pre-mitigation impact rating | Post mitigation impact rating |
| Extent | 2 | 2 |
| Probability | 3 | 1 |
| Reversibility | 3 | 2 |
| Irreplaceable loss | 3 | 1 |
| Duration | 1 | 2 |
| Cumulative effect | 2 | 2 |
| Intensity/magnitude | 2 | 1 |
| Significance rating | 28 (low negative) | 10 (low negative) |
| Mitigation measure | *Should any sites be identified during the construction phase of the project the attached recommendations should be followed in the mitigation of them.* | |

## 9.3 Assessing Visual Impact

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV Architects and The Department of Environmental

Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.

## 9.4 Assumptions and Restrictions

- It is assumed that the South African Heritage Resources Information System (SAHRIS) database locations are correct
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the social impact assessment and public participation process of the Basic Assessment will result in the identification of any intangible sites of heritage potential.

### 9.4.1 Cultural Landscape

The following landscape types were evaluated during the study.

Table 12: Cultural Landscape

| Landscape Type | Description | Occurrence still possible? | Identified on site? |
|---|---|---|---|
| 1 Paleontological | Mostly fossil remains. Remains include microbial fossils such as found in Barberton Greenstones | Yes, sub-surface | No |
| 2 Archaeological | Evidence of human occupation associated with the following phases – Early-, Middle-, Late Stone Age, Early-, Late Iron Age, Pre-Contact Sites, Post-Contact Sites | Yes, sub-surface | No |
| 3 Historic Built Environment | - Historical townscapes/streetscapes<br>- Historical structures; i.e. older than 60 years<br>- Formal public spaces<br>- Formally declared urban conservation areas<br>- Places associated with social identity/displacement | No | No |
| 4 Historic Farmland | These possess distinctive patterns of settlement and historical features such as:<br>- Historical farm yards<br>- Historical farm workers villages/settlements<br>- Irrigation furrows<br>- Tree alignments and groupings<br>- Historical routes and pathways<br>- Distinctive types of planting<br>- Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting. | No | No |
| 5 Historic rural town | - Historic mission settlements<br>- Historic townscapes | No | No |
| 6 Pristine natural landscape | - Historical patterns of access to a natural amenity<br>- Formally proclaimed nature reserves<br>- Evidence of pre-colonial occupation<br>- Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages<br>- Historical structures/settlements older than 60 years<br>- Pre-colonial or historical burial sites<br>- Geological sites of cultural significance. | No | No |

| | | | |
|---|---|---|---|
| 7 Relic Landscape | - Past farming settlements<br>- Past industrial sites<br>- Places of isolation related to attitudes to medical treatment<br>- Battle sites<br>- Sites of displacement, | No | No |
| 8 Burial grounds and grave sites | - Pre-colonial burials (marked or unmarked, known or unknown)<br>- Historical graves (marked or unmarked, known or unknown)<br>- Graves of victims of conflict<br>- Human remains (older than 100 years)<br>- Associated burial goods (older than 100 years)<br>- Burial architecture (older than 60 years) | Yes | No |
| 9 Associated Landscapes | - Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes<br>- Sites associated with displacement & contestation<br>- Sites of political conflict/struggle<br>- Sites associated with an historic event/person<br>- Sites associated with public memory | No | No |
| 10 Historical Farmyard | - Setting of the yard and its context<br>- Composition of structures<br>- Historical/architectural value of individual structures<br>- Tree alignments<br>- Views to and from<br>- Axial relationships<br>- System of enclosure, e.g. defining walls<br>- Systems of water reticulation and irrigation, e.g. furrows<br>- Sites associated with slavery and farm labour<br>- Colonial period archaeology | No | No |
| 11 Historic institutions | - Historical prisons<br>- Hospital sites<br>- Historical school/reformatory sites<br>- Military bases | No | No |
| 12 Scenic visual | - Scenic routes | No | No |
| 13 Amenity landscape | - View sheds<br>- View points<br>- Views to and from<br>- Gateway conditions<br>- Distinctive representative landscape conditions<br>- Scenic corridors | No | No |

## Mitigation

It is recommended that the development designs take into account the positive and negative characteristics of the existing cultural landscape type and that they endeavor to promote the positive aspects while at the same time mitigating the negative aspects.

# 10. Resource Management Recommendations and Chance Finds Protocol

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.
- Paleontological remains such as fossils.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

# 11. Conclusion

The Proposed Development of a 4 Megawatt per hour Micro-Hydro Power Station in the Jozini Local Municipality, within the Umkhanyakude District of the KwaZulu–Natal Province was investigated through archival studies. The site did not have references to any heritage sites of significance. It is recommended that obscured, subterranean sites be managed, if they are encountered.

Due to the high state of alteration as well as the small footprint of the proposed development it is recommended that it be exempt from a full HIA.

Provided the recommendations in this report is followed there is no reason, from a heritage point of view, why this development cannot continue.

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