

**HERITAGE SURVEY OF THE PROPOSED 3140MW
COMBINED CYCLE POWER PLANT (CCPP) POWER
PROJECT AT ERF 1854 ALTON, .RICHARDS BAY,
KWAZULU-NATAL**

FOR EXIGENT ENGINEERING

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Executive summary

The proposed plan is to develop a high-efficiency Combined Cycle Power Generation Facility (800MW x 4) at Richards Bay port. The main components of combined cycle power plant include a Gas Turbine generator, a heat recovery steam generator, a steam turbine and generator. The objective of this Project is to produce up to 3000MW clean electricity based on Liquefied Natural Gas (LNG) at Richards Bay and Coega in South Africa and to obviate the utilization of diesel to generate power during peak demand

The desktop heritage survey used historical maps to locate 20th century features. These sites were specifically visited during the survey in order to determine if they were still visible or had artefacts in the vicinity. The field survey did not find any features or artefacts in the entire study area, with the exception of an old Erythrina spp. tree. These trees are traditionally associated with human graves. This tree was also associated with a potential kraal that could have human graves.

All sites noted in the report will require monitoring by a qualified archaeologist during any earthmoving and/or construction phase. If any graves are noted during the excavations, then the area will need to be cordoned off until Amafa KZN and the SAPS have been informed. A permit will be required to remove the graves if they are found.

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Abbreviations

HP	Historical Period
IIA	Indeterminate Iron Age
LIA	Late Iron Age
EIA	Early Iron Age
ISA	Indeterminate Stone Age
ESA	Early Stone Age
MSA	Middle Stone Age
LSA	Late Stone Age
HIA	Heritage Impact Assessment
PIA	Palaeontological Impact Assessment

INTRODUCTION

Phinda Power Producers (Pty) Ltd (“Phinda”) proposes to develop a Combined Cycle Power Plant (CCPP) with an installed generating capacity of up to 3,150 MW in phases, with a first phase of 2,360 MW and the associated infrastructure required to operate the CCPP. The proposed project also known as the “Phinda CCPP”, and will be fuelled using natural gas, initially via imported liquid natural gas (“LNG”) and later through regionally supplied pipeline natural gas. It is also proposed to have limited storage of diesel as an emergency fuel resource. The project site is on approximately 530,000 m² in extent.

The site is located in the Alton Industrial Zone, approximately 2km from the Richards Bay port boundary, which falls within the jurisdiction of the City of Umhlatuze Local Municipality and the King Cetshwayo District Municipality, KwaZulu-Natal Province (Figure 4).

The site comprises of three separate land titles, all owned freehold by companies associated with Phinda:

- Remainder of Erf 1854 Richards Bay, Extension Nine, in extent of 45.0478 hectares;
- Portion 2 of Erf 1854 Richards Bay, Extension Nine, in extent of 4.4986 hectares; and
- Sections 1 – 17 inclusive of Sectional Plan No SS294/98 in the scheme known as Richards Bay Industrial Park, in extent of 32,230m².

The main infrastructure associated with the facility includes the following:

- 8 x gas turbines for the generation of electricity using natural gas or diesel (emergency resource).

- 8 x Heat Recovery Steam Generators (“HRSG”) to capture heat from the high temperature exhaust gases produced by the gas turbines to produce high temperature and high-pressure dry steam to be utilised in the steam turbines.
- 4 x Steam turbines for the generation of additional electricity using dry steam generated by the HRSG.
- Bypass stacks associated with each gas turbine to allow for the operation in open cycle
 - Dirty (Brackish) Water Pond and Clean (Potable) Water Pond
 - Storm water drainage system
 - Waste storage facilities (general and hazardous)
- Exhaust stacks for the discharge of combustion gases into the atmosphere
 - Cooling tower & cooling tower basin with 4 days storage capacity
 - Sea water make up pipeline
 - Desalination plant for potable water production
- A water treatment plant for the treatment of potable water and the production of demineralised water (for steam generation)
 - Blow down from Cooling water Basin, HRSG, Desalination plant etc
 - Blowdown mixing chamber and pumped discharge to sea
 - Water pipelines and water tanks to transport and store water of both industrial quality and potable quality (to be supplied by the Local Municipality)
- A gas pipeline and a gas pipeline supply conditioning process facility for the conditioning and measuring of the natural gas prior to being supplied to the gas turbines. It must be noted however that the environmental permitting processes for the gas pipeline construction and operation will be undertaken under a separate EIA Process, other than the connection to the site from the main gas pipeline
- Diesel off-loading facility and storage tanks

- Ancillary infrastructure including access roads, emergency access road warehousing, buildings, access control facilities and workshop area, storage facilities, emergency back-up generators, firefighting systems, laydown areas and 132kV and 400kV switchyards.
- A power line to connect the Phinda CCGT to the national grid for the evacuation of the generated electricity. It must be noted however that the due environmental permitting processes for the development of the power line component are being undertaken under a separate EIA Process. OR It must be noted that the scope of the EIA should include 400 KVA power lines up to the Eskom servitude.

The proposed plan is to develop a high-efficiency Combined Cycle Power Generation Facility (800MW x 4) at Richards Bay port. The main components of combined cycle power plant include a Gas Turbine generator, a heat recovery steam generator, a steam turbine and generator. The objective of this Project is to produce up to 3000MW clean electricity based on Liquefied Natural Gas (LNG) at Richards Bay and Coega in South Africa and to obviate the utilization of diesel to generate power during peak demand

Umlando was contracted by Exigent Engineering to undertake the HIA survey.

FIG. 1 GENERAL LOCATION OF THE PROPOSED CEMETERY

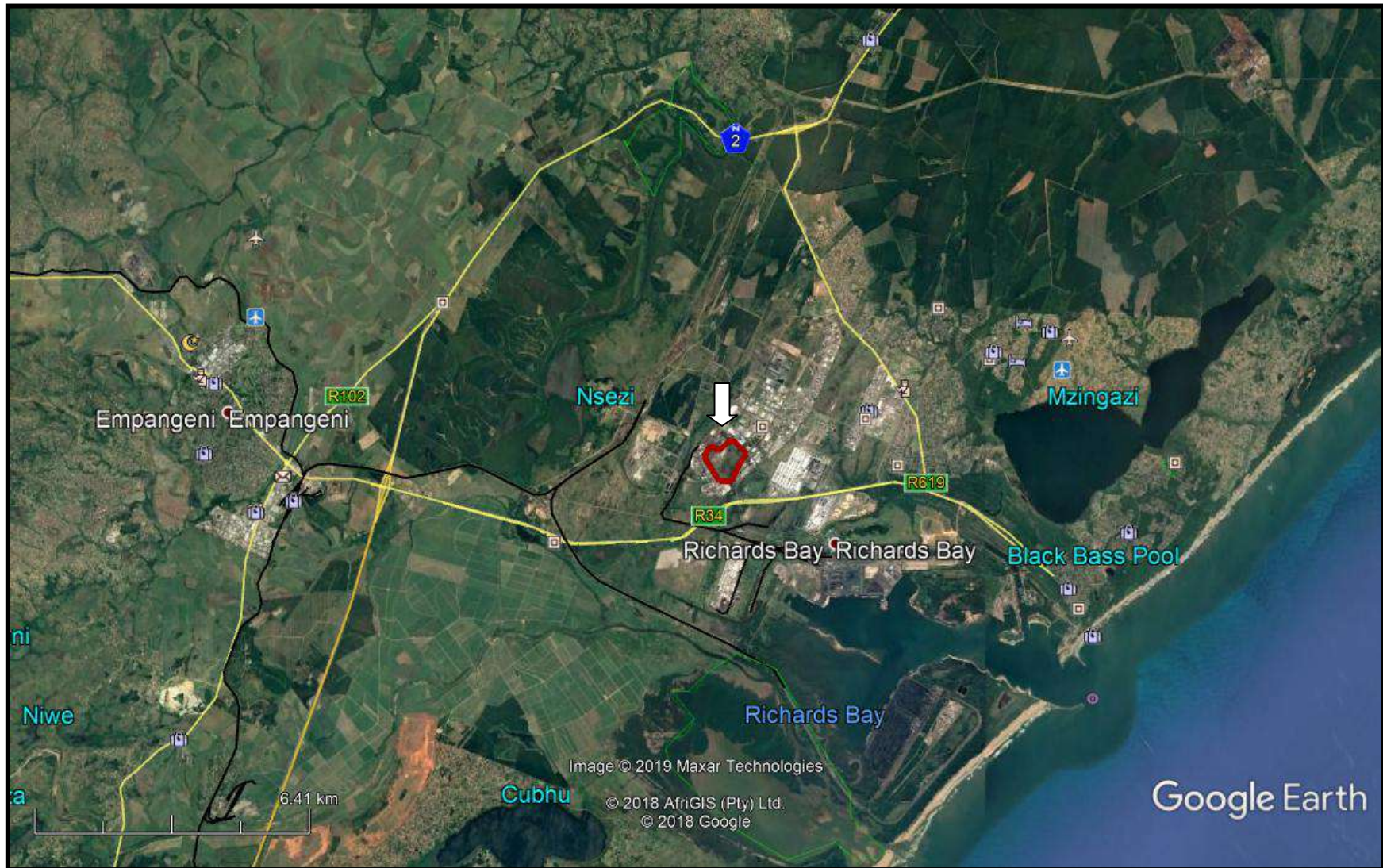


FIG. 2: AERIAL OVERVIEW OF THE PROPOSED CEMETERY



FIG. 3: TOPOGRAPHICAL MAP OF THE NORTHERN SECTION OF THE PROPOSED



FIG. 4: SCENIC VIEWS OF THE STUDY AREA



KWAZULU NATAL AMAFA AND RESEARCH INSTITUTE, ACT 05, 2018

“General protection: Structures.—

- No structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Council having been obtained on written application to the Council.
- Where the Council does not grant approval, the Council must consider special protection in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- The Council may, by notice in the *Gazette*, exempt—
- A defined geographical area; or
- defined categories of sites within a defined geographical area, from the provisions of subsection where the Council is satisfied that heritage resources falling in the defined geographical area or category have been identified and are adequately protected in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- A notice referred to in subsection (2) may, by notice in the *Gazette*, be amended or withdrawn by the Council.

General protection: Graves of victims of conflict.—No person may damage, alter, exhume, or remove from its original position—

- the grave of a victim of conflict;
- a cemetery made up of such graves; or
- any part of a cemetery containing such graves, without the prior written approval of the Council having been obtained on written application to the Council.
- General protection: Traditional burial places.—
- No grave—
- not otherwise protected by this Act; and
- not located in a formal cemetery managed or administered by a local authority, may be damaged, altered, exhumed, removed from its original

position, or otherwise disturbed without the prior written approval of the Council having been obtained on written application to the Council.

The Council may only issue written approval once the Council is satisfied that—

- the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and
- the applicant and the relevant communities or individuals have reached agreement regarding the grave.

General protection: Battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.—

- No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
- Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Council without delay.
- The Council may, after consultation with an owner or controlling authority, by way of written notice served on the owner or controlling authority, prohibit any activity considered by the Council to be inappropriate within 50 metres of a rock art site.
- No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
- No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or

- excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Council having been obtained on written application to the Council.
- The ownership of any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site, on discovery, vest in the Provincial Government and the Council is regarded as the custodian on behalf of the Provincial Government.”

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (<http://www.vuvuzela.com/googleearth/monuments.html>) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Defining significance

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

1. State of preservation of:

- 1.1. Organic remains:
 - 1.1.1. Faunal
 - 1.1.2. Botanical
- 1.2. Rock art
- 1.3. Walling
- 1.4. Presence of a cultural deposit
- 1.5. Features:
 - 1.5.1. Ash Features
 - 1.5.2. Graves

- 1.5.3. Middens
- 1.5.4. Cattle byres
- 1.5.5. Bedding and ash complexes

2. Spatial arrangements:

- 2.1. Internal housing arrangements
- 2.2. Intra-site settlement patterns
- 2.3. Inter-site settlement patterns

3. Features of the site:

- 3.1. Are there any unusual, unique or rare artefacts or images at the site?
- 3.2. Is it a type site?
- 3.3. Does the site have a very good example of a specific time period, feature, or artefact?

4. Research:

- 4.1. Providing information on current research projects
- 4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

- 5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?
- 5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. Archaeological Experience:

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

7. Educational:

- 7.1. Does the site have the potential to be used as an educational instrument?
- 7.2. Does the site have the potential to become a tourist attraction?
- 7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. Other Heritage Significance:

- 8.1. Palaeontological sites
- 8.2. Historical buildings
- 8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites
- 8.4. Graves and/or community cemeteries
- 8.5. Living Heritage Sites
- 8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

RESULTS

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. Anderson and Anderson (2009, 2010a-b, 2015, 2004 – 2018, 2005 - 2014) have undertaken several surveys in the general area where a variety of sites have been recorded, sampled and excavated (fig. 5). These cover the Early, Middle and Late Stone Ages, Early and Late Iron Ages, Historical Period and the 20th century.

FIG. 6: SURVEYOR GENERAL MAP (1909)

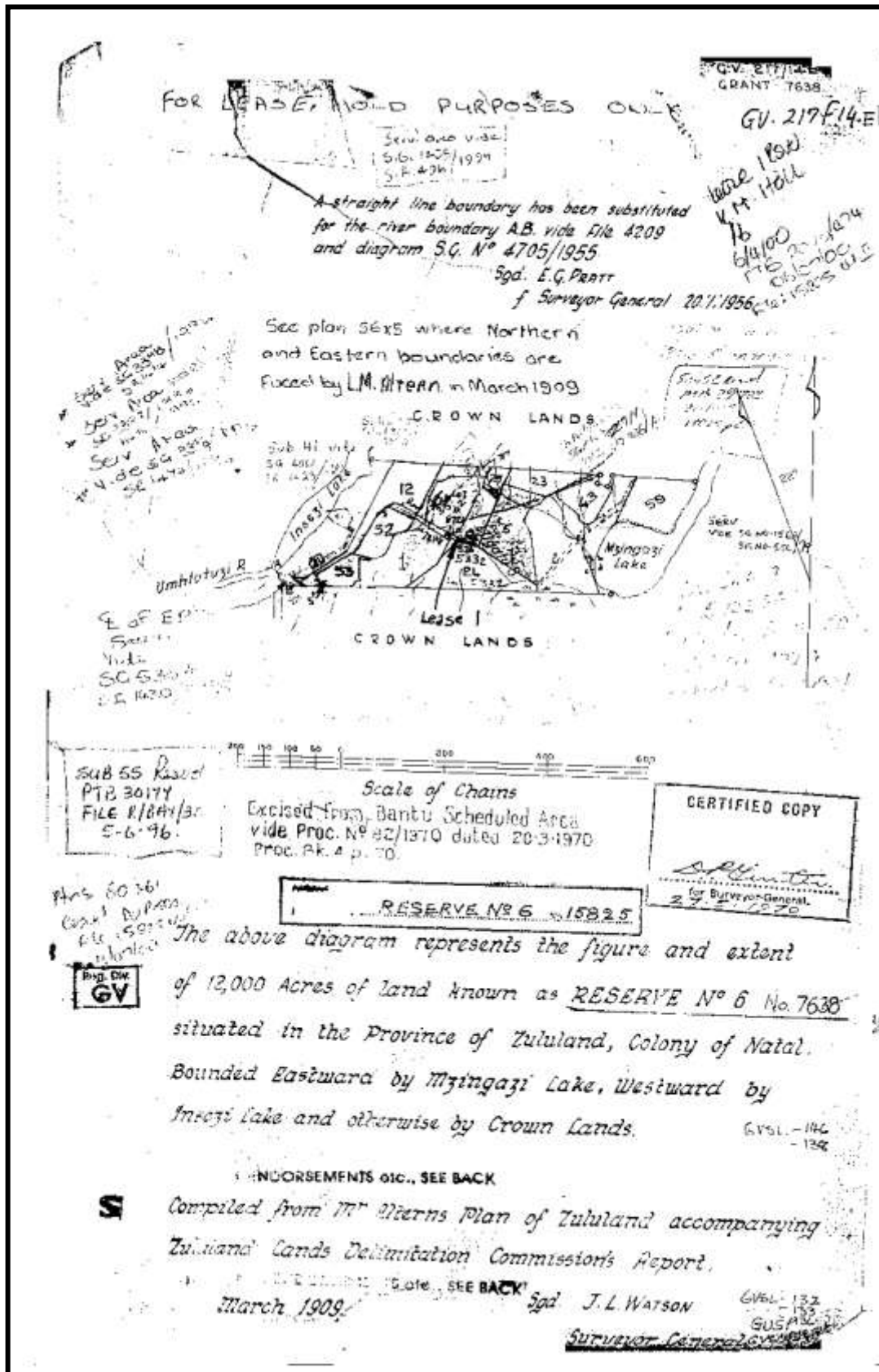


FIG. 7: LOCATION OF STUDY AREA IN 1937



FIG. 8: LOCATION OF STUDY AREA IN 1942

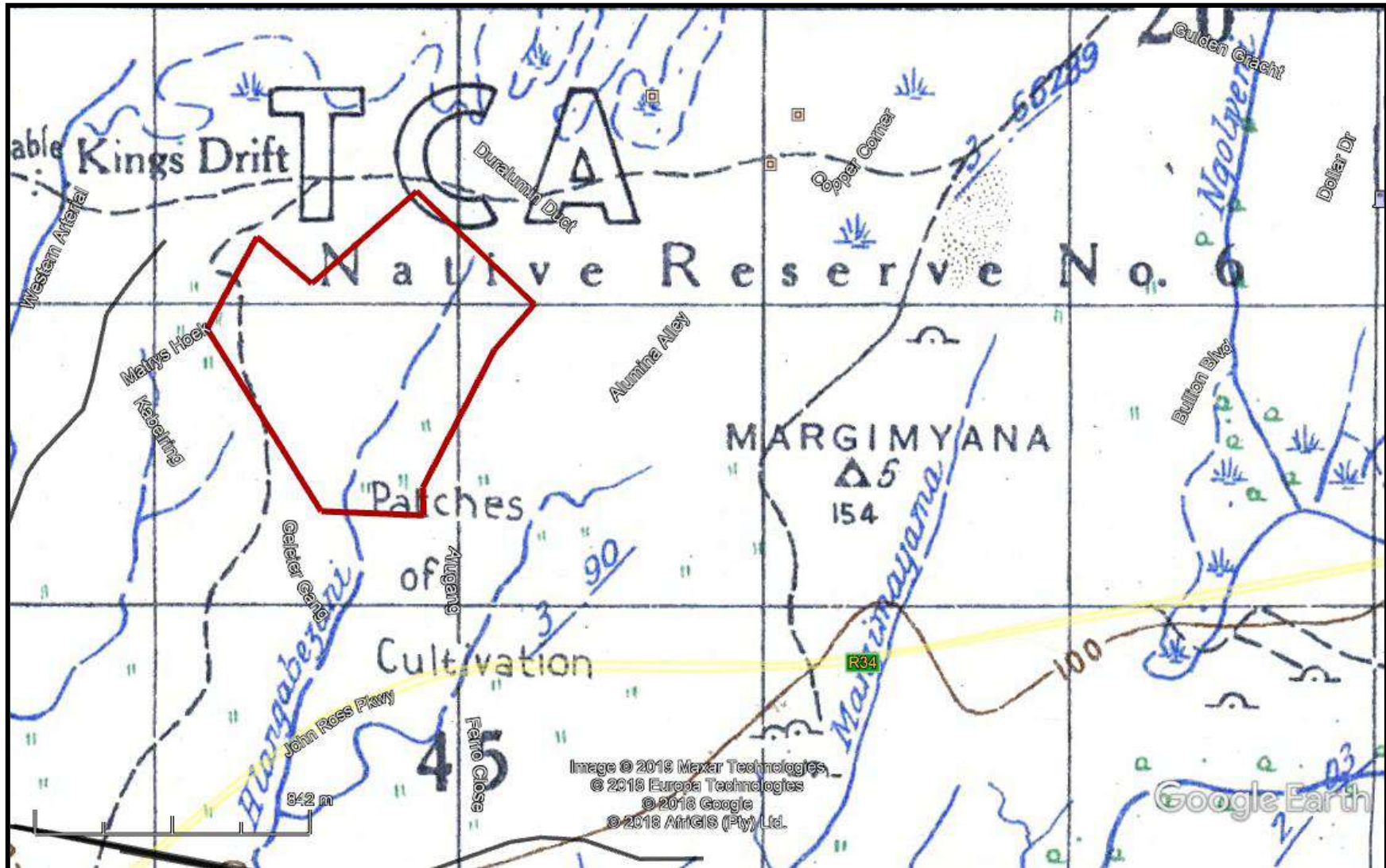


FIG. 9: LOCATION OF HOUSES IN THE STUDY AREA IN 1964

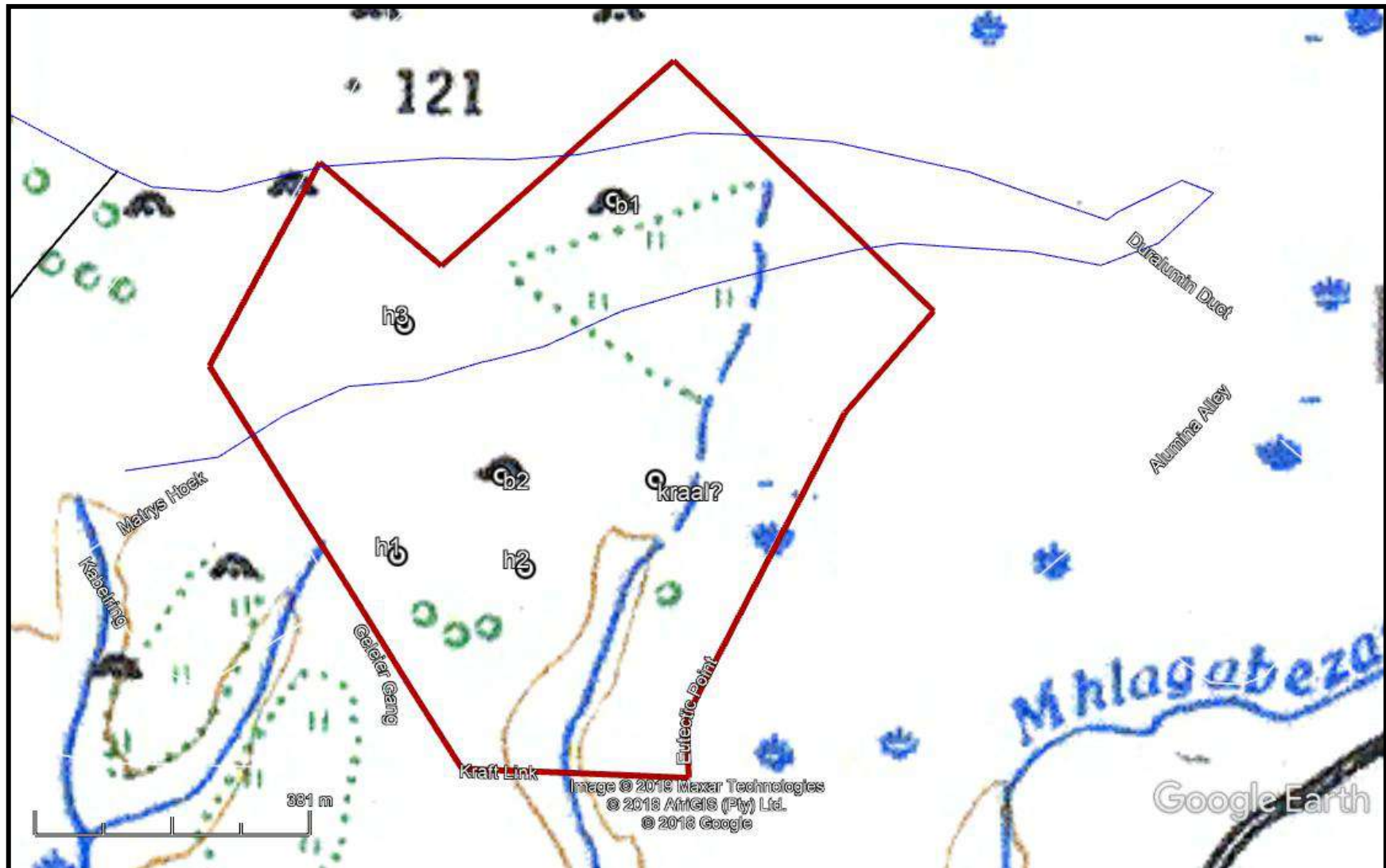
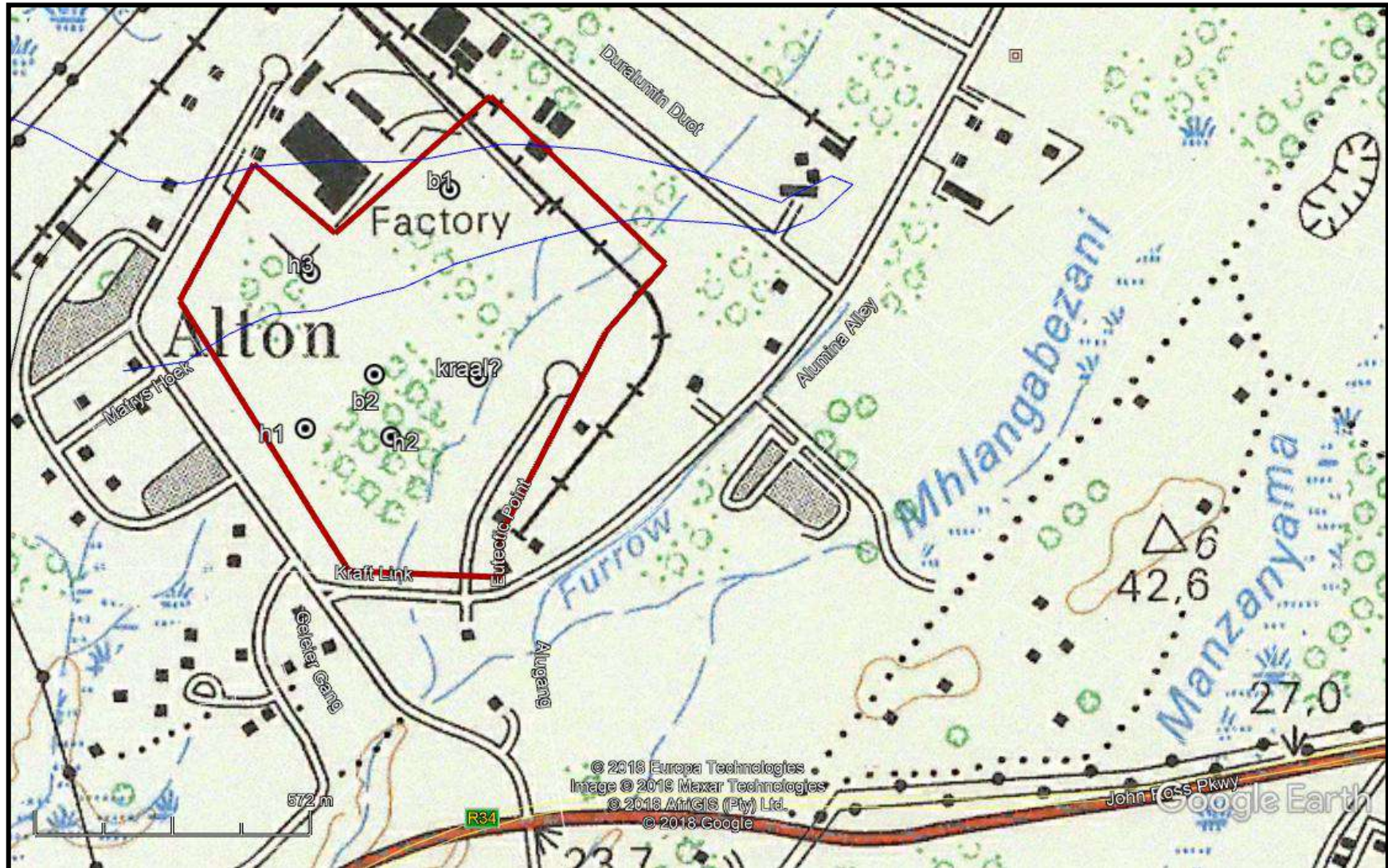


FIG. 10: LOCATION OF STUDY AREA IN 1983



The land was first surveyed in 1909 as Reserve No. 6 surrounded by Crown Land (fig.6). It appears that some of the land was subdivided, but this is not shown on later maps. The 1937 map indicates that the study area was mostly used as agricultural fields surrounding wetlands (fig. 7). Three possible settlements and one kraal is visible on this map. Human graves would be associated with these settlements.

The 1942 topographical map (fig. 8) does not show these settlements. However, the 1964 topographical map (fig. 9) indicates that there are two settlements within the study area. Human graves would be associated with these settlements. The 1984 topographical map (fig. 10) shows the area as an industrial zone. These maps concur that there was a wetland formed by the Hlangabenzani River. However, by 1983 furrows/canals had drained much of the water.

The historical maps thus indicate that human settlements did exist in the study area and thus there is a possibility for human graves.

The palaeontological sensitivity map indicates that the area is of low sensitivity, and no further mitigation is required (fig. 11).

FIG. 11: PALAEOLOGICAL SENSITIVITY MAP



FIELD SURVEY

The field survey was undertaken over 11 September 2019. Table 2 and Figure 12 shows the locations of the finds.

Name	Date	Description	South	East	Required Mitigation
H1	1937	Settlement?	28°45'53.80"	32° 0'34.77"	monitor
H2	1937	Settlement?	28°45'54.35"	32° 0'41.30"	Monitor
H3	1937	Settlement?	28°45'43.49"	32° 0'35.13"	Monitor
Kraal	1937	Kraal?	28°45'50.40"	32° 0'47.91"	Monitor
B1	1964	Settlement	28°45'36.07"	32° 0'47.11"	Monitor
B2	1964	Settlement	28°45'50.22"	32° 0'40.06"	monitor

Much of the area had good ground visibility, except for some of the eastern parts that had dense grass cover. Some areas had been burnt recently. All areas identified by the historical maps were visited. No sites or artefacts were noted. This is on par with previous heritage studies that also found few artefacts. Since much of this area is (drained) wetland it would not have been occupied, except for the small hills.

The area noted a possible kraal on the 1937 aerial photograph had an old *Erythrina spp.* at the same location (fig. 12). This is important, as these trees are traditionally associated with human graves where a branch was planted on top of the grave. Heads of households were often buried in the centre of the kraal. There is thus a strong possibility that this might be a grave.

Significance: All human remains are considered as having high significance. The *Erythrina spp.* tree should be treated as a grave until proven otherwise.

SAHRA rating: 3A

Mitigation: A 50m buffer should be placed around all sites noted from the desktop and survey. These areas must be monitored by a qualified archaeologist

during any earthmoving activity or construction phase. Since these will be graves less than 100 years in age, a public participation process might be required (see Appendix A for processes involved). The relevant Traditional Authority will also need to be involved if graves are found, as this could be their ancestral graves.

Since the graves would be less than 100 years in age, the remains should be well preserved as shown by Anderson and Anderson (2004 – 2018).

MANAGEMENT PLAN

All sites noted from the historical maps need to be monitored by a qualified archaeologist during any earthmoving activity and/or construction phase. If human graves are found, a 20m buffer will need to be cordoned off until the remains are removed. Permits for the removal of the graves will be required, as well as a Public Participation Process, specifically with the relevant Traditional Authority. This can take up to 6 months to complete; however, an emergency permit might be issued by Amafa KZN.

I suggest that these sites are compared to the final layout plans as soon as possible. If they will be affected, then that area should be cleared and mitigation should begin as early possible so as not to delay construction. Mitigation can be phased in the following stages:

1. Ground vegetation is cleared and area is inspected and assessed. If artefacts are noted, then one can assume the site occurs in the area.
2. Upper 30cm – 50cm of topsoil is removed by a bulldozer under supervision and the site is assessed.
3. If no human graves occur, then the area can be provisionally released; however, further earthmoving activity would require monitoring up to 1m in depth.
4. If human remains are found then a grave relocation specialist will be required to take over the rest of the project.

FIG. 11: LOCATION OF STUDY AREA AND SITES FROM HISTORICAL MAPS



FIG. 12: ERYTHRINA SPP. TREE AT A POSSIBLE KRAAL



CONCLUSION

A heritage survey was undertaken for the proposed Phinda Power Plant, Alton, Richards Bay.

The desktop study note six possible features that could occur in the study area. Of these six, only one site can be possibly associated with the maps. This site is an *Erythrina spp.* tree that is linked to a kraal and a possible grave.

All noted sites must have a 50m sensitivity buffer around the centre point. These will require monitoring during any earthmoving and/or construction activity. If human graves are found, then a Public Participation Process will be required as well as a grave relocation specialist. Umlando does not undertake this task and could only be used to verify if human remains occur.

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APPENDIX A
GRAVE REMOVAL PROCESS

The developer must follow the guidelines mentioned below otherwise the project may be brought to halt.

The process of grave removals is a complex one that requires community consultation, advertisements, several permits, and finally reburial. Moreover, those graves older than 60 years require a qualified archaeologists to undertake the entire process. This process is summarised as follows¹:

In terms of the National Heritage Resources Act (No. 25 of 1999), and KZN Heritage Act of 1997 and 2008, graves older than 60 years (not in a municipal graveyard) are protected. Human remains younger than 60 years should be handled only by a registered undertaker or an institution declared under the Human Tissues Act. Anyone who wishes to develop an area where there are graves older than 60 years is required to follow the process described in the legislation (section 36 and associated regulations). The specialist will require a permit from the heritage resources authority:

- Determine/ confirm the presence of the graves on the property. Normally the quickest way to proceed is to obtain the service of a professional archaeologist accredited to undertake burial relocations. The archaeologist will provide an estimate of the age of the graves. There may be a need for archival research and possibly test excavations (permit required).
- The preferred decision is to move the development so that the graves may remain undisturbed. If this is done, the developer must satisfy SAHRA/KZN Heritage that adequate arrangements have been made to protect the graves on site from the impact of the development. This usually involves fencing the grave(yard) and setting up a small site management plan indicating who will be responsible for maintaining the graves and how this is legally tied into the development. It is recommended that a distance of 10-20 m is left undisturbed between the grave and the fence around the graves.
- If the developer wishes to relocate or disturb the graves:

¹ Information supplied by SAHRA, and it applies to KZN, although falling under the KwaZulu Natal Amafa And Research Institute, Act 05.

- A 60-day public participation (social consultation) process as required by section 36 (and regulations - see attachment), must be undertaken to identify any direct descendants of those buried on the property. This allows for a period of consultation with any family members or community to ascertain what their wishes are for the burials. It involves notices to the public on site and through representative media. This may be done by the archaeologist, who can explain the process, but for large or sensitive sites, a social consultant should be employed. Archaeologists often work with undertakers, who rebury the human remains.
- If as a result of the public participation, the family (where descendants are identified) or the community agree to the relocation process then the graves may be relocated.
- The archaeologist must submit a permit application to SAHRA/KZN Heritage for the disinterment of the burials. This must include written approval of the descendants or, if there has not been success in identifying direct descendants, written documentation of the social consultation process, which must indicate to SAHRA's satisfaction, the efforts that have been made to locate them. It must also include details of the exhumation process and the place to which the burials are to be relocated. (There are regulations regarding creating new cemeteries and so this usually means that relocation must be to an established communal rural or formal municipal cemetery.)
- Permission must be obtained before exhumation takes place from the landowner where the graves are located, and from the owners/managers of the graveyard to which the remains will be relocated.
- Other relevant legislation must be complied with, including the Human Tissues Act (National Department of Health) and any ordinances of the Provincial Department of Health). The archaeologist can usually advise about this.