

**450MW EMERGENCY RISK MITIGATION POWER  
PLANT (RMPP) AND ASSOCIATED INFRASTRUCTURE  
RICHARDS BAY, KZN**

**FOR SAVANNAH ENVIRONMENTAL (PTY) LTD**

**DATE: 3 SEPTEMBER 2020**

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## EXECUTIVE SUMMARY

*Phinda Power Producers (Pty) Ltd proposes the construction of a power plant, and associated infrastructure, of up to 450MW, 132kV electricity transmission infrastructure and liquid petroleum gas (“LPG”) storage, and associated infrastructure, of up to 10,000m<sup>3</sup>.*

*A heritage survey was undertaken for the proposed Power Plant site in 2019 and 2020. Since the initial project started it has been broken down to several Projects that are being dealt with on an individual basis through separate environmental approval processes.*

*The desktop study indicated that several human settlements occurred in the general study area; however, none occurred within the project study areas. The study area consists of old agricultural fields.*

*In the event that human remains are exposed during construction, then all work must stop and the area must be cordoned off.*

*Isolated stone tools will occur in the study area, however these are of low significance and do not require any mitigation.*

*The general area is of low palaeontological sensitivity. However Cretaceous deposits could occur at 4m+ below the surface. It is unlikely that excavations will extend to these depths.*

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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

The 450MW Emergency Risk Mitigation Power Plant (RMPP) involves the construction of a gas-fired power station which will provide mid-merit power supply[1] to the electricity grid. The 450MW RMPP is planned to operate on a mid-merit basis at an average annual minimum dispatch rate of ~50% (i.e. operational between 5am and 9:30pm daily and being deployed on average for a minimum 72% over the year during this time period) and has been designed and developed as a power balance system to manage electricity demand during peak periods to stabilise the grid, as well as provide back up support for base load generation in the event of unscheduled maintenance on the coal fired power stations. The power station will have an installed capacity of up to 450MW, to be operated on LPG or naphtha and later converted from utilising LPG to natural gas. The natural gas or naphtha is to be supplied via a pipeline to the RMPP from the supply take-off point at the Richards Bay Harbour with LPG being supplied via truck from the import terminal at the Richards Bay harbour. The use of Naphtha or LPG and the associated infrastructure will be investigated further within the EIA phase and the preferred fuel source presented. The LNG terminal infrastructure and naphtha supply infrastructure at the port and the relevant pipelines do not form part of the scope of this assessment, whereas LPG infrastructure does form part of this report.

The main infrastructure associated with the facility includes the following:

- Main Power Island consisting of either gas turbines comprising of air intake, air filter structures and exhaust stack for the generation of electricity through the use of natural gas, naphtha or LPG; or Gas engines comprising of reciprocating internal combustion engines and exhaust stack utilising LPG or natural gas.
- Generator and Auxiliary transformers.

- Balance of Plant systems.
- Dry Cooling systems.
- Auxiliaries.
- 132kV interconnecting substation and power lines connecting to the grid transmission infrastructure (The power lines to the grid transmission structure will be applied for under a separate environmental approvals process).
- LPG fuel pipe routing between the LPG storage site and the power plant site **or** Naphtha import pipeline from the port of Richards Bay to the onsite storage of Naphtha (the Naphtha pipeline will be applied for under a separate environmental approval process).
- Stormwater management ponds.
- LPG storage comprising of up to 15 000m<sup>3</sup> of storage in total, comprising of a number of either bullets or spheres storage tanks in design **or**;
- Naphtha storage on the power plant site of up to 90,000m<sup>3</sup> in total, comprising of a number of tanks,
- Once imported LNG is available in Richards Bay, the 450MP RMPP will be converted from utilising LPG / Naphtha to the use of regassified LNG by means of a new dedicated natural gas pipeline which will replace or supplement the LPG / Naphtha supply to the power plant (The approval for the pipeline will be conducted under a separate process);
- 3 effluent reticulation systems - i.e. 1) sanitary wastewater system; 2) oily water collection system and 3) storm water and rainwater collection system.
- Diesel generator to provide start-up power to the first gas engine / turbine.

Umlando was requested to undertake an assessment of the proposed development. Figures 1 – 4 show the location of the development.

FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT





FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT

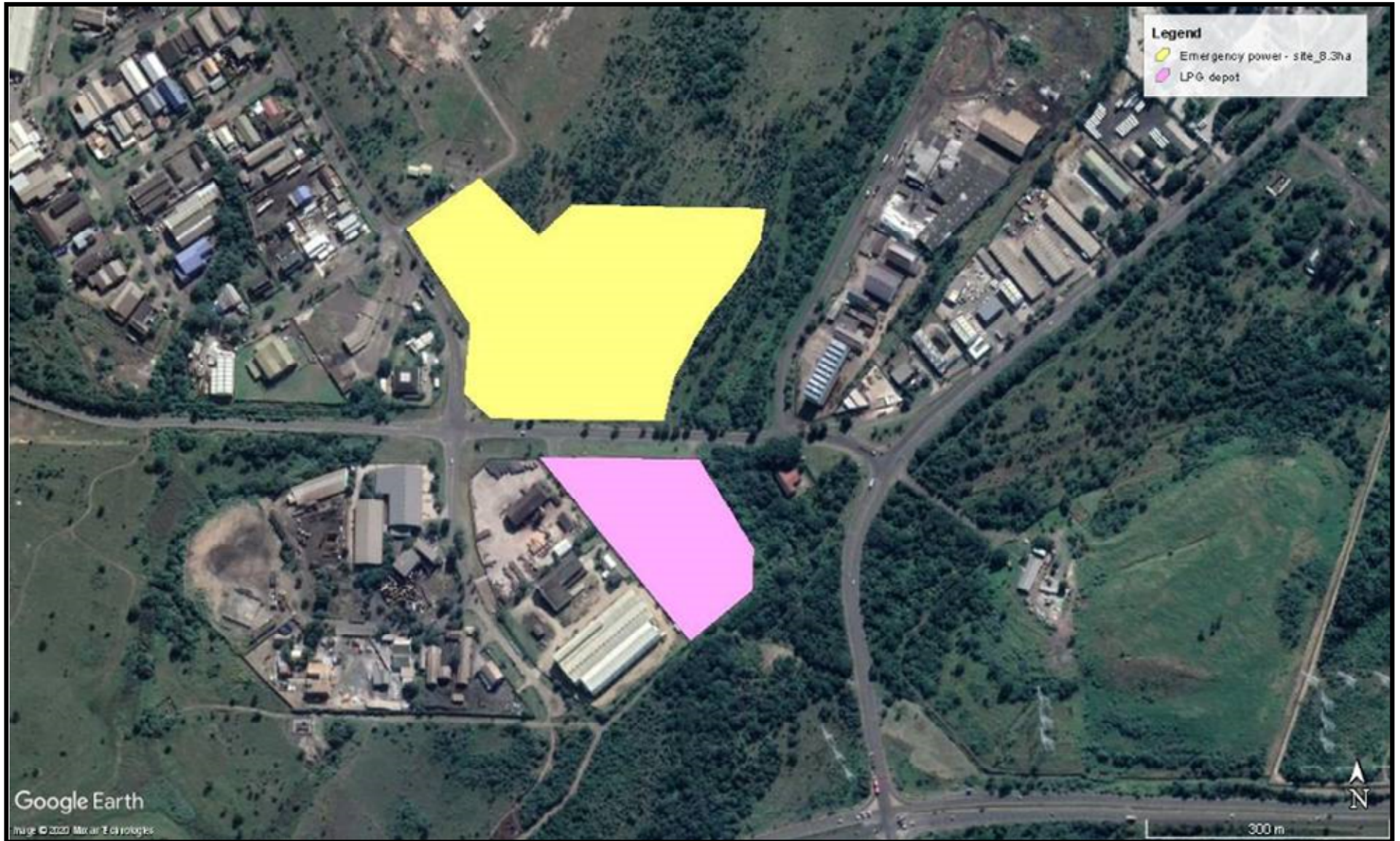
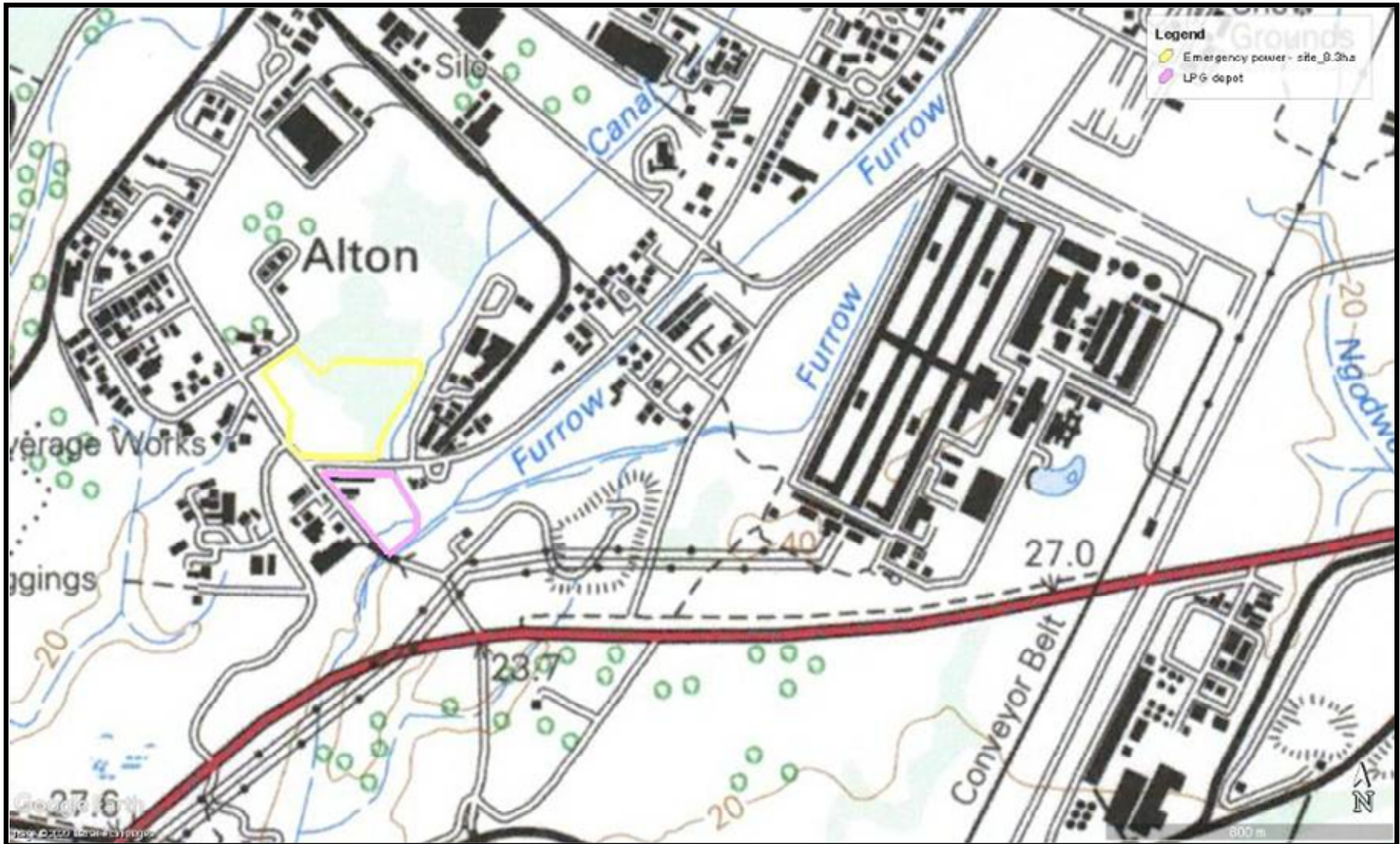




FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (2002)



**FIG. 4: SCENIC VIEWS OF THE 450MW 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. These databases contain 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 1<sup>st</sup> and 2<sup>nd</sup> 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. Table 1 lists the grading system.

**TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES**

SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	
High / Medium Significance	Generally Protected A		Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling

		/ monitoring prior to or during development / destruction
<b>Low Significance</b>	Generally Protected C	On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction

## 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 20<sup>th</sup> century.

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 for lease purposes and may be linked to the Native Delimitation Act of 1904. The leased area is subsequently removed as 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). Settlements and one cattle byre are visible on this map. Human graves would be associated with these settlements. Only agricultural fields occur in the study area, while settlements occur outside it.

The 1942 topographical map (fig. 8) does not show these settlements. The 1953 Surveyor General map indicates that this was originally Erf 211 Umhlatuzi 14411 that buffered Reserve No. 6 (fig. 9). It was then withdrawn and remained as Reserve No. 6. However, the 1964 topographical map (fig. 10) indicates that

there are two settlements within the study area. Human graves would be associated with these settlements.

This area has also been one of the many areas regarding forced removals of the Mandlazini people (Griffiths 1996; Ntuil 2019). There is still a land claim for the general area.

The 1984 topographical map (fig. 11) 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 general area and thus there is a possibility for human graves.

No human settlements appear to occur in the specific study area.

### **PALAEONTOLOGICAL SENSITIVITY**

The study area is coded blue according to the SAHRIS palaeosensitivity map (fig. 12). It thus has no or very low, palaeontological value. However, this is slightly misleading as there are Cretaceous deposits 4m+ below the surface. These deposits are noticeable for their megalodon teeth, large ammonites, and other shell species. Any excavations reaching these layers would need to inform KZNARI and have a qualified palaeontologist assess the samples. This would include an assessment of the deposits and possible sampling. The sampling of these deposits will not effect the project as it is only the recovery of exposed fossils..



FIG. 5: LOCATION OF KNOWN HERITAGE SITES IN THE GENERAL AREA

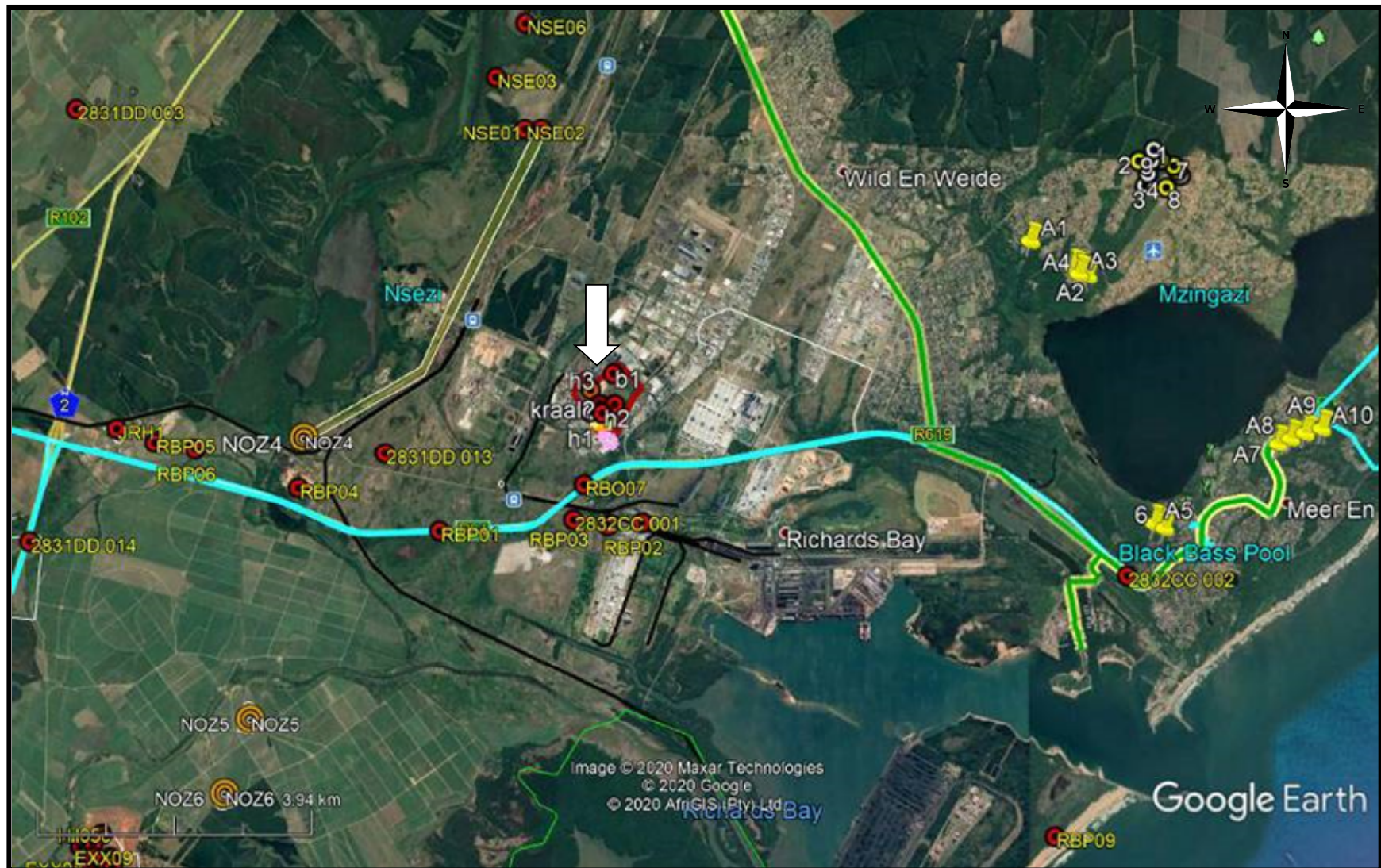


FIG. 6: SURVEYOR GENERAL MAP (1909)

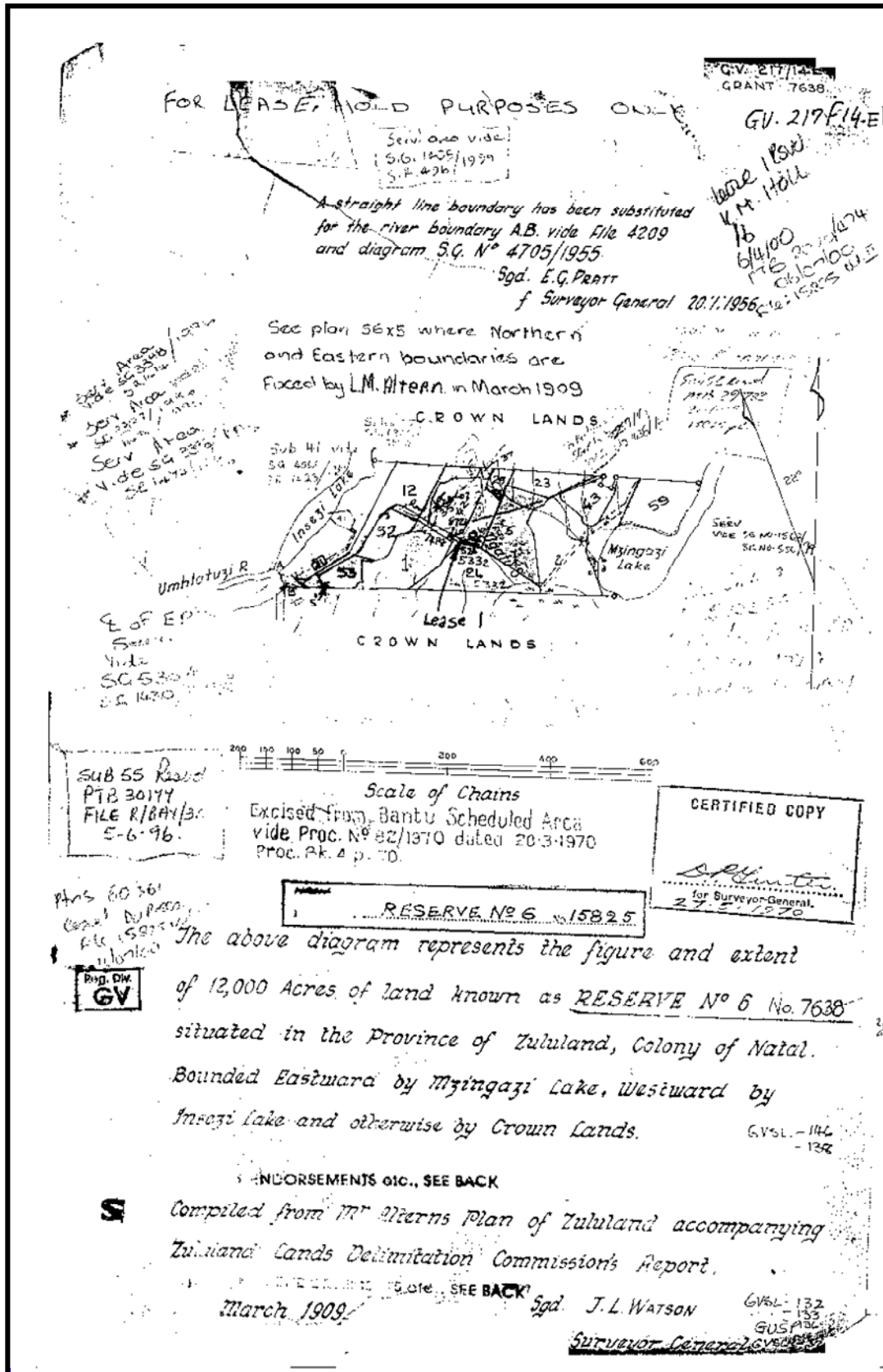
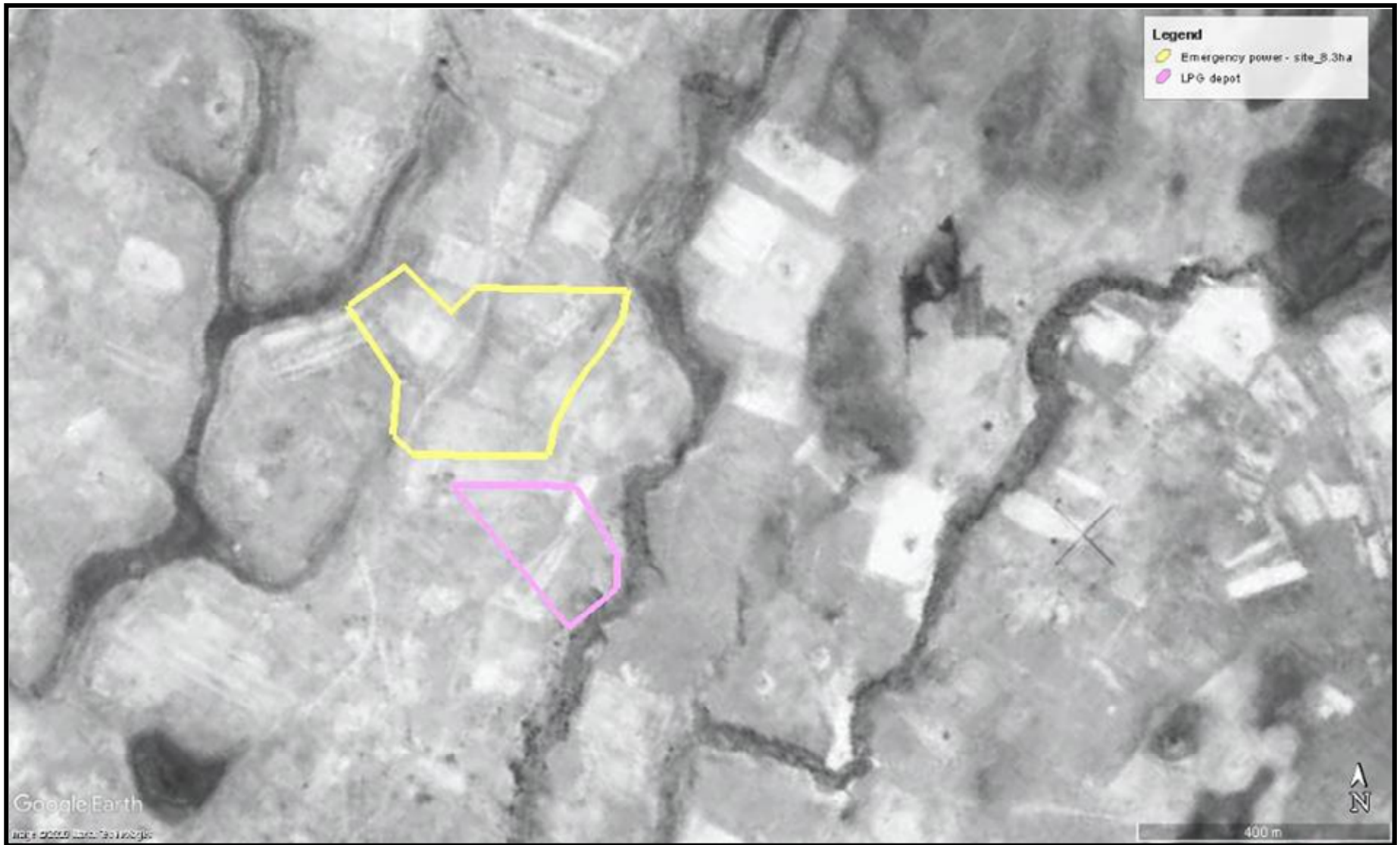


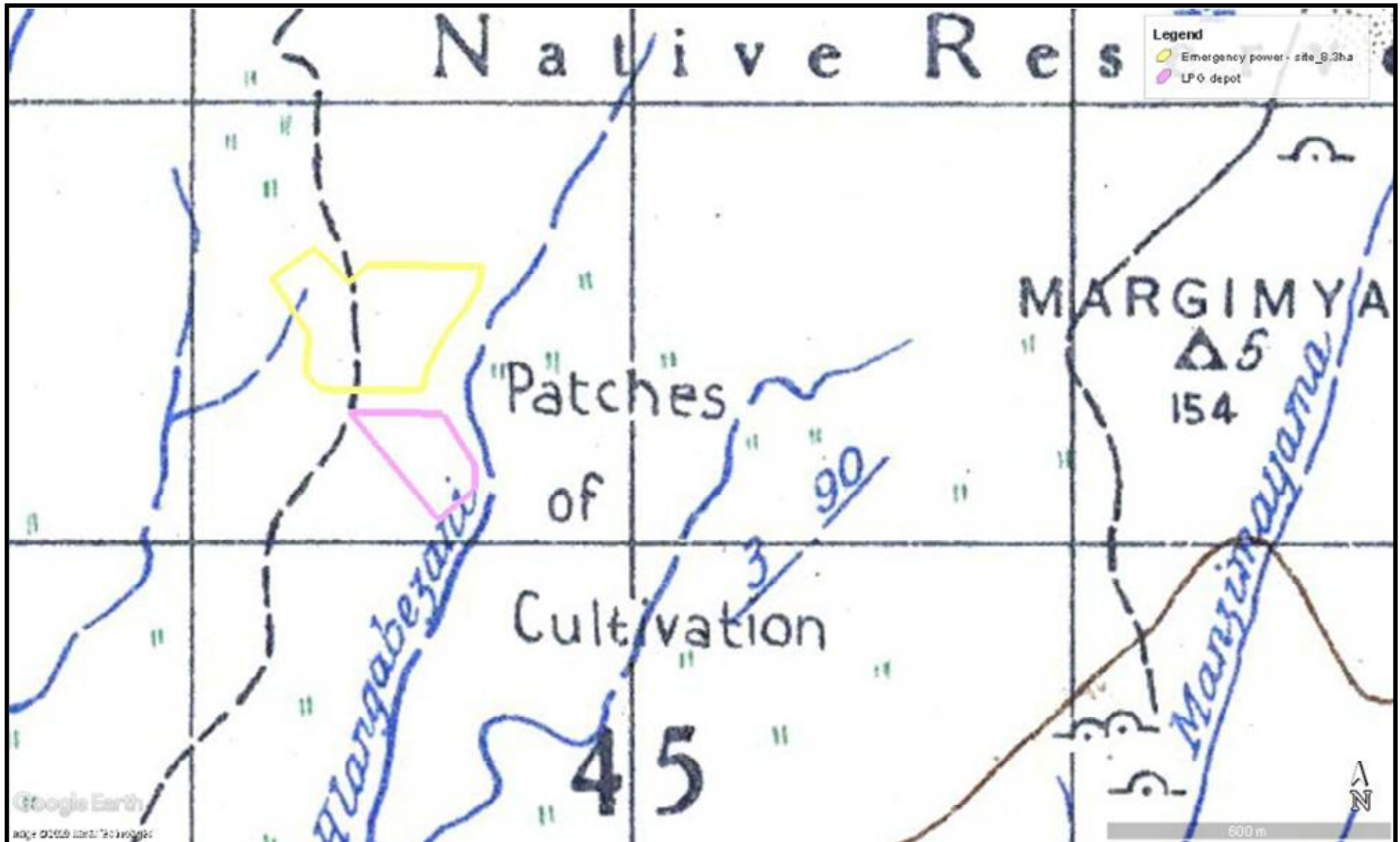


FIG. 7: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (1937)<sup>1</sup>



<sup>1</sup> 117C\_059\_66290

FIG. 8: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (1943)<sup>2</sup>



<sup>2</sup> 2832CC Richards Bay 1943

FIG. 9: SURVEYOR GENERAL MAP OF 221 UMHLATUZI 14411

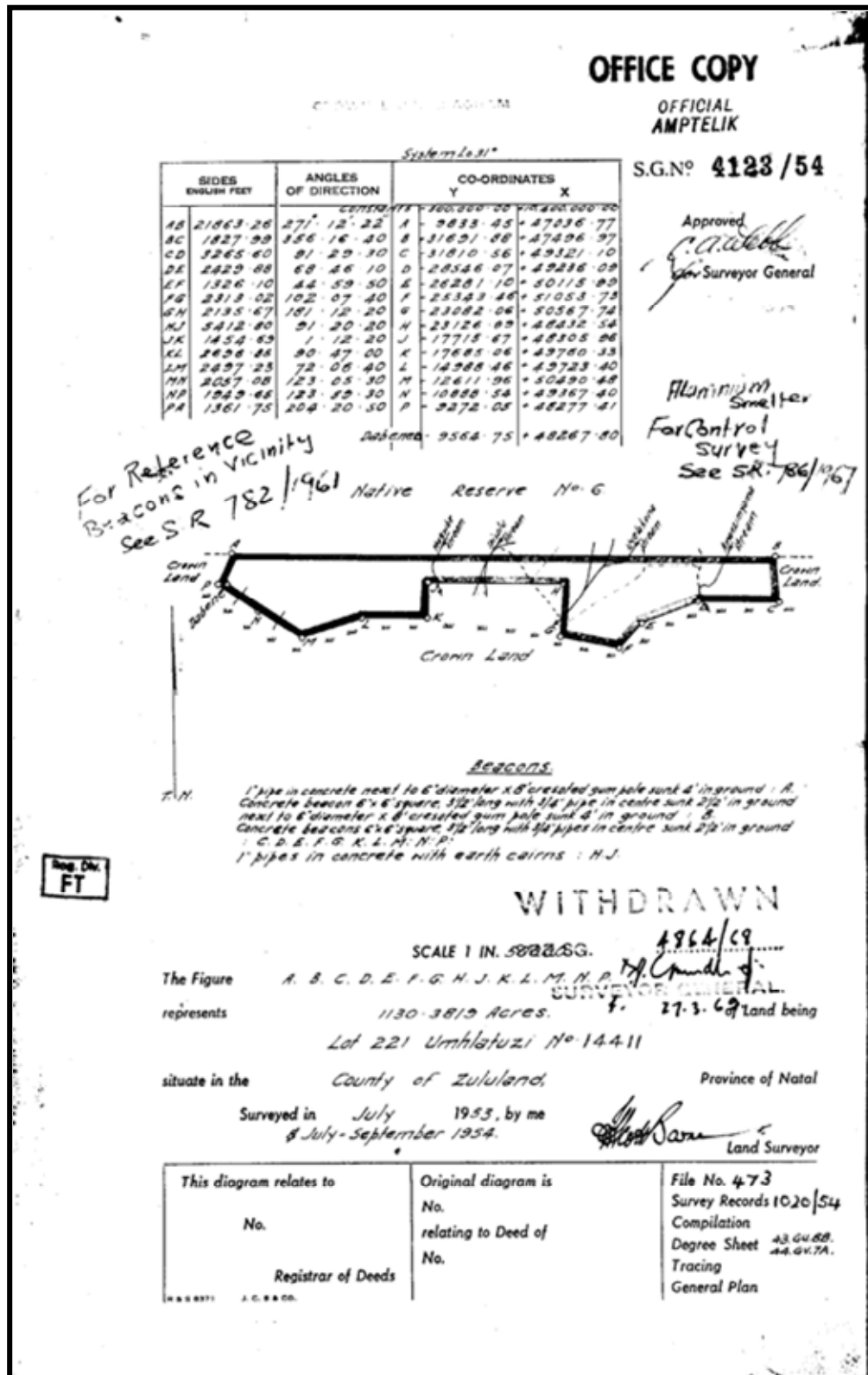




FIG. 10: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (1964)

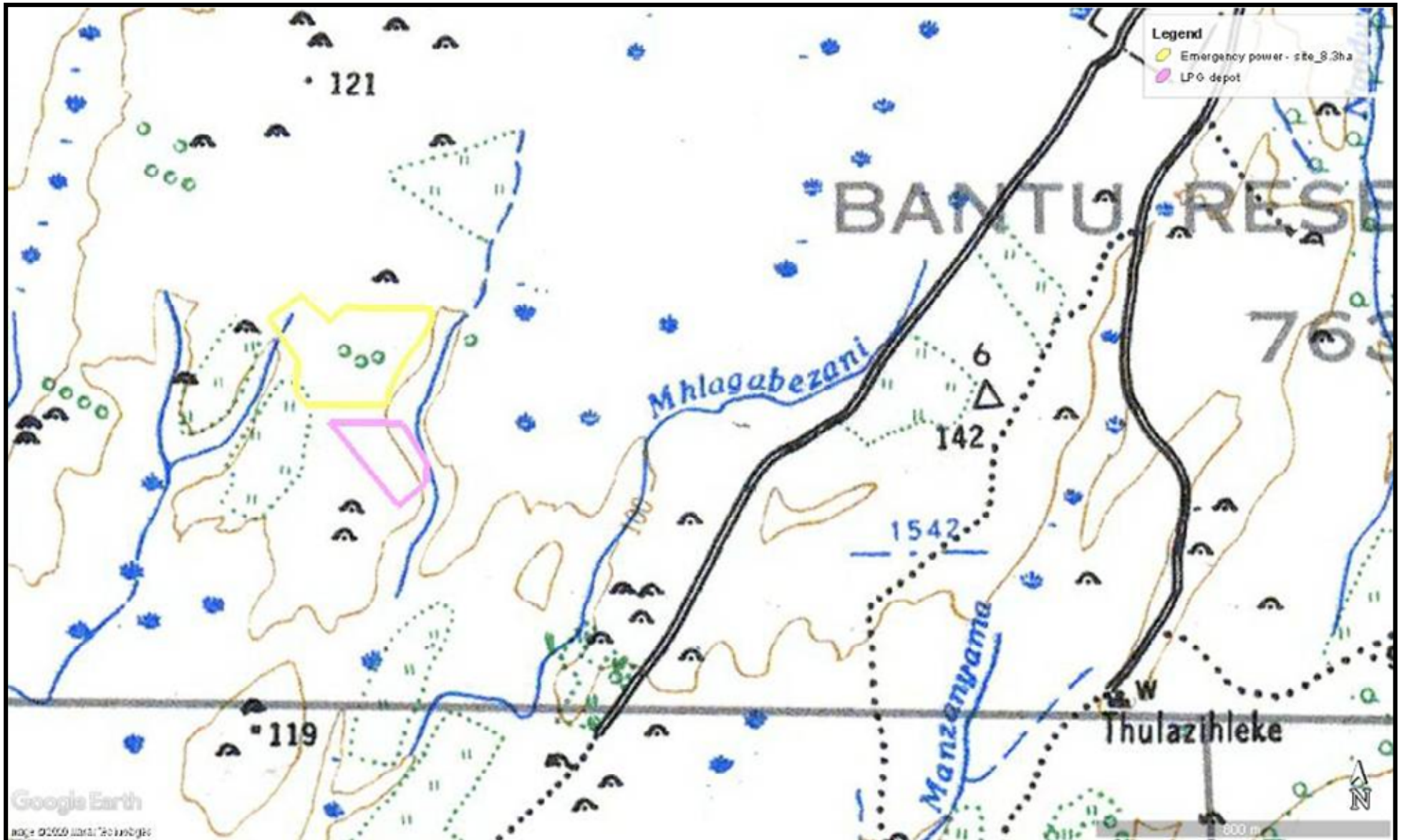




FIG. 11: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (1983)



FIG. 12: PALAEOANTHROPOLOGICAL SENSITIVITY MAP



### FIELD SURVEY

The original field surveys were undertaken on 11 September 2019 and 6 January 2020 as part of the general Phinda Power Project survey. No sites were recorded in the study area.

Individual stone tools will probably occur as a lag deposit on the hard clay horizons as noticed in the previous surveys. These are not significant and do not constitute an archaeological site. No mitigation would be required.

There is always a possibility of human remains occurring as a subsurface feature. However, it is unlikely to occur in this area as it has a high water table level before canalisation occurred. This would have resulted in the rapid decay of organic material.

The storage facilities for the LPG occur in an existing built area and was excluded from the field survey.



## **RECOMMENDATIONS**

If human remains are located then all work in that area must cease and KZNARI and the SAPS need to be informed. The area needs to be cordoned off and designated as a no-go area. Public Participation will need to occur with the Mthiyane TA as they would claim these ancestral remains.

It is highly unlikely that human remains will occur in the study area (See Table 2). Human remains may occur elsewhere on the property (Anderson 2020).

If any archaeological or palaeontological remains are located at the site then they can be initially assessed via photographs and emails. Isolated artefacts occur throughout the general area and would not require a field assessment if found.

## **CONCLUSION**

A heritage survey was undertaken for the proposed Power Plant site in 2019 and 2020. Since the initial project started, it has been broken down into several Projects that are being dealt with on an individual basis as the subject of separate environmental approval processes. This report deals with Project 1a. Project 1a is a power plant of up to 450MW, 132kV transmission infrastructure, liquid petroleum gas storage facility and associated infrastructure.

The desktop study indicated that several human settlements occurred in the general study area; however, none occurred within the study areas. The study area consists of old agricultural fields.

In the event that human remains are exposed during construction, then all work must stop and the area must be cordoned off.

The general area is of low palaeontological sensitivity. However Cretaceous deposits could occur at 4m+ below the surface. It is unlikely that excavations will extend to these depths.



**TABLE 2: POTENTIAL IMPACTS**

<b>Impact</b> Potential impacts on Potential impacts on subsurface human grave(s).			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Potential Human remains	Direct impacts: <ul style="list-style-type: none"> <li>•Partial removal of ancestral remains.</li> </ul> Indirect impacts: <ul style="list-style-type: none"> <li>•N/A</li> </ul>	Regional	None identified at this stage
<b>Description of expected significance of impact</b> Human settlements occur in the general area and have been noted on historical maps. While no settlements are known to occur in the study area, there is a possibility that they might occur. Human burials during this time period were not buried in coffins. The high water tables in the area, before canalization, would have resulted in the rapid decay of human remains.			
<b>Specific recommendations with regards to Human remains:</b> If human remains are located then all work in that area must cease and KZNARI (0333946543) and the SAPS need to be informed. The area needs to be cordoned off. No impacts on archaeological and palaeontological resources is expected in this project study area.			

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### Maps:

2831DD Blackburn 1942, 1964, 2000

2832CC8 1942, 1964, 1997 Richards Bay

117C\_059\_66292

### **EXPERIENCE OF THE HERITAGE CONSULTANT**

Gavin Anderson has a M. Phil (in archaeology and social psychology) degree from the University of Cape Town. Gavin has been working as a professional archaeologist and heritage impact assessor since 1995. He joined the Association of Professional Archaeologists of Southern Africa in 1998 when it was formed. Gavin is rated as a Principle Investigator with expertise status in Rock Art, Stone Age and Iron Age studies. In addition to this, he was worked on both West and East Coast shell middens, Anglo-Boer War sites, and Historical Period sites.

### **DECLARATION OF INDEPENDENCE**

I, Gavin Anderson, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

A handwritten signature in black ink, appearing to read 'G. Anderson', with a horizontal line underneath.

Gavin Anderson  
Archaeologist/Heritage Impact Assessor