

PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

For

**The Proposed Poultry Farm
on a Portion of the RE of
Portion 42 of the Farm
Welgekozen 514 IT, Mkhondo,
Mpumalanga**

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February 2021

A Phase 1 Archaeological Impact Assessment for the proposed poultry farm
on a Portion of the RE of Portion 42 of the Farm Welgekozen 514 IT,
Mkhondo, Mpumalanga

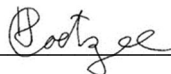
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I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Welgekozen Poultry Farm in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.



Date: 26 February 2021

Executive Summary

The author was appointed by Hlobisa Building Maintenance Services to undertake a Phase 1 Archaeological Impact Assessment for the proposed construction of 10 chicken houses on a portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT near Mkhondo/Piet Retief in the Mpumalanga Province. The proposed poultry farm is located approximately 4 km north-northwest of Mkhondo/Piet Retief and 20 km west of the Eswatini/Swaziland border. The closest town to Mkhondo/Piet Retief is Amsterdam 45 km to the north-northwest. The aim of the study is to determine the scope of archaeological resources that could be impacted on by the construction of the proposed chicken houses.

Seven sites (CP1 – CP7) are associated with the demarcated portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT. Site CP1 consists of a cemetery falling outside of the demarked study area, but due to the sensitive nature of graves, a conservation buffer of 30 m along the northern boundary of the demarcated portion is recommended. Site CP2 consists of three stone cairns resembling graves. Therefore, a fenced-off conservation buffer and applicable signage are recommended. Should impact be unavoidable, a Ground Penetrating Radar investigation is recommended in order to verify the existence of graves. Alternatively a grave relocation processes might be followed.

The remaining sites (CP3 – CP7) are not considered significant from a heritage perspective as these sites date to recent times. However, care must be exercised when developing in the vicinity of Sites CP5 – CP7 as these sites consist of foundation mounds that might be associated with subsurface material culture.

Subject to adherence of the recommendations and approval by SAHRA, the proposed poultry farm as per the indicated demarcation may continue. Should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage and Resources Act, 25 of 1999 section 36 (6)). Also, should culturally significant material be discovered during the course of the said development, all activities must be suspended pending further investigation by a qualified archaeologist.

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1. Project Background

1.1 Introduction

Hlobisa Building Maintenance Services appointed the author to undertake a Phase 1 Archaeological Impact Assessment for the proposed construction of 10 chicken houses and the associated activities on a portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT (**Table 1 & Figures 1 & 2**). The proposed poultry farm is located approximately 4 km north-northwest of Mkhondo/Piet Retief and 20 km west of Mpumalanga's border with Eswatini/Swaziland. Amsterdam is located approximately 45 km north-northwest of the proposed project area. The purpose of this study is to examine the demarcated portion in order to determine if any archaeological resources of heritage value will be impacted on by the proposed construction of the chicken houses, as well as to archaeologically contextualise the general study area. The aim of this report is to provide the developer with information regarding the location of heritage resources on the demarcated portion.

In the following report, I discuss the implication for the construction of 10 chicken houses and the associated activities on the demarcated portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT with regard to heritage resources. The demarcated portion is roughly rectangular in shape, consists of the north-eastern half of Portion 42 and is located towards the southwest of the Farm Welgekozen 514 IT. The legislation section included serves as a guide towards the effective identification and protection of heritage resources and will apply to any such material unearthed during development and construction phases within the demarcated study area.

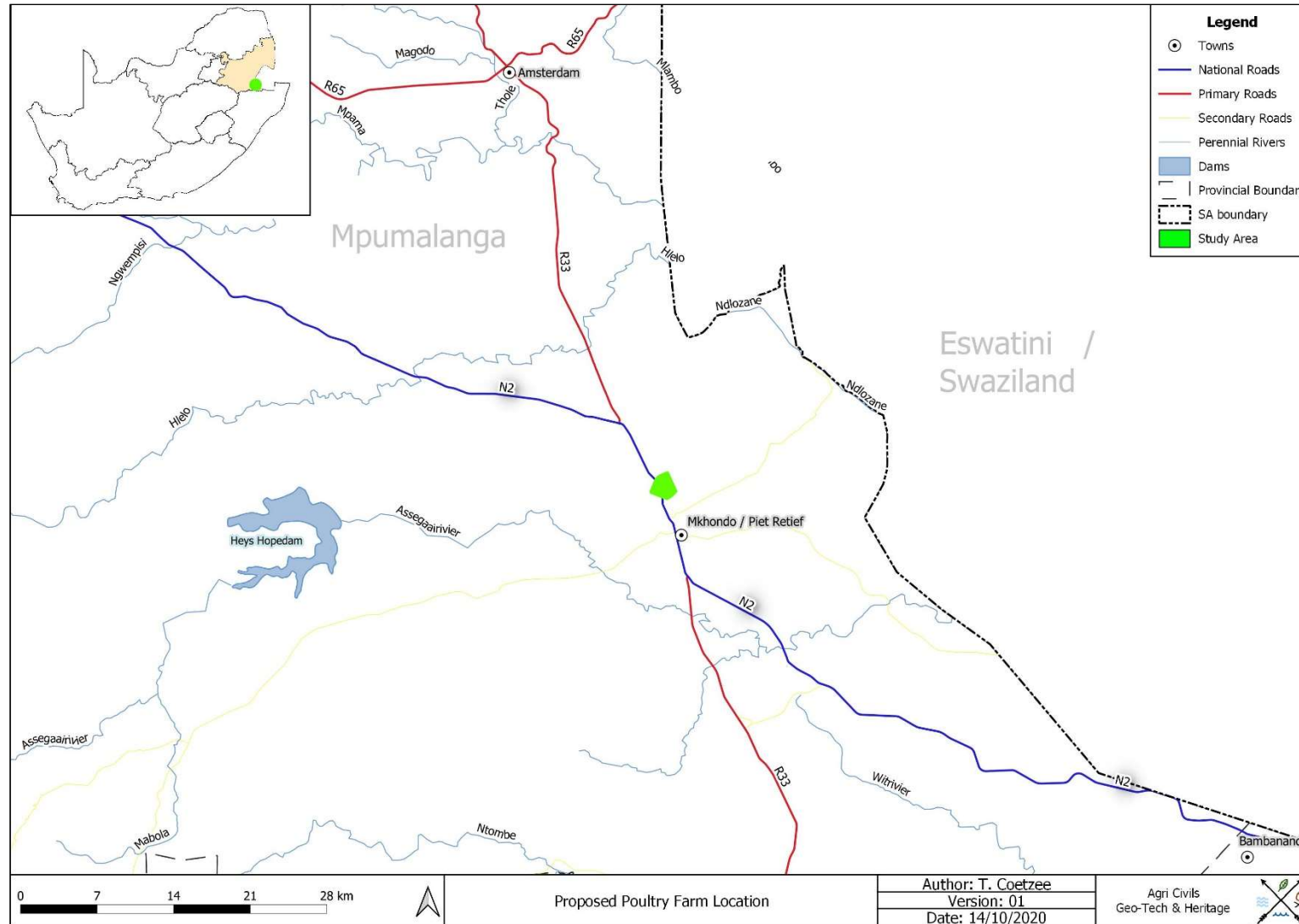


Figure 1: Regional and Provincial location of the study area.

1.2 Legislation

The South African Heritage Resources Agency (SAHRA) aims to conserve and control the management, research, alteration and destruction of cultural resources of South Africa and to prosecute if necessary. It is therefore crucially important to adhere to heritage resource legislation contained in the Government Gazette of the Republic of South Africa (Act No.25 of 1999), as many heritage sites are threatened daily by development. Conservation legislation requires an impact assessment report to be submitted for development authorisation that must include an AIA if triggered.

AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources that might occur in areas of development and (b) make recommendations for protection or mitigation of the impact of the sites.

1.2.1 The EIA and AIA processes

Phase 1 Archaeological Impact Assessments generally involve the identification of sites during a field survey with assessment of their significance, the possible impact that the development might have, and relevant recommendations.

All Archaeological Impact Assessment reports should include:

- a. Location of the sites that are found;
- b. Short descriptions of the characteristics of each site;
- c. Short assessments of how important each site is, indicating which should be conserved and which mitigated;
- d. Assessments of the potential impact of the development on the site(s);
- e. In some cases a shovel test, to establish the extent of a site, or collection of material, to identify the associations of the site, may be necessary (a pre-arranged SAHRA permit is required); and
- f. Recommendations for conservation or mitigation.

This AIA report is intended to inform the client about the legislative protection of heritage resources and their significance and make appropriate recommendations. It is essential to also provide the heritage authority with sufficient information about the sites to enable the authority to assess with confidence:

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;

- c. Which sites require permits for mitigation or destruction;
- d. Which sites require mitigation and what this should comprise;
- e. Whether sites must be conserved and what alternatives can be proposed to relocate the development in such a way as to conserve other sites; and
- f. What measures should or could be put in place to protect the sites which should be conserved.

When a Phase 1 AIA is part of an EIA, wider issues such as public consultation and assessment of the spatial and visual impacts of the development may be undertaken as part of the general study and may not be required from the archaeologist. If, however, the Phase 1 project forms a major component of an AIA it will be necessary to ensure that the study addresses such issues and complies with Section 38 of the National Heritage Resources Act.

1.2.2 Legislation regarding archaeology and heritage sites

National Heritage Resource Act No.25 of April 1999

Buildings are among the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Farming Community settlements. The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives;

- any other prescribed category.

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

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

and

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

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites."* (35. [4] 1999:58)

and

"No person may, without a permit issued by SAHRA or a provincial heritage resources authority:

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals."* (36. [3] 1999:60)

On the development of any area the gazette states that:

"...any person who intends to undertake a development categorised as:

- (a) *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) *the construction of a bridge or similar structure exceeding 50m in length;*
- (c) *any development or other activity which will change the character of a site-*
 - i. *exceeding 5000m² in extent; or*
 - ii. *involving three or more existing erven or subdivisions thereof; or*
 - iii. *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv. *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) *the re-zoning of a site exceeding 10000m² in extent; or*
- (e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”(38. [1] 1999:62-64)*

and

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

- (a) *The identification and mapping of all heritage resources in the area affected;*
- (b) *an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) *an assessment of the impact of the development on such heritage resources;*
- (d) *an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*

- (f) *if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) *plans for mitigation of any adverse effects during and after the completion of the proposed development.”*
(38. [3] 1999:64)

Human Tissue Act and Ordinance 7 of 1925

The Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) protects graves younger than 60 years. These fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities. Graves 60 years or older fall under the jurisdiction of the National Heritage Resources Act as well as the Human Tissues Act, 1983.

2. Study Area and Project Description

2.1 Location & Physical Environment

The proposed poultry farm is situated 4 km north-northwest of Mkhondo/Piet Retief across the following property:

Table 1: Property name & coordinates

Property	Portion	Map Reference (1:50 000)	Lat	Lon	Parcel Size (ha)	Proposed portion (ha)
Welgekozen 514 IT	42	2630 DD	-26.965749	30.795123	8.9	7.2

Amsterdam is located roughly 45 km to the north-northwest and the Swaziland/Eswatini border 20 km to the east of the proposed poultry farm (**Figures 1 & 2**). The study area falls within the Gert Sibande District Municipality and the Mkhondo Local Municipality in the Mpumalanga Province. In terms of vegetation, the study area falls within the Grassland Biome, Mesic Highveld Grassland Bioregion and the KaNgwane Montane Grassland vegetation unit. The Grassland Biome covers approximately 28% of South Africa (Mucina & Rutherford 2006). This vegetation unit's conservation status is considered to be vulnerable with a conservation target of 27%. Only about 0.4% is protected within formally proclaimed nature reserves, while a number of private conservation areas protect small patches. KaNgwane Montane Grassland is mainly found in Mpumalanga and Swaziland/Eswatini, as well as marginally into northern KwaZulu-Natal. Areas include the gentle slopes of the escarpment, from the Phongolo Valley in the south, northwards to the Usutu Valley and to the uppermost Lomati Valley near Carolina, including the western grassland areas of Swaziland/Eswatini. About 30% of this vegetation unit has been converted to plantations of alien trees as this vegetation unit is well suited to afforestation. A further 6% is under cultivation. Erosion associated with this vegetation unit varies between low and very low (Mucina & Rutherford 2006).

The average elevation for KaNgwane Montane Grassland ranges from 880 to 1740 MASL (Mucina & Rutherford 2006). The average elevation of the project area is 1334 MASL and slopes from the slightly more elevated north-eastern and south-western sides towards the lower middle section.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 920 mm per year. The average annual temperature is 16.6 °C. The average summer temperature is 20.1 °C, while the average winter temperature averages 11.4 °C (Climate-data.org accessed 14/10/2020).

The study area falls within the W51F Quaternary Catchment that forms part of the Usutu to Mhlatuze Water Management Area. The closest perennial river to the study area is the Assegaai River that flows 9 km to the southwest of the study area. Several non-perennial offshoots and minor dams, however, are found within the general vicinity of the study area.

When the surrounding environment is considered, the general area is associated with the forestry industry, agricultural activity, low income housing, as well as small businesses. Access to the study area (**Figure 2**) is via a dirt road along the northern boundary.

On a local scale, the study area consists of a combination of burnt grassland, a small dam, a patch of trees near the southern boundary and dense tree cover in the northern half. At present the study area is not fenced-off and is used for cattle grazing by local people from Ajax township. Ajax township borders the study area to the north, privately owned land used for cattle grazing to the east, fenced-off privately owned land to the west and a fenced-off nursery to the south. The demarcated portion for the poultry farm was subdivided from Portion 42, which belonged to the owner of the nursery.

Historical topographical maps (**Appendix A**) show the study area to be partially covered by trees in 1971 and 1985, while no tree cover is documented on the 2009 topographical map. Historical aerial imagery dating to 1955 and 1963 show the area to be partially covered by trees, while the 1977 aerial image shows the presence of some buildings.

2.2 Project description

The project proposes the construction of a poultry farm near the Mkhondo/Piet Retief in the Mpumalanga Province (**Figure 2**). The water requirements for the facility will be 200ml of water per chicken per day, for 160 000 chickens to total 32 000l per day. The size of the area to be developed is 5.5 ha and will consist of 10 chicken houses, a bore hole, water reservoir of 50 000l, office buildings, a 5 000l diesel storage tank, shed/store, greenhouse and a hatchery/sorting/packaging/dry store/cold store (**Figure 3**). The Portion on which the project is proposed is a portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT (**Figure 4**).

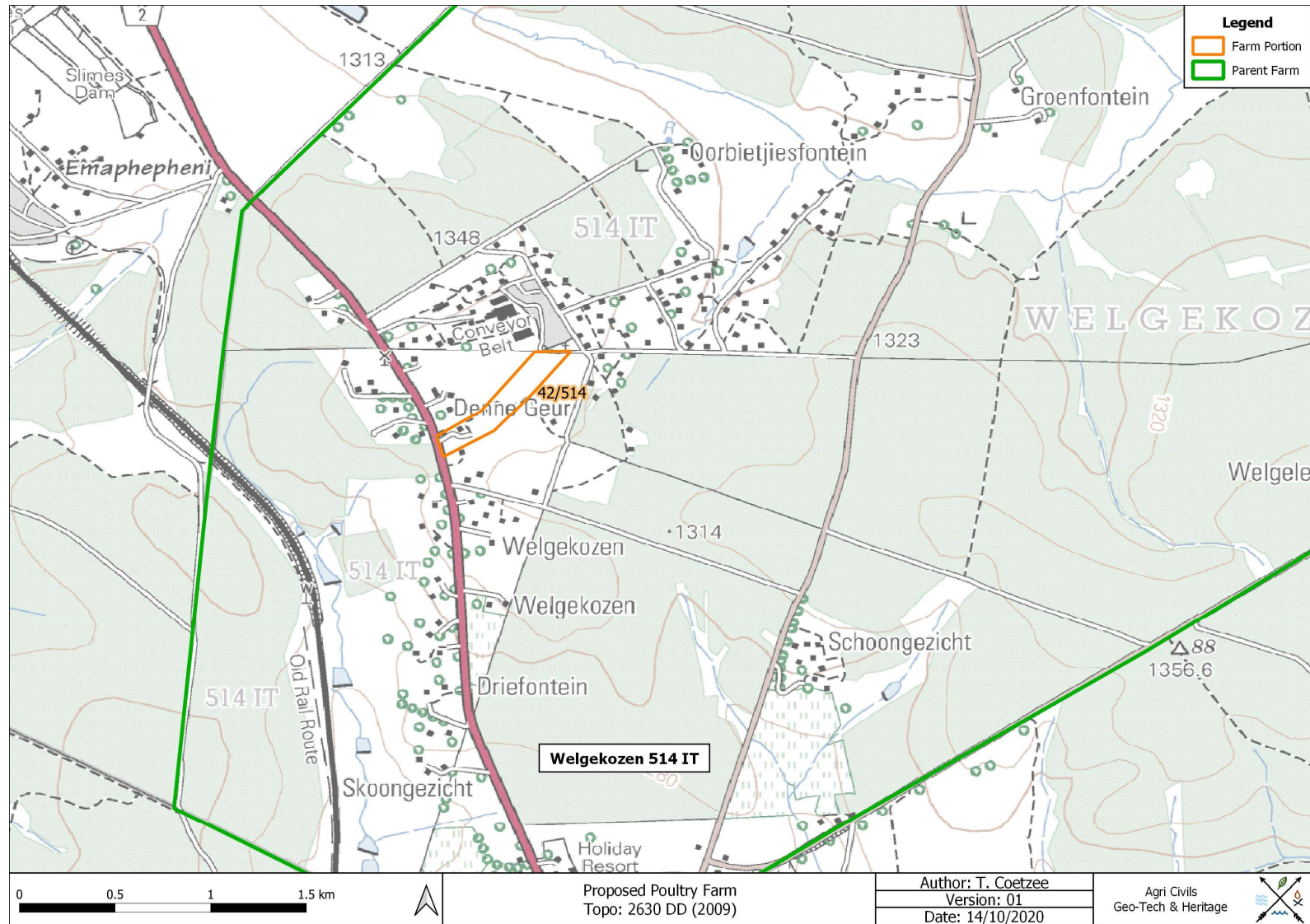


Figure 2: Segment of SA 1: 50 000 2630 DD indicating the study area.

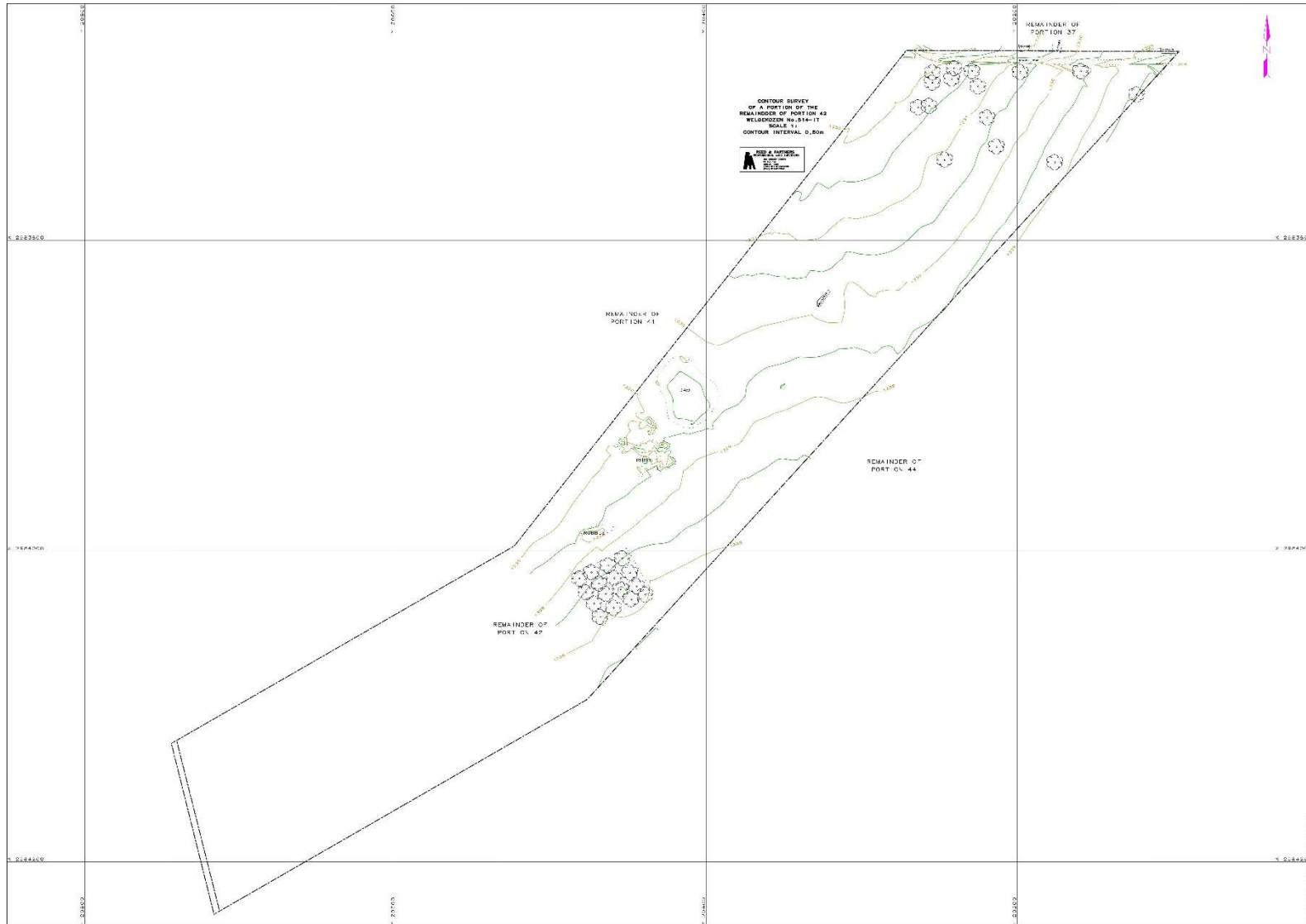


Figure 4: Surveyed section of the RE of Portion 42.

3. Archaeological Background

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods. This section of the report provides a general background to archaeology in South Africa and focuses on more site-specific elements where relevant.

3.1 The Stone Ages

The earliest stone tool industry, the Oldowan, was developed by early human ancestors which were the earliest members of the genus *Homo*, such as *Homo habilis*, around 2.6 million years ago. It comprises tools such as cobble cores and pebble choppers (Toth & Schick 2007). Archaeologists suggest these stone tools are the earliest direct evidence for culture in southern Africa (Clarke & Kuman 2000). The advent of culture indicates the advent of more cognitively modern hominins (Mitchell 2002: 56, 57)

The Acheulean industry completely replaced the Oldowan industry. The Acheulian industry was first developed by *Homo ergaster* between 1.8 to 1.65 million years ago and lasted until around 300 000 years ago. Archaeological evidence from this period is also found at Swartkrans, Kromdraai and Sterkfontein. The most typical tools of the ESA are handaxes, cleavers, choppers and spheroids. Although hominins seemingly used handaxes often, scholars disagree about their use. There are no indications of hafting, and some artefacts are far too large for it. Hominins likely used choppers and scrapers for skinning and butchering scavenged animals and often obtained sharp ended sticks for digging up edible roots. Presumably, early humans used wooden spears as early as 5 million years ago to hunt small animals.

Middle Stone Age artefacts started appearing about 250 000 years ago and replaced the larger Early Stone Age bifaces, handaxes and cleavers with smaller flake industries consisting of scrapers, points and blades. These artefacts roughly fall in the 40-100 mm size range and were, in some cases, attached to handles, indicating a significant technical advance. The first *Homo sapiens* species also emerged during this period. Associated sites are Klasies River Mouth, Blombos Cave and Border Cave (Deacon & Deacon 1999).

Although the transition from the Middle Stone Age to the Later Stone Age did not occur simultaneously across the whole of southern Africa, the Later Stone Age ranges from about 20 000 to 2000 years ago. Stone tools from this period are generally smaller, but were used to do the same job as those from previous periods; only in a different, more efficient way. The Later Stone Age is associated with: rock art, smaller stone tools (microliths), bows and arrows, bored stones, grooved stones, polished bone tools, earthenware pottery and beads. Examples of Later Stone Age sites are Nelson Bay Cave, Rose Cottage Cave and Boomplaas Cave (Deacon & Deacon 1999).

3.2 The Iron Age & Later History

The Early Iron Age marks the movement of farming communities into South Africa in the first millennium AD, or around 2500 years ago (Mitchell 2002:259, 260). These groups were agro-pastoralist communities that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Archaeological evidence from Early Iron Age sites is mostly artefacts in the form of ceramic assemblages. The origins and archaeological identities of this period are largely based upon ceramic typologies. Some scholars classify Early Iron Age ceramic traditions into different “streams” or “trends” in pot types and decoration, which emerged over time in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). Early Iron Age ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. This period continued until the end of the first millennium AD (Mitchell 2002; Huffman 2007). Some well-known Early Iron Age sites include the Lydenburg Heads in Mpumalanga, Happy Rest in the Limpopo Province and Mzonjani in Kwa-Zulu Natal.

The Middle Iron Age roughly stretches from AD 900 to 1300 and marks the origins of the Zimbabwe culture. During this period cattle herding appeared to play an increasingly important role in society. However, it was proved that cattle remained an important source of wealth throughout the Iron Age. An important shift in the Iron Age of southern Africa took place in the Shashe-Limpopo basin during this period, namely the development of class distinction and sacred leadership. The Zimbabwe culture can be divided into three periods based on certain capitals. Mapungubwe, the first period, dates from AD 1220 to 1300, Great Zimbabwe from AD 1300 to 1450, and Khami from AD 1450 to 1820 (Huffman 2007: 361, 362).

The Late Iron Age roughly dates from AD 1300 to 1840. It is generally accepted that Great Zimbabwe replaced Mapungubwe. Some characteristics include a greater focus on economic growth and the increased importance of trade. Specialisation in terms of natural resources also started to play a role, as can be seen from the distribution of iron slag which tend to occur only in certain localities compared to a wide distribution during earlier times. It was also during the Late Iron Age that different areas of South Africa were populated, such as the interior of KwaZulu Natal, the Free State, the Gauteng Highveld and the Transkei. Another characteristic is the increased use of stone as building material. Some artefacts associated with this period are knife-blades, hoes, adzes, awls, other metal objects as well as bone tools and grinding stones.

The Historical Period mainly deals with Europe’s discovery, settlement and impact on southern Africa. Some topics covered by the Historical period include Dutch settlement in the Western Cape, early mission stations, Voortrekker routes and the Anglo Boer War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

3.2.3 Mkhondo/Piet Retief History

The town of Piet Retief was laid out by the surveyor Anton von Wielligh in 1883 on the Farm Osloop and Geluk and was named such after the Voortrekker leader. In 1932 Piet Retief became a municipality. The town, conveniently located in the mist belt of South Africa, originated as a centre for timber, paper and wattle bark production, but mica, kaolin and iron played a role as well. During the early years an area of 100 square kilometres was known as the 'Little Free State', had its own president between 1886 and 1891 and a population of 72 residents. The republic, however, was incorporated into the Piet Retief district as Ward 1 on 2 May 1891. The Assegaai River that flows to the south of Piet Retief was erroneously translated by Europeans from 'Mkhondo', actually meaning zigzag (Bulpin 1986: 639-640). The town was renamed to Mkhondo on 2 February 2010.

4. Methodology

I conducted archaeological reconnaissance of the study area during October 2020 (spring) through a systematic pedestrian site survey that lasted one day. The survey consisted of transects spaced roughly 50 m apart. General site conditions were recorded via photographic record (**Figures 6 – 9**). Also, the site was inspected beforehand on Google Earth, historical aerial imagery and topographical maps in order to identify possible heritage remains (**Appendix A**). The provided surveyor map (**Figure 4**) indicated some features not visible on topographical maps and aerial imagery and was used to identify potential heritage sites as well. Three sites (2630DD-CP1 – 2630DD-CP3) were identified, pre-plotted and visited during the survey (**Table 2 & Figure 5**). Four additional sites (2360DD-CP4 – 2360DD-CP7) were identified during the survey. It should be noted that the prefix '2630DD' is not used as a site reference due to the length of the name, but is recorded in **Table 2**. The historical topographical datasets dating to 1971 and 1985, as well as the historical aerial photographs dating to 1955, 1963 and 1977 proved useful in terms of determining the location and age of some of the structures and features associated with the study area. The total area surveyed was roughly 6.7 ha, though the planned development will be 5.5 ha.

The reconnaissance of the area under investigation served a twofold purpose:

- To obtain an indication of heritage material found in the general area as well as to identify or locate archaeological sites on the area demarcated for development. This was done in order to establish a heritage context and to supplement background information that would benefit developers through identifying areas that are sensitive from a heritage perspective.
- All archaeological and historical events have spatial definitions in addition to their cultural and chronological context. Where applicable, spatial recording of these definitions were done by means of a handheld GPS during the site visit.

Table 2: Site coordinates & description

Abbreviated name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	Identification Source
CP1	2630DD-CP1	30.796668	-26.964180	Cemetery	Intact	Surveyor map
CP2	2630DD-CP2	30.795223	-26.965696	Possible Graves	Intact	Surveyor map
CP3	2630DD-CP3	30.794202	-26.966554	Rubble	Rubble	Surveyor map
CP4	2630DD-CP4	30.793847	-26.967010	Rubble	Rubble	Pedestrian survey
CP5	2630DD-CP5	30.795060	-26.966140	Foundation mound	Demolished	Pedestrian survey
CP6	2630DD-CP6	30.795031	-26.965165	Foundation mound	Demolished	Pedestrian survey
CP7	2630DD-CP7	30.795787	-26.966036	Foundation remains	Demolished	Pedestrian survey

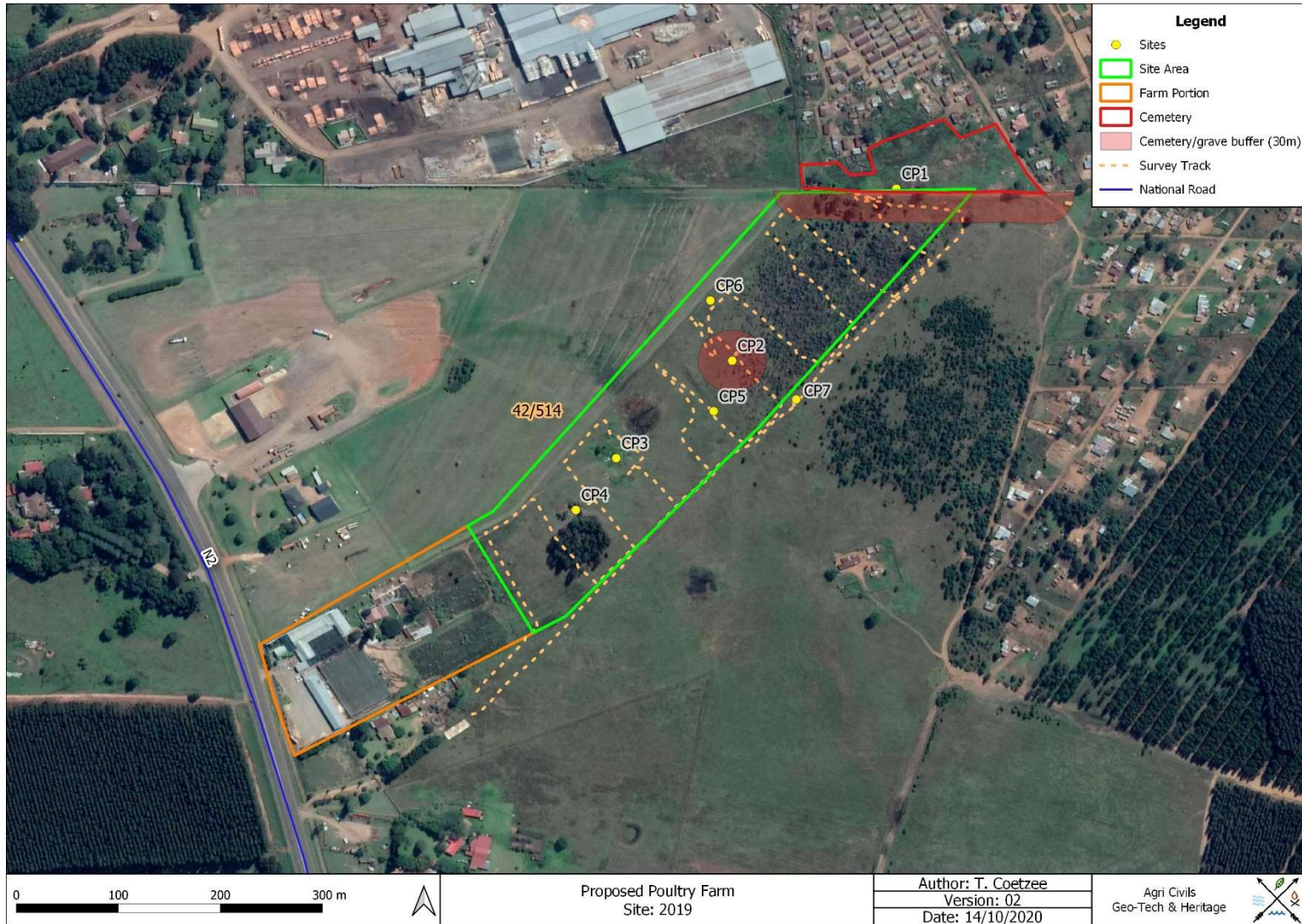


Figure 5: Study area with survey track on a 2019 aerial backdrop.



Figure 6: Southern boundary as seen from the south-eastern corner towards the northwest.



Figure 7: Area currently used for grazing.



Figure 8: Mid-section of the study area seen from east to west.



Figure 9: Mid-section of the study area seen from north to south.

4.1 Sources of information

At all times during the survey, I followed standard archaeological procedures for the observation of heritage resources. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, I paid special attention to disturbances; both man-made such as roads and clearings, and those made by natural agents such as burrowing animals and erosion. I recorded locations of archaeological material remains by means of a Garmin Oregon 550 GPS and photographed these sites as well as general conditions on the terrain with a Sony Cyber-shot camera.

I conducted a literature study, which incorporated previous work done in the region, in order to place the study area into context from a heritage perspective.

Personal communication with the owner of Portion 93 of the Farm Welgekozen 514 IT, located just to the south of the study area, revealed that the larger farm belonged to her father, Mr. Eep Coetser. Mr. Coetser only had daughters and in later years each daughter received a farm portion. According to the daughter on Portion 93, who has been living on the farm a long time, no graves exist on Portion 42.

The owner of Portion 42, Mr. Lothar Meier, who sold the demarcated portion of Portion 42 to the developer, also confirmed that to his knowledge, no infrastructure or graves exist on the Remaining Extent of Portion 42 (Lothar Meier, pers. Comm. 2020).

4.1.1 Previous Heritage Studies

Remainder of Portion 1 of Piet Retief Town and Townlands 149 HT

Kudzala Antiquity (2012) conducted an Archaeological Impact Assessment for Enpact Environmental Consultants CC on the remainder of Portion 1 of Piet Retief Town and Townlands 149 HT. The AIA recorded 1 formal cemetery consisting of mostly unmarked graves. This development is located roughly 7.5 km south of the proposed poultry farm concerned in this report.

Borrow Pits and Quarries for the improvement of the National Route N2, Km 34 (Bloemendal) to Km 63.3 (Piet Retief)

The Cultural Heritage Assessment for the borrow pits and quarries for the improvement of the National Route N2 was done by Van Schalkwyk (2016). The study recorded one heritage site consisting of the ruins of a farm labourer's homestead. A number of house structure foundations, a refuse midden and a cattle enclosure were recorded. According to Van Schalkwyk (2016), the site is of low significance but highlights the possibility that infant graves might exist at the site. The recorded site is located approximately 13 km south-southeast of the study area concerned in this report, while the borrow pits and quarries project included the N2 section next to the proposed poultry farm.

9 Agri-Villages in the greater Piet Retief area

An Archaeological Impact Assessment was done for the establishment of Agri-Villages at Athalia, E'Thandaukhanya, Glen Eland, Hartebeest Mdukazane, New Plaas B and New Plaas Kalambaso, Riverside, Sluis, Speenkoppies and Watersmeet A & B in the larger Piet Retief area. The study recorded Historical Period stone wall enclosures, collapsed stone wall structures, floor structures, dilapidated cattle enclosure and a livestock dipping tank, a preserved rectangular stone house, as well as several graves and cemeteries (Kruger 2015). The project area referred to is located in the general Piet Retief area with the closest Agri-Village approximately 10 km to southeast of the proposed poultry farm.

4.2 Limitations

The majority of the study area consisted of burnt grassland at the time of surveying that provided good visibility (October 2020). The northern half of the study area, however, is associated with dense tree cover that hampered visibility (**Figure 10**). Also, the northern section of the study area borders Ajax township and the author was on several occasions warned of the unsafe situation towards the northern boundary. The pedestrian survey, therefore, did not extend into the cemetery falling outside of the proposed project area (**Figure 11**).



Figure 10: Dense vegetation associated with the north-eastern half of the study area.



Figure 11: Northern boundary with Ajax.

5. Archaeological and Historical Remains

5.1 Stone Age Remains

I found no Stone Age archaeological remains within the demarcated study area.

Although I located no Stone Age archaeological remains, such artefacts may occur in the area. These artefacts are often associated with rocky outcrops or water sources. **Figures 12 – 14** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

Archaeological studies done on the surrounding areas also did not locate material pertaining to the Stone Age.

According to Bergh (1999: 5), no major Stone Age archaeological sites are located in the direct vicinity of Mkhondo/Piet Retief.

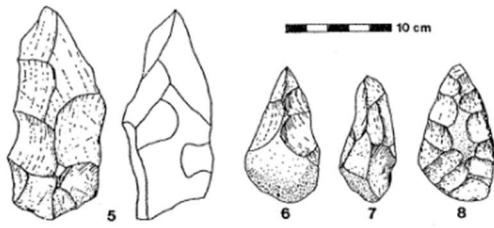


Figure 12: ESA artefacts from Sterkfontein (Volman 1984).

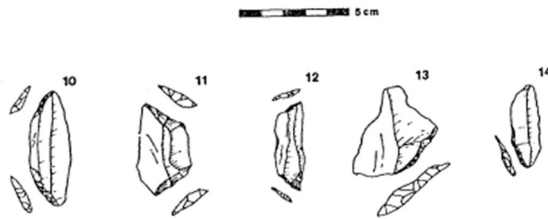


Figure 13: MSA artefacts from Howiesons Poort (Volman 1984).



Figure 14: LSA scrapers (Klein 1984).

5.2 Iron Age Farmer Remains

I found no Iron Age Farmer remains within the demarcated study area.

Archaeological studies done on the surrounding areas also did not locate material pertaining to the Iron Age.

5.3 Historical

I found no historical remains within the demarcated study area.

Two of the heritage studies done in the surrounding area recorded buildings and ruins dating to the Historical Period. The remains are in various stages of preservation (see Kruger 2015 & Van Schalkwyk 2016).

5.4 Contemporary Remains

Five sites dating to contemporary times were identified using a combination of historical topographical maps, aerial images, surveyor map and visual observation during the pedestrian survey.

Site CP3 is located just south of a small dam and consists of building rubble (**Figure 15**). According to the owner of Portion 93, a quarry once existed at this location and people from Ajax township later used it to dump building material. No structures or activity are visible on the historical aerial images (**Appendix A: Figures 25 – 27**) or any the topographical maps (**Appendix A: Figures 28 – 30**).

Site CP4, located directly north of a patch of eucalyptus trees and approximately 57 m southwest of Site CP3, consists of building rubble (**Figure 16**). No structures or activity are visible on the historical aerial images (**Appendix A: Figures 25 – 27**) or any the topographical maps (**Appendix A: Figures 28 – 30**), suggesting that the material might have been dumped as in the case of CP3.

Sites CP5 and CP6 consist of what appears to be foundation mounds. Site CP5 is characterised by a singular angular mound measuring approximately 3 X 3 m near the middle of the project area. No surface material were observed at the site (**Figure 17**). Site CP6 consists of several similar sized mounds along the north-western boundary of the study area with no associated surface material (**Figures 18 – 19**). The owner of the Portion 93 and 42 are not aware of any structures in the past and the 1955 and 1963 aerial images, as well as the topographical maps, do not indicate the presence of structures. On the 1977 aerial image, however, some structures are visible, suggesting that these structures were built between 1963 and 1977.

Site CP7 represents a building foundation consisting of bricks and cement measuring 9 X 3 m that falls just outside of the proposed project area's south-eastern boundary (**Figure 20**). According to the owner of Portion 93, the foundation used to be a pump house dating to recent times. No structures or activity are visible on the historical aerial images (**Appendix A: Figures 25 – 27**) or any the topographical maps (**Appendix A: Figures 28 – 30**).

Heritage studies done in the surrounding area did not record cultural remains dating to recent times.



Figure 15: Building rubble associated with Site CP3.



Figure 16: Building rubble associated with Site CP4.



Figure 17: Site CP5 – foundation mound.



Figure 18: Foundation mounds as seen from the south (CP6).



Figure 19: : Foundation mounds as seen from the north (CP6).



Figure 20: Foundation remains at CP7.

5.5 Graves

I observed one cemetery and identified one potential unmarked burial site consisting of three graves on the demarcated study area.

Site L01 is a large cemetery that borders the study area to north and is used by the people living in Ajax township (**Figure 21**). The cemetery appears to be still in use, is not fenced-off and has of a combination of graves consisting of stacked stones and formal grave dressings. The number of graves are not known. Due to the unsafe nature of the area, little time was spent in this vicinity. When the historical aerial images are inspected, the possibility of one building is observed on the 1955 image (**Appendix A: Figure 25**), while the 1963 image (**Appendix A: Figure 26**) shows a significant amount building in the vicinity of CP1. The sawmill to the northwest of the study area is also shown for the first time, suggesting that the buildings and cemetery might be related to early sawmill workers. It should also be noted that the cemetery falls outside of the proposed study area.

Site CP2 consists of three stone cairns in close proximity of each other near the centre of the study area (**Figures 22 – 24**). **Figure 22** shows a slightly elongated stone cairn oriented in an east-west direction (known as the Christian Western style) measuring 1 X 2 m with a possible headstone at the eastern end. The piece of concrete possibly serving as a headstone, is loosely placed on the ground and is without any markings. Also, no surface material was observed at the site. Similar to **Figure 22**, **Figures 23 & 24** indicate stone cairns, though not elongated and without possible headstones. Also, no surface material of grave good were observed. These potential graves are poorly preserved and not maintained. It should be noted that positively identified graves similar in appearance were recorded by Kruger's (2015) study.

According to the previous owner, Mr. Meier, as well as the owner of Portion 93, no graves exist on the portion and to their knowledge, no one visited the potential graves in the past.

The heritage studies done by Celliers (2012) and Kruger (2015) recorded cemeteries, while the study by Van Schalkwyk (2016) mentions the possibility of infant graves at the building remains of a homestead.



Figure 21: Cemetery CP1.



Figure 22: Possible grave with headstone at CP2.



Figure 23: Stone cairn at CP2.



Figure 24: Possible grave at CP2.

6. Evaluation

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

6.1 Field Ratings

All sites should include a field rating in order to comply with section 38 of the National Heritage Resources Act (Act No. 25 of 1999). The field rating and classification in this report are prescribed by SAHRA.

Table 3: Field Ratings

Rating	Field Rating/Grade	Significance	Recommendation
National	Grade 1		National site
Provincial	Grade 2		Provincial site
Local	Grade 3 A	High	Mitigation not advised
Local	Grade 3 B	High	Part of site should be retained
General protection A	4 A	High/Medium	Mitigate site
General Protection B	4 B	Medium	Record site
General Protection C	4 C	Low	No recording necessary

Table 4: Individual site ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2630DD-CP1	Cemetery	Local	Grade 3 A	High	Mitigation not advised
2630DD-CP2	Possible Graves	Local	Grade 3 A	High	Mitigation not advised
2630DD-CP3	Rubble	General Protection C	Grade 4 C	Low	No recording necessary
2630DD-CP4	Rubble	General Protection C	Grade 4 C	Low	No recording necessary
2630DD-CP5	Foundation mound	General Protection C	Grade 4 C	Low	No recording necessary
2630DD-CP6	Foundation mound	General Protection C	Grade 4 C	Low	No recording necessary
2630DD-CP7	Foundation remains	General Protection C	Grade 4 C	Low	No recording necessary

7. Statement of Significance & Recommendations

7.1 Statement of significance

The study area: The proposed poultry farm on a portion of the Remaining Extent of Portion 42 of the Farm Welgekozen 514 IT

Some of the sites located within the demarcated portion are considered to be significant from a heritage perspective. The significance of the observed sites is discussed here.

Site CP1 & CP2 are considered significant from a heritage perspective. Site CP1 falls outside of the proposed development boundary, but should construction and development occur along the northern boundary of the study area, these activities might negatively impact the cemetery. Although the general study area is associated with modern building rubble and the previous owner is not aware of any graves on Portion 42, a chance exists that the stone cairns at CP2 might be graves and should be treated as such. Graves of similar appearance recorded by the Kruger (2015) study strengthens this possibility. Although the exact age of Sites CP1 & CP2 are not known, the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply.

Sites CP3 & CP4 consist of modern building rubble and was confirmed by the previous owner. Historical aerial imagery and topographical maps also do not indicate any activity in this area. These sites are therefore not considered to be significant from a heritage perspective.

Sites CP5 & CP6 consist of foundation mounds. Although the previous owners are not aware of any structures in the past, the historical aerial image dating to 1977 indicate several structures, while no structures are visible on the 1963 aerial image. These structures were therefore most likely built between 1963 and 1977, dating the remains to a maximum age of 56/57 years. These sites are therefore not considered to be significant from a heritage perspective.

Site CP7 is located outside of the boundary of the study area and, according to the owner of Portion 93, was built in recent years. Also, no structures or activity are visible on historical aerial imagery. This site, therefore, is not considered to be significant from a heritage perspective.

7.2 Recommendations

The following recommendations are made in terms with the National Heritage Resources Act (25 of 1999) in order to avoid the destruction of heritage remains associated with the area demarcated for development:

- Because the cemetery at Site CP1 falls outside of the demarcated study area, but the possibility exists that construction negatively impact the graves, it is recommended that a conservation buffer of 30 m be established at the northern boundary of the study area as indicated on **Figure 5**. The buffer does not need not be fenced-off, but it is recommended that this area be avoided by construction activities and vehicular traffic.
- Due to the sensitive nature of graves, it is recommended that a fenced-off conservation buffer of 30 m be placed around the potential graves at Site CP2 and that applicable signage be erected. Also, access to the area must not be refused. Should impact to the stone cairns at CP2 be unavoidable, the potential graves may be relocated by a qualified graves relocation unit to a premises earmarked by the local municipality, but will set in motion a substantial process as new legislation will be triggered. These processes, however, must be performed in accordance with the involvement of community leaders and the relatives of the deceased. Alternatively, the potential burial sites may be investigated by using Ground Penetrating Radar to verify whether the sites contain human remains. The results may then be used to inform a site-specific course of action that will enable the safeguarding of heritage resources. A qualified archaeologist specialising in human remains should conduct the ground penetrating radar study.
- Sites CP3 & CP4 are not considered significant from a heritage perspective as these sites date to recent times. No further action is required.
- Site CP5 & CP6 do not exceed 60 years of age and are not considered significant from a heritage perspective. No further action is required, but care should be exercised when developing in this vicinity as subsurface cultural material might be present.
- Site CP7 falls outside of the area demarcated for development and are not considered significant from a heritage perspective as this structure does not exceed 60 years of age. No further action is required.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist.

Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).

- Should the need arise to expand the proposed development beyond the surveyed areas outlined in this study, the following applies: A qualified archaeologist must conduct a full Phase 1 Archaeological Impact Assessment (AIA) on the sections beyond the demarcated area that will be affected by the development, in order to determine the occurrence and extent of any archaeological sites and the impact development might have on these sites.
- From a heritage point of view, development may proceed on the demarcated project area, subject to the abovementioned conditions, recommendations and approval by the South African Heritage Resources Agency.

8. Addendum: Terminology

Archaeology:

The study of the human past through its material remains.

Artefact:

Any portable object used, modified, or made by humans; e.g. pottery and metal objects.

Assemblage:

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

Context:

An artefact's context usually consist of its immediate *matrix* (the material surrounding it e.g. gravel, clay or sand), its *provenience* (horizontal and vertical position within the matrix), and its *association* with other artefacts (occurrence together with other archaeological remains, usually in the same matrix).

Cultural Resource Management (CRM):

The safeguarding of the archaeological heritage through the protection of sites and through salvage archaeology (rescue archaeology), generally within the framework of legislation designed to safeguard the past.

Excavation:

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

Feature:

An irremovable artefact; e.g. hearths or architectural elements.

Ground Reconnaissance:

A collective name for a wide variety of methods for identifying individual archaeological sites, including consultation of documentary sources, place-name evidence, local folklore, and legend, but primarily actual fieldwork.

Matrix:

The physical material within which artefacts is embedded or supported, i.e. the material surrounding it e.g. gravel, clay or sand.

Phase 1 Assessments:

Scoping surveys to establish the presence of and to evaluate heritage resources in a given area.

Phase 2 Assessments:

In-depth culture resources management studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required.

Sensitive:

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

Site:

A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity.

Surface survey:

There are two kinds: (1) unsystematic and (2) systematic. The former involves field walking, i.e. scanning the ground along one's path and recording the location of artefacts and surface features. Systematic survey by comparison is less subjective and involves a grid system, such that the survey area is divided into sectors and these are walked ally, thus making the recording of finds more accurate.

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Human Tissue Act No. 65 of 1983, Government Gazette, Cape Town

National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town

Removal of Graves and Dead Bodies Ordinance No. 7 of 1925, Government Gazette, Cape Town

Appendix A: Historical Aerial Photographs and Topographical Maps



Figure 25: Study area superimposed on a 1955 aerial photograph.



Figure 26: Study area superimposed on a 1963 aerial photograph.

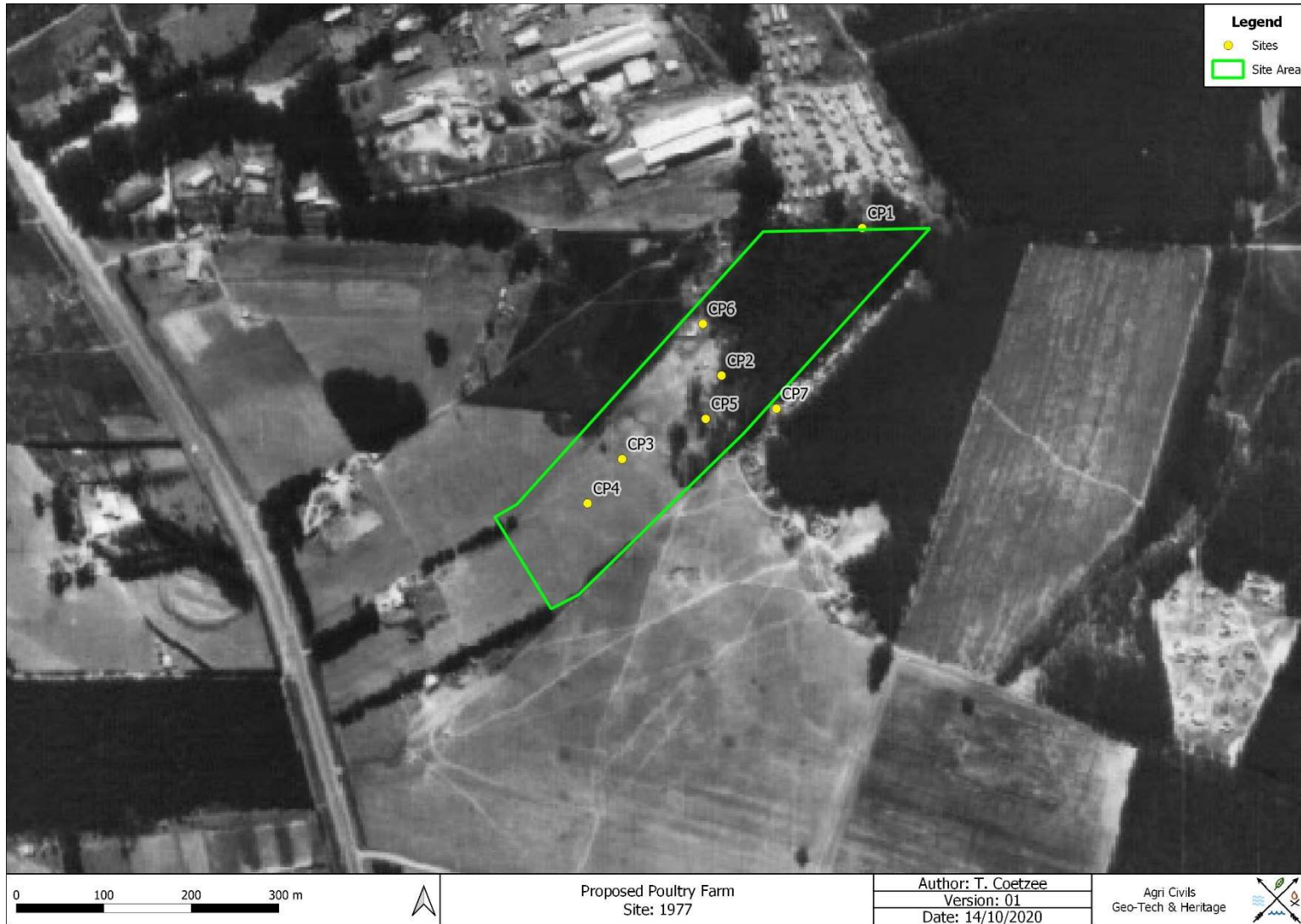


Figure 27: Study area superimposed on a 1977 aerial photograph.

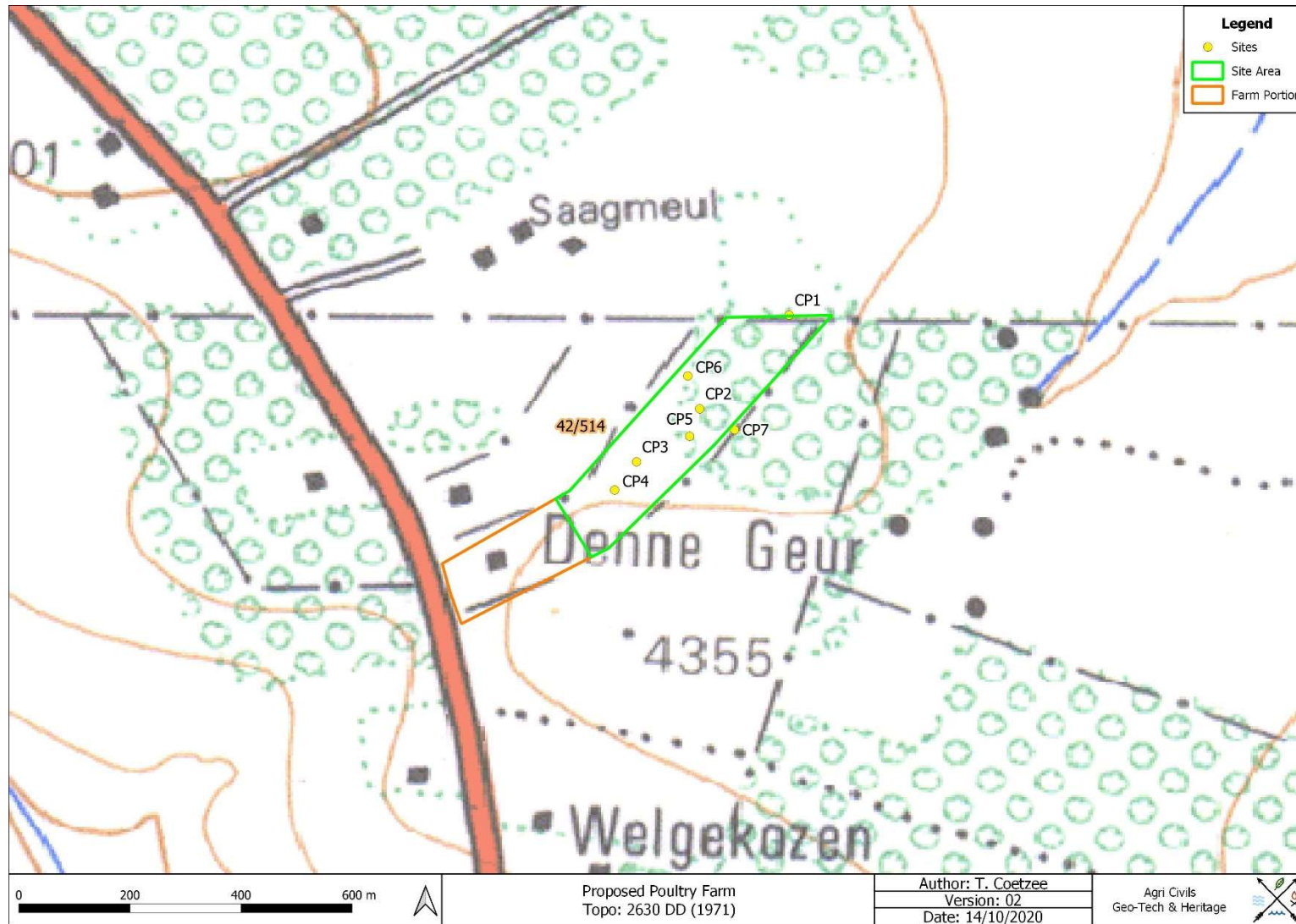


Figure 28: Site area superimposed on a 1971 topographical map.

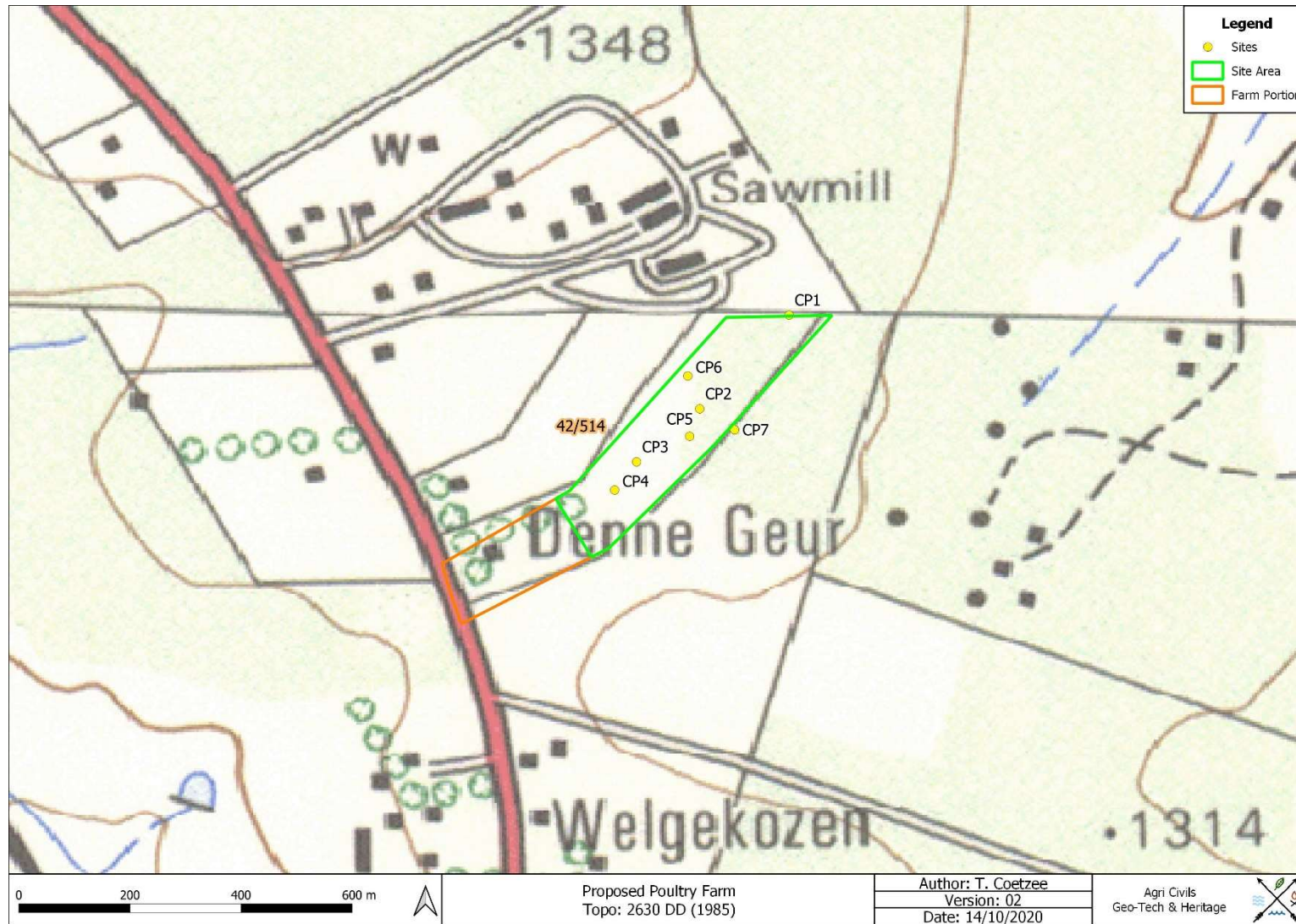


Figure 29: Site area superimposed on a 1985 topographical map.

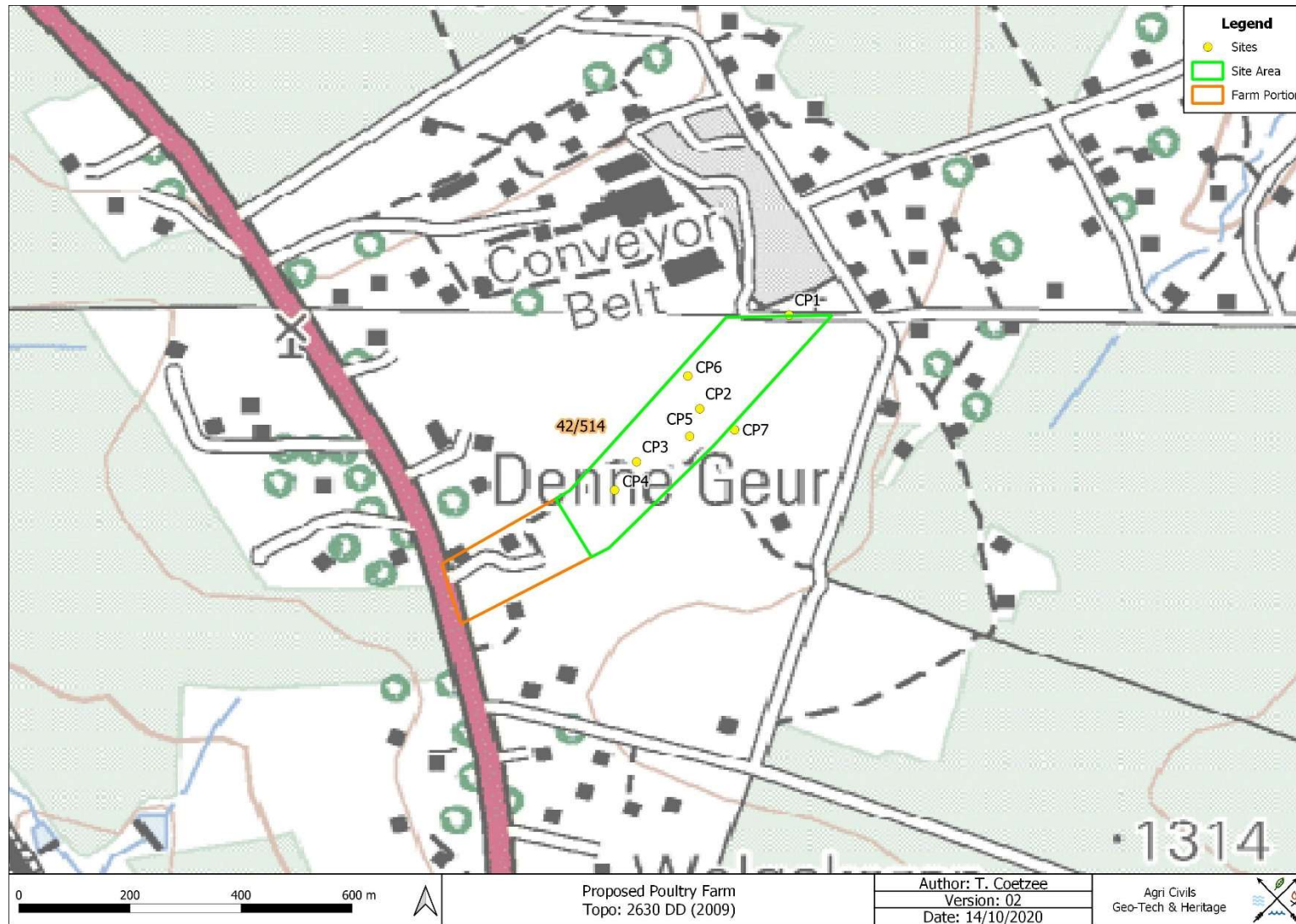


Figure 30: Site area superimposed on a 2009 topographical map.

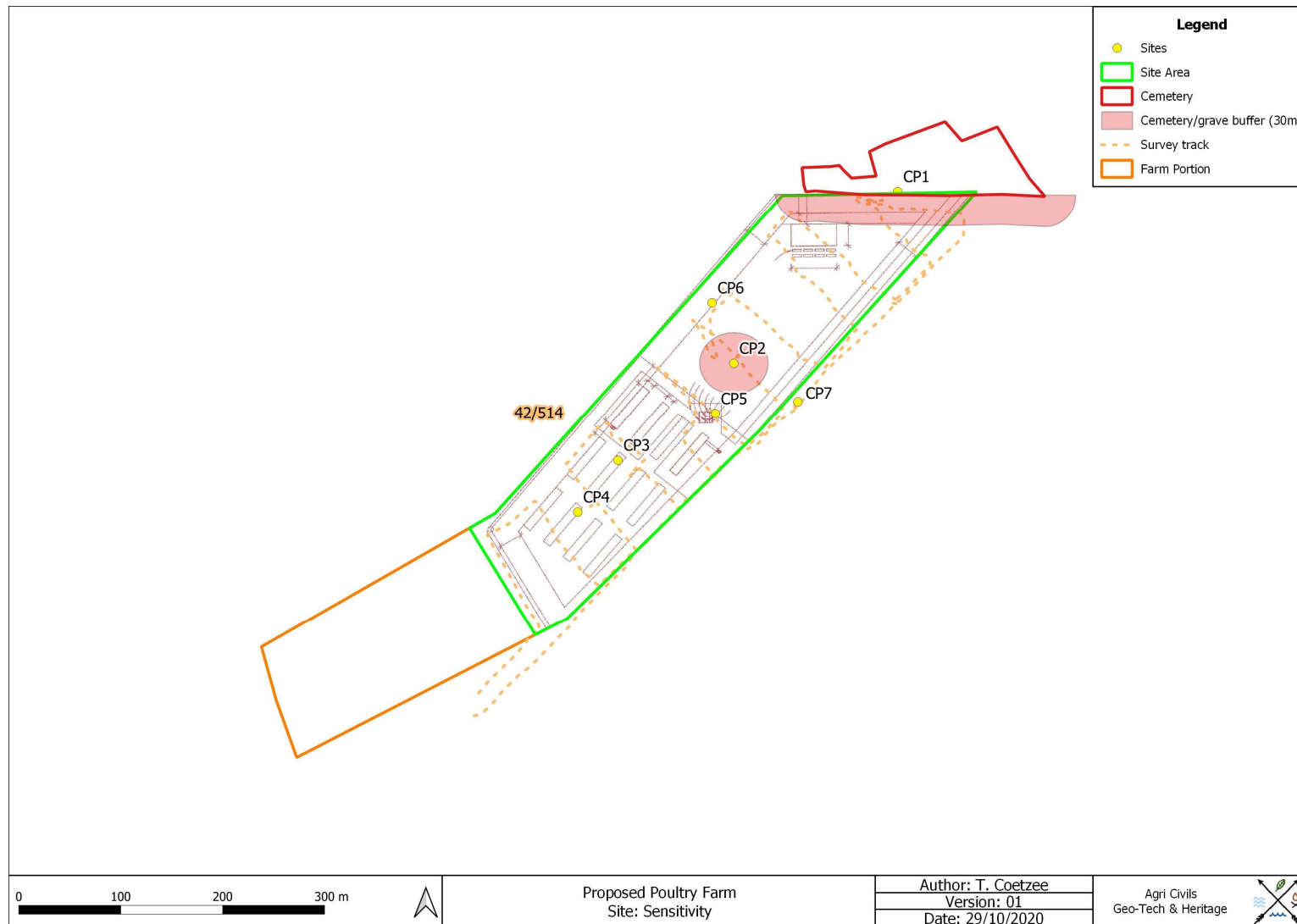


Figure 31: Heritage sites & infrastructure overlay.

Appendix B: Impact Table

v) Impacts and risks identified including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts

This section includes the impact management for the preferred layout plan.

1 Surface and subsurface impact on heritage resources due to infrastructure construction

Activity, nature, and consequence of impact:

During the construction and operational phases, surface and subsurface impacts take place. These activities can lead to irreparable damage or complete destruction of heritage resources if not correctly managed.

Cumulative impacts:

Due to the unfenced cemetery along the northern boundary of the proposed project area, site access and regular traffic might have a cumulative impact on culturally significant remains.

Assumptions, uncertainties, and gaps in knowledge:

Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases. Potential heritage surface indicators are therefore rather considered sites than assuming the presence of a natural feature.

Impact pre-mitigation:

	Heritage sites		
Intensity and magnitude	3	Potential destruction of burial sites and subsurface culturally significant material	
Resource replaceability	3	Damage is irreversible	
Duration	3	Risk exists as long as project is operational	
Extent or spatial scale	2	The impact will be site specific.	
Probability	2	There is a probability for the impact to occur.	
Significance	13		
	High		

Impact post-mitigation:

	Heritage sites		
Intensity and magnitude	1	The proposed development can avoid the heritage sites and implement precautionary measures, thereby limiting/avoiding impact.	
Resource replaceability	2	Damage is irreversible	
Duration	2	Risk exists as long as project is operational	
Extent or spatial scale	1	The impact will be site specific.	
Probability	1	With correct management, it is unlikely that the impact will occur.	
Significance	7		
	Low		

Environmental objective

To ensure that heritage resources are not negatively impacted.

Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Financial provision for long-term maintenance and/or environmental costs	Mitigation hierarchy
Heritage awareness must be included in normal site induction for all employees, contractors and visitors to the subject properties. This will ensure that the general level of heritage awareness is raised and that there is compliance with the act. The sections of the NHRA must be highlighted to each visitor, contactor and employee or any other person acting on the sites or immediate surrounds.	Operational	General awareness	Site inspections	Inspections during construction and development	ECO	Only necessary if any resource is found.	Prevent
All actions on the property will be subject to the provisions of the NHRA and any transgressions of the act will make the transgressor liable in terms of the act.	Operational.	NHRA	Site inspections	Inspections during operation	ECO	Only necessary if any resource is found.	Prevent
The demarcated project boundary must be enforced to limit the footprint of the impact of activities outside the project area.	Operational.	General awareness.	Site inspections.	Inspections during operation	ECO	Only necessary if any resource is found.	Prevent
Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).	Operational.	General awareness	Site inspections	Inspections during construction and development	ECO	Only necessary if any resource is found.	Prevent
Prior to the commencement of any work or action that will impact or effect a heritage resource, the relevant authorisation must be obtained from the SAHRA.	Planning and operational.	N/A.	N/A.	N/A.	N/A.	N/A.	N/A.
Where there is uncertainty with regard to the status of a heritage resource, object, place or artefact, or any legislative or other policy issue the SAHRA can be contacted for clarity.	Operational.	General awareness	Site inspections	Inspections during construction and development	ECO	Only necessary if any resource is found.	Prevent

<p>Stakeholder expectations and / or comments</p> <p>None received.</p>
<p>Residual and latent risks</p> <p>If effective management takes place, there should not be residual impacts. No latent impacts foreseen.</p>

Pre- and post-mitigation impacts per site (table1/2)

Line No	Site No	Site Type	Activity	Impact pre-mitigation						Impact post-mitigation					
				Intensity & Magnitude	Resource replaceability	Duration	Extent or spatial scale	Probability	Significance	Intensity & Magnitude	Resource replaceability	Duration	Extent or spatial scale	Probability	Significance
1	2630DD-CP1	Cemetery	Destruction of heritage resources	3	3	2	1	2	11 Medium Burial sites are protected by the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999.	1	2	2	1	1	7 Low
2	2630DD-CP2	Possible Graves	Destruction of heritage resources	3	3	3	2	2	13 High Burial sites are protected by the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999.	1	2	2	1	1	7 Low
3	2630DD-CP3	Rubble	Destruction of heritage resources	1	1	1	1	1	5 Low Not culturally significant material	1	1	1	1	1	5 Low
4	2630DD-CP4	Rubble	Destruction of heritage resources	1	1	1	1	1	5 Low Not culturally significant material	1	1	1	1	1	5 Low
5	2630DD-CP5	Foundation mound	Destruction of heritage resources	3	3	3	2	2	13 High Not significant from a heritage perspective, unless significant subsurface cultural material unearthed	1	1	1	2	1	6 Low
6	2630DD-CP6	Foundation mound	Destruction of heritage resources	3	3	3	2	2	13 High Not significant from a heritage perspective, unless significant subsurface cultural material unearthed	1	1	1	2	1	6 Low
7	2630DD-CP7	Foundation remains	Destruction of heritage resources	1	1	1	1	1	5 Low Not significant from a heritage perspective - outside of project area and of recent origin	1	1	1	1	1	5 Low

Pre- and post-mitigation impacts per site (table2/2)

Line No	Environmental objective	Management measures to be applied	Phase applicable to management measure	Management tools	Monitoring programmes	Management timeframe and schedule	Responsibilities for implementation and long-term maintenance	Financial provision for long term maintenance and/or environmental costs	Mitigation hierarchy	Residual and latent risks
1	To ensure that heritage resources are not negatively impacted.	Establish conservation buffer of 30 m at the northern boundary	Construction and operational	General awareness	Site inspections	Inspections during construction, development and operation	ECO	Only necessary if relocation is considered.	Prevent	If effective management takes place, there should not be residual impacts. No latent impacts foreseen
2	To ensure that heritage resources are not negatively impacted.	Establish fenced-off conservation buffer of 30 m, erect applicable signage	Construction and operational	General awareness	Site inspections	Inspections during construction, development and operation	ECO	Only necessary if relocation is considered.	Prevent	If effective management takes place, there should not be residual impacts. No latent impacts foreseen
3	N/A	None	None	None	None	None	N/A	None	N/A	None
4	N/A	None	None	None	None	None	N/A	None	N/A	None
5	To ensure that heritage resources are not negatively impacted.	Care should be exercised when developing in this vicinity	Construction and operational	General awareness	Site inspections	Inspections during construction and development	ECO	Only necessary if any resource is found.	Prevent	If effective management takes place, there should not be residual impacts. No latent impacts foreseen
6	To ensure that heritage resources are not negatively impacted.	Care should be exercised when developing in this vicinity	Construction and operational	General awareness	Site inspections	Inspections during construction and development	ECO	Only necessary if any resource is found.	Prevent	If effective management takes place, there should not be residual impacts. No latent impacts foreseen
7	N/A	None	None	None	None	None	N/A	None	None	None

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

Impact assessment

The methodology used to assess the significance of an impact is based on the requirements as set out in EIA Regulations, (GN 982) of 2014 i.t.o. the NEMA as well as the Proposed National Guideline on Minimum Information Requirements for Preparing EIA for Mining Activities that Require EA, of 2018, GN 86 in terms of NEMA. The impact significance methodology described below also complies to Appendix B of the Operational Guideline to Integrated Water and Waste Management of 2010 in terms of the NWA. In the event of any Section 21c&i water uses in terms of the NWA being assessed, Appendix A of the General Authorisations of 2016, GN 509 in terms of the NWA will be used to construct a risk matrix. Regulation 3(b) of the General Authorisations of 2016, GN 509 in terms of the NWA states that a suitably qualified SACNASP professional member must determine risks associated with this risk matrix.

Impact identification and prediction means forecasting the change of environmental parameters due to developmental patterns. These parameters may also be changing due to climate change and should be included.

Method of assessment: Impact identification and prediction is a stepwise procedure to identify the direct, indirect and cumulative impacts (relating to both positive and negative impacts) for which a proposed activity and its alternatives will have on the environment as well as the community. This should be undertaken by determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity aspects of sites and locations as well as the risk of impact of the proposed activity. Refer to part A(h)(iv) for a complete description of these environmental attributes. Sources of data to be used for gathering data on the environmental attributes as well as the impacts include; monitoring / sampling data collected and stored, assumptions and actual measurements, published data available from the departments or other stakeholders in the area as well as specialist studies. Likely impacts should be described qualitatively and then studied separately in detail. This provides consistent and systematic basis for the comparison and application of judgements.

Significance rating: Ratings should then be assigned to each criterion. Significance of impacts should be determined for each phase of the mining lifecycle this includes; preconstruction, construction, operational, closure (including decommissioning) and post closure phases. The significance of impacts should further be assessed both with and without mitigation action. The description of significance is largely judgemental, subjective and variable. However, generic criteria can be used systematically to identify, predict, evaluate and determine the significance of impacts resulting from project construction, operation and decommissioning. The process of determining impact magnitude and significance should never become mechanistic. Impact magnitude is determined by empirical prediction, while impact significance should ideally involve a process of determining the acceptability of a predicted impact to society. Making the process of determining the significance of impacts more explicit, open to comment and public input would be an improvement of environmental assessment practice. Impact magnitude and significance should as far as possible be determined by

reference to either legal requirements (accepted scientific standards) or social acceptability. If no legislation or scientific standards are available, the EAP can evaluate impact magnitude based on clearly described criteria. A matrix selection process is the most common methodology used in determining and ranking the site sensitivities:

- The consequence: includes the nature / intensity / severity of the impact, spatial extent of the impact, and duration of the impact.
 - The nature / intensity / severity of the impact: An evaluation of the effect of the impact related to the proposed development on the receiving environment. The impact can be either positive or negative. A description should be provided as to whether the intensity of the impact is high, medium, or low or has no impact in terms of its potential for causing negative or positive effects. Cognisance should be given to climate change which may intensify impacts.
 - The spatial extent of the impact: Indication of the zone of influence of the impact: A description should be provided as to whether impacts are either limited in extent or affect a wide area or group of people. Cumulative impacts must also be considered as the extent of the impact as may increase over time.
 - The duration of the impact: It should be determined whether the duration of an impact will be short-term, medium term, long term or permanent. Cumulative impacts must also be considered as the duration of the impact as it may increase over time.
- The likelihood: includes the probability of the potential occurrence of the impact, and frequency of the potential occurrence of the impact
 - The probability of the impact: The probability is the quality or condition of being probable or likely. The probability must include the degree to which these impacts can be reversed; may cause irreplaceable loss of resources; and can be avoided, managed or mitigated
 - The frequency of the potential occurrence of the impact.
- The significance: This is worst case scenario without any management measures. See below how significance is determined: Impact that may have a notable effect on one or more aspects of the environment or may result in noncompliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence. Mitigation measures should be provided with evidence or motivation of its effectiveness

Example of significance rating:

Prior to mitigation

Intensity and magnitude	1 Natural processes or functions are not affected and will adequately return to its natural state. The impact will be completely reversed with correct management, and can be completely avoided, managed, or mitigated.	2 Natural processes or functions are affected, and natural processes or functions will continue in a modified manner. The impact will be reversed to some degree with correct management, and can be somewhat avoided, managed, or mitigated	3 Natural processes or functions are to the extent where it temporarily or permanently ceases. The impact cannot be reversed even with correct management, and cannot be avoided, managed, or mitigated
Resource replaceability	1 Loss of resource can be completely replaced.	2 Loss of resource can somewhat be replaced.	3 Resources will be completely lost.
Duration	1 The impact will be short-lived.	2 The impact will last for the entire operational life of the activity but will be mitigated thereafter.	3 The impact will not cease after the operational life of the activity ceases but will be permanent.
Extent or spatial scale	1 The impact will be site specific.	2 The impact will affect the local area.	3 The impact will affect an area larger than just the local area.
Probability	1 It is unlikely that the impact will occur.	2 There is a probability for the impact to occur.	3 The impact will definitely occur.
Significance	None or low If the sum of the above ranking is equal or more than 5 and 7, and no ranking equals 3.	Medium If the sum of the above ranking is equal or more than 8 to 11.	High If the sum of the above ranking is 12 or more.

Post to mitigation

Intensity and magnitude	1 Natural processes or functions are not affected and will adequately return to its natural state. The impact will be completely reversed with correct management, and can be completely avoided, managed, or mitigated.	2 Natural processes or functions are affected, and natural processes or functions will continue in a modified manner. The impact will be reversed to some degree with correct management, and can be somewhat avoided, managed, or mitigated	3 Natural processes or functions are to the extent where it temporarily or permanently ceases. The impact cannot be reversed even with correct management, and cannot be avoided, managed, or mitigated
Resource replaceability	1 Loss of resource can be completely replaced.	2 Loss of resource can somewhat be replaced.	3 Resources will be completely lost.
Duration	1 The impact will be short-lived.	2 The impact will last for the entire operational life of the activity but will be mitigated thereafter.	3 The impact will not cease after the operational life of the activity ceases but will be permanent.
Extent or spatial scale	1 The impact will be site specific.	2 The impact will affect the local area.	3 The impact will affect an area larger than just the local area.
Probability	1 It is unlikely that the impact will occur.	2 It is likely for the impact to occur.	3 The impact will definitely occur.
Significance	None or low If the sum of the above ranking is equal or more than 5 and 7, and no ranking equals 3.	Medium If the sum of the above ranking is equal or more than 8 to 11.	High If the sum of the above ranking is 12 or more.

Mitigation and management

Management methodology is based on the requirements as set out in EIA Regulations, (GN 982) of 2014 i.t.o. the NEMA as well as the Proposed National Guideline on Minimum Information Requirements for Preparing EIA for Mining Activities that Require EA, of 2018, GN 86 in terms of NEMA; and the Mining and Biodiversity Guideline (Mainstreaming Biodiversity into the Mining Sector) IDB of 2013 in terms of the MPRDA.

Management statements detail the processes, procedures and practices required to achieve an impact management outcome. A hierarchy of management tools used can also be used as seen below.



Mitigation should include measures in the following order of priority. The aim is to prevent adverse impacts from happening or, where this is unavoidable, to limit their significance to an acceptable level.

	<p>Avoid or prevent Refers to considering options in project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services, and people. This is the best option, but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts mining should not take place. In such cases it is unlikely to be possible or appropriate to rely on the latter steps in the mitigation.</p>
	<p>Minimise (Modification or control measures) Refers to considering alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity and ecosystem services. In cases where there are environmental and social constraints every effort should be made to minimise impacts. Can also include changes to process and or practices to reduce risk; or control, either through physical control or operational practices to ensure acceptable performance is maintained.</p>
	<p>Rehabilitate Refers to rehabilitation and pollution clean-up of areas where impacts are unavoidable and measures are provided to return impacted areas to near-natural state or an agreed land use after mine closure. Although rehabilitation may fall short of replicating the diversity and complexity of a natural system.</p>
	<p>Offset Refers to measures over and above rehabilitation to compensate for the residual negative effects on biodiversity, after every effort has been made to minimise and then rehabilitate impacts. Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity.</p>

Avoiding or preventing impacts

If the biodiversity (an ecosystem, habitat for threatened species, ecological corridor or area that provides essential ecosystem services) is of conservation value or importance, it is best to plan to avoid or prevent impacts altogether by changing the location, siting, method or processes of the mining activities and related infrastructure.

Minimising impacts

Minimising impacts of mining is a mitigation measure that deals with the environment in general. In areas where the biodiversity is to be affected is of conservational value or importance, then every effort should be made to minimise those impacts that cannot be avoided or prevented. Mining companies should strive to minimise impacts on biodiversity to ensure environmental protection. Section 2 of NEMA contains environmental management principles that resonates with minimising the impact rather than stopping at mitigation, this is imperative in the mining sector.

Rehabilitating impacted areas

Rehabilitation is the measures that are undertaken to “as far as it is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which aligns to the generally accepted principle of sustainable development. A closure plan is an essential part of rehabilitation and must be developed based on the establishment of the closure objectives and criteria.

Biodiversity offsets

Biodiversity offsets are measurable conservation gains that help to balance any significant biodiversity losses that remain after actions to avoid, minimise and restore negative impacts have been taken. They are the last stage of mitigation and should be considered after appropriate avoidance, minimisation, and rehabilitation/restoration measures have been applied already.

When dealing with management, impact management outcomes must:

- be set for the expected activity-based impacts;
- describe the desired outcome of the management measure/s prescribed or the standard to be achieved (environmental objective);
- be clearly documented and identified per project phase as in the impact identification and significance rating process (this must be aligned to the mines closure objectives, and must therefore include predicted long-term result of the applied management measures);
- be measurable to determine compliance, which includes time frames and schedule for the implementation of the management measures; responsibilities for implementation and long-term maintenance of the management measures; financial provision for long-term maintenance; and monitoring programmes to be implemented;
- be informed by stakeholder expectations; and
- ensure legal compliance;

Finally, the impact assessment must refer to the residual and latent impact after successful implementation of the management measures.

Appendix C: Curriculum Vitae

Curriculum vitae

Tobias Coetzee

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Registered Professional Archaeologist, Association of Southern African Professional Archaeologists (ASAPA), CRM accredited, membership no: 289

Full names: Tobias Johannes Coetzee
Date of birth: 19 May 1986
Qualifications: MA (Archaeology)

Education:

2017 MA (Archaeology)
University of Pretoria
Dissertation: *Mapping Bokoni: Exploring Bokoni settlement choices and changes in Mpumalanga and Limpopo, South Africa using GIS site distribution analysis techniques*

2008 BA (Hons) (Archaeology)
University of Pretoria
Dissertation: *Mapping Bokoni towns & trade: Applying Geographic Information Systems to the articulation of Mpumalanga stonewalled sites with pre-colonial trade routes*

2006 – 2008 BA (Archaeology & Geography)
University of Pretoria
Subjects: Zulu, Afrikaans, Cartography, GIS and ArcGIS applications, Meteorology, Anthropology, Ancient History, Isotope Ecology and Dating, Computer and Information Literacy, Academic Skills and Introduction to research

Employment:

2020 Heritage Practitioner
Agri Civils Geo-Tech & Heritage

2013 – 2019 GIS Practitioner
Bigen Group (Pty) Ltd

2013 Specialist consultant: Heritage
Environmental Assurance (Pty) Ltd

2011 Junior lecturer in Archaeology at the University of South Africa (UNISA) at the department of Anthropology & Archaeology
Primary lecturer for: The Prehistory of South Africa
Assistant lecturer for: Applied Archaeology - Heritage Conservation

2009 Tutor
Department of Anthropology & Archaeology, University of Pretoria

Conference papers, publications & Cultural Resources Management Reports:

Coetzee, T. 2020. *Conservation Management Plan for Cemetery 1 at the Kwagga North Mine, Middelburg, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *Conservation Management Plan for Cemetery 4 at the Kwagga North Mine, Middelburg, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *A Phase 1 Archaeological Impact Assessment for the Proposed Trentra Mining Development near Kriel, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *A Phase 1 Archaeological Impact Assessment for the Proposed Lakeside/Leeuwfontein Colliery Expansion near Ogies, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *A Phase 1 Archaeological Impact Assessment for the proposed Blesboklaagte Colliery near eMalahleni, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *Integrated Heritage Impact Assessment for The Proposed Buchuberg Resources Prospecting Right Project On Portion 1 Of The Farm Karoovlei 454; Portion 21 Of The Farm Elsie Erasmuskloof 158; Erf 624 In The Matzikama Local Municipality, West Coast District Municipality, Western Cape Province*. Pretoria

Coetzee, T. 2019. *Grave relocation report of Tlabane Mamoloko Mankge from Portion 2 of the Farm Diepgezet 18 JT, Mashishing, Mpumalanga*. Pretoria

Coetzee, T. 2019. *Conservation Management Plan for the Cemetery on the Farm Portions of the Proposed Bothashoek Mine, Pullens Hope, Mpumalanga*. Pretoria

Coetzee, T. 2019. *A Phase 1 Archaeological Impact Assessment for Rivanet Mining & Exploration on Several Portions of the Farm Palmietfontein 189 IP near Ventersdorp, North West*. Pretoria

Coetzee, T. 2019. *A Phase 1 Archaeological Impact Assessment for the Wildebeestfontein Colliery near Phola, Mpumalanga*. Pretoria

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Coetzee, T. 2019. *A Phase 1 Archaeological Impact Assessment for South 32 on a Portion of the Farm Prinshof 2 IS near Ogies, Mpumalanga*. Pretoria

Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Isiko Malt Grain Milling Plant on Pt 7 of the Farm Reydal 165 IQ, Krugersdorp, Gauteng*. Pretoria

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Coetzee, T. 2019. *Archaeological Scoping Report for the Proposed Prospecting of Manganese, Baryte and Iron Ore on the Farm Vlak Fontein 433, Postmasburg, Northern Cape*. Pretoria

Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Proposed Woestalleen/Noodhulp Coal Mining Project near Middelburg, Mpumalanga*. Pretoria

Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Refurbishment of the Reception and Construction of a New Double Storey Office Extension at Sender Technology Park, Roodepoort, Gauteng*. Pretoria

Coetzee, T. 2019. *Conservation Management Plan for the Graveyards and Infrastructure on Portion 5 of the Farm Op Goedenhoop 205 IS, Mpumalanga*. Pretoria

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Coetzee, T. 2018. *A Phase 1 Archaeological Impact Assessment for the Expansion of the Kleinfontein Colliery Between Hendrina and Bethal, Mpumalanga*. Pretoria

Coetzee, T. 2018. *Grave Relocation Report for the Jeremiah Nyathi Grave from Portion 7 of the Farm Enkeldedoorns 35 JT, Lydenburg, Mpumalanga*. Pretoria

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Coetzee, T. 2017. *A Phase 1 Archaeological Impact Assessment for the Proposed Witbank Siding on erf 5197 and portions of portion 2, 144, 150, 219 and 244 of the Farm Blesboklaagte 296 JS, Emalahleni, Mpumalanga*. Pretoria

Coetzee, T. 2017. *Heritage Management Plan for Sedibeng Iron Ore Mine on Annex Taaibosch 1, Portion 3 and the RE of Farm 445 Postmasburg, Northern Cape*. Pretoria

Coetzee, T. 2017. *A Phase 1 Archaeological Impact Assessment for the Emfuleni Local Municipality landfill development on a Portion of Portion 178 of the Farm Viakfontein 546 IQ, Vereeniging, Gauteng*. Pretoria

Coetzee, T. 2017. *A Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd on a portion Intersecting Portions 19, 22 and 29 of the Farm Kennedy's Vale 361 KT, Steelpoort, Limpopo Province*. Pretoria

Coetzee, T. 2017. *A Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd on erf 1 of Masehlaneng and erf 1480 of Sekgakgapeng, Mokopane, Limpopo*. Pretoria

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- Coetzee, T. 2016. *Phase 1 Archaeological Impact Assessment for Vunene Mining (Pty) Ltd on a portion of portion 6 of the Farm Jan Hendriksfontein 263 IT and a portion of the Farm Transutu 257 IT, Ermelo, Mpumalanga.* Pretoria
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