

# **PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT**

**For**

**The Proposed Township  
Development on Portions  
814, 815 and 816 of the Farm  
Knopjeslaagte 385 JR,  
Gauteng**

**Author ©:**

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**May 2021**

A Phase 1 Archaeological Impact Assessment for the Proposed Township  
Development on Portions 814, 815 and 816 of the Farm Knopjeslaagte 385  
JR, Gauteng

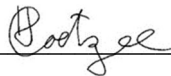
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Version: 1

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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 Knopjeslaagte Township Development 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: 25 May 2021

## List of Abbreviations

**AIA** – Archaeological Impact Assessment

**CRM** – Cultural Resource Management

**EIA** – Environmental Impact Assessment

**ECO** – Environmental Control Officer

**ESA** – Early Stone Age

**GPR** – Ground Penetrating Radar

**GPS** – Global Positioning System

**ha** – Hectare

**HIA** – Heritage Impact Assessment

**km** – Kilometre

**LSA** – Later Stone Age

**m** – Metre

**MASL** – Metres Above Sea Level

**MEC** – Member of the Executive Council

**MSA** – Middle Stone Age

**NHRA** – National Heritage Resources Act

**SAHRA** – South African Heritage Resources Agency

**WMA** – Water Management Area

## NEMA Appendix 6

<b>NEMA Specialist reports</b>	
<b>Item</b>	<b>Page No</b>
1. (1) A specialist report prepared in terms of these Regulations must contain—	
(a) details of-	
(i) the specialist who prepared the report; and	Cover, 2
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Cover, Appendix B
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	2
(c) an indication of the scope of, and the purpose for which, the report was prepared;	10, 20
(cA) an indication of the quality and age of base data used for the specialist report;	22
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	17 – 20
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	22
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	22
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	29-45
(g) an identification of any areas to be avoided, including buffers;	47 – 50
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	23
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	27
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment]or activities;	29 – 49
(k) any mitigation measures for inclusion in the EMPr;	48 – 49
(l) any conditions for inclusion in the environmental authorisation;	48 – 49
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	48 – 49
(n) a reasoned opinion—	
(i)[as to] whether the proposed activity, activities or portions thereof should be authorised	48 – 49
(iA) regarding the acceptability of the proposed activity or activities; and	48 – 49
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	48 – 49
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	25

<b>NEMA Specialist reports</b>	
<b>Item</b>	<b>Page No</b>
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(q) any other information requested by the competent authority.	
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

## Executive Summary

The author was appointed by Elemental Sustainability (Pty) Ltd to undertake a Phase 1 Archaeological Impact Assessment (AIA) for the proposed Township Development on Portions 814, 815 and 816 of the Farm Knopjeslaagte 385 JR near Diepsloot in the Gauteng Province. The proposed development falls within the City of Tshwane Metropolitan Municipality. The aim of the study is to determine the scope of archaeological resources that could be impacted by the proposed township development.

One cemetery (B07), four demolished sites (B01, B03, B05, B06), one contemporary site (B08) and two altered and potentially historic buildings (B04) were located.

Demolished sites B01, B03 and B05 are located on Portions 814 and 816 and might be associated with subsurface culturally significant material. Care should be exercised during the construction phase of the project when developing within the demarcated boundaries of these sites.

Site B02, a disused mine/quarry, was identified on historical topographical maps and recorded via photographic record. The site is not regarded as significant from a cultural perspective.

Two of the buildings located at the main residence (Site B04) might exceed 60 years of age. However, these buildings have significantly been altered in more recent times. The cultural significance of these buildings are therefore considered to be low.

Site B07, a cemetery that is no longer in use, might be impacted by the proposed township development. Therefore the following recommendations are made: A fenced-off conservation buffer of 30 m, a plaque indicating the presence of the cemetery, as well as monitoring by the Environmental Control Officer (ECO) during the construction phase. Alternatively, the graves may be relocated by a professional graves relocation unit.

Site B08, a windpump with associated cement structure, as well the remaining contemporary buildings associated with the study area are of recent origin and are not significant from a cultural perspective.

Subject to adherence to the recommendations and approval by SAHRA (South African Heritage Resources Agency), the proposed Knopjeslaagte Township Development as per the indicated boundary 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

Elemental Sustainability (Pty) Ltd appointed the author to undertake a Phase 1 Archaeological Impact Assessment for the proposed Knopjeslaagte Township Development on Portions 814, 815 and 816 of the Farm Knopjeslaagte 385 JR (**Table 1**) to the northeast of Diepsloot in the Gauteng Province (**Figures 1 – 3**). The proposed township development falls within the City of Tshwane Metropolitan Municipality, and is located 2.3 km northeast of Diepsloot, 15 km northwest of Midrand, 16 km west-southwest of Centurion and 20 km southeast of Hartbeespoort Dam. The purpose of this study is to examine the demarcated study area in order to determine if any archaeological resources of heritage value will be impacted by the proposed township development, 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 study area.

In the following report, the implication for the development of the Knopjeslaagte Township on the demarcated portions with regard to heritage resources is discussed: Portions 814, 815 and 816 of the Farm Knopjeslaagte 385 JR. The development will consist of 31 erven that amounts to 108.19 ha. 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.

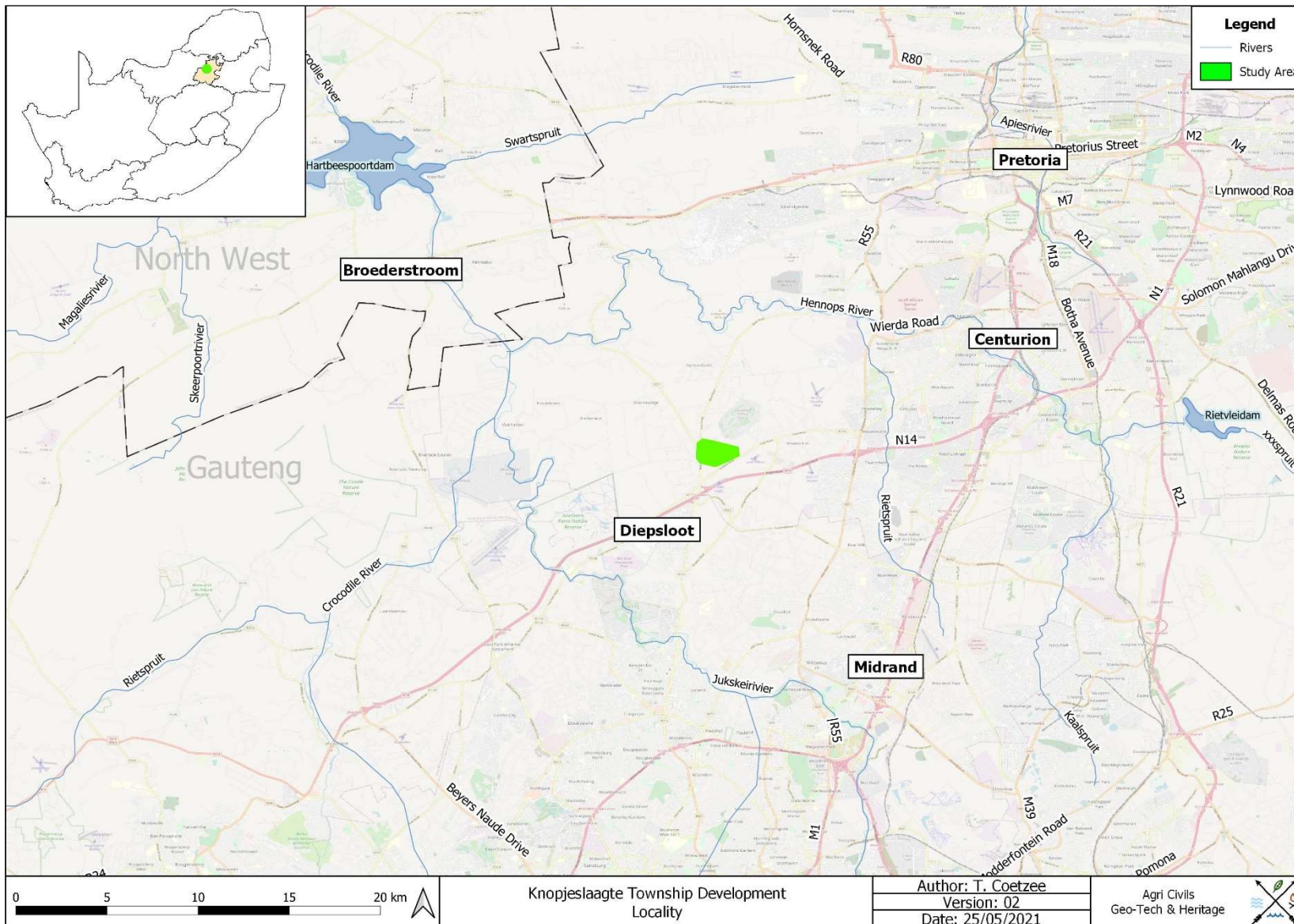


Figure 1: Regional and Provincial location of the study area.

## 1.2 Legislation

The South African Heritage Resources Agency 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 (Environmental Impact Assessment ) 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 5000m<sup>2</sup> 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 10000m<sup>2</sup> 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)

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 (Member of the Executive Council) as well as the relevant Local Authorities. Graves 60 years or older fall under the jurisdiction of the National Heritage Resources Act (NHRA) as well as the Human Tissues Act, 1983.

## 2. Study Area and Project Description

### 2.1 Location & Physical Environment

The proposed Knopjeslaagte Township Development is situated to the northeast of Diepsloot. The farm portions are listed below:

**Table 1:** Property name & coordinates

Property	Portion	Map Reference (1:50 000)	Lat	Lon	Parcel Size (ha)
Knopjeslaagte 385 JR	814	2528 CC	-25.891911	28.033471	65.9
Knopjeslaagte 385 JR	815	2528 CC	-25.892659	28.040686	22.6
Knopjeslaagte 385 JR	816	2528 CC	-25.895414	28.035402	20.6
<b>Total</b>					<b>109.1</b>

The study area is located 2.3 km northeast of Diepsloot, 15 km northwest of Midrand, 16 km west-southwest of Centurion and 20 km southeast of Hartbeespoort Dam (**Figures 1 – 3**). The study area falls within the City of Tshwane Metropolitan Municipality in the Gauteng Province. In terms of vegetation, the study area falls within the Grassland Biome, which is typically associated with summer rainfall regions. This Biome covers approximately 28% of South Africa. According to the vegetation classification by Mucina & Rutherford (2006) the study area falls within the Egoli Granite Grassland vegetation unit.

Egoli Granite Grassland is found in the Gauteng Province and extends from northern Johannesburg further north to include Lanseria Airport and Centurion. It also extends to Muldersdrif in the west and Tembisa in the east. Egoli Granite Grassland is considered endangered with a conservation target of 24%. About 3% is conserved in statutory reserves and a few private conservation areas. Roughly two thirds of this vegetation unit has been transformed by urbanisation, cultivation and the building of roads. Also, no serious alien infestation is associated with this vegetation unit and erosion varies between very low and moderate (Mucina & Rutherford 2006).



The average elevation for Egoli Granite Grassland varies between 1280 and 1660 MASL (metres above sea level). The average elevation of the project area is 1420 MASL and slopes slightly from the higher eastern and western areas to the lower middle section.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 725 mm per year. The average annual temperature is 16.3 °C. The average summer temperature is 19.9 °C, while the average winter temperature averages 10 °C (Climate-data.org accessed 24/04/2021).

The study area falls within the Quaternary catchment A21B within the Upper Crocodile/Hennops/Hartbeespoort River catchment. The closest major rivers to the study area are the Hennops River 8 km to the north and the Rietspruit 6 km to the east. A perennial centreline, Swartbooispruit, also intersects Portions 814 and 816 and divides the study area into an eastern and western half. A local dam is located on Portion 814, while another is located on Portion 816.

When the surrounding environment is considered, the general area is associated with urban built-up areas and pastures. Access to the study area is via a local road turning from the R114 secondary road to the southeast (**Figures 2 & 3**). On a local scale, the area is associated with sand mining (Portion 814), pasture land, residential buildings and outbuildings.

Historical aerial images and topographical maps (**Appendix A**) show that the majority of the study area has been cultivated since at least 1937. The earliest buildings date to the same period, however, the most of these buildings have been demolished.

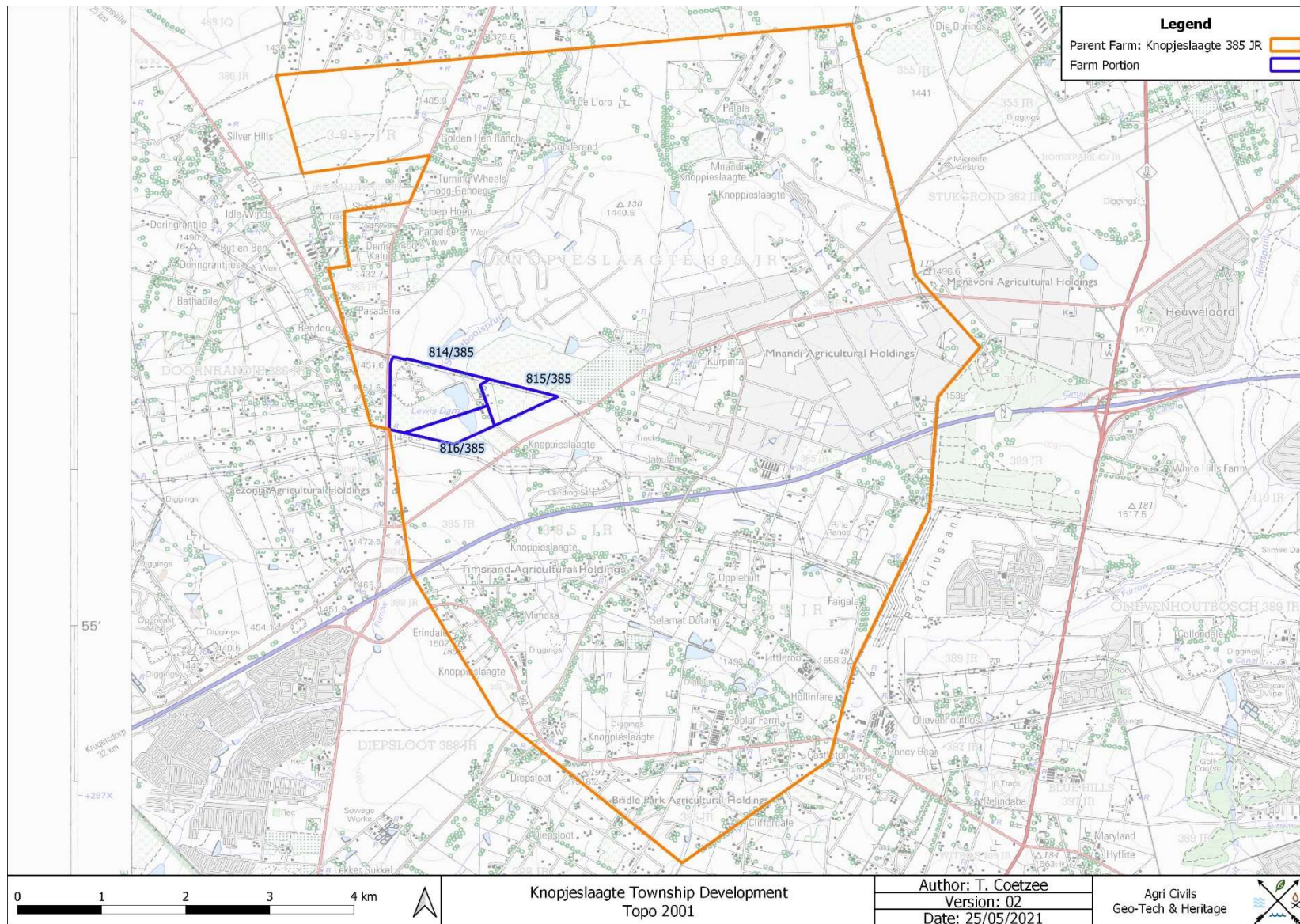
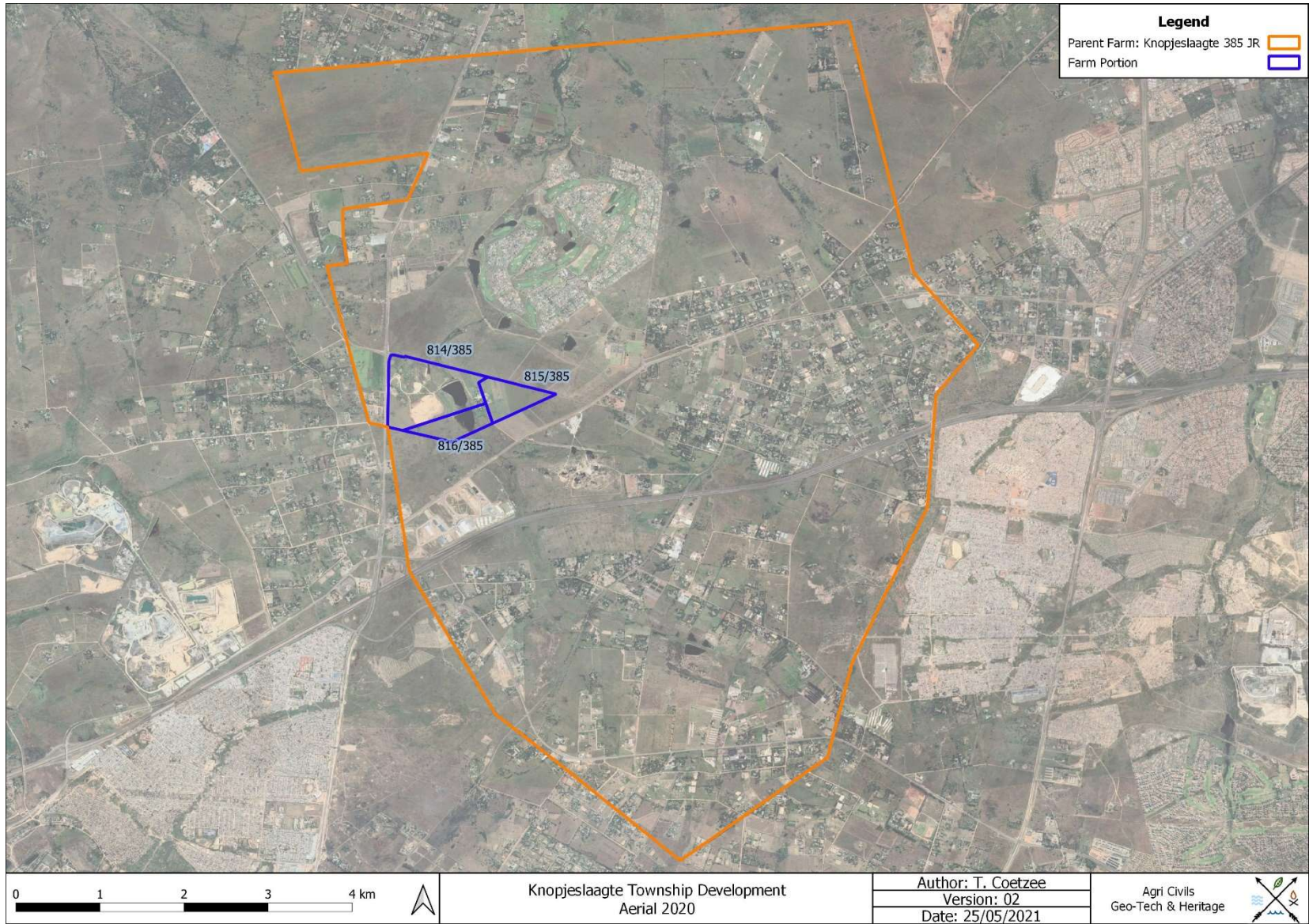


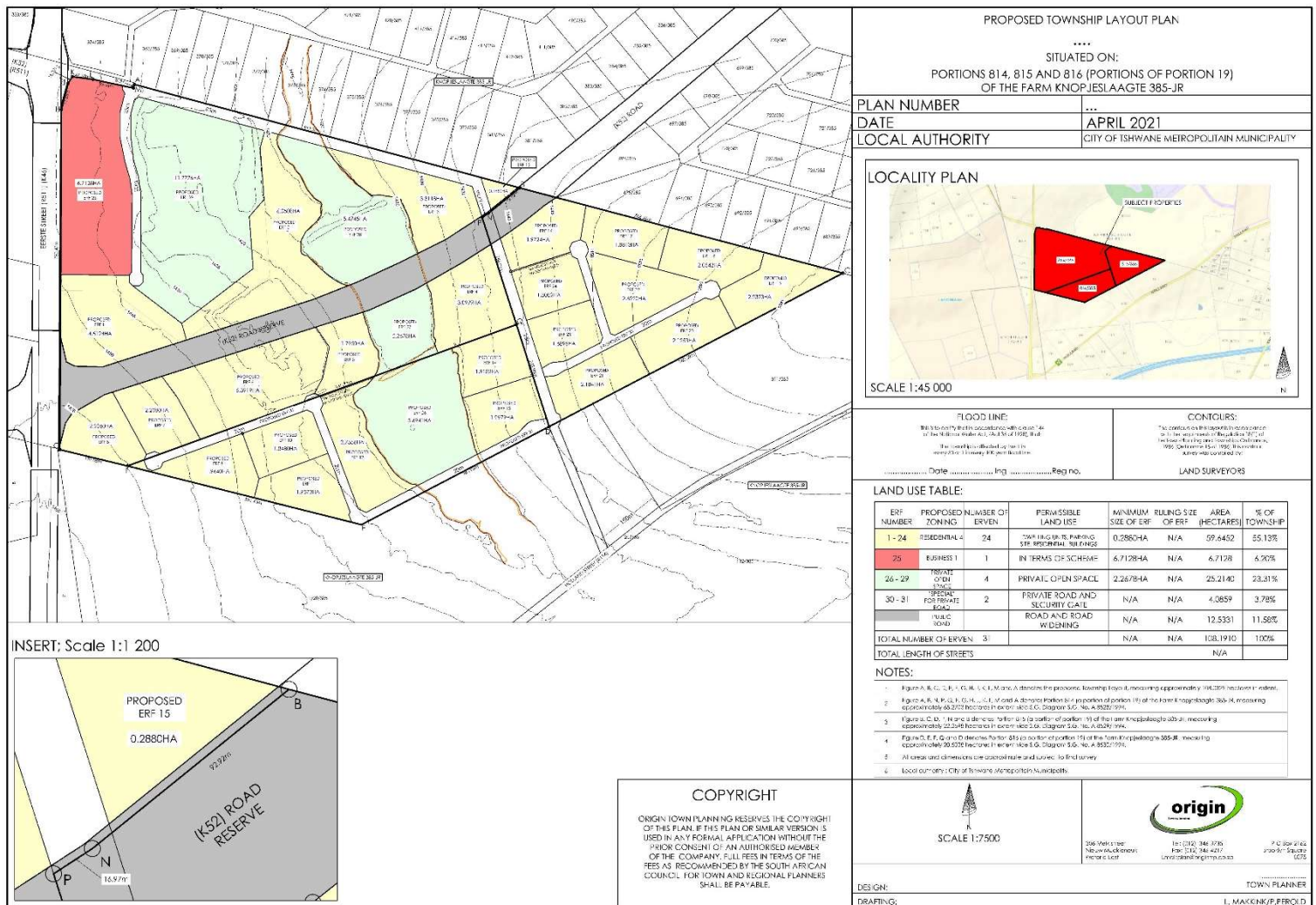
Figure 2: Segment of SA 1: 50 000 2528 CC indicating the study area.



**Figure 3:** Satellite imagery of the study area and surrounding areas.

## 2.2 Project Description

The developer plans the establishment of 31 erven on Portions 814, 815 and 816 of the Farm Knopjeslaagte 385 JR. Twenty-four erven will be zoned for Residential 4, one for business, four for private open space and two for private roads (**Figure 4**). The total proposed impact area is 108.19 ha.



**Figure 4: Proposed layout .**

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### 3. Methodology

Archaeological reconnaissance of the study area was conducted during April 2021 through an unsystematic pedestrian and vehicular survey of the proposed study area (**Figure 5**). General site conditions were recorded via photographic record (**Figures 6 – 10**). Also, the project area was inspected beforehand on Google Earth, historical aerial imagery and topographical maps in order to identify potential heritage remains (**Appendix A**). Six sites were identified during the study through a combination of inspecting historical topographical maps and aerial images, while two additional sites were recorded during the survey (**Table 2**). Areas that have been disturbed by past cultivation and mining activities were mapped to allow the identification of undisturbed areas. The survey focussed on these areas. The six sites identified on historical aerial photographs and topographical maps were visited and photographed as well, regardless of the site falling within a disturbed section. It should be noted that the prefix '2528CC' is not used when referring to the site names due to the length of the name, but is recorded as such in **Tables 2 & 7**. The historical topographical datasets dating to 1939, 1957, 1964, 1975 and 1995, as well as the historical aerial photographs dating to 1937, 1958, 1964, 1968 and 1976 proved useful in terms of providing an indication of the location and age of some of the structures and features associated with the study area. The total area inspected was roughly 109.1 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 (Global Positioning System) during the site visit, as well as by plotting the boundaries from aerial imagery and topographical maps.

**Table 2:** Site coordinates & description.

Abbreviated name	Site Name	Longitude	Latitude	Description	Current Status	Identification Source
B01	2528CC-B01	28.031436	-25.894712	Building	Demolished	Aerial (1937)
B02	2528CC-B02	28.028298	-25.894176	Mine/Quarry	Intact	Topo (1939)
B03	2528CC-B03	28.029805	-25.889765	Building	Demolished	Aerial (1958)
B04	2528CC-B04	28.037516	-25.892646	Building	Altered	Aerial (1937)
B05	2528CC-B05	28.029256	-25.888942	Building	Demolished	Aerial (1958)
B06	2528CC-B06	28.030348	-25.890802	Building	Demolished	Aerial (1968)
B07	2528CC-B07	28.029521	-25.893342	Cemetery	Intact	Field
B08	2528CC-B08	28.029480	-25.893569	Windpump	Intact	Field

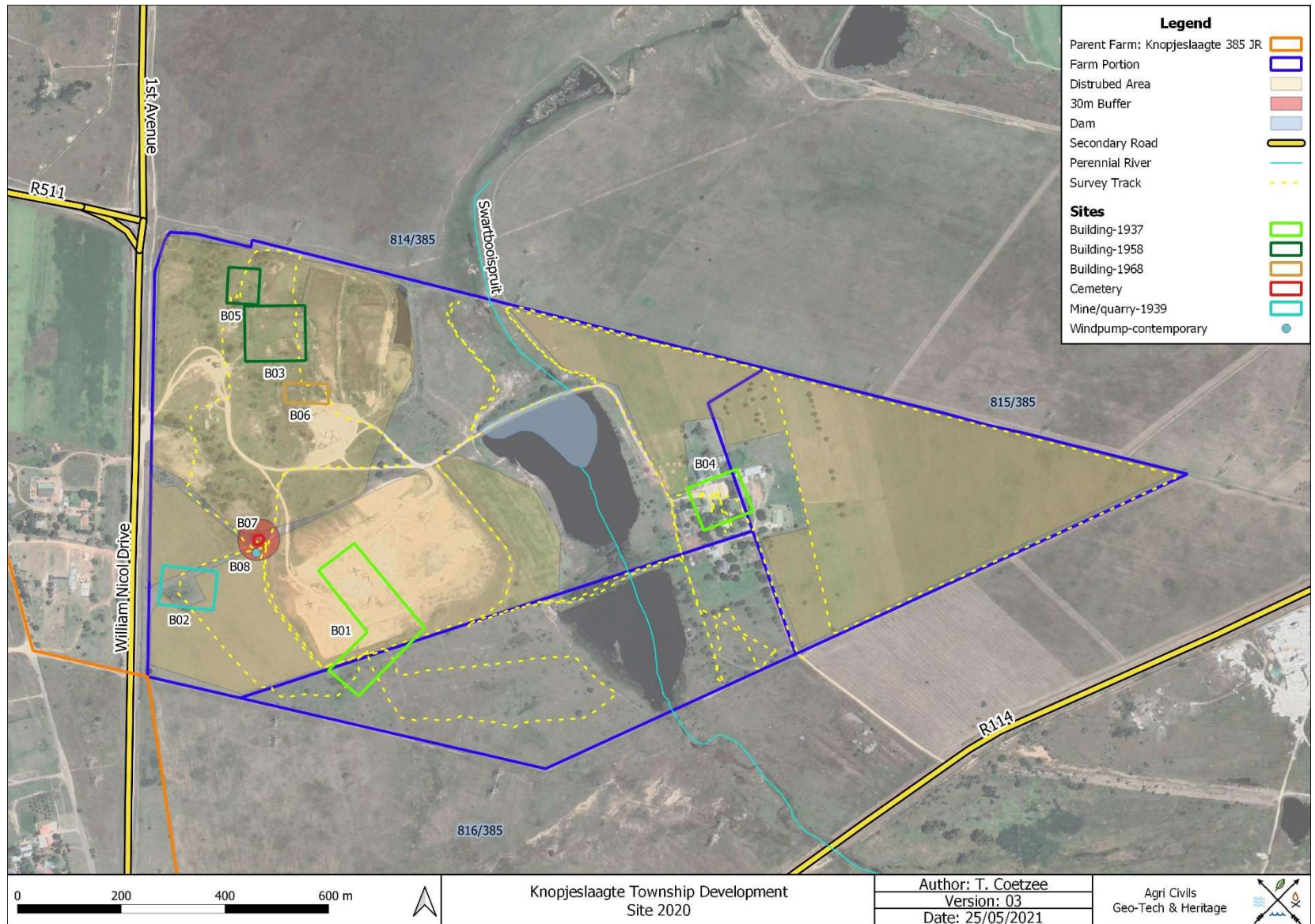


Figure 5: Study area with recorded sites on a 2020 aerial backdrop.



**Figure 6:** Slashed grass along the northern boundary.



**Figure 7:** Study area as seen from the eastern corner.



**Figure 8:** Open veldt towards the southern boundary.





**Figure 9:** Area to the east of the residence.



**Figure 10:** Current mining activity.

### **3.1 Sources of information**

At all times during the survey, standard archaeological procedures for the observation of heritage resources were followed. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was paid to disturbances; both man-made such as roads and clearings, and those made by natural agents such as burrowing animals and erosion. Locations associated with archaeological material remains were recorded by means of a Garmin Oregon 750 GPS and were photographed with a Samsung S7 mobile phone.

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

Personal communication with Mr Josef Lewis, the owner of the farm, proved useful in obtaining information regarding the location of graves and age of historical infrastructure (Josef Lewis, pers. Comm. 2021).

### **3.1.1 Previous Heritage Studies**

#### **Blue Valley Golf and Country Estate, Centurion**

An Archaeological investigation was done by UNISA's Archaeology Contracts Unit on the Blue Valley Golf and Country Estate located on Portions 251 and 252 of the Farm Olievenhoutbosch 389 JR. The study was done for the development of additional plots. The study area is located about 8.8 km to the southeast of the proposed study concerned in this report. During the Archaeology Contract Unit's investigation no sites of heritage importance were identified (Coetzee 2004).

#### **Laezonia, Centurion**

The National Cultural History Museum conducted a cultural resources survey for Eco Assessments cc in the Laezonia area towards the east of Centurion. The surveyed area appears to be located close to the proposed development on Portions 814, 815 and 816 of the Farm Knopjeslaagte 385 JR, however, the exact location could not be determined from the report. The survey did not locate any heritage remains within the demarcated study area (National Cultural History Museum 2002).

#### **Cycle path and sidewalk at Olievenhoutbosch 389 JR, Centurion**

A Cultural Heritage Impact Assessment was done for the development of cycle paths and sidewalks along several roads on Olievenhoutbosch 389 JR in Centurion. The study areas is located roughly 7 km southeast of the proposed Knopjeslaagte Township Development. During the survey, no sites of heritage importance were observed because the demarcated areas were already disturbed by development (Küsel 2013).

#### **Diepsloot East Power Line and Substation**

Van Schalkwyk (2013) conducted a Basic Cultural Heritage Assessment for the Diepsloot East Power Line and Substation in the Midrand region. The closest section of the power line is located approximately 2.5 km to the south of the proposed Knopjeslaagte Township Development. During the survey, no sites of heritage importance were observed. However, Van Schalkwyk (2013) noted that some heritage sites of importance are located in the general area. These include: MSA sites on the Farm Waterval, LSA rock shelter sites near the Jukskei River and LIA sites at Lone Hill and the Boulders Shopping Centre. Accordingly, the larger farms in this region were divided into holdings about 40 years ago, which means that the general built environment date to recent times and do not exceed 60 years. No sites of heritage importance were observed during the study (Van Schalkwyk 2013).

#### **Olievenhoutsbosch Primary School**

The Wits Heritage Contracts Unit conducted an Archaeological Impact Assessment for the Olievenhoutsbosch Primary School, Olievenhoutsbosch Ext. 19, Gauteng. Not sites of heritage significance were observed during the study. Olievenhoutsbosch Primary School is located about 5 km southeast of the proposed Knopjeslaagte Township Development (Van der Walt 2008).

### 3.2 Limitations

During the survey (April 2021), the southern area along the river was characterised by relatively dense vegetation cover, while the remaining areas consisted of relatively short grass cover (**Figures 11 & 12**). Visibility at this time was therefore considered good. No other access constraints were encountered.



**Figure 11:** Denser vegetation along the river.



**Figure 12:** Relatively short grass cover.

## 4. 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.

## 4.1 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 (Early Stone Age) 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 (MSA) 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 (LSA) 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).

## 4.2 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.

## 5. Archaeological and Historical Remains

### 5.1 Stone Age Remains

No Stone Age archaeological remains were located within the demarcated study area.

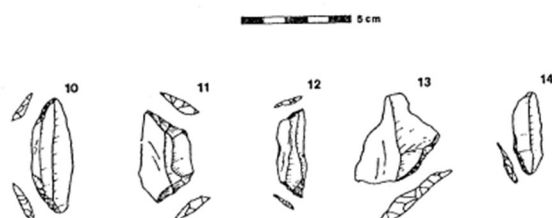
Although no Stone Age archaeological remains were located, such artefacts may occur in the area. These artefacts are often associated with rocky outcrops or water sources. **Figures 13 – 15** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

Archaeological studies done in the surrounding areas also did not locate material pertaining to the Stone Age, but did mention the presence of such sites in the greater area (see Van Schalkwyk 2013).

According to Bergh (1999: 5), several Stone Age archaeological sites are located along the Hennops River.



**Figure 13:** ESA artefacts from Sterkfontein (Volman 1984).



**Figure 14:** MSA artefacts from Howiesons Poort (Volman 1984).



**Figure 15:** LSA scrapers (Klein 1984).

## 5.2 Iron Age Farmer Remains

No Iron Age Farmer remains were located within the demarcated study area.

Archaeological studies done in the surrounding areas also did not locate Iron Age material remains, but Van Schalkwyk (2013) mentions an LIA site at the Lone Hill and the Boulders Shopping Centre.

### 5.3 Historical

Five historic sites were identified on historical aerial imagery and topographical maps. Three of the sites have completely been demolished and are not associated with surface material, while the other consist of a small mine/quarry and altered buildings (**Table 3 & Figures 16 – 28**).

Site B01 was identified on the 1937 aerial image (**Appendix A: Figure 42**) as several buildings intersecting Portions 814 and 816. The buildings are indicated as huts on the 1939 and 1957 topographical maps (**Appendix A: Figures 43 & 44**), but the 1958 aerial image indicates that these buildings were demolished and replaced by cultivated fields (**Appendix A: Figure 45**). Contemporary satellite imagery shows that the section of the site falling on Portion 814 is now associated with mining activity (**Figure 4**), while the section falling on Portion 816 is associated with open veldt. The survey confirmed the findings and no surface material remains were observed (**Figures 16 & 17**).

Site B02, a mine/quarry indicated on the 1939 topographical map (**Appendix A: Figure 43**), is located near the south-western corner of Portion 816. The site is shown on the 1957 topographical map (**Appendix A: Figure 44**) as well, but is omitted from all subsequent topographical maps. A disturbance is also noted on the 1937 aerial image (**Appendix A: Figure 42**). The mine/quarry is still visible on contemporary satellite imagery and a shallow pit with an approximate diameter of 50 m was observed during the survey (**Figure 18**). The site is overgrown and no material remains were observed.

Site B03, located towards the north-western corner of Portion 814, was identified as a building on the 1958 aerial image and is visible on the 1964 and 1968 aerial images, as well as on the 1964 topographical map (**Appendix A: Figures 45 - 48**). The 1975 topographical map (**Appendix A: Figure 49**) shows the presence of a building to the west of the buildings identified on the 1958 aerial image, while the buildings appear to be demolished on the 1976 aerial image (**Appendix A: Figure 50**). Contemporary satellite imagery (**Figure 4**) shows the area to be open veldt and the site inspection confirmed the presence of a cultivated field with no visible material remains (**Figure 19**).

The two buildings associated with Site B04 are located on Portion 814 and close to the borders with Portions 815 and 816. The first buildings are visible on the 1937 aerial image (**Appendix A: Figure 42**), but appear to have been demolished by 1958 (**Appendix A: Figure 45**) as a few buildings are visible to the west of the original building. The first buildings indicated on topographical maps, however, date to 1964 (**Appendix A: Figure 47**) as the previous topographical maps show the area to be cultivated fields. The 1975 topographical map (**Appendix A: Figure 49**) indicates that two of the previously identified buildings were demolished and that two new buildings were constructed nearby. Since 1975, several additional buildings have been built. Mr Josef Lewis, the owner of the farm, pointed out the two oldest buildings associated with Site B04 (**Figures 20 – 27**). According to Mr Lewis, the two buildings have significantly been altered and renovated over the years and are no longer representative

of the original building style. The exact construction date for the buildings, however, is not known. It should also be noted that the property has been in Mr Lewis's family for several generations.

Site B05 is located in the north-western corner of Portion 814 and was identified as a building on the 1958 aerial image (**Appendix A: Figure 45**). A building is also visible on the 1964, 1968 and 1976 aerial images (**Appendix A: Figures 46, 48 & 50**), while the first topographical map to indicate a building dates to 1975 (**Appendix A: Figure 49**). A building is indicated on the 1995 topographical map (**Appendix A: Figure 51**), as well as on the 2001 topographical map (**Appendix A: Figure 52**). However, the location of the building on the 1975 and 1995 topographical maps appears to differ, suggesting that the original building was demolished and that a new building was constructed slightly to the north. Therefore, it seems likely that the building was demolished between 1976 and 1995. Contemporary satellite imagery (**Figure 4**) shows the area to be open veldt and the survey confirmed the observation (**Figure 28**). No material remains were observed.

**Table 3:** Historic sites

Name	Type	Source	Year	Status	Age	Estimates extent (ha)	Parcel
B01	Building	Aerial imagery	1937	Demolished	Historic	2.41	814, 816
B02	Mine/Quarry	Topo	1939	Intact	Historic	0.72	814
B03	Building	Aerial imagery	1958	Demolished	Historic	1.12	814
B04	Building	Aerial imagery	1937	Altered	Historic	0.80	814
B05	Building	Aerial imagery	1958	Demolished	Historic	0.38	814



**Figure 16:** Southern section of demolished Site B01.





**Figure 17:** Demolished Site B01 towards the north.



**Figure 18:** Mine/Quarry Site B02.



**Figure 19:** Demolished Site B03.



**Figure 20:** Northern aspect of the western building at Site B04.



**Figure 21:** Eastern aspect of the western building at Site B04.



**Figure 22:** North-western aspect of the western building at Site B04.



**Figure 23:** Southern aspect of the western building at Site B04.



**Figure 24:** Northern aspect of the eastern building at Site B04.



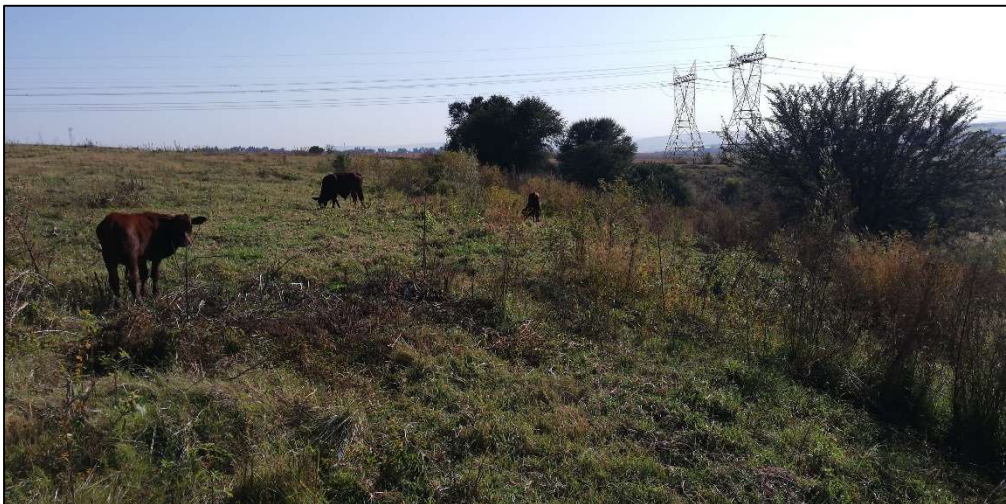
**Figure 25:** Eastern aspect of the eastern building at Site B04.



**Figure 26:** South-eastern aspect of the eastern building at Site B04.



**Figure 27:** South-western aspect of the eastern building at Site B04.



**Figure 28:** Demolished Site B05.

Heritage studies done in the surrounding areas did not record historical infrastructure.

## 5.4 Contemporary Remains

Contemporary buildings associated with the study area include residences, outbuildings and a windpump with associated structure (Table 4).

Site B06 was identified on the 1968 aerial image (Appendix A: Figure 48) as a building located on Portion 814/385. The 1975 topographical map, however, is the first topographical map to show a building in the vicinity of Site B06. Subsequent topographical maps indicate buildings in slightly different localities near Site B06. According to contemporary satellite imagery, Site B06 has been demolished as the area is now associated with agricultural and mining activities (Figure 4). The survey confirmed the findings and no surface material remains were observed (Figure 29).

Site B08, consisting of a windpump and associated cement structure, was recorded during the survey (Figures 30 & 31). These structures are not indicated on any of the historical topographical maps or historical aerial images. According to Mr Josef Lewis, the windpump and associated structure were constructed in recent years, but are no longer in a working order. The cement structure was constructed to serve as a platform for a water tank.

Figures 32 – 34 are some of the modern residences, outbuildings and stores associated with the study area.

Table 4: Contemporary Remains.

Name	Type	Source	Year	Status	Age	Estimates extent	Parcel
B06	Building	Aerial imagery	1968	Demolished	Contemporary	0.29 ha	814
B08	Windpump	Field	Unknown	Intact	Contemporary	9 m <sup>2</sup>	814



Figure 29: Demolished contemporary Site B06.



**Figure 30:** Windpump at Site B08.



**Figure 31:** Water tank platform at Site B08.



**Figure 32:** Modern residential building.



**Figure 33:** Modern building – garage.



**Figure 34:** Modern building near the residence.

Heritage studies done in the surrounding areas did not mention significant contemporary remains.

## 5.5 Graves

One cemetery was observed during the pedestrian survey and is listed in **Table 5**.

Cemetery B07 is located approximately 206 m from the western boundary and 270 m from the southern boundary of Portion 814/385 (**Figure 35 – 41**). The cemetery is fenced-off and consists of between 22 and 24 graves that are oriented in an east-west direction. Four of the graves are associated with formal grave dressings, while the rest consist of elongated stone cairns. The four formally decorated graves each have an aloe planted on the grave and are associated with grave goods in the form of flowers, empty glass jars and snuff boxes. One of graves is fenced-off with metal bars (**Figure 38**), two are lined with bricks (**Figures 39 & 40**) and another with upright stones (**Figure 41**). The only clearly visible decease date at the cemetery is '1988' and is found on the headstone of the grave fenced-off with metal bars.

The overgrown state of the cemetery hampered the identification of the informal graves and no identification or evidence of grave goods were observed at these graves (Figure 37).

According to Mr Josef Lewis, the cemetery is no longer in use, but is still visited by the family members (Josef Lewis, pers. Comm. 2021).

**Table 5:** Graves

Name	Type	Source	Status	Estimates extent (m <sup>2</sup> )	Parcel	Number of graves
B07	Cemetery	Field	Intact	260	814	22 – 24



**Figure 35:** Cemetery B07.



**Figure 36:** Formal grave dressings.





**Figure 37:** Overgrown informal graves.



**Figure 38:** Grave of Johannah M. Tsebe



**Figure 39:** Grave of Oupa Alfred.



**Figure 40:** Grave with unclear inscription.



**Figure 41:** Grave with broken headstone.

The heritage studies done in the area did not record the presence of graves and cemeteries.

## **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 6:** Prescribed 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 7:** Individual Site Ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2528CC-B01	Demolished Buildings	General Protection C	4 C	Low	No recording necessary
2528CC-B02	Mine/Quarry	General Protection B	4 B	Medium	Record site
2528CC-B03	Demolished Buildings	General Protection C	4 C	Low	No recording necessary
2528CC-B04	Altered Buildings	General Protection B	4 B	Medium	Record site
2528CC-B05	Demolished Buildings	General Protection C	4 C	Low	No recording necessary
2528CC-B06	Demolished Buildings	General Protection C	4 C	Low	No recording necessary
2528CC-B07	Cemetery	Local	Grade 3 A	High	Mitigation not advised

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2528CC-B08	Windpump	General Protection C	4 C	Low	No recording necessary

\*Note – These ratings are based on the specific surface infrastructure boundaries and are project specific – A change in these boundaries and/or activities will require the ratings to be revised.

## 7. Statement of Significance & Recommendations

### 7.1 Statement of significance

#### The study area: The Proposed Knopjeslaagte Township Development

Some areas of heritage significance were identified on the demarcated farm portions. These include several areas associated with demolished buildings, a disused mine/quarry, a cemetery and several buildings.

#### Sites B01, B03, B05 – Demolished buildings

The buildings associated with Sites B01, B02 and B05 have been demolished and are not associated with surface remains. Significant subsurface heritage material exceeding 60 years of age might be unearthed within the boundaries of the demarcated areas during the construction phase and would therefore be considered significant from a heritage perspective as such remains would be protected under the NHRA 25 of 1999.

#### Sites B06 & B08 – Contemporary sites

Site B06 consists of a demolished site where no surface remains were noted, while Site B08 consists of a windpump and cement structure used for housing a water tank. Both sites are of contemporary origin and do not exceed 60 years of age. These sites are not significant from a heritage perspective.

#### Site B02 – Quarry/Mine

Site B02 is a quarry/mine first observed on the 1939 topographical map. Although the site exceeds 60 years of age, the quarry/mine appears not be significant from a heritage perspective. Also, no material culture is associated with this site.

#### Site B04 – Altered Buildings

The two buildings associated with Site B04 might exceed 60 years of age and would therefore be protected under the NHRA 25 of 1999. However, these buildings have significantly been altered and renovated and do no longer represent the original building style. The cultural significance is therefore considered to be low.

### Site B07 – Cemetery

The cemetery associated with Site B07 is significant from a heritage perspective as 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. The site might be impacted by the proposed development if measures for the protection of the site are not taken.

## 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:

- Sites B01, B03, and B05 are considered to be potentially significant from a heritage perspective as the demarcated areas might be associated with buildings dating to the historic period. Although surface indications are no longer present, subsurface cultural material might exist and care should therefore be exercised during the construction phase. The ECO should therefore monitor the construction process and a qualified archaeologist must be contacted should culturally significant material be exposed.
- Site B02, a quarry/mine that fell into disuse between 1957 and 1964, is considered to be of low cultural significance and has sufficiently been recorded in this study. No further action is required.
- The structures associated with Site B08 (windpump and cement structure), as well as demolished Site B06 are of contemporary origin and are not considered to be significant from a heritage perspective. No further action is required.
- The two buildings at Site B04 were possibly constructed between 1958 and 1964, but have been altered and renovated to the extent where the original building style is no longer evident. Therefore, these structures are considered to be of low cultural significance and no further action is required.
- Site B07 consists of a cemetery of between 22 and 24 graves. It is recommended that a fenced-off conservation buffer of 30 m be established around the cemetery and that the ECO monitor the cemetery during the construction phase. A plaque indicating the presence of the cemetery should also be erected and access to the cemetery must not be refused. Alternatively, the 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 buried at the concerned location.

### **General Recommendations**

- The above recommendations are based on the specific project activities and extents as indicated in the figures of this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction phase, 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)).
- From a heritage point of view, development may proceed on the demarcated area, subject to the abovementioned conditions, recommendations and approval by the South African Heritage Resources Agency.

## **8. Conclusion**

The proposed Knopjeslaagte Township Development consists of surface infrastructure covering approximately 108 ha. The Archaeological Impact Assessment examined the area and identified sites of cultural significance that might be impacted by the proposed development. These sites aided in the archaeological contextualisation of the general study area.

The AIA found three sites of potential heritage significance and one cemetery. The potential subsurface remains of Sites B01, B03 and B05, as well as the cemetery might be impacted by the proposed development as a result of surface and subsurface impacts. Sites considered not to be of cultural significance include a demolished contemporary building, an abandoned mine/quarry, and altered buildings.

The demolished sites are not likely to be impacted due to the disturbed state of the surface, but care should be exercised during the construction phase of the project as subsurface culturally significant material might be unearthed. The cemetery might be impacted as well and should therefore be fenced-off and monitored.

Should the recommendations made in this study be adhered to and with the approval of the South African Heritage



Resources Agency, the proposed Knopjeslaagte Township Development may proceed.

## 9. 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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## Appendix A: Historical Aerial Photographs and Topographical Maps

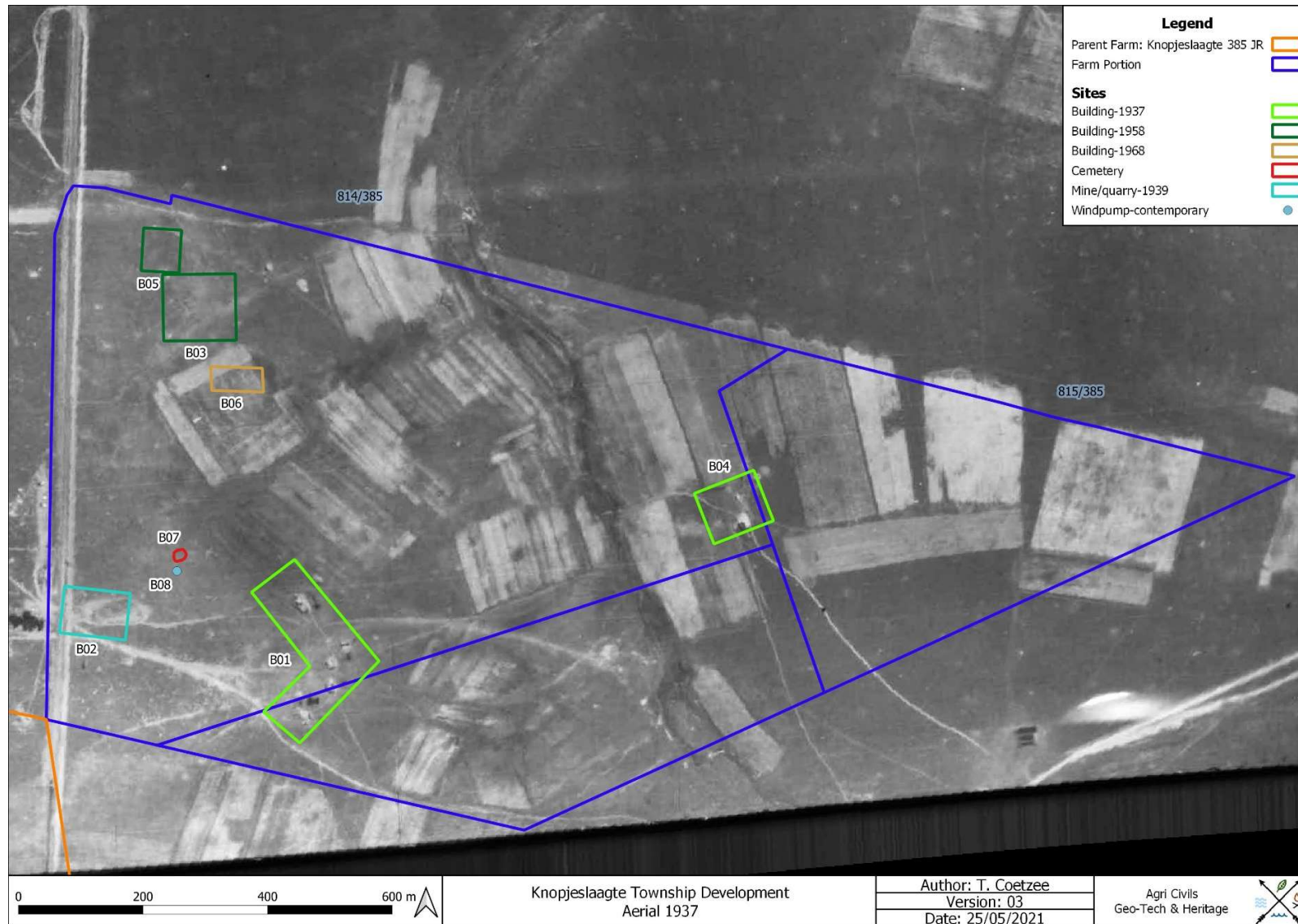


Figure 42: Study area superimposed on a 1937 aerial photograph.

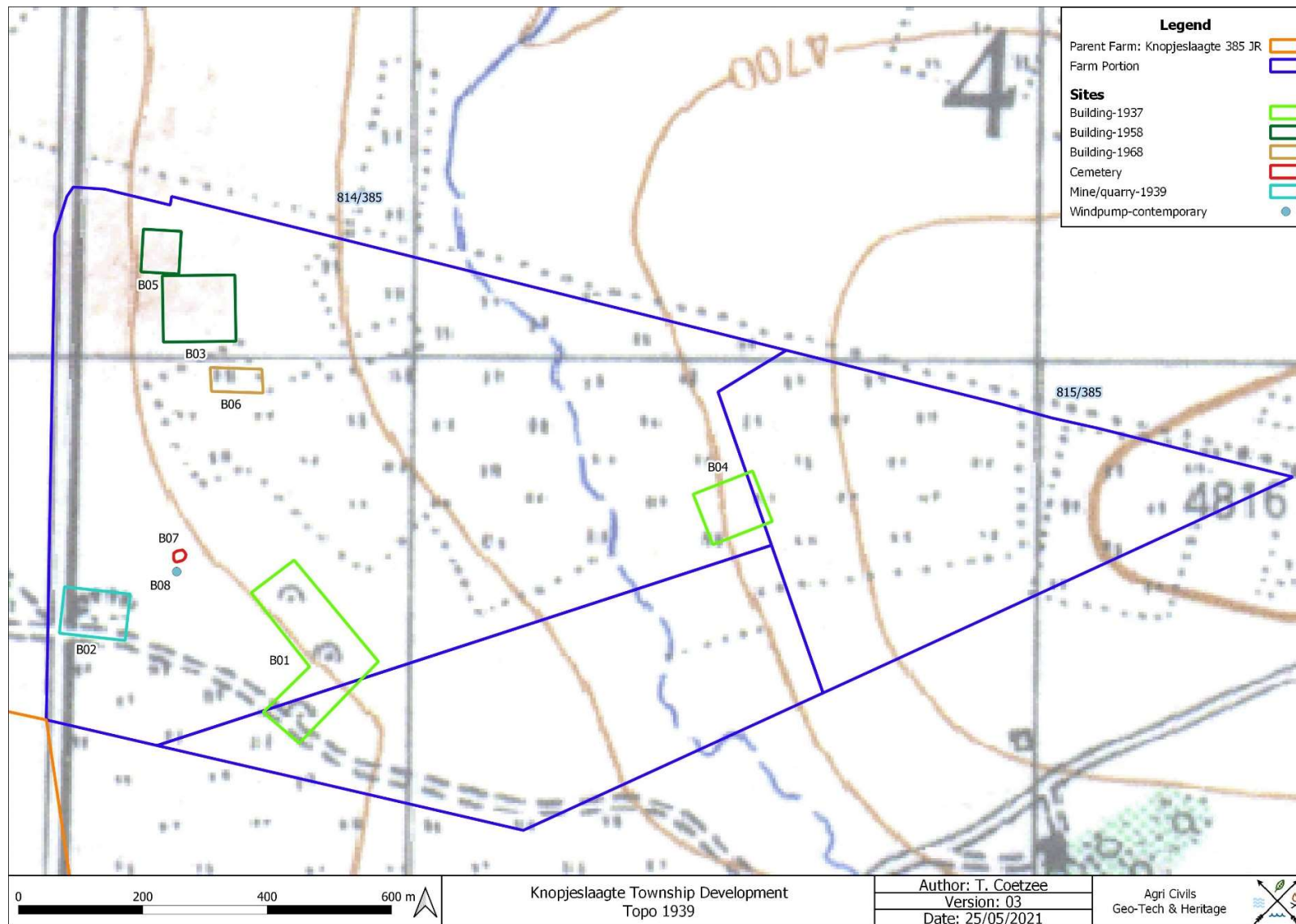


Figure 43: Study area superimposed on a 1939 topographical map.

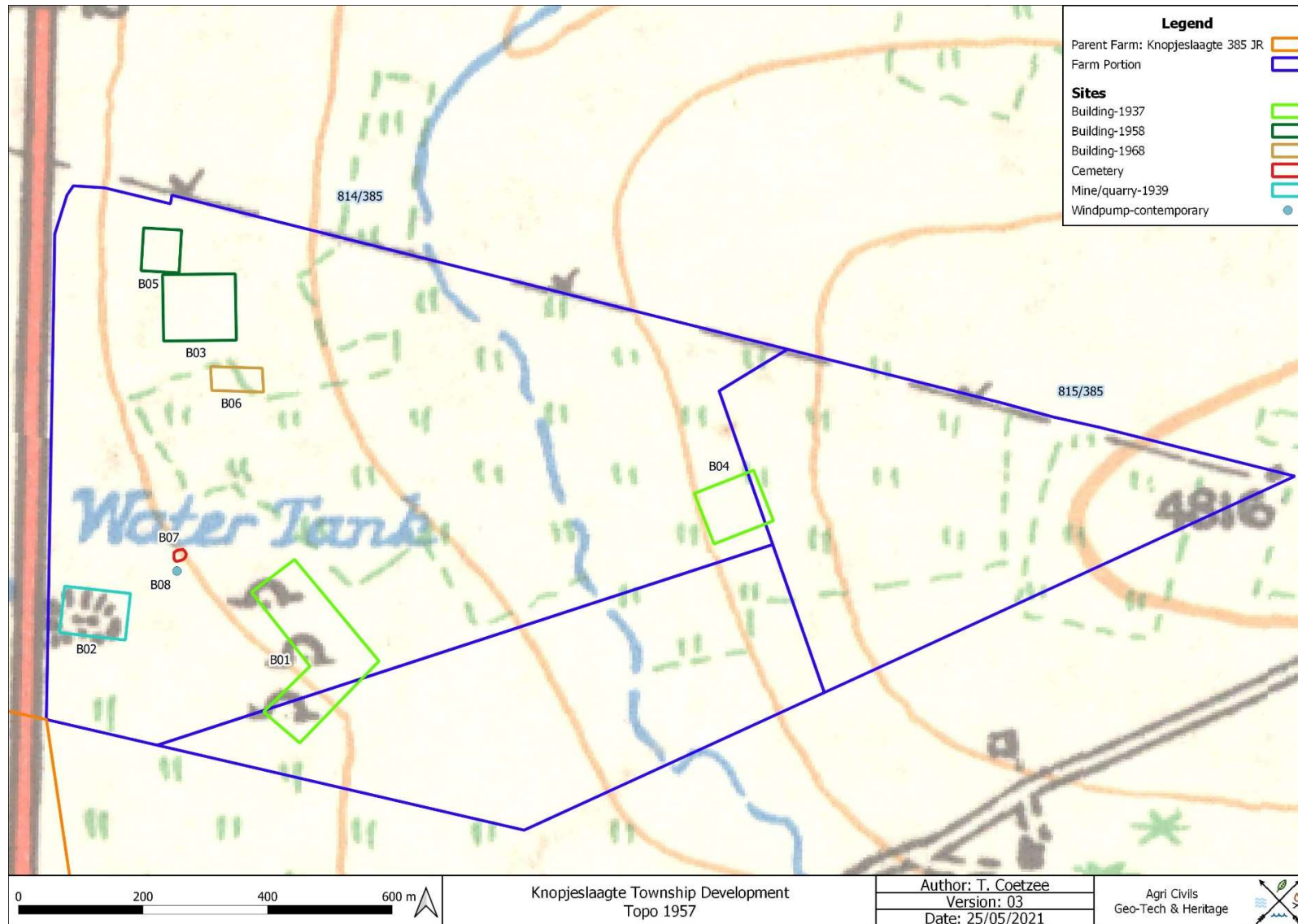


Figure 44: Study area superimposed on a 1957 topographical map.



Figure 45: Study area superimposed on a 1958 aerial photograph.





**Figure 46:** Study area superimposed on a 1964 aerial photograph.

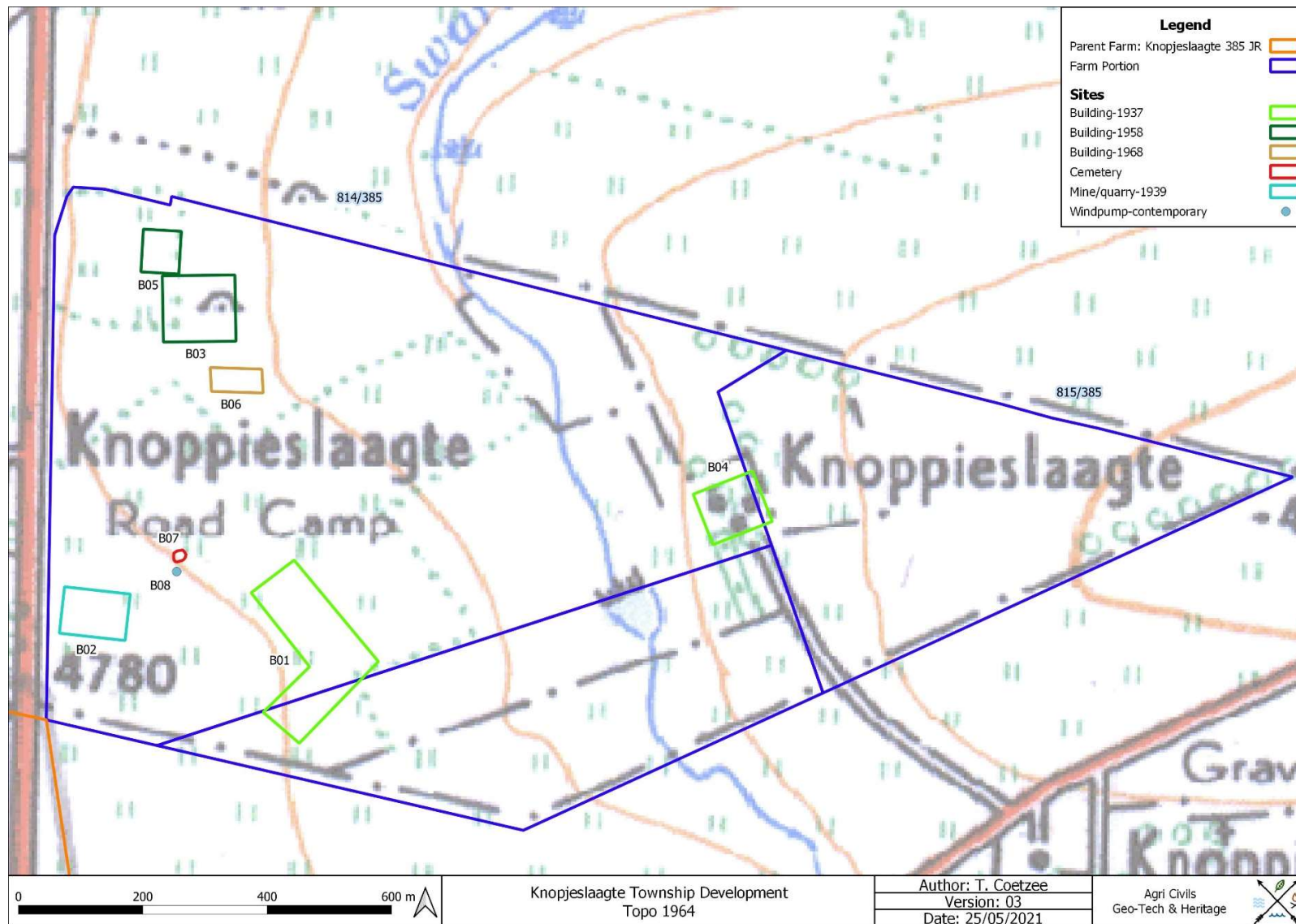


Figure 47: Study area superimposed on a 1964 topographical map.

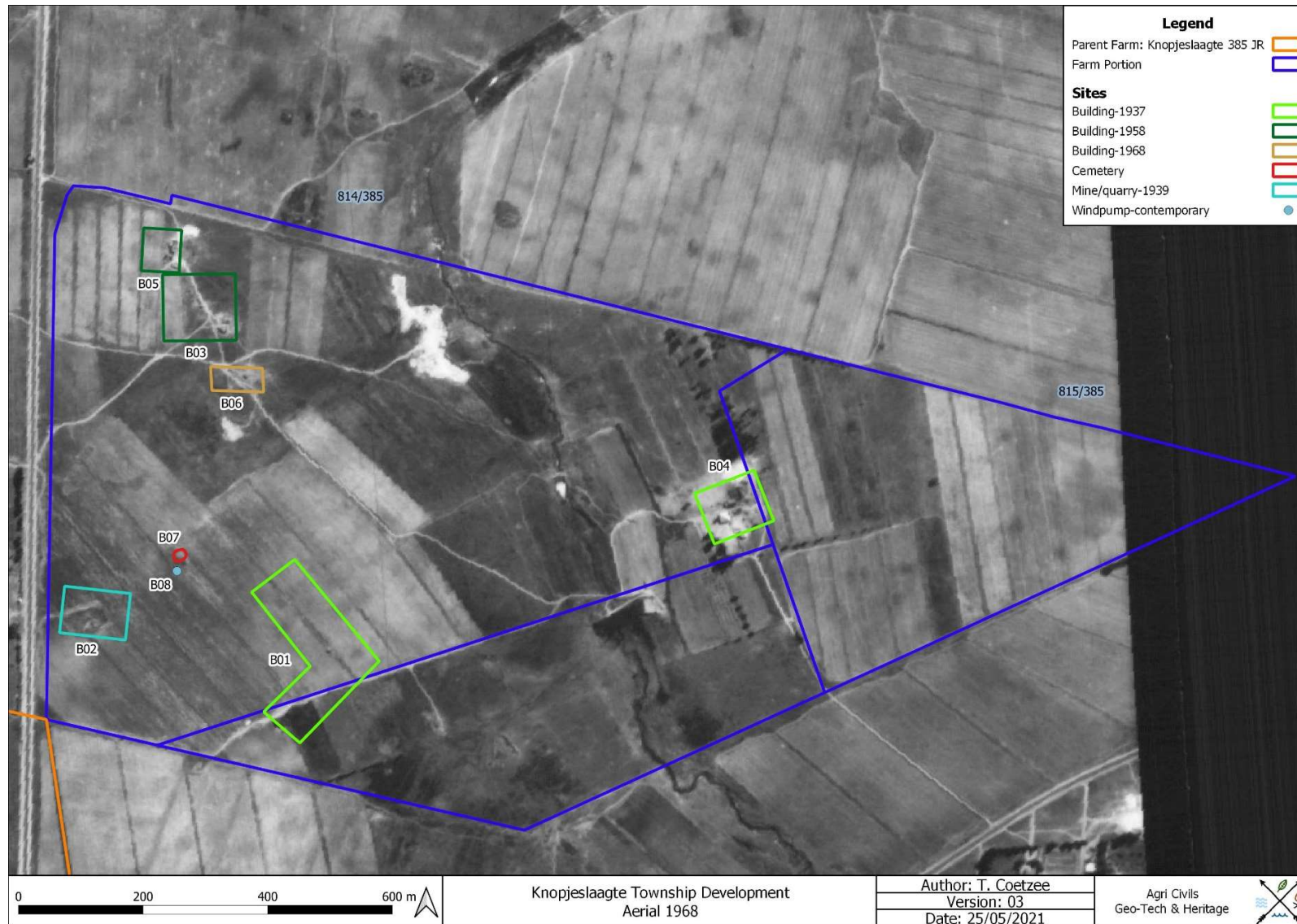


Figure 48: Study area superimposed on a 1968 aerial photograph.

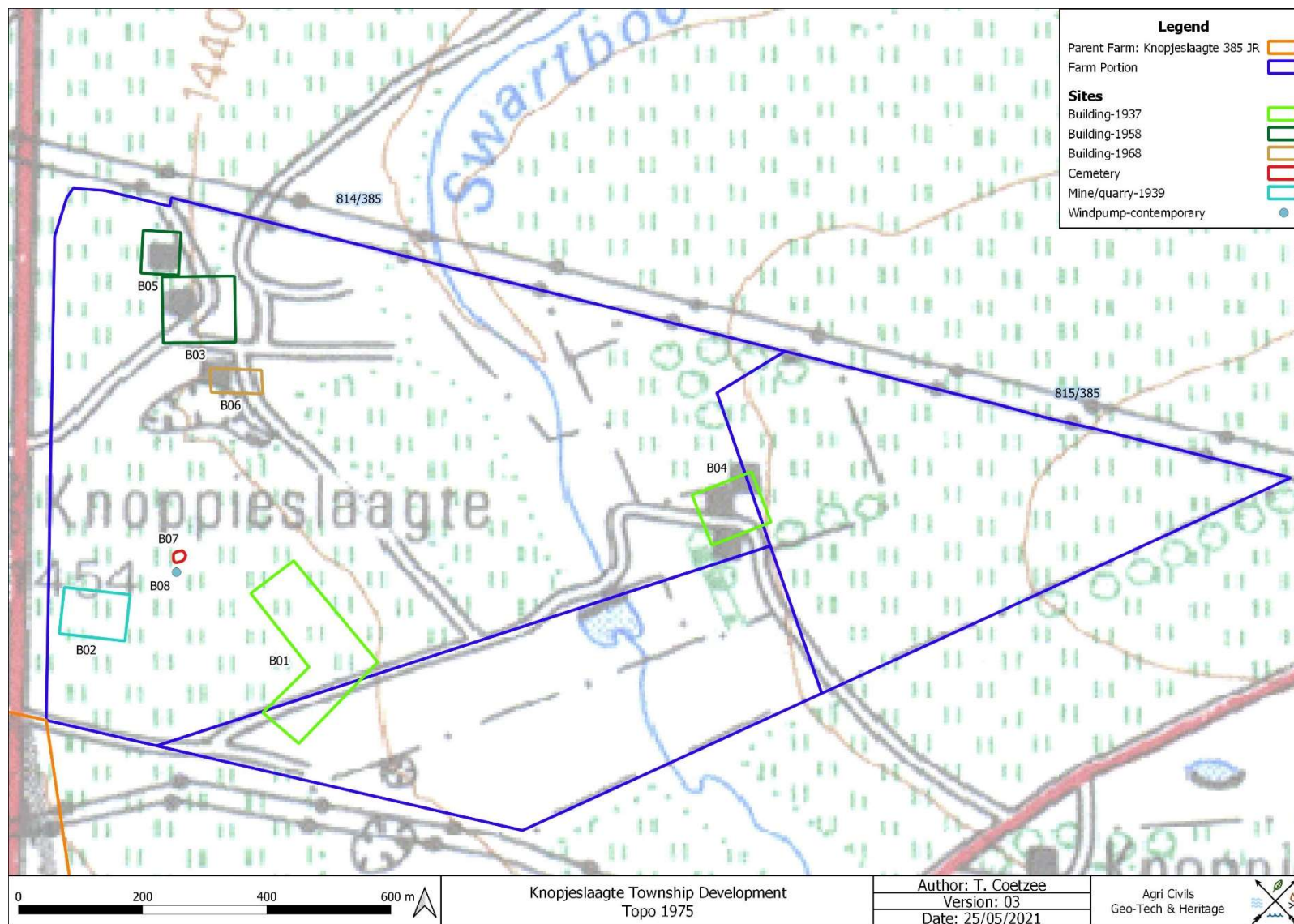


Figure 49: Study area superimposed on a 1975 topographical map.



Figure 50: Study area superimposed on a 1976 aerial photograph.

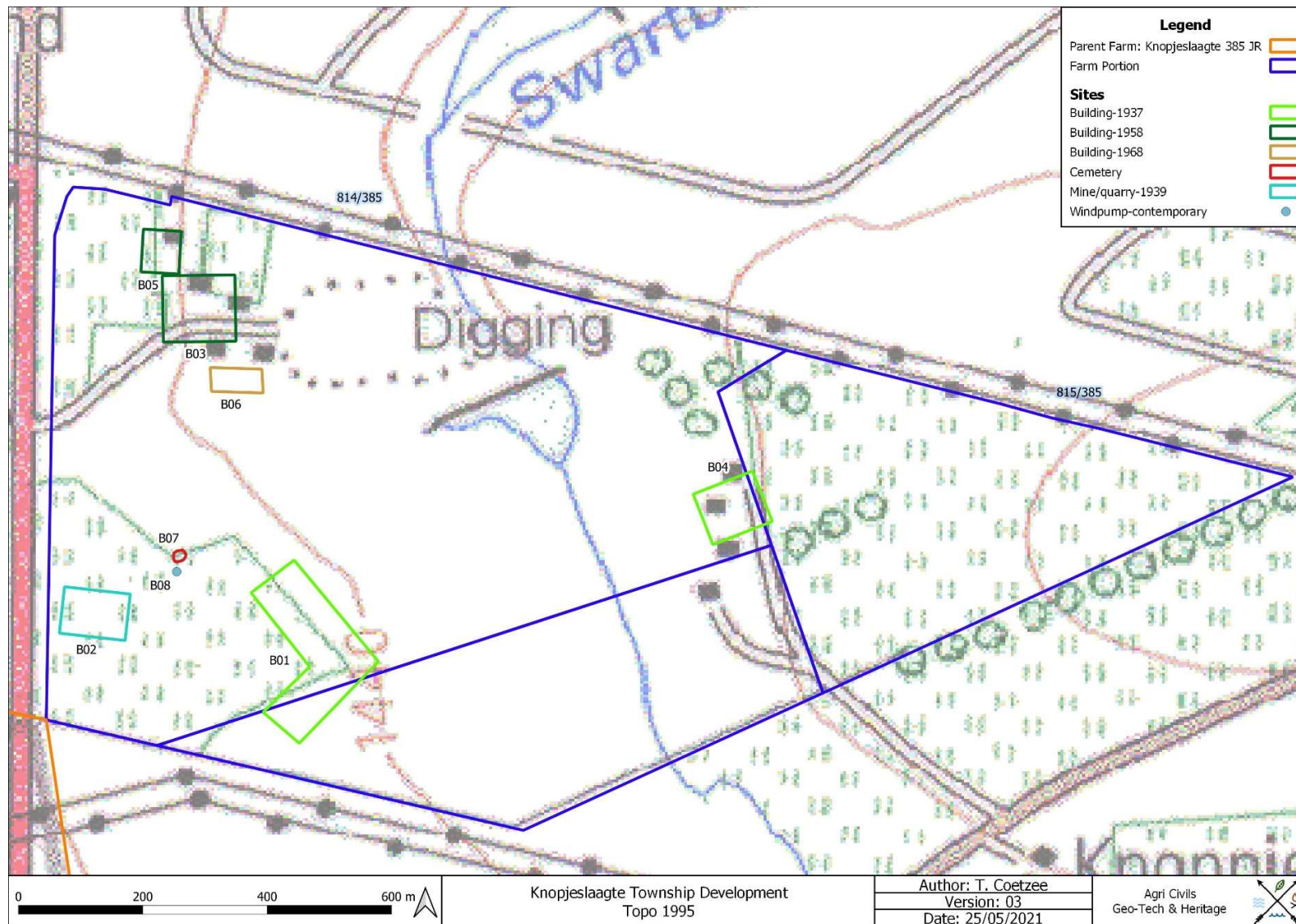


Figure 51: Study area superimposed on a 1995 topographical map.

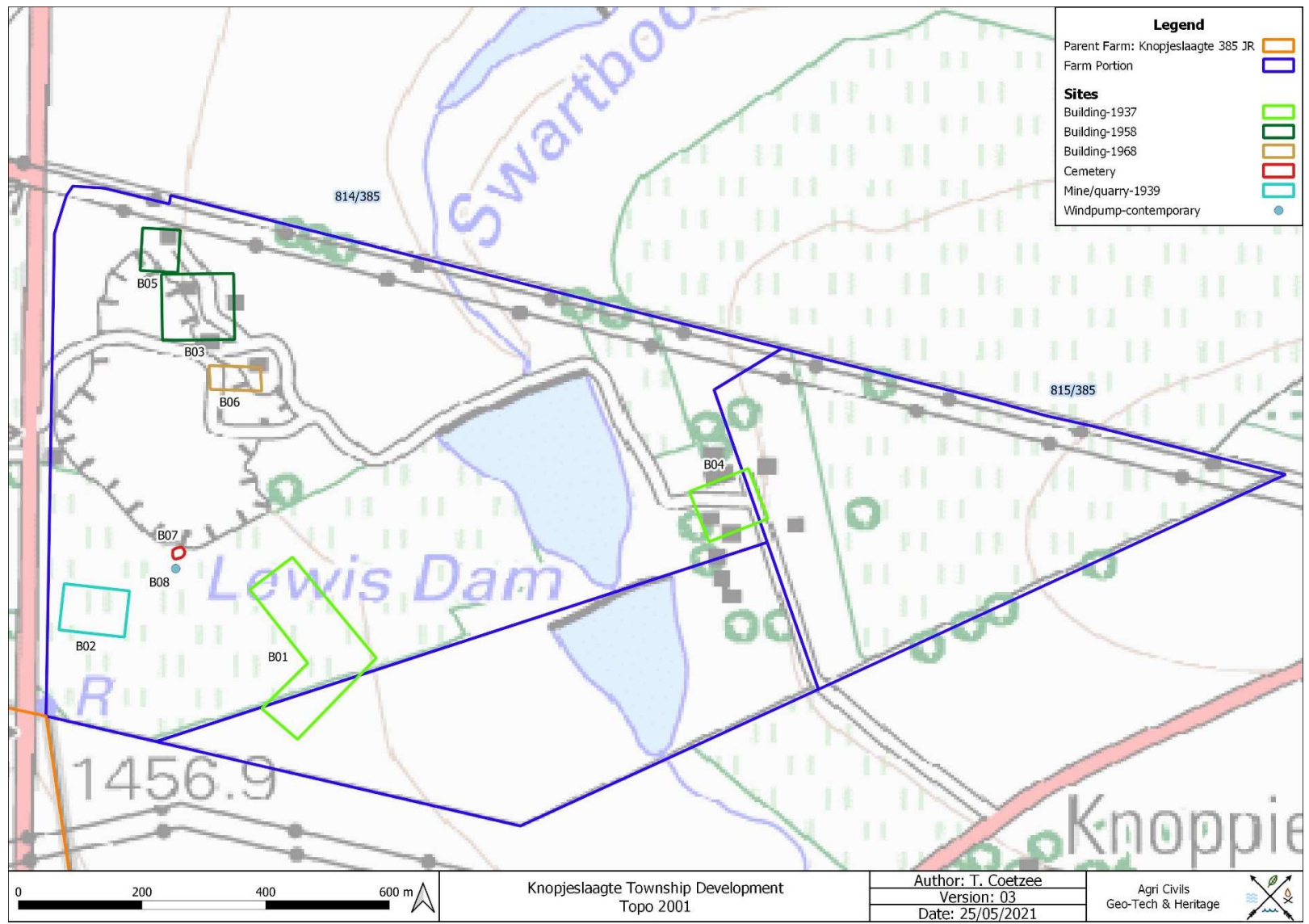


Figure 52: Study area superimposed on a 2001 topographical map.

# Appendix B: 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 – present	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

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- 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
- Coetzee, T. 2018. *Conservation Management Plan for a Graveyard on Portion 5 of the Farm Van Dykspruit 431 JR, Mpumalanga*. Pretoria
- Coetzee, T. 2018. *A Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd for the Construction of the Mareesburg Haul Road near Boschfontein, Mpumalanga*. Pretoria
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- Coetzee, T. & George, L. 2013. *A Phase 1 Archaeological Impact Assessment for the proposed mining on portions 3, 8, 19, and the remaining extent of the Farm Mamatwan 331, Northern Cape Province*. Pretoria
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- Coetzee, T. 2012. *Phase 1 AIA for the proposed Medium Density Fibre plant on portion 60 of the farm Lothair 124 IT, Mpumalanga*. Pretoria: ENVASS Pty. Ltd.
- Coetzee, T. 2012. *Phase 1 AIA for the proposed mining of sand and clay from the remaining portion of the Farm Papkuilfontein 469 JR, Mpumalanga*. Pretoria: ENVASS Pty. Ltd.
- Coetzee, T. 2012. *Archaeological Scoping Report for the Proposed Prospecting for Iron Ore and Manganese Ore for Amari Manganese (Pty) Ltd on the Farms Constantia 309, Simondium 308 and Portions 1,2, 3 and 8 of the Farm Goold 329 in the Vicinity of District Municipality: Kgalagadi Northern Cape Province, South Africa*. Pretoria: ENVASS Pty. Ltd.
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**References:**

- Dr M.H. Schoeman, Lecturer, Honours project and Masters supervisor  
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Email :neels@exigo3.com

# Appendix C: NEMA Risk Assessment Methodology

## 1.1 RISK ASSESSMENT

The first stage of impact assessment is the identification of environmental activities, aspects and impacts. The receptors and resources are also identified, which allows for an understanding of the impact pathway and assessment of the sensitivity to change.

The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The values for the likelihood and consequence (severity, spatial scope and duration) of the impact are then used to determine whether mitigation is necessary.

### 1.1.1 Methodology used in Determining the Significance of Environmental impacts

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below

<b>Extent of the impact</b>		
The EXTENT of an impact is the physical extent/area of impact or influence.		
<b>Score</b>	<b>Extent</b>	<b>Description</b>
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.
<b>Duration of the impact</b>		
The DURATION of an impact is the expected period of time the impact will have an effect.		
<b>Score</b>	<b>Duration</b>	<b>Description</b>
1	Short term	The impact is quickly reversible within a period of less than 2 y limited to the construction phase, or immediate upon the commencing of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development
<b>Intensity of the impact</b>		
The INTENSITY of an impact is the expected amplitude of the impact.		
<b>Score</b>	<b>Intensity</b>	<b>Description</b>
1	Minor	The activity will only have a minor impact on the affected environment in a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which be disturbed to the extent where it temporarily or permanently ceases
5	Very High	The activity will have a very high impact on the affected environment may be disturbed to the extent where it temporarily or permanently ceases

### Reversibility of the impact

The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure

Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and management measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation of significant mitigation and management measures. Significant time resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

### Probability of the impact

The PROBABILITY of an impact is the severity of the impact on the ecosystem structure

Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than of impact occurring).
2	Low	The possibility of the impact occurring is very low, due either to circumstances, design or experience (5% to 30% of impact occurring)
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent that provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plan and there can only be relied on migratory actions or contingency plans to contain the effect (90% to 100% of impact occurring).






### Calculation of Impacts – Significance Rating of Impact

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact. The significance of an impact is rated according to the scores as presented below:

*Equation 1:*

$$\text{Significance} = \text{Irreplaceability (Reversibility + Intensity + Duration + Extent)} \times \text{Probability}$$



Significance Rating		
Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	
Mitigation Efficiency		
<p><b>Degree to which the impact can be mitigated:</b> <i>The effect of mitigation measures on the impact and its degree of effectiveness:</i></p> <p><i>Equation 2:</i></p> $\text{Significance Rating} = \text{Significance} \times \text{Mitigation Efficiency}$		
High		0,2
Medium to High		0,4
Medium		0,6
Low to Medium		0,8
Low		1,0

**Confidence rating:** *Level of certainty of the impact occurring.*

- **Certain**
- **Sure**
- **Unsure**

**Cumulative impacts:** *The effect the combination of past, present and “reasonably foreseeable” future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact

## Appendix D: Monitoring – Heritage

Site type	Impact	Applicable Phase	Action	Frequency	Responsible person
Demolished heritage sites with no surface remains	Potential damage to subsurface culturally significant material	Construction	None, monitor subsurface material	Duration of construction	ECO
Graves / cemeteries	Potential damage to graves / cemeteries	Planning & Construction	Establish 30 m conservation buffer; monitor	Duration of construction	ECO
All surface impacts	Potential damage to subsurface culturally significant material	Construction	Monitor subsurface material	Duration of construction	ECO