



PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

for the Proposed Nndanganeni S102 application on a Portion
intersecting Portions 14 and 15 of the Farm Hartogs Hof 413
JS, Middelburg, Mpumalanga

For:

Eco Elementum (Pty) Ltd

Project Ref:

Nndanganeni Colliery S102

Date:


04/11/2022

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Project Ref: Nndanganeni Colliery S102
 Report No: EE-0411221
 Report Version: 1

I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Nndanganeni Colliery S102 Project 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.

Author	Qualification	Email	Date	Signature
Tobias Coetzee	MA (Archaeology – UP)	tcoetzee.heritage@gmail.com	04/11/2022	



Executive Summary

Agri Civils Geo-Tech & Heritage was appointed by Eco Elementum (Pty) Ltd to undertake a Phase 1 Archaeological Impact Assessment for the proposed Nndanganeni Colliery S102 Project on a portion intersecting Portions 14 and 15 of the Farm Hartogs Hof 413 JS near Middelburg in the Mpumalanga Province. The proposed mining development is located approximately 23 km southeast of Middelburg and falls within the Steve Tshwete Local Municipality. The aim of the study is to determine the scope of archaeological resources that could be impacted by the proposed mining development.

The area demarcated for the S102 mining expansion is associated with open veldt and sections of cultivated land. A possibility also exists that the majority of the study area used to be cultivated in the past, indicating a lower sensitivity and potential impact to cultural resources. Three potential buildings (Sites B01 – B03) falling within the demarcated area were noted on the 1964 aerial image, and two contemporary sites consisting of a borehole and what appears to be irrigation equipment (Sites F01 & F02) were noted during the site inspection. The building sites were completely demolished and apart from a foundation mound at Site B02, are not associated with surface remains. Although the buildings were demolished, the possibility exists that potentially sensitive subsurface cultural remains might be located at Sites B01 – B03. Should such remains be discovered, it is recommended that the associated activity be suspended and that a qualified archaeologist be contacted. Contemporary Sites F01 & F02 are not significant from a heritage perspective, have sufficiently been recorded and require no further action.

Subject to adherence to the recommendations and approval by SAHRA, the proposed Nndanganeni Colliery S102 Project 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.



List of Abbreviations

AIA – Archaeological Impact Assessment

CRM – Cultural Resource Management

DMR – Department of Mineral Resources

EIA – Environmental Impact Assessment

ESA – Early Stone Age

ha – Hectare

HIA – Heritage Impact Assessment

km – Kilometre

LIA – Late Iron Age

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



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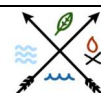


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1. Project Background

1.1 Introduction

Eco Elementum (Pty) Ltd appointed Agri Civils Geo-Tech & Heritage to undertake a Phase 1 Archaeological Impact Assessment (AIA) for the proposed Nndanganeni Colliery S102 Project on a portion intersecting Portions 14 and 15 of the Farm Hartogs Hof 413 JS near Middelburg in the Mpumalanga Province (**Table 1 & Figure 1**). The proposed coal mining development falls within the Steve Tshwete Local Municipality and is located approximately 23 km southeast of Middelburg. 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 mining development, as well as to archaeologically contextualise the general study area.

In the following report, the implications for the proposed Nndanganeni Colliery S102 Project on the demarcated portion regarding heritage resources are discussed: A Portion intersecting Portions 14 & 15 of the Farm Hartogs Hof 413 JS. The development will consist of the expansion of the existing void. 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 of the project.



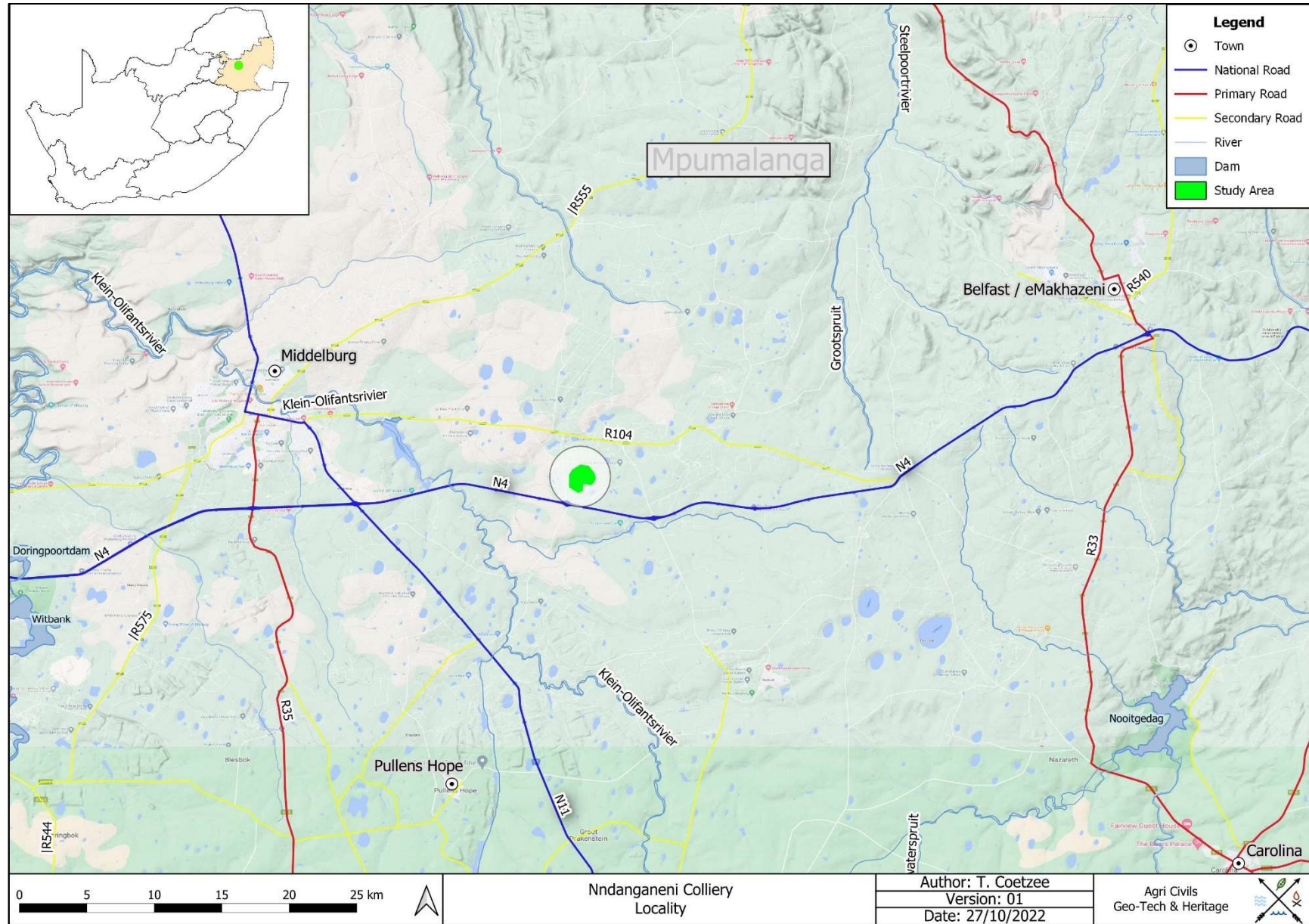


Figure 1: Regional and Provincial location of the study area.



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.

Archaeological Impact Assessments 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 Environmental Impact Assessment (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)



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 Nndanganeni Colliery S102 Project is situated to the southeast of Middelburg. The identified land parcels are listed below (Table 1):

Table 1: Farm Portions & Coordinates.

Farm Name	Farm Portion	Map Reference (1:50 000)	Lat	Lon	Land Parcel Extent (ha)	Intersecting Development Extent (ha)
Hartogs Hof 413 JS	14	2529 DC	-25.817200	29.676097	245.9	9.8
Hartogs Hof 413 JS	15	2529 DC	-25.809802	29.677668	825.2	35.7
Total						45.5

The study area is located 23 km southeast of Middelburg, while Pullens Hope is located 24 km to the southwest, and Belfast / eMakhazeni 40 km to the east-northeast (Figure 1). The study area falls within the Nkangala District Municipality and the Steve Tshwete Local Municipality in the Mpumalanga 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 eastern half of the study area falls within the Eastern Highveld Grassland vegetation unit, while the western half is classified as Rand Highveld Grassland.

Eastern Highveld Grassland's conservation status is considered to be endangered with a conservation target of 24%. Only a small portion is conserved in statutory and private reserves. This vegetation unit consists of the plains between Belfast / eMakhazeni in the east and the eastern side of Johannesburg in the west and also extends towards Bethal, Ermelo and to the west of Piet Retief / eMkhondo. This vegetation type is associated with slightly to moderately undulating plains and includes low hills and pan depressions. The general vegetation is short dense grassland with small, scattered rocky outcrops and some woody species. About 44% of this vegetation unit has been transformed by cultivation, plantations, mines, urbanisation and the building of dams. Although no serious alien invasions are reported, *Acacia mearnsii* may become dominant in disturbed areas. Erosion associated with this vegetation unit is considered to be low (Mucina & Rutherford 2006).



Rand Highveld Grassland has a conservation status of endangered. The conservation target for this area is 24% and only a small portion is conserved in statutory and private conservation areas. Rand Highveld Grassland consists of the areas between rocky ridges from Pretoria to eMalahleni, extending onto ridges in the Stofberg and Roosenekal regions. Other localities include the area west of Krugersdorp, as well as the Potchefstroom and Derby surroundings. Almost 50% of this vegetation unit has been transformed by cultivation, plantations, urbanisation and the building of dams. Scattered alien invasive species are found in about 7% of the vegetation unit. Erosion in this area is moderate to high in only about 7% of the vegetation unit (Mucina & Rutherford 2006).

The average elevation for Eastern Highveld Grassland varies between 1520 and 1780 Metres Above Sea Level (MASL), while the average elevation for Rand Highveld Grassland ranges from 1300 to 1635 MASL. The average elevation of the project area is 1630 MASL and is associated with a relatively even gradient.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 714 mm. The average annual temperature is 16.5 °C, while the average summer temperature is 20.1 °C and the average winter temperature 10.4 °C (Climate-data.org accessed 27/10/2022).

The study area falls within the B12C Quaternary Catchment of the Olifants Water Management Area (WMA). The closest perennial river to the study area is an offshoot of the Klein Olifants River that flows approximately 2.2 km to the north. Another perennial offshoot also flows roughly 4 km to the south. It should be noted that several non-perennial rivers are found to the east and west of the study area, and that the study area is shaped around a perennial pan. Middelburg Dam is located approximately 10 km to the west.

When the surrounding environment is considered, the region is associated with mining development and crop cultivation. Access to the study area is via a local mine/farm road turning from a tertiary road to the west of the study area (**Figures 2 & 3**). In terms of the proposed S102 project area, the southern and south-eastern points are cultivated, while the remaining area consists of open veldt, likely to be used as pasture. The area directly to the south of the study area forms part of the Nndanganeni Colliery and is currently being mined.



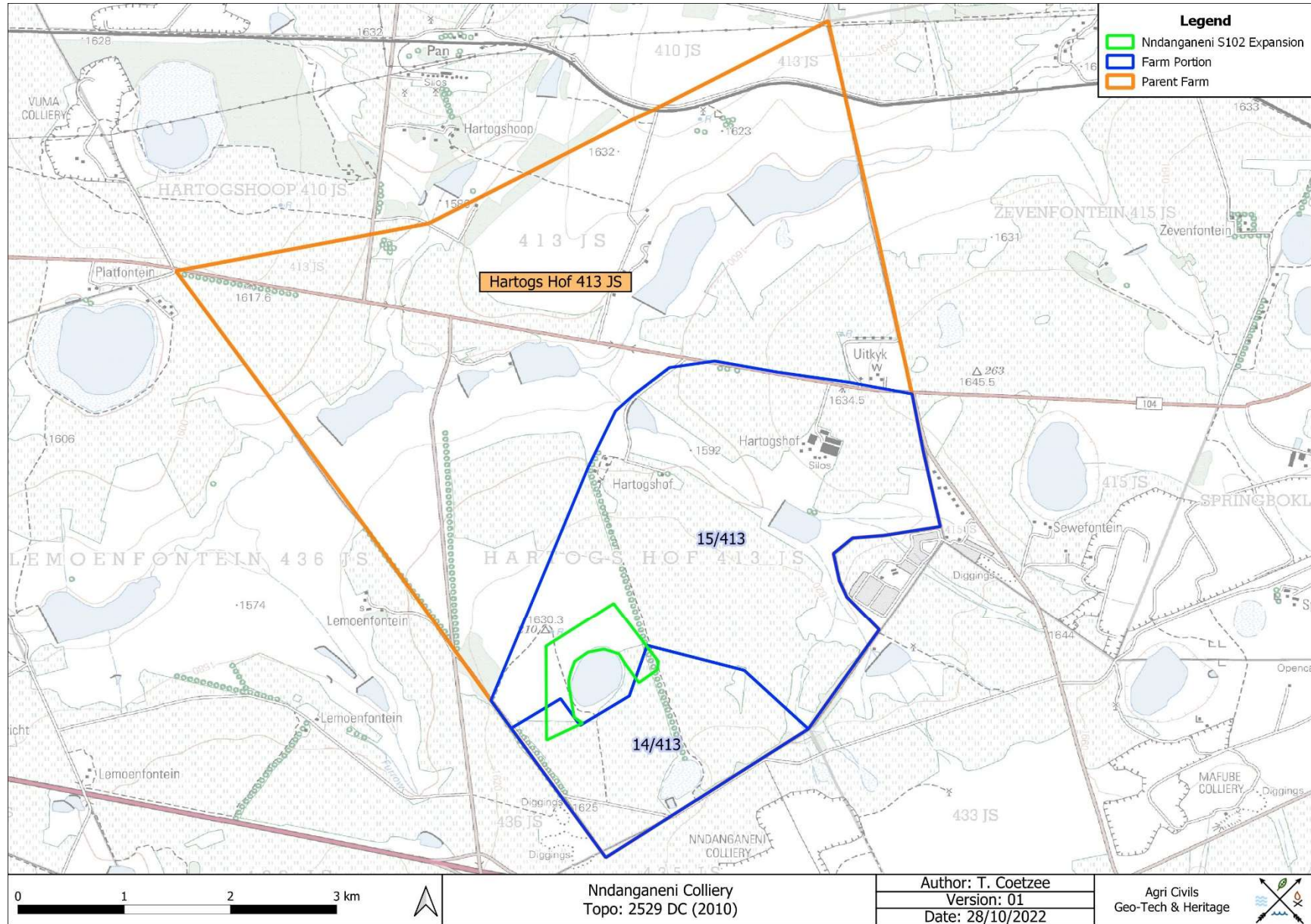


Figure 2: Segment of SA 1: 50 000 2529 DC indicating the study area.



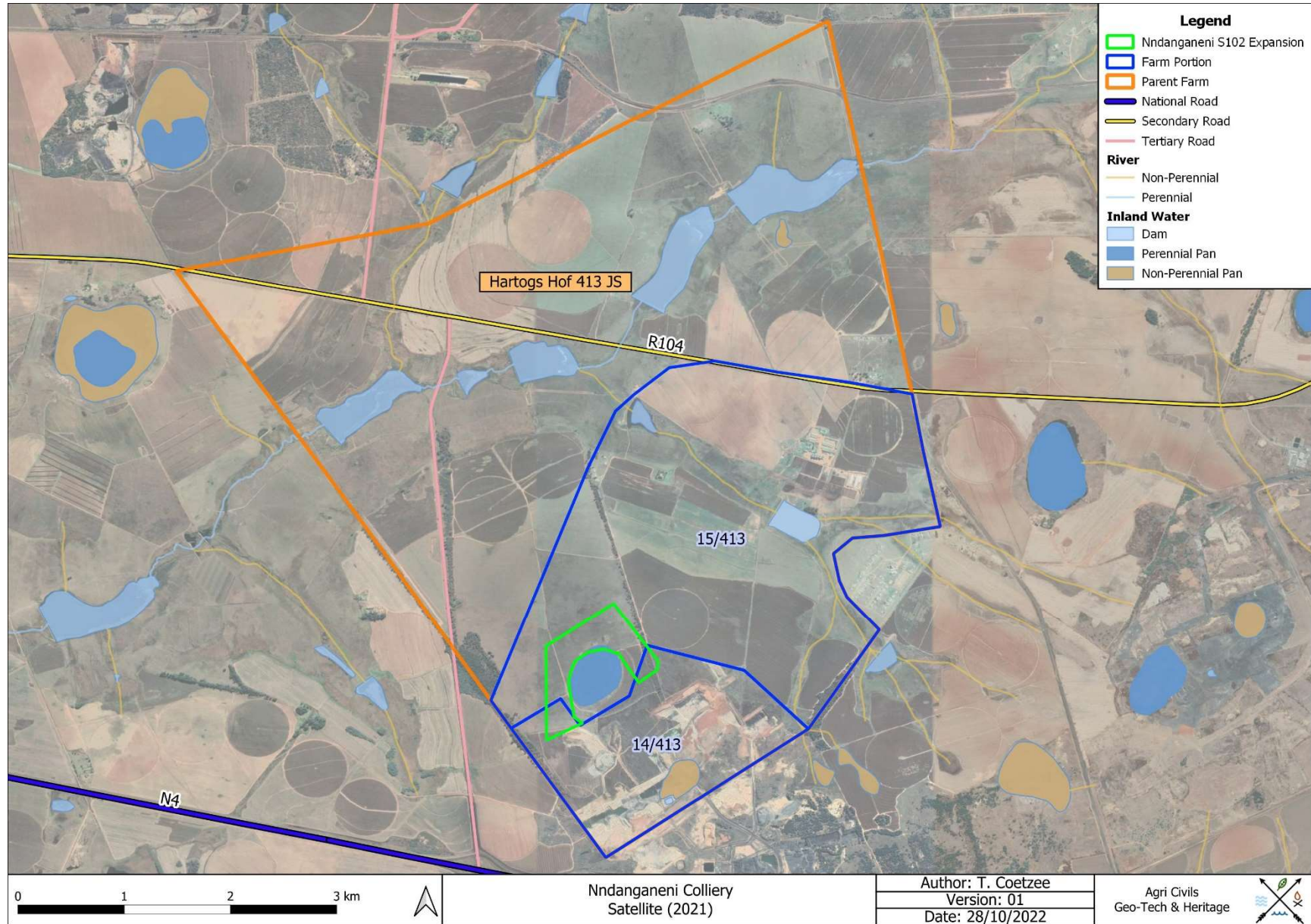


Figure 3: Study area portrayed on a 2021 satellite image.



2.2 Project Description

The Nndanganeni Colliery plans to expand its existing void around a pan on its existing Mining Right 299MR. Therefore, a Section 102 Mining Work Programme and Basic Assessment Environmental Management Programme amendment application to the existing Mining Right 299MR will have to be applied for (**Figure 4**). The proposed mining development consists of approximately 45.5 ha.



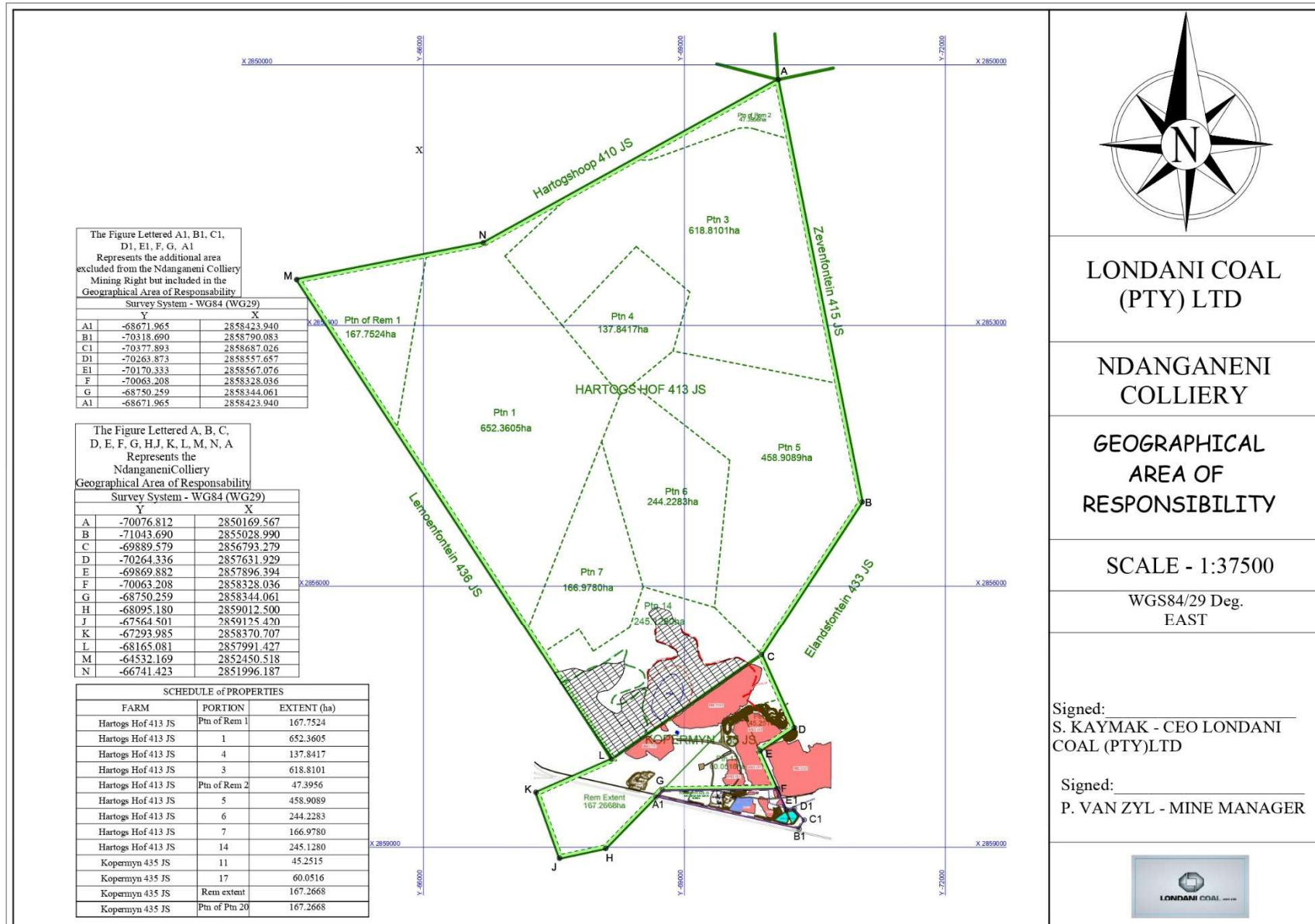


Figure 4: Ndanganeni Colliery mining operations (supplied by Eco Elementum 2022).



3. Methodology

Archaeological reconnaissance of the study area was conducted during October 2022 through a systematic pedestrian survey of the proposed 45.5 ha S102 area (**Figure 5**). The transects were spaced between 50 m and 60 m apart and general site conditions were recorded via photographic record (**Figures 7 – 14**). Also, the study area was inspected on Google Earth, historical topographical maps, and historical aerial imagery in order to identify potential heritage remains (**Appendix A**). The historical topographical maps dating to 1967, 1984, 1997 and 2010, as well as the historical aerial images dating to 1943, 1955, 1964, 1975, and 1997 proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. Three (3) potential sites were identified on historical aerial imagery and topographical maps and were inspected during the pedestrian survey (**Table 2 & Figure 5**). An additional two (2) contemporary sites were also identified during the site visit. The site status of all recorded sites is shown in **Figure 6**. Since heritage resources are often associated with perennial and non-perennial rivers/pans, these water sources located within close proximity of the study area were buffered by a distance of 500 m, indicating a potentially sensitive area. Since the study area is located around a perennial pan, the entire study area falls within this zone. The two small areas in the southern and south-eastern corners are associated with cultivated land and were not traced and plotted, but are clearly visible on satellite and aerial imagery. These areas are disturbed and are less sensitive from a heritage perspective (**Figure 5**).

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 & descriptions.

Name	Off. Name	Latitude	Longitude	Description	Age	Current Status	Estimated Extent	ID Source	Farm Portion	Intersecting Development
B01	2529DC-B01	-25.814490	29.675284	Building	Historical	Demolished – No surface remains	0.7 ha	Aerial 1964	15/413	Yes
B02	2529DC-B02	-25.816739	29.677303	Building	Historical	Demolished - Foundation mound	0.5 ha	Aerial 1964	14/413; 15/413	Yes
B03	2529DC-B03	-25.812444	29.682410	Building	Historical	Demolished – No surface remains	0.5 ha	Aerial 1964	14/413; 15/413	Yes
F01	2529DC-F01	-25.812363	29.675090	Borehole	Contemporary	Intact	1 m ²	Field	15/413	Yes
F02	2529DC-F02	-25.813562	29.676256	Irrigation	Contemporary	Intact	1 m ²	Field	15/413	Yes



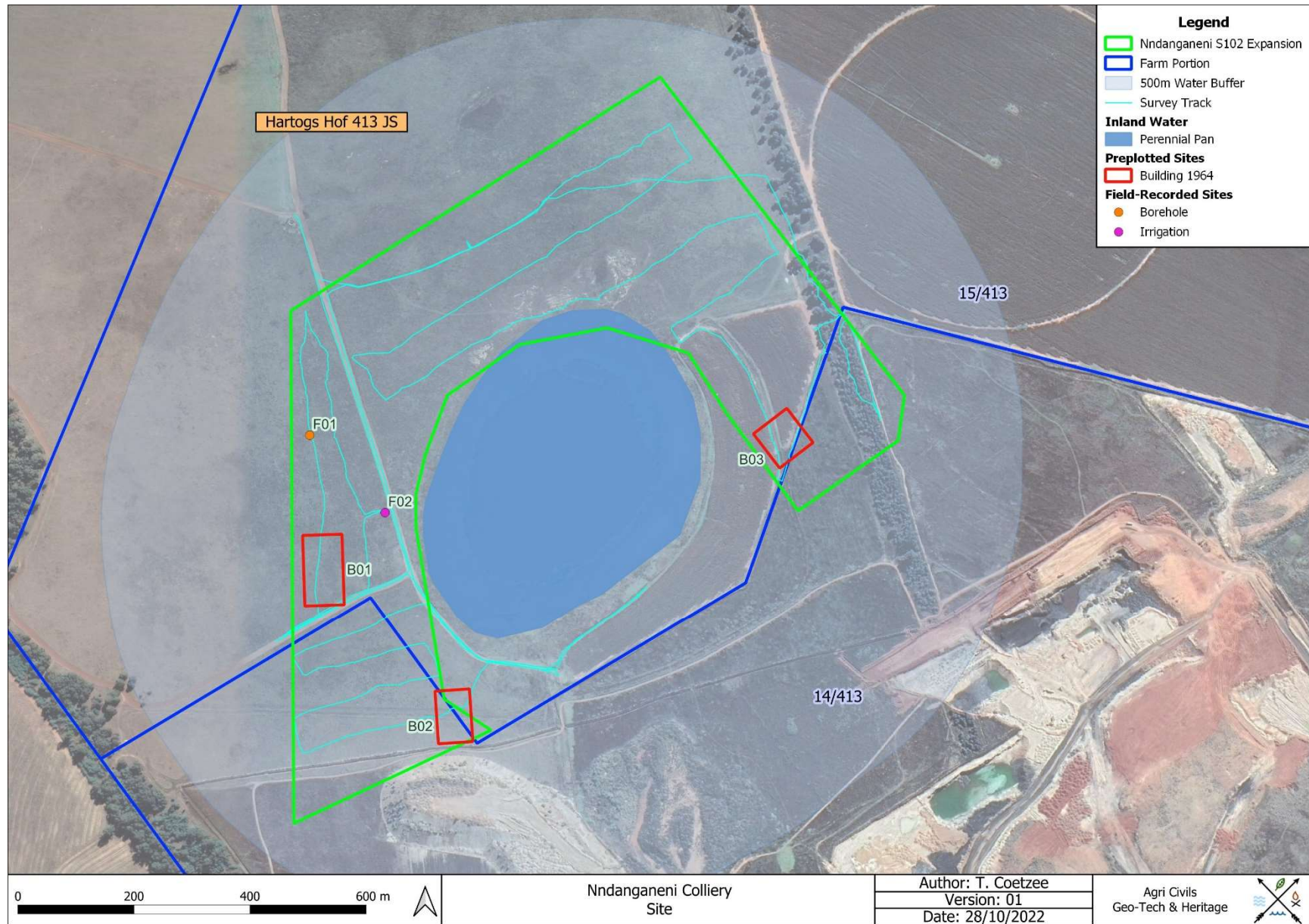


Figure 5: Study area with survey track portrayed on a 2021 satellite image.



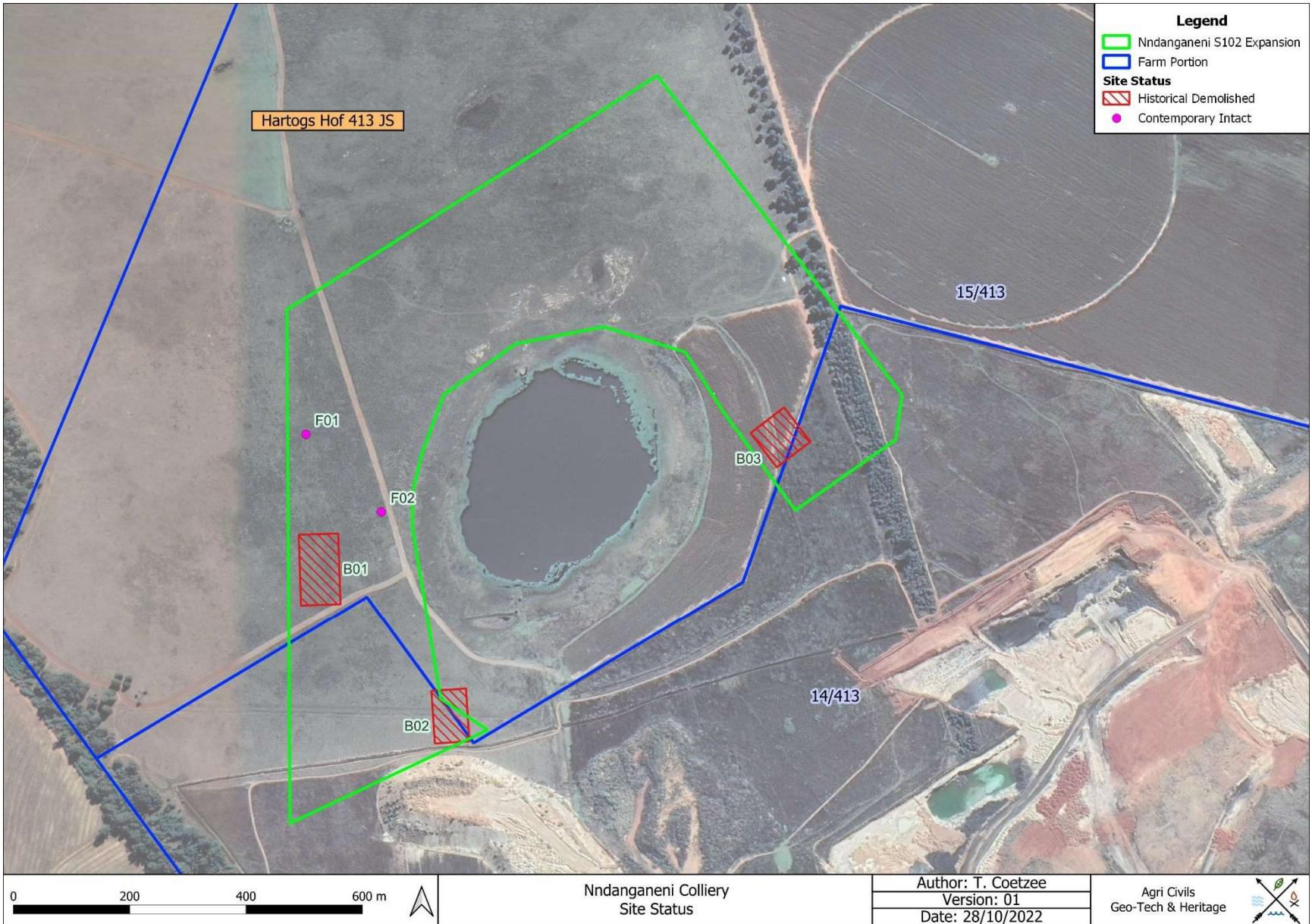


Figure 6: Site status portrayed on a 2021 satellite image.





Figure 7: Study area seen from the north-eastern corner.



Figure 8: South-eastern corner of the study area.



Figure 9: Opencast section south of the south-eastern corner of the study area.





Figure 10: South-eastern section bordering current mining activities.



Figure 11: Study area seen from the south-western corner.



Figure 12: Study area seen from the north-western corner.





Figure 13: Cultivated section.



Figure 14: Perennial pan around which mining development is planned.

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, as well as general environmental conditions, were recorded by means of a Garmin Oregon 750 GPS and were photographed with a Samsung A71 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.



3.1.1 Previous Heritage Studies

Zonnebloem Switching Station

The Heritage Impact Assessment (HIA) for the Zonnebloem Switching Station (132 / 22 kV) and two Loop-In Loop-Out power lines (132 kV), located approximately 7 km north-northeast of the proposed Nndanganeni Colliery S102 Project, was conducted by HCAC – Heritage Consultants (Van der Walt 2018). The project entailed an assessment of the cultural heritage resources associated with the project area via a desktop assessment as well as a field survey. The HIA recorded four features relating to a previous farmstead and outbuildings. The features were recorded as a “linear wall, stone-built walling, dug out feature” and “dilapidated structures”. It was noted that some structures were demolished and that the dilapidated structures were inhabited by vagrants, posing a safety hazard. The recorded sites appeared not to exceed 60 years of age and were deemed to be of low significance (Van der Walt 2018).

Forzando Coal Holdings on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS

An archaeological survey was conducted for a coal mine on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS. The demarcated impact area was 600 X 600 m and is located roughly 40 km south of the proposed Nndanganeni Colliery S102 Project. Archaeological Resources Management (ARM) surveyed the study area and the remains of two circular homesteads that possibly date to the Late Iron Age were observed. Both homesteads consisted of between 3 and 6 structures and were located close to a stream. More recent angular settlement remains, as well as 2 graveyards associated with the settlements were observed as well. The graves consisted of mounds made with ferricrete. One of the graveyards consisted of 8 graves, and the other of 5 graves (Huffman & Steel 1995).

Goedehoop Coal Mine, Mpumalanga

An Archaeological and Cultural Historical survey and impact assessment was conducted by the National Cultural History Museum (2003) for the development of the Goedehoop opencast coal mine near Hendrina in the Mpumalanga Province. The Goedehoop site is located roughly 53 km south-southwest of the proposed Nndanganeni Colliery S102 Project. Opencast areas that were surveyed included portions of the Farms Schurvekop 227 IS, Vlakkuijen 76 IS, Middelkraal 50 IS, and Halfgewonnen 190 IS. It was noted that a few graveyards located outside of the impacted areas were observed and would therefore not be impacted.

3.1.2 Historical topographical maps & aerial images

The historical aerial image dating to 1943 (**Appendix A: Figure 26**) shows the south-eastern corner of the study area to be cultivated, while the remaining area appears to consist of open veldt. Except for a few additional cultivated sections, the 1955 aerial image depicts the same detail (**Appendix A: Figure 27**). The 1964 aerial image (**Appendix A: Figure 28**) shows the presence of three areas potentially associated with buildings (Sites B01 – B03), while the remaining land use appears to remain the same. When the 1967 topographical map is inspected, the entire demarcated study area is shown as open veldt without any buildings or cultivation (**Appendix**



A: Figure 29). The 1975 aerial image also shows the study area to be absent of buildings, but the entire area appears to be cultivated (**Appendix A: Figure 30**). The 1984 and 1997 topographical maps, 1997 aerial image and the 2010 topographical map show the two small cultivated sections and remaining open veldt that is consistent with the field observations (**Appendix A: Figures 31 – 34**). Although most of the data sources indicate that the majority of the study area consisted of open veldt, the 1975 aerial image suggests that the entire area was cultivated. The possibility, however, exists that the markings observed on the image could represent a different activity. It should also be noted that the buildings observed on the 1964 aerial image are not visible/indicated on any of the remaining data sources.

3.2 Limitations

The site visit (October 2022) confirmed that the southern and south-eastern corners of the study area are cultivated, while the remaining area consists of open veldt. Except for a small densely vegetated section near the south-eastern corner of the study area that hampered free movement and visibility, the general visibility was considered to be good and no other constraints were encountered (**Figure 15**).



Figure 15: Section of dense vegetation and trees near the south-eastern border of the study area.

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.

4.1 The Stone Age

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). These artefacts are often associated with rocky outcrops or water sources.

4.2 The Iron Age & Historical Period

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 (LIA) 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.

4.2.1 The South African War

Several small skirmishes took place in the general area. However, no artefacts or features relating to the South African War were found during the survey. One of the more important and well-known South African War sites in the vicinity of the study area is the Battle of Bergendal, located approximately 43 km east of the study area. The battle took place on 27 August 1900 between the forces of General Louis Botha and Lord Roberts. Lord Robert's plan was to use his 20 000 troops for a decisive action against the Boer commandos to the east of Pretoria, while the Boers intended to use strong positions north and south of the railway line near Belfast to stop the British advance to Machadodorp. During this time President Paul Kruger was in Machadodorp, the new seat of the Boer government (Von der Heyde 2013: 205-207).

Lord Robert's force was mobilising from Middleburg and General Sir Redvers Buller was on his way from Natal to trap the Boers in a pincer movement between Machadodorp and Belfast. Buller, however, decided to move his force to the north instead of Machadodorp, a decision based on the fact that a large force would be travelling slowly and through swampy areas. The Boers under General Louis Botha positioned 5000 men in a defensive



line over 80 km long to the north and south of the railway line with the centre near Belfast. Botha strengthened his flanks as he expected the British to attack his flanks with cavalry, as they had done so on previous occasions. The attack, however, was aimed at Bergendal Koppie near the middle of Botha's defensive line, taking him by surprise. Seventy-four members of the Zuid-Afrikaansche Republiek Politie under Commandant Sarel Oosthuizen held the hill for three hours until the British infantry reached the foot of the hill. As the British fixed their bayonets for the charge the Boers withdrew. Upon realising that the line had been breached, the rest of the Boers withdrew as well. Between 21 and 27 August 1900 the British suffered 300 casualties and the Boers 14. Nineteen were taken prisoner. This led to the British occupying Waterval Boven, the Boer government releasing 2000 British prisoners from the camp near Barberton and moving their railway carriage to Nelspruit. The Battle of Bergendal is considered to be the last pitched battle of the Anglo-Boer War as the guerrilla phase started thereafter (Von der Heyde 2013: 205-207).

4.2.2 General history and coal mining near eMalahleni, Middelburg, Bethal, Hendrina, Ermelo and Carolina

Mpumalanga, especially the area between eMalahleni, Middelburg, Bethal, Hendrina, Ermelo and Carolina, is associated with vast coal fields. These coal fields formed between 200 and 300 million years ago from rotten forests in swamps. During this period, Africa was still attached to South America, India and Antarctica as part of the Gondwana supercontinent. By 250 million years ago, the climate changed to dry warm conditions and the swamps in Mpumalanga were replaced by desert-like conditions around 200 million years ago. By 180 million years ago, when the Gondwana supercontinent started to split up, volcanic lava fields covered areas in Mpumalanga (De Wit 2007: 37).

With the rich coal deposits in Mpumalanga, it was only a matter of time before its value was realised and the coal extracted. Coal mining is Mpumalanga's most important industrial activity and produces about 80% of South Africa's coal. The earliest coal mining in the area dates to 1868 when farmers extracted coal for personal use in the Middelburg district. Large-scale coal mining around eMalahleni, however, only started after the discovery of gold on the Witwatersrand in 1886. Due to the discovery of coal in the Brakpan and Springs surroundings in 1887 and no railway linking eMalahleni with the Rand, these early eMalahleni coal mines closed down. It was more cost effective to exploit the closer Brakpan and Springs coal deposits than the coal found at eMalahleni (Schirmer 2007: 316).

After the construction of the railway line between the Rand and eMalahleni the deposits were exploited on large scale again. The coal fields, which are about 40 km wide, are concentrated around eMalahleni and run towards Belfast in the east. The first collieries around eMalahleni were Douglas, Transvaal and Delagoa Bay, Witbank and Landau and are of a higher quality compared to the coal found at Brakpan and Springs. During the 1890s some of the coal was exported via Delagoa Bay. In addition, the coal was readily accessible as the deposits occurred at a depth of 100 m or less (Schirmer 2007: 316-317). It should also be noted that the railway line



between Pretoria and Lorenzo Marques (Maputo) was completed on 2 November 1894 and the connection between eMalahleni and Johannesburg during the 1910s (Heydenrych 1999).

Between 1900 and 1920 many new collieries were established and the coal price dropped. This led to the establishment of the Transvaal Coal Owners' Association with the main aim to regulate output coal prices. This also acted to counter possible competition. It should also be noted that not all collieries joined this association. The establishment of the Transvaal Coal Owners' Association had positive as well as negative influences. On the one hand eliminating the competition might have impacted negatively on efficiency and the workers. On the other hand, it is possible that the capacity of coal mines was enhanced and facilitated further development in the industry. One positive point was that the association eased interaction with international buyers. During the 1930s, however, the coal price continued to drop and resulted in mechanisation. This introduced electric coal cutters and eliminated the need for high number of unskilled workers. By 1946 eMalahleni and Middelburg saw the emergence of a modern coal industry. The Transvaal had 34 large collieries that were responsible for 99.7% of the province's coal (Schirmer 2007: 317-319).

Between 1940 and 1960 coal output in the Eastern Transvaal increased from 13 million to 25 million tons. Although industrialisation expanded throughout this time in South Africa and a demand existed for coal both locally and internationally, a steady shift to oil as the dominant form of energy was noted. In light of these developments Anglo American Corporation launched three research programmes in the 1960s. As a result of these programmes the region's coal mines became export orientated. This trend continued throughout the 1980s. During these times a series of coal-burning power stations around the eastern Highveld coal deposits were constructed (Schirmer 2007: 321).

In 1859 the Republican Government decided to found a town halfway between Lydenburg and Pretoria, but when nothing resulted from this, the Dutch Reformed Church bought the farm Sterkfontein from L. de Jager in 1864, laid out a town in 1866 and named it Nazareth (Bulpin 1986: 629). The town was renamed to Middelburg in 1874 (Bergh 1999a: 140).

5. Archaeological and Historical Remains

5.1 Stone Age Remains

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

These artefacts are often associated with rocky outcrops or water sources. **Figures 16 – 18** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

Archaeological studies conducted in the surrounding areas also did not locate Stone Age artefacts.



According to Bergh (1999b: 5), no major Stone Age archaeological sites are located in the direct vicinity of the study area.

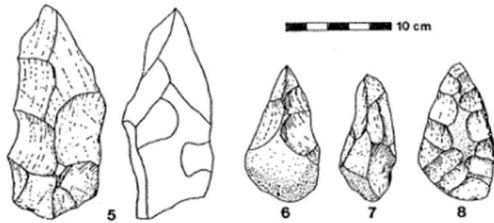


Figure 16: ESA artefacts from Sterkfontein (Volman 1984).

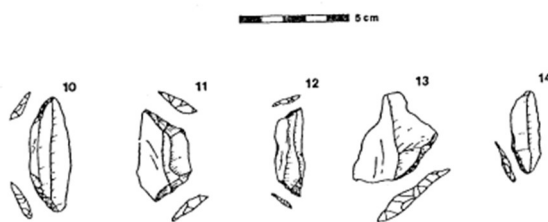


Figure 17: MSA artefacts from Howiesons Poort (Volman 1984).



Figure 18: LSA scrapers (Klein 1984).

5.2 Iron Age Farmer Remains

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

The heritage study conducted for Forzando Coal Holdings on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS located two circular homesteads that possibly date to the LIA (Huffman & Steel 1995).

5.3 Historical Remains

Three potential sites dating to the Historic Period were noted on the historical aerial imagery dating to 1964 (**Appendix A: Figure 28 & Table 3**). All three sites (B01 – B03) are visible on the 1964 aerial image only, suggesting that the buildings were constructed between 1955 and 1964 (**Appendix A: Figures 27 & 28**), but were demolished by 1967 (**Appendix A: Figure 29**).



Site B01 is located along the western border of the study area and is not associated with any surface remains (**Figure 19**). Site B02 is located near the southern-most corner of the study area and a foundation mound was noted during the site inspection (**Figure 20**). Site B03, located near the eastern border of the study area, is currently associated with cultivated land and no surface remains were observed during the site inspection (**Figure 21**).

The heritage study conducted by Huffman & Steel (1995) recorded angular settlement remains that might date to the Historic Period.

Table 3: Historical Sites.

Name	Type	Source	Year	Current Status	Surface Indications
B01	Building	Aerial	1964	Demolished	None
B02	Building	Aerial	1964	Demolished	Foundation mound
B03	Building	Aerial	1964	Demolished	None



Figure 19: Environment associated with Site B01.





Figure 20: Foundation mound at Site B02.



Figure 21: Environment associated with Site B03.

5.4 Contemporary/Natural Remains

Two sites dating to contemporary times were noted during the site inspection (**Table 4**).

Site F01, identified as a ground monitoring borehole (**Figures 22 & 23**), is located along the western border of the study area. An identification plate with the name “Borehole Casing Suppliers” and a telephone number was observed, but no additional information is shown.

Site F02 (**Figure 24**), located to the southeast of Site F01, appears to be equipment associated with an irrigation system. The site consists of a metal shaft and an iron peg.



The heritage study conducted by Huffman & Steel (1995) recorded contemporary angular settlement remains, while the heritage study conducted by Van der Walt (2018) noted the presence of four features relating to farmsteads and outbuildings.

Table 4: Contemporary Sites.

Name	Type	Source	Year	Current Status	Surface Indications
F01	Borehole	Field	Unknown	Intact	Metal & concrete marker
F02	Irrigation	Field	Unknown	Intact	Metal shaft & iron peg



Figure 22: Borehole at Site F01.

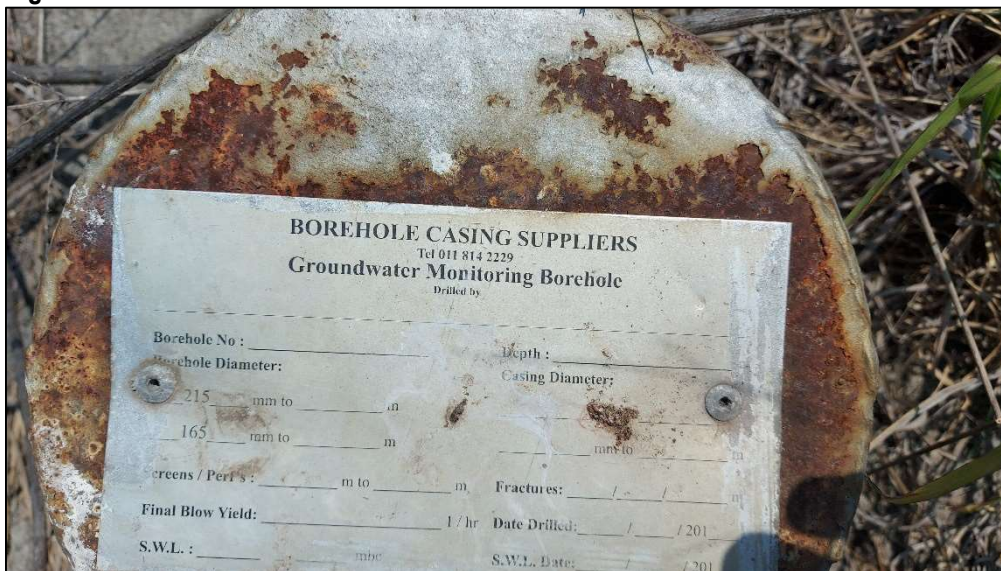


Figure 23: Identification plate at Site F01.





Figure 24: Potential irrigation equipment at site F02.

5.5 Graves/Burial Sites

No burial sites were observed during the pedestrian survey.

The heritage studies conducted by Huffman & Steel (1995) and the National Cultural History Museum (2003), recorded the presence of several 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, 1999 (Act No. 25 of 1999). The field rating and classification in this report are prescribed by SAHRA.

Table 5: 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 6: Individual site ratings.

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2529DC-B01	Demolished Building	General Protection C	4 C	Low	No recording necessary
2529DC-B02	Demolished Building	General Protection B	4 B	Medium	Record site
2529DC-B03	Demolished Building	General Protection C	4 C	Low	No recording necessary
2529DC-F01	Intact borehole	General Protection C	4 C	Low	No recording necessary
2529DC-F02	Intact potential irrigation equipment	General Protection C	4 C	Low	No recording necessary

* Ratings are dependent on specific project boundaries and activities.



7. Statement of Significance & Recommendations

7.1 Statement of Significance

The study area: The Proposed Nndanganeni Colliery S102 Project

Some of the areas within the demarcated project area are considered to be potentially significant from a heritage perspective. The significance of the proposed area and the observed sites are discussed here.

The general study area is associated with a combination of open veldt and cultivated land, while three potentially historical sites associated with demolished buildings and two contemporary sites were noted. The demarcated S102 area is completely located within 500 m of a perennial pan, a zone that is generally associated with a higher heritage site probability. However, the general area surrounding the pan appears to have been disturbed by cultivation and the immediate surroundings are not well known for Stone Age or Iron Age sites. The area is therefore not considered to be particularly sensitive from a heritage perspective (**Figure 25**).

Sites B01 – B03 were identified as buildings on the 1964 aerial image. Since these buildings appear to have been constructed between 1955 and 1964, the age of these buildings might exceed 60 years and would therefore be protected by the NHRA, 1999 (Act No. 25 of 1999). However, all three buildings were completely demolished, are not associated with surface remains and are therefore no longer considered to be significant from a heritage perspective. Additionally, the areas associated with Sites B02 and B03 were disturbed by the cultivation of crops. Although sites B01 – B03 were demolished, the possibility exists that significant cultural material might be unearthed within the demarcated boundaries. These sites are therefore considered to be potentially sensitive (**Figure 25**).

Sites F01 & F02 were respectively identified as a contemporary borehole and potential irrigation equipment. The sites are not significant from a heritage perspective.



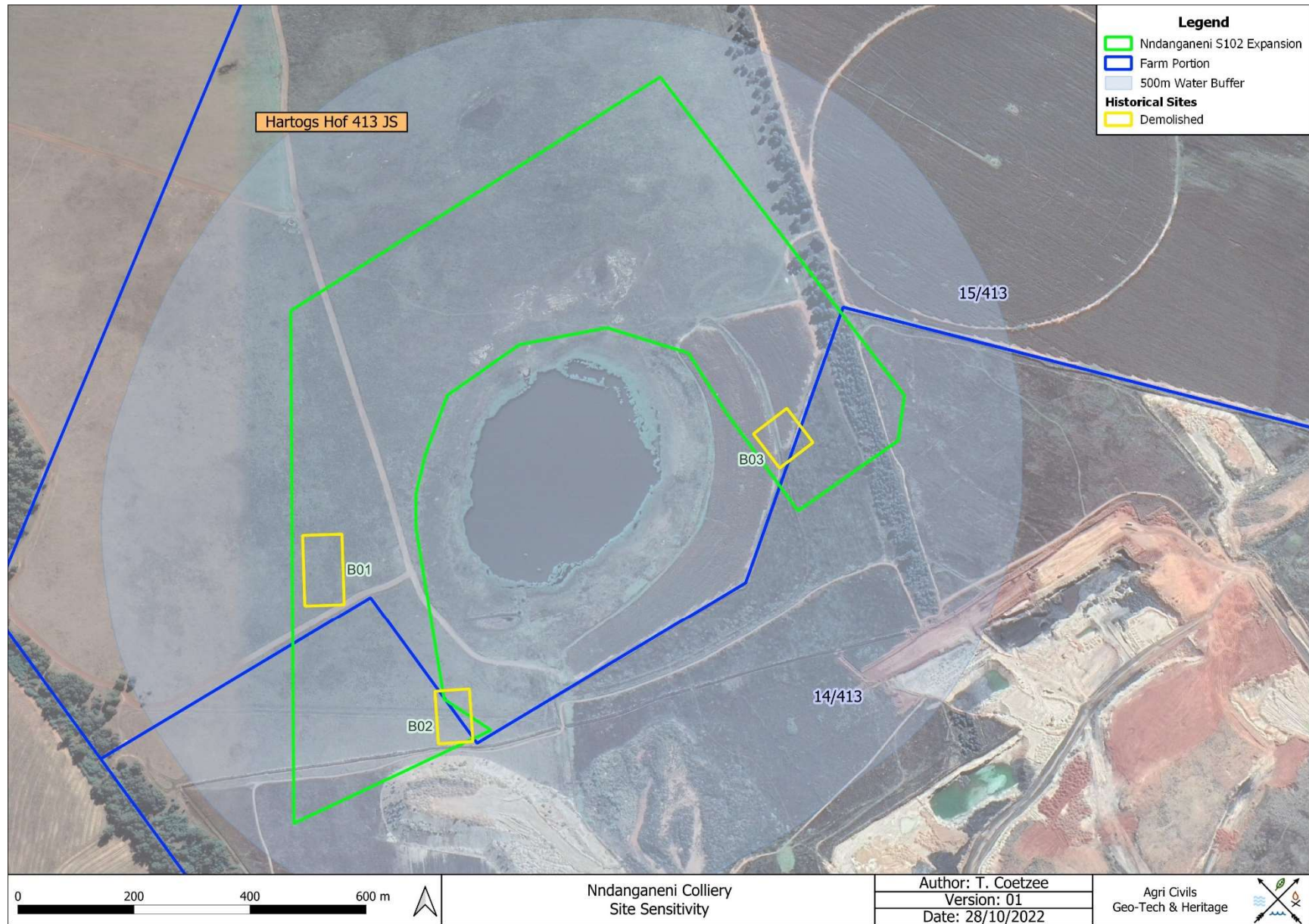


Figure 25: Study area and potentially sensitive areas portrayed on a 2021 satellite image.



7.2 Recommendations

The following recommendations are made in terms with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) in order to avoid the destruction of heritage remains associated with the area demarcated for the proposed mining expansion:

- Historical Sites B01 – B03 used to be associated with buildings potentially exceeding 60 years of age. However, the buildings were demolished, and the sites were sufficiently recorded. Since infrastructure existed at these sites, the possibility of uncovering cultural material within the demarcated boundaries is higher compared to other areas. Should such remains be discovered, it is recommended that the associated activity be suspended and that a qualified archaeologist be contacted. These sites are therefore considered to be potentially sensitive.
- Contemporary Sites F01 and F02 are associated with a borehole and possible irrigation equipment that do not to exceed 60 years of age. These sites are not significant or sensitive from a heritage perspective and the recording conducted during the study is considered to be sufficient. No further action is required.
- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.
- Since 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)).
- 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 Nndanganeni Colliery S102 Project consists of the expansion of the existing void and will impact approximately 45.5 ha. Although the identified sites (Sites B01 – B03) are considered to be sufficiently recorded, sensitive subsurface cultural material might be located within the boundaries. Care should therefore be exercised during the construction and development phases of the project. Sites F01 and F02 are of contemporary origin and are not significant or sensitive from a heritage perspective.

Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed Nndanganeni Colliery S102 Project 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 all, thus making the recording of finds more accurate.

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



Appendix A: Historical Aerial Imagery & Topographical Maps



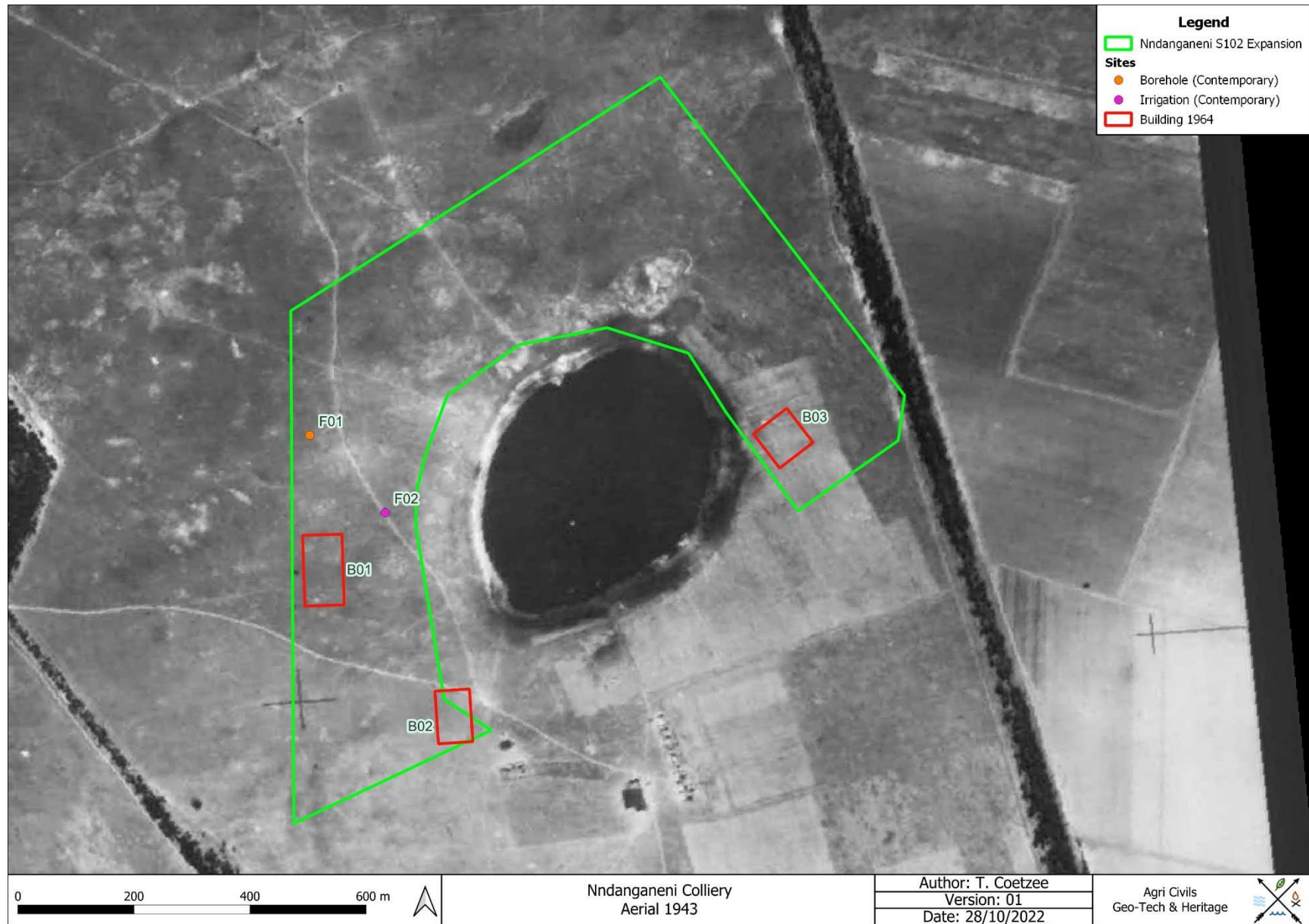


Figure 26: Study area superimposed on a 1943 aerial image.



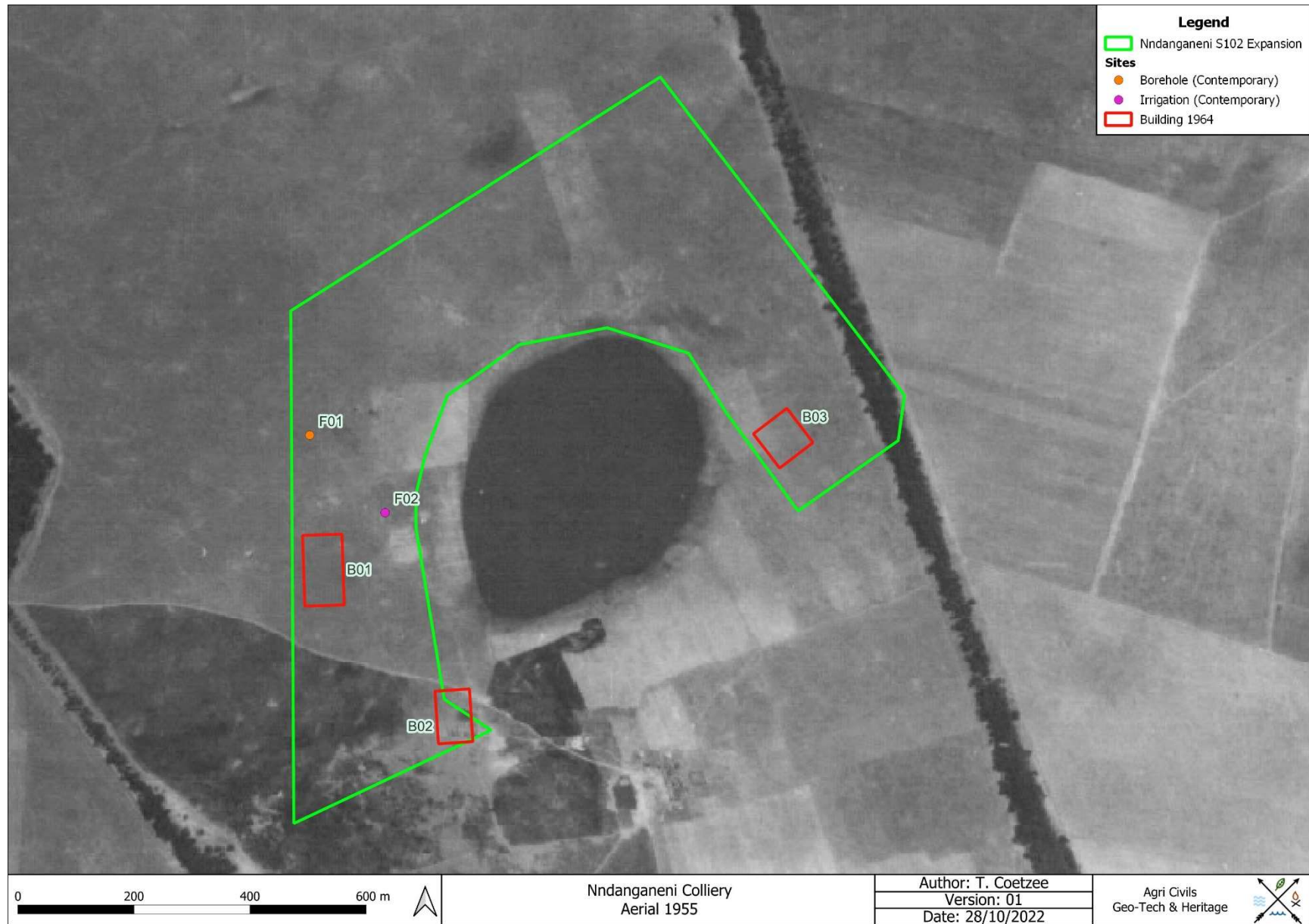


Figure 27: Study area superimposed on a 1955 aerial image.



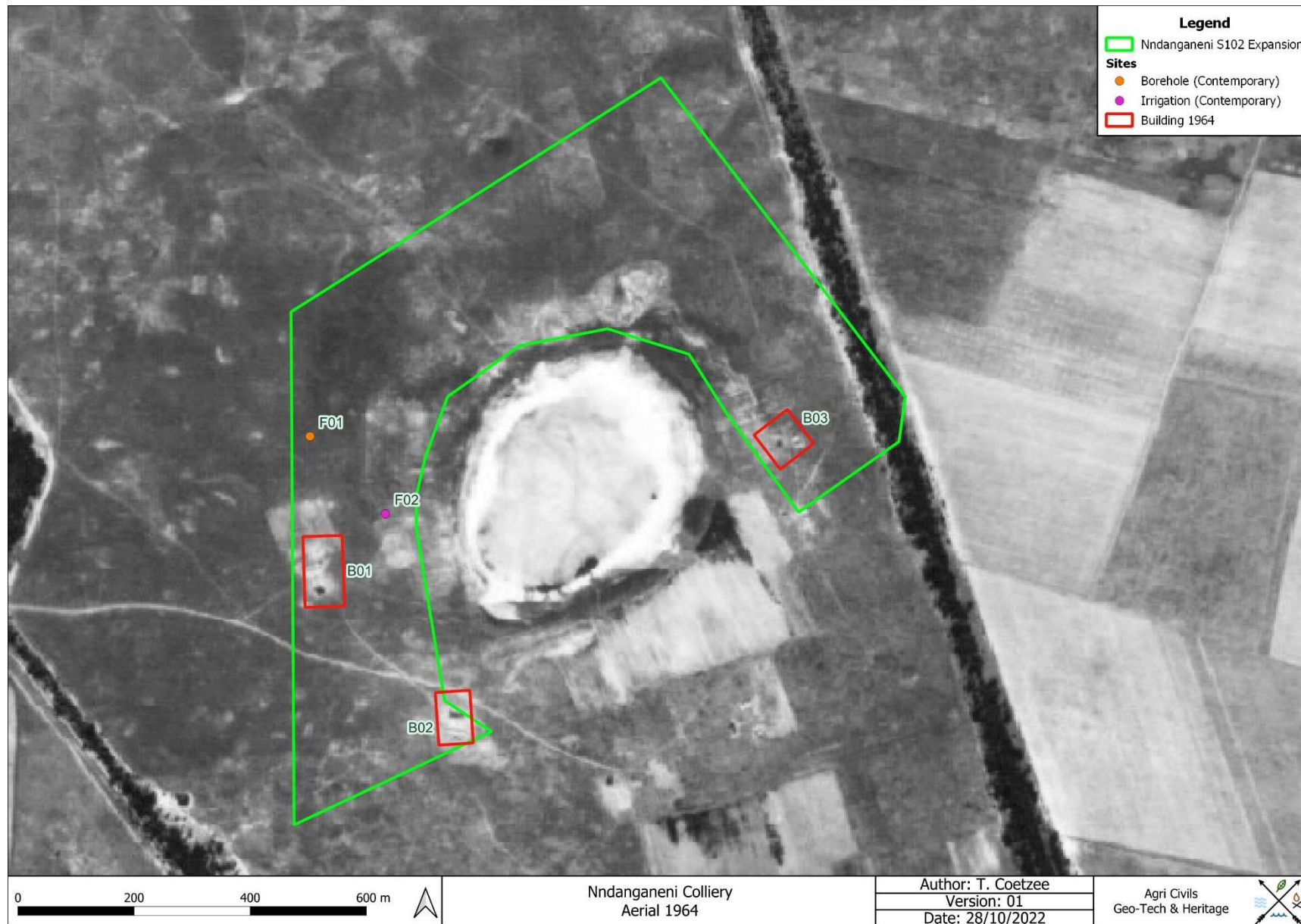


Figure 28: Study area superimposed on a 1964 aerial image.



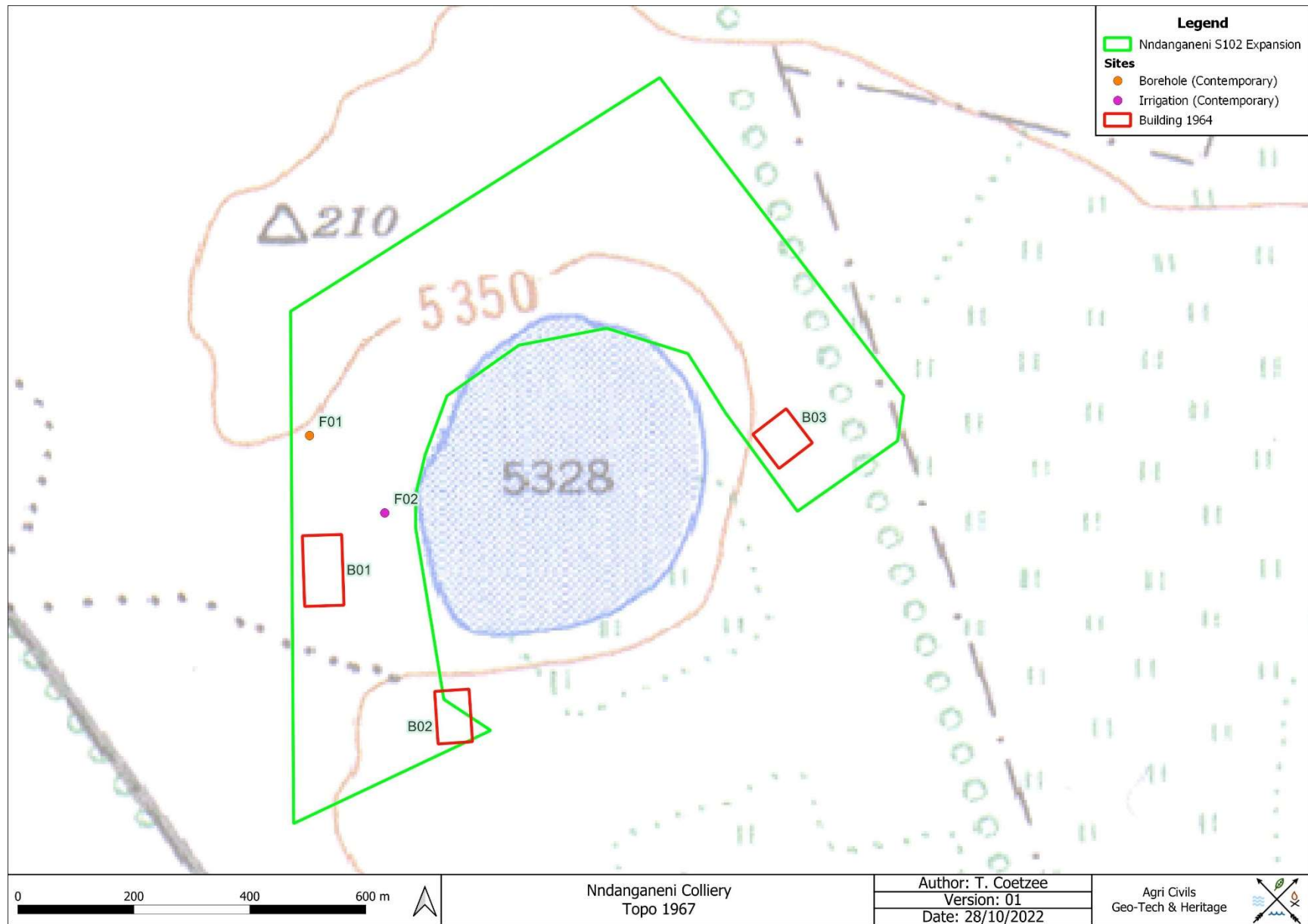


Figure 29: Study area superimposed on a 1967 topographical map.





Figure 30: Study area superimposed on a 1975 aerial image.



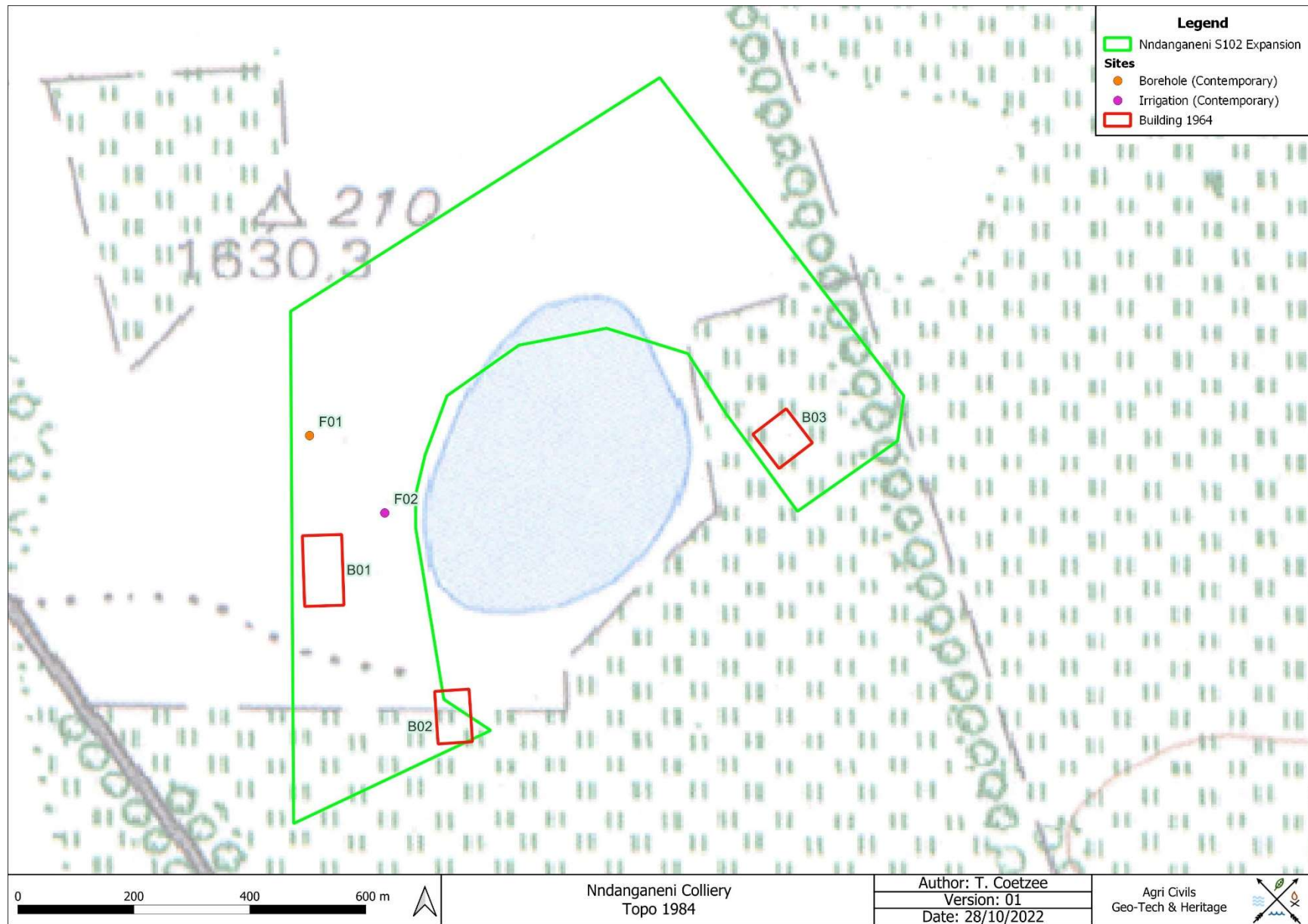


Figure 31: Study area superimposed on a 1984 topographical map.



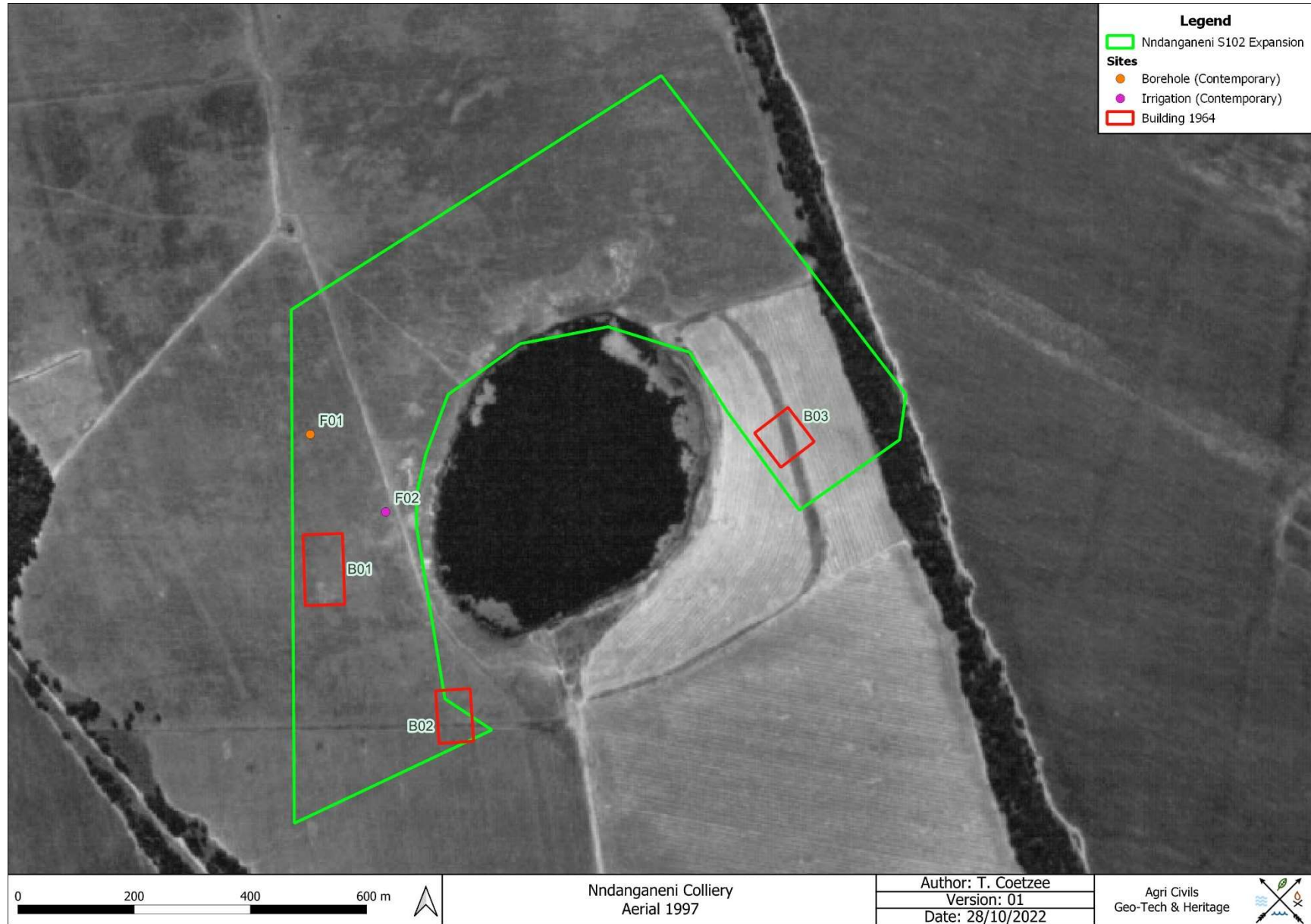


Figure 32: Study area superimposed on a 1997 aerial image.



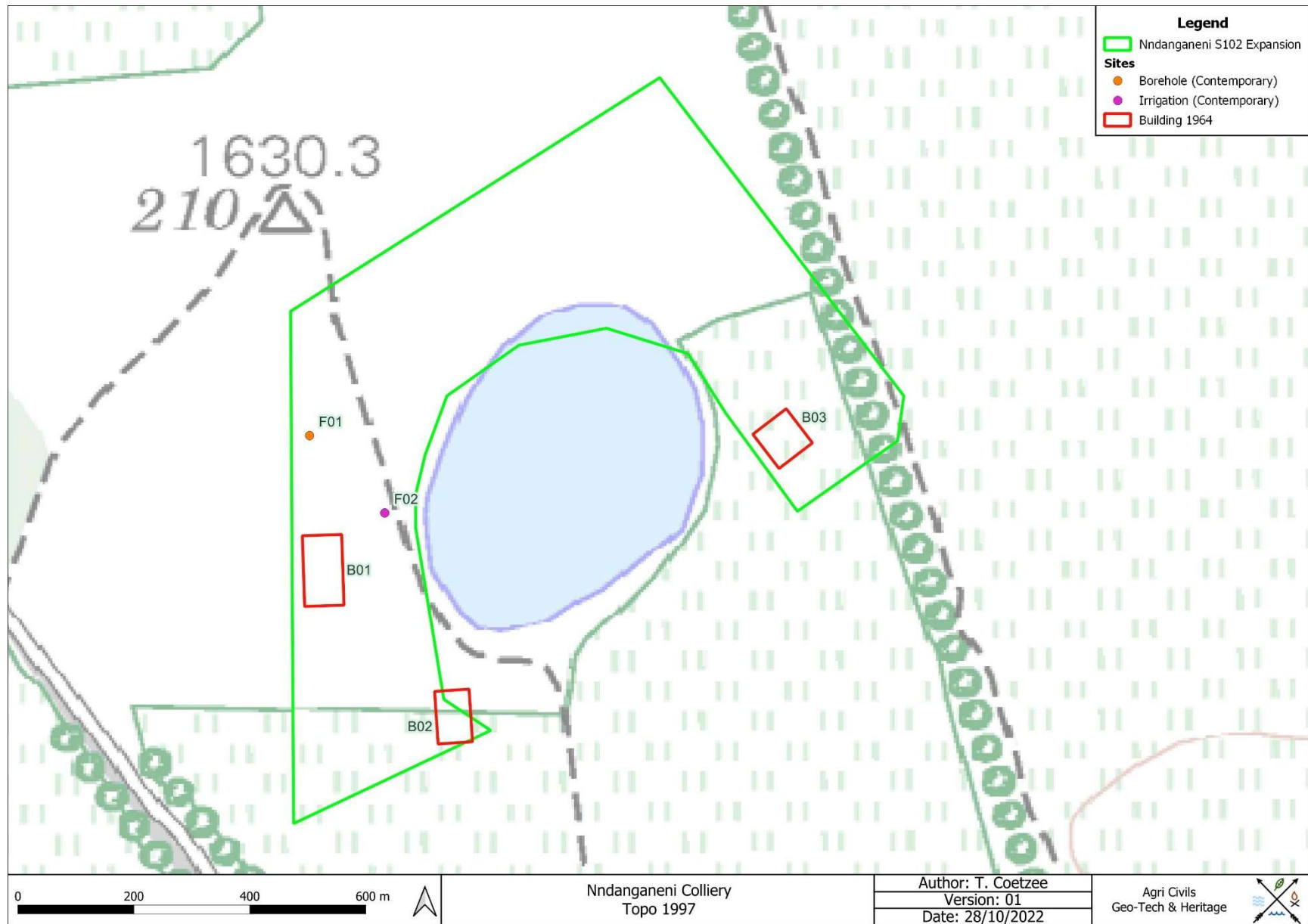


Figure 33: Study area superimposed on a 1997 topographical map.



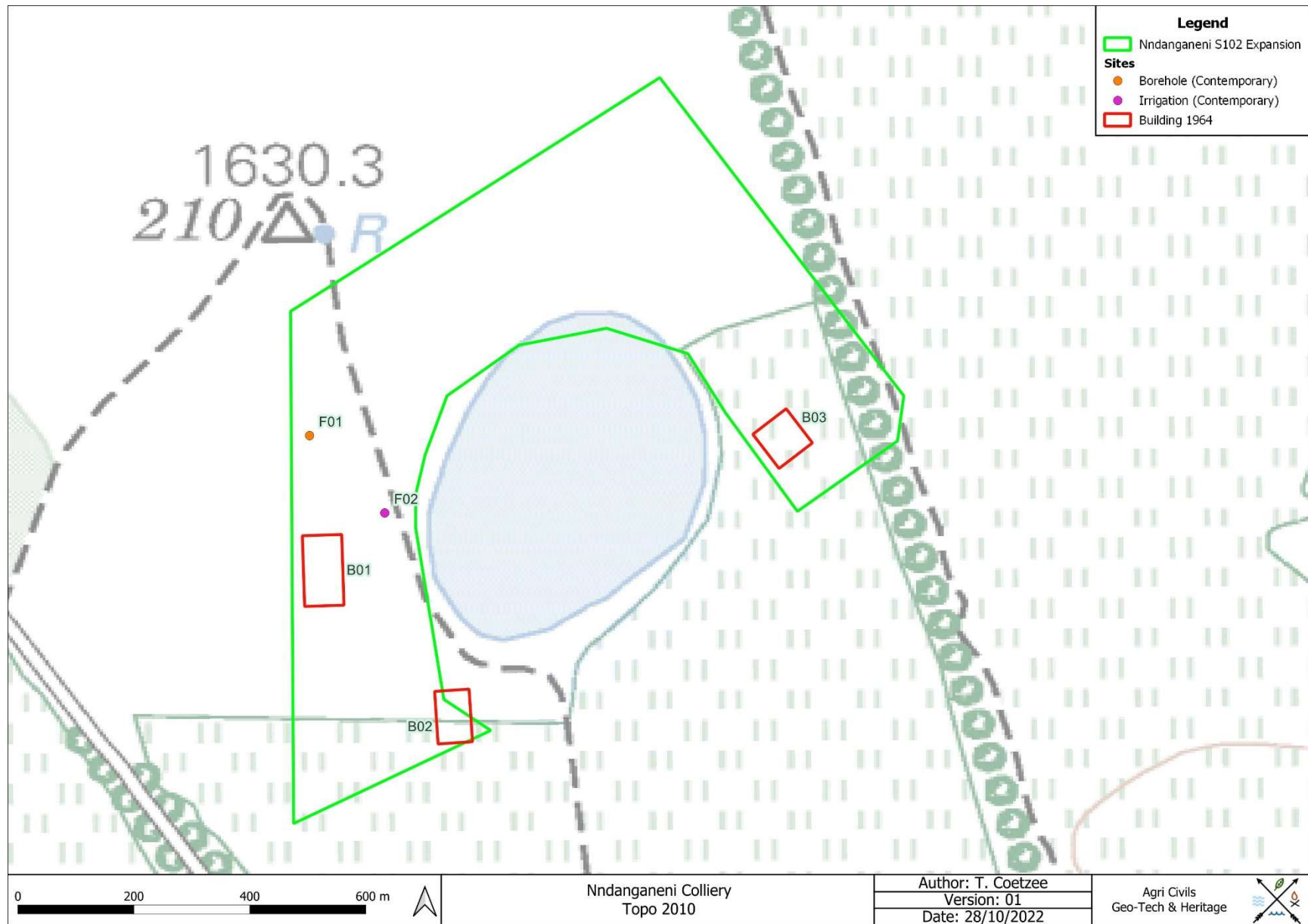


Figure 34: Study area superimposed on a 2010 topographical map.

