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PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

for the Proposed Roodepoort Colliery Mining Right on Portion 15 of the Farm Roodepoort 40 IS, Kriel, Mpumalanga

For:
Eco Elementum (Pty) Ltd

Project Ref:
21-1545-AUTH Roodepoort MR, EA & IWULA

Date:
22/09/2022

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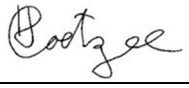
Project Ref:	21-1545-AUTH Roodepoort MR, EA & IWULA
Report No:	EE-14062022
Report Version:	1

I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Roodepoort Colliery Mining Right 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	22/09/2022	

Executive Summary

The author was appointed by Eco Elementum (Pty) Ltd to undertake a Phase 1 Archaeological Impact Assessment for the proposed Roodepoort Colliery Mining Right on Portion 15 of the Farm Roodepoort 40 IS near Kriel in the Mpumalanga Province. The proposed mining development is located approximately 8 km north of Kriel and falls within the eMalahleni 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 proposed Mining Right area consists of a combination of open veldt, rehabilitated mined land, as well as previously cultivated land. The demarcated development footprints, however, are located on previously mined areas only, indicating a low sensitivity and potential impact to cultural resources. One area associated with potentially historical buildings was identified on historical aerial imagery (Site B01), while one cemetery (Site F01) was identified during the pedestrian survey. Both sites, however, are located near the northern corner of the proposed Mining Right and do not intersect the demarcated development footprints.

The buildings associated with Site B01 are likely to exceed 60 years of age, but have completely been demolished and are no longer associated with surface remains. Also, the site is located approximately 306 m from the proposed development and is therefore not at risk of being impacted by the proposed development.

Cemetery F01 is located roughly 650 m from the proposed development and consists of 17 graves, some exceeding 60 years of age. Although the cemetery is considered to be sensitive from a heritage perspective, the site is unlikely to be impacted by the proposed project. The cemetery is protected by the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act (NHRA) 25 of 1999. Since the cemetery appears not to be in use anymore, it is recommended that a 50 m fenced-off conservation buffer be erected around the cemetery in order to avoid accidental damage. Access to the cemetery should also not be refused.

Subject to adherence to the recommendations and approval by SAHRA, the proposed Roodepoort Colliery Mining Right as per the indicated boundaries 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

Pollution Control Dam – PCD

SAHRA – South African Heritage Resources Agency

WMA – Water Management Area

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1. Project Background

1.1 Introduction

Eco Elementum (Pty) Ltd appointed the author to undertake a Phase 1 Archaeological Impact Assessment for the proposed Roodepoort Colliery Mining Right on Portion 15 of the Farm Roodepoort 40 IS (**Table 1**) near Kriel in the Mpumalanga Province (**Figures 1 – 3**). The proposed coal mining development falls within the eMalahleni Local Municipality and is located approximately 8 km north of Kriel. 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. The aim of this report is to provide the developer with information regarding the location of heritage resources within the demarcated study area.

In the following report, the implications for the proposed Roodepoort Colliery Mining Right on the demarcated portion with regard to heritage resources are discussed: portion 15 of the Farm Roodepoort 40 IS. The development will consist of surface infrastructure and opencast pits. 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.

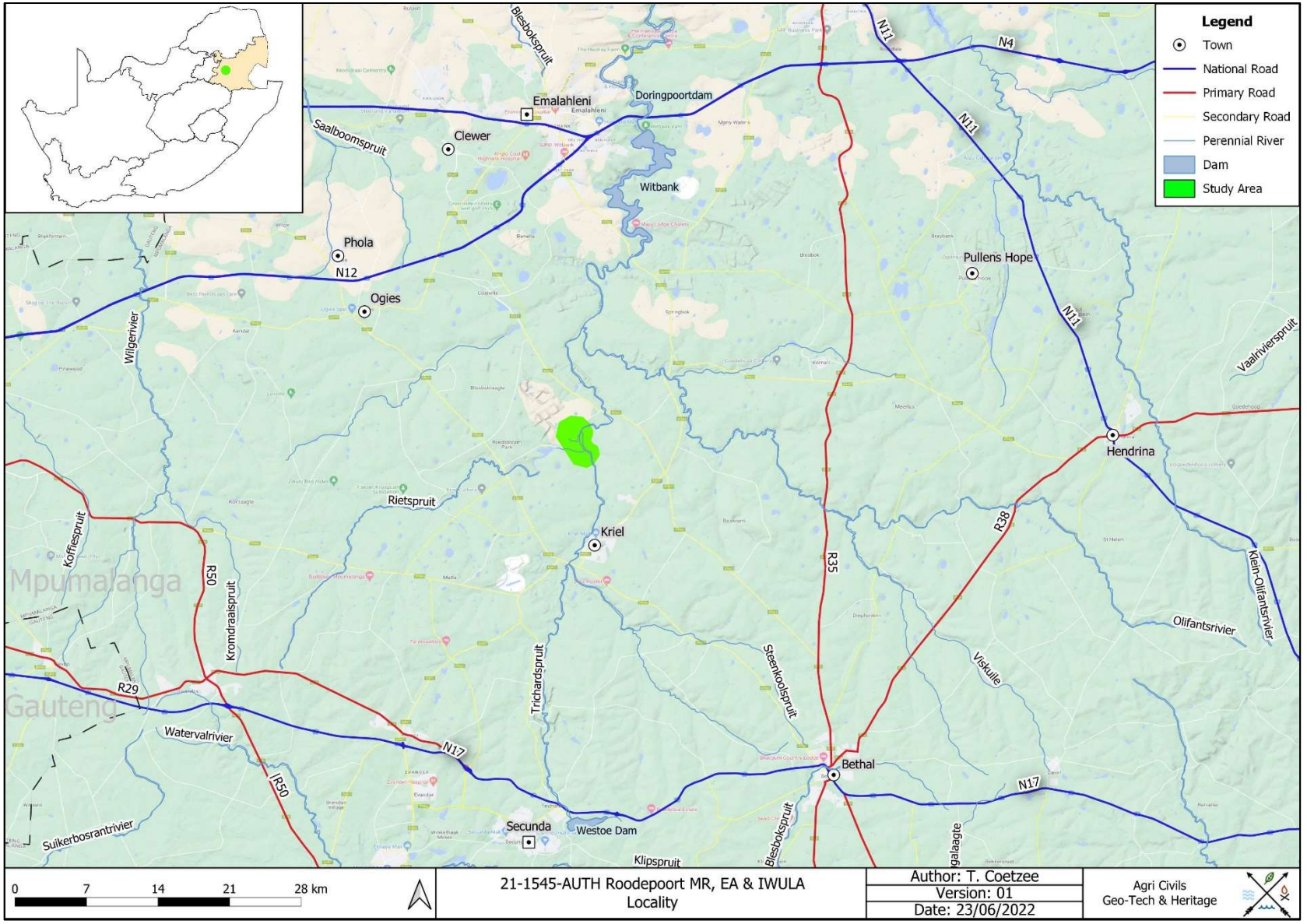

Figure 1: Regional and Provincial location of the study area.

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 (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 5000m² in extent; or

ii. involving three or more existing erven or subdivisions thereof; or

iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or

iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10000m² in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development." (38. [1] 1999:62-64)

and

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

(a) The identification and mapping of all heritage resources in the area affected;

(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;

(c) an assessment of the impact of the development on such heritage resources;

(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(g) plans for mitigation of any adverse effects during and after the completion of the proposed development." (38. [3] 1999:64)

Human Tissue Act and Ordinance 7 of 1925

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

2. Study Area and Project Description

2.1 Location & Physical Environment

The proposed Roodepoort Colliery Mining Right is situated to the north of Kriel. The development extent and intersecting farm portion are listed below (**Table 1**):

Table 1: Study area & coordinates.

Study area	Farm Name	Farm Portion	Map Reference (1:50 000)	Lat	Lon	Farm Portion Extent (ha)	Development Extent (ha)
Roodepoort Colliery Mining Right	Roodepoort 40 IS	15	2629 AA & AB	-26.165269	29.246403	312	±77.5

The study area is located 8 north of Kriel, while Ogies is located roughly 21 km to the northwest and eMalahleni 29 km to the north (**Figure 1**). The study area falls within the Nkangala District Municipality and the eMalahleni 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 & Rutherfords (2006) the study area falls within the Eastern Highveld Grassland vegetation unit.

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 & Rutherfords 2006).

The average elevation for Eastern Highveld Grassland varies between 1520 and 1780 MASL (metres above sea level). The average elevation of the project area is 1535 MASL and is associated with an undulating landscape.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 760 mm. The average annual temperature is 16.3 ºC. The average summer temperature is 19.9 ºC, while the winter temperature averages 10.1 ºC (Climate-data.org accessed 19/09/2022).

The majority of the study area falls within the B11E Quaternary Catchment, while the southern quarter falls within the B11D Quaternary Catchment of the Olifants Water Management Area (WMA). The closest perennial rivers to the study area are Steenkoolspruit that forms the eastern boundary of the study area and Rietspruit that divides the study areas into a northern and southern section near the southern boundary. However, it should be noted that the flow of the Rietspruit River was completely diverted between 1965 and 1984 and the current location of the Rietspruit River/canal is the product of the construction of the Rietspruit Dam during the same period. The Rietspruit Dam is located 1.8 km to the west.

When the surrounding environment is considered, the region is associated with crop cultivation and mining activity. Access to the study area is via a tertiary road intersecting Portion 15 (**Figures 2 & 3**). On a local scale, the area is associated with open veldt, rehabilitated mined land, a river, canal and a power line.

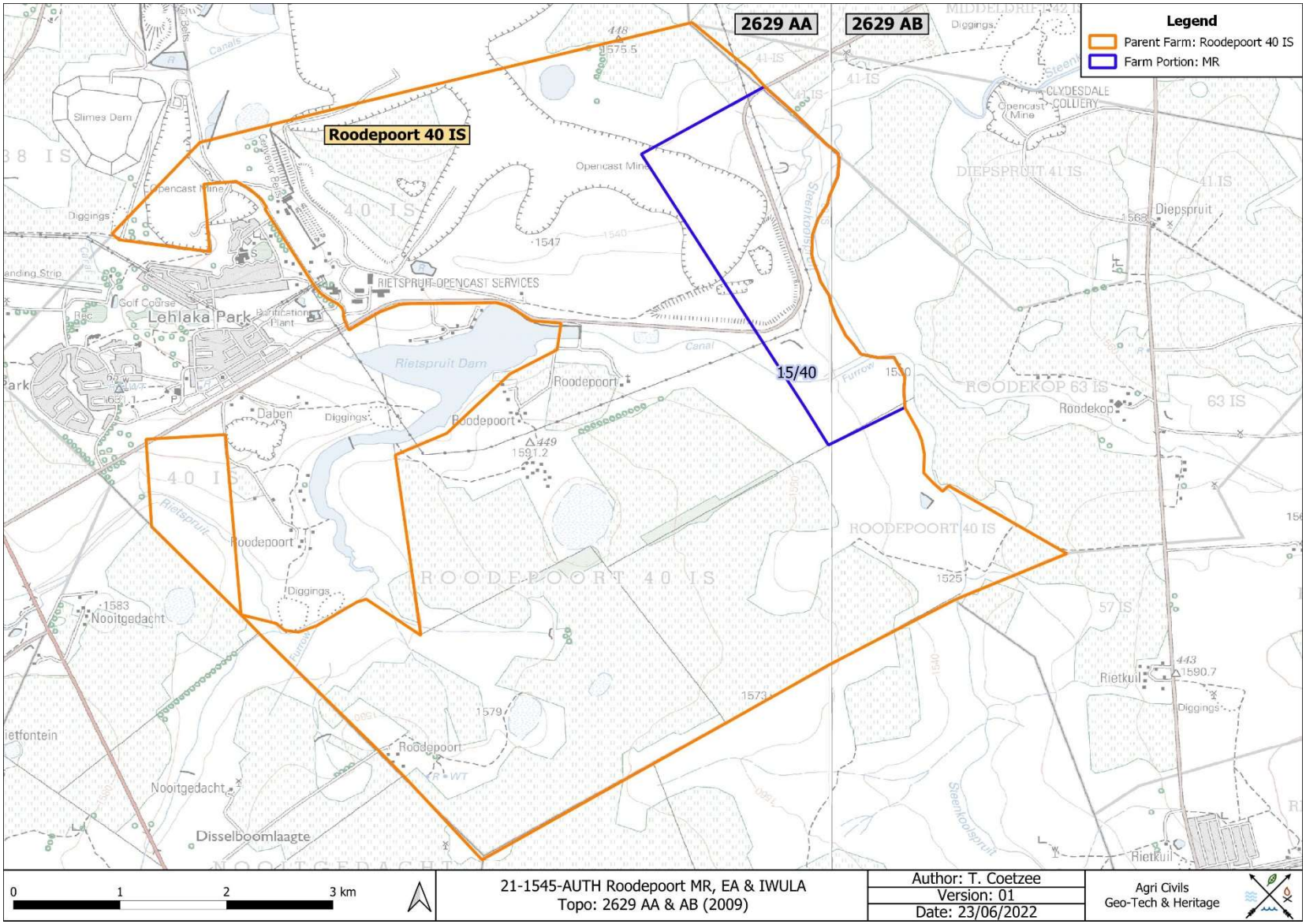

Figure 2: Segment of SA 1: 50 000 2629 AA & AB indicating the study area.

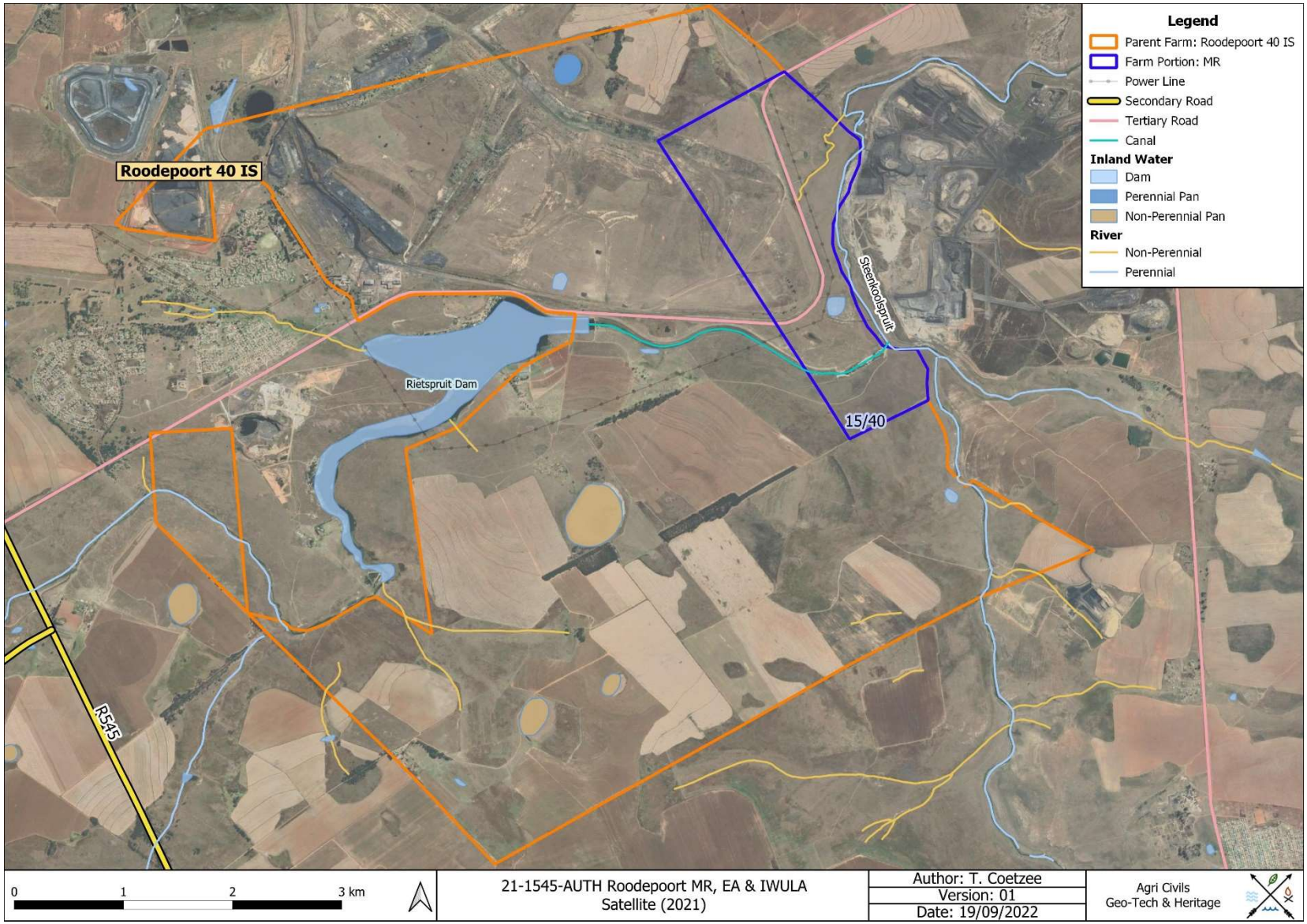

Figure 3: Study area portrayed on a 2021 satellite image

2.2 Project Description

The proposed Mining Right measures 312 ha, while the proposed infrastructure for the mining of coal measures approximately 77.5 ha (**Figure 4**). The proposed infrastructure and activities include:

- Culvert crossing
- Haul Road
- Office, Mine fleet hard park and workshop
- Pollution Control Dam (PCD)
- New road
- Resource blocks (Opencast pits)
- Stockpile: Topsoil / Softs
- Stockpile: ROM, Product and Crush & Screen Platform
- Stockpile: Hards
- Clean water channels
- Dirty water channels

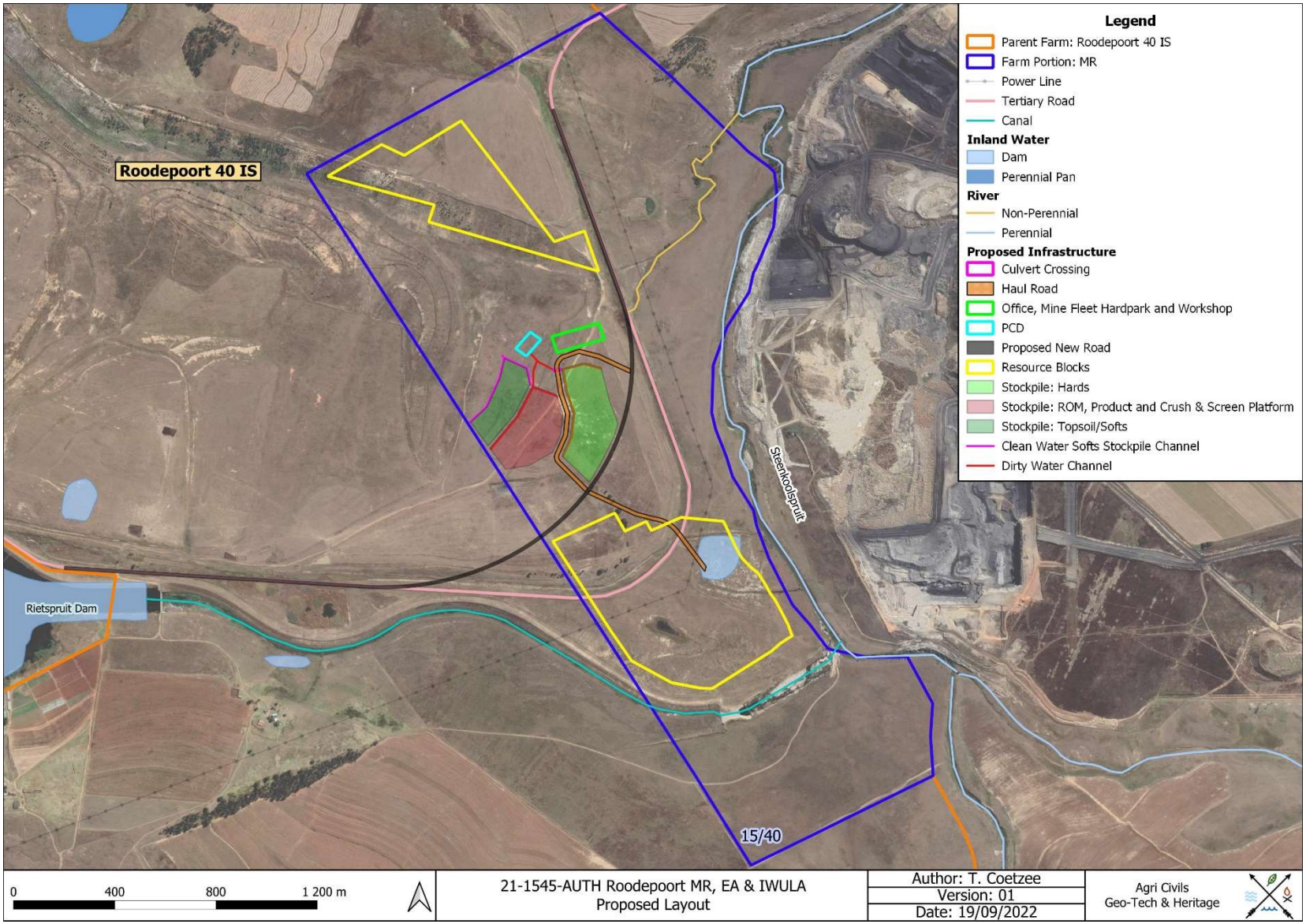

Figure 4: Proposed Roodepoort Colliery layout.

3. Methodology

Archaeological reconnaissance of the study area was conducted during June 2022 through a combination of systematic and unsystematic pedestrian and vehicular surveys of the proposed study area (**Figure 5**). The transects were spaced between 50 and 90 m apart and general site conditions were recorded via photographic record (**Figures 6 – 11)**. Also, the project area was inspected beforehand on Google Earth, historical topographical maps and aerial imagery in order to identify potential heritage remains (**Appendix A**). The historical topographical datasets dating to 1962/1965, 1984, 1995/1996 and 2009, as well as the historical aerial images dating to 1954, 1968, 1978, 1991, 1997 and 2005, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. One potential site associated with buildings was identified on the 1968 aerial image (Site B01), while one cemetery site (F01) was identified during the pedestrian survey (**Table 2**). The total area inspected was 312 ha. Because heritage resources are often associated with perennial and non-perennial rivers, the rivers and streams located within close proximity of the study area were buffered by a distance of 500 m, indicating a potentially sensitive area. Areas previously/currently associated with cultivated land and mining development that intersect the study area were traced and plotted as shown on topographical maps and aerial imagery, indicating disturbed areas that 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 & description.

Name	Off. Name	Latitude	Longitude	Description	Age	Current Status	Estimated Extent	ID Source	Farm Portion	Intersecting Developmen
B01	2629AA-B01	-26.152250	29.246287	Building	Historical	Demolished – No surface remains	10 ha	Aerial 1968	15	No
F01	2629AA-F02	-26.152031	29.247251	Cemetery	Historical	Dilapidated	332 m²	Field	15	No

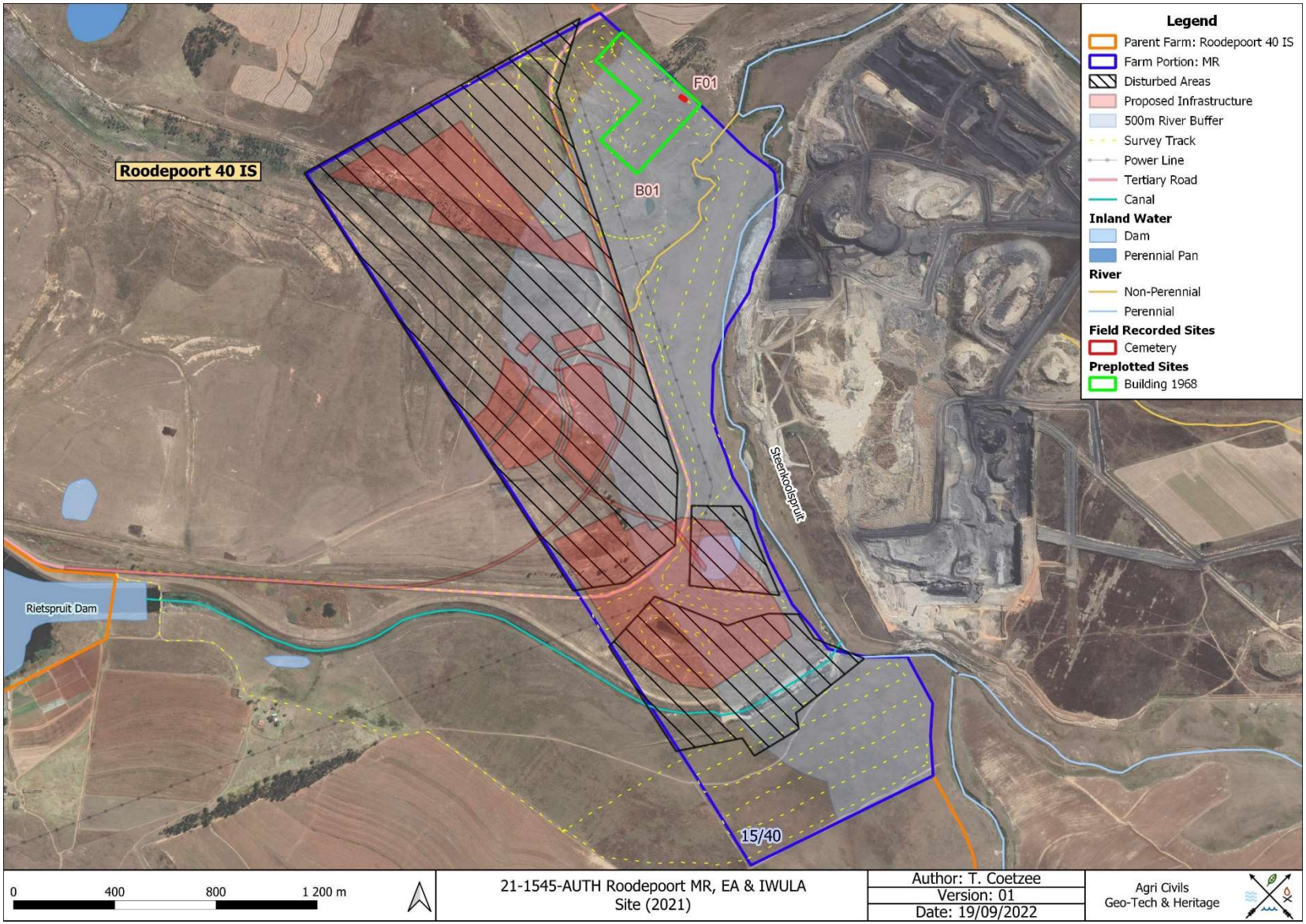

Figure 5: Study area with survey track and river buffer zone portrayed on a 2021 satellite image.

Figure 6: The study area seen from the south-eastern corner.

Figure 7: The study area seen from the southern-most point.

Figure 8: Undisturbed area along the eastern boundary.

Figure 9: Rehabilitated mine land along the western boundary of the study area.

Figure 10: Southernmost rehabilitated mined land.

Figure 11: Rehabilitated mined land along the eastern border of the study area.

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 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.

3.1.1 Previous Heritage Studies

Nokuhle Colliery, Ogies

An Archaeological Impact Assessment was conducted for Nokuhle Coal (Pty) Ltd for the mining operations on the farm Oogiesfontein 4 IS about 1 km north of Ogies. During the surveys that covered roughly 180 ha, three cemeteries and six ruins were located within the development footprints. A further five cemeteries and three ruins were located in the area adjacent to the demarcated footprint areas (PGS 2010). The colliery referred to is located approximately 23 km northwest of the study area concerned in this report.

Klipspruit Extension: Weltevreden

The Heritage Impact Assessment (HIA) survey for the Klipspruit Extension: Weltevreden project was conducted by Du Piesanie (2014). The project entailed an assessment of the built environment that included a field reconnaissance survey that identified, recorded, and documented all structures and burials in the project area, in addition to the sites identified by Cultmatrix cc (De Jong 2009). The HIA recorded 57 heritage sites within the project area: 20 burial grounds, 34 built structures and 1 palaeontology and meteorites sites. The Klipspruit Extension project is located approximately 25 km northwest of the proposed Roodepoort Colliery Mining Right.

Vlaklaagte Block 6 Open Pit on the Farm Lourens 472 IS

The Phase 1 HIA for the Vlaklaagte Block 6 Open Pit on the Farm Lourens 472 IS was conducted by Pelser (2019). The Block 6 area is located approximately 9 km east of the proposed Roodepoort Colliery Mining Right. The HIA recorded one cemetery and recommended that the graves be protected in situ. As an alternative, a grave relocation process was recommended.

3.1.2 Historical topographical maps & aerial images

The historical aerial image dating to 1954 (**Appendix A: Figure 38**), as well as the 1962/1965 topographical map (**Appendix A: Figure 39**) show the presence of buildings and cultivated land in the north-western quadrant of the study area, while the remaining area appears to consist of open veldt. The same detail, except for additional buildings in the north-eastern corner of the study area, is evident on the 1968 aerial image (**Appendix A: Figure 40**). The aerial images dating to 1978, 1991, 1997 and 2005, as well as the 1984, 1995/1996, and 2009

topographical maps (**Appendix A: Figures 41 – 47**) indicate the majority of the study area to be significantly impacted by mining activities. A section between the secondary road and the Steenkoolspruit, as well as a section along the south-eastern boundary of the proposed Mining Right area, however, appear to have remained largely unaffected. It is worth noting that the proposed infrastructure areas are located on areas previously disturbed by mining activities.

3.2 Limitations

The pedestrian survey (June 2022) confirmed that the study area consists of a combination of open grassland and rehabilitated mined land. Movement was slightly hampered in a few places by wet and marshy conditions (**Figure 12**), but the general visibility was considered to be good. No other access constraints were encountered. It should be noted that an area of roughly 100 ha along the south-western border of the proposed Mining Right area was requested to be excluded from the study and was therefore not inspected. This area, however, is completely located within an area previously disturbed by mining activities and is not considered to be sensitive from a heritage perspective.

Figure 12: Wet and marshy conditions associated with some areas.

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. The phase in the South African War that is significant in terms of the study area relates to the period after the British occupied Pretoria on 5 June 1900. During this time the republican forces retreated towards the eastern boundary of the *Zuid-Afrikaansche Republiek* under General Louis Botha and started employing guerrilla tactics (Matakoma Heritage Consultants 2007).

One of the more important and well-known South African War sites in the vicinity of the study area is the Battle of Bakenlaagte, located approximately 17 km southwest of the study area. The battle took place on 30 October 1901 between Lieutenant Colonel George Benson's Flying Column and the joint forces of General Louis Botha and General Sarel Grobler. Benson's Flying Column continuously threatened Boer commandos that caused the commandos to move camp every two days. Grobler had been following Benson's trail and harassed his rearguard, but it was only after Botha and his commando joined Grobler's commando that an attack could be launched. Benson's column was enroute from Syferfontein to Balmoral to resupply his men and horses. The column,

consisting of more than 300 wagons, 800 horses and 600 infantry, aimed to camp at Bakenlaagte farmstead (Von der Heyde 2013: 208-209).

During the march, the column stretched out over a distance of approximately 2 km. The advance guard reached the Bakenlaagte farmstead at 09:00, but one of the rearguard wagons got stuck in mud when crossing a drift. Because the Boers were close by and visibility was poor, Benson rode back towards the rearguard and ordered two field guns be placed on a stony ridge between the camp and the rearguard. Benson was on his way to rescue the wagon when Botha with 800 men launched his attack. Upon seeing the attack, Benson ordered a retreat to Gun Hill, where the field guns were positioned. Two companies were also on their way from the camp to Gun Hill. At this stage Benson ordered some of the rearguard toward the northeast to protect the camp, creating a gap through which the Boers attacked. The position was overrun and of the 280 soldiers, the British suffered 231 casualties. Before Benson succumbed to his wounds, he ordered the camp to fire their guns at the hill, despite the danger to him and his men. The shelling drove the Boers back, but ambulance wagons provided cover and they manged to capture the two field guns. The Boers lost almost 100 men and decided not to follow up with an attack. The 73 British soldiers, including Benson, who were killed in the Battle were buried on Gun Hill, but were later exhumed and reburied in Germiston's Primrose Cemetery (Von der Heyde 2013: 208-209)

4.2.2 Coal mining general history 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 Lorenço 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).

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

According to Bergh (1999: 5), no major Stone Age archaeological sites are located in the direct vicinity of Kriel, but some rock art have been noticed in the area to the south of eMalahleni (Bergh 1999: 6).

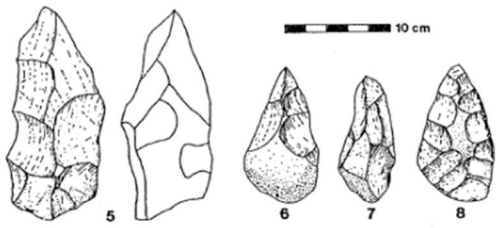

Figure 13: ESA artefacts from Sterkfontein (Volman 1984).

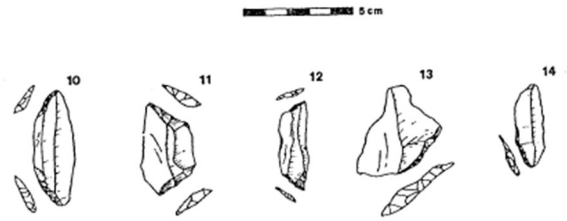

Figure 14: MSA artefacts from Howiesons Poort (Volman 1984).

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 conducted in the surrounding areas also did not locate Iron Age material remains.

5.3 Historical Remains

One potential site (B01) consisting of buildings was observed on the 1968 aerial image (**Appendix A: Figure 40**) near the northern corner of the study area, but is not visible on the 1954 aerial image and is not shown on the 1962/1965 topographical map (**Table 3, Appendix A: Figures 38 & 39**). The site might have been omitted from the topographical map, which suggests that the buildings could have been constructed between 1954 and 1968. Since no buildings are visible on the 1978 aerial image (**Appendix A: Figure 41**), it is likely that the buildings were demolished between 1968 and 1978. The site inspection also confirmed the absence of surface remains (**Figures 16 – 19**).

Heritage studies conducted in the surrounding areas recorded several historical buildings and homesteads. See PGS (2010) and Du Piesanie (2014).

Table 3: Historical Sites.

Name	Type	Source	Year	Current Status	Surface Indications
B01	Building	Aerial	1968	Demolished	None

Figure 16: Site B01 seen from the southeast.

Figure 17: Site B01 towards the northwest.

Figure 18: Southern section of Site B01.

Figure 19: Northern section of Site B01.

5.4 Contemporary/Natural Remains

No contemporary sites were located within the demarcated study area.

Heritage studies conducted in the surrounding areas did not mention any significant contemporary remains. See PGS (2010), Du Piesanie (2014), and Pelser (2019).

5.5 Graves/Burial Sites

One unfenced cemetery consisting of 17 graves was recorded during the site inspection (Site F01). The site is located near the northern corner of the study area and within the boundary of Site B01. Cemetery F01 consists of 13 formal and 4 informal surface decorations (**Figures 20 – 36**), and is in a dilapidated state since several headstones have fallen over. The formal graves consist of cement or brick-lined surface features and formal headstones, while the informal graves are all associated with elongated stone cairns without headstones or inscriptions. All the graves are placed in an approximate east-west orientation, known as the Christian Western style. In terms of grave goods, one clay pot, a ceramic bowl and a beer bottle were observed. Due to the dilapidated state of the cemetery and the lack of recent burials, it is assumed that the cemetery is no longer in use, but might still be visited. The majority of the headstones with inscriptions date to the 1970's. The oldest visible date is 1960, while the most recent is 1973.

The heritage studies conducted in the area, PGS (2010), Du Piesanie (2014) and Pelser (2019), recorded the presence of several graves and cemeteries.

Table 4: Burial Sites.

Name	Type	Source	Year	Status	Age
F01	Cemetery	Field	N/A	Dilapidated	Some exceeding 60 years

Figure 20: Cemetery F01 seen from the northwest.

Figure 21: Cemetery F01 seen from the southwest.

Figure 22: Grave dating to 1968.

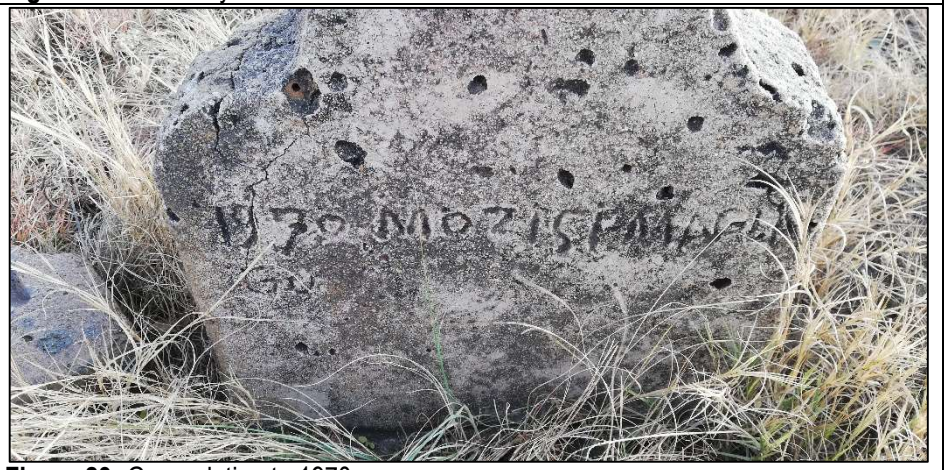

Figure 23: Grave dating to 1970.

Figure 24: Clay pot.

Figure 25: Ceramic bowl.

Figure 26: Beer Bottle.

Figure 27: Ineligible inscription.

Figure 28: Grave dating to 1960.

Figure 29: Formal grave without inscriptions.

Figure 30: Formal grave dating to 1973.

Figure 31: Broken headstone dating to 1970.

Figure 32: Dilapidated grave.

Figure 33: Grave of K. Skhosana.

Figure 34: Grave of G. Skhosana.

Figure 35: Grave without inscription.

Figure 36: Informal grave.

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 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
2629AA-F01	Cemetery	Local	Grade 3 A	High	Mitigation not advised
2629AA-B01	Demolished Buildings	General Protection C	4 C	Low	No recording necessary

7. Statement of Significance & Recommendations

7.1 Statement of Significance

The study area: The Proposed Roodepoort Colliery Mining Right

One site associated with demolished buildings (Site B01) and one cemetery (Site F01) were noted near the northern corner of the proposed Mining Right. The eastern half of the demarcated Mining Right also falls within 500 m of a river, an area generally considered to be sensitive from a heritage perspective (**Figure 37**). However, according to historical aerial imagery and topographical maps, the majority of the proposed Mining Right area was subjected to opencast mining activities and crop cultivation that significantly lowered the sensitivity in terms of heritage resources. Heritage studies conducted in the surrounding areas noted the presence of historical building sites and graves/cemeteries.

- **Sites located within the demarcated development footprints**

No sites were located within the demarcated development footprints. It should also be noted that the associated footprints fall on previously mined areas that are not considered to be sensitive from a heritage perspective.

- **Sites located outside of the demarcated development footprint**

Site B01 was identified on the 1968 aerial image (**Appendix A: Figure 40**) as an area associated with buildings approximately 306 m northeast of the area demarcated for development. The buildings are not indicated on the 1962/1965 topographical map (**Appendix A: Figure 39**), but might have been omitted. The possibility, therefore, exists that the buildings were constructed between 1954 (**Appendix A: Figure 38**) and 1968 and might therefore exceed 60 years of age. However, the buildings have completely been demolished and no surface indications were observed during the site inspection. Since the site is also located a considerable distance from the proposed development, no impact is foreseen.

Site F01 was identified as a cemetery along the north-eastern border of the proposed Mining Right and within the Site B01 boundary. The cemetery appears to contain graves older, as well as younger than 60 years and are 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. Cemetery Site F01 is located approximately 650 m northeast of the proposed development and is therefore unlikely to be impacted.

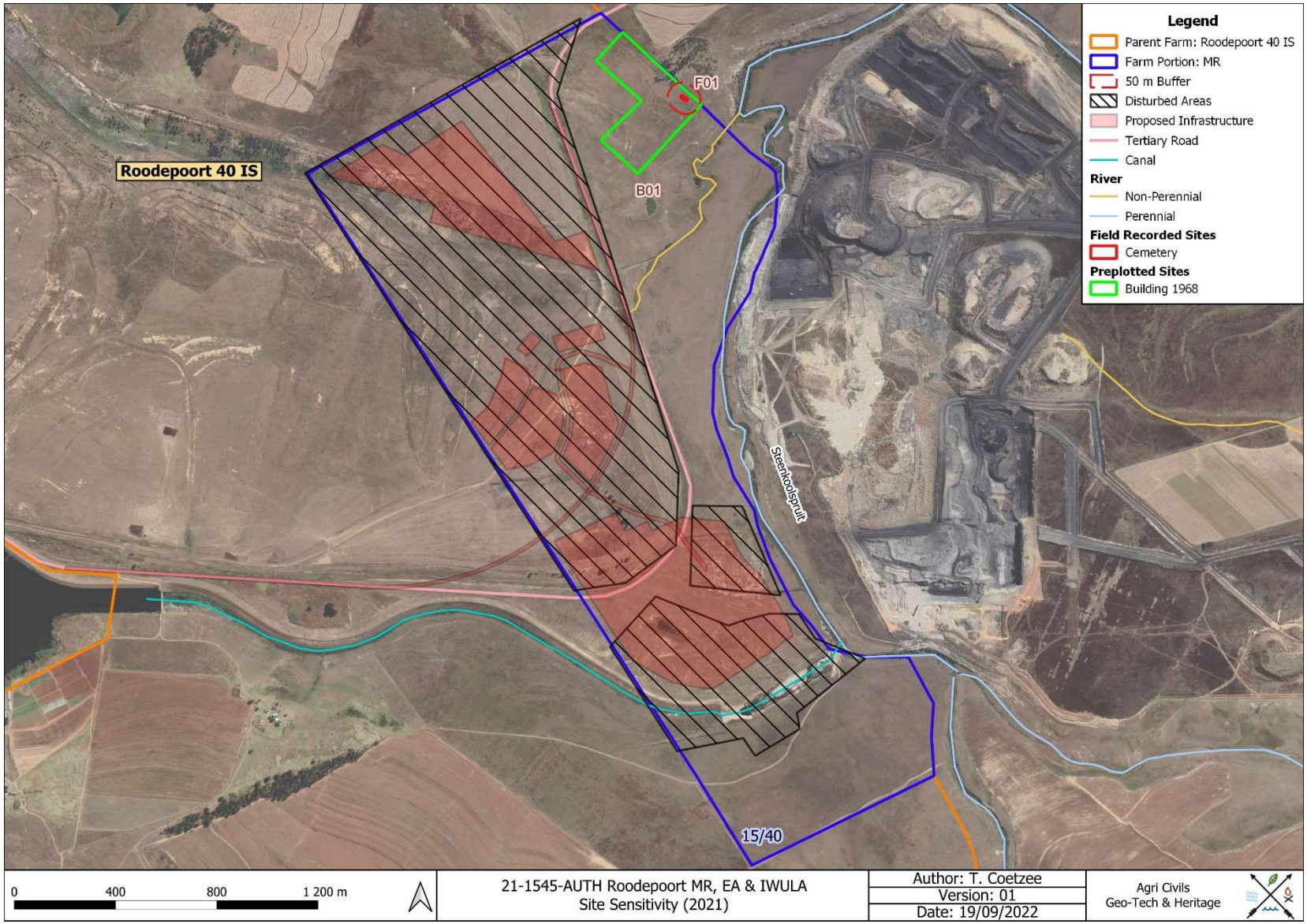

Figure 37: Study area and potentially sensitive areas portrayed on a 2021 satellite image.

7.2 Recommendations

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

- Site B01 used to be associated with buildings potentially dating to the Historic Period. The buildings, however, have completely been demolished and no surface indications are present. The site is not considered to be significant from a heritage perspective and since it is located approximately 306 m from the proposed development, is not at risk of being impacted.

- Site F01, a cemetery consisting of 17 graves, is located approximately 650 m from the proposed development. Some of the graves appear to exceed 60 years of age. Therefore, 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. Due to the proximity of the graves to the proposed development, it is unlikely that the site will be impacted by the proposed project. However, since the cemetery appears not to be in use anymore and in order to prevent accidental damage to the graves, a fenced-off conservation buffer of 50 m is recommended. Access to the cemetery should also not be refused.

- The above recommendations are based on the specific project activities and extents as indicated by 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.

- 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 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 must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).

- From a heritage point of view, development may proceed on the demarcated areas, subject to the abovementioned conditions, recommendations and approval by the South African Heritage Resources Agency.

8. Conclusion

The proposed Roodepoort Colliery Mining Right consists of surface infrastructure and activities impacting approximately 77.5 ha on previously mined and cultivated land that is not considered to be sensitive from a heritage perspective. The two identified sites, Sites B01 and F01, are located a significant distance from the proposed development and are therefore not at risk of being impacted by the proposed activities. However, a fenced-off conservation buffer of 50 m is recommended for cemetery F01.

Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed Roodepoort Colliery 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 selvage 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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National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town

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

Appendix A: Historical Aerial Imagery & Topographical Maps

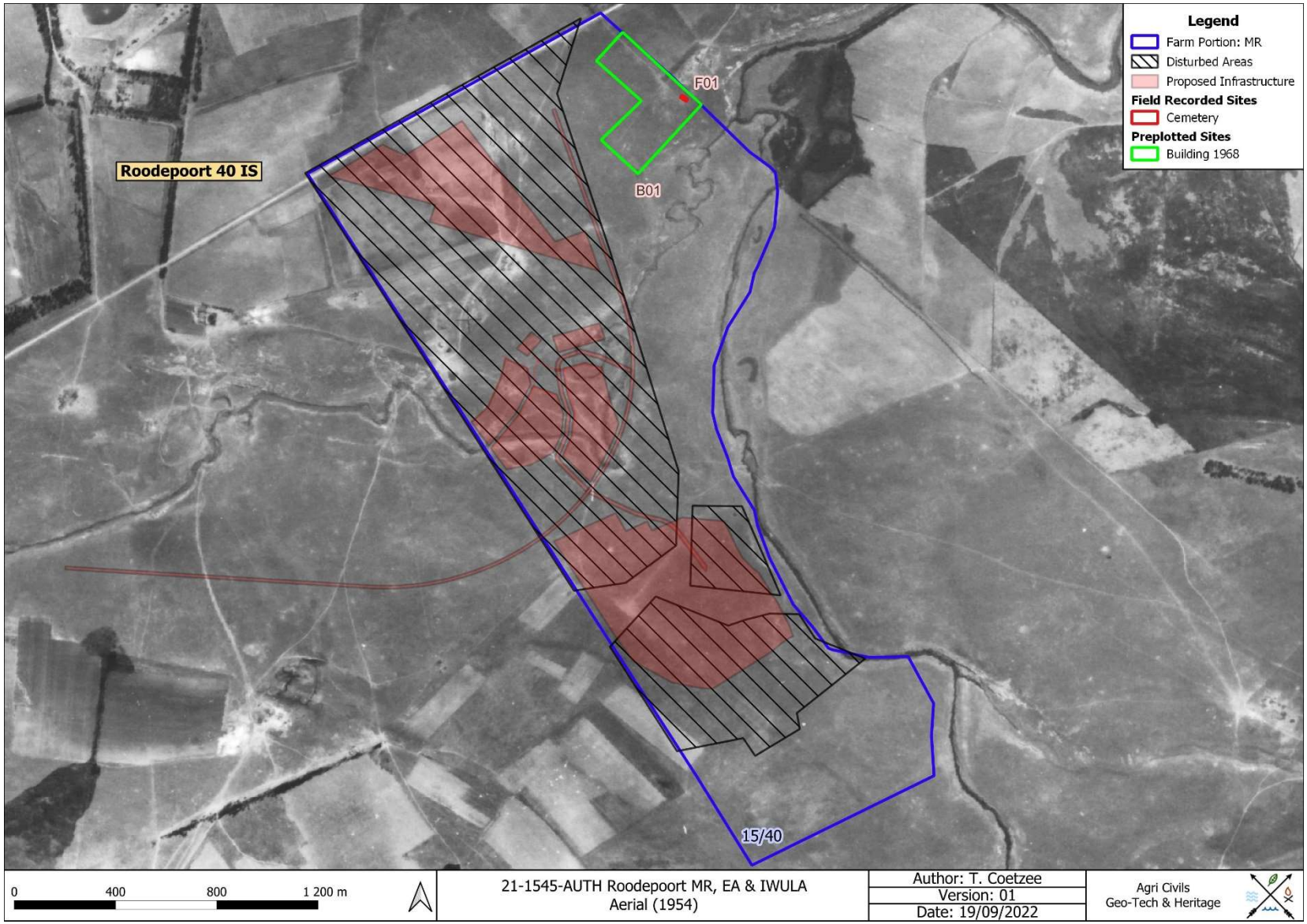

Figure 38: Study area superimposed on a 1954 aerial image.

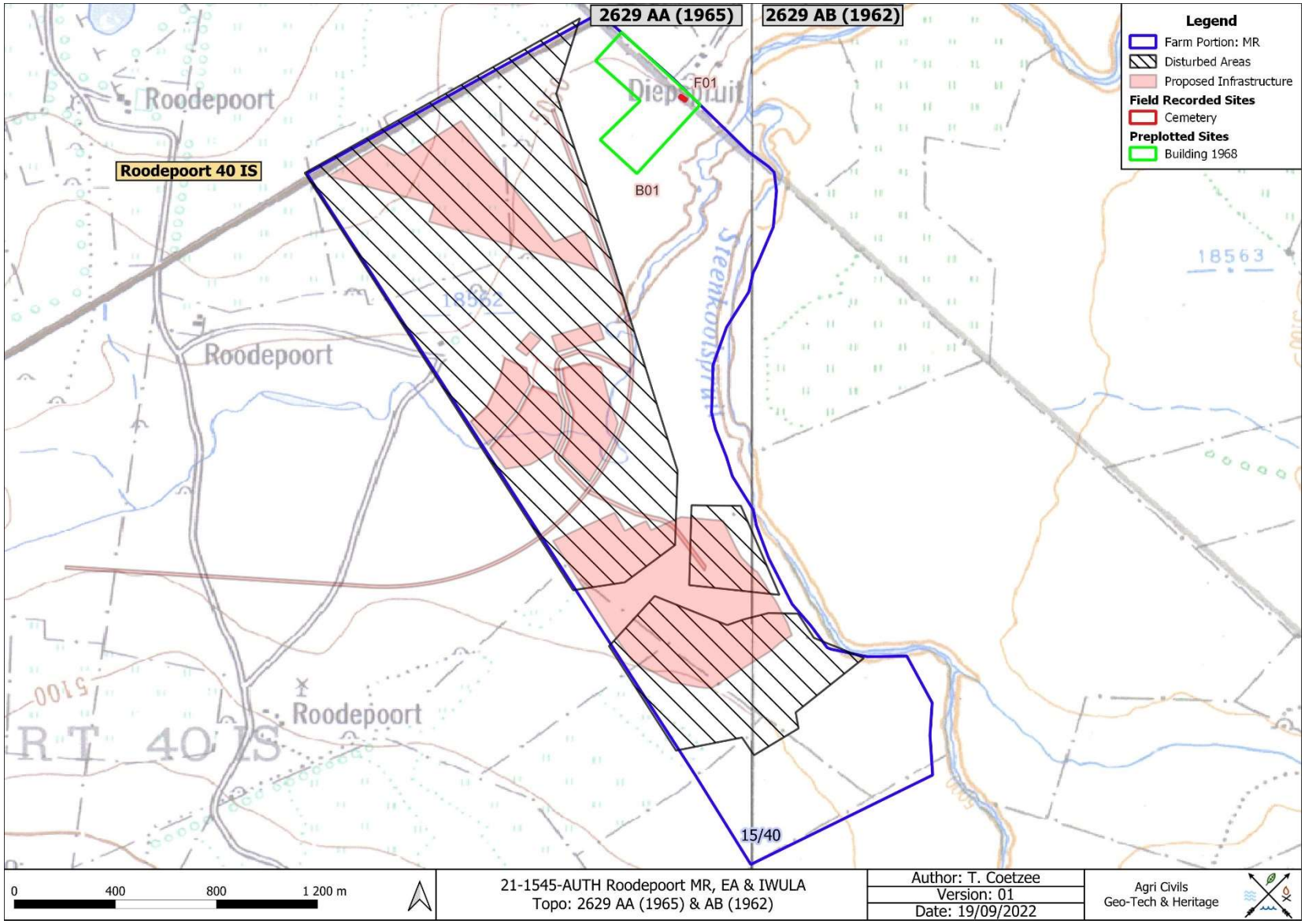

Figure 39: Study area superimposed on a 1962 and 1965 topographical map.

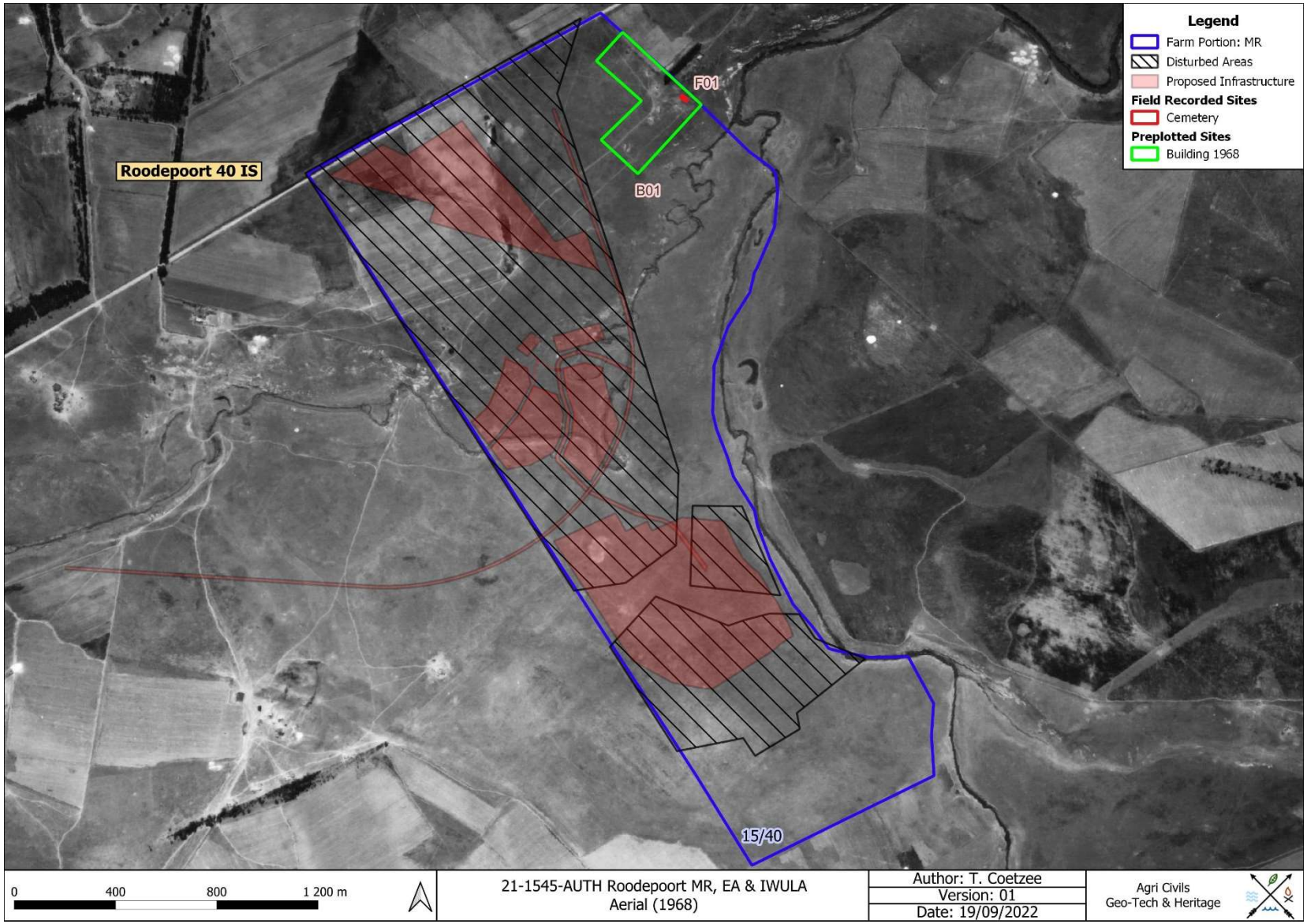

Figure 40: Study area superimposed on a 1968 aerial image.

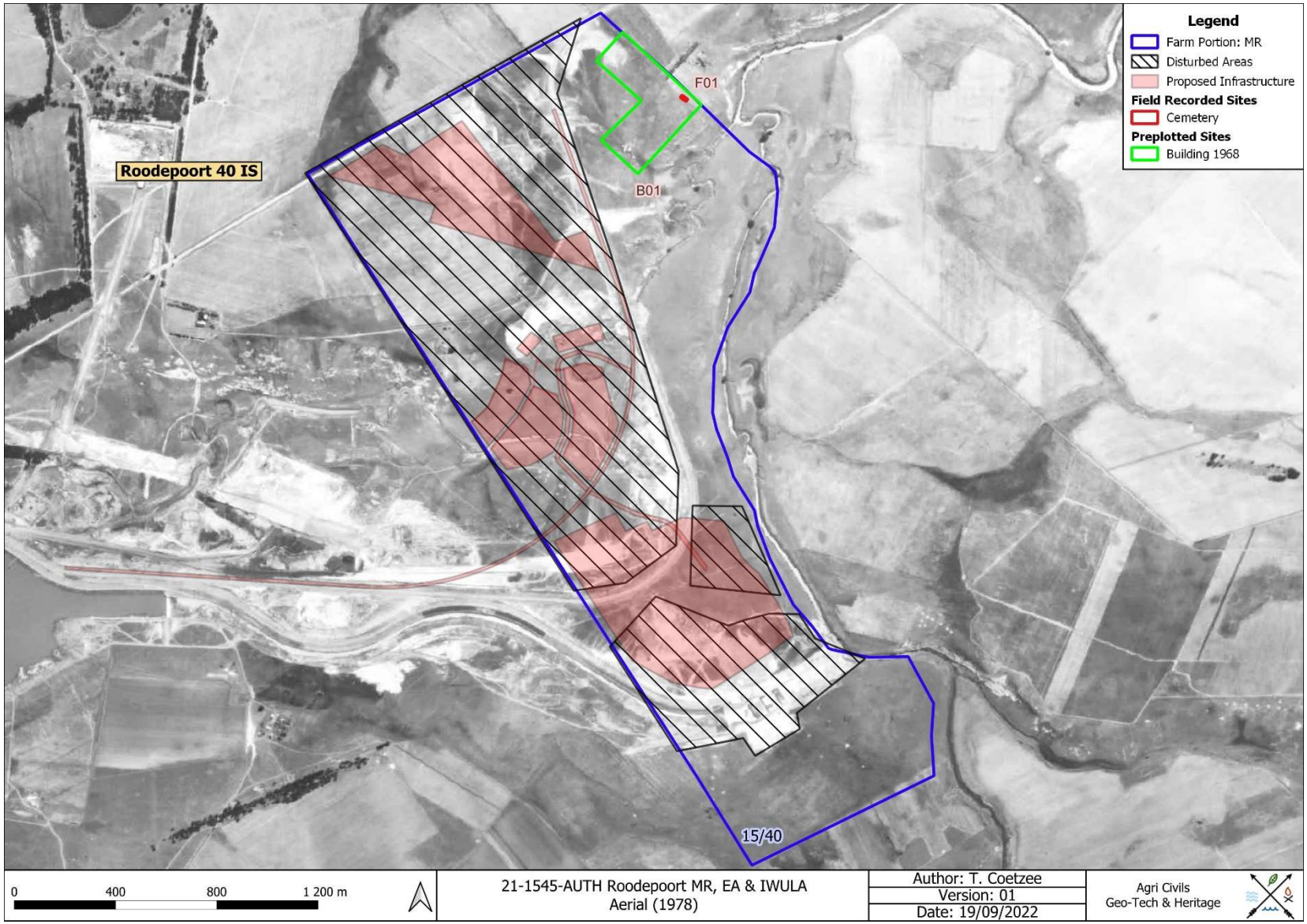

Figure 41: Study area superimposed on a 1978 aerial image.

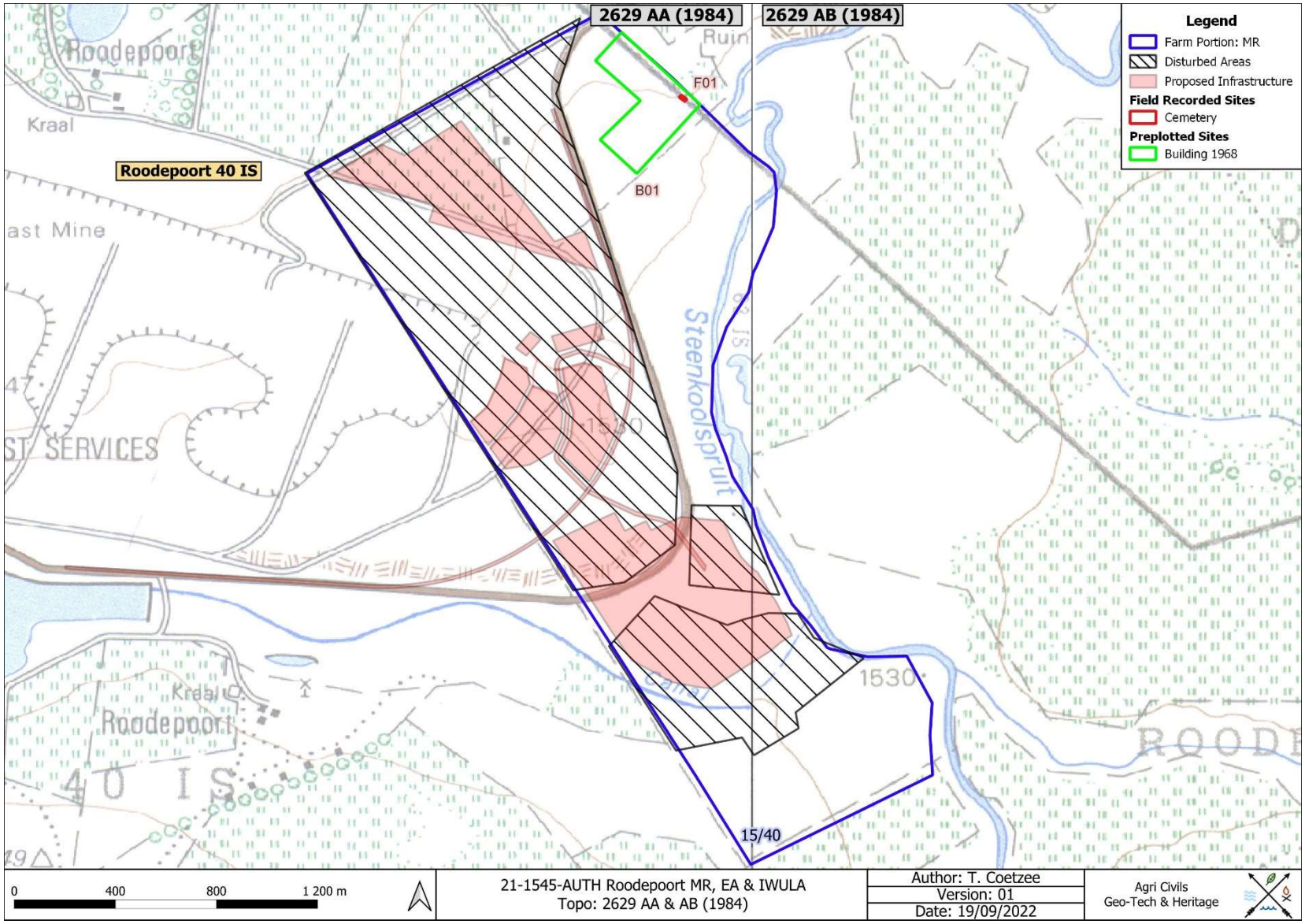

Figure 42: Study area superimposed on a 1984 topographical map.

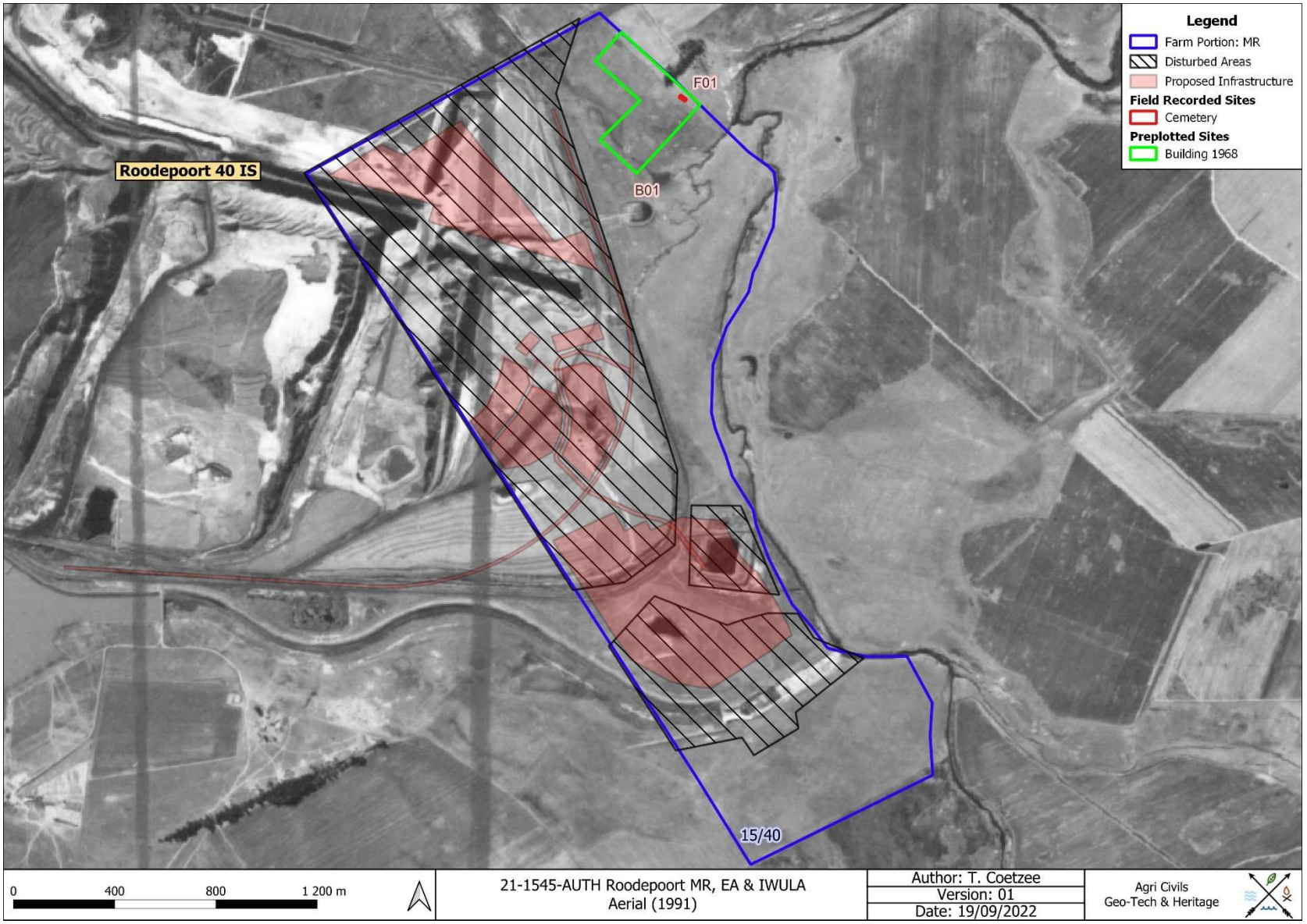

Figure 43: Study area superimposed on a 1991 aerial image.

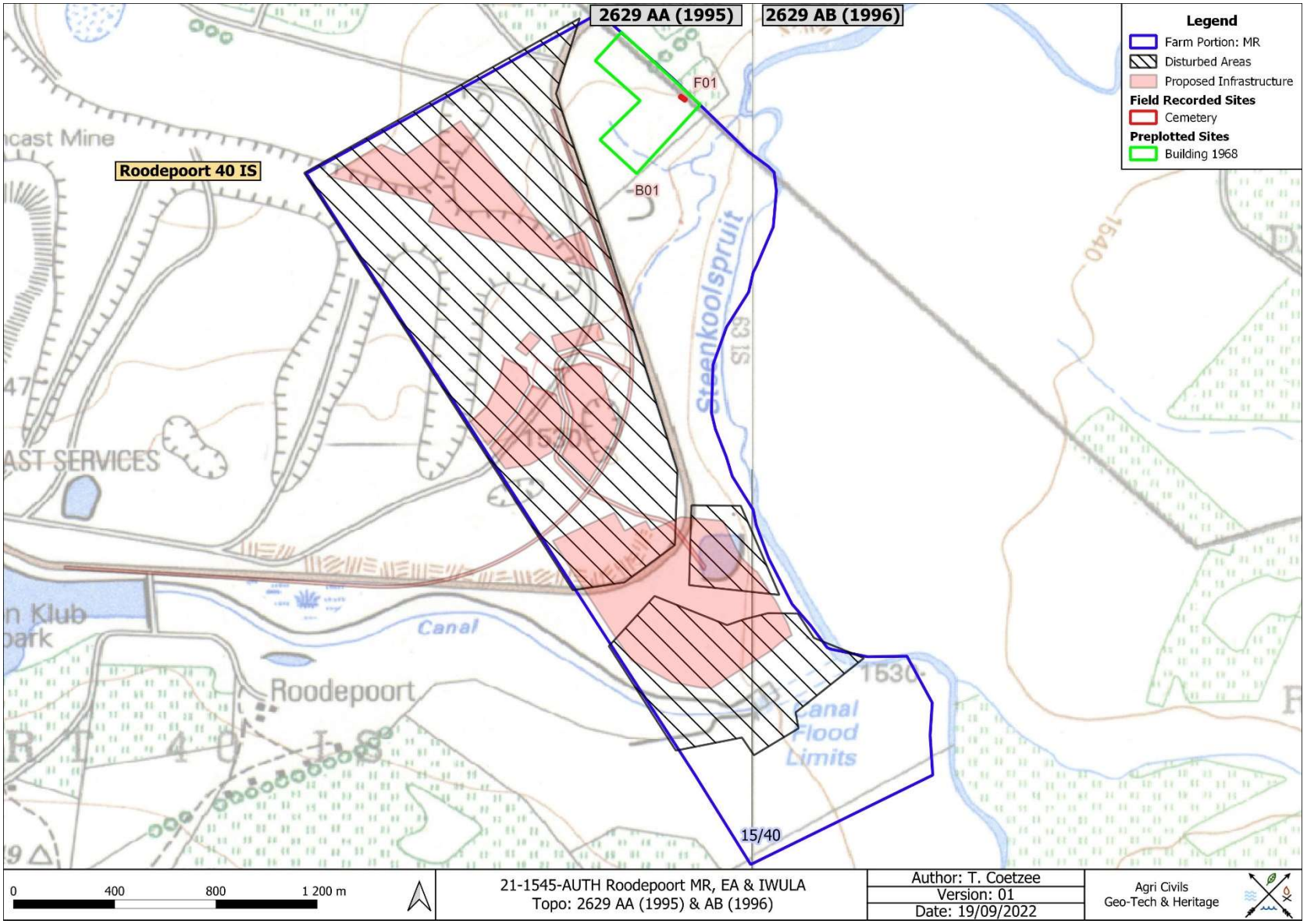

Figure 44: Study area superimposed on a 1995 and 1996 topographical map.

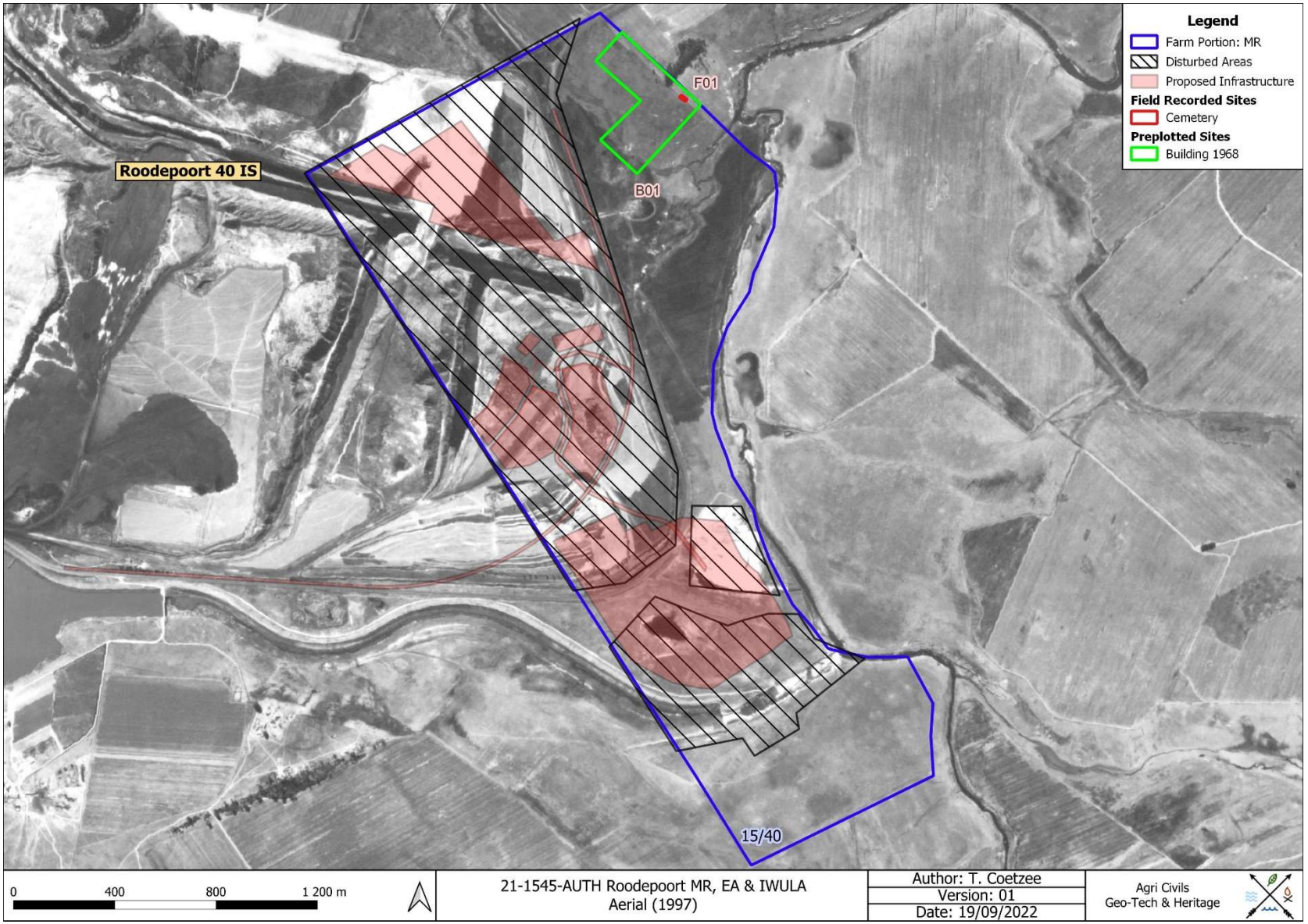

Figure 45: Study area superimposed on a 1997 aerial image.

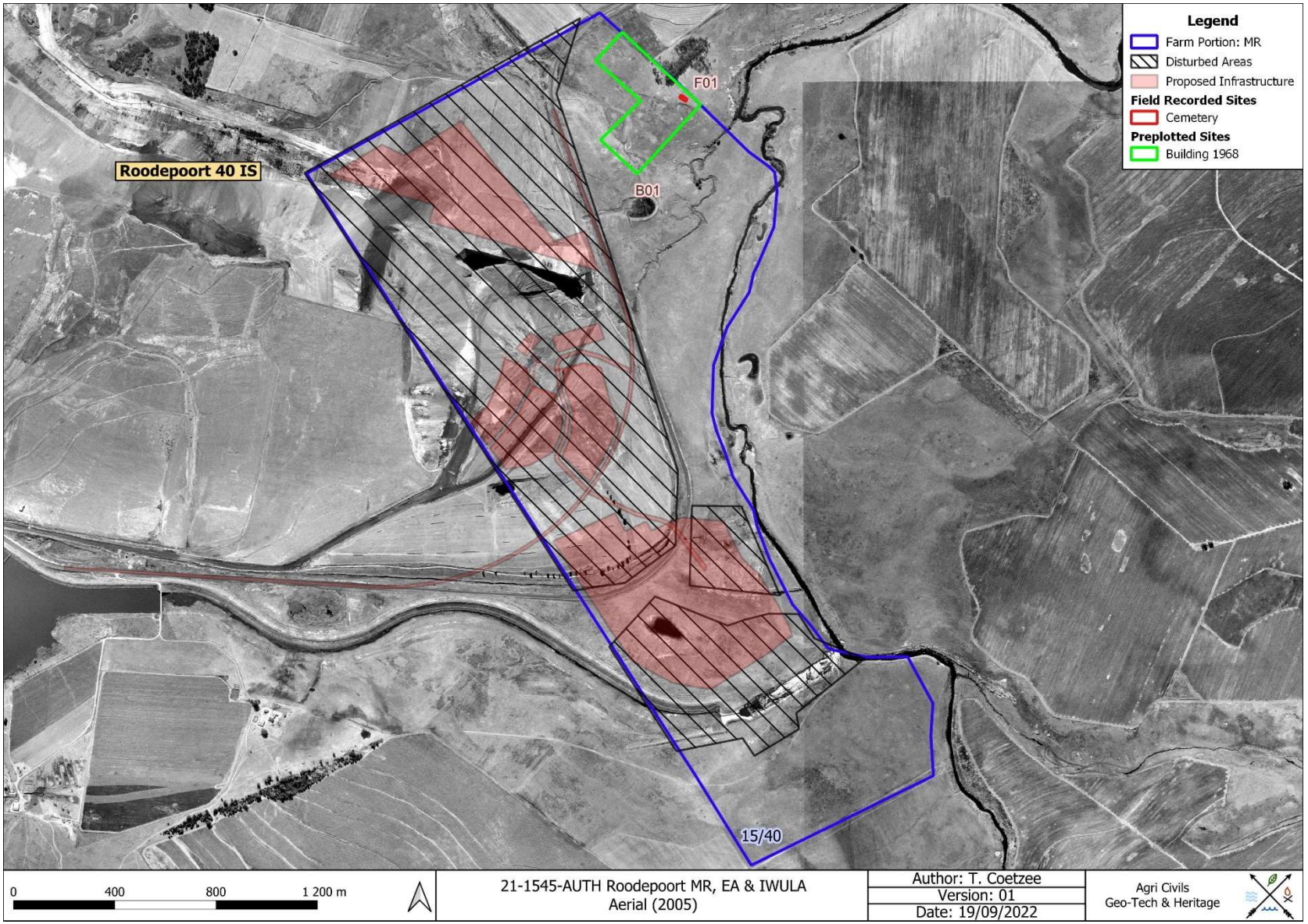

Figure 46: Study area superimposed on a 2005 aerial image.

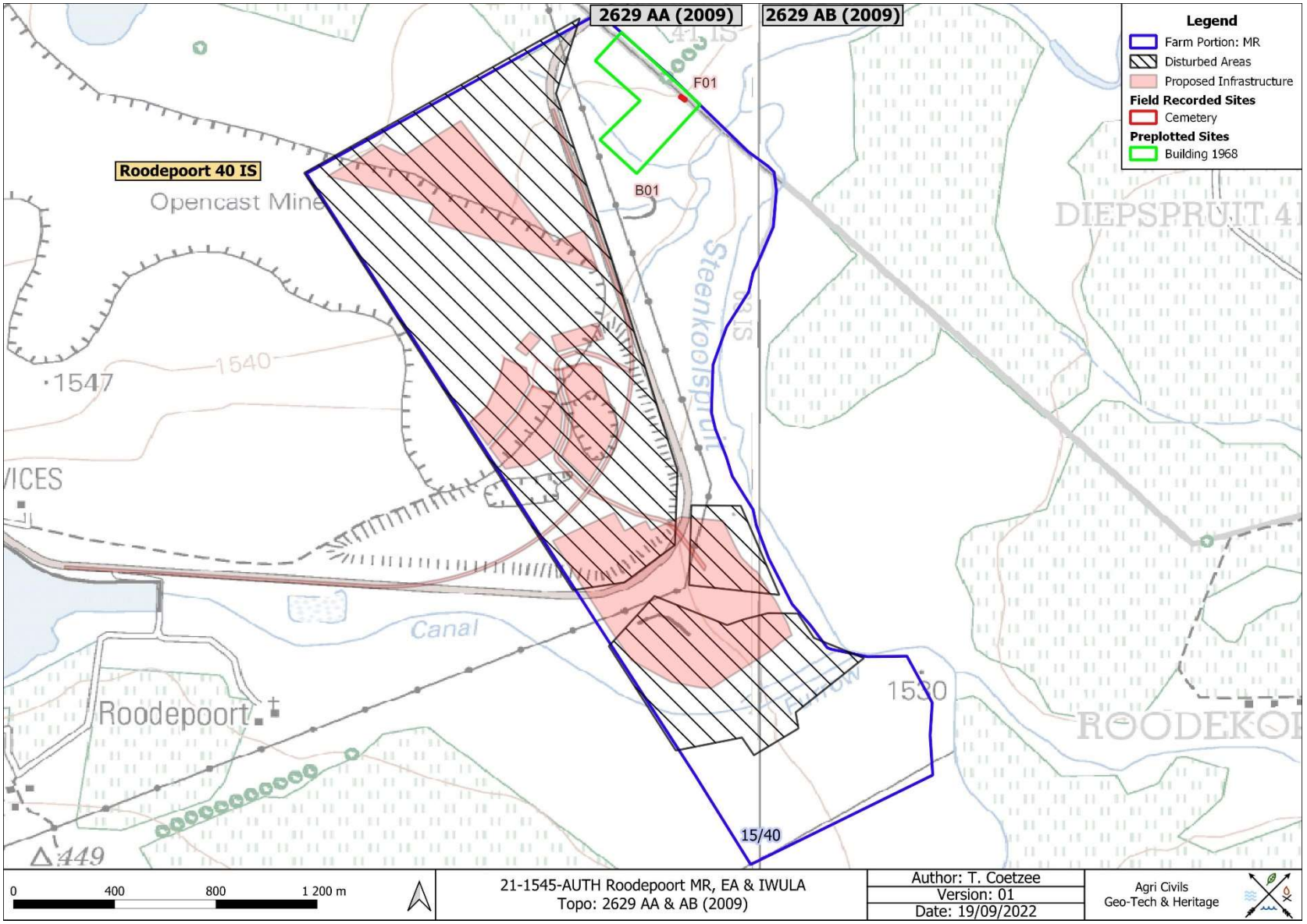

Figure 47: Study area superimposed on a 2009 topographical map.