



ARCHAEOLOGICAL DESKTOP STUDY

for the Proposed Tweefontein Coal Mine Prospecting Right near
Morgenzon, Mpumalanga

For:

Eco Elementum (Pty) Ltd

Project Ref:

Tweefontein PR

Date:


19/06/2023

**Archaeological Desktop Study for the Proposed Tweefontein Coal Mine Prospecting Right near Morgenzon,
Mpumalanga**

Project Ref: Tweefontein PR
Report No: EE_1606231
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 Tweefontein Coal Mine Prospecting 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.

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Executive Summary

Agri Civils Geo-Tech & Heritage was appointed by Eco Elementum (Pty) Ltd to undertake an Archaeological Desktop Study for the proposed prospecting of coal on Portions 7, 12 and 14 of the Farm Tweefontein 471 IS near Morgenon in the Mpumalanga Province. The aim of this report is to contextualise the general study area in terms of heritage resources and will provide the developers with general information regarding potentially sensitive areas. This will also shed light on what is to be expected during a Phase 1 Archaeological Impact Assessment and aid in interpreting finds.

A total of five building sites (Sites B01 – B05) were noted on historical topographical maps and aerial imagery, but since buildings and structures are not always indicated on topographical maps and are not necessarily visible on aerial imagery, additional sites might exist within the demarcated project area. Analysis indicates that four sites date to historical times, while one site potentially dates to historical times. One of the historical sites is associated with surface remains and four of the sites seem to have been demolished since no surface infrastructure could be identified on contemporary satellite imagery. Since some sites might be associated with subsurface historical material likely to exceed 60 years of age, the demarcated areas are considered to be sensitive from a heritage perspective. Should historical building remains be present, the remains might be protected under the National Heritage Resources Act (Act No. 25 of 1999). The five historical / potentially historical sites should therefore be avoided by the proposed prospecting activities. Should this not be possible, the sites must first be inspected by a qualified archaeologist.

Since a significant section of the study area falls within the 500 m river buffer, a zone considered to be potentially sensitive from a heritage perspective, care should be exercised when prospecting. Areas previously/currently associated with cultivated fields are considered to be disturbed and are less sensitive from a heritage perspective. Although the previously / currently cultivated areas are considered to be disturbed, the possibility of encountering subsurface cultural material still exists. Care should therefore still be exercised when prospecting in such areas. The least sensitive areas are areas falling outside of the 500 m river buffer zone, within previously / currently cultivated fields and not within close proximity of potential heritage sites, contemporary infrastructure or shelters.

The possibility also exists that culturally sensitive sites, such as burial sites, might have been created after cultivated fields fell into disuse, meaning that burial sites might be located on disturbed areas as well. Therefore, should uncertainty regarding heritage remains exist, it is advised that a qualified archaeologist be contacted prior to any impact.

A full Phase 1 Archaeological Impact Assessment must be conducted should any development that triggers an Archaeological Impact Assessment result from the prospecting project, including if the cumulative impact of the proposed prospecting project exceeds 0.5 ha.



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

SAHRIS – South African Heritage Resources Information System



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1. Project Background

1.1 Introduction

Eco Elementum (Pty) Ltd appointed Agri Civils Geo-Tech & Heritage to undertake an Archaeological Desktop Study for the proposed Tweefontein Coal Mine Prospecting Right on Portions 7, 12 and 14 of the Farm Tweefontein 471 IS within the Gert Sibande District Municipality in the Mpumalanga Province. The study area is located roughly 23 km east-southeast of Morgenzon (**Figure 1 & Table 1**). The purpose of this study is to contextualise the demarcated study area in order to determine the scope of heritage resources that might be encountered during the prospecting phase and subsequent heritage studies, as well as to provide recommendations for the safeguarding of archaeological resources during prospecting. The aim of this report is to provide the developer with information regarding heritage resources in the vicinity of the study area based on results from previous studies, written historical information and historical topographical maps and aerial photographs.

In the following report, a broad overview of the proposed prospecting right application for coal is provided and the study area is contextualised in terms of heritage resources. 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 the prospecting phase.



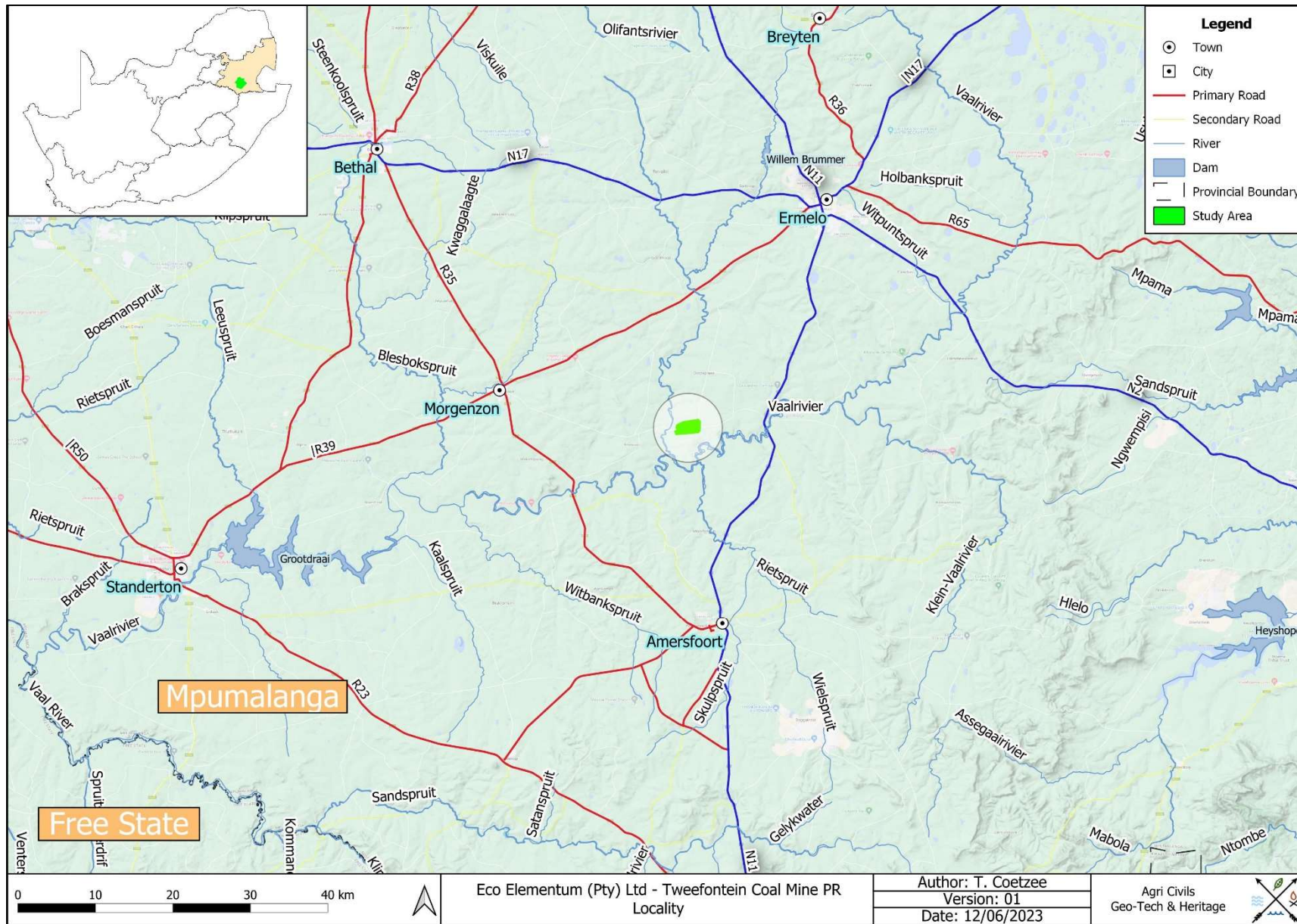
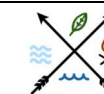


Figure 1: Regional and provincial location of the study area.



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 (Act No. 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 Tweefontein Coal Mine Prospecting Right is situated on the land parcels listed in **Table 1** and is illustrated in **Figures 2 & 3**.

Table 1: Land parcels & coordinates.

No	Property	Portion	Map Reference (1:50 000)	Lat (y)	Lon (x)	Extent (ha)
1	Tweefontein 471 IS	7/479	2629DD	-26.778836	29.838528	128.85
2	Tweefontein 471 IS	12/479	2629DD	-26.779786	29.827627	129.18
3	Tweefontein 471 IS	14/479	2629DD	-26.784737	29.821656	15.97
Total Extent						274.0

Morgenzon is located roughly 23 km to the west-northwest of the proposed prospecting area, while Amersfoort is located 25 km to the south and Ermelo 33 km to the northeast. The study area falls within the Lekwa Local Municipality and the Gert Sibande District Municipality within the Mpumalanga Province. The N11 national road runs in a north-south direction 8 km to the east.

In terms of vegetation, the study area falls within the Grassland Biome and Mesic Highveld Grassland Bioregion. On a local scale, the majority of the study area falls within the Amersfoort Highveld Clay Grassland, while the north-western corner of the demarcated study area falls within Soweto Highveld Grassland (Mucina & Rutherford 2006).

Soweto Highveld Grassland is found in the Mpumalanga and Gauteng Provinces between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River in the south. The western parts extend along the southern edge of the Johannesburg Dome as far as Randfontein and include Vanderbijlpark and Vereeniging in southern Gauteng, as well as Sasolburg in the northern Free State. This type of vegetation is considered to be endangered and has a conservation target of 24%. Only small patches are conserved and cultivation, urban sprawl, mining, dams and road infrastructure have transformed about half of the area. Erosion is generally very low (Mucina & Rutherford 2006).



Amersfoort Highveld Clay Grassland is found in the Mpumalanga and KwaZulu-Natal Provinces between Ermelo in the north, through Amersfoort to Memel in the south. This type of vegetation is considered to be vulnerable, has a conservation target of 27%, but none is protected. Cultivation transformed about 25% of the vegetation and the associated area is not suitable for afforestation. Erosion is generally low and very low (Mucina & Rutherford 2006).

According to Mucina & Rutherford (2006), the average elevation for Soweto Highveld Grassland ranges from 1420 to 1760 Metres Above Sea Level (MASL), while Amersfoort Highveld Clay Grassland is found between 1580 and 1860 MASL. The average elevation of the study area is 1622 MASL and is generally associated with an even gradient.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 823 mm. The average annual temperature is 15.2 °C. The average summer temperature is 18.7 °C, while the winter temperature averages 9.1 °C (Climate-data.org accessed 14/06/2023).

The study area falls within in the C11G quaternary catchment of the Vaal Water Management Area. The Vaal River flows approximately 1.6 km to the south of the demarcated study area, while a perennial offshoot and several non-perennial streams intersect portions 7 and 12 of the Farm Tweefontein 471 IS. The Grootdraai Dam is located approximately 40 km to the west-southwest of the study area and the Heys Hope Dam 67 km to the east-southeast.

Access to the demarcated study area appears to be through a tertiary road turning from the N11 national road to the east of the study area. Approximately half of the study area appears to consist of open veldt, while the remaining areas consist of currently / previously cultivated land. The land use of the undisturbed section is unknown, but is likely to be utilised as pasture for cattle. In terms of infrastructure, only a building ruin is visible on Portion 7 of the Farm Tweefontein 471 IS. The general surroundings appear to be associated with crop cultivation and farming related activities.



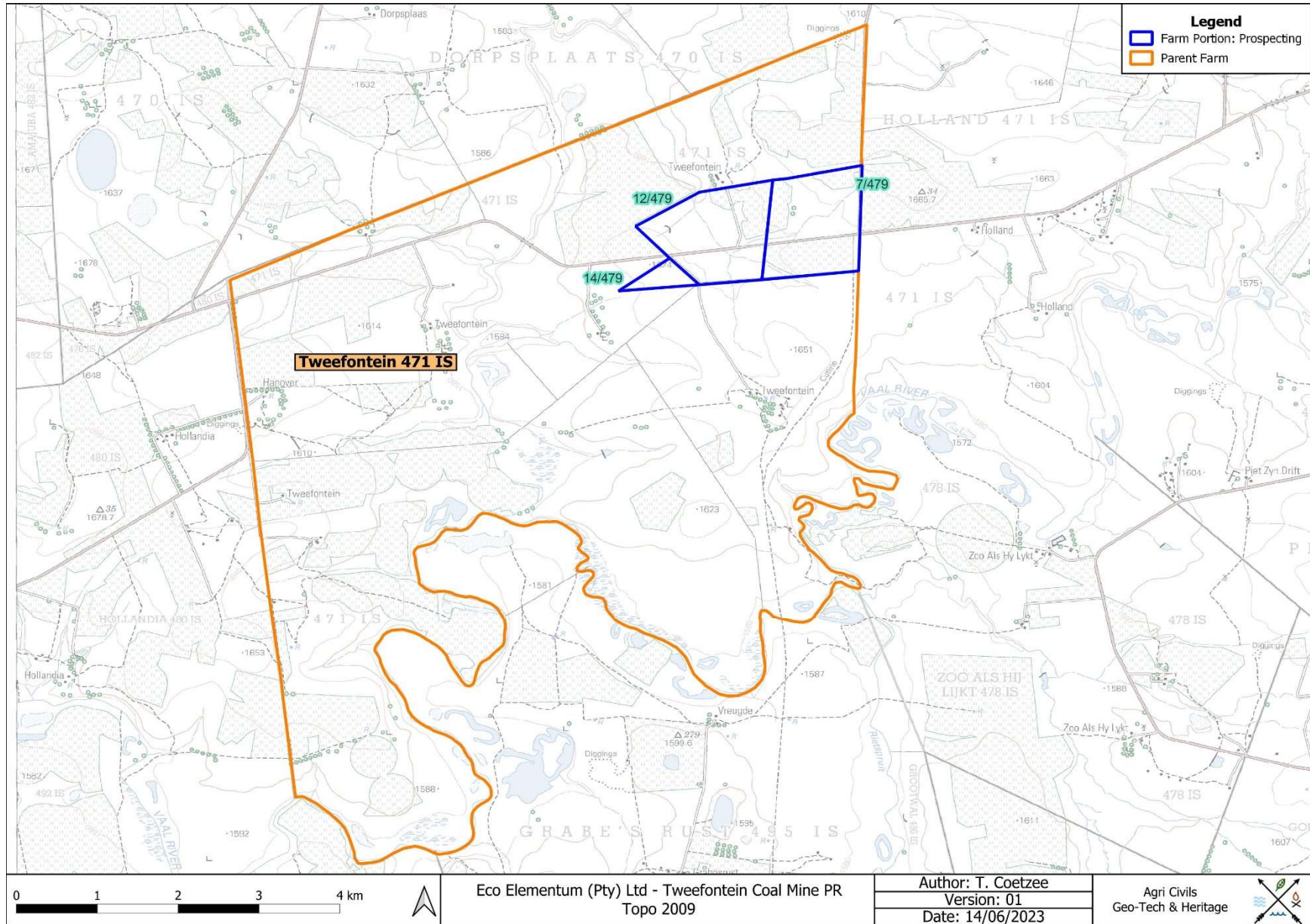


Figure 2: Segment of SA 1:50 000 2629 DD indicating the area demarcated for prospecting.



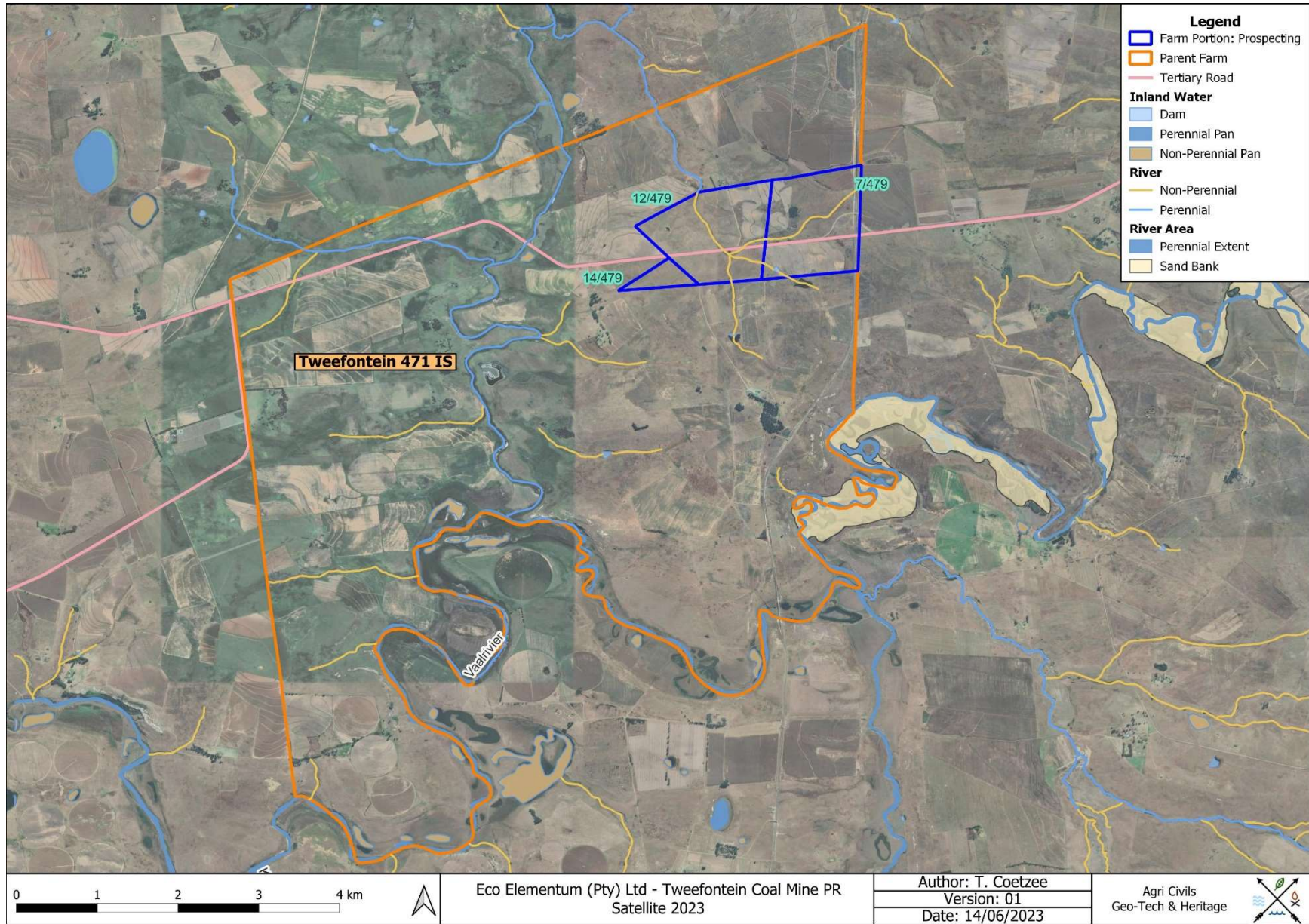


Figure 3: Proposed prospecting area portrayed on a 2023 satellite image.



2.2 Project Description

The prospecting right application for coal covers approximately 274 ha (**Figures 2 & 3**). For the prospecting phase, however, several sites will be selected for geotechnical drilling. These boreholes and its associated activities will impact a surface area of between 250 and 625 m². The full extent of the drill site will also be demarcated and no drilling will be done outside of the boundary.

Prospecting activities will include the following:

Current access roads will be used as far as possible, but in cases where access roads to drill sites do not exist, a single track will be selected based on the area where the least environmental impact will occur. The same tracks will be used should repeated access be required. Vegetation and topsoil excavated during the drilling process will be stockpiled next to sumps where it will serve as a storm water diversion berm. On completion of the drilling process, the rehabilitated sumps will be backfilled with the stockpiled material. Because a constant water supply is needed for the drilling process, 15 000l will be stored in tanks. The plastic-lined sumps will be used to recycle water through a filter process in order to maintain a constant clean water source for the purpose of drilling. In terms of potable water for employees and workers, a temporary 260l tank will be placed on-site. Additional facilities will include temporary portable toilets, berms, and a maximum of 60m³ of diesel fuel located on an impermeable surface with bunds

3. Methodology

Archaeological reconnaissance of the study area was conducted by means of inspecting historical aerial imagery and topographical maps in order to identify potential heritage remains (**Appendix A**). The historical topographical datasets dating to 1955, 1973, 1991, and 2009, as well as the historical aerial images dating to 1955, 1963, 1968, 1991, and 2005, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. Five potential sites were observed within the demarcated boundary using these data sources (**Table 2 & Figure 4**). It should be noted that the prefix '2629DD' is not used when referring to the site names due to the length of the names, but are recorded as such in **Tables 2 & 6**. Based on contemporary satellite imagery, four of the sites (B02 – B05) appear to have been demolished since no surface remains are visible (**Figures 5**), while some surface remains are visible at one of the sites (B01). The total area inspected was 274 ha. Since heritage resources are often associated with water sources such as perennial and non-perennial rivers/streams, these water sources were buffered by a distance of 500 m, indicating a potentially sensitive area (**Figure 17**). The areas previously / currently associated with cultivated land were traced and plotted as shown on topographical maps, indicating disturbed areas that are less sensitive from a heritage perspective (**Figure 17**).



Table 2: Potential Sites.

Site No	Type	Parent Farm	Farm Portion	Current Status	Age	Estimated Extent (ha)	Lat (y)	Lon (x)
2629DD-B01	Building	Tweefontein 471 IS	7/479	Surface Remains	Historical	0.9	-26.779255	29.836235
2629DD -B02	Building	Tweefontein 471 IS	7/479	No Visible Remains	Historical	0.7	-26.778659	29.839619
2629DD -B03	Building	Tweefontein 471 IS	7/479	No Visible Remains	Historical	0.7	-26.777808	29.842624
2629DD -B04	Building	Tweefontein 471 IS	14/479	No Visible Remains	Historical	0.3	-26.786221	29.817348
2629DD -B05	Building	Tweefontein 471 IS	7/479	No Visible Remains	Potentially Historical	0.8	-26.777276	29.838524



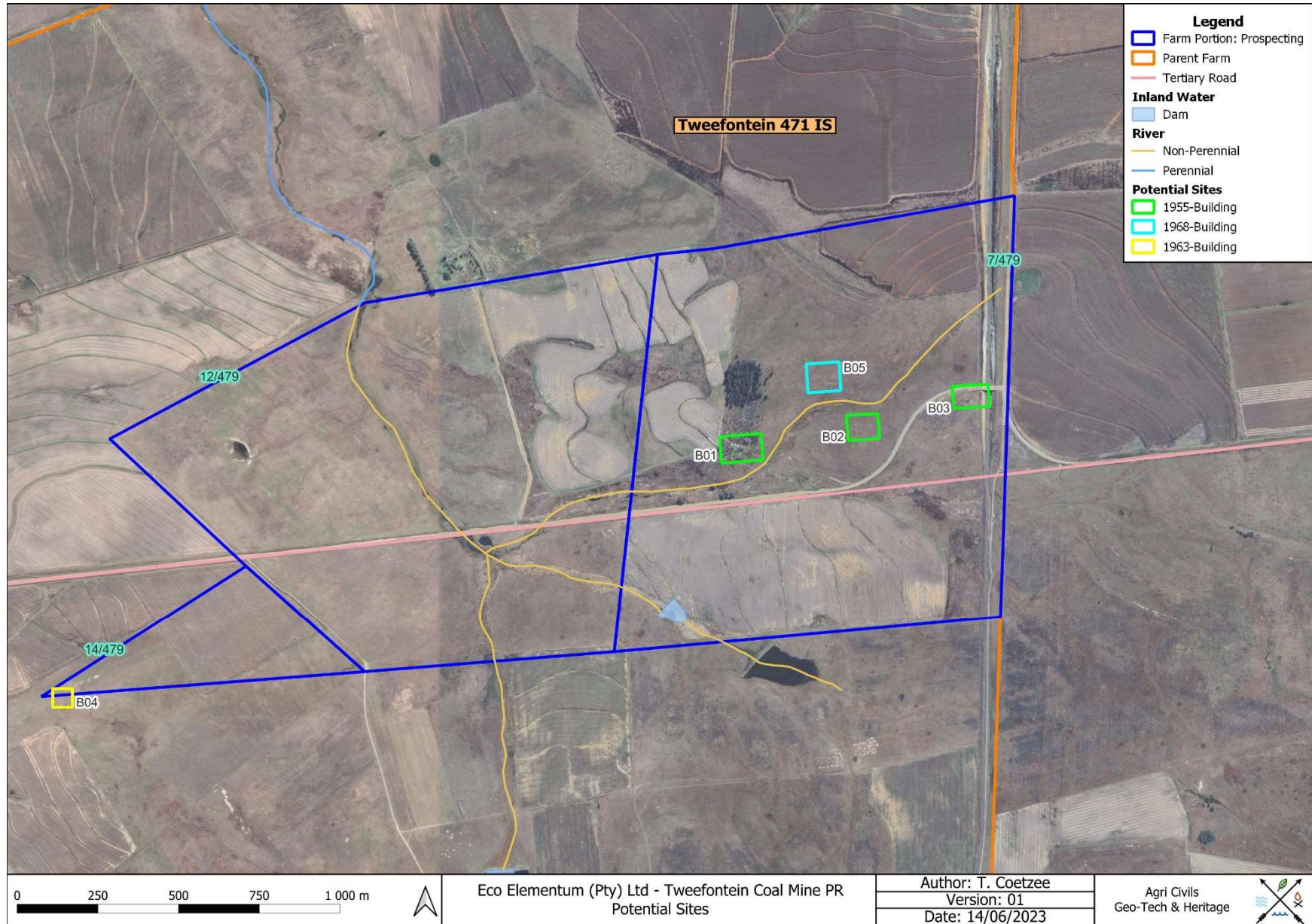


Figure 4: Potential Sites.



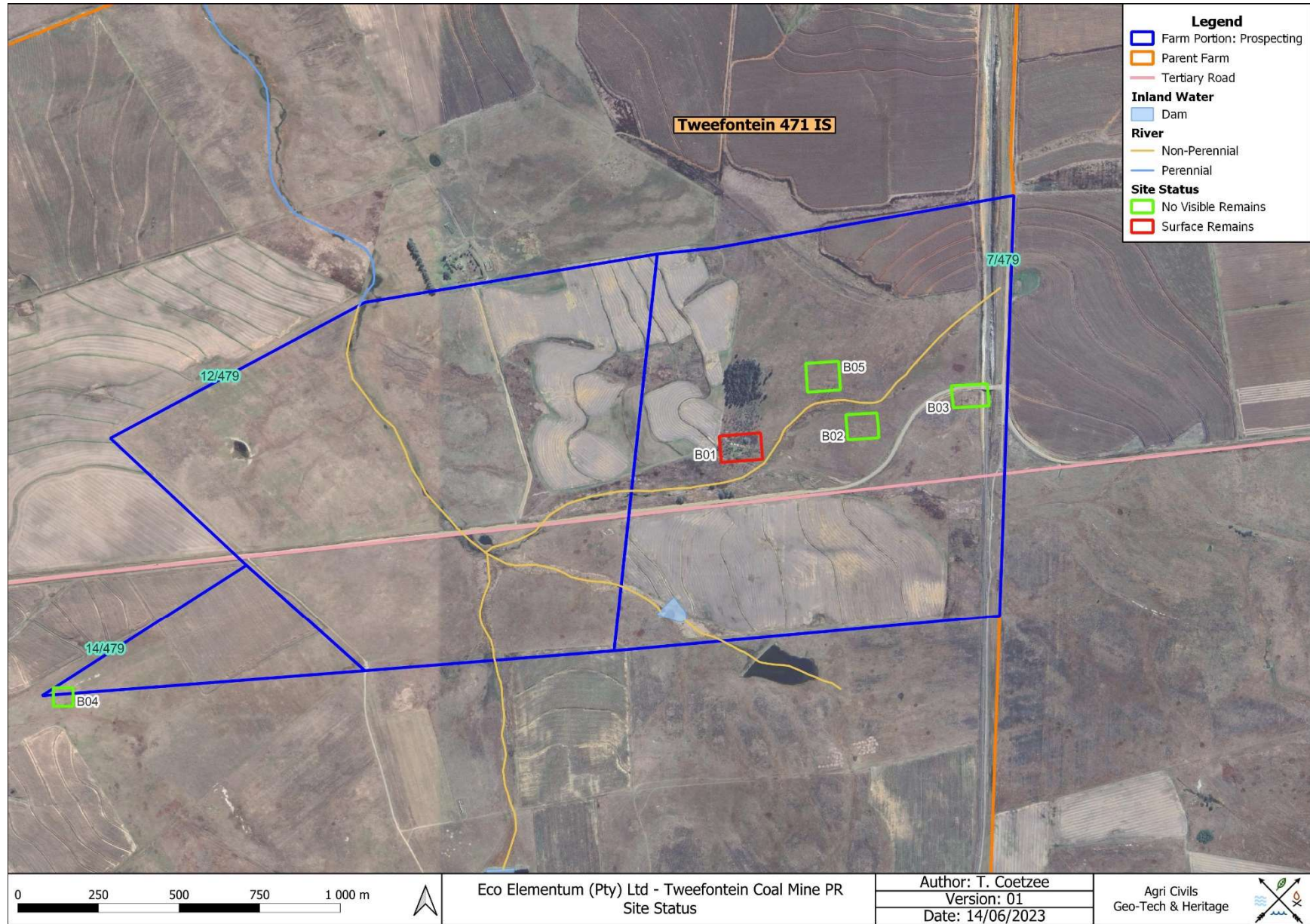


Figure 5: Site Status.



3.1 Limitations

Using historical topographical maps and historical aerial images for locating heritage resources have several shortcomings. Potential heritage remains, such as buildings, structures and graves/cemeteries, are not always indicated on topographical maps and are often omitted between different publications. Historical aerial imagery, on the other hand, might have a poor image resolution that renders potential heritage sites invisible. Inaccuracies during the georeferencing process may also lead to some heritage sites not being plotted, as well as dense vegetation obscuring heritage sites. Due to the small size of some heritage sites, such as Stone Age sites, small Iron Age features, rock art sites and burials, such sites are rarely visible on aerial imagery and are generally only detected during pedestrian surveys.

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 South African War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

4.2.1 The South African War

According to Von der Heyde (2013), no major battles took place in the direct vicinity of the study area. The nearest battles to the study area took place in the vicinity of Volksrust 65 km to the south and near Kriel 85 km to the northwest.

4.2.2 Coal mining general history on the Highveld

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).

4.2.3 Morgenzon History

The town of Morgenzon was laid out in 1912 on the Farm Morgenzon and has been administered by the village council since 1920 (Raper 1987). Accordingly, the town was laid out around the Marnico Hotel, which was built in 1912 and is also the town's oldest landmark. Also, the Morgenzon NGK church was designed by Gerard Moerdyk, the same architect who designed the Voortrekker Monument.

5. Sources of Information

Sources consulted include an inspection of historical aerial images and historical topographical maps, previous heritage studies conducted in the general area, and the South African Heritage Resources Information System (SAHRIS) database.

5.1 Historical Aerial Imagery and Topographical Maps

Historical aerial images and topographical maps dating to 1955, 1963, 1968, 1973, 1991, 2005, and 2009 (**Appendix A**) were used to determine the location and relative age of the structures and buildings associated with the demarcated portions (**Table 3**), as well as to establish historical land uses associated with the demarcated area.



Table 3 indicates the identified sites, the date of the aerial images and topographical maps on which the sites are visible, as well as the date range during which the sites were constructed and demolished. Five building sites were identified. Four of the sites date to the historic period, while one potentially dates to historical times. Also, one site appears to be associated with some form of surface indication, while no surface remains were noted at the four remaining sites. Potential sites were identified on Portions 7 and 14 of the Farm Tweefontein 471 IS, while no potential sites were observed on Portion 12.



Table 3: Site age & type as identified on historical aerial images and topographical maps.

Site No	1955 Aerial	1955 Topo	1963 Aerial	1968 Aerial	1973 Topo	1991 Aerial	1991 Topo	2005 Aerial	2009 Topo	2023 Satellite	Constructed	Demolished
B01	Building	Building	Building	Building	Building	Building	Building	Building	None	Surface Remains	<=1955	2005-2009
B02	Building	Hut	Building	Building	None	None	None	None	None	No Visible Remains	<=1955	1968-1973
B03	Building	Hut	Building	Building	None	None	None	None	None	No Visible Remains	<=1955	1968-1973
B04	None	None	Building	Building	Building	None	None	None	None	No Visible Remains	1955-1963	1973-1991
B05	None	None	None	Building	Building	None	None	None	None	No Visible Remains	1963-1968	1973-1991



5.2 Previous Heritage Studies

Sivukile Extension 4, Morgenzon

A Phase 1 Heritage Impact Assessment (HIA) was conducted by the National Cultural History Museum (Van Schalkwyk 2004) for the Sivukile Extension 4 township development at Morgenzon that is located approximately 23 km to the west-northwest of the proposed Tweefontein Coal Mine Prospecting Right. Several sites associated with demolished infrastructure were noted. However, according to Van Schalkwyk (2004), these sites dated to contemporary times and were not considered to be significant from a heritage perspective.

Mooiplaats Colliery Expansion

A Phase 1 HIA was conducted for the Mooiplaats Colliery Expansion 28 km to the northeast of the proposed Tweefontein Coal Mine Prospecting Right (Fourie 2020). No potential heritage remains were recorded during the study.

Dagsoom Twyfelaar Coal Mining Project

Digby Wells conducted a Phase 1 HIA for the Dagsoom Twyfelaar Coal Mining Project near Ermelo. The project area is located approximately 41 km east-northeast of the proposed Tweefontein Coal Mine Prospecting Right and consisted of the mining of three underground sections accessed by boxcuts. During the assessment, 27 heritage sites were identified: 13 burial grounds and graves, 12 historical sites and two isolated historical artefacts. The burial grounds and graves consisted of a combination of formal and informal surface decorations, while the historical sites consisted of European ceramic sherds, stone-walled kraals, angular ruins and buildings (Hardwick 2019).

5.3 SAHRIS Database

The databases containing the declared and graded heritage sites were exported from SAHRIS on 01/06/2023 and were plotted on the site map in order to determine the presence of previously recorded heritage sites within the project area. Accordingly, no graded heritage sites intersect the demarcated study area, while the nearest declared heritage site to the demarcated project area is the Begin-der-Lijn Bridge approximately 9 km to the east.

5.4 Examples of Heritage Sites

Figures 6 – 16 are examples of heritage sites often encountered. Iron Age and Stone Age sites are often associated with water sources, rocky outcrops and hills and should be avoided by the proposed prospecting activities.



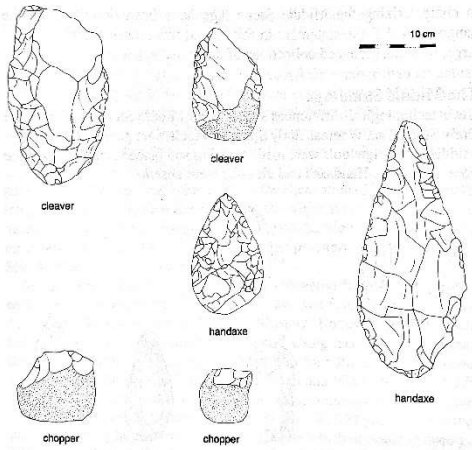


Figure 6: ESA artefacts (Mazel 1989).

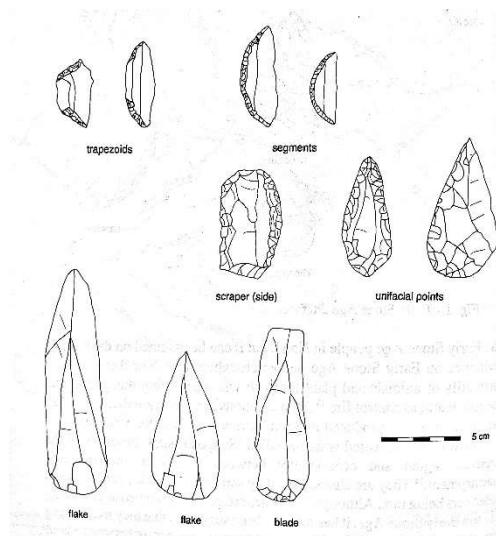


Figure 7: MSA artefacts (Mazel 1989).

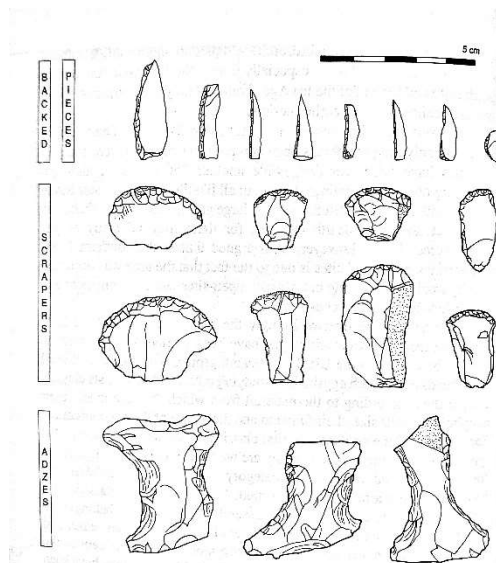


Figure 8: LSA artefacts (Mazel 1989).





Figure 9: Example of undecorated Iron Age potsherds.



Figure 10: Example of a decorated Iron Age potsherd.



Figure 11: Example of dilapidated linear walling.





Figure 12: Example of a stone-walled Iron Age site.



Figure 13 : Example of a broken lower grinding stone dating to the LIA.



Figure 14: Example of a dilapidated stone-walled site dating to the LIA.





Figure 15: Example of a historical building.



Figure 16: Example of a potential informal grave.

6. Archaeological and Historical Remains

This section serves as an indication of heritage material associated with the study area based on previous research, as well as historical aerial images and topographical maps.

6.1 Stone Age Remains

The heritage studies conducted by Van Schalkwyk (2004), Fourie (2020) and Hardwick (2019) did not record any Stone Age Sites.

According to Bergh (1998), Welgelegen Shelter is located directly to the southwest of Ermelo on the banks of the Vaal River. Based on evidence from the layers dating to AD 1200, it is suggested that the early farming and hunter-gatherer communities co-existed. The farmers used metal tools and occupied the shelter, while the hunter-gatherer group used typical LSA tools and pottery and occupied the overhang area (Esterhuysen & Smith 2007).



Since such sites are often associated with water sources, Stone Age sites are more likely to be encountered within the 500 m river buffer zone of the study area.

6.2 Iron Age Farmer Remains

Stone-walled sites are often detectable on satellite and aerial imagery. However, no such sites were noted on aerial and satellite imagery. It should also be noted that stone-walled sites might be obscured by dense vegetation and poor preservation and are more likely to be located in the undisturbed sections of the study area.

The heritage studies conducted by Van Schalkwyk (2004), Fourie (2020) and Hardwick (2019) did not record any Iron Age Sites.

According to Bergh (1998), a rather large area to the south and west of the study area is associated with 585 LIA sites. Bergh (1998) also noted the movement of the Phuthing through the general area during the Difaqane.

According to Huffman (2007), ceramics that can be expected in the study area include the following from the Urewe Tradition:

- Makgwareng facies of the Blackburn branch with an estimated date range of AD 1700 to 1820

6.3 Historical Remains

Five sites associated with buildings were identified on historical aerial imagery and topographical maps (**Table 4**). Three of the sites were constructed before or during 1955 (B01 – B03), one site was constructed between 1955 and 1963 (B04), and one site was constructed between 1963 and 1968 (B05), therefore potentially dating to the Historic Period. One of the historical / potentially historical sites is still associated with some form of surface indication (B01), while the remaining four sites are not associated with any visible surface remains (B02 – B05). Subsurface cultural remains, however, might be associated with the demolished sites and could therefore be sensitive from a heritage perspective.

The heritage study conducted by Hardwick (2019) recorded European ceramic sherds, stone-walled kraals, angular ruins and buildings.

Table 4: Historical Sites.

Site No	Dataset date & site type	Current Status	Age	Farm Portion	Lat (y)	Lon (x)
B01	1955-Building	Surface Remains	Historical	7/479	-26.779255	29.836235
B02	1955-Building	No Visible Remains	Historical	7/479	-26.778659	29.839619
B03	1955-Building	No Visible Remains	Historical	7/479	-26.777808	29.842624
B04	1963-Building	No Visible Remains	Historical	14/479	-26.786221	29.817348
B05	1968-Building	No Visible Remains	Potentially Historical	7/479	-26.777276	29.838524



6.4 Contemporary Remains

No buildings or structures dating to contemporary times were noted on the historical aerial images or on the historical topographical maps.

The heritage study conducted by Van Schalkwyk (2004) recorded several demolished contemporary building sites. The sites, however, were not deemed to be significant from a heritage perspective.

6.5 Graves

No graves were noted on the historical aerial images or on the historical topographical maps. Such sites are rarely visible on aerial imagery and are not always indicated on topographical maps. Burial sites are also often associated with historical farm- and homesteads and the possibility therefore exists that graves may be associated with the study area.

The heritage study conducted by Hardwick (2019) mentions the presence of several burial grounds and graves.

7. 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.



7.1 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

*These site ratings can only be assigned following a Phase 1 AIA.

8. Statement of Significance & Recommendations

8.1 Statement of Significance

The study area: Tweefontein Coal Mine Prospecting Right

As can be seen from previous research conducted in the area, the general study area appears to be sensitive from a heritage perspective and sites are likely to include graves, stone-walling, kraals, historical buildings and ceramics, Late Iron Age settlements, shelters, and Stone Age sites. Since heritage sites, such as burial sites, are not always clearly identifiable due to disturbed / removed surface features, care must be exercised when prospecting.

Figure 17 indicates historical and potentially historical sites, as well as a 500 m buffer area around water sources. The 500 m buffer area is considered to be potentially sensitive from a heritage perspective since archaeological sites are often located within this zone. Areas previously / currently associated with cultivated fields are indicated as well. These areas are considered to be less sensitive from a heritage perspective due to the areas being disturbed. The least sensitive areas would therefore be areas that are located more than 500 m from a water source, fall within previously/currently cultivated fields and are not located within close proximity of potential heritage sites or contemporary infrastructure. Apart from the identified potential sites, undisturbed areas falling outside of the previously / currently cultivated sections and within the 500 m river buffer zone are considered to be the most sensitive areas from a heritage perspective. The possibility also exists that culturally sensitive sites, such as burial sites, might have been created after some of the cultivated fields fell into disuse, meaning that burial sites might be located on disturbed areas as well.



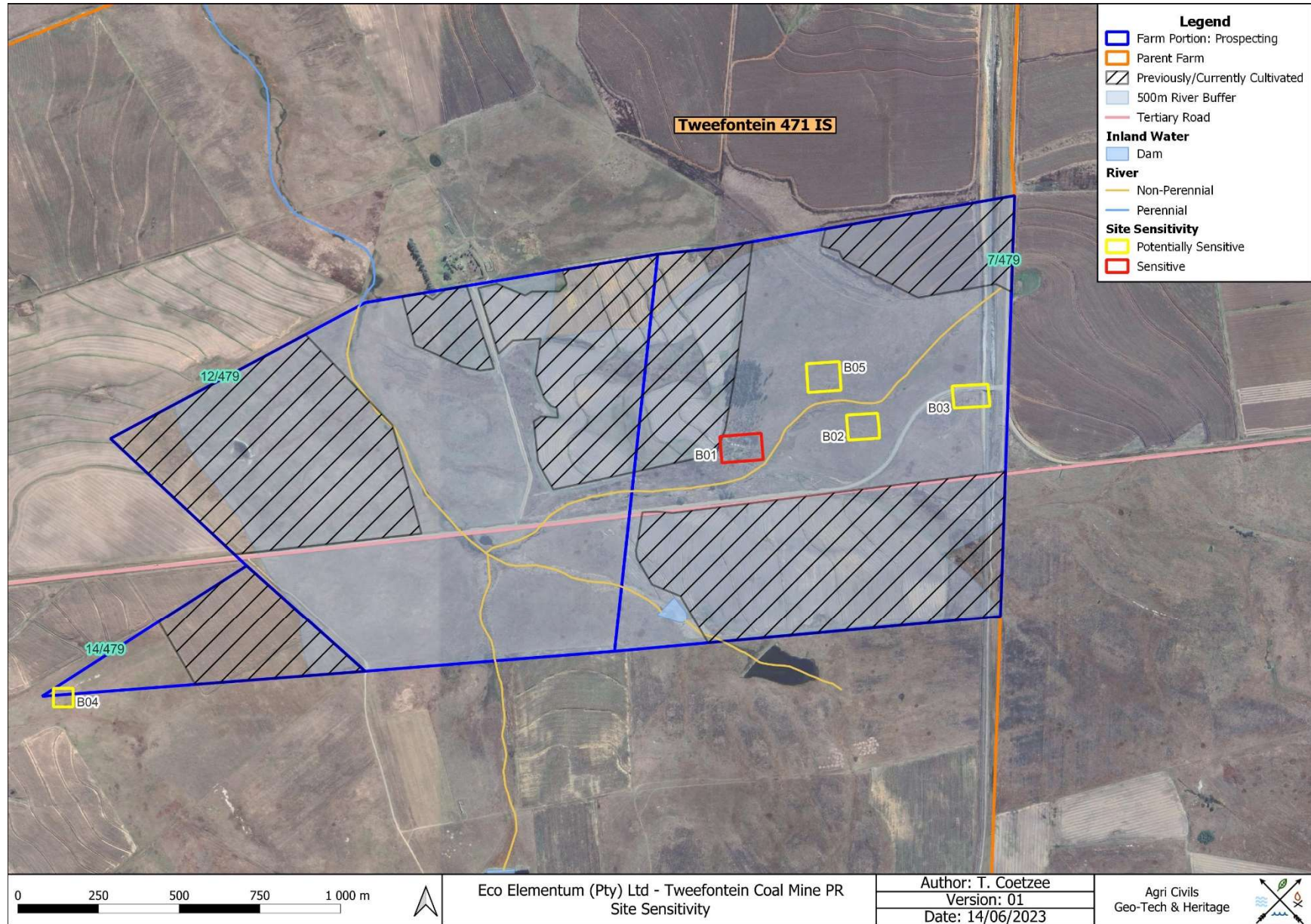
The five sites listed in **Table 6** are associated with ruins and demolished historical and potentially historical infrastructure that might exceed 60 years of age. The site associated with surface remains is considered to be sensitive from a heritage perspective, while the sites where no surface remains are visible are considered to be potentially sensitive. Due to the listed sites potentially exceeding 60 years of age, the sites might be protected under the NHRA (Act No. 25 of 1999). Any grave will be considered to be sensitive and significant from a heritage perspective as the Human Tissues Act (Act No. 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 (Act No. 25 of 1999) could apply.



Table 6: Sensitive Sites.

Site No	Type	Farm Portion	Lat (y)	Lon (x)	Current Status	Age	Sensitivity
2629DD-B01	Building	7/479	-26.779255	29.836235	Surface Remains	Historical	Sensitive
2629DD-B02	Building	7/479	-26.778659	29.839619	No Visible Remains	Historical	Potentially Sensitive
2629DD-B03	Building	7/479	-26.777808	29.842624	No Visible Remains	Historical	Potentially Sensitive
2629DD-B04	Building	14/479	-26.786221	29.817348	No Visible Remains	Historical	Potentially Sensitive
2629DD-B05	Building	7/479	-26.777276	29.838524	No Visible Remains	Potentially Historical	Potentially Sensitive





8.2 Recommendations

The following recommendations are made in order to avoid the destruction of heritage remains within the area demarcated for prospecting:

- The four historical and potentially historical sites (B02 – B05) that appear not to be associated with surface remains, might be associated with subsurface culturally significant material. The possibility also exists that historical surface remains exceeding 60 years of age are present, but are not detectable on aerial imagery. Therefore, it is recommended that the demarcated areas be avoided by the proposed prospecting activities. Should this not be possible, a qualified archaeologist should first inspect the sites in order to determine the potential presence of heritage remains.
- Site B01 appears to be associated with historical surface remains likely to exceed 60 years of age. Therefore, it is recommended that the demarcated area be avoided by the proposed prospecting activities. Should this not be possible, a qualified archaeologist should first inspect the site in order to determine the significance of the site.
- The 500 m buffer zone surrounding the perennial and non-perennial rivers is potentially sensitive from a heritage perspective. Although the previously / currently cultivated areas that intersect the 500 m buffer zone are disturbed, the potential for subsurface cultural material still exist and care should be exercised when prospecting.
- The least sensitive areas are areas falling outside of the 500 m river buffer zone, within previously / currently cultivated fields and not within close proximity of potential heritage sites, contemporary infrastructure or shelters. These areas should therefore be considered when selecting prospecting sites.
- Should uncertainty regarding the presence of heritage remains exist, or of heritage sites are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted. Alternatively, once the prospecting localities have been finalised, a qualified archaeologist can inspect the proposed sites and provide recommendations that will aid the protection of heritage resources.
- Prospecting should not take place in the vicinity of stone cairns, potential burial sites, stone-walling, building ruins or any other heritage material or structures.
- Should the prospecting outcome result in further development or construction, a full Phase 1 AIA must be conducted on the affected area if triggered. Also, a full Phase 1 AIA must be conducted should the cumulative impact of the proposed prospecting exceed 0.5 ha.



- Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the prospecting phase, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed, 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, prospecting may proceed on the demarcated portions, subject to the abovementioned conditions and recommendations.

9. Conclusion

The proposed Tweefontein Coal Mine Prospecting Right that consists of the prospecting of coal on Portions 7, 12 and 14 of the Farm Tweefontein 471 IS covers approximately 274 ha. The general area is characterised by open grassland and sections of cultivated / previously cultivated land. The Archaeological Desktop Study examined the area using a combination of historical aerial imagery, historical topographical maps, contemporary satellite imagery, as well as written sources and previous heritage studies conducted in the area. Five historical and potentially historical sites were noted. These areas should be avoided by the proposed prospecting activities. Since the region is associated with Stone Age, Iron Age and Historical sites, the general area is considered to be sensitive.

Should the recommendations made in this study be adhered to, the proposed Tweefontein Coal Mine Prospecting Right project may proceed.



10. Addendum: Terminology

Archaeology:

The study of the human past through its material remains.

Artefact:

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

Assemblage:

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

Context:

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

Cultural Resource Management (CRM):

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

Excavation:

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

Feature:

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

Ground Reconnaissance:

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

Matrix:

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

Phase 1 Assessments:

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

Phase 2 Assessments:

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

Sensitive:

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



Site:

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

Surface survey:

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

11. References

Bergh, J.S. 1998. Administratiewe en ruimtelike ordening. In: Bergh, J. (ed.) *Geskiedenisatlas Van Suid-Afrika: Die Vier Noordelike Provinsies*: 133-153. Pretoria: J. L. van Schaik Uitgewers

Clarke, R.J. & Kuman, K. 2000. *The Sterkfontein Caves Palaeontological and Archaeological Sites*. Johannesburg: University of the Witwatersrand.

Climate-Data.org. Warden Climate. <https://en.climate-data.org/africa/south-africa/mpumalanga/morgenzon-189648/>
Accessed 14-06-2023.

Deacon, H. & Deacon, J. 1999. *Human beginnings in South Africa*. Cape Town: David Philip.

De Wit, M. 2007. A History of Deep Time. In: Delius, P. (ed.) *Mpumalanga History and Heritage*: 27-38. Scottsville: University of KwaZulu-Natal Press.

Esterhuysen, A. & Smith, J. 2007. Stories in Stone. In: Delius, P. (ed.). *Mpumalanga History and Heritage*: 41-68. Scottsville: University of KwaZulu-Natal Press.

Heydenrych, D. H. 1999. Mynbou-, landbou-en spoorwegontwikkeling in die 19de en 20ste eeu. In: Bergh, J. (ed.) *Geskiedenisatlas Van Suid-Afrika: Die Vier Noordelike Provinsies*: 327-332. Pretoria: J. L. van Schaik Uitgewers

Fourie, W. 2020. The Proposed Mooiplaats Colliery Expansion, Gert Sibande District Municipality, Mpumalanga Province. Pretoria: PGS Heritage

Hardwick, S. 2019. Integrated Environmental Authorisation Process for the Proposed Dagsoom Twyfelaar Coal Mining Project near Ermelo, Mpumalanga. Heritage Impact Assessment. Bryanston: Digby Wells Environmental



Huffman, T.N. 2007. *Handbook to the Iron Age*. Pietermaritzburg: UKZN Press.

Mazel, A. 1989. The Stone Age Peoples of Natal. In: Duminy, A. & Guest, B. (eds.) *Natal and Zululand from Earliest Times to 1910. A New History*: 1 – 27. University of Natal: University of Natal Press and Shuter & Shooter (Pty) Ltd.

Mitchell, P. 2002. *The archaeology of southern Africa*. Cambridge: Cambridge University Press.

Mucina, L. & Rutherford, M. C. 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Raper, P.E. 1987. *Dictionary of Southern African place names*. Johannesburg: Lowry Publishers

Schirmer, S. 2007. Enterprise and Exploitation in the 20th Century. In: Delius, P. (ed.) *Mpumalanga History and Heritage*: 291-346. Scottsville: University of KwaZulu-Natal Press

Von der Heyde, N. 2013. *Field Guide to the Battlefields of South Africa*. Century City: Struik Travel & Heritage.

Van Schalkwyk, J. 2004. *Heritage Impact Assessment for the Planned Sivukile Extension 4 Township Development, Lekwa Municipality, Mpumalanga*. Pretoria: National Cultural History Museum

Toth, N. & Schick, K. 2007. *Handbook of paleoanthropology*. Berlin: Springer.

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

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

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



Appendix A: Historical Aerial Imagery & Topographical Maps



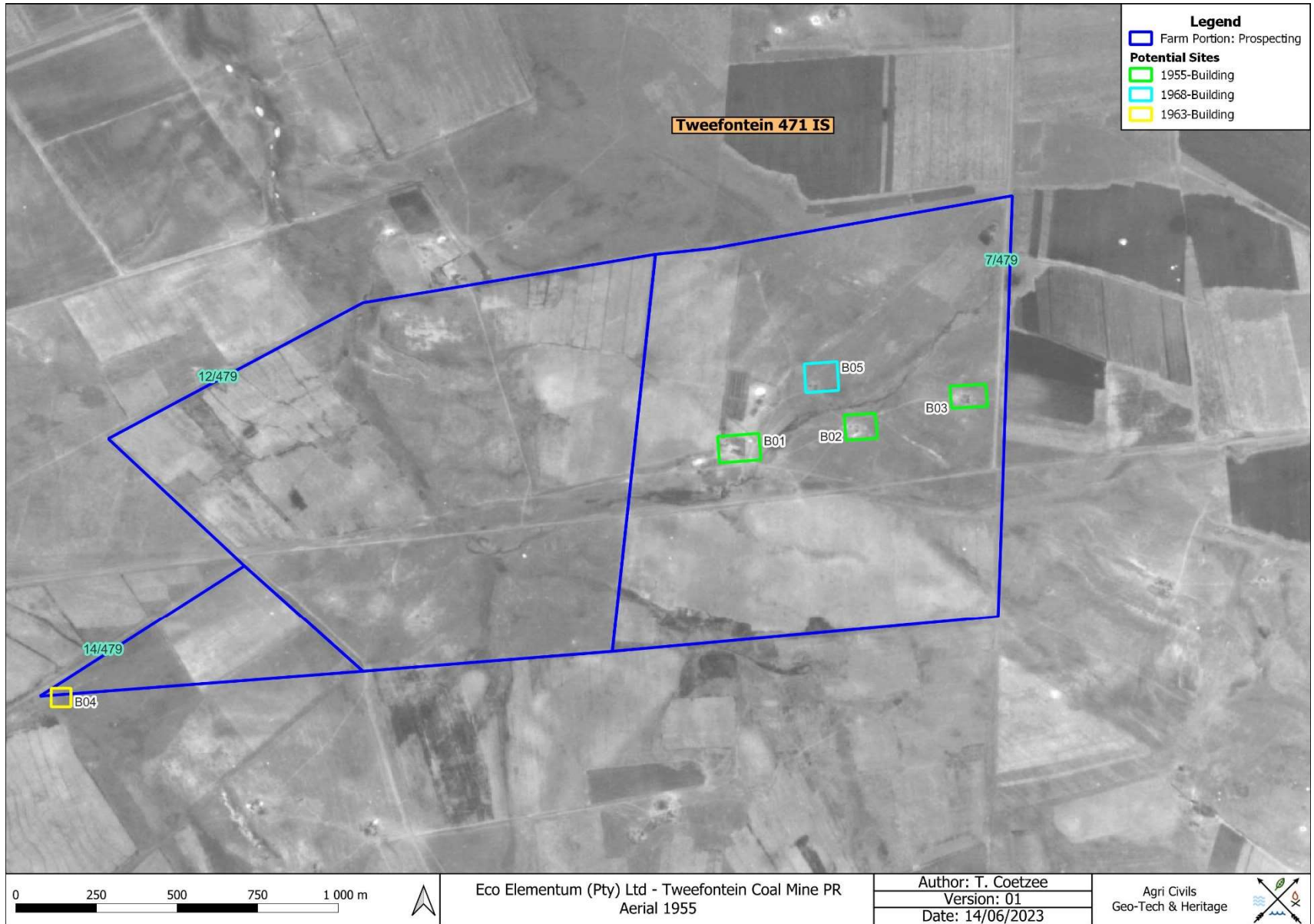


Figure 18: 1955 Aerial image of the study area.



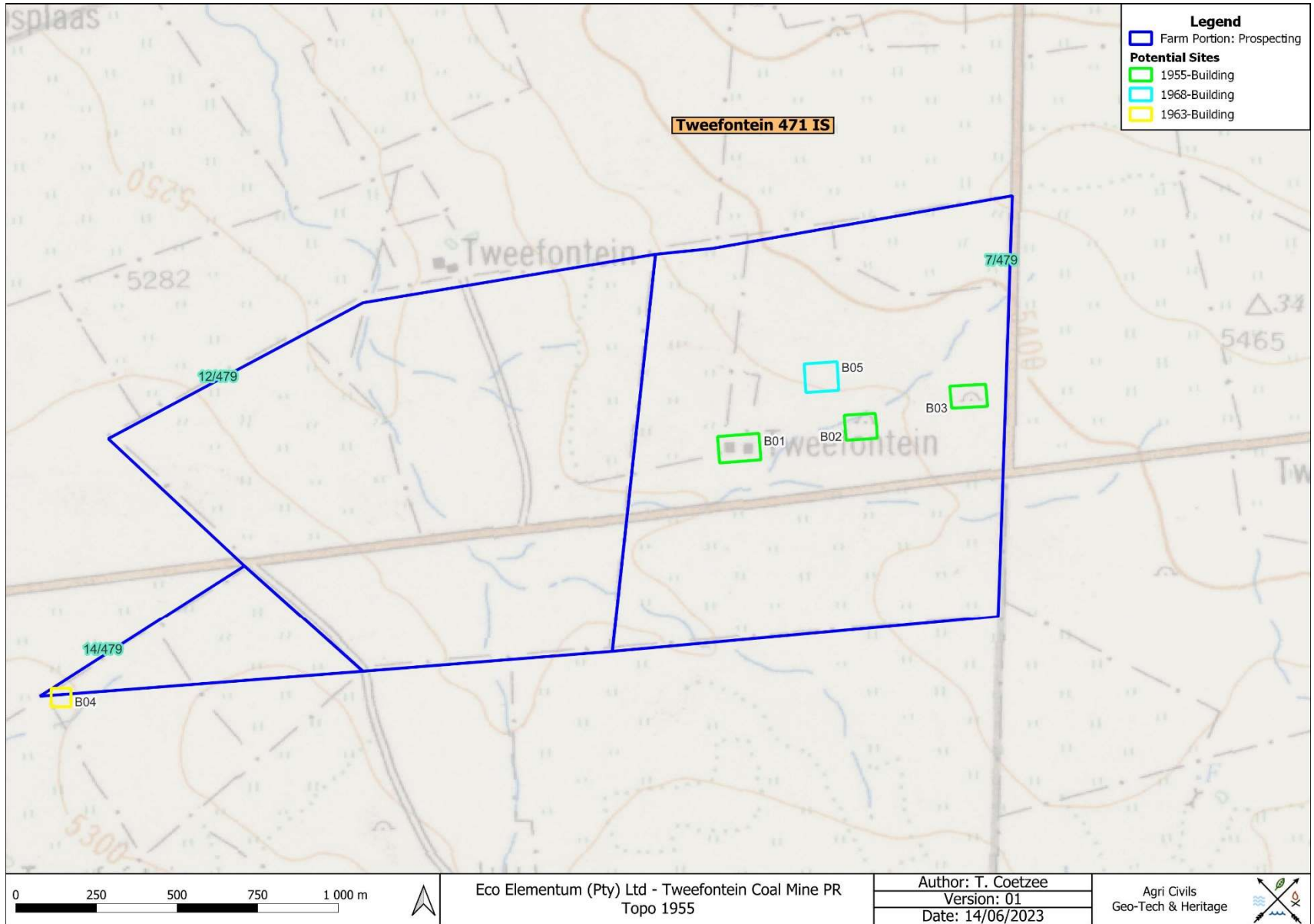
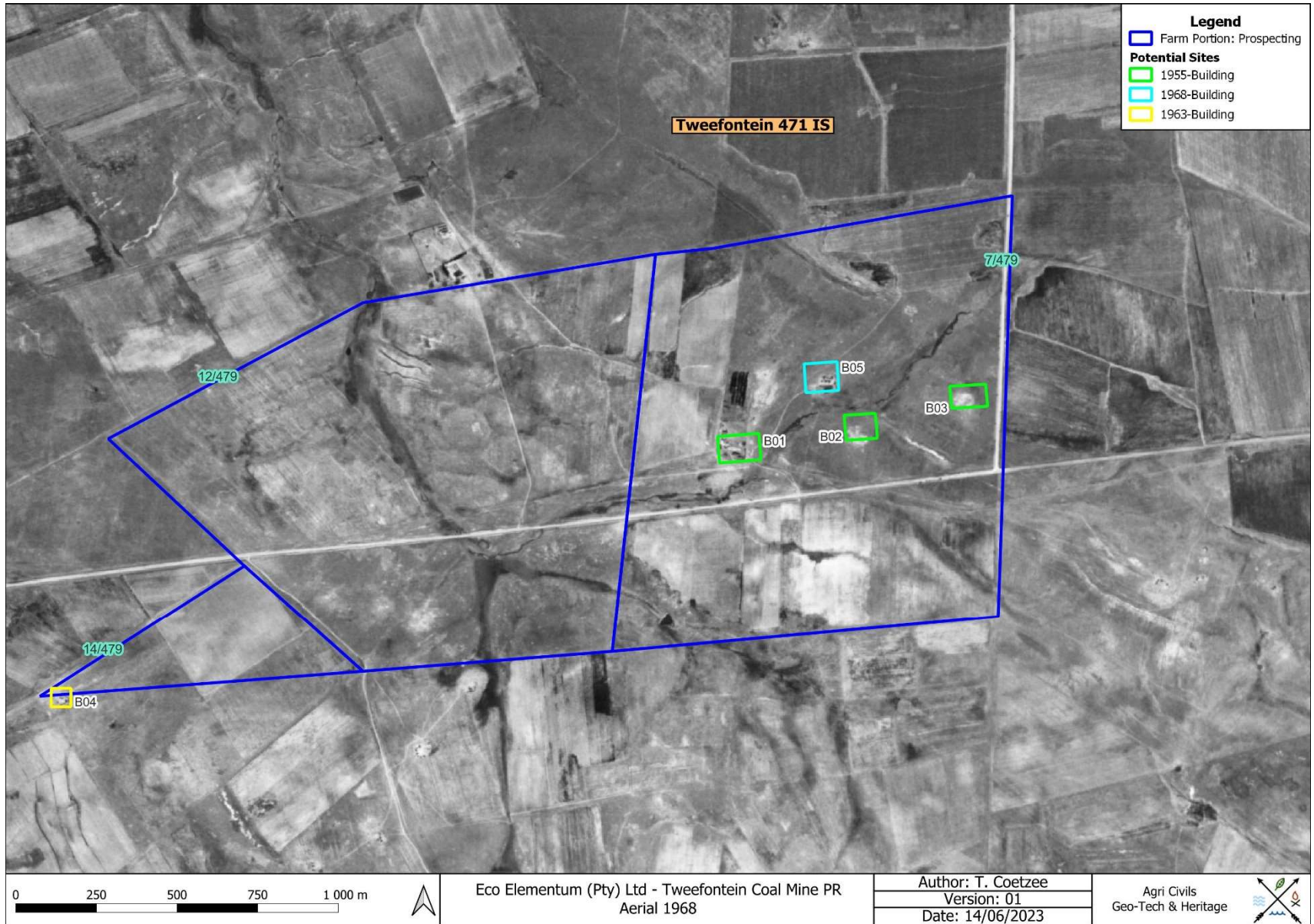


Figure 19: Segment of 1955 1:50 000 2629 DD indicating the study area.







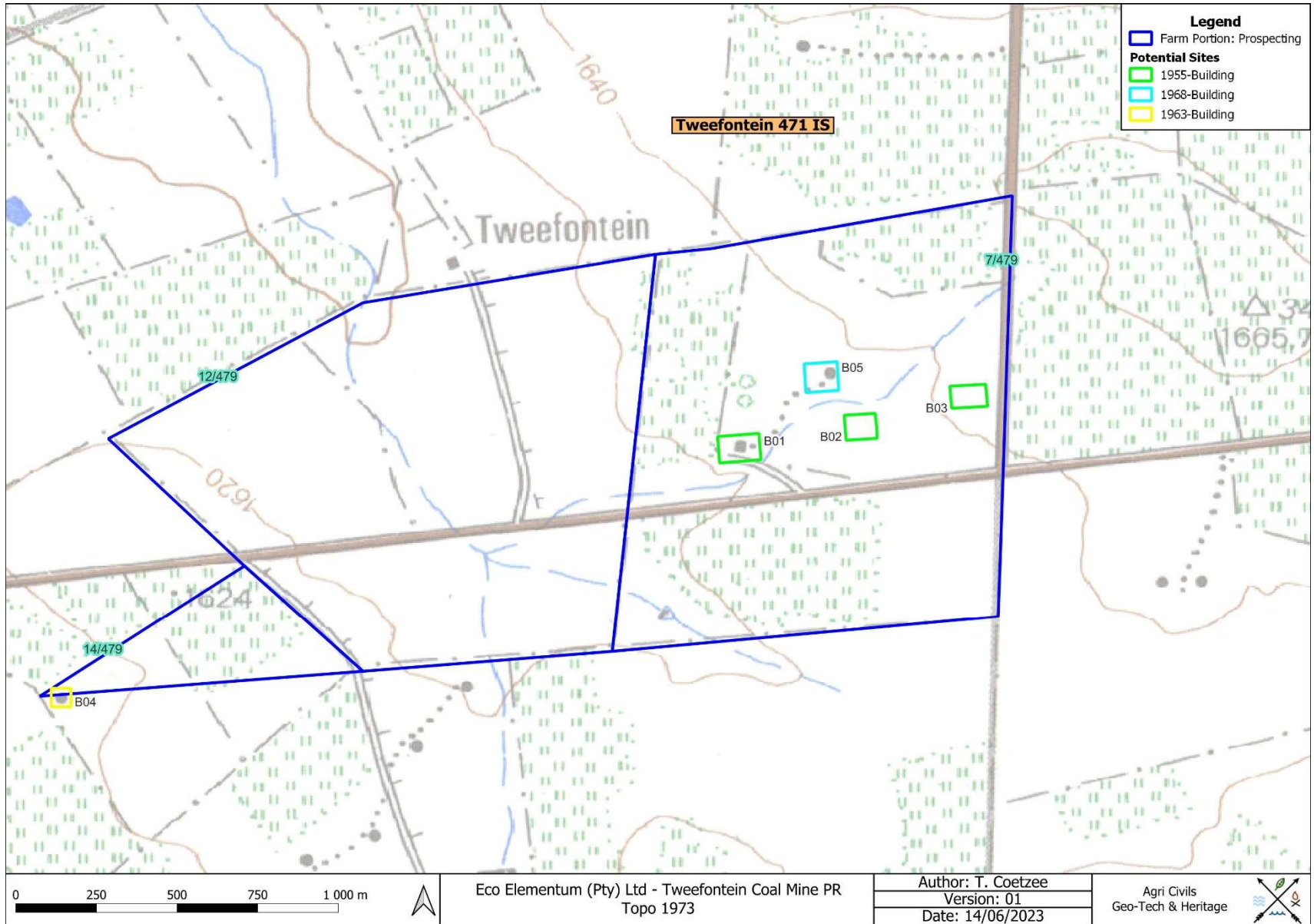


Figure 22: Segment of 1973 1:50 000 2629 DD indicating the study area.



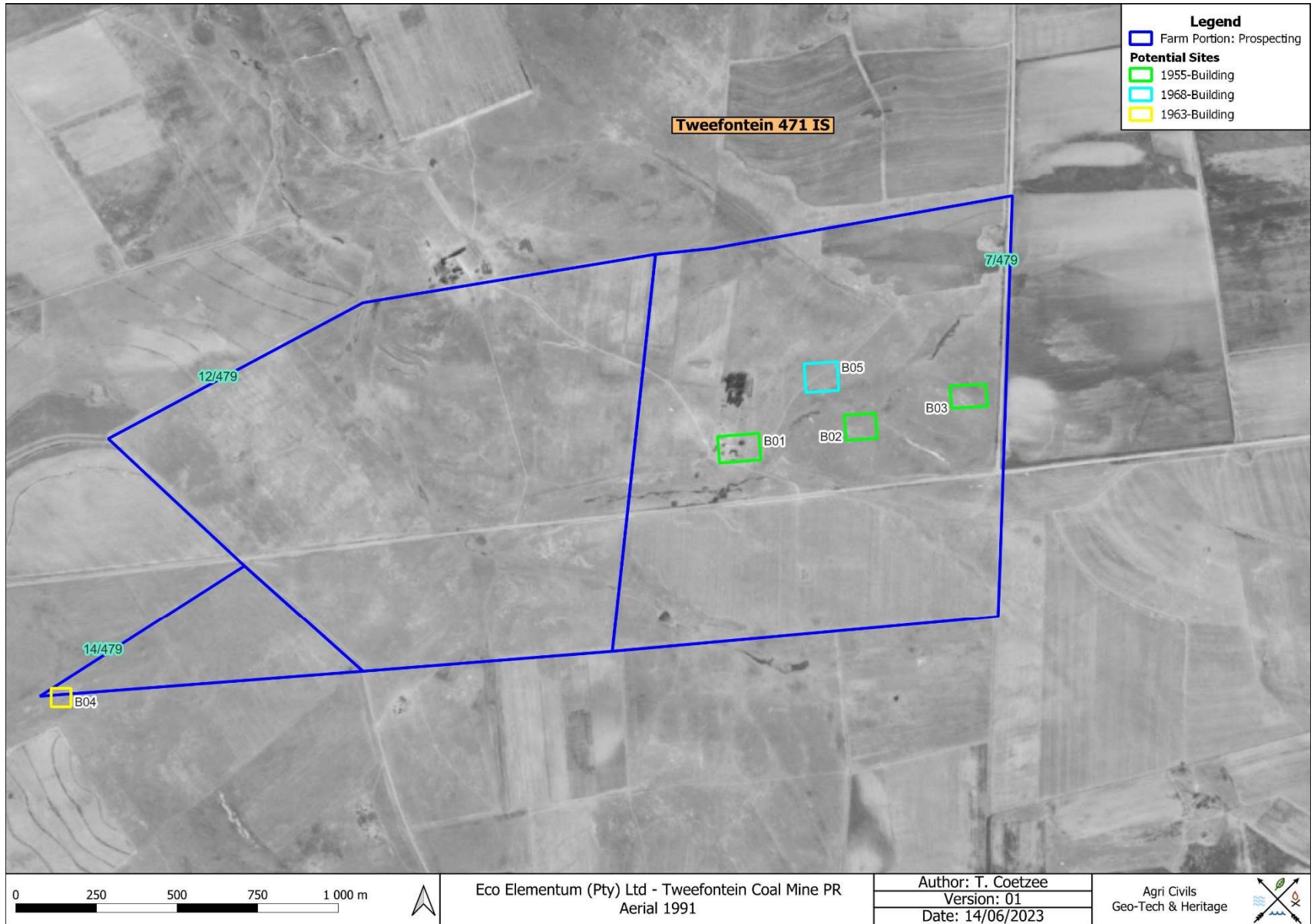


Figure 23: 1991 Aerial image of the study area.



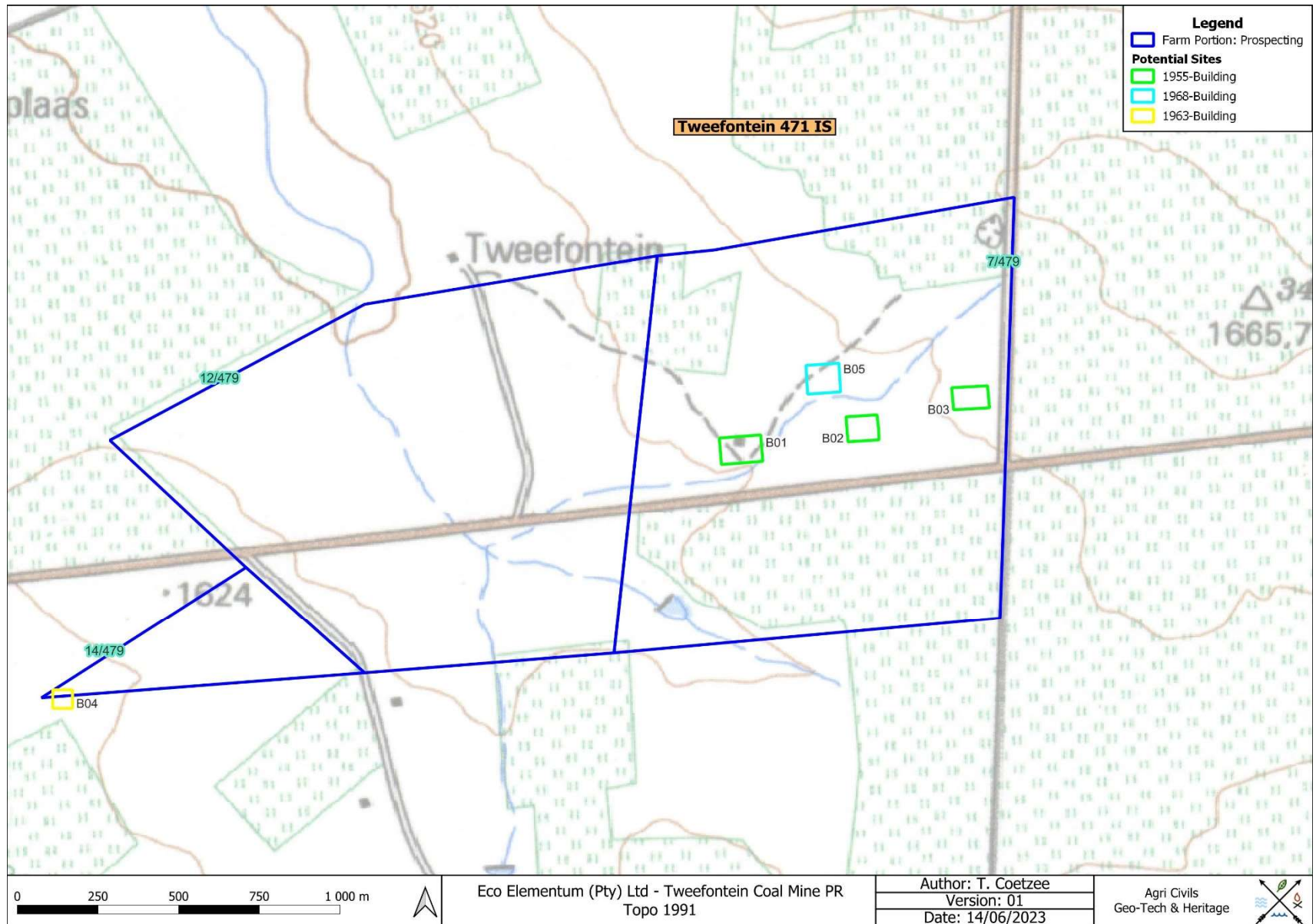


Figure 24: Segment of 1991 1:50 000 2629 DD indicating the study area.





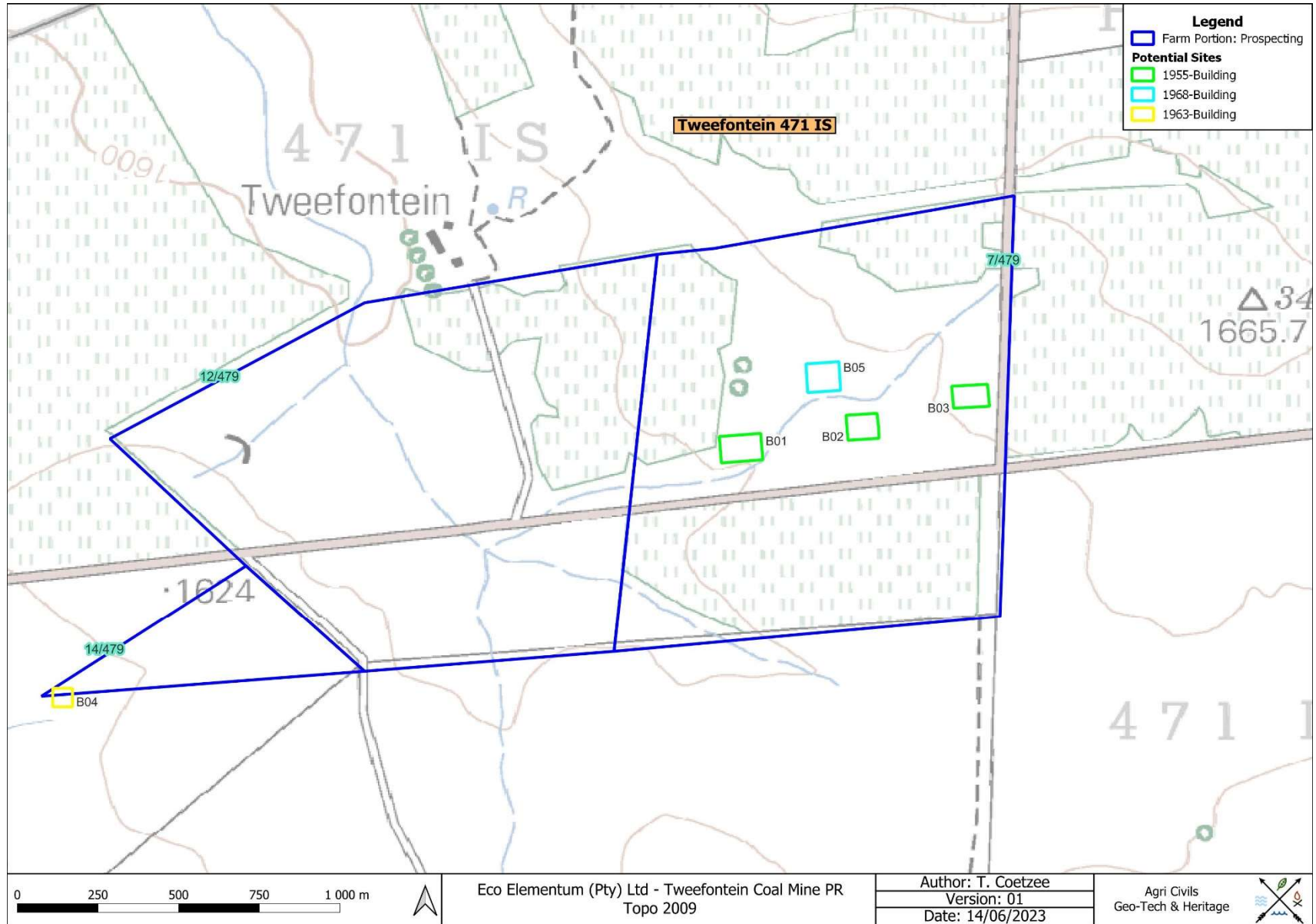


Figure 26: Segment of 2009 1:50 000 2629 DD indicating the study area.

