



ARCHAEOLOGICAL DESKTOP STUDY

for the Proposed Klei Minerale (Pty) Ltd SABrix Prospecting Right on
Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR, Pretoria,
Gauteng

For:

Elementum Sustainability (Pty) Ltd

Project Ref:

SABrix PR

Date:


21/07/2023

Archaeological Desktop Study for the Proposed Klei Minerale (Pty) Ltd SABrix Prospecting Right on Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR, Pretoria, Gauteng

Project Ref: SABrix PR
Report No: ES_2107231
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 Klei Minerale (Pty) Ltd SABrix 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.

Author	Qualification	Email	Date	Signature
Tobias Coetzee	MA (Archaeology – UP)	tcoetzee.heritage@gmail.com	21/07/2023	



Executive Summary

Agri Civils Geo-Tech & Heritage was appointed by Elemental Sustainability (Pty) Ltd to undertake an Archaeological Desktop Study for the proposed prospecting of clay and related minerals on Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR near Pretoria in the Gauteng 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 nine building sites and one hut site (Sites B01 – B10) 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 five sites date to historical times, while one site potentially dates to historical times. One of the historical / potentially historical sites is associated with intact buildings (Site B05) and five of the sites seem to have been demolished since no surface infrastructure could be identified on contemporary satellite imagery (Sites B01 – B04; B06). The site associated with intact infrastructure, however, appears to consist of historical buildings that were demolished and replaced by contemporary infrastructure. Since the remaining historical / potentially historical sites might be associated with subsurface historical material likely to exceed 60 years of age, the demarcated areas are considered to be potentially 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 six 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.

Additionally, four contemporary building sites were noted on historical topographical maps and aerial imagery (Sites B07 – B10). These sites appear to be no longer associated with surface remains, do not exceed 60 years of age and are unlikely to be significant from a heritage perspective. However, should impact to the sites be unavoidable, it is recommended that a qualified archaeologist inspect the sites prior to any impact.

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 within this area. Areas previously / currently associated with cultivated land 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 and contemporary infrastructure.



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 exceed 0.5 ha.



List of Abbreviations

AIA – Archaeological Impact Assessment

CBD – Central Business District

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

PR – Prospecting Right

SAHRA – South African Heritage Resources Agency

SAHRIS – South African Heritage Resources Information System



NEMA Appendix 6

NEMA Specialist reports	
Item	Section / Page No
1. (1) A specialist report prepared in terms of these Regulations must contain—	
(a) details of-	
(i) the specialist who prepared the report; and	P2
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	P2
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	P2
(c) an indication of the scope of, and the purpose for which, the report was prepared;	1, 2.2
(cA) an indication of the quality and age of base data used for the specialist report;	3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	2
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	6, 8.1, P22, P23, P40
(g) an identification of any areas to be avoided, including buffers;	8.2, P40
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	P40
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	3.1
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	6, 8
(k) any mitigation measures for inclusion in the EMPr;	8.2
(l) any conditions for inclusion in the environmental authorisation;	8.2
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	8.2, Appendix C
(n) a reasoned opinion—	
(i)[as to] whether the proposed activity, activities or portions thereof should be authorised	8.2



NEMA Specialist reports	
Item	Section / Page No
(iA) regarding the acceptability of the proposed activity or activities; and	8.2
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	8.2, Appendix C
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	None
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q) any other information requested by the competent authority.	Nothing received to date
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Noted



Table of Contents

Executive Summary	3
List of Abbreviations	5
NEMA Appendix 6	6
1. Project Background	10
1.1 Introduction.....	10
1.2 Legislation	12
1.2.1 The EIA (Environmental Impact Assessment) and AIA processes	12
1.2.2 Legislation regarding archaeology and heritage sites	13
2. Study Area and Project Description	16
2.1 Location & Physical Environment	16
2.2 Project Description	20
3. Methodology	20
3.1 Limitations	24
4. Archaeological Background	24
4.1 The Stone Age.....	24
4.2 The Iron Age & Historical Period	25
4.2.1 The South African War	26
4.2.2 Study area archaeo-history	26
5. Sources of Information	27
5.1 Historical Aerial Imagery and Topographical Maps	27
5.2 Previous Heritage Studies	29
5.3 SAHRIS Database.....	29
5.4 Examples of Heritage Sites	30
6. Archaeological and Historical Remains	34
6.1 Stone Age Remains.....	34
6.2 Iron Age Farmer Remains	34
6.3 Historical Remains.....	35
6.4 Contemporary Remains.....	35
6.5 Graves	36
7. Evaluation	36
7.1 Field Ratings.....	37
8. Statement of Significance & Recommendations	37
8.1 Statement of Significance.....	37
8.2 Recommendations.....	41
9. Conclusion	42
10. Addendum: Terminology	43
11. References	44
Appendix A: Historical Aerial Imagery & Topographical Maps	A



Appendix B: NEMA Risk Assessment Methodology	a
Appendix C: Monitoring – Heritage	i

List of Figures

Figure 1: Regional and provincial location of the study area.....	11
Figure 2: Segment of SA 1:50 000 2528 CA indicating the area demarcated for prospecting.	18
Figure 3: Proposed prospecting area portrayed on a 2023 satellite image.....	19
Figure 4: Potential Sites.	22
Figure 5: Site Status.	23
Figure 6: ESA artefacts (Mazel 1989).....	30
Figure 7: MSA artefacts (Mazel 1989).	30
Figure 8: LSA artefacts (Mazel 1989).	31
Figure 9: Example of undecorated Iron Age potsherds.....	31
Figure 10: Example of a decorated Iron Age potsherd.....	31
Figure 11: Example of dilapidated linear walling.	32
Figure 12: Example of a stone-walled Iron Age site.....	32
Figure 13 : Example of a broken lower grinding stone dating to the LIA.....	32
Figure 14: Example of a dilapidated stone-walled site dating to the LIA.....	33
Figure 15: Example of a historical building.	33
Figure 16: Example of a potential informal grave.....	33
Figure 17: Site Sensitivity.....	40
Figure 18: 1939 Aerial image of the study area.	B
Figure 19: Segment of 1939 1:50 000 2528 CA indicating the study area.....	C
Figure 20: 1948 Aerial image of the study area.	D
Figure 21: 1958 Aerial image of the study area.	E
Figure 22: 1964 Aerial image of the study area.	F
Figure 23: Segment of 1965 1:50 000 2528 CA indicating the study area.....	G
Figure 24: 1968 Aerial image of the study area.	H
Figure 25: Segment of 1975 1:50 000 2528 CA indicating the study area.....	I
Figure 26: Segment of 1979 1:50 000 2528 CA indicating the study area.....	J
Figure 27: 1991 Aerial image of the study area.	K
Figure 28: Segment of 1995 1:50 000 2528 CA indicating the study area.....	L
Figure 29: 2001 Aerial image of the study area.	M
Figure 30: Segment of 2001 1:50 000 2528 CA indicating the study area.....	N
Figure 31: 2006 Aerial image of the study area.	O

List of Tables

Table 1: Land parcels & coordinates.....	16
Table 2: Potential Sites.	21
Table 3: Site age & type as identified on historical aerial images and topographical maps (1/2).....	28
Table 4: Site age & type as identified on historical aerial images and topographical maps (2/2).....	28
Table 5: Historical Sites.	35
Table 6: Contemporary Sites.	36
Table 7: Prescribed Field Ratings.....	37
Table 8: Sensitive Sites.	39



1. Project Background

1.1 Introduction

Elemental Sustainability (Pty) Ltd appointed Agri Civils Geo-Tech & Heritage to undertake an Archaeological Desktop Study for the proposed Klei Minerale (Pty) Ltd SABrix Prospecting Right (PR) on Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR within the City of Tshwane Metropolitan Municipality in the Gauteng Province. The study area is located roughly 13 km northwest of the Pretoria Central Business District (CBD) (**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 clay and related minerals 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.



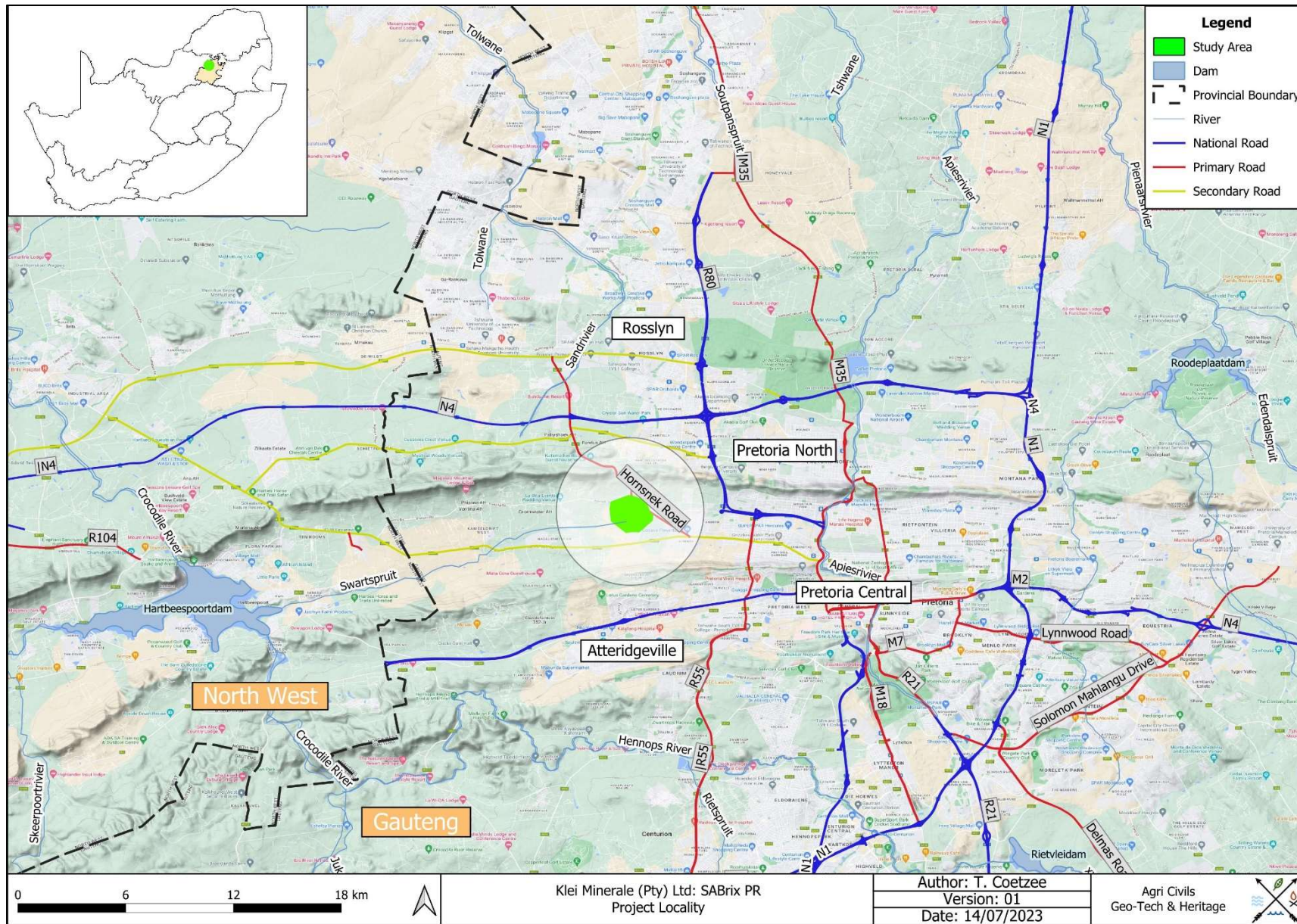


Figure 1: Regional and provincial location of the study area.



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 SABrix PR 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	Boekenhoutkloof 315 JR	16/315	2528CA	-25.704416	28.078657	20.1
2	Boekenhoutkloof 315 JR	20/315	2528CA	-25.703962	28.073060	13.6
3	Boekenhoutkloof 315 JR	22/315	2528CA	-25.703173	28.075643	13.2
Total Extent						46.9

The Pretoria CBD is located about 13 km southeast of the proposed Klei Minerale (Pty) Ltd SABrix PR, while Rosslyn is located 7 km to the north-northeast and Atteridgeville 7 km to the south. The study area lays between the Magaliesberg Mountain and the Daspoortrand Mountain within the Tshwane Metropolitan Municipality in the Gauteng Province. The Hornsnek primary road runs in a northwest – southeast direction approximately 340 m to the east of the study area, while a local road runs along the northern boundary (**Figures 1 – 3**). Access to the study area appears to be via the local road.

In terms of vegetation, the study area falls within the Savanna Biome and Central Bushveld Bioregion. On a local scale, the proposed prospecting area is classified as Moot Plains Bushveld (Mucina & Rutherford 2006).

Moot Plains Bushveld is associated with the Gauteng and North West Provinces. The main belt occurs immediately south of the Magaliesberg from the Selons River Valley in the west through Maanhaarrand, filling the valley bottom of the Magalies River, proceeding east of the Hartebeestpoort Dam between the Magaliesberg and Daspoort mountain ranges to Pretoria. A narrow belt also occurs immediately north of the Magaliesberg from Rustenburg in the West to just east of the Crocodile River in the east. Moot Plains Bushveld is considered to be vulnerable with a conservation target of 19%. Some 13% is statutorily conserved mainly in the Magaliesberg Nature Reserve Area, while about 28% is transformed mainly by cultivation and urban and built-up areas. Very scattered occurrences of alien vegetation are found while erosion varies between very low and low (Mucina & Rutherford 2006).



The average elevation for Moot Plains Bushveld varies between 1050 and 1450 MASL (Metres Above Sea Level) while the average elevation of the study area is 1290 MASL and slopes from the slightly more elevated northern section to the lower southern area.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 661 mm. The average maximum temperature for the study area is recorded during January when an average of 22.3 °C is reached. The average minimum temperature is recorded during July when an average of 12 °C is reached (Climate-data.org 15/07/2023).

The study area falls within the A21H Quaternary Catchment within the Limpopo Water Management Area. The closest perennial rivers to the study area are Swartspruit approximately 110 m to the south and the Sand River 6 km to the northwest. No non-perennial streams are associated with the demarcated study area.

Access to the demarcated study area appears to be via a local road turning from the Hornsnek Road to the east of the study area. The majority of the study area appears to consist of cultivated land, while the remaining areas consist of a combination of previously cultivated land and areas that used to be associated with built environment. The land use of the areas not being cultivated is unknown. In terms of infrastructure, buildings are visible on Portion 22 of the Farm Boekenhoutkloof 315 JR only. The general area is associated with farming related activities and mining development.



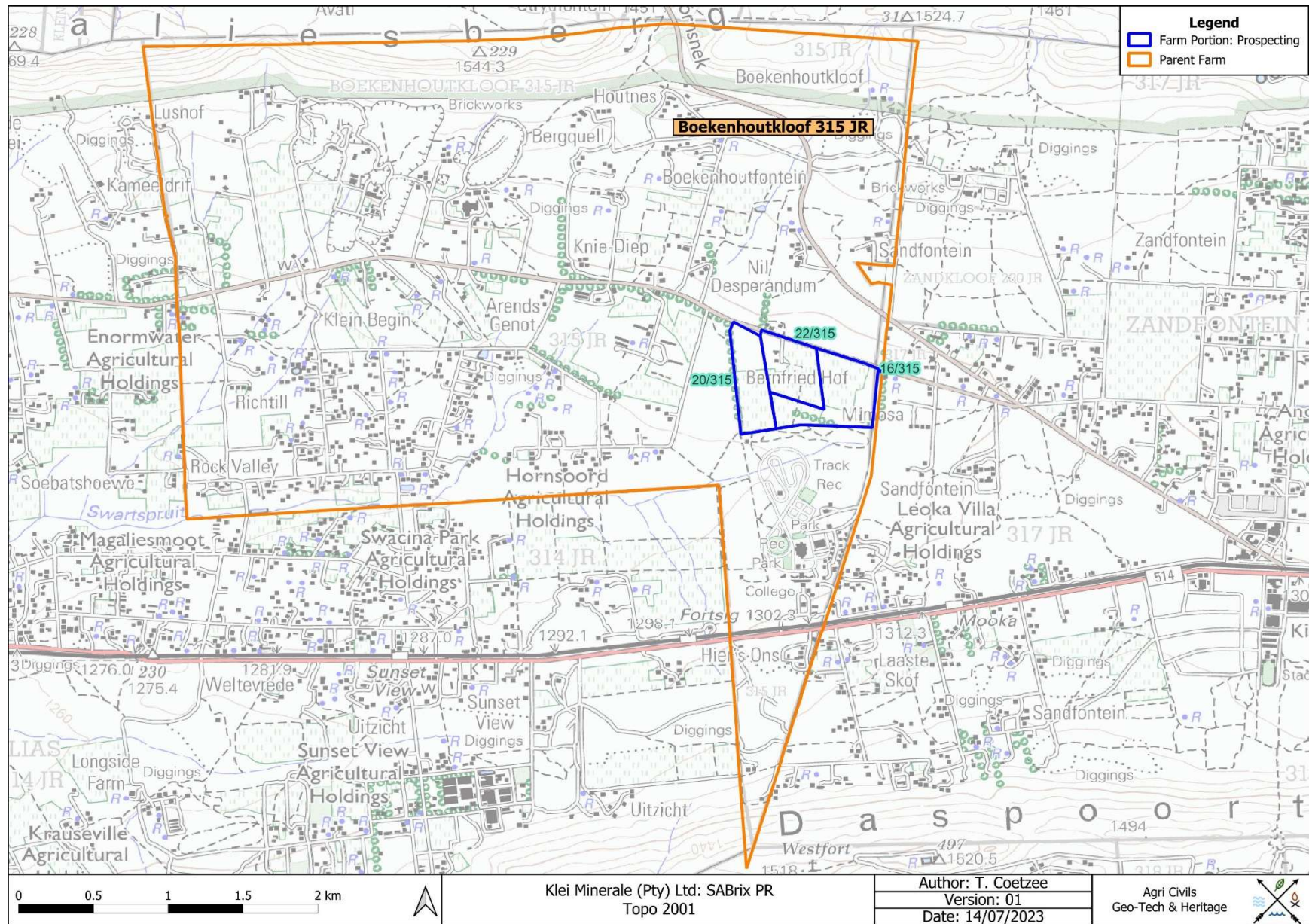


Figure 2: Segment of SA 1:50 000 2528 CA indicating the area demarcated for prospecting.



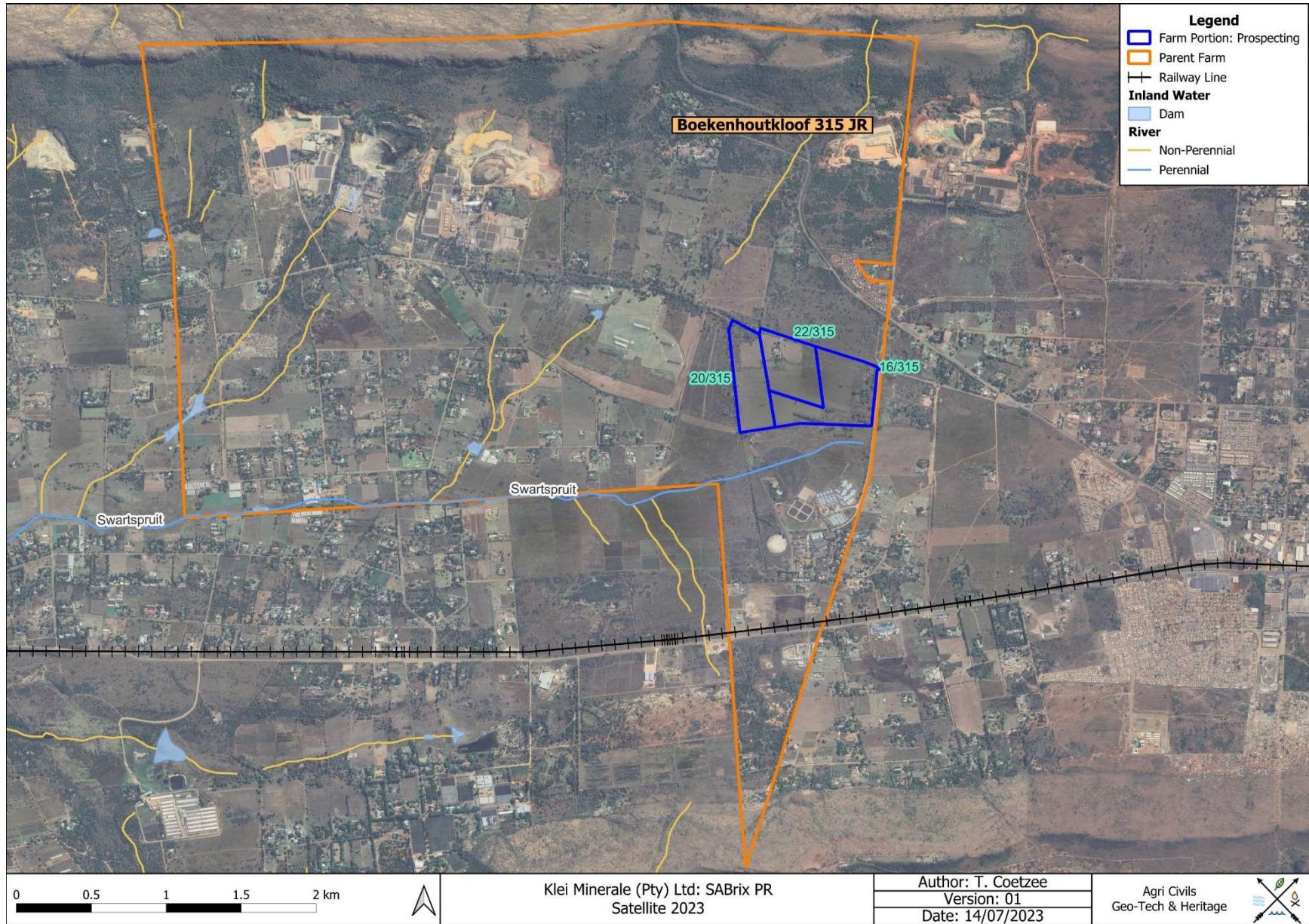


Figure 3: Proposed prospecting area portrayed on a 2023 satellite image.



2.2 Project Description

The proposed prospecting right application for clay and related minerals covers approximately 46.9 ha (**Figures 2 & 3**). The following project description was provided by Elementum Sustainability (Pty) Ltd:

“Prior to mining activities being conducted, prospecting will allow the applicant to determine if the area contains any minerals of economic value so that investments can be made on a proven reserve. The prospecting activity provides the economic value of the ore bodies reserves in the ground and the information on the required earth works for stripping the surface for exposure of the ore bodies. It is noted that should the Prospecting Right be granted, it will not provide the required authorization for mining activities to be undertaken. Any future intention to undertake mining within the application area would require a mining right application and the associated environmental authorizations.

Initially prospecting work will include a high-level desktop study and potential desktop resource evaluation. This will include a data search of any previous drilling, trenching, sampling activities, exploration activities, existing maps and relevant historical data. When the desktop study has been successfully completed, further trenching and resource estimations will be performed.”

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 1939, 1965, 1975, 1979, 1995, and 2001, as well as the historical aerial images dating to 1939, 1948, 1958, 1964, 1968, 1991, 2001, and 2006, proved useful in terms of providing an indication of potential heritage sites and past land uses associated with the study area. Ten potential sites were observed within the demarcated boundary using these data sources (**Table 2 & Figure 4**). It should be noted that the prefix ‘2528CA’ is not used when referring to the site names due to the length of the names, but are recorded as such in **Tables 2 & 8**. Based on contemporary satellite imagery, nine of the sites (B01 – B04; B06 – B10) appear to have been demolished since no surface remains are visible (**Figures 5**), while intact buildings are visible at one of the sites (B05). The total area inspected was 46.9 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)
2528CA-B01	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Historical	0.5	-25.705399	28.078912
2528CA-B02	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Historical	0.6	-25.704281	28.080081
2528CA-B03	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Historical	0.1	-25.705562	28.078386
2528CA-B04	Hut	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Historical	0.5	-25.706151	28.079445
2528CA-B05	Building	Boekenhoutkloof 315 JR	22/315	Intact Building	Historical	1.0	-25.702393	28.074753
2528CA-B06	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Potentially Historical	0.2	-25.704750	28.079859
2528CA-B07	Buidling	Boekenhoutkloof 315 JR	16 & 22/315	No Visible Remains	Contemporary	0.7	-25.705596	28.078066
2528CA-B08	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Contemporary	0.2	-25.704900	28.080298
2528CA-B09	Building	Boekenhoutkloof 315 JR	16/315	No Visible Remains	Contemporary	0.3	-25.705882	28.079530
2528CA-B10	Building	Boekenhoutkloof 315 JR	22/315	No Visible Remains	Contemporary	0.2	-25.702893	28.074928



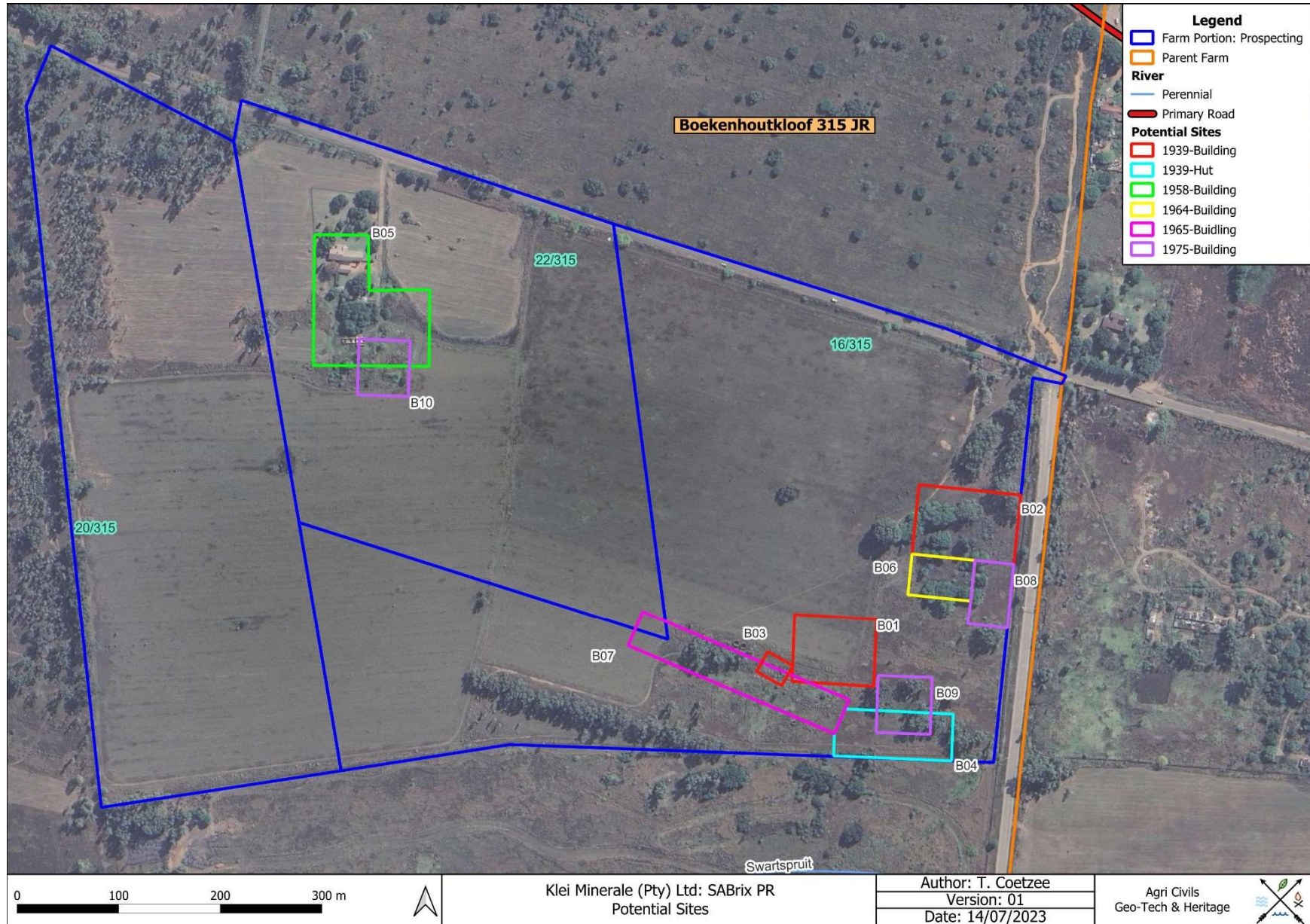


Figure 4: Potential Sites.



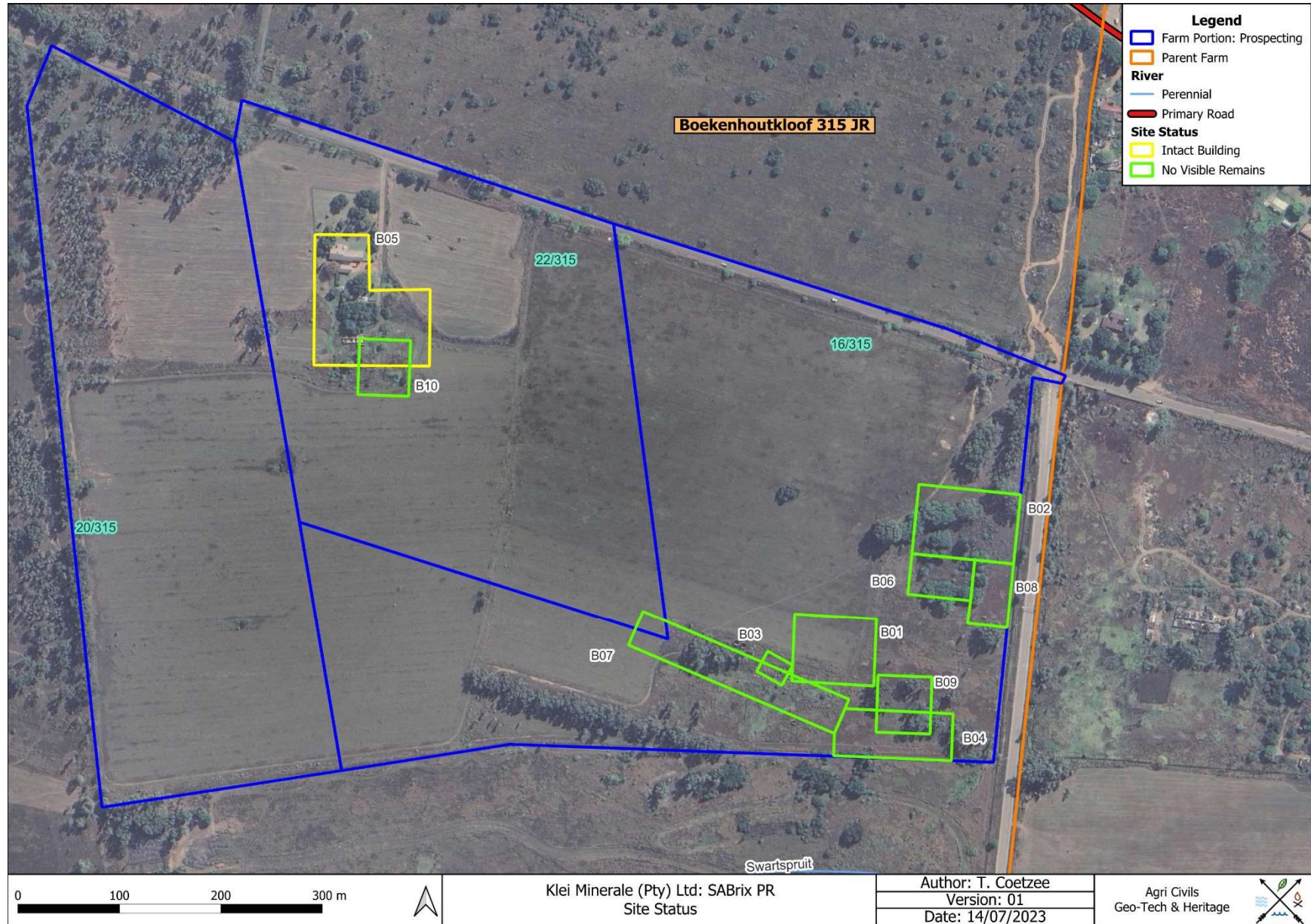


Figure 5: Site Status.



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 Diamond Hill 44 km to the east-southeast and near Soweto 60 km to the south-southwest (Battle of Doornkop). Forts in the area include Fort Daspoortrand 3 km to the south and Fort Wonderboompoort 12 km to the east-northeast.

4.2.2 Study area archaeo-history

In terms of the general project area, the region is well known for LIA sites. The area west of Wonderboompoort is associated with one of the earliest LIA sites. Further to the west a high concentration of sites is also found that stretches to Olifantspoort in the Magaliesberg. These sites date to the Moloko period that roughly stretched from AD 1100 – 1500 (Van Vollenhoven 2006).

Oral traditions of Nguni-speaking Ndebele groups indicate their sites in the area to the east of Pretoria, while heritage reports conducted on the stone-walled sites of this area suggest that Ndebele-speaking people inhabited this area between the late 1600s and mid-1800s (Antonites 2020).

According to Van Vuuren (2006), Ndebele oral traditions state that they first settled at Emhlangeni, translating to “At the reeds”, near Randfontein in the Gauteng Province. Accordingly, they entered the Pretoria region during the early to mid- 1600s and settled at KwaMnyamana, which translates to “Place of the Black Hills”. KwaMnyamana is located close to the Hippo Quarries crusher site on the farms De Onderstepoort (300JR) and Doornpoort (295JR). The first chief to settle at this site was called Musi. A split between his sons caused the Ndebele to divide into several tribal entities. The descendants of the youngest son, Ndzungza, moved further to the east, while the descendants of the eldest son, Manala, stayed behind.

A later Ndebele invasion that was led by Mzilikaze in 1827, settled at Kungwini, present day Wonderboom in Pretoria North. In 1832, the Zulu king Dingane attacked Mzilikaze at Kungwini. According to Van Vollenhoven (2006), the Sotho-Tswana groups are the largest Bantu language speaking people who are formed by the Northern and Southern Sotho, as well as the Tswana. These groups are responsible for large stone-walled towns and according to oral histories, these groups re-established themselves after the 1827 arrival of Mzilikaze during the Mfecane/Difaqane.



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 1939, 1948, 1958, 1964, 1965, 1968, 1975, 1979, 1991, 1995, 2001, and 2006 (**Appendix A**) were used to determine the location and relative age of the structures and buildings associated with the demarcated farm portions (**Tables 3 & 4**), as well as to determine historical land uses.

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. Nine building sites and one hut site were identified. Five of the sites date to the historic period, while one potentially dates to historical times. Also, one site is associated with intact buildings, while no surface remains were noted at the nine remaining sites. Potential sites were identified on Portions 16 and 22 of the Farm Boekenhoutkloof 315 JR, while no potential sites were observed on Portion 20.



Table 3: Site age & type as identified on historical aerial images and topographical maps (1/2).

Site No	1939 Aerial	1939 Topo	1948 Aerial	1958 Aerial	1964 Aerial	1965 Topo	1968 Aerial	1975 Topo	1979 Topo	1991 Aerial	1995 Topo	2001 Aerial
B01	None	Building	Building	None	None	None	None	None	None	None	None	None
B02	Building	Building	Building	Building	Building	Building	Building	Building	Building	None	Ruin	None
B03	Building	None	None	None	None	None	None	None	None	None	None	None
B04	None	Hut	None	None	None	None	None	None	None	None	None	None
B05	None	None	None	Building	Building	Building	Building	None	None	Building	Building	Building
B06	None	None	None	None	Building	Building	Building	Building	Building	None	None	None
B07	None	None	None	None	None	Building	None	Building	Building	None	None	None
B08	None	None	None	None	None	None	None	Building	None	None	None	None
B09	None	None	None	None	None	None	None	Building	Building	None	None	None
B10	None	None	None	None	None	None	None	Building	Building	None	None	None

Table 4: Site age & type as identified on historical aerial images and topographical maps (2/2).

Site No	2001 Topo	2006 Aerial	2023 Satellite	Constructed	Demolished
B01	None	None	None	<=1939	1948-1958
B02	None	None	None	<=1939	1979-1991
B03	None	None	None	<=1939	1939-1948
B04	None	None	None	<=1939	1939-1948
B05	Building	Building	Building	1948-1958	N/A
B06	None	None	None	1958-1964	1979-1991
B07	None	None	None	1964-1965	1979-1991
B08	None	None	None	1968-1975	1975-1979
B09	None	None	None	1968-1975	1979-1991
B10	None	None	None	1968-1975	1979-1991



5.2 Previous Heritage Studies

Fort West Phase 1 Development

An archaeological survey was conducted for the development of a mixed-use township on Portion 1 of the Farm Fort 646 JR within the Tshwane Metropolitan Municipality. The site is located south of the Daspoortrand, north of the suburb of Lotus Gardens and approximately 3 km south of the proposed prospecting concerned in this report. J. van Schalkwyk (2012) surveyed the study area and located seven stone-walled Late Iron Age sites consisting of settlement structures, cattle enclosures and several other smaller enclosures. According to Van Schalkwyk (2012), these sites can probably be linked to Tswana- or Ndebele speakers who settled in the area within the past 300 years. Other sites of heritage importance located in close vicinity are Fort Daspoort, built by the ZAR out of fear for British domination (Van Vollenhoven 1999), and Westfort Hospital, which was erected in 1898.

HIA on the Farm Hartbeeshoek 301 JR

The National Cultural History Museum (2002) conducted a Heritage Impact Assessment to identify graves on the Farm Hartbeeshoek 301 JR within the Akasia municipal area, Pretoria. The aim of the study was to identify graves within the road reserve of the Platinum Toll Highway. The study identified approximately 20 graves marked with stone cairns and a recommendation was made to relocate the graves. The graveyard was identified about 5 km northeast of the demarcated Klei Minerale (Pty) Ltd SABrix PR study area.

Extension of SABRIX Quarry

Dr R. C. de Jong (2002) conducted a Heritage Scoping Study as part of an EMP for the expansion of the SABrix quarry on Portion 19 of the Farm Boekenhoutkloof 315 JR, Pretoria. Portion 19 is located approximately 1.1 km northwest of the Klei Minerale (Pty) Ltd SABrix project area. According to De Jong (2002), the Farm Boekenhoutkloof originally belonged to the Zuid-Afrikaansche Republiek and was subsequently leased to Willem Hendrik Boshoff Jr. from 26 July 1859. During the 1860s, the farm was transferred to G. P. J. Horn. The original farmhouse was built by Horn to the northwest of the SABrix quarry and a farm school was later erected approximately in the middle of the property. In June 1892, Arthur H. Walker surveyed the entire farm for G. P. J. Horn and in March 1912, the farm was subdivided. During the survey, two heritage sites were identified: one ruin consisting of stone-walls and clay mortar dating to between 1930 and 1960, and one graveyard consisting of several graves (De Jong 2002).

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 a Pioneers House approximately 590 m to the west.



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.

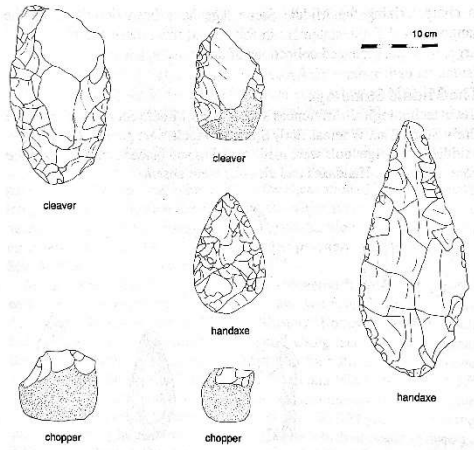


Figure 6: ESA artefacts (Mazel 1989).

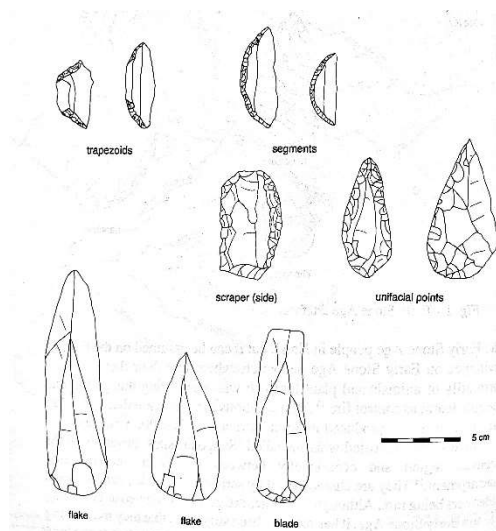


Figure 7: MSA artefacts (Mazel 1989).



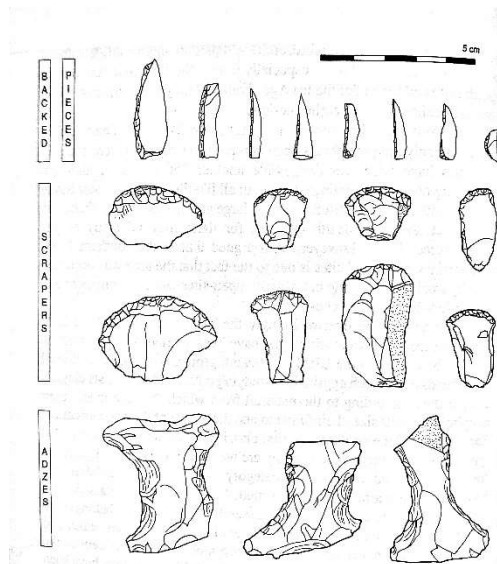


Figure 8: LSA artefacts (Mazel 1989).



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

Archaeological studies conducted by Van Schalkwyk (2013), the National Cultural History Museum (2002) and De Jong (2002) did not locate material pertaining to the Stone Age.

According to Bergh (1998), the nearest Stone Age site to the study area is the Wonderboompoort ESA site approximately 15 km to the east.

Since Stone Age sites are often associated with water sources, these 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. Very few undisturbed sections, however, are found within the demarcated study area.

The heritage study conducted by van Schalkwyk (2012) recorded several stone-walled enclosures belonging to the LIA in the vicinity of the Daspoortrand that is located approximately 3 km to the south of the study area.

According to Bergh (1998), the study area falls within a rather large Iron Age site concentration that is associated with 125 LIA sites. Bergh (1998) also noted the presence of the Kgatla Manala-Ndebele in the area during the start of the 19th Century, as well as Zulu attacks during the *Difaqane*.

According to Huffman (2007), the following ceramics are associated with the general area surrounding Pretoria:

- Mzonjani facies of the Kwale Branch of the Urewe Tradition (AD 450 to 750).
- Uikomst facies of the Blackburn Branch of the Urewe Tradition (AD 1650 to 1820)
- Olifantpoort facies of the Moloko branch of the Urewe Tradition (AD 1500 to 1700)
- Buispoort facies of the Moloko branch of the Urewe Tradition AD (1700 – 1840)



6.3 Historical Remains

Six sites associated with buildings and a hut were identified on historical aerial imagery and topographical maps (Table 5). Four of the sites were constructed before or during 1939 (B01 – B04), one site was constructed between 1948 and 1958 (B05), and one site was constructed between 1958 and 1964 (B06), therefore potentially dating to the Historic Period. However, it should be noted that the initial buildings associated with Site B05 were demolished between 1968 and 1975, while new buildings appear to have been constructed between 1979 and 1991. Site B05 is also still associated with intact buildings, while the remaining five historical / potentially historical sites are not associated with any visible surface remains (B01 – B04; B06). Subsurface cultural remains, however, might be associated with the demolished sites and could therefore be sensitive from a heritage perspective. Site B01 appears to have been demolished between 1948 and 1958, Sites B02 and B06 between 1979 and 1991, while Sites B03 and B04 seem to have been demolished between 1939 and 1948.

According to Van Vollenhoven (1999) nearby historic infrastructure include Fort Daspoort and Westford Hospital, while the heritage study conducted by De Jong (2002) noted the presence of a historical farmhouse and farm school, as well as a historical ruin dating to between 1930 and 1960.

Table 5: Historical Sites.

Site No	Dataset date & site type	Current Status	Age	Farm Portion	Lat (y)	Lon (x)
B01	1939-Building	No Visible Remains	Historical	16/315	-25.705399	28.078912
B02	1939-Building	No Visible Remains	Historical	16/315	-25.704281	28.080081
B03	1939-Building	No Visible Remains	Historical	16/315	-25.705562	28.078386
B04	1939-Hut	No Visible Remains	Historical	16/315	-25.706151	28.079445
B05	1958-Building	Intact Building	Historical	22/315	-25.702393	28.074753
B06	1964-Building	No Visible Remains	Potentially Historical	16/315	-25.704750	28.079859

6.4 Contemporary Remains

Four sites associated with contemporary buildings were identified on historical aerial imagery and topographical maps (Table 6). One of the sites (B07) was constructed between 1964 and 1965, while the remaining three sites (B08 – B10) were constructed between 1968 and 1975. The four identified contemporary sites are not associated with any visible surface remains. Sites B07, B09 and B10 appear to have been demolished between 1979 and 1991, while Site B08 seems to have been demolished between 1975 and 1979.

The heritage studies conducted by the National Cultural History Museum (2002), De Jong (2002) and Van Schalkwyk (2012) did not mention significant contemporary sites.



Table 6: Contemporary Sites.

Site No	Dataset date & site type	Current Status	Age	Farm Portion	Lat (y)	Lon (x)
B07	1965-Buidling	No Visible Remains	Contemporary	16 & 22/315	-25.705596	28.078066
B08	1975-Building	No Visible Remains	Contemporary	16/315	-25.704900	28.080298
B09	1975-Building	No Visible Remains	Contemporary	16/315	-25.705882	28.079530
B10	1975-Building	No Visible Remains	Contemporary	22/315	-25.702893	28.074928

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 exist that graves may be associated with the study area.

The heritage studies conducted by the National Cultural History Museum (2002) and De Jong (2002) recorded cemeteries in the general study area.

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 7: 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: The proposed Klei Minerale (Pty) Ltd SABrix PR on Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR

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, ESA sites, LIA sites, and historical infrastructure. 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 six sites listed in **Table 8** are associated with demolished historical and potentially historical infrastructure that might exceed 60 years of age. The site associated with intact buildings (Site B05) is considered to be potentially sensitive from a heritage perspective since the original historical buildings appear to have been demolished and were replaced by contemporary buildings. 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. The remaining four sites consist of demolished contemporary buildings that do not exceed 60 years of age (Sites B07 – B10). These sites are unlikely to be significant from a heritage perspective.



Table 8: Sensitive Sites.

Site No	Type	Farm Portion	Lat (y)	Lon (x)	Current Status	Age	Sensitivity
2528CA-B01	Building	16/315	-25.705399	28.078912	No Visible Remains	Historical	Potentially Sensitive
2528CA-B02	Building	16/315	-25.704281	28.080081	No Visible Remains	Historical	Potentially Sensitive
2528CA-B03	Building	16/315	-25.705562	28.078386	No Visible Remains	Historical	Potentially Sensitive
2528CA-B04	Hut	16/315	-25.706151	28.079445	No Visible Remains	Historical	Potentially Sensitive
2528CA-B05	Building	22/315	-25.702393	28.074753	Intact Building	Historical	Potentially Sensitive
2528CA-B06	Building	16/315	-25.704750	28.079859	No Visible Remains	Potentially Historical	Potentially Sensitive



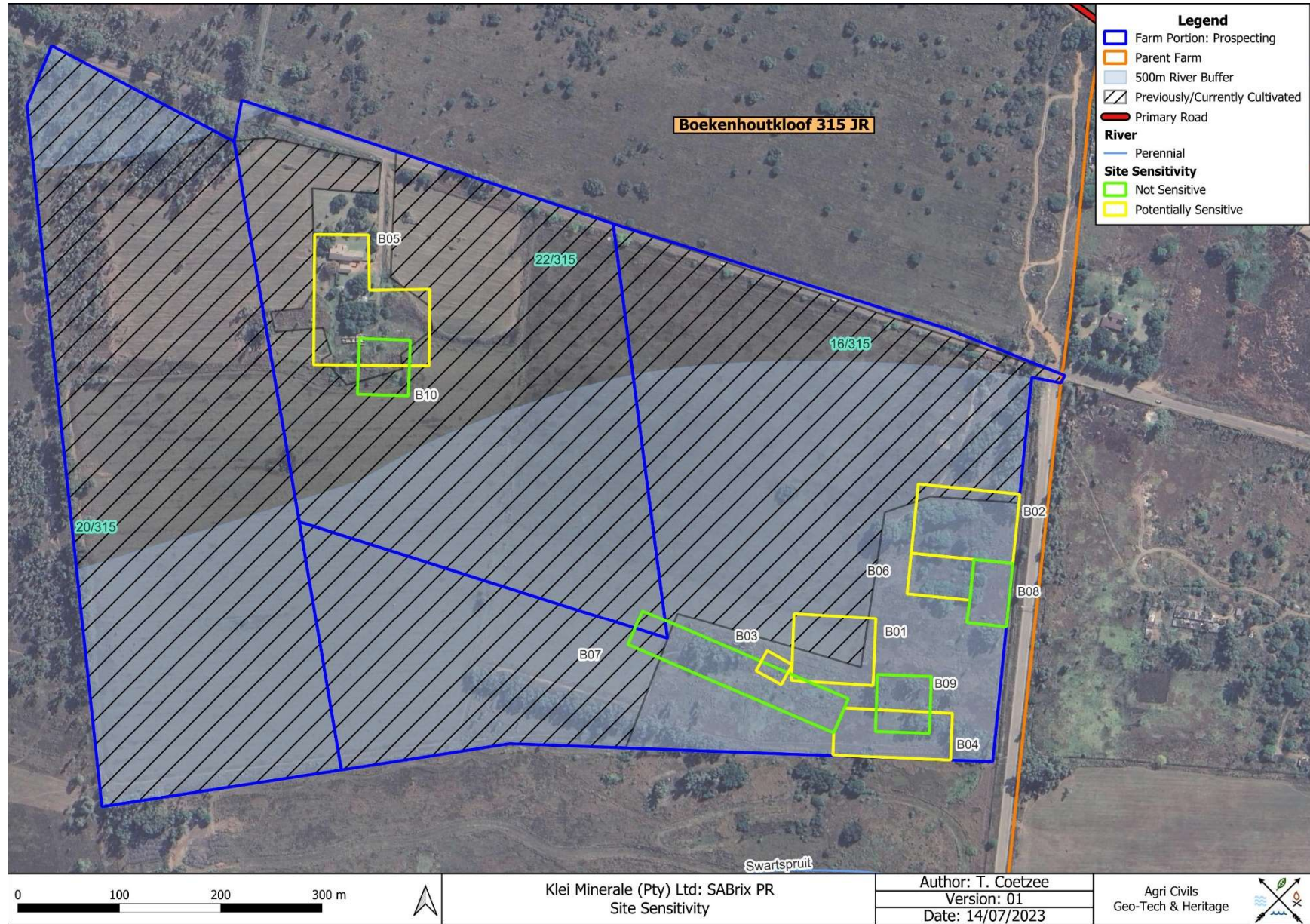


Figure 17: Site Sensitivity.



8.2 Recommendations

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

- The five historical and potentially historical sites (B01 – B04; B06) 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 B05 is associated with intact infrastructure. The intact buildings, however, appear to date to contemporary times while the historical buildings that used to be associated with the site have been demolished. The possibility, therefore, exists that subsurface culturally significant material might be associated with the site, but also that historical surface remains exceeding 60 years of age might be present, but are not detectable on aerial imagery. 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 potential presence of heritage remains.
- Sites B07 – B10 used to be associated with contemporary infrastructure. These sites do not exceed 60 years of age, have been demolished, and are unlikely to be significant from a heritage perspective. However, should impact to the sites be unavoidable, it is recommended that a qualified archaeologist inspect the sites prior to any impact.
- 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 and contemporary infrastructure. 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 Klei Minerale (Pty) Ltd SABrix PR that consists of the prospecting of clay and related minerals on Portions 16, 20 and 22 of the Farm Boekenhoutkloof 315 JR covers approximately 46.9 ha. The general area is characterised by cultivated and 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. Six historical and potentially historical sites, as well as four contemporary 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 Klei Minerale (Pty) Ltd SABrix PR 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

- Antonites, X. 2020. Heritage Impact Assessment Report for the Proposed Pig Production Facility on Portion 23 of Kameel Zyn Kraal 547 JR, Bapsfontein, Gauteng Province. Pretoria
- 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. Pretoria Climate. <https://en.climate-data.org/africa/south-africa/gauteng/pretoria-154/> Accessed 15-07-2023.
- Deacon, H. & Deacon, J. 1999. *Human beginnings in South Africa*. Cape Town: David Philip.
- De Jong, R. C. 2002. Heritage Scoping: Extension of KLEI MINERALE (PTY) LTD Quarry on the Farm Boekenhoutkloof 315 JR, Pretoria. Pretoria: Cultmatrix.
- 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.



National Cultural Museum. 2002. Identification of Graves on the Farm Hartbeeshoek 301 JR, Akasia Municipal Area, Wonderboom District, Gauteng Province

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

Van Schalkwyk, J. Heritage Impact Assessment for the proposed Fort West Phase 1 Development, Pretoria Magisterial District, Gauteng Province. Pretoria: J. van Schalkwyk.

Van Vollenhoven, A.C. 1999. The military fortifications of Pretoria (1880-1902). Pretoria: A.C. van Vollenhoven.

Van Vollenhoven, A.C. 2006. Die prehistoriese en vroeë historiese tydvak in Pretoria. South African Journal of Cultural History 20 (2): 176–200.

Van Vuuren, C.J. 2006. Ndebele Place Names and Settlement in Pretoria. South African Journal of Cultural History 20 (1): 78–99

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: 1939 Aerial image of the study area.



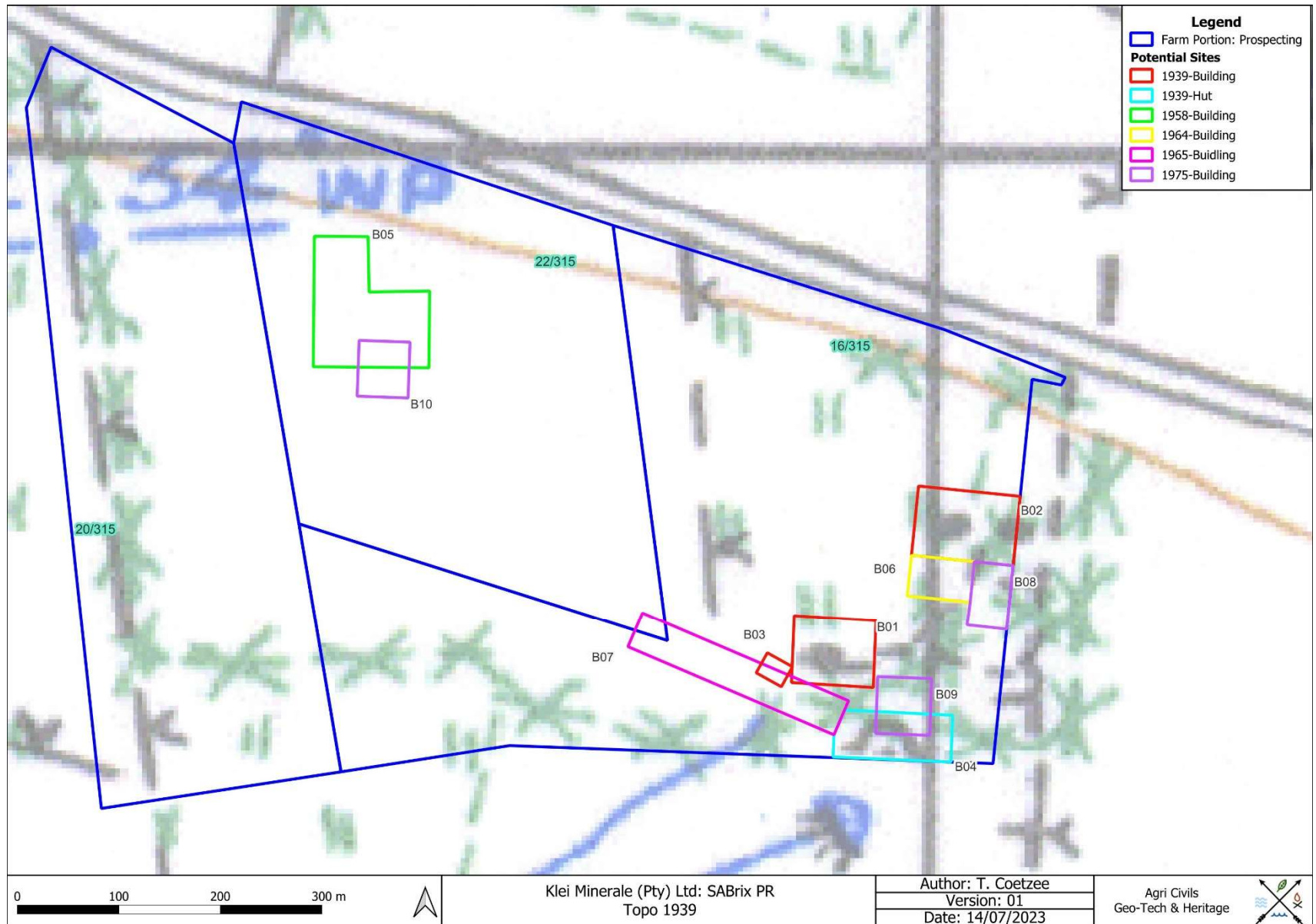


Figure 19: Segment of 1939 1:50 000 2528 CA indicating the study area.





Figure 20: 1948 Aerial image of the study area.



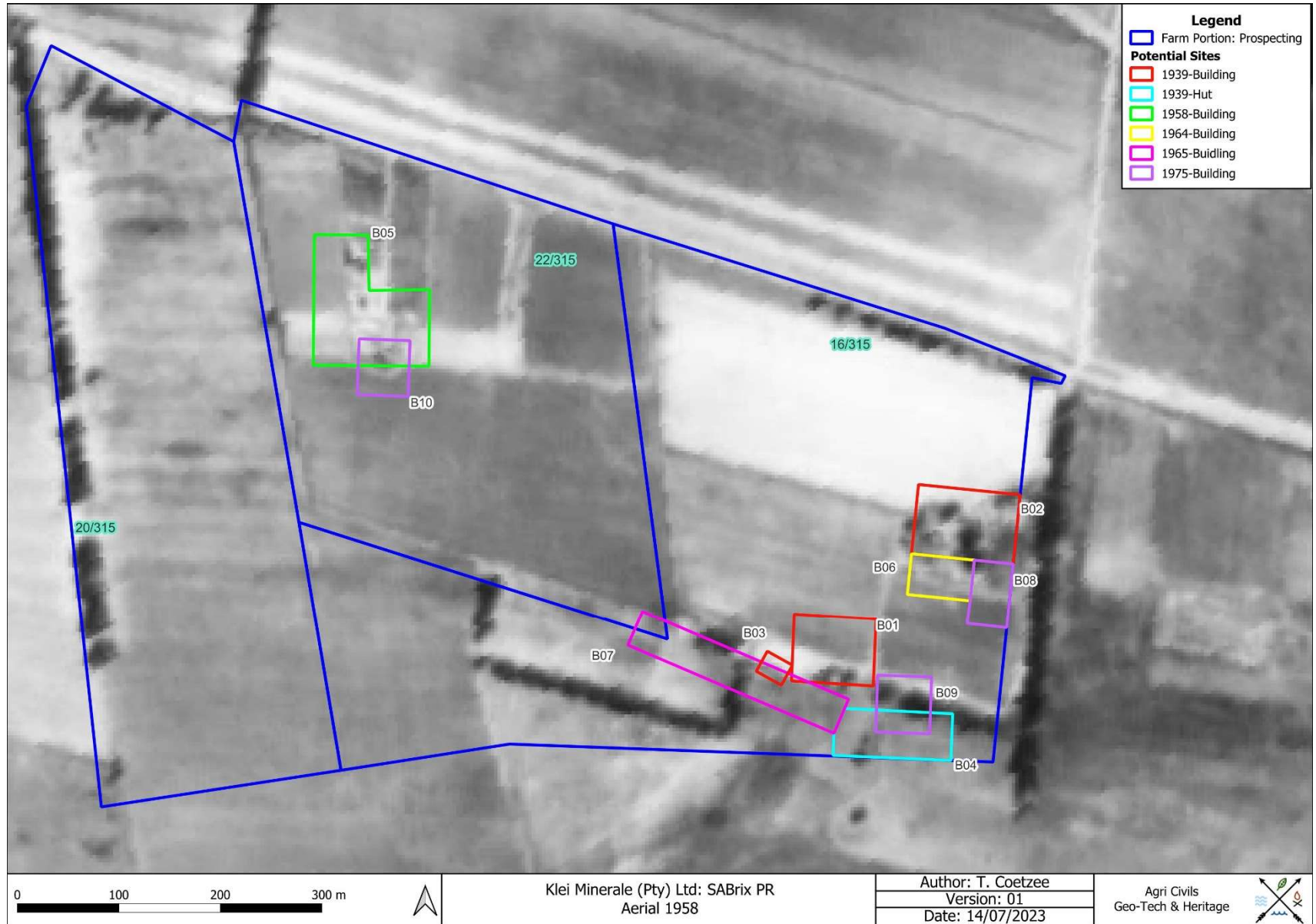


Figure 21: 1958 Aerial image of the study area.





Figure 22: 1964 Aerial image of the study area.



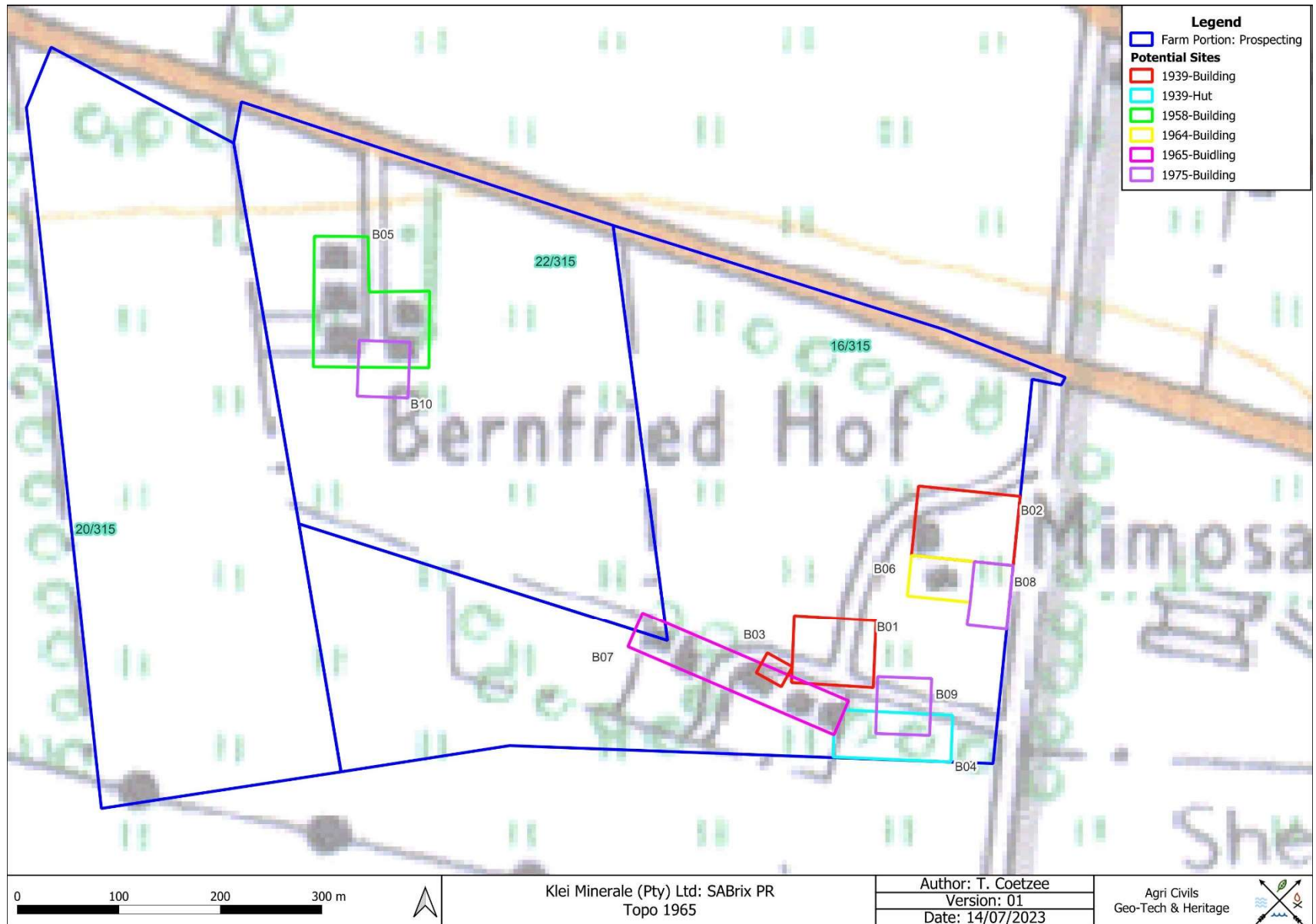


Figure 23: Segment of 1965 1:50 000 2528 CA indicating the study area.



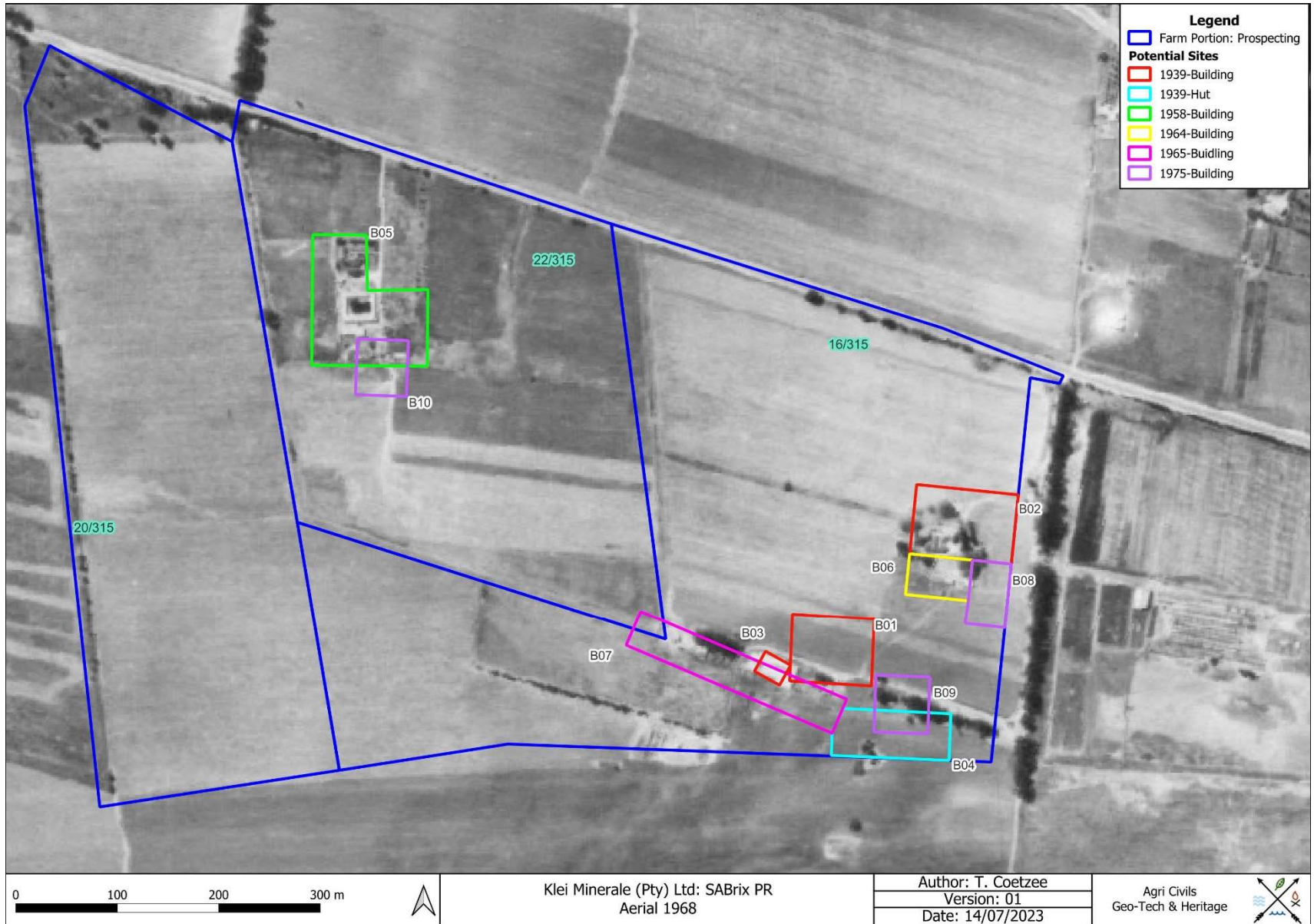


Figure 24: 1968 Aerial image of the study area.



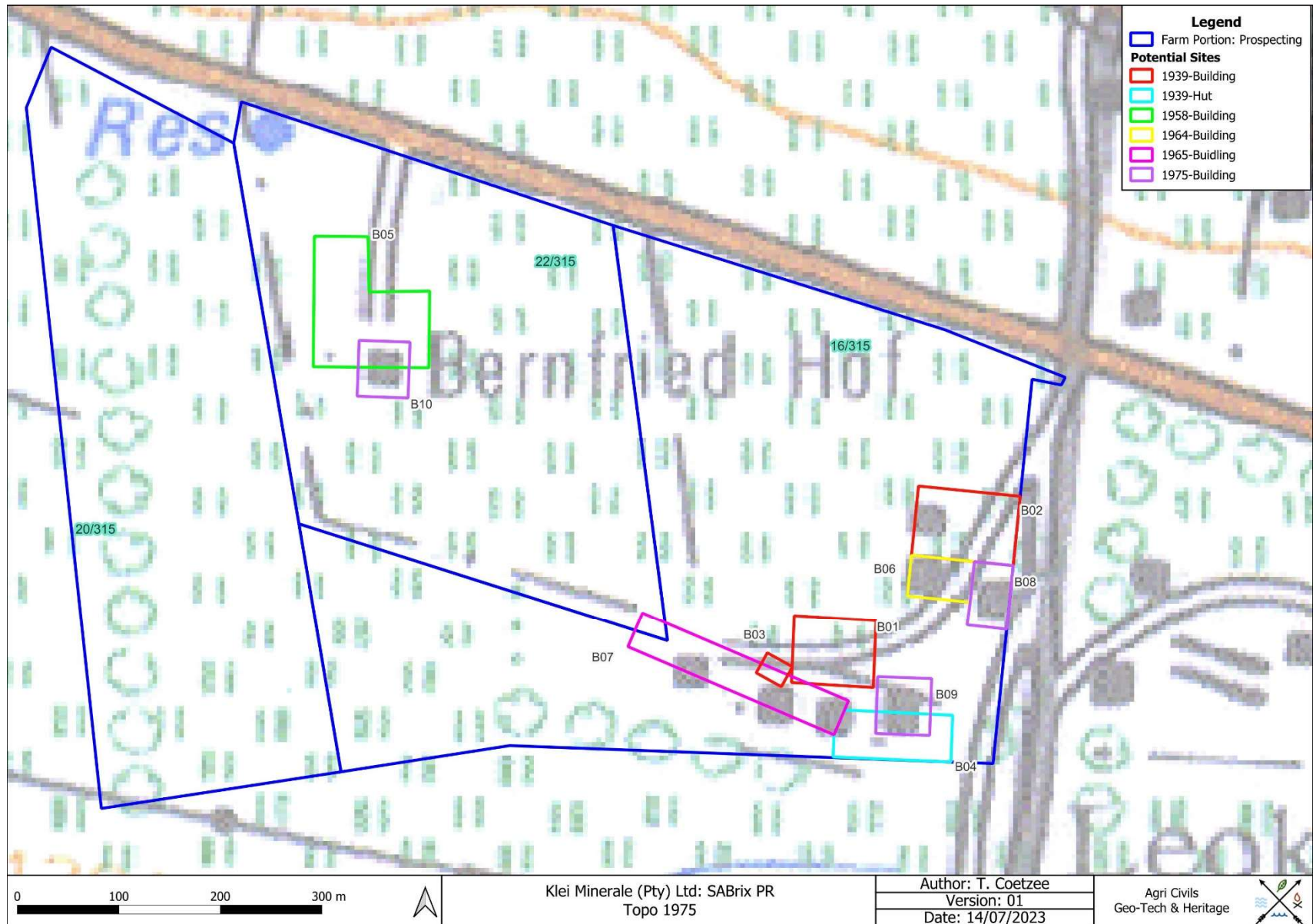


Figure 25: Segment of 1975 1:50 000 2528 CA indicating the study area.



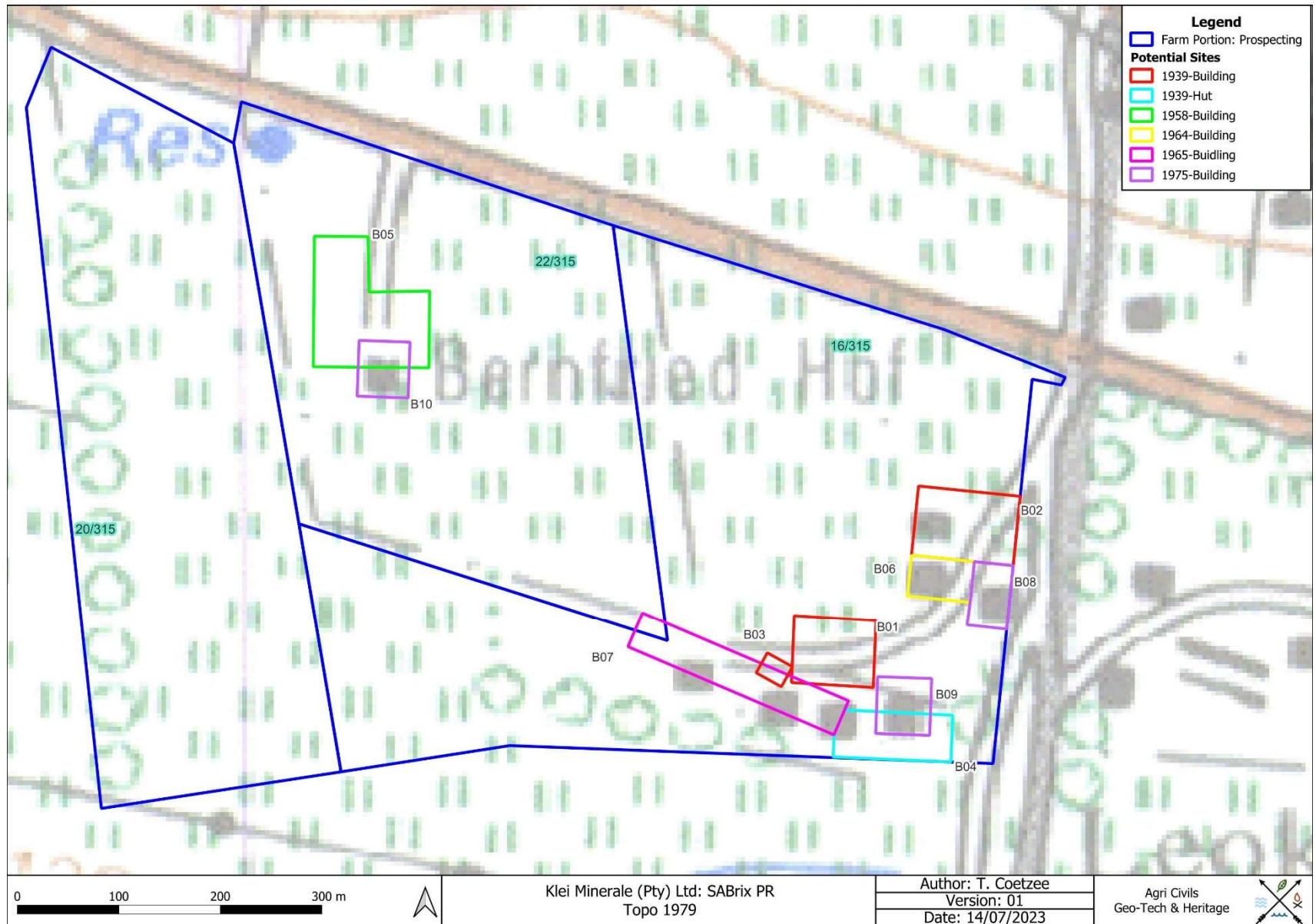


Figure 26: Segment of 1979 1:50 000 2528 CA indicating the study area.



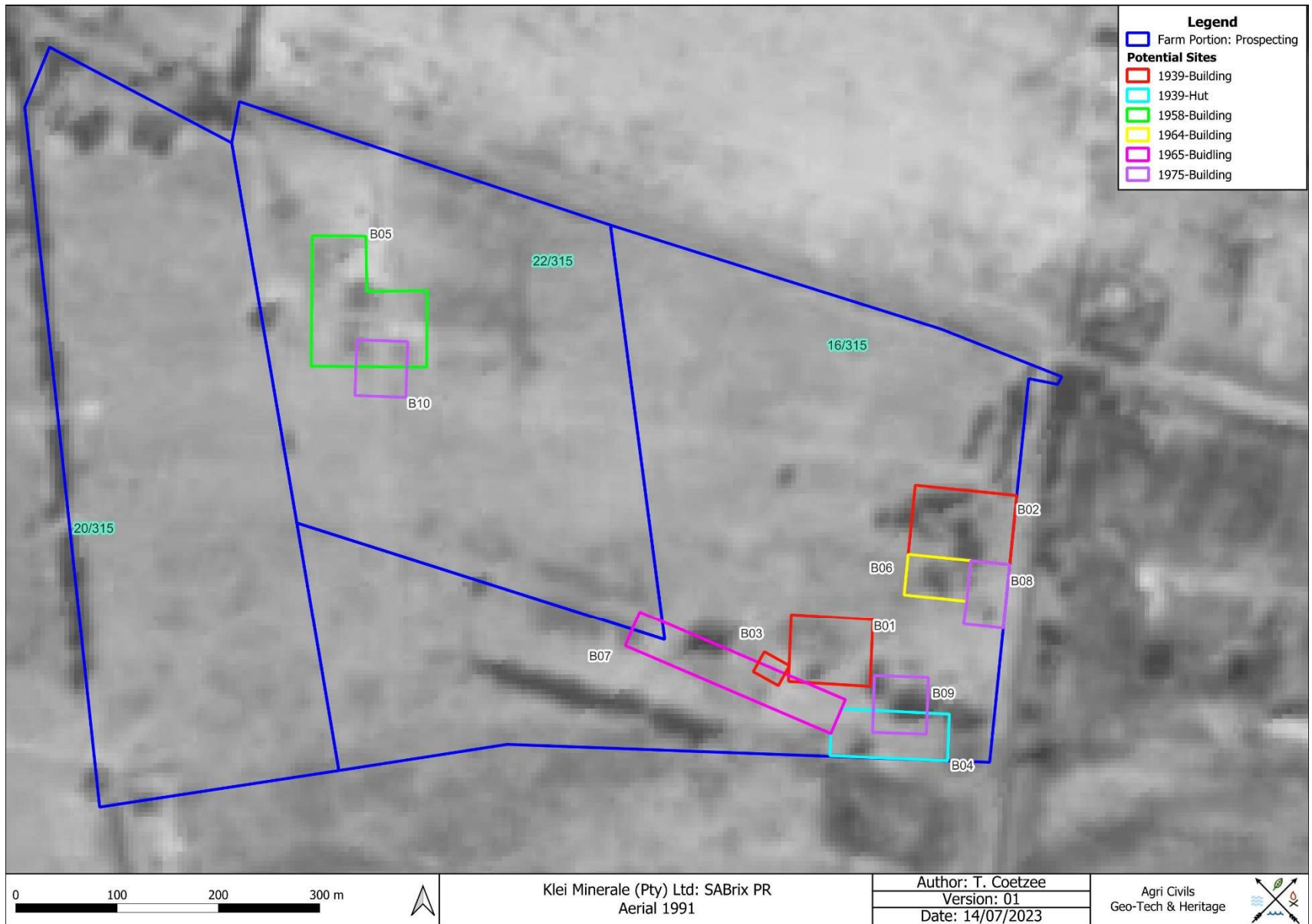


Figure 27: 1991 Aerial image of the study area.



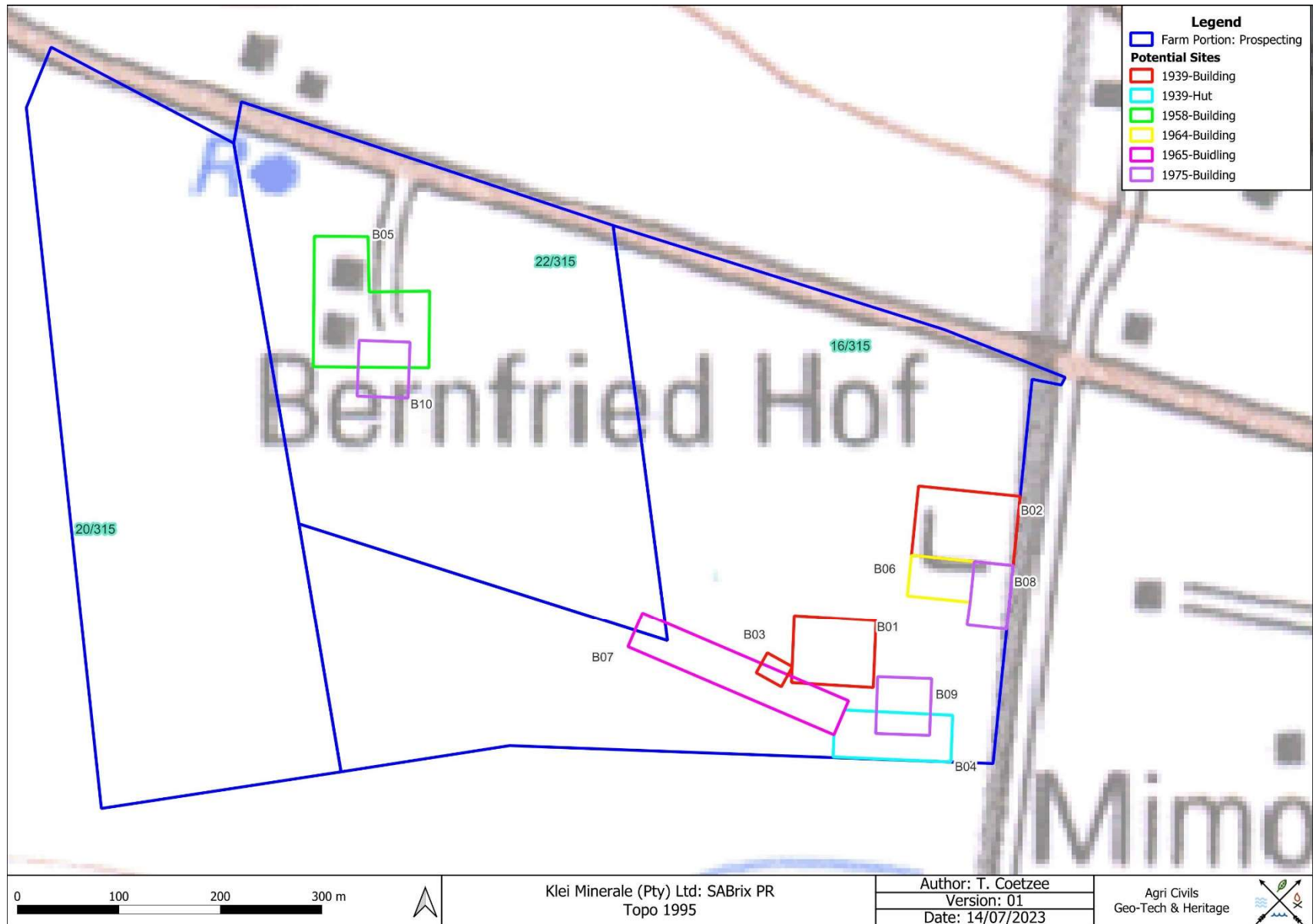


Figure 28: Segment of 1995 1:50 000 2528 CA indicating the study area.



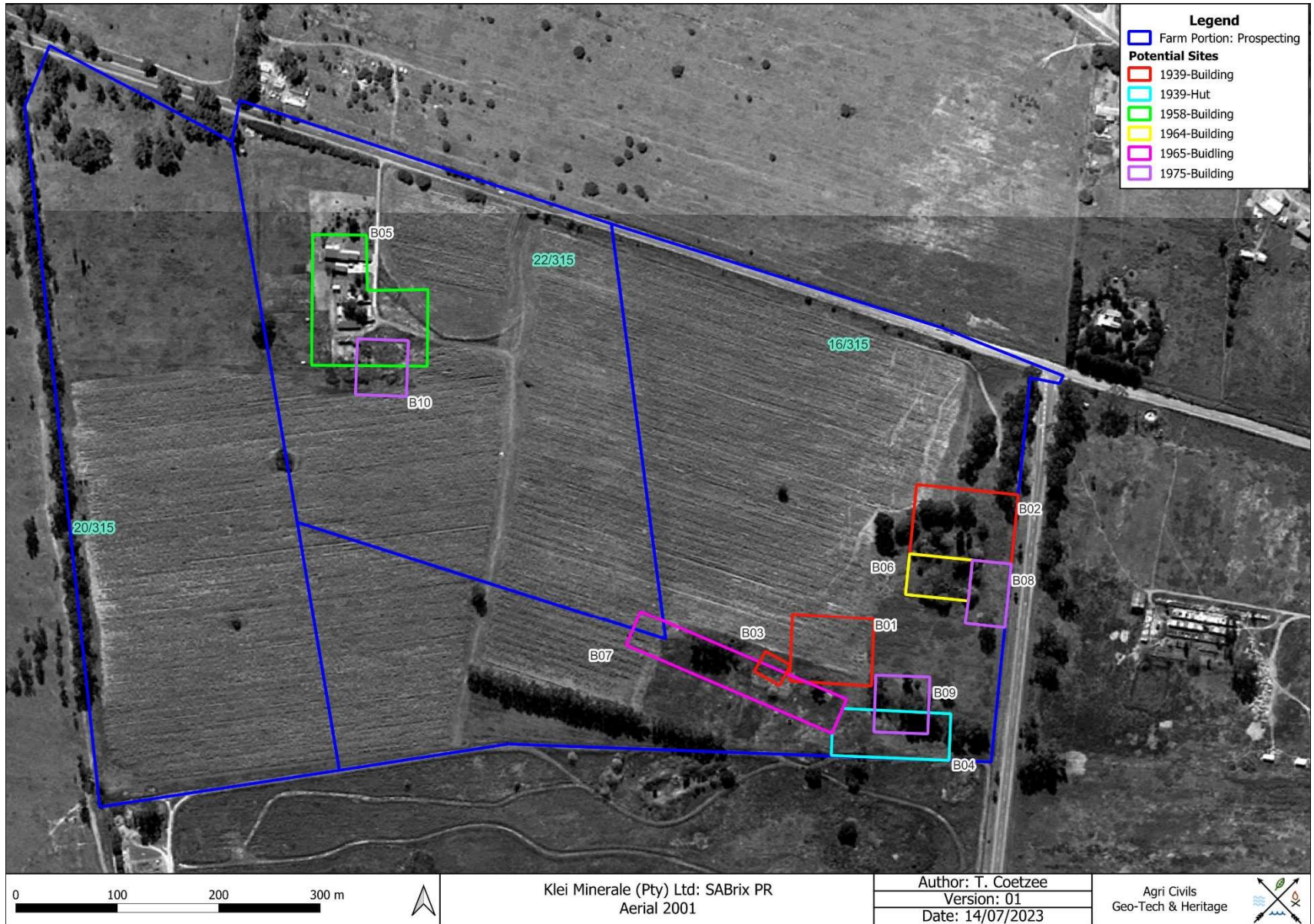


Figure 29: 2001 Aerial image of the study area.



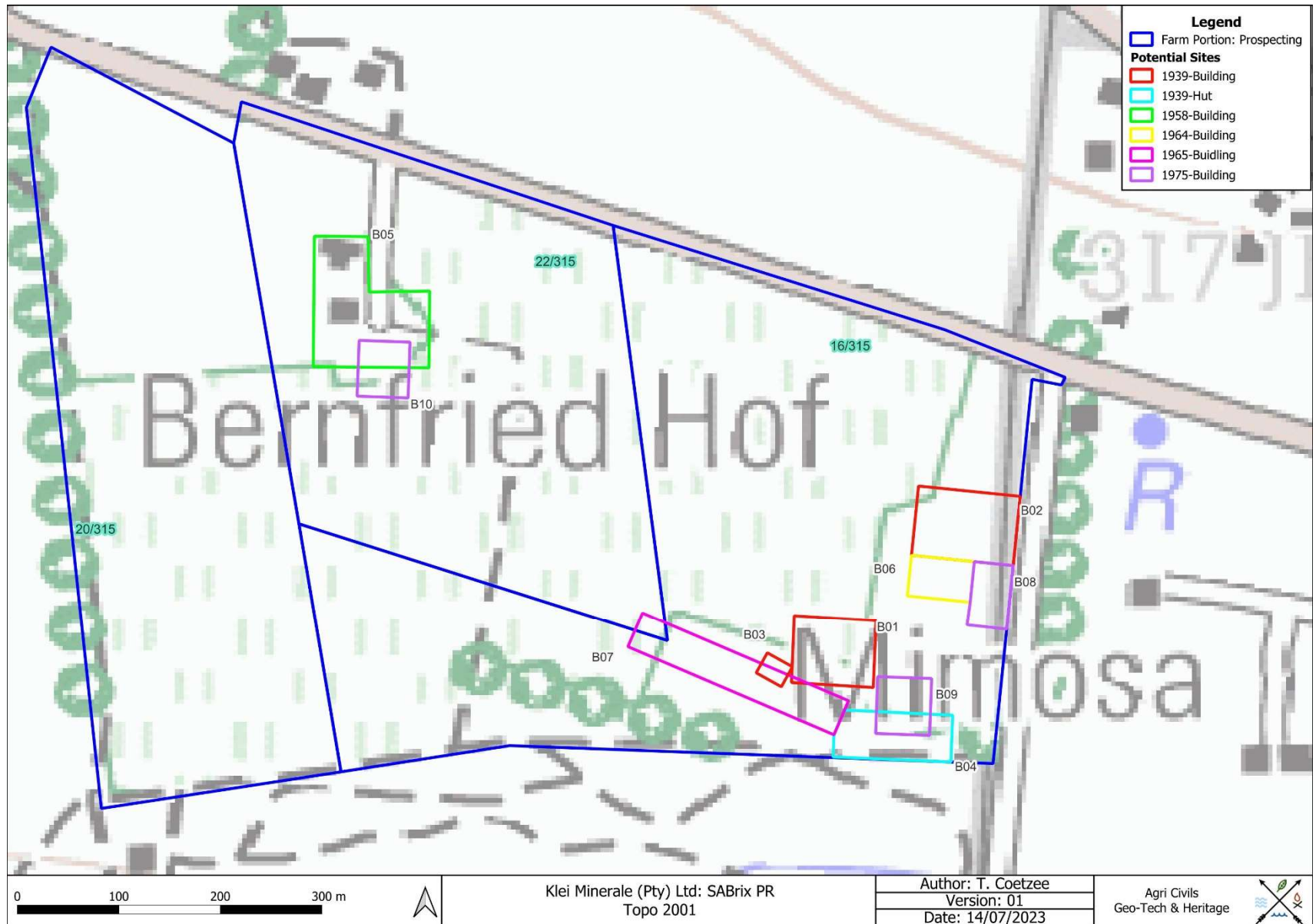


Figure 30: Segment of 2001 1:50 000 2528 CA indicating the study area.





Figure 31: 2006 Aerial image of the study area.



Appendix B: NEMA Risk Assessment Methodology

1.1 RISK ASSESSMENT

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

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

1.1.1 Methodology used in Determining the Significance of Environmental impacts

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

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

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



Extent of the impact

The EXTENT of an impact is the physical extent/area of impact or influence.

Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.

Duration of the impact

The DURATION of an impact is the expected period of time the impact will have an effect.

Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 y limited to the construction phase, or immediate upon the commencing of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development

Intensity of the impact

The INTENSITY of an impact is the expected amplitude of the impact.

Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which will be disturbed to the extent where it temporarily or permanently ceases
5	Very High	The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases



Reversibility of the impact

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

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

Probability of the impact

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

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

Calculation of Impacts – Significance Rating of Impact






Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact.

The significance of an impact is rated according the scores a presented below:

Equation 1:

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



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

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

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

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

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



Appendix C: Monitoring – Heritage

Site	Impact	Applicable Phase	Action	Frequency	Responsible person
2528CA-B01	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B02	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B03	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B04	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B05	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B06	Potential impact to subsurface material	Prospecting	Avoid site / Monitor subsurface material	During prospecting	ECO
2528CA-B07	None foreseen	Prospecting	Monitor subsurface material	During prospecting	ECO
2528CA-B08	None foreseen	Prospecting	Monitor subsurface material	During prospecting	ECO
2528CA-B09	None foreseen	Prospecting	Monitor subsurface material	During prospecting	ECO
2528CA-B10	None foreseen	Prospecting	Monitor subsurface material	During prospecting	ECO

