

# **PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT**

**For**

**The Proposed Birmingham  
Mining Project near Hendrina,  
Mpumalanga**

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A Phase 1 Archaeological Impact Assessment for the Proposed Birmingham Mining Project near Hendrina, Mpumalanga

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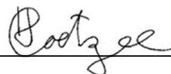
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I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Birmingham Mining Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.



\_\_\_\_\_  
Date: 20 September 2021

## List of Abbreviations

**AIA** – Archaeological Impact Assessment

**CMP** – Conservation Management Plan

**CRM** – Cultural Resource Management

**EIA** – Environmental Impact Assessment

**ECO** – Environmental Control Officer

**ESA** – Early Stone Age

**GPS** – Global Positioning System

**ha** – Hectare

**km** – Kilometre

**LSA** – Later Stone Age

**m** – Metre

**MASL** – Metres Above Sea Level

**MEC** – Member of the Executive Council

**MSA** – Middle Stone Age

**NEMA** - National Environmental Management Act

**NHRA** – National Heritage Resources Act

**SAHRA** – South African Heritage Resources Agency

## NEMA Appendix 6

NEMA Specialist reports	
Item	Page / section 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	Cover, p2
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Cover, Appendix B
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	p2
(c) an indication of the scope of, and the purpose for which, the report was prepared;	1.1
(cA) an indication of the quality and age of base data used for the specialist report;	4
(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;	4
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	4
(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, 7.1
(g) an identification of any areas to be avoided, including buffers;	7.2
(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;	p113, p114
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	4.2
(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;	5-7
(k) any mitigation measures for inclusion in the EMPr;	7.2
(l) any conditions for inclusion in the environmental authorisation;	7.2
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7.2
(n) a reasoned opinion—	
(i)[as to] whether the proposed activity, activities or portions thereof should be authorised	7.2
(iA) regarding the acceptability of the proposed activity or activities; and	7.2
(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;	7.2
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	4.1

<b>NEMA Specialist reports</b>	
<b>Item</b>	<b>Page / section No</b>
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(q) any other information requested by the competent authority.	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

## Executive Summary

The author was appointed by Elemental Sustainability (Pty) Ltd to undertake a Phase 1 Archaeological Impact Assessment for the proposed Birmingham Mining Project intersecting 30 farm portions (listed in **Table 1**) of the Farms Boschmansfontein 182 IS, Boschmanskraal 184 IS, Bloemfontein 196 IS and Birmingham 197 IS near Hendrina in the Mpumalanga Province. The mining right applied for is divided into a northern and southern section. At his stage, however, the underground operations and surface infrastructure will only be located on the northern section. The proposed Birmingham Mining Project is located approximately 1.5 km west of Hendrina, 40 km southeast of Middelburg and 35 km northeast of Bethal, between the N11 National Road and the R35 and R38 Provincial roads. The aim of the study is to determine the scope of archaeological resources that could be impacted by the proposed Birmingham Mining Project.

One area demarcated for surface development, labelled as the Northern Section, was identified and inspected, as well as the area for which underground mining is planned. It should be noted that the initial survey and site identification was based on the original mining layout that significantly differed from the revised layout as the updated mining layout limits the proposed surface infrastructure and underground mining to Portions 3, 4, 7, 8 and the RE of the Farm Boschmansfontein 182 IS. Subsequent alterations to the surface layout were again made to avoid areas with a high agricultural potential. This report lists and discusses all the identified sites, but ratings and recommendations are only provided for the sites intersecting the revised mining layout (**Table 1**).

**Table 1:** Sites associated with the Northern Section.

Abb. name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	ID Source	Northern / Southern
B49	2629BA-B49	29.693313	-26.086203	Building	Ruin	Aerial 1956	North
B50	2629BA-B50	29.672927	-26.077368	Huts	Demolished	Topo 1965	North
B51	2629BA-B51	29.677116	-26.075591	Building	Demolished	Aerial 1956	North
B52	2629BA-B52	29.677725	-26.077342	Building	Intact	Aerial 1956	North
B53	2629BA-B53	29.656679	-26.046294	Building	Ruin	Aerial 1956	North
B72	2629BA-B72	29.680006	-26.075887	Building	Ruin	Aerial 1956	North
BF25	2629BA-BF25	29.678873	-26.074327	Cemetery/ Grave	Intact	Field	North
BF26	2629BA-BF26	29.683430	-26.076871	Cemetery/ Grave	Intact	Field	North
BF28	2629BA-BF28	29.656104	-26.069718	Foundation Mound	Demolished	Aerial 1956	North

One hundred and three sites were identified on the entire mining right area, plotted and inspected on recent aerial imagery, as well as on historical aerial imagery and historical topographical maps. Sixteen of the 103 sites are located on the Northern Section. Fifty-two of the 103 sites have been demolished and fall outside of the demarcated surface infrastructure area and were therefore not visited. Twenty-six of the pre-identified sites were visited and recorded, while an additional 25 sites were identified and recorded during the survey. It should be noted that due to the most recent layout changes, one demolished site intersecting the surface development area was not visited (Site B50). Five sites are likely to be impacted by the proposed mining activities and require further action.

Two areas associated with demolished historical sites were recorded within the area demarcated for surface development (Sites B50 & B51). Site B50, associated with huts on the 1965 topographical map, partially intersects the boundary of the area demarcated for surface development, while Site B51 was identified as a building on the 1956 aerial image. Both sites are no longer associated with surface material and are currently located within a cultivated field. Subsurface cultural material might exist at these locations and care should therefore be exercised during construction and mining phases. Should culturally significant material be unearthed during these processes, it is advised that a qualified archaeologist be contacted.

One site, consisting of intact buildings dating to the Historical Period, falls within the boundary of the proposed underground mining area. This site (B52) consists of a farmhouse, garage and outbuildings that were first observed on the 1956 aerial image. Since this site exceeds 60 years of age, the buildings associated with this site should be monitored by the mine's ECO (Environmental Control Officer) on a quarterly basis as well pre- and post-blasting. Should any impact be observed, or if impact cannot be avoided, a qualified archaeologist should be contacted to provide the required input to ensure the safeguarding of the buildings.

The cemetery falling outside of the area demarcated for surface development, but within the boundary of the proposed underground mining section should be monitored by the mine's ECO on a quarterly basis, as well pre- and post-blasting (Site BF26). Should any impact be observed, or if impact cannot be avoided, a qualified archaeologist should be contacted to provide the required input to ensure the safeguarding of the sites.

A fenced-off conservation buffer of 50 m must be established around the cemetery located within the area demarcated for surface development since this site is at risk of being impacted by the proposed surface infrastructure (Site BF25). A qualified archaeologist should also compile a Conservation Management Plan (CMP) to ensure the safeguarding of the burial sites and access to the cemetery must not be refused. Monitoring by the ECO should take place on a quarterly basis, as well as pre- and post-blasting. Alternatively, the graves may be relocated by a qualified graves relocation unit to a premises earmarked by the local municipality, but will set in motion a substantial process as new legislation will be triggered. These processes, however, must be performed in accordance with the involvement of the relatives of the deceased buried at the concerned location.

Two sites consisting of building ruins (Sites B49 & B72) fall within the proposed underground section, while another site falls just to the outside (Site B53). No further action is required as the recording done during this study is regarded as sufficient. One site associated with foundation mounds borders the area demarcated for surface development, but is not at risk of being impacted as it is located outside of the study area.

Site BF28, associated with foundation mounds and currently in a demolished state, is located outside of the areas demarcated for underground and surface development. The site is not associated with surface remains and no impact is envisaged.

Subject to adherence to the recommendations and approval by SAHRA (South African Heritage Resources Agency), the proposed Birmingham Mining Project as per the indicated demarcations may continue. Should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage and Resources Act, 25 of 1999 section 36 (6)). Also, should culturally significant material be discovered during the course of the said development, all activities must be suspended pending further investigation by a qualified archaeologist.



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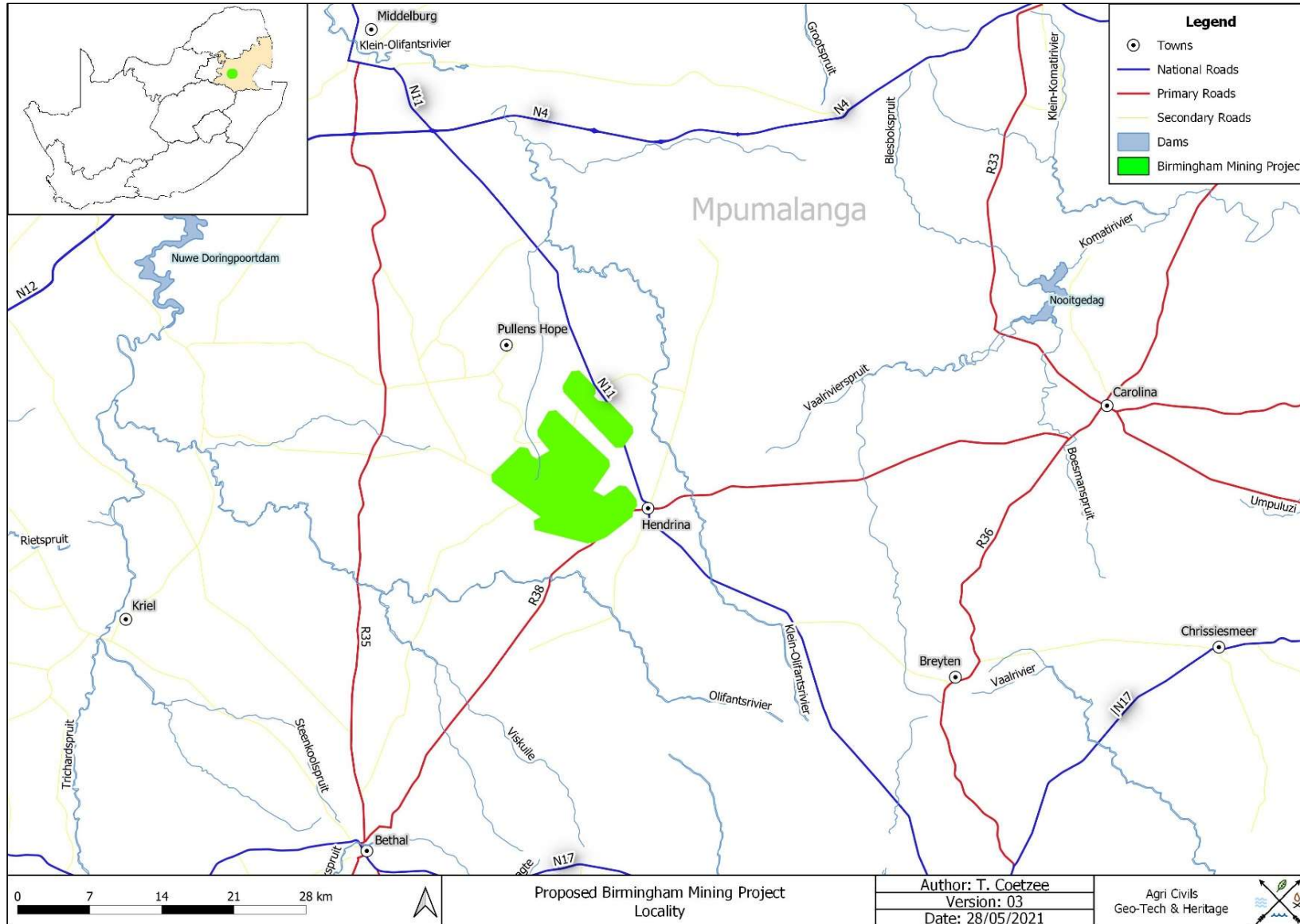
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# 1. Project Background

## 1.1 Introduction

Elemental Sustainability (Pty) Ltd appointed the author to undertake a Phase 1 Archaeological Impact Assessment for the proposed Birmingham Mining Project intersecting 30 farm portions (**Table 2**) of the Farms Boschmansfontein 182 IS, Boschmanskraal 184 IS, Bloemfontein 196 IS and Birmingham 197 IS near Hendrina in the Mpumalanga Province (**Figures 1 & 2**). The mining right applied for is divided into a northern and southern section. At this stage, however, the underground operations and surface infrastructure will only be located on the northern section. The proposed colliery is located approximately 1.5 km west of Hendrina, 40 km southeast of Middelburg and 35 km northeast of Bethal, between the N11 National Road and the R35 and R38 Provincial roads. The purpose of this study is to examine the demarcated portions in order to determine if any archaeological resources of heritage value will be impacted by the proposed colliery, as well as to archaeologically contextualise the general study area. The aim of this report is to provide the developer with information regarding the location of heritage resources on the demarcated portions.

In the following report, the implication for the mining of coal on the demarcated portions with regard to heritage resources are discussed: Portions 1 – 5 of the Farm Birmingham 197 IS, Portions 0 – 2 of the Farm Bloemfontein 196 IS, Portions 0 – 6; 8 – 12; 15 – 18 of the Farm Boschmanskraal 184 IS, Portions 0 & 1; 3 & 4; 7 & 8 of the Farm Boschmansfontein 182 IS. The development will consist of underground mining methods and surface infrastructure. The legislation section included serves as a guide towards the effective identification and protection of heritage resources and will apply to any such material unearthed during development and construction phases within the demarcated study area. It should be noted that mining and development was initially planned for the whole study area, but was subsequently revised to include Portions 3, 4, 7, 8 and the RE of the Farm Boschmansfontein 182 IS only.



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

## 1.2 Legislation

The South African Heritage Resources Agency aims to conserve and control the management, research, alteration and destruction of cultural resources of South Africa and to prosecute if necessary. It is therefore crucially important to adhere to heritage resource legislation contained in the Government Gazette of the Republic of South Africa (Act No.25 of 1999), as many heritage sites are threatened daily by development. Conservation legislation requires an impact assessment report to be submitted for development authorisation that must include an AIA (Archaeological Impact Assessment) if triggered.

AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources that might occur in areas of development and (b) make recommendations for protection or mitigation of the impact of the sites.

### 1.2.1 The EIA (Environmental Impact Assessment) and AIA processes

Phase 1 Archaeological Impact Assessments generally involve the identification of sites during a field survey with assessment of their significance, the possible impact that the development might have, and relevant recommendations.

All Archaeological Impact Assessment reports should include:

- a. Location of the sites that are found;
- b. Short descriptions of the characteristics of each site;
- c. Short assessments of how important each site is, indicating which should be conserved and which mitigated;
- d. Assessments of the potential impact of the development on the site(s);
- e. In some cases a shovel test, to establish the extent of a site, or collection of material, to identify the associations of the site, may be necessary (a pre-arranged SAHRA permit is required); and
- f. Recommendations for conservation or mitigation.

This AIA report is intended to inform the client about the legislative protection of heritage resources and their significance and make appropriate recommendations. It is essential to also provide the heritage authority with sufficient information about the sites to enable the authority to assess with confidence:

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;



- c. Which sites require permits for mitigation or destruction;
- d. Which sites require mitigation and what this should comprise;
- e. Whether sites must be conserved and what alternatives can be proposed to relocate the development in such a way as to conserve other sites; and
- f. What measures should or could be put in place to protect the sites which should be conserved.

When a Phase 1 AIA is part of an EIA, wider issues such as public consultation and assessment of the spatial and visual impacts of the development may be undertaken as part of the general study and may not be required from the archaeologist. If, however, the Phase 1 project forms a major component of an AIA it will be necessary to ensure that the study addresses such issues and complies with Section 38 of the National Heritage Resources Act.

### 1.2.2 Legislation regarding archaeology and heritage sites

*National Heritage Resource Act No.25 of April 1999*

Buildings are among the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Farming Community settlements. The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives;
- any other prescribed category.

With regards to activities and work on archaeological and heritage sites this Act states that:

*“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.” (34. [1] 1999:58)*

and

*“No person may, without a permit issued by the responsible heritage resources authority:*

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.”(35. [4] 1999:58)*

and

*“No person may, without a permit issued by SAHRA or a provincial heritage resources authority:*

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals.” (36. [3] 1999:60)*

On the development of any area the gazette states that:

*“...any person who intends to undertake a development categorised as:*

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*

- (c) *any development or other activity which will change the character of a site-*
  - i. *exceeding 5000m<sup>2</sup> in extent; or*
  - ii. *involving three or more existing erven or subdivisions thereof; or*
  - iii. *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - iv. *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) *the re-zoning of a site exceeding 10000m<sup>2</sup> in extent; or*
- (e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.” (38. [1] 1999:62-64)*

and

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

- (a) *The identification and mapping of all heritage resources in the area affected;*
- (b) *an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) *an assessment of the impact of the development on such heritage resources;*
- (d) *an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) *if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) *plans for mitigation of any adverse effects during and after the completion of the proposed development.”*  
(38. [3] 1999:64)

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

## 2. Study Area and Project Description

### 2.1 Location & Physical Environment

The proposed Birmingham Mining Project study area is situated directly west of Hendrina. The 30 identified farm portions are listed below:

**Table 2:** Property name & coordinates

Property	Portion	Map Reference (1:50 000)	Lat	Lon	Intersecting Parcel Size (ha)
Boschmansfontein 182 IS	0	2629 BA	-26.096272	29.691328	93.0
Boschmansfontein 182 IS	1	2629 BA	-26.109037	29.651121	1989.7
Boschmansfontein 182 IS	3	2629 BA	-26.054312	29.655822	374.0
Boschmansfontein 182 IS	4	2629 BA	-26.073926	29.672074	434.4
Boschmansfontein 182 IS	7	2629 BA	-26.085227	29.687818	224.0
Boschmansfontein 182 IS	8	2629 BA	-26.091175	29.686115	101.2
Boschmanskraal 184 IS	8	2629 BA	-26.119266	29.632550	320.6
Boschmanskraal 184 IS	9	2629 BA	-26.138487	29.627885	381.6
Boschmanskraal 184 IS	10	2629 BA	-26.118119	29.602327	213.2
Boschmanskraal 184 IS	11	2629 BA	-26.132873	29.617550	59.7
Boschmanskraal 184 IS	12	2629 BA	-26.150162	29.622466	123.0
Boschmanskraal 184 IS	15	2629 BA	-26.142343	29.603781	136.1
Boschmanskraal 184 IS	17	2629 BA	-26.136546	29.609406	75.9
Boschmanskraal 184 IS	18	2629 BA	-26.141877	29.647773	281.8
Boschmanskraal 184 IS	3	2629 BA	-26.150873	29.638710	250.1
Boschmanskraal 184 IS	4	2629 BA	-26.158154	29.628530	273.8
Boschmanskraal 184 IS	6	2629 BA	-26.124786	29.614268	316.2
Boschmanskraal 184 IS	0	2629 BA	-26.133865	29.592504	186.7
Boschmanskraal 184 IS	1	2629 BA	-26.129191	29.642386	381.2
Boschmanskraal 184 IS	2	2629 BA	-26.143334	29.657138	104.5
Boschmanskraal 184 IS	16	2629 BA	-26.129592	29.600308	192.1
Boschmanskraal 184 IS	5	2629 BA	-26.145581	29.613897	170.3
Bloemfontein 196 IS	0	2629 BA	-26.173250	29.636962	350.5
Bloemfontein 196 IS	1	2629 BA	-26.170609	29.652814	341.4
Bloemfontein 196 IS	2	2629 BA	-26.164709	29.641881	138.2
Birmingham 197 IS	4	2629 BA	-26.171506	29.675529	215.2
Birmingham 197 IS	5	2629 BA	-26.149154	29.687901	33.9

Property	Portion	Map Reference (1:50 000)	Lat	Lon	Intersecting Parcel Size (ha)
Birmingham 197 IS	1	2629 BA	-26.157146	29.690550	555.9
Birmingham 197 IS	3	2629 BA	-26.156866	29.667046	635.9
Birmingham 197 IS	2	2629 BA	-26.171528	29.663690	383.8

The closest town to the study area is Hendrina, located 1.5 km to the east. Middelburg is located roughly 40 km to the northwest and Bethal 35 km to the southwest of the proposed mining project (**Figures 1 & 2**). The study area falls within the Nkangala District Municipality and the Steve Tshwete Local Municipality in the Mpumalanga Province. In terms of vegetation, the study area falls within the Grassland Biome, Mesic Highveld Grassland Bioregion and the Eastern Highveld Grassland vegetation unit. The Grassland Biome covers approximately 28% of South Africa (Mucina & Rutherford 2006). This vegetation unit's conservation status is considered to be endangered with a conservation target of 24%. Only a small portion is conserved in statutory and private reserves. Eastern Highveld Grassland consists of the plains between Belfast in the east and the eastern side of Johannesburg in the west and also extends towards Bethal, Ermelo and to the west of Piet Retief. This vegetation type is associated with slightly to moderately undulating planes and includes low hills and pan depressions. The general vegetation is short dense grassland with small, scattered rocky outcrops and some woody species. About 44% of this vegetation unit has been transformed by cultivation, plantations, mines, urbanisation and the building of dams. Although no serious alien invasions are reported, *Acacia mearnsii* may become dominant in disturbed areas. Erosion associated with this vegetation unit is low (Mucina & Rutherford 2006).

According to Mucina & Rutherford (2006) the average elevation for Eastern Highveld Grassland ranges from 1520 to 1780 MASL (Metres Above Sea Level). The average elevation of the project area is 1690 MASL and is associated with an undulating landscape.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 683 mm per year. The average annual temperature is 15.5 °C. The average summer temperature is 20.3 °C, while the average winter temperature averages 8.5 °C (Climate-data.org accessed 20/10/2020).

The study area falls within the B11A, B12A and B12B Quaternary Catchments that form part of the Olifants Water Management Area. The closest perennial river to the study area is an offshoot from the Klein-Olifants River that enters Portion 6 of the Farm Boschmanskraal 184 IS from the north. The Klein-Olifants flows approximately 2 km to the east of the study area. Several minor dams and pans, however, are found within the study area.

When the surrounding environment is considered, the general study area is associated with crop cultivation and pastures with mining occurring approximately 12 km to the northwest. Access to the study area (**Figures 2 & 3**) is mostly via tertiary and jeep track farm roads turning from secondary dirt roads, as well as from the R38 Provincial and N11 National roads.

Historical topographical maps (**Appendix A**) show that in terms of cultivation, the demarcated study area remained much the same between 1965 and 2009, except for a few expanded areas. All the huts are also omitted from the 2009 topographical map, while several buildings are no longer indicated. Several new buildings, however, are shown.

## 2.2 Project description

Canyon Resources (Pty) Ltd plans to obtain a mining right for the proposed Birmingham Mining Project intersecting several farm portions of the Farms Boschmansfontein 182 IS, Boschmanskraal 184 IS, Bloemfontein 196 IS and Birmingham 197 IS near Hendrina in the Mpumalanga Province. The total proposed mining right area is 12213.5 ha and is divided into a northern and southern section. The initial mining layout included both the northern and southern sections, but was subsequently revised to include the northern section only. The proposed underground mining area is roughly 704 ha, while an estimated 148 ha will be used for surface infrastructure (**Figures 2 & 3**). Underground mining methods will be used to extract the coal and a processing plant will be constructed. The proposed surface infrastructure is planned for Portion 4 of the Farm Boschmansfontein 182 IS (**Table 3**).

The following overview of the mining method was adapted from the Mining Work Programme (Canyon Resources 2020).

One shaft will be opened. The underground mining operations will be conducted by a contractor. The underground mining method to be undertaken at the Birmingham Mining Project is bord and pillar mining with continuous miners (CM) and shuttle cars, supported by roof bolters for roof support. The underground bord and pillar mining was based on the following factors:

- The planned production rate of 1.8 Mtpa
- Underground bord and pillar mining utilising CM with shuttle cars is a well-proven and flexible mining system, with acceptable production rates, operating and capital costs, and safe operational standards.

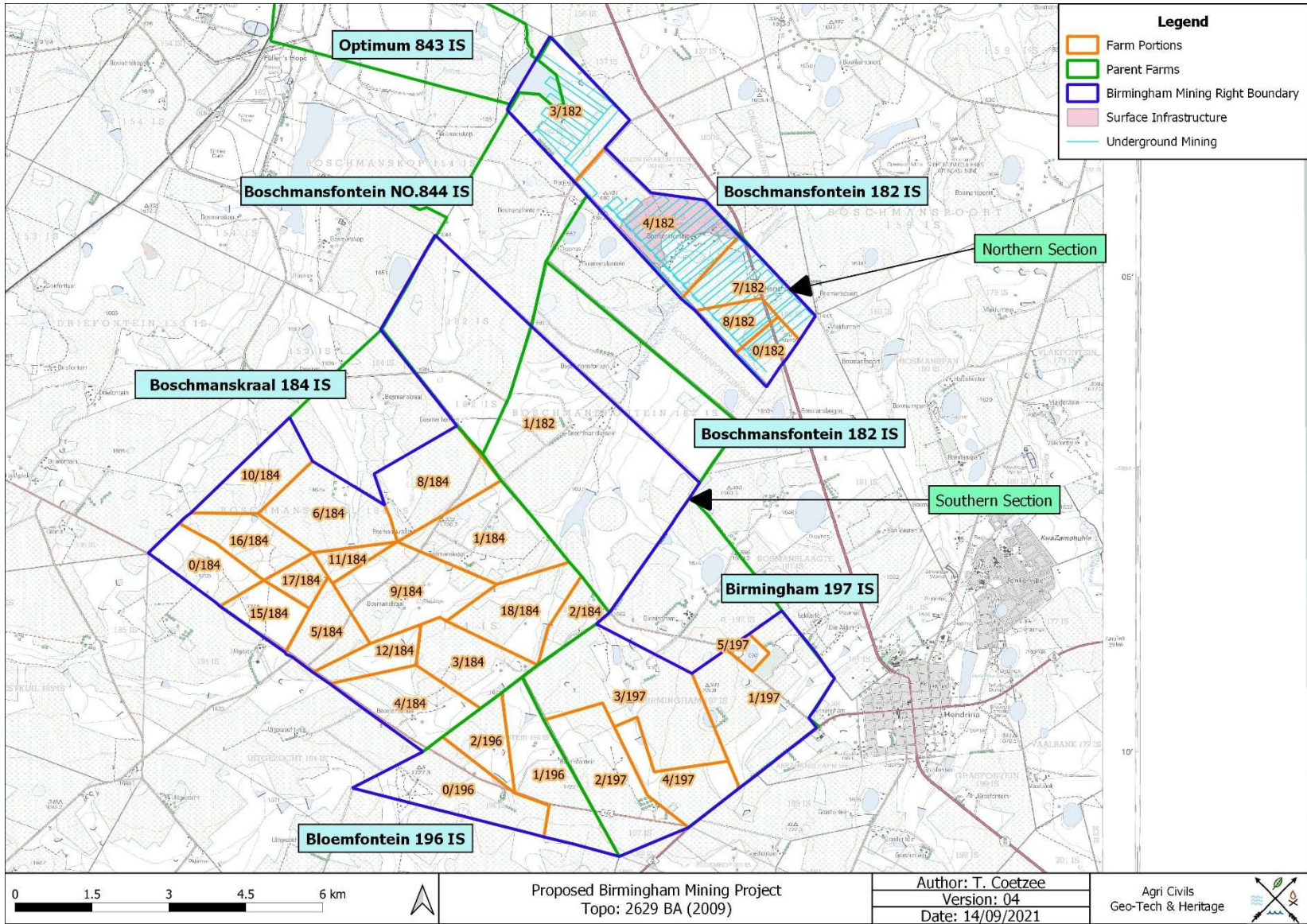
The mined coal from the underground workings will be transported via conveyer belts and the haul roads and stored on the Run of Mine (RoM) stockpile area. The coal will be fed into a crushing and washing plant with a conveyor after which the coal product will be temporarily stored at the product stockpile area before being transported to the newly proposed siding for distribution or directly via truck to the relevant markets. A temporary low grade stockpile will be constructed to store discard before being rewashed.

**The following infrastructure is proposed:**

- Access / haul roads
- Workshops
- Offices
- Weighbridge
- Pollution Control Dams
- Stormwater management facilities
- Boreholes
- Powerlines
- Substation
- Sewage management systems
- Conveyor belt systems
- Shaft complex
- Lamp room
- Ventilation Shafts
- Discard Dump
- Slurry Dam
- Topsoil stockpile
- Softs stockpile
- Hards stockpile

**Table 3:** Proposed surface development.

<b>Property</b>	<b>Portion</b>	<b>Farm</b>	<b>Approximate surface impact (ha)</b>	<b>Lat</b>	<b>Lon</b>
Surface Impact	4	Boschmansfontein 182 IS	200	-26.071056	29.668531



**Figure 2:** Segment of SA 1: 50 000 2629 BA indicating the study area.



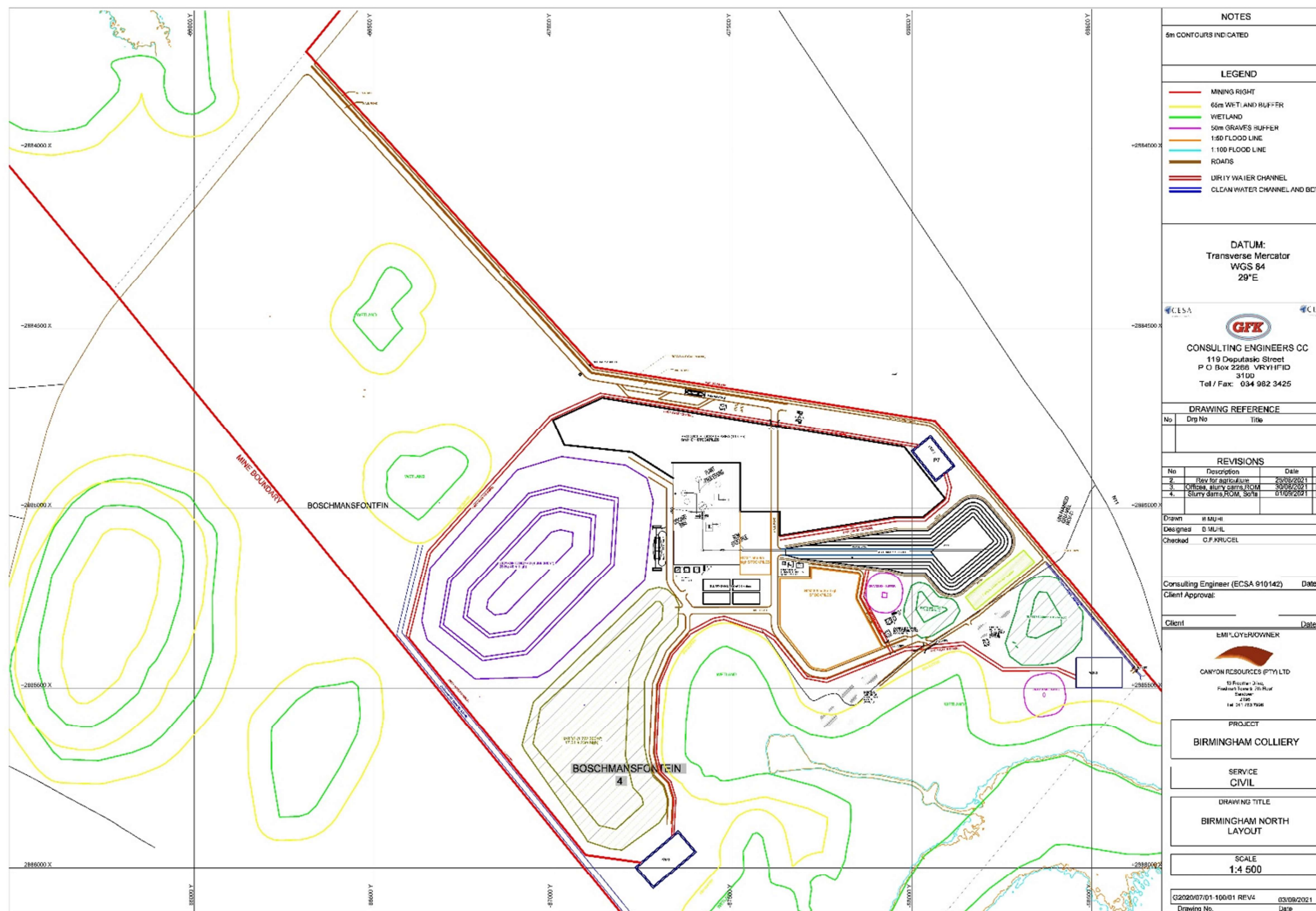


Figure 3: Proposed layout of the Birmingham Mining Project (supplied by Elemental Sustainability 2021).

### 3. Archaeological Background

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods. This section of the report provides a general background to archaeology in South Africa and focuses on more site-specific elements where relevant.

#### 3.1 The Stone Ages

The earliest stone tool industry, the Oldowan, was developed by early human ancestors which were the earliest members of the genus *Homo*, such as *Homo habilis*, around 2.6 million years ago. It comprises tools such as cobble cores and pebble choppers (Toth & Schick 2007). Archaeologists suggest these stone tools are the earliest direct evidence for culture in southern Africa (Clarke & Kuman 2000). The advent of culture indicates the advent of more cognitively modern hominins (Mitchell 2002: 56, 57)

The Acheulean industry completely replaced the Oldowan industry. The Acheulian industry was first developed by *Homo ergaster* between 1.8 to 1.65 million years ago and lasted until around 300 000 years ago. Archaeological evidence from this period is also found at Swartkrans, Kromdraai and Sterkfontein. The most typical tools of the ESA 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 (ESA) 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 did not occur simultaneously across the whole of southern Africa, the Later Stone Age (LSA) 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).

## 3.2 The Iron Age & Later History

The Early Iron Age marks the movement of farming communities into South Africa in the first millennium AD, or around 2500 years ago (Mitchell 2002:259, 260). These groups were agro-pastoralist communities that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Archaeological evidence from Early Iron Age sites is mostly artefacts in the form of ceramic assemblages. The origins and archaeological identities of this period are largely based upon ceramic typologies. Some scholars classify Early Iron Age ceramic traditions into different “streams” or “trends” in pot types and decoration, which emerged over time in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). Early Iron Age ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. This period continued until the end of the first millennium AD (Mitchell 2002; Huffman 2007). Some well-known Early Iron Age sites include the Lydenburg Heads in Mpumalanga, Happy Rest in the Limpopo Province and Mzonjani in Kwa-Zulu Natal.

The Middle Iron Age roughly stretches from AD 900 to 1300 and marks the origins of the Zimbabwe culture. During this period cattle herding appeared to play an increasingly important role in society. However, it was proved that cattle remained an important source of wealth throughout the Iron Age. An important shift in the Iron Age of southern Africa took place in the Shashe-Limpopo basin during this period, namely the development of class distinction and sacred leadership. The Zimbabwe culture can be divided into three periods based on certain capitals. Mapungubwe, the first period, dates from AD 1220 to 1300, Great Zimbabwe from AD 1300 to 1450, and Khami from AD 1450 to 1820 (Huffman 2007: 361, 362).

The Late Iron Age roughly dates from AD 1300 to 1840. It is generally accepted that Great Zimbabwe replaced Mapungubwe. Some characteristics include a greater focus on economic growth and the increased importance of trade. Specialisation in terms of natural resources also started to play a role, as can be seen from the distribution of iron slag which tend to occur only in certain localities compared to a wide distribution during earlier times. It was also during the Late Iron Age that different areas of South Africa were populated, such as the interior of KwaZulu Natal, the Free State, the Gauteng Highveld and the Transkei. Another characteristic is the increased use of stone as building material. Some artefacts associated with this period are knife-blades, hoes, adzes, awls, other metal objects as well as bone tools and grinding stones.

The Historical period mainly deals with Europe’s discovery, settlement and impact on southern Africa. Some topics covered by the Historical period include Dutch settlement in the Western Cape, early mission stations, Voortrekker routes and the Anglo Boer War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

### 3.2.1 The South African War

Several small skirmishes took place in the general area and according to Mr Uys, a building ruin on Portion 3 of the Farm Birmingham 197 IS, is the remnants of a South African War field hospital. The phase in the South African War that is significant in terms of the study area relates to the period after the British occupied Pretoria on 5 June 1900. During this time the republican forces retreated towards the eastern boundary of the *Zuid-Afrikaansche Republiek* under General Louis Botha and started employing guerrilla tactics (Matakoma Heritage Consultants 2007).

One of the more important and well-known South African War sites in the vicinity of the study area is the Battle of Bakenlaagte, located approximately 56 km southwest of the study area. The battle took place on 30 October 1901 between Lieutenant Colonel George Benson's Flying Column and the joint forces of General Louis Botha and General Sarel Grobler. Benson's Flying Column continuously threatened Boer commandos that caused the commandos to move camp every two days. Grobler had been following Benson's trail and harassed his rearguard, but it was only after Botha and his commando joined Grobler's commando that an attack could be launched. Benson's column was enroute from Syferfontein to Balmoral to resupply his men and horses. The column, consisting of more than 300 wagons, 800 horses and 600 infantry, aimed to camp at Bakenlaagte farmstead (Von der Heyde 2013: 208-209).

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

### 3.2.2 Coal mining general history near eMalahleni, Middelburg, Bethal, Hendrina, Ermelo and Carolina

Mpumalanga, especially the area between eMalahleni, Middelburg, Bethal, Hendrina, Ermelo and Carolina, is associated with vast coal fields. These coal fields formed between 200 and 300 million years ago from rotten forests in swamps. During this period, Africa was still attached to South America, India and Antarctica as part of the Gondwana supercontinent. By 250 million years ago, the climate changed to dry warm conditions and the

swamps in Mpumalanga were replaced by desert-like conditions around 200 million years ago. By 180 million years ago, when the Gondwana supercontinent started to split up, volcanic lava fields covered areas in Mpumalanga (De Wit 2007: 37).

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

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

### 3.2.3 Hendrina general history

The town of Hendrina became a village in 1923 and was named after Hendrina Beukes, the wife of the owner of the farm on which it was established. The area is associated with maize production and coal mining, as well as Arnot and Hendrina power stations (Bulpin 1986: 637).

## 4. Methodology

Initial archaeological reconnaissance of the study area was conducted during October 2020. This survey was based on the initial mining layout that included all listed farm portions. The proposed mining layout, however, was subsequently revised to include Portions 3, 4, 7, 8 and the RE of the Farm Boschmansfontein 182 IS only. A follow-up survey was therefore conducted during May 2021 to investigate the new area demarcated for surface development. Both site visits consisted of a combination of unsystematic vehicular and systematic pedestrian surveys of the proposed surface infrastructure areas. Following the second site inspection, the layout was changed again to avoid negative impact on areas of high potential for agricultural production. The altered layout now excludes a large north-western section, and extends further to the south-east. The extended south-eastern section largely falls on cultivated or previously cultivated land. General site conditions were recorded via photographic record (**Figures 5 – 10**). Although no development is planned for the Southern Section, **Figures 9 & 10** only serve as indication of the environment associated with this area. Also, the project area was inspected beforehand on Google Earth, historical aerial imagery and topographical maps in order to identify possible heritage remains, especially on the area demarcated for surface infrastructure and underground mining (**Appendix A**). One hundred and three sites (**Table 4**) were identified on the entire mining right area through a combination of inspecting historical topographical maps, aerial images, through personal communication with land owners and local farm workers, as well as through personal observation during the survey. Sixteen of the 103 sites are located on the Northern Section. Fifty-two of the 103 sites have been demolished and fall outside of the demarcated surface infrastructure area and were therefore not visited (**Table 5**). Twenty-six of the pre-identified sites were visited and recorded, while an additional 25 sites were identified and recorded during the survey (**Tables 6 – 12 & Figure 4**). Due to the most recent layout changes, one demolished site intersecting the surface development area was not visited (Site B50). It should be noted that the prefix '2629BA' is not used when referring to the official site names due to the length of the name, but is recorded as such in **Tables 4 & 14**. The historical topographical datasets dating to 1965, 1984 and 1996, as well as the historical aerial photographs dating to 1956 and 1968 proved useful in terms of providing an indication of the location and age of some of the structures and features associated with the study area. The Northern Section of the mining right applied for measures

approximately 985 ha, while the Southern Section is roughly 6510 ha. The total area inspected was therefore roughly 7495 ha.

The reconnaissance of the area under investigation served a twofold purpose:

- To obtain an indication of heritage material found in the general area as well as to identify or locate archaeological sites on the areas demarcated for development. This was done in order to establish a heritage context and to supplement background information that would benefit developers through identifying areas that are sensitive from a heritage perspective.
- All archaeological and historical events have spatial definitions in addition to their cultural and chronological context. Where applicable, spatial recording of these definitions were done by means of a handheld GPS (Global Positioning System) during the site visit, as well as by plotting the boundaries from aerial imagery and topographical maps.

**Table 4:** Site coordinates & description.

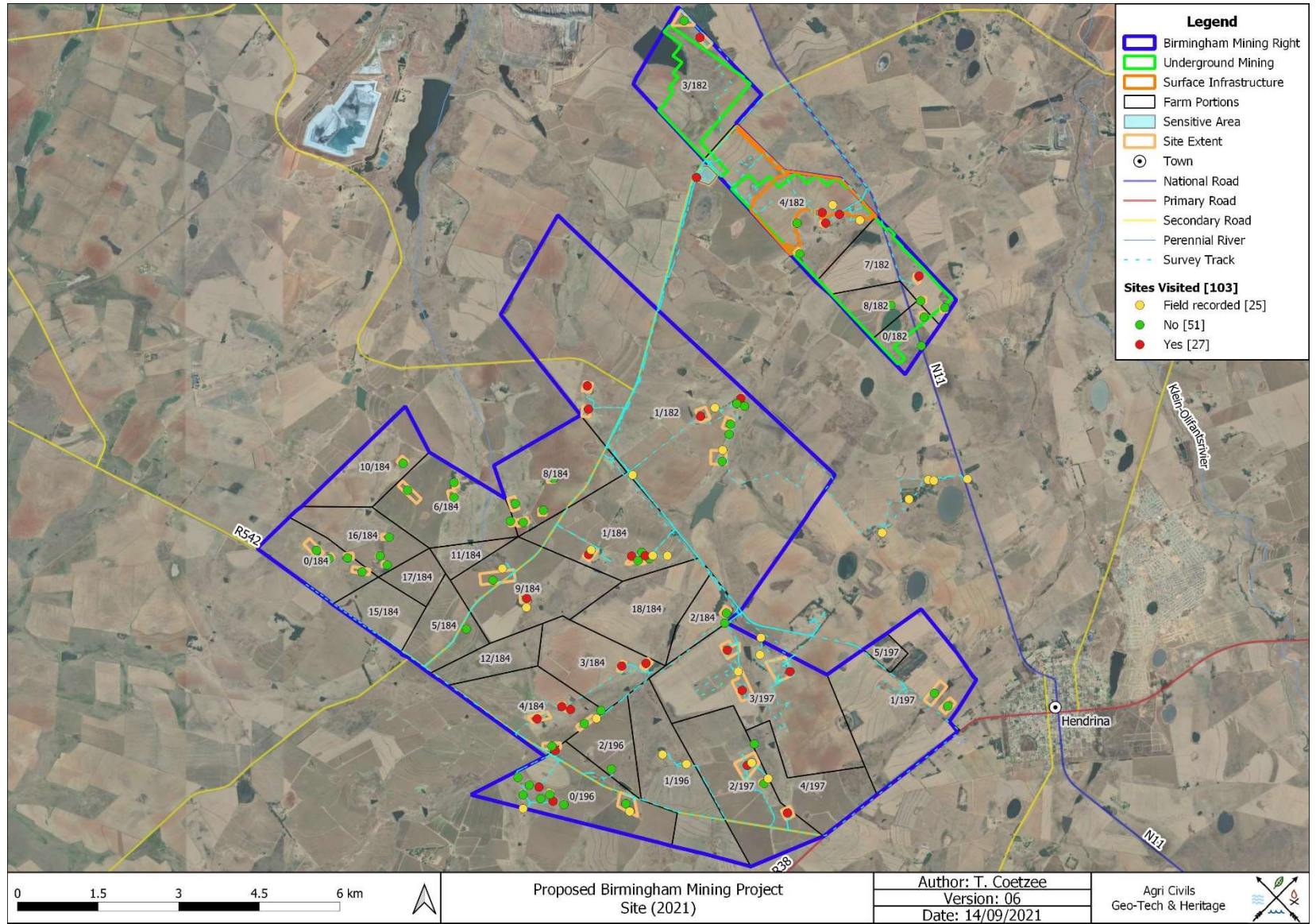
Abb. name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	ID Source	Northern / Southern
B01	2629BA-B01	29.695891	-26.155983	Building	Demolished	Aerial 1956	South
B02	2629BA-B02	29.698146	-26.158116	Building	Demolished	Aerial 1956	South
B03	2629BA-B03	29.671322	-26.176015	Building	Intact	Aerial 1956	South
B04	2629BA-B04	29.664604	-26.168046	Building	Intact	Aerial 1956	South
B05	2629BA-B05	29.661270	-26.148774	Building	Intact	Aerial 1956	South
B06	2629BA-B06	29.663746	-26.155492	Foundation mound	Demolished	Aerial 1956	South
B07	2629BA-B07	29.671739	-26.152354	Building	Intact/ruin	Aerial 1956	South
B08	2629BA-B08	29.644305	-26.174459	Building	Demolished	Aerial 1956	South
B09	2629BA-B09	29.629772	-26.171670	Building	Ruin	Aerial 1956	South
B10	2629BA-B10	29.632117	-26.174041	Building	Altered-modern ruin	Aerial 1956	South
B11	2629BA-B11	29.646958	-26.132417	Building	Demolished	Aerial 1968	South
B12	2629BA-B12	29.632466	-26.165591	Building	Ruin	Topo 1965	South
B13	2629BA-B13	29.631933	-26.164822	Building	Demolished	Aerial 1956	South
B14	2629BA-B14	29.629456	-26.160261	Building	Intact	Aerial 1956	South
B15	2629BA-B15	29.637351	-26.161070	Building	Demolished	Aerial 1956	South
B16	2629BA-B16	29.635046	-26.158692	Building	Intact	Aerial 1956	South

Abb. name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	ID Source	Northern / Southern
B17	2629BA-B17	29.633579	-26.158213	Cemetery/Grave	Unknown	Topo 1965	South
B18	2629BA-B18	29.643616	-26.151436	Building	Intact	Aerial 1956	South
B19	2629BA-B19	29.647662	-26.150968	Building	Altered-modern bld	Aerial 1956	South
B20	2629BA-B20	29.661122	-26.142583	Building	Demolished	Aerial 1956	South
B21	2629BA-B21	29.622064	-26.137066	Building	Demolished	Aerial 1956	South
B22	2629BA-B22	29.627728	-26.140131	Building	Intact	Aerial 1956	South
B23	2629BA-B23	29.645271	-26.133056	Building	Intact	Aerial 1968	South
B24	2629BA-B24	29.592567	-26.132089	Building	Demolished	Aerial 1956	South
B25	2629BA-B25	29.638075	-26.132775	Building	Intact	Aerial 1956	South
B26	2629BA-B26	29.594676	-26.133462	Building	Demolished	Aerial 1956	South
B27	2629BA-B27	29.600193	-26.135669	Building	Demolished	Aerial 1956	South
B28	2629BA-B28	29.597765	-26.133339	Building	Demolished	Aerial 1956	South
B29	2629BA-B29	29.604400	-26.134521	Building	Demolished	Aerial 1956	South
B30	2629BA-B30	29.604730	-26.129901	Building	Demolished	Aerial 1956	South
B31	2629BA-B31	29.607802	-26.122031	Building	Demolished	Aerial 1956	South
B32	2629BA-B32	29.615545	-26.123224	Huts	Demolished	Topo 1965	South
B33	2629BA-B33	29.615571	-26.120736	Building	Demolished	Aerial 1956	South
B34	2629BA-B34	29.624989	-26.127184	Huts	Demolished	Topo 1965	South
B35	2629BA-B35	29.625827	-26.124265	Building	Demolished	Aerial 1956	South
B36	2629BA-B36	29.630498	-26.125382	Building	Demolished	Aerial 1956	South
B37	2629BA-B37	29.632193	-26.120044	Building	Demolished	Aerial 1956	South
B38	2629BA-B38	29.607060	-26.117531	Building	Demolished	Aerial 1956	South
B39	2629BA-B39	29.660399	-26.117200	Building	Demolished	Aerial 1956	South
B40	2629BA-B40	29.661782	-26.111006	Building	Demolished	Aerial 1956	South
B41	2629BA-B41	29.664143	-26.107959	Building	Demolished	Aerial 1956	South
B42	2629BA-B42	29.656781	-26.109660	Building	Intact	Aerial 1956	South
B43	2629BA-B43	29.638045	-26.108467	Building	Intact	Aerial 1956	South
B44	2629BA-B44	29.637852	-26.104568	Building	Ruin	Aerial 1956	South
B45	2629BA-B45	29.694151	-26.093082	Building	Demolished	Aerial 1956	North
B46	2629BA-B46	29.688617	-26.091077	Building	Demolished	Aerial 1956	North
B47	2629BA-B47	29.693593	-26.090341	Building	Demolished	Aerial 1956	North
B48	2629BA-B48	29.697654	-26.091483	Building	Demolished	Aerial 1956	North
B49	2629BA-B49	29.693313	-26.086203	Building	Ruin	Aerial 1956	North
B50	2629BA-B50	29.672927	-26.077368	Huts	Demolished	Topo 1965	North
B51	2629BA-B51	29.677116	-26.075591	Building	Demolished	Aerial 1956	North
B52	2629BA-B52	29.677725	-26.077342	Building	Intact	Aerial 1956	North
B53	2629BA-B53	29.656679	-26.046294	Building	Ruin	Aerial 1956	North
B54	2629BA-B54	29.654014	-26.043501	Building	Demolished	Aerial 1956	North
B55	2629BA-B55	29.673384	-26.082471	Building	Demolished	Aerial 1956	North
B56	2629BA-B56	29.648204	-26.133474	Building	Demolished	Aerial 1956	South
B57	2629BA-B57	29.647531	-26.132977	Building	Intact	Aerial 1968	South
B58	2629BA-B58	29.667388	-26.171072	Building	Demolished	Aerial 1956	South
B59	2629BA-B59	29.633922	-26.174596	Building	Demolished	Aerial 1956	South
B60	2629BA-B60	29.631569	-26.172922	Building	Demolished	Aerial 1956	South
B61	2629BA-B61	29.630071	-26.173627	Building	Demolished	Aerial 1956	South



Abb. name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	ID Source	Northern / Southern
B62	2629BA-B62	29.628158	-26.171349	Building	Demolished	Aerial 1956	South
B63	2629BA-B63	29.626245	-26.170078	Building	Demolished	Aerial 1956	South
B64	2629BA-B64	29.627113	-26.172972	Building	Demolished	Aerial 1956	South
B65	2629BA-B65	29.641876	-26.168668	Building	Demolished	Aerial 1956	South
B66	2629BA-B66	29.660850	-26.144251	Building	Demolished	Aerial 1956	South
B67	2629BA-B67	29.617623	-26.145245	Building	Demolished	Aerial 1956	South
B68	2629BA-B68	29.603212	-26.133009	Building	Demolished	Aerial 1956	South
B69	2629BA-B69	29.663524	-26.106654	Building	Intact	Aerial 1956	South
B70	2629BA-B70	29.662845	-26.107547	Building	Demolished	Aerial 1968	South
B71	2629BA-B71	29.693693	-26.097869	Building	Demolished	Aerial 1956	North
B72	2629BA-B72	29.680006	-26.075887	Building	Ruin	Aerial 1956	North
B73	2629BA-B73	29.665771	-26.164467	Building	Demolished	Aerial 1956	South
B74	2629BA-B74	29.640133	-26.158873	Building	Demolished	Aerial 1968	South
B75	2629BA-B75	29.646319	-26.133789	Building	Demolished	Aerial 1968	South
B76	2629BA-B76	29.627138	-26.127389	Building	Demolished	Aerial 1968	South
B77	2629BA-B77	29.661561	-26.112651	Building	Demolished	Aerial 1968	South
BF01	2629BA-BF01	29.666889	-26.146688	Cemetery/ Grave	Intact	Field	South
BF02	2629BA-BF02	29.666723	-26.149543	Cemetery/ Grave	Intact	Field	South
BF03	2629BA-BF03	29.663078	-26.152357	Cemetery/ Grave	Intact	Field	South
BF05	2629BA-BF05	29.645433	-26.119470	Ruin	Ruin	Field	South
BF06	2629BA-BF06	29.687148	-26.129131	Cemetery/ Grave	Intact	Field	South
BF07	2629BA-BF07	29.691631	-26.123516	Cemetery/ Grave	Intact	Field	South
BF08	2629BA-BF08	29.694852	-26.120292	Cemetery/ Grave	Intact	Field	South
BF09	2629BA-BF09	29.695796	-26.120426	Cemetery/ Grave	Intact	Field	South
BF10	2629BA-BF10	29.701422	-26.120141	Cemetery/ Grave	Intact	Field	South
BF11	2629BA-BF11	29.660491	-26.115300	Cemetery/ Grave	Intact	Field	South
BF12	2629BA-BF12	29.659203	-26.108235	Cemetery/ Grave	Intact	Field	South
BF13	2629BA-BF13	29.639385	-26.160203	Cemetery/ Grave	Intact	Field	South
BF16	2629BA-BF16	29.668082	-26.170254	Cemetery/ Grave	Intact	Field	South
BF17	2629BA-BF17	29.650428	-26.166236	Cemetery/ Grave	Intact	Field	South
BF18	2629BA-BF18	29.654433	-26.167837	Foundation Mound	Demolished	Field	South
BF19	2629BA-BF19	29.627115	-26.175270	Cemetery/ Grave	Intact	Field	South
BF20	2629BA-BF20	29.627674	-26.141635	Cemetery/ Grave	Intact	Field	South

<b>Abb. name</b>	<b>Site / Survey Point Name</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Description</b>	<b>Current Status</b>	<b>ID Source</b>	<b>Northern / Southern</b>
BF21	2629BA-BF21	29.623659	-26.135126	Cemetery/ Grave	Intact	Field	South
BF22	2629BA-BF22	29.638498	-26.132027	Cemetery/ Grave	Intact	Field	South
BF23	2629BA-BF23	29.648795	-26.132959	Cemetery/ Grave	Intact	Field	South
BF24	2629BA-BF24	29.651246	-26.132988	Cemetery/ Grave	Intact	Field	South
BF25	2629BA-BF25	29.678873	-26.074327	Cemetery/ Grave	Intact	Field	North
BF26	2629BA-BF26	29.683430	-26.076871	Cemetery/ Grave	Intact	Field	North
BF27	2629BA-BF27	29.644943	-26.175746	Cemetery/ Grave	Intact	Field	South
BF28	2629BA-BF28	29.656104	-26.069718	Foundation Mound	Demolished	Aerial 1956	North
BF29	2629BA-BF29	29.665343	-26.167623	Cemetery/ Grave	Intact	Field	South



**Figure 4:** Study area with pre-plotted and field-recorded sites on a 2020 aerial backdrop.



**Figure 5:** Section of open veldt where the surface development is proposed.



**Figure 6:** Cultivated land where the surface development is proposed.



**Figure 7:** Proposed underground mining – open veldt within a cultivated land.



**Figure 8:** Patch of open veldt within a cultivated land.



**Figure 9:** Open veldt on the Southern Section of the proposed Birmingham Mining Project.



**Figure 10:** Cultivated land on the Southern Section of the proposed Birmingham Mining Project.

## 4.1 Sources of information

At all times during the survey, standard archaeological procedures for the observation of heritage resources were followed. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention to disturbances; both man-made such as roads and clearings, and those made by natural agents such as burrowing animals and erosion. Locations of archaeological material remains were recorded by means of a Garmin Oregon 750 GPS. These sites, as well as the general conditions of the terrain, were photographed with a Sony Cyber-shot camera.

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

Personal communication with the following owners proved useful in locating graves, cemeteries and historical infrastructure:

- Mr. WA de Klerk (Portions 1 & 5 of the Farm Birmingham 197 IS, Portions 1 & 3 of the Farm Boschmansfontein 182 IS, Portions 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 16,17, 18 of the Farm Boschmanskraal 184 IS)
- Mr. Peter Kane Berman (Portions 2 & 4 of the Farm Birmingham 197 IS, Portion 0 & 2 of the Farm Bloemfontein 196 IS)
- Mr. Hendrik de Jager (Portion 1 of the Bloemfontein 196 IS)
- Mr. Anton Pelser (Portion 0, 4, 7 of the Farm Boschmansfontein 182 IS)
- Mr. Hannes Scheepers (Portion 8 of the Farm Boschmansfontein 182 IS)
- Mr. Albert van Wyk (Portion 1 of the Farm Boschmanskraal 184 IS)
- Mr. Willem Marthinus Davel (Portion 0 of the Farm Boschmanskraal 184 IS, Portion 15 of the Farm Boschmanskraal 184 IS)
- Mr. Hendrik Mdalane – occupant – (Portion 0 of the Farm Bloemfontein 196 IS).

Personal communication with several local people living in the area proved equally as useful.

### 4.1.1 Previous Heritage Studies

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

An archaeological survey was done for a coal mine on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS. The demarcated impact area was 600 X 600 m and is located roughly 13 km southwest of the proposed Birmingham Mining Project. Archaeological Resources Management (ARM) surveyed the study area and the remains of two circular homesteads that possibly date to the Late Iron Age were observed. Both homesteads consist of between 3 and 6 structures and are located close to a stream. More recent angular settlement remains,

as well as 2 graveyards associated with the settlements were observed. The graves consisted of mounds made with ferricrete. One of the graveyards consisted of 8 graves, and the other of 5 graves (Huffman & Steel 1995).

### **Goedehoop Coal Mine, Mpumalanga**

An Archaeological and Cultural Historical survey and impact assessment was conducted by the National Cultural History Museum (2003) for the development of the Goedehoop opencast coal mine near Hendrina in the Mpumalanga Province. The Goedehoop site is located roughly 15 km southwest of the proposed Birmingham Mining Project. Opencast areas that were surveyed included portions of the Farms Schurvekop 227 IS, Vlakkuijen 76 IS, Middelkraal 50 IS, and Halfgewonnen 190 IS. It was noted that a few graveyards located outside of the impacted areas were observed and would therefore not be impacted.

### **Halfgewonnen Colliery, Mpumalanga**

Van Vollenhoven (2013) conducted a Cultural Heritage Impact Assessment for a mining right application at the Halfgewonnen Colliery between Hendrina and Bethal. The Halfgewonnen Colliery is located on the Farm Halfgewonnen 190 IS about 21 km southwest of the proposed Birmingham Mining Project. The project entailed the extraction of pillars from the underground mining area that was previously mined through bord-and-pillar methods. Van Vollenhoven (2013) located no sites of cultural heritage significance during the survey.

## **4.2 Limitations**

The majority of the study area was characterised by a combination of burnt grassland, cultivated maize fields and pastures during the time of surveying (October 2020 & May 2021). Visibility was generally considered good and is illustrated in **Figures 11 & 12**, though a few places were characterised by patches of dense vegetation that hampered the detection structures and features (**Figure 13**). No other access constraints were encountered. It should be noted that Site B50 was not inspected because the initial surface layouts did not intersect this site.





**Figure 11:** Short grass cover.



**Figure 12:** Cultivated land.



**Figure 13:** Patch of dense vegetation.

## **5. Archaeological and Historical Remains**

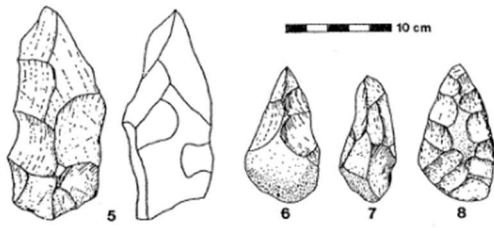
### **5.1 Stone Age Remains**

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

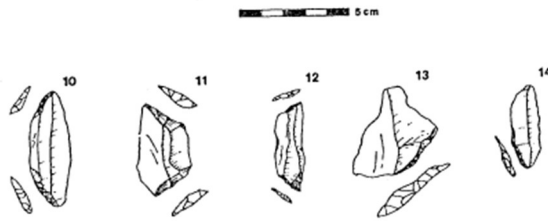
Although no Stone Age archaeological remains were located, such artefacts may occur in the area. These artefacts are often associated with rocky outcrops or water sources. **Figures 14 – 16** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

Archaeological studies undertaken in the surrounding areas also did not locate material pertaining to the Stone Age.

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



**Figure 14:** ESA artefacts from Sterkfontein (Volman 1984).



**Figure 15:** MSA artefacts from Howiesons Poort (Volman 1984).



**Figure 16:** LSA scrapers (Klein 1984).

## 5.2 Iron Age Farmer Remains

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

The Archaeological and Cultural Historical study undertaken by Huffman & Steel (1995) located two circular homesteads that could possibly date to the Late Iron Age.

## 5.3 Historical

Seventy-six potentially Historic sites were identified on historical aerial and topographical maps, as well as during the site visit. Fourteen of these sites are associated with the Northern Section.

Fifty-one of the Historical sites have been demolished and fall outside of the demarcated surface infrastructure area. The majority of these sites were not visited and mostly include huts indicated on historical topographical maps and buildings visible on historical aerial imagery (**Table 5 & Appendix A**).

**Table 5:** Demolished historical sites outside of the areas demarcated for surface development.

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B01	Building	Aerial	1956	Demolished	Historical	7.2	1/197	South
B02	Building	Aerial	1956	Demolished	Historical	3.8	1/197	South
B06	Foundation mound	Aerial	1956	Demolished	Historical	11.1	3/197	South
B08	Building	Aerial	1956	Demolished	Historical	8.6	0/196	South
B11	Building	Aerial	1968	Demolished	Historical	0.3	1/184	South
B13	Building	Aerial	1956	Demolished	Historical	3.3	4/184	South
B15	Building	Aerial	1956	Demolished	Historical	3.0	4/184	South
B20	Building	Aerial	1956	Demolished	Historical	2.1	2/184	South
B21	Building	Aerial	1956	Demolished	Historical	12.0	9/184	South
B24	Building	Aerial	1956	Demolished	Historical	5.3	0/184	South
B26	Building	Aerial	1956	Demolished	Historical	1.5	0/184	South
B27	Building	Aerial	1956	Demolished	Historical	3.0	0/184	South
B28	Building	Aerial	1956	Demolished	Historical	1.7	0/184	South
B29	Building	Aerial	1956	Demolished	Historical	1.0	16/184	South
B30	Building	Aerial	1956	Demolished	Historical	1.7	16/184	South
B31	Building	Aerial	1956	Demolished	Historical	5.4	6/184	South
B32	Huts	Topo	1965	Demolished	Historical	2.9	6/184	South
B33	Building	Aerial	1956	Demolished	Historical	1.1	6/184	South
B34	Huts	Topo	1965	Demolished	Historical	1.3	6/184	South
B35	Building	Aerial	1956	Demolished	Historical	3.2	8/184	South
B36	Building	Aerial	1956	Demolished	Historical	1.5	8/184	South
B37	Building	Aerial	1956	Demolished	Historical	1.6	8/184	South
B38	Building	Aerial	1956	Demolished	Historical	2.0	10/184	South
B39	Building	Aerial	1956	Demolished	Historical	6.6	1/182	South
B40	Building	Aerial	1956	Demolished	Historical	3.0	1/182	South
B41	Building	Aerial	1956	Demolished	Historical	0.9	1/182	South
B45	Building	Aerial	1956	Demolished	Historical	1.1	0/182	North
B46	Building	Aerial	1956	Demolished	Historical	1.5	8/182	North
B47	Building	Aerial	1956	Demolished	Historical	1.4	7/182	North
B48	Building	Aerial	1956	Demolished	Historical	1.1	7/182	North
B54	Building	Aerial	1956	Demolished	Historical	5.6	3/182	North
B55	Building	Aerial	1956	Demolished	Historical	1.5	4/182	North
B56	Building	Aerial	1956	Demolished	Historical	0.3	1/184	South
B58	Building	Aerial	1956	Demolished	Historical	1.3	2/197	South
B59	Building	Aerial	1956	Demolished	Historical	0.4	0/196	South
B60	Building	Aerial	1956	Demolished	Historical	0.8	0/196	South
B61	Building	Aerial	1956	Demolished	Historical	0.4	0/196	South
B62	Building	Aerial	1956	Demolished	Historical	0.5	0/196	South
B63	Building	Aerial	1956	Demolished	Historical	0.6	0/196	South
B64	Building	Aerial	1956	Demolished	Historical	0.6	0/196	South
B65	Building	Aerial	1956	Demolished	Historical	0.7	2/196	South
B66	Building	Aerial	1956	Demolished	Historical	0.3	2/184	South

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B67	Building	Aerial	1956	Demolished	Historical	0.6	5/184	South
B68	Building	Aerial	1956	Demolished	Historical	0.5	16/184	South
B70	Building	Aerial	1968	Demolished	Historical	0.4	1/182	South
B71	Building	Aerial	1956	Demolished	Historical	0.4	0/182	North
B73	Building	Aerial	1956	Demolished	Historical	0.5	4/197	South
B74	Building	Aerial	1968	Demolished	Historical	0.4	4/184	South
B75	Building	Aerial	1968	Demolished	Historical	3.0	1/184	South
B76	Building	Aerial	1968	Demolished	Historical	2.5	8/184	South
B77	Building	Aerial	1968	Demolished	Historical	0.4	1/182	South

\*Site B26 was visited as this site intersected a previous area demarcated for surface development. Following the altered mining layout, the proposed surface infrastructure area was discarded.

**Table 6** lists the three sites (**Figures 17 & 18**) that date to the Historical Period, fall within or within close proximity of the areas demarcated for surface development and have been demolished. These sites and the associated 'sensitive areas' as indicated on **Figures 113 & 114** are not associated with surface remains and are indicated as huts on historical topographical maps and buildings on historical aerial imagery (**Appendix A**). Site B51 falls within the demarcated surface infrastructure area, while site BF28 is located on the outside and borders the proposed underground area. It should be noted that Site B50 was not inspected because the initial surface layouts did not intersect this site.

**Table 6:** Demolished historical sites within or near areas demarcated for surface development.

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B50	Huts	Topo	1965	Demolished	Historical	0.8	4/182	North
B51	Building	Aerial	1956	Demolished	Historical	1.1	4/182	North
BF28	Foundation mound	Aerial	1956	Demolished	Historical	8.3	Outside	North



**Figure 17:** B51 – Demolished building.



**Figure 18:** BF28 – Foundation mounds.

**Table 7** lists the three historical sites (**Figures 19 – 25**) that consist of buildings/structures that fall outside of the area demarcated for surface development but within the boundary demarcated for underground mining (**Figures 113 & 114**).

Site B52 consists of intact farmsteads that date to the Historical Period as indicated by historical aerial photographs (**Appendix A**). Sites B49 and B72 are characterised by building remains in a severely dilapidated state. These sites were identified on historical aerial imagery and topographical maps (**Appendix A**). It should be noted that these sites are generally associated with several structures, some of which date to contemporary times. The possibility also exists that some of the historical homesteads may have been replaced by modern homesteads and some of the farmsteads may have been renovated or altered. These areas, whether on the surface or subsurface level, may be significant from heritage perspective.

**Table 7:** Ruins/intact historical sites within the boundary of underground mining.

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B49	Building	Aerial	1956	Ruin	Historical	1.8	7/182	North
B52	Building	Aerial	1956	Intact	Historical	1.0	4/182	North
B72	Building	Aerial	1956	Ruin	Historical	0.1	4/182	North



**Figure 19:** B49 – Building ruin.



**Figure 20:** B49 – Demolished building.



**Figure 21:** B52 – Farmhouse.



**Figure 22:** B52 – Farmhouse.



**Figure 23:** B52 – Outbuilding.



**Figure 24:** B52 – Garage.



**Figure 25:** B72 – Building ruin.

**Table 8** lists the 18 historical sites (**Figures 26 - 63**) that consist of buildings/structures that fall outside of the area demarcated for surface development and underground mining (**Figures 113 & 114**). Of these 18 sites, only site B53 is found on the Northern Section.

Sites B03, B04, B14, B16, B18, B22, B23, B25, B42, B43, B57 and B69 consist of intact homesteads or farmsteads that date to the Historical Period as indicated by historical aerial photographs (**Appendix A**). Sites B09, B12, B44 and B53 are characterised by building remains in a severely dilapidated state. These sites were identified from historical aerial imagery and topographical maps (**Appendix A**). It should be noted that these sites are generally associated with several structures, some of which date to contemporary times. The possibility also exists that some of the historical buildings may have been replaced by modern buildings and some of the farmsteads may have been renovated or altered.

Site B05 is characterised by a combination of one intact historical building, several demolished historical buildings, as well as intact modern buildings (**Figures 32 – 34**). Historical aerial imagery dating to 1956 and 1968 (**Appendix A: Figures 116 & 118**), as well as the 1965 topographical map (**Appendix A: Figure 120**) show the presence of structures. However, the 1984 topographical map (**Appendix A: Figure 122**), shows the highest concentration of buildings, while only a few are shown on the 2009 topographical map (**Appendix A: Figure 126**).

Site B07 is characterised by several historical building ruins, a kraal and a modern intact building (**Figures 35 – 41**). The building remains portray a farmstead with several outbuildings, as well as structures possibly used for livestock. The majority of the buildings were constructed from bricks. Historical aerial imagery dating to 1956 and 1968 (**Appendix A: Figures 116 & 118**), as well as the 1965 and 1984 topographical maps (**Appendix A: Figures 120 & 122**) show the presence of several structures. However, the 1984 and 1996 topographical maps, show the highest concentration of buildings, suggesting that the majority of the buildings were built in recent times. By 2009 only the presence of a ruin is shown (**Appendix A: Figure 126**). Personal communication with the owner, Mr. Eugene Uys, revealed that one of the older buildings located within the patch of trees, was used as a field hospital during the Anglo Boer War (Eugene Uys, pers. Comm. 2020).



**Table 8:** Ruin/intact historical sites outside of areas demarcated for underground mining and surface development.

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B03	Building	Aerial	1956	Intact	Historical	3.1	2/197	South
B04	Building	Aerial	1956	Intact	Historical	11.4	2/197	South
B05	Building	Aerial	1956	Intact	Historical	6.2	3/197	South
B07	Building	Aerial	1956	Intact/ruin	Historical	12.4	3/197	South
B09	Building	Aerial	1956	Ruin	Historical	0.7	0/196	South
B12	Building	Topo	1965	Ruin	Historical	0.2	0/196	South
B14	Building	Aerial	1956	Intact	Historical	4.0	4/184	South
B16	Building	Aerial	1956	Intact	Historical	1.3	4/184	South
B18	Building	Aerial	1956	Intact	Historical	1.7	3/184	South
B22	Building	Aerial	1956	Intact	Historical	2.3	9/184	South
B23	Building	Aerial	1968	Intact	Historical	3.3	1/184	South
B25	Building	Aerial	1956	Intact	Historical	0.3	1/184	South
B42	Building	Aerial	1956	Intact	Historical	4.1	1/182	South
B43	Building	Aerial	1956	Intact	Historical	2.5	1/182	South
B44	Building	Aerial	1956	Ruin	Historical	2.5	1/182	South
B53	Building	Aerial	1956	Ruin	Historical	2.8	3/182	North
B57	Building	Aerial	1968	Intact	Historical	0.3	1/184	South
B69	Building	Aerial	1956	Intact	Historical	0.7	1/182	South



**Figure 26:** B03 – Building.



**Figure 27:** B03 – Intact farmhouse.



**Figure 28:** B04 – Possible historical building.



**Figure 29:** B04 – Possible historical building.



**Figure 30:** B04 – Possible historical building.



**Figure 31:** B04 – Possible historical building.



**Figure 32:** B05 – Modern building.



**Figure 33:** B05 – Historical building.



**Figure 34:** B05 – Recent building.



**Figure 35:** B07 – Possible Anglo Boer War hospital.



**Figure 36:** B07 – Building ruins.



**Figure 37:** B07 – Building ruins.



**Figure 38:** B07 – Structures.



**Figure 39:** B07 – Kraal.



**Figure 40:** B07 – Modern building.



**Figure 41:** B07 – Modern building ruins.



**Figure 42:** B09 – Ruin.



**Figure 43:** B12 – Building Ruin.



**Figure 44:** B14 – Demolished building.



**Figure 45:** B14 – Intact farmhouse.



**Figure 46:** B16 – Historical building.



**Figure 47:** B18 – Historical homestead.



**Figure 48:** B22 – Outbuilding & water tank.



**Figure 49:** B22 – Farmhouse.



**Figure 50:** B23 – Homestead.



**Figure 51:** B25 – Farmhouse.



**Figure 52:** B42 – Historical store.



**Figure 53:** B42 – Farmyard.



**Figure 54:** B42 – Store.



**Figure 55:** B43 – Farmhouse.



**Figure 56:** B43 – Outbuilding.



**Figure 57:** B43 – Modern Store.



**Figure 58:** B44 – Modern building ruin.



**Figure 59:** B44 – Demolished building.



**Figure 60:** B53 – Building ruin.



**Figure 61:** B53 – Demolished structure.



**Figure 62:** B57 – Homestead.



**Figure 63:** B69 – Homestead.

The Heritage study undertaken by Huffman & Steel (1995) for the Forzando Coal Holdings on the Farms Weltevreden 193 IS and Halfgewonnen 190 IS recorded angular settlement remains that might date to the same period as the structures recorded in this study.

## 5.4 Contemporary Remains

**Table 9** lists the four sites (**Figures 64 – 67**) that date to contemporary times (**Figure 114**). These sites include recent foundation mounds, a foundation and intact buildings (**Appendix A**). It should be noted that all four of the identified sites fall on the southern section.

Both sites B10 and B19 were identified on historical aerial imagery (**Appendix A**) and fall outside of the area demarcated for underground mining. According to Mr. Hendrik Madalane, who lives in the homestead associated with Site B10 (**Figure 64**), the original building was demolished and replaced by the existing building in 1971.

Site B19 (**Figure 65**), clearly visible on the historical datasets (**Appendix A**), consists of a homestead that might include several buildings. According to the property's manager, Mr. Ulrich, the original homestead was demolished and recently illegally replaced with a modern building by the current occupants. The site falls outside of the demarcated underground mining boundary.

Site BF05 (**Figure 66**) is located outside of the area demarcated for development. The structure appears to date to recent times, but has been demolished. The use of the structure, however, is not known.

Site BF18 is first indicated on the 1996 topographical map as a building, but has since been demolished (**Figure 67**). Site BF18 also falls outside of the area demarcated for underground mining.



**Table 9:** Contemporary Remains.

Name	Type	Source	Year	Status	Age	Estimated extent (ha)	Parcel	Northern / Southern
B10	Building	Aerial	1956	Altered-modern ruin	Contemporary	0.6	0/196	South
B19	Building	Aerial	1956	Altered-modern building	Contemporary	2.3	3/184	South
BF05	Ruin	Field	Unknown	Ruin	Contemporary	3 (m <sup>2</sup> )	1/182	South
BF18	Foundation Mound	Field	Unknown	Demolished	Contemporary	0.3	1/196	South



**Figure 64:** B10 – Contemporary homestead.



**Figure 65:** B19 – Modern homestead.



**Figure 66:** BF05 – Angular foundation.



**Figure 67:** BF18 – Demolished homestead.

Heritage studies undertaken in the surrounding area did not record buildings or structures dating to contemporary times See Van Vollenhoven (2013); National Cultural History Museum (2003); Huffman & Steel (1995).

## 5.5 Graves

Twenty-three confirmed graves or cemeteries and one possible grave were identified on the Mining Right area using a combination of historical topographical maps, aerial images, personal communication with land owners or local farm workers and via the personal observation. The graves are generally oriented in an east-west direction,

but a few instances have been noted where graves are oriented in a north-south direction. Two of these sites (BF 25 & BF26) are located on the Northern Section.

**Table 10** lists the 22 sites (**Figure 114**) that fall on the Southern Section and therefore outside of the area demarcated for surface development and underground mining (**Figures 68 – 108**). These burial sites are located at a significant distance from any potential surface impact by the proposed development.

Site B17 was identified on topographical maps as a grave, however, the site visit revealed no indication of a grave. Whether the grave was relocated at some stage is unknown (**Figure 68**).

Site BF01 consists of approximately 50 graves. The cemetery is not fenced-off and is significantly overgrown by dense vegetation that hampered the identification of graves. Only two formal grave dressings with headstones were observed and no burial dates could be found. The remainder of the graves consist of informal grave dressings in the form of stacked stones. Grave goods in the form of glass bottles were observed (**Figures 69 – 73**). The cemetery appears not to be in use anymore.

Site BF02 is located close to historical site B07. Site BF02 is characterised by two brick-lined burial sites without any visible inscriptions. The site is not fenced-off and is in a dilapidated state. Due to the dilapidated state, it is unclear whether more graves exist in the direct vicinity, but slight soil mounds suggest that this might be the case. No grave goods were observed in association of Site BF02 and the burial site appears not to be in use anymore (**Figures 74 & 75**).

Site BF03 is associated with Site B06. The burial site, that was pointed out by one of the local people living nearby, consists of approximately three graves. The graves are in a dilapidated state that hampered the potential identification of other graves in the direct vicinity. The site is not fenced-off and consists of one grave with a formal grave dressing constructed from cement, and two graves characterised by informal grave dressings in the form of stacked stones. The two graves with informal grave dressings appear to be marked by iron pegs as well (**Figures 76 & 77**).

Sites BF06, BF07, BF08, BF09, BF20 and BF22 (**Figures 78 – 81, 98, 101**) consist of one or two unfenced graves with formal dressing. Site BF24, however, consists of a partially fenced-off grave with no formal grave dressing (**Figure 104**).

Sites BF10, BF21 and BF23 (**Figures 82, 99 – 103**) are unfenced cemeteries housing a combination of graves with formal and informal grave dressings. Site BF19 also houses graves with formal and informal grave decorations, but is fenced-off (**Figures 96 & 97**).

Sites BF11 and BF17 consist of fenced-off cemeteries housing a combination of formal and informal grave dressings (**Figures 83 – 95**). Site BF27 consists of a fenced-off cemetery with formal grave dressings. One open pit was observed (**Figures 105 – 107**).

Site BF12 consists of two graves with formal grave dressings (**Figures 86 – 87**). The burial site is partially fenced-off by a broken metal fence. BF29 also consists of one or possibly two graves (**Figure 108**). BF29, however, is not fenced-off and is characterised by stacked stones. Site BF13, an unfenced cemetery consisting of formal and informal grave dressings, is also characterised by approximately 10 graves oriented in a north-south direction (**Figures 88 – 90**). BF16 was pointed out by one of the local residents (**Figures 91**). The graves are not fenced-off and are extremely overgrown and dilapidated. The number of graves could not be determined.

**Table 10:** Graves/cemeteries located outside of the Northern Section.

Name	Type	Source	Year	Status	Estimates extent (m <sup>2</sup> )	Parcel	Number of graves
B17	Grave/Cemetery	Topo	1965	Intact	Unknown	Unknown	4/184
BF01	Grave/Cemetery	Field	N/A	Intact	1350	Outside	+ - 50
BF02	Grave/Cemetery	Field	N/A	Intact	12	3/197	+ - 4
BF03	Grave/Cemetery	Field	N/A	Intact	35	3/197	+ - 3
BF06	Cemetery/Grave	Field	N/A	Intact	6	Outside	1
BF07	Cemetery/Grave	Field	N/A	Intact	24	Outside	2
BF08	Cemetery/Grave	Field	N/A	Intact	6	Outside	1
BF09	Cemetery/Grave	Field	N/A	Intact	6	Outside	1
BF10	Cemetery/Grave	Field	N/A	Intact	370	Outside	+ - 11
BF11	Grave/Cemetery	Field	N/A	Intact	500	1/182	+ - 38
BF12	Grave/Cemetery	Field	N/A	Intact	18	1/182	2
BF13	Grave/Cemetery	Field	N/A	Intact	1053	2/196	+ - 40
BF16	Grave/Cemetery	Field	N/A	Intact	110	2/197	Unknown
BF17	Grave/Cemetery	Field	N/A	Intact	840	1/196	+ - 43
BF19	Cemetery/Grave	Field	N/A	Intact	1265	0/196	+ - 40
BF20	Cemetery/Grave	Field	N/A	Intact	12	9/184	1
BF21	Cemetery/Grave	Field	N/A	Intact	1260	9/184	+ - 30
BF22	Cemetery/Grave	Field	N/A	Intact	6	1/184	1
BF23	Cemetery/Grave	Field	N/A	Intact	500	1/184	+ - 20
BF24	Cemetery/Grave	Field	N/A	Intact	8	1/184	1
BF27	Grave/Cemetery	Field	N/A	Intact	240	0/196	5
BF29	Grave/Cemetery	Field	N/A	Intact	12	2/197	+ - 2



**Figure 68:** B17 – No visible grave.



**Figure 69:** BF01 – Unfenced cemetery.



**Figure 70:** BF01 – Elongated stone cairn grave.



**Figure 71:** BF01 – Graves lined with bricks.



**Figure 72:** BF01 – overgrown grave.



**Figure 73:** BF01 – Grave goods.



**Figure 74:** BF02 – Graves lined with bricks.



**Figure 75:** BF02 – Potential graves.



**Figure 76:** BF03 – Unfenced graves.



**Figure 77:** BF03 – Two graves.



**Figure 78:** BF06 – Single grave.



**Figure 79:** BF07 – Two graves.



**Figure 80:** BF08 – Single grave.



**Figure 81:** BF09 – Single grave.



**Figure 82:** BF10 – Unfenced cemetery.



**Figure 83:** BF11 – Fenced-off cemetery.



**Figure 84:** BF11 – N/S & E/W graves.



**Figure 85:** BF11 – Overgrown graves.



**Figure 86:** BF12 – Two graves with broken fence.



**Figure 87:** BF12 – Close-up of grave.



**Figure 88:** BF13 – Cemetery.



**Figure 89:** BF13 – Dilapidated graves.



**Figure 90:** BF13 – Overgrown graves.



**Figure 91:** BF16 – Overgrown graves.



**Figure 92:** BF17 – Cemtery.



**Figure 93:** BF17 – Formal grave dressings.



**Figure 94:** BF17 – Undecorated graves.



**Figure 95:** BF17 – Recent grave.



**Figure 96:** BF19 – Fenced-off cemetery.



**Figure 97:** BF19 – Modern grave dressing.





**Figure 98:** BF20 – Single grave with wall.



**Figure 99:** BF21 – Cemetery.



**Figure 100:** BF21 – Formal & informal grave dressings.



**Figure 101:** BF22 – Grave near farmhouse.



**Figure 102:** BF23 – Unfenced cemetery.



**Figure 103:** BF23 – N/S grave.



**Figure 104:** BF24 – Partially fenced-off grave.



**Figure 105:** BF27 – Fenced-off cemetery.



**Figure 106:** BF27 – open grave pit.



**Figure 107:** BF27 – Overgrown graves.



**Figure 108:** BF29 – Informal grave dressings.

The cemetery that falls outside of the area demarcated for surface development, but within the boundary of the proposed underground mining is listed in **Table 11 (Figures 113 & 114)**. This burial site is located a significant distance from the proposed surface impact and should therefore not be at risk from the proposed surface development, but might be impacted by the underground mining activities (**Figures 109 & 110**).

Site BF26 consists of approximately 26 graves. The cemetery is fenced-off and appears to be kept tidy. Four modern grave dressings with headstones that appear to have replaced older grave dressings were observed. The remainder of the grave dressings consist of stacked stones, stones outlining the graves, built brick walling and cement headstones. Grave goods in the form of empty plastic bottles were observed. It is unknown whether the cemetery is still in use.

**Table 11:** Cemetery located outside of the area demarcated for surface development, but within the underground mining boundary.

Name	Type	Source	Year	Status	Estimated extent (m <sup>2</sup> )	Parcel	Number of graves
BF26	Grave/Cemetery	Field	N/A	Intact	710	4/182	+ - 26



**Figure 109:** BF26 – Formal & informal graves.



**Figure 110:** BF26 – Modern grave dressings.

The cemetery that is located within the boundary of the proposed surface development is listed in **Table 12 (Figures 113 & 114)**.

Site BF25 consists of a walled cemetery within a cultivated field on Portion 4 of the Farm Boschmansfontein 182 IS. The cemetery consists of 14 graves with formal grave dressings and one open pit. The graves are oriented in an east-west direction and the cemetery appears to be no longer in use. The oldest burial date observed was 1922 and the most recent 2015. The Van Rensburg, Janse Van Rensburg and Van Niekerk families are buried in the cemetery (**Figures 111 & 112**). According to owner of the farm, Mr Pelsler, the previous owner who sold the farm to him asked to be buried on the farm.

**Table 12:** Cemetery located within of the area demarcated for surface development.

Name	Type	Source	Year	Status	Estimated extent (m <sup>2</sup> )	Parcel	Number of graves
BF25	Grave/Cemetery	Field	N/A	Intact	200	4/182	15



**Figure 111:** BF25 – Cemetery with wall.



**Figure 112:** BF25 – Formal graves.

Two of the heritage studies undertaken in the area (Cultural History Museum 2003; Huffman & Steel 1995) recorded similar burial sites.

## 6. Evaluation

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

## 6.1 Field Ratings

All sites should include a field rating in order to comply with section 38 of the National Heritage Resources Act (Act No. 25 of 1999). The field rating and classification in this report are prescribed by SAHRA.

**Table 13:** Field Ratings

Rating	Field Rating/Grade	Significance	Recommendation
National	Grade 1		National site
Provincial	Grade 2		Provincial site
Local	Grade 3 A	High	Mitigation not advised
Local	Grade 3 B	High	Part of site should be retained
General protection A	4 A	High/Medium	Mitigate site
General Protection B	4 B	Medium	Record site
General Protection C	4 C	Low	No recording necessary

**Table 14:** Individual site ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2629BA-B49	Building Ruin	General Protection B	4 B	Medium	Record site
2629BA-B50	Demolished Huts	General Protection C	4 C	Low	No recording necessary
2629BA-B51	Demolished Building	General Protection C	4 C	Low	No recording necessary
2629BA-B52	Intact Building	General Protection B	4 B	Medium	Record site
2629BA-B53	Building Ruin	General Protection B	4 B	Medium	Record site
2629BA-B72	Building Ruin	General Protection B	4 B	Medium	Record site
2629BA-BF25	Cemetery	Local	Grade 3 A	High	Mitigation not advised
2629BA-BF26	Cemetery	Local	Grade 3 A	High	Mitigation not advised
2629BA-BF28	Foundation Mound	General Protection B	4 B	Medium	Record site

\*Note – Only the sites located on or near the northern section of the study area are rated. No surface development or underground mining is currently planned for the southern section. The sites falling on the southern section will have to be assessed and rated prior to any development. Any change to the current boundaries and/or activities will require the ratings to be revised as well.

## 7. Statement of Significance & Recommendations

### 7.1 Statement of significance

#### **The study area: The Proposed Birmingham Mining Project**

Some of the areas associated with the proposed Birmingham Mining Project are considered to be significant from a heritage perspective. The significance of the proposed areas and the observed sites are discussed here.

The Mining Right area is associated with a combination of historical buildings, foundation mounds, building ruins, single graves and cemeteries. Although the southern section of the study area will not be utilised for mining development at present, the sites located during the survey are indicated on **Figures 113 & 114** as well and might aid future planning.

#### **Demolished historical sites falling outside of the areas demarcated for surface development**

Fifty-two of the Historical sites have been demolished and fall outside of the demarcated surface development area boundary. These sites were not visited and mostly include huts indicated on historical topographical maps and buildings visible on historical aerial imagery (**Table 5**). Although these sites might be significant from a heritage perspective, no surface impact is envisaged.

#### **Demolished historical sites within or near areas demarcated for surface development.**

Two sites (**Table 6**) have been identified that fall within or within close proximity of the areas demarcated for surface development. These sites have been demolished and are not associated with surface remains. Significant subsurface heritage material exceeding 60 years of age might be unearthed within the boundaries of the demarcated sensitive areas during construction and mining phases and would therefore be considered significant from a heritage perspective as such remains would be protected under the NHRA (National Heritage Resources Act) 25 of 1999.

#### **Ruins/Intact historical sites within the boundary of areas demarcated for underground mining.**

The three sites listed in **Table 7** date to historical times and consist mostly of intact buildings/ structures/ homesteads/ farmsteads that fall outside of the area demarcated for surface development but within the boundary demarcated for underground mining. Because these buildings/structures exceed 60 years of age they are protected under the NHRA 25 of 1999. These sites might therefore be at risk of suffering impact from the proposed underground mining activities. This possibility is supported by the Regional Stability and Subsidence Analysis report that states that for the mining of the specific seam (Seam 2) in the specific area, cracks of between 2 cm and 10 cm can be expected, as well as compression ridges of between 1 cm and 5 cm high.

### **Ruins/Intact historical sites falling outside of the area demarcated for surface development and underground mining.**

Eighteen historical sites (**Table 8**) consisting of buildings/structures fall outside of the area demarcated for surface development and underground mining. These sites consist of intact homesteads or farmsteads, as well as building ruins that date to the Historical Period. Although these sites might be significant from a heritage perspective, no impact is envisaged.

### **Contemporary remains**

Four sites (**Table 9**), consisting of a combination of intact buildings, ruins and foundation mounds, proved to date to contemporary times and are therefore not considered significant from a heritage perspective as these sites do not exceed 60 years of age and appear not to bear any other heritage importance.

### **Graves/Cemeteries located outside of the demarcated surface development and underground mining areas**

Seventeen sites (**Table 10**) were identified as graves/cemeteries falling outside of the demarcated surface development and underground mining areas. As stated above, it is uncertain whether a grave or cemetery is located at Site B17, but it should be regarded as a burial site until proven otherwise. It is likely that the cemeteries contain graves older, as well as younger than 60 years and are significant from a heritage perspective as the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply. However, it is unlikely that these sites will be impacted by the proposed development as they are located a significant distance from the proposed development.

### **Graves/Cemeteries located outside of the demarcated surface development area but within the underground mining boundary**

The cemetery listed in **Table 11** falls outside of the area demarcated for surface development, but within the boundary of underground mining activity. This site might therefore be at risk of suffering impact from the proposed underground mining activities as is evident from the Regional Stability and Subsidence Analysis report.

The burial dates of the majority of the graves could not be determined. However, it is likely that the cemetery contains graves older, as well as younger than 60 years and are significant from a heritage perspective as the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply.

**Graves/cemeteries located within the area demarcated for surface development (Northern Section).**

The site listed in **Table 12** is a cemetery falling within of the proposed surface development area. This site is therefore at risk of being impacted by the proposed development. The cemetery contains graves older, as well as younger than 60 years and is significant from a heritage perspective as the Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925), as well as the National Heritage Resources Act 25 of 1999 apply.



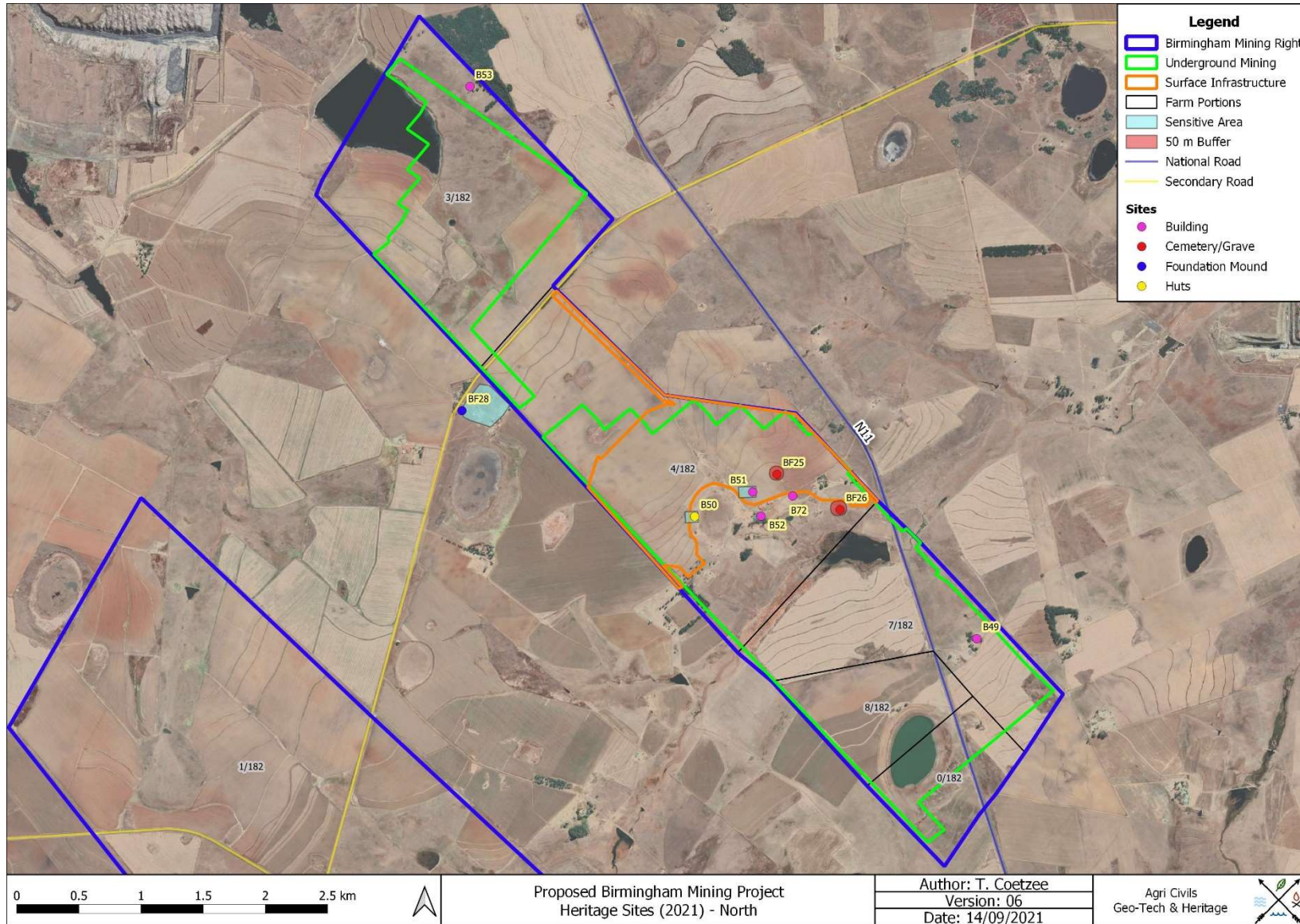


Figure 113: Heritage sites and buffer zones indicated on a 2020 aerial backdrop – Northern Section.

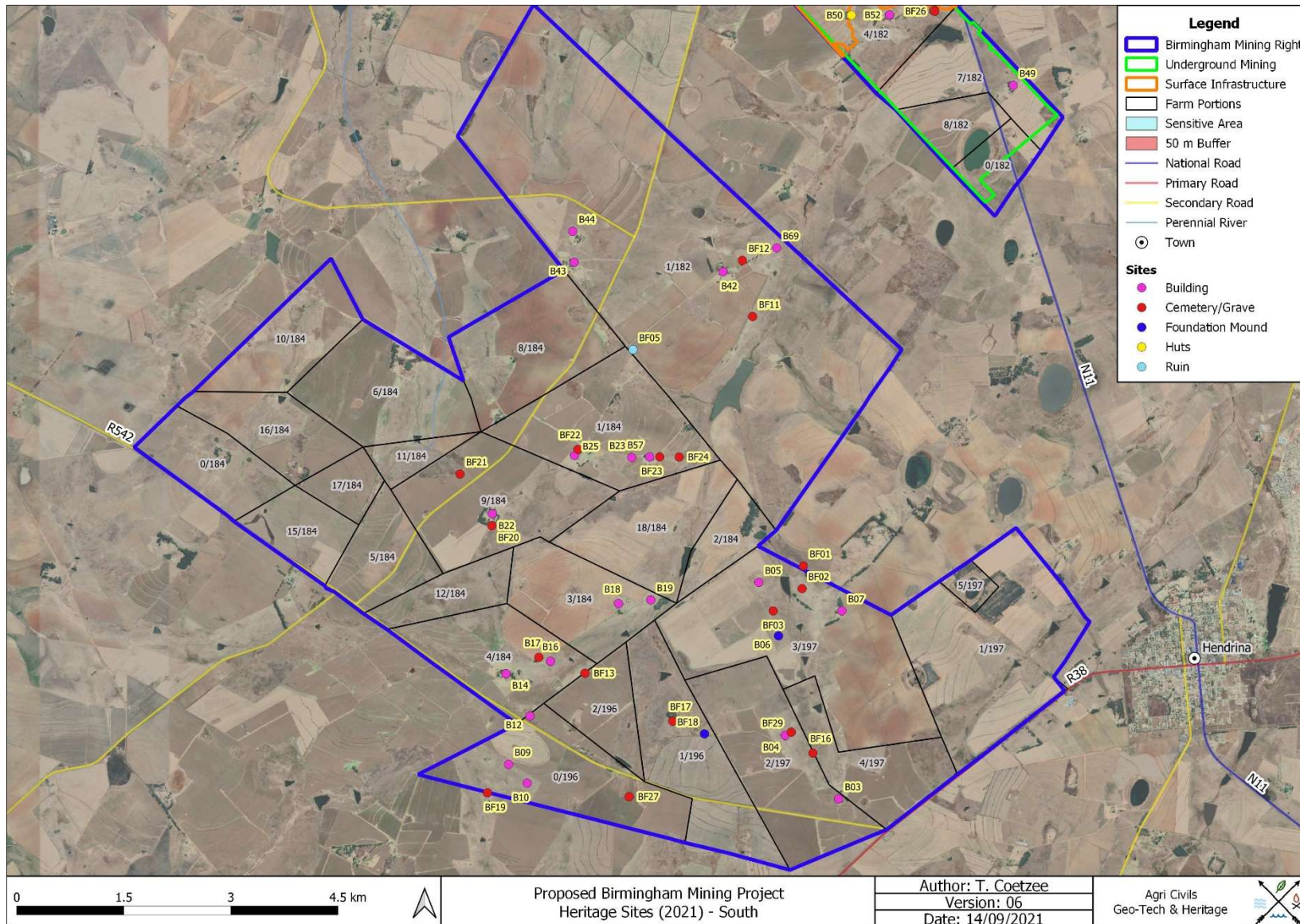


Figure 114: Heritage sites and buffer zones indicated on a 2020 aerial backdrop – Southern section.

## 7.2 Recommendations

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

### **Sites intersecting the proposed surface development area (Northern Section)**

- Site BF25, a cemetery consisting of 14 graves and one open pit, is enclosed by a brick wall and is located within a cultivated field. It is recommended that a fenced-off conservation buffer of 50 m be established around the cemetery and that a qualified archaeologist compile a Conservation Management Plan to ensure the safeguarding of the graves. Access to the cemetery must not be refused and monitoring by the ECO should take place on a quarterly basis, as well as pre- and post-blasting. Alternatively, the graves may be relocated by a qualified graves relocation unit to a premises earmarked by the local municipality, but will set in motion a substantial process as new legislation will be triggered. These processes, however, must be performed in accordance with the involvement the relatives of the deceased buried at the concerned location.
- Sites B50, B51 and the associated 'sensitive' areas on **Figure 113** are considered potentially significant from a heritage perspective as this area is associated with structures and buildings dating to historical times. Even though surface structures are no longer present, subsurface cultural material might exist and care should therefore be exercised during construction and mining phases. Should culturally significant material be unearthed during these processes, it is advised that a qualified archaeologist be contacted.
- Site BF28 and the associated 'sensitive' area on **Figure 113** are considered potentially significant from a heritage perspective as this area is associated with structures and buildings dating to historical times. This site, however, is located outside of the demarcated project area and no impact is envisaged. No further action is therefore required.

### **Sites falling outside of the proposed surface infrastructure area, but within the proposed underground mining boundary.**

- Sites B49 and B72 fall within the boundary of the proposed underground section and consist of building ruins. No further action is required as the recording done during this study is regarded as sufficient.
- Site B52 falls within the boundary of the proposed underground section and consists of intact buildings/structures. It is therefore recommended that the mine's ECO inspect these buildings/structures on a quarterly basis, as well as pre- and post-blasting. Should any impact be observed, or if impact cannot be avoided, all buildings and structures associated with the demarcated area must be adequately recorded by a qualified archaeologist and destruction permits be obtained from the relevant heritage authority.

- It is recommended that cemetery BF26 be inspected by the mine's ECO on a quarterly basis, as well as pre- and post-blasting in order to determine the mining development's impact on the burial sites. Should impact be observed, a qualified archaeologist should be contacted to provide the required input to ensure the safeguarding of the sites.

#### **Sites falling outside of the proposed surface and underground mining boundary**

- Site B53 consists of a building ruin located outside of the area demarcated for surface development and underground mining, but close to the northern section of the study area. No impact, however, is envisaged and no further action is required.
- Due to the alterations made to the initial mining layout, the remaining sites fall outside of the area demarcated for surface development and underground mining. Therefore, no recommendations regarding these sites are made. However, these sites will have to be rated and recommendations must be made to ensure the safeguarding of the sites prior to any future surface development or underground mining on these areas.

#### **Demolished historical sites falling outside of the area demarcated for surface development**

- The demolished Historical sites listed in **Table 5** fall outside of the demarcated surface infrastructure area. Although these sites might be significant from a heritage perspective, no impact is envisaged. No further action is required.

#### **General Recommendations**

- The above recommendations are based on the specific project activities, as well as surface and underground mining boundaries as indicated in this report. Should the proposed development expand to any area outside of the proposed surface or underground boundaries, a qualified archaeologist must revise the recommendations made in this report to ensure the safeguarding of heritage sites. Also, should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new area and amend the report accordingly.
- Because archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the development and construction phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).

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

## 8. Conclusion

The proposed Birmingham Mining Project consists of an underground mining section and surface development at the Northern Section of the mining right area. The Archaeological Impact Assessment examined the area and identified sites of cultural significance that might be impacted by the proposed development. These sites aided in the archaeological contextualisation of the general study area.

The AIA found several sites of heritage significance intersecting the proposed underground mining section and surface infrastructure area. The buildings, structures and burial sites associated with these sites might be affected by the proposed mining development as a result of surface impacts, vibration and subsistence. Therefore, it is recommended that the intact buildings and cemetery intersecting the proposed underground mining area be monitored. A fenced-off conservation buffer of 50 m should be established around the cemetery intersecting the area demarcated for surface development and a CMP should be compiled. Alternatively, the graves may be relocated.

Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed Birmingham Mining Project may proceed.

## 9. Addendum: Terminology

### **Archaeology:**

The study of the human past through its material remains.

### **Artefact:**

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

### **Assemblage:**

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

### **Context:**

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

### **Cultural Resource Management (CRM):**

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

### **Excavation:**

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

### **Feature:**

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

### **Ground Reconnaissance:**

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

### **Matrix:**

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

### **Phase 1 Assessments:**

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

### **Phase 2 Assessments:**

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

### **Sensitive:**

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

### **Site:**

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

### **Surface survey:**

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

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

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

# Appendix A: Historical Aerial Photographs and Topographical Maps



Figure 115: Study area superimposed on a 1956 aerial photograph – Northern Section.

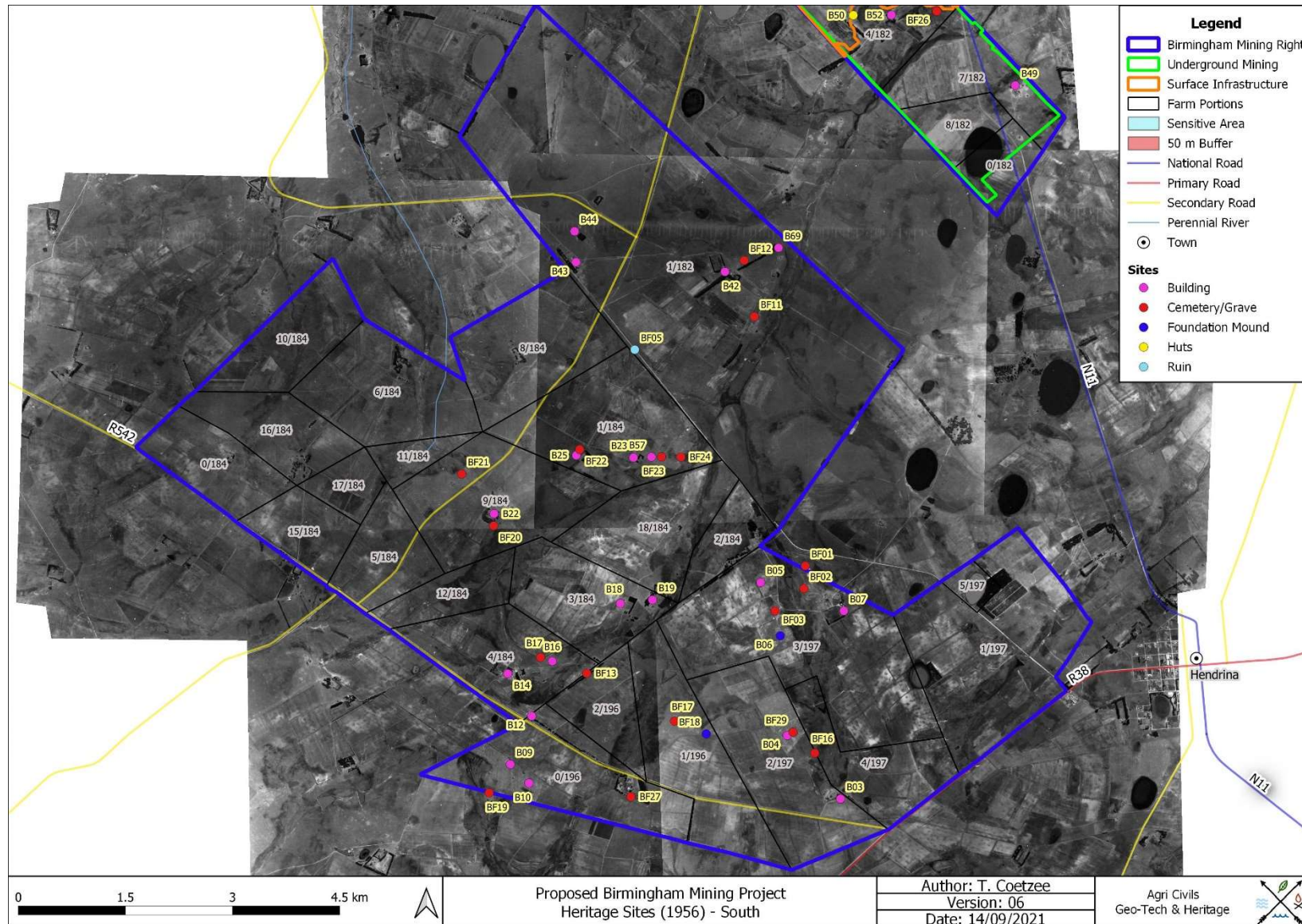


Figure 116: Study area superimposed on a 1956 aerial photograph – Southern Section.

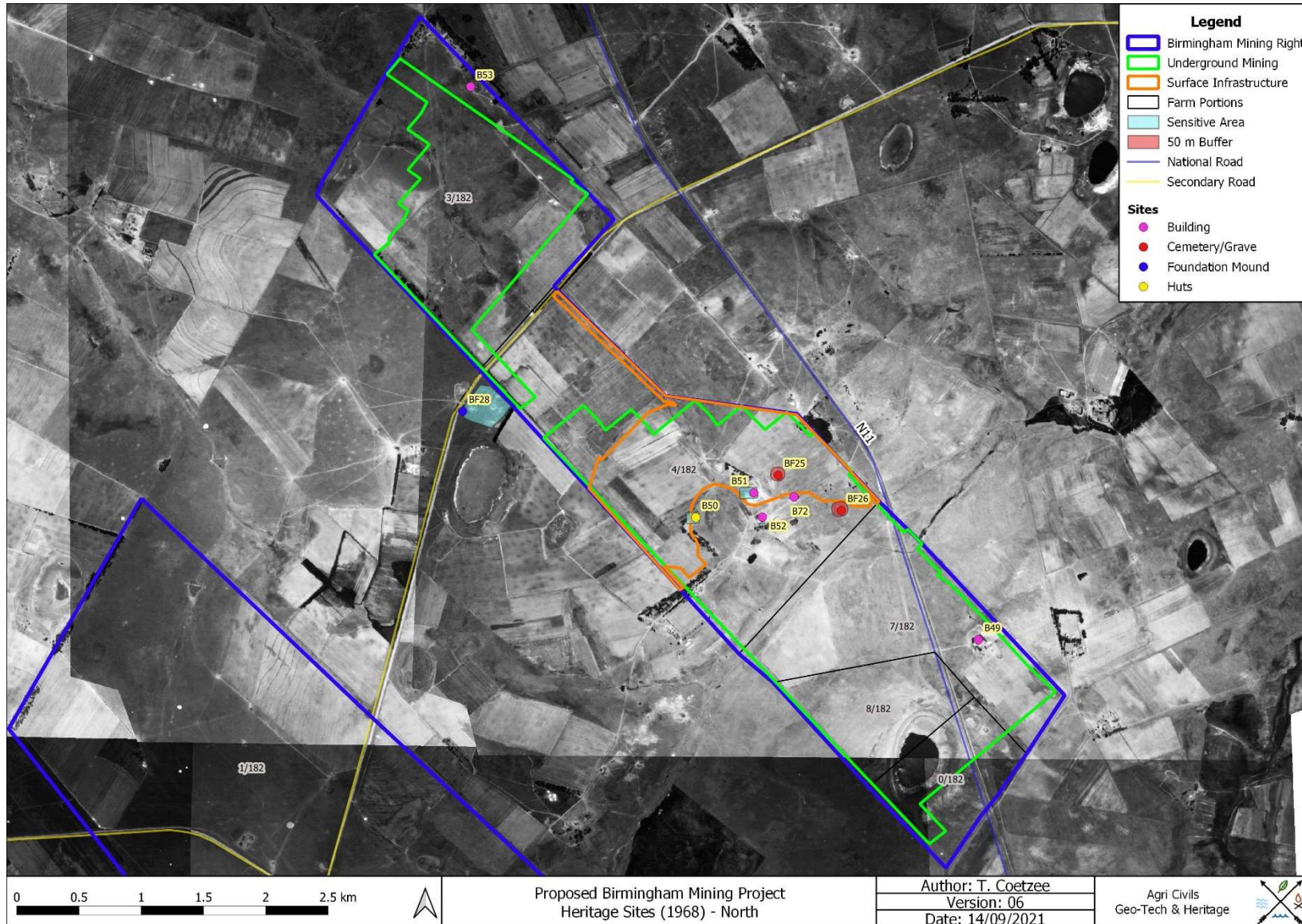


Figure 117: Study area superimposed on a 1968 aerial photograph – Northern Section.

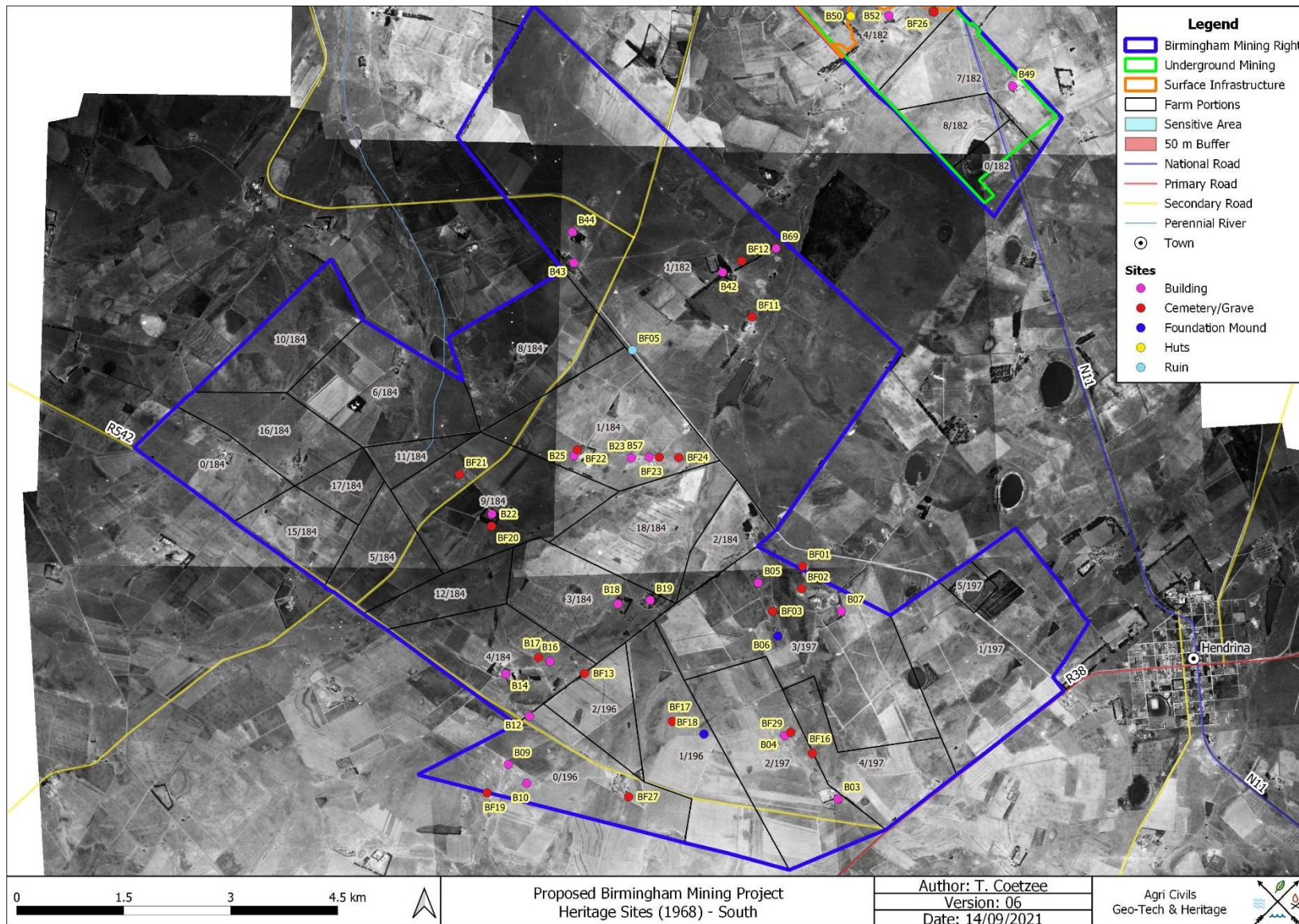


Figure 118: Study area superimposed on a 1968 aerial photograph – Southern Section.

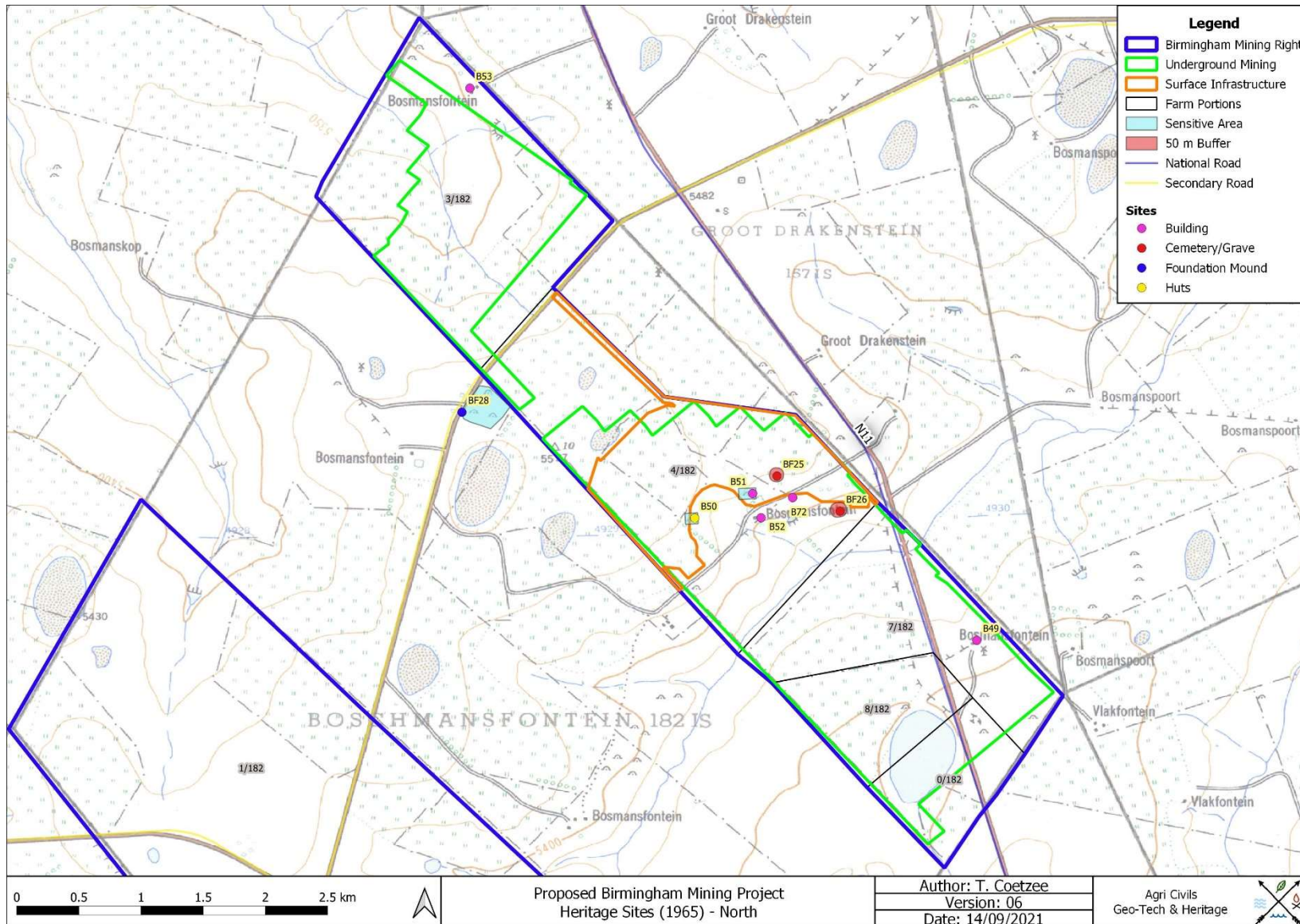


Figure 119: Study area superimposed on a 1965 topographical map – Northern Section.

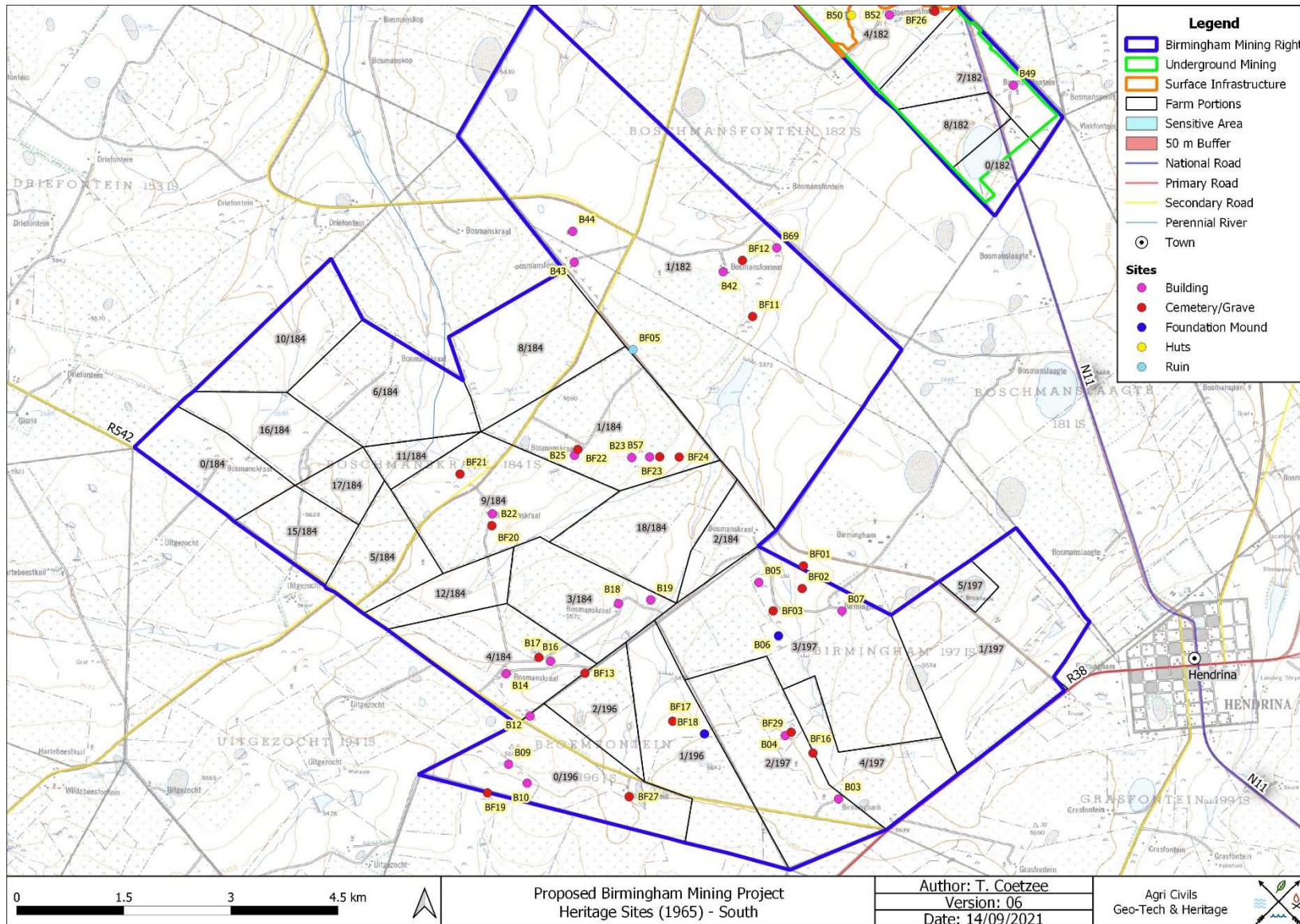


Figure 120: Study area superimposed on a 1965 topographical map – Southern Section.



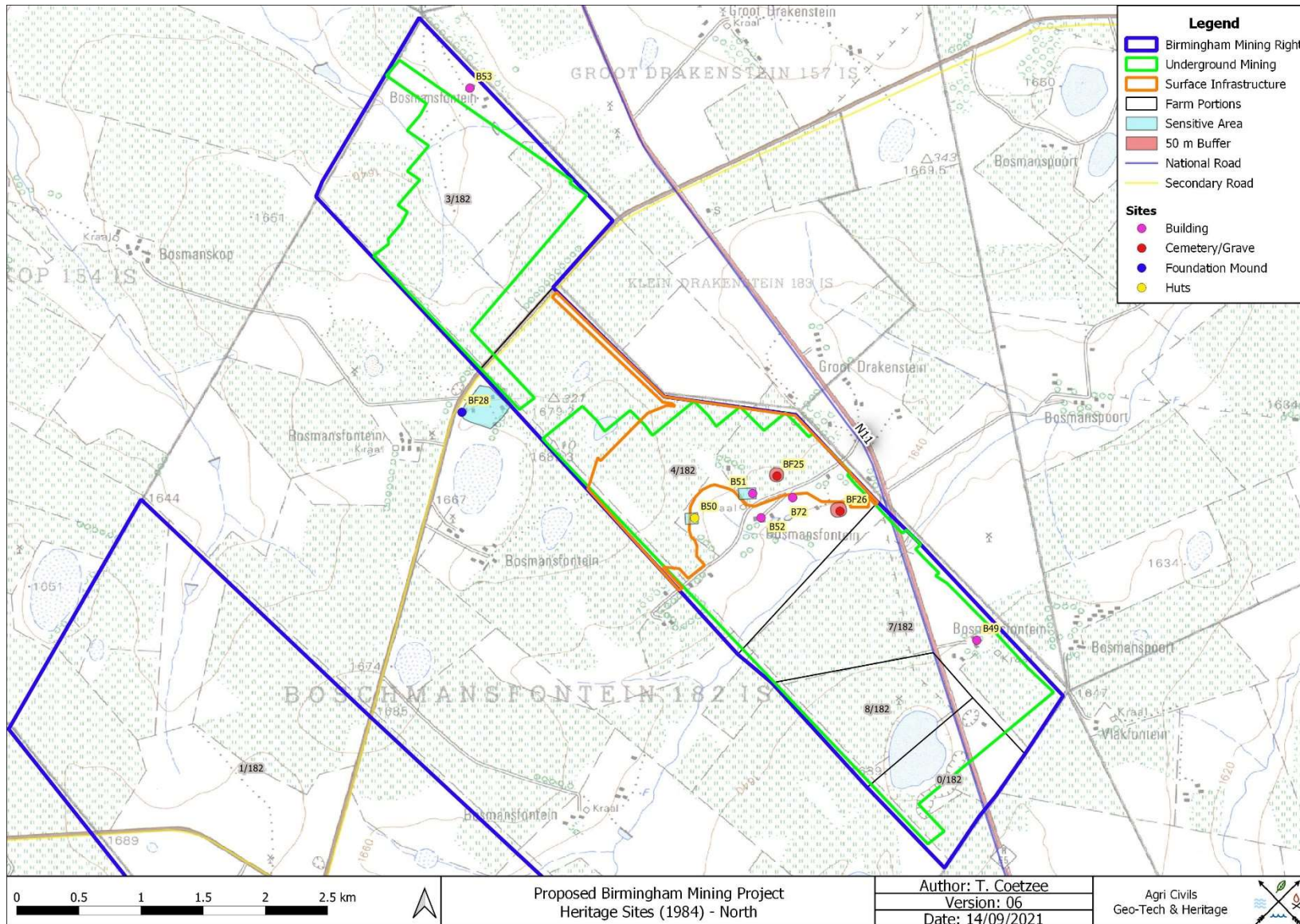


Figure 121: Study area superimposed on a 1984 topographical map – Northern Section.

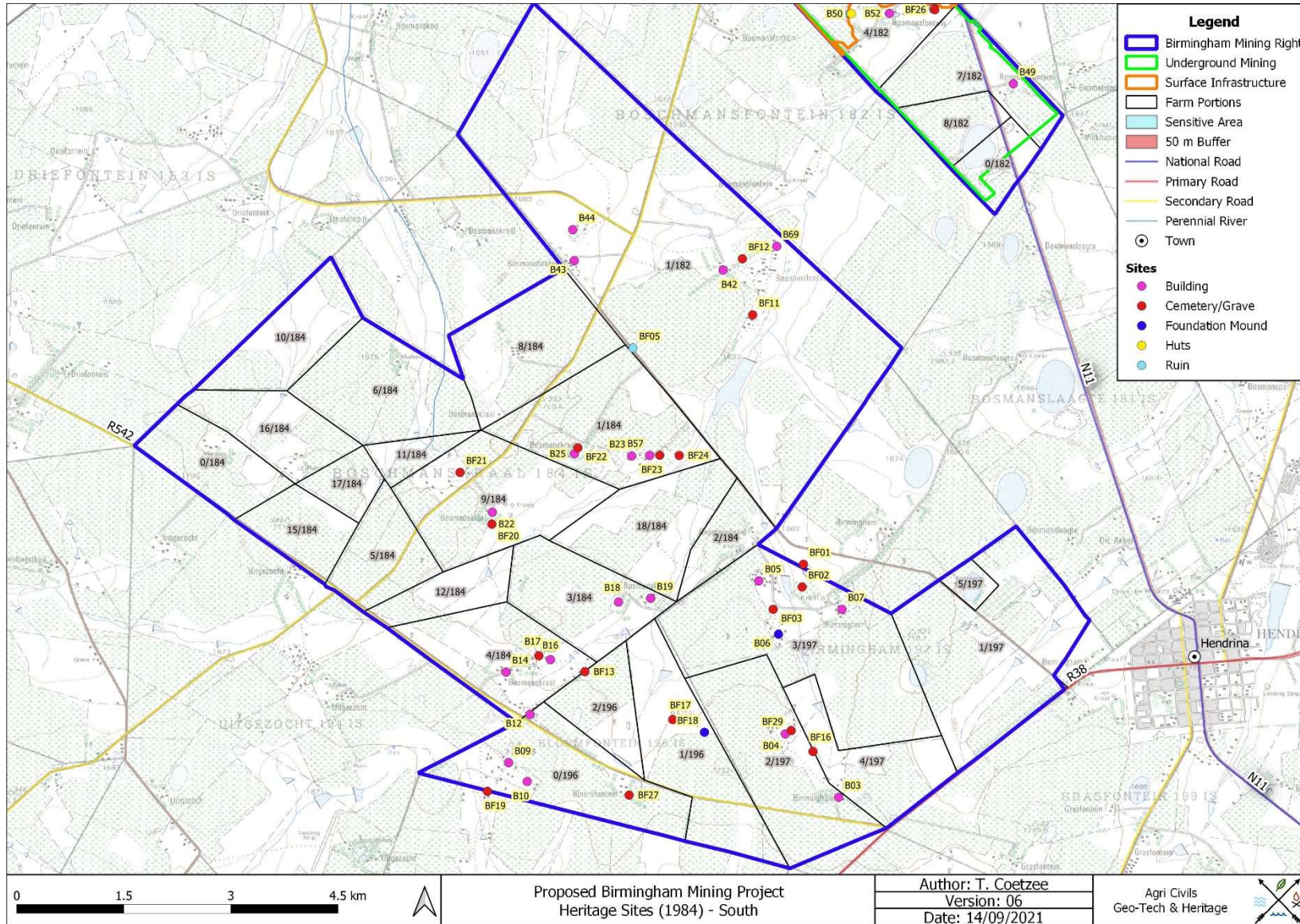


Figure 122: Study area superimposed on a 1984 topographical map – Southern Section.

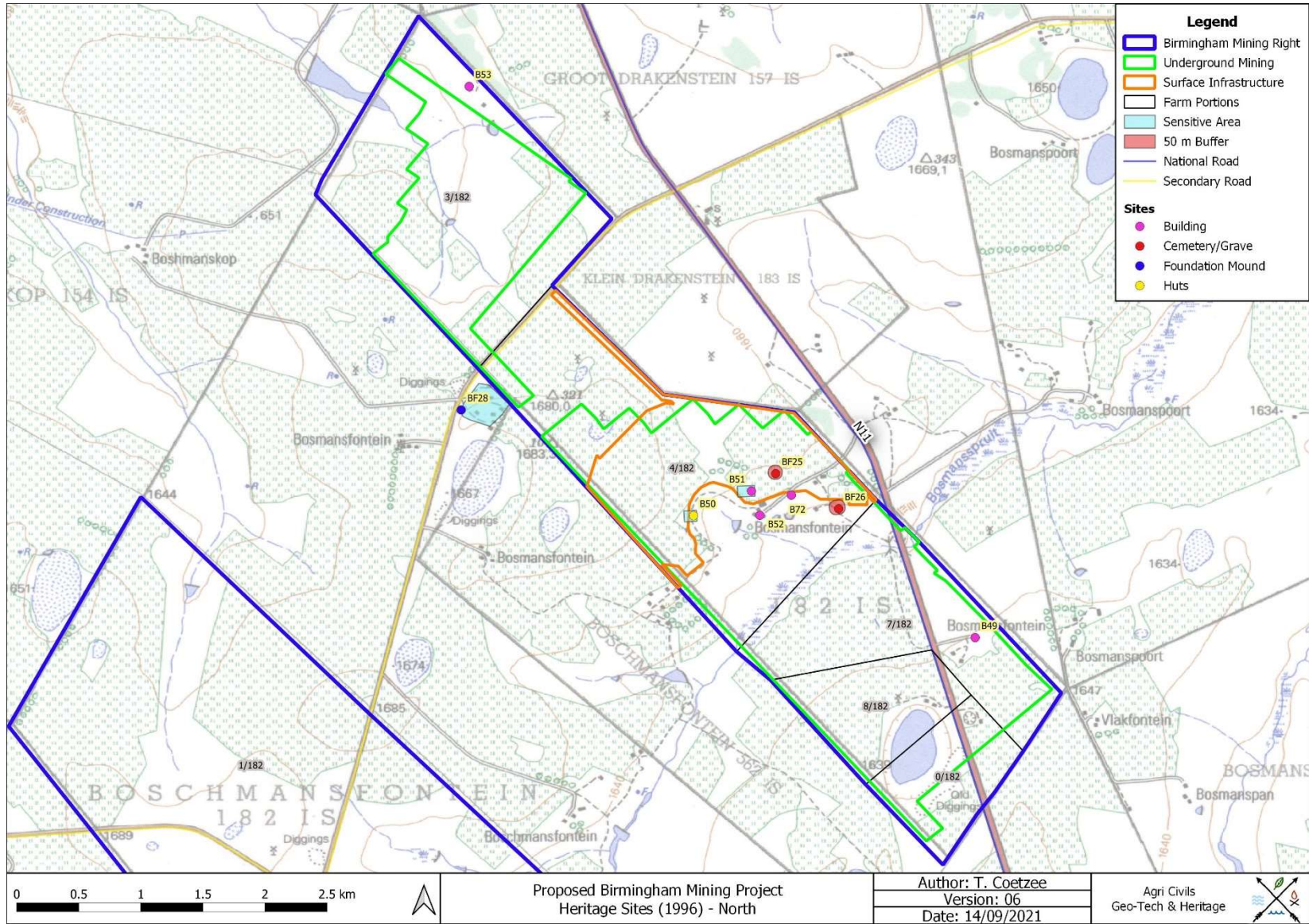


Figure 123: Study area superimposed on a 1996 topographical map – Northern Section.

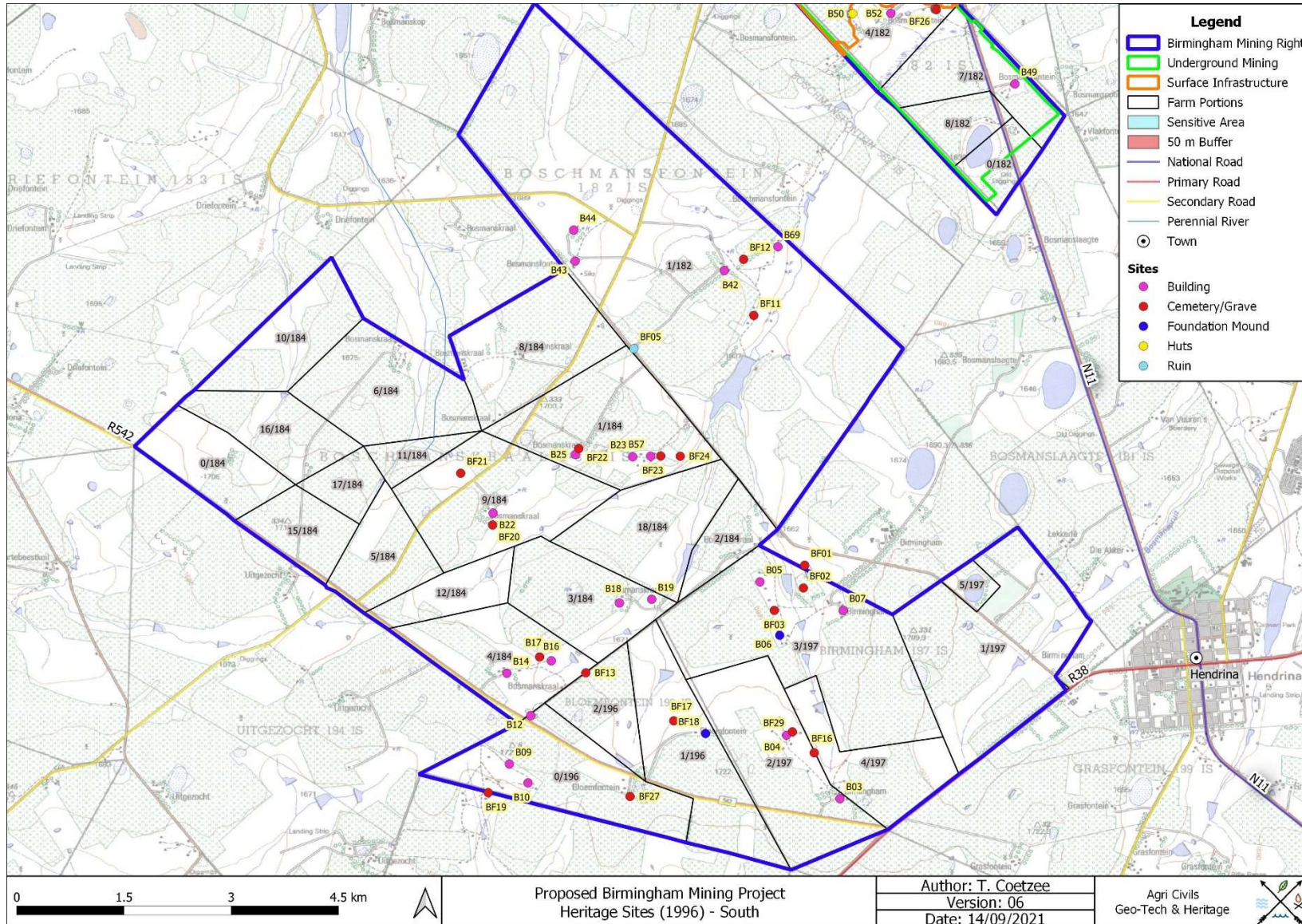


Figure 124: Study area superimposed on a 1996 topographical map – Southern Section.

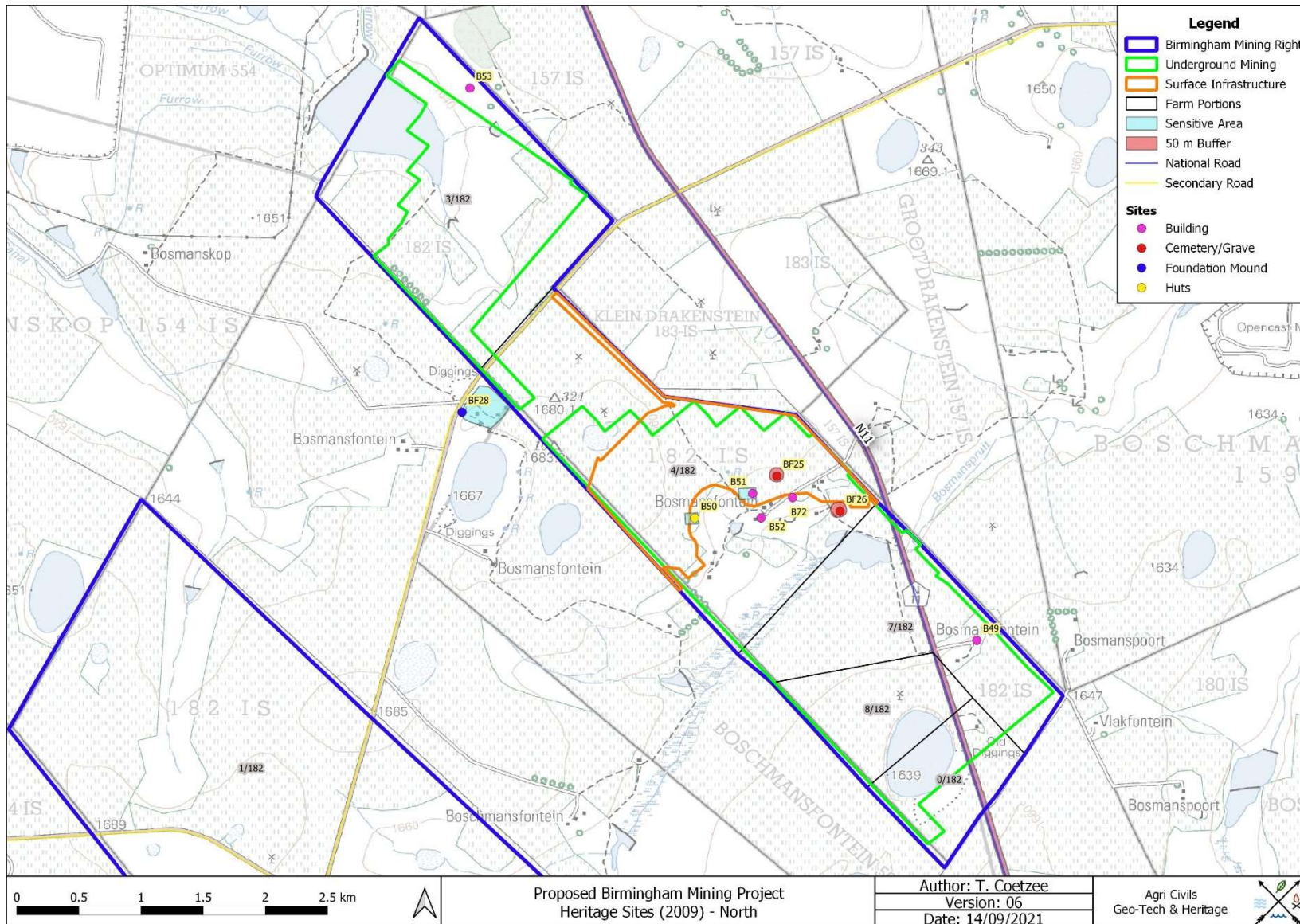


Figure 125: Study area superimposed on a 2009 topographical map – Northern Section.

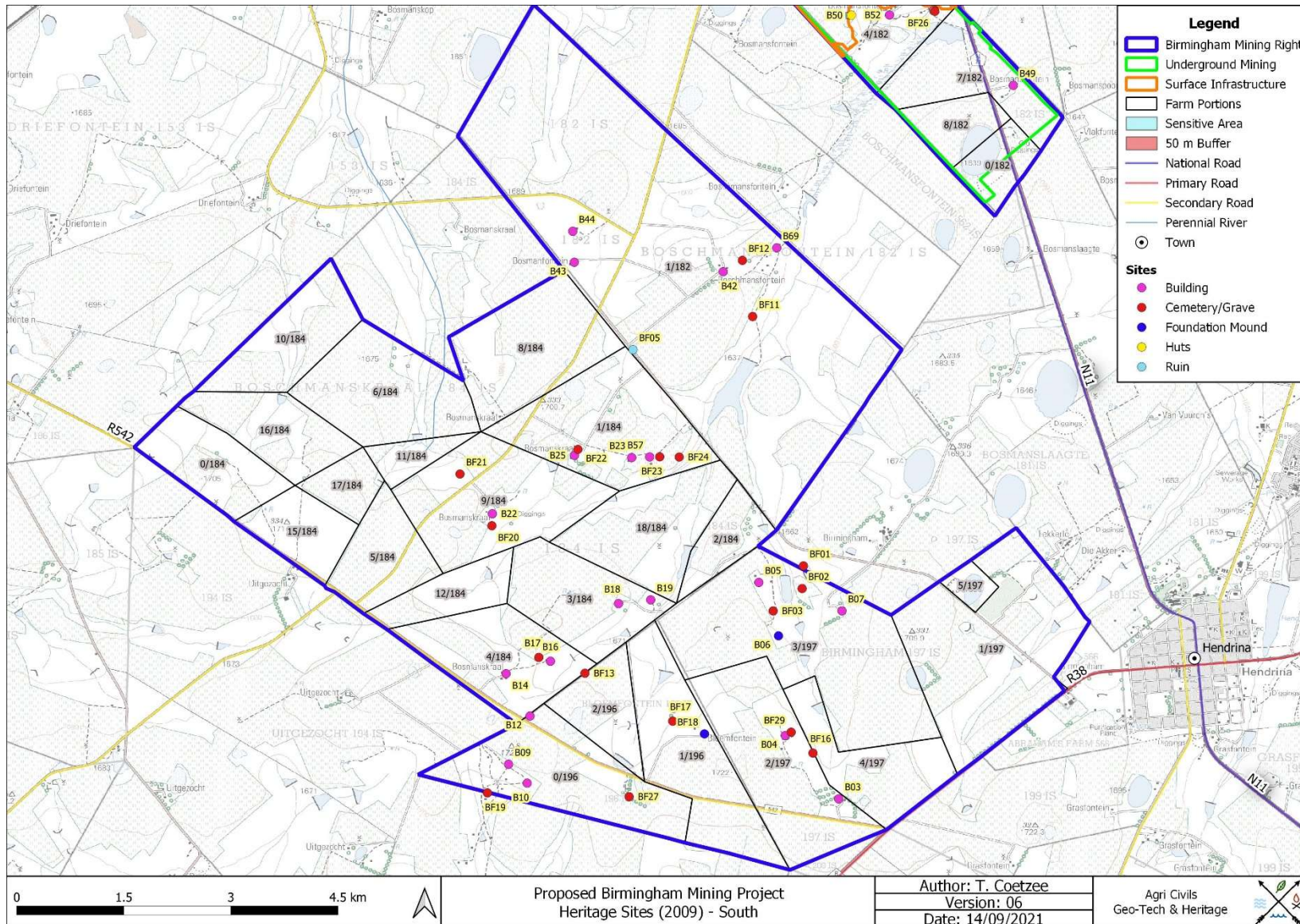


Figure 126: Study area superimposed on a 2009 topographical map – Southern Section.

# Appendix B: Curriculum Vitae

## Curriculum vitae

**Tobias Coetzee**

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Registered Professional Archaeologist, Association of Southern African Professional Archaeologists (ASAPA), CRM accredited, membership no: 289

**Full names:** Tobias Johannes Coetzee

**Date of birth:** 19 May 1986

**Qualifications:** MA (Archaeology)

### Education:

- 2017 MA (Archaeology)  
University of Pretoria  
Dissertation: *Mapping Bokoni: Exploring Bokoni settlement choices and changes in Mpumalanga and Limpopo, South Africa using GIS site distribution analysis techniques*
- 2008 BA (Hons) (Archaeology)  
University of Pretoria  
Dissertation: *Mapping Bokoni towns & trade: Applying Geographic Information Systems to the articulation of Mpumalanga stonewalled sites with pre-colonial trade routes*
- 2006 – 2008 BA (Archaeology & Geography)  
University of Pretoria  
Subjects: Zulu, Afrikaans, Cartography, GIS and ArcGIS applications, Meteorology, Anthropology, Ancient History, Isotope Ecology and Dating, Computer and Information Literacy, Academic Skills and Introduction to research

## **Employment:**

2020	Heritage Practitioner Agri Civils Geo-Tech & Heritage
2013 – 2019	GIS Practitioner Bigen Group (Pty) Ltd
2013	Specialist consultant: Heritage Environmental Assurance (Pty) Ltd
2011	Junior lecturer in Archaeology at the University of South Africa (UNISA) at the department of Anthropology & Archaeology Primary lecturer for: The Prehistory of South Africa Assistant lecturer for: Applied Archaeology - Heritage Conservation
2009	Tutor Department of Anthropology & Archaeology, University of Pretoria

## **Conference papers, publications & Cultural Resources Management Reports:**

Coetzee, T. 2020. *Conservation Management Plan for Cemetery 1 at the Kwagga North Mine, Middelburg, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *Conservation Management Plan for Cemetery 4 at the Kwagga North Mine, Middelburg, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

Coetzee, T. 2020. *A Phase 1 Archaeological Impact Assessment for the Proposed Trentra Mining Development near Kriel, Mpumalanga*. Lydenburg: Agri Civils Geo-Tech & Heritage

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Coetzee, T. 2019. *Conservation Management Plan for the Cemetery on the Farm Portions of the Proposed Bothashoek Mine, Pullens Hope, Mpumalanga*. Pretoria

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- Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Isiko Malt Grain Milling Plant on Pt 7 of the Farm Reydal 165 IQ, Krugersdorp, Gauteng*. Pretoria
- Coetzee, T. 2019. *Heritage Scoping Report for the Development of Erf 96, Kilner Park, Pretoria, Gauteng*. Pretoria
- Coetzee, T. 2019. *Archaeological Scoping Report for the Proposed Prospecting of Manganese, Baryte and Iron Ore on the Farm Vlak Fontein 433, Postmasburg, Northern Cape*. Pretoria
- Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Proposed Woestalleen/Noodhulp Coal Mining Project near Middelburg, Mpumalanga*. Pretoria
- Coetzee, T. 2019. *Phase 1 Archaeological Impact Assessment for the Refurbishment of the Reception and Construction of a New Double Storey Office Extension at Sender Technology Park, Roodepoort, Gauteng*. Pretoria
- Coetzee, T. 2019. *Conservation Management Plan for the Graveyards and Infrastructure on Portion 5 of the Farm Op Goedenhoop 205 IS, Mpumalanga*. Pretoria
- Coetzee, T. 2018. *Conservation Management Plan for a Graveyard on Portion 5 of the Farm Van Dykspruit 431 JR, Mpumalanga*. Pretoria
- Coetzee, T. 2018. *A Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd for the Construction of the Mareesburg Haul Road near Boschfontein, Mpumalanga*. Pretoria
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Coetzee, T. 2017. *Heritage Management Plan for Sedibeng Iron Ore Mine on Annex Taaibosch 1, Portion 3 and the RE of Farm 445 Postmasburg, Northern Cape*. Pretoria

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Coetzee, T. 2017. *A Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd on a portion Intersecting Portions 19, 22 and 29 of the Farm Kennedy's Vale 361 KT, Steelpoort, Limpopo Province*. Pretoria

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Coetzee, T. 2017. *Limited Phase 1 AIA for Diepsoils Investments (Pty) Ltd on a portion of Portion 5 of the Farm Kalabasfontein 232 IS and a portion of Portion 10 of the Farm Rietkuil 224 IS, Bethal, Mpumalanga*. Pretoria

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Coetzee, T. 2016. *Phase 1 Archaeological Impact Assessment for I-Cat (Pty) Ltd on a Portion of Portion 25 of the Farm Vlakfontein 523 JR, Bronkhorstspuit, Gauteng*. Pretoria

Coetzee, T. 2016. *Phase 1 AIA & Scoping for Yoctolux Collieries (Pty) Ltd on Portions 13 & 16 of the Farm Mooifontein 109 IT, Ermelo, Mpumalanga*. Pretoria

Coetzee, T. 2016. *Phase 1 Archaeological Desktop Study for Eco Elementum (Pty) Ltd on a portion of the remaining portion of the Farm Dingwell 276 JT, White River, Mpumalanga*. Pretoria

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- Coetzee, T. 2015. *Phase 1 Archaeological Impact Assessment for Vus'ithemba Project Solutions CC on a portion of the remaining extent of the farm Witklip 388 KR, Modimolle, Limpopo*. Pretoria
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- Coetzee, T. 2014. *A Phase 1 Archaeological Impact Assessment for the proposed Kebrafield (Pty) Ltd open cast coal mine on Portion 17 of the farm Roodepoort 151 IS, Pullens Hope, Mpumalanga*. Pretoria
- Coetzee, T. 2014. *Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd on Portion 43, a portion of Portion 16 of the Farm Rooibraai 34 JT - Mpumalanga*. Pretoria
- Coetzee, T. 2014. *Phase 1 Archaeological Impact Assessment for Environmental Assurance (Pty) Ltd on the area demarcated for the development of Argent Siding near Delmas, Mpumalanga*. Pretoria
- Coetzee, T. & George, L. 2013. *Archaeological Impact Assessment for Assmang Limited – Black Rock Mine Operations on Erf 5529, a portion of Erf 01 Kuruman*. Pretoria
- Coetzee, T. & George, L. 2013. *A Phase 1 Archaeological Impact Assessment for the proposed mining on portions 3, 8, 19, and the remaining extent of the Farm Mamatwan 331, Northern Cape Province*. Pretoria
- Coetzee, T. & George, L. 2013. *A Phase 1 Archaeological Impact Assessment for the proposed Yoctolux (Pty) Ltd open cast coal mine on Portion 38 of the farm Elandspruit 291 JS, district Middelburg, Mpumalanga*. Pretoria
- Coetzee, T. 2012. *Phase 1 AIA for the proposed Medium Density Fibre plant on portion 60 of the farm Lothair 124 IT, Mpumalanga*. Pretoria: ENVASS Pty. Ltd.
- Coetzee, T. 2012. *Phase 1 AIA for the proposed mining of sand and clay from the remaining portion of the Farm Papkuilfontein 469 JR, Mpumalanga*. Pretoria: ENVASS Pty. Ltd.
- Coetzee, T. 2012. *Archaeological Scoping Report for the Proposed Prospecting for Iron Ore and Manganese Ore for Amari Manganese (Pty) Ltd on the Farms Constantia 309, Simondium 308 and Portions 1,2, 3 and 8 of the Farm Goold 329 in the Vicinity of District Municipality: Kgalagadi Northern Cape Province, South Africa*. Pretoria: ENVASS Pty. Ltd.
- Coetzee, T. & Schoeman, A. 2011. Mapping Trade in Bokoni. *The Digging Stick* 28 (1): 7-9.
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- Coetzee, T. 2010. *Mapping Bokoni: Applying Geographic Information Systems to the articulation of Mpumalanga stonewalled sites with pre-colonial trade routes*. Paper presented at the SAFA/PAA Congress, Dakar, November 2010.

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### **References:**

- Dr M.H. Schoeman, Lecturer, Honours project and Masters supervisor  
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## Appendix C: NEMA Risk Assessment Methodology

### 1.1 RISK ASSESSMENT

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

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

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

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

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

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

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

2	Site	activity. 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 commen 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 developm

#### 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 i 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 environme function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment whic be disturbed to the extent where it temporarily or permanently ceases
5	Very High	The activity will have a very high impact on the affected environment may be disturbed to the extent where it temporarily or permanently ce

#### 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 manag measures
2	Nearly completely	The impact is reversible without any significant mitigation

	reversible	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 provis 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 pla and there can only be relied on migratory actions or contingency pla to contain the effect (90% to 100% of impact occurring).






### Calculation of Impacts – Significance Rating of Impact

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

<b>Mitigation Efficiency</b>	
<b>Degree to which the impact can be mitigated:</b> <i>The effect of mitigation measures on the impact and its degree of effectiveness:</i>	
<i>Equation 2:</i>	
$Significance\ Rating = Significance \times Mitigation\ Efficiency$	
High	0,2
Medium to High	0,4
Medium	0,6
Low to Medium	0,8
Low	1,0

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

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

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

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



## Appendix D: Monitoring – Heritage

Site type	Impact	Applicable Phase	Action	Frequency	Responsible person
Heritage buildings, structures and cemeteries intersecting the area demarcated for underground mining	Potential damage should subsistence and vibration occur	Operational	Monitoring of buildings, structures and cemeteries	Quarterly, as well as pre- and post-blasting	ECO
Demolished heritage sites intersecting the area demarcated for underground mining	None foreseen	Operational	None required	N/A	N/A
Demolished heritage buildings, structures and intact cemetery intersecting the area demarcated for surface infrastructure	Potential damage to subsurface cultural remains and cemetery	Planning & Construction	Monitoring of subsurface remains; Conservation buffer, management plan and monitoring of cemetery	Subsurface material: Duration of construction Cemetery: Quarterly, as well as pre- and post-blasting	ECO
All surface impacts	Potential damage to subsurface culturally significant material	Construction	Monitor subsurface material	Duration of construction	ECO