

PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT

For

**the Proposed Tiara Mining Project
on the demarcated portions of the
Remaining Extents of the Farms
B.V.B Ranch 776 LT, Josephine
749 LT and the Farm Granville 767
LT, Phalaborwa, Limpopo**

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November 2020

A Phase 1 Archaeological Impact Assessment for the Proposed Tiara Mining Project on the demarcated portions of the Remaining Extents of the Farms B.V.B Ranch 776 LT, Josephine 749 LT and the Farm Granville 767 LT, Phalaborwa, Limpopo

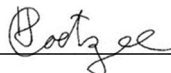
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I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Tiara 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 November 2020

Executive Summary

The author was appointed by Archean Resources (Pty) Ltd to undertake a Phase 1 Archaeological Impact Assessment for the proposed Tiara Mining Project on the listed Farm Portions (**Table 1**) within the Ba-Phalaborwa Local Municipality in the Limpopo Province. The larger project consists of the full extent of the Farm Granville 767 LT, Buffalo Ranch 834 LT and Josephine 749 LT, Portion 12 and the Remaining Extent of the Farm B.V.B. Ranch 776 LT, the Remaining Extents of the Farms Willie 787 LT and Danie 789 LT, as well as Portion 6 and the Remaining Extent of the Farm Farrel 781 LT. The total proposed area is approximately 16 988 ha. For the first phase of the project two areas were identified: One portion on B.V.B. Ranch 776 LT and one portion on the Farm Granville 767 LT. The B.V.B. Ranch 776 LT portion is located roughly 15 km east-northeast of Gravelotte, 44 km west of Phalaborwa and 66 km south of Giyani. The Granville 767 LT portion is located approximately 31 km northeast of Gravelotte, 30 km northwest of Phalaborwa and 61 km south-southeast of Giyani. Three areas demarcated for overburden stockpiles were identified at a later stage. One of the areas is located on the Farm Granville 767 LT, one on Portion 12 of the Farm B.V.B. Ranch 776 LT and one on the Remaining Extent of the Farm Josephine 749 LT. The aim of the study is to determine the scope of archaeological resources that could be impacted on by the proposed Tiara Mining Project.

It should also be noted that the boundaries for the three additional areas demarcated for overburden stockpiles were received close to the final stages of the report and limited time to arrange access. Two of these areas were briefly inspected. The third proposed overburden stockpile area is located within the Selati Nature Reserve and guided access will be required as the Big Five are found within the reserve.

In terms of limitations, the demarcated study areas are all characterised by extremely dense vegetation that severely restricted access, free movement and visibility during the time of surveying. The type of vegetation consisted of thick mopane tree cover, thorn bushes and grass cover. This can be ascribed to the fact that the larger area received approximately 200mm of rain in the weeks preceding the survey.

Two contemporary buildings, an area where a building might have existed, a contemporary building ruin, a cattle drinking trough and a water reservoir were located within the area demarcated for mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 776 LT (Sites TA01, TA02, TF01, TF07). These sites are of recent origin, not of heritage significance, was adequately recorded and require no further action.

Three stone cairns (Sites TF03, TF04 and TF08), also located within the area demarcated for mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 776 LT, indicate the position of mining claims and are therefore not significant from a heritage perspective. The recording done is regarded as sufficient and no further action is required. Not all stone cairns, however, might indicate mining claims as stone cairns often indicate the location of a burial sites. In such cases where the mine manager is uncertain regarding the origin of a stone cairn, it is recommended that such sites be regarded as graves.

Another stone cairn or possible section of a wall located on the same portion, however, might date to the Iron Age and would therefore be significant from a heritage perspective as the site would be protected under the NHRA 25 of 1999 (Site TF06). The site is poorly preserved and dense vegetation hampered inspecting the surrounding area. Recording of the site for this phase of the project is deemed sufficient as the site is located a significant distance from the nearest proposed development and should therefore not be impacted. Should impact be unavoidable, a destruction permit might be required pending site verification after vegetation is cleared.

Sites TA03 and TA04 are located within the boundary of the proposed Opencast Mining Boundary A1 on the Farm Granville 767 LT. These sites consist of natural pans/dams and are therefore not significant from a heritage perspective and no further action is required.

One historical rectangular enclosure exceeding 60 years of age was identified along the western boundary of the area demarcated for mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 776 LT (Site TF01). The site is located a significant distance from the nearest proposed surface development and should therefore not be impacted by the proposed mining development. However, it is recommended that the mine's ECO inspect the site on a quarterly basis. Should any impact be observed, or if impact cannot be avoided, the vegetation must be cleared and the structure adequately recorded by a qualified archaeologist. A destruction permit will have to be obtained from the relevant heritage authority as the site is protected under the NHRA 25 of 1999.

The general area is considered significant from a heritage perspective, but dense vegetation and tree cover significantly hampered free movement and site observation, thereby preventing obtaining a true representation and indication of the cultural resources within the demarcated development areas. Therefore, it is recommended that a qualified archaeologist be present on site when vegetation is cleared in order to prevent the accidental damage and destruction of heritage resources.

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1. Project Background

1.1 Introduction

Archean Resources (Pty) Ltd appointed the author to undertake a Phase 1 Archaeological Impact Assessment for Tiara Mining (Pty) Ltd on portions of the following parent farms: B.V.B. Ranch 776 LT and Granville 767 LT within the Ba-Phalaborwa Local Municipality and the Mopani District Municipality in the Limpopo Province. The affected farm portions are listed in **Table 1**, while **Table 2** lists the farm portions pertaining to the larger long-term mining project. The proposed project consists of two study areas: One portion on B.V.B. Ranch 776 LT and a portion on the Farm Granville 767 LT. The B.V.B. Ranch 776 LT section is located roughly 15 km east-northeast of Gravelotte, 44 km west of Phalaborwa and 66 km south of Giyani. The Granville 767 LT portion is located approximately 31 km northeast of Gravelotte, 30 km northwest of Phalaborwa and 61 km south-southeast of Giyani (**Figure 1**). Three additional demarcated areas, one on the Remaining Extent of the Farm Josephine 749 LT, one on Portion 12 of the Farm B.V.B. Ranch 776 LT and one the Farm Granville 767 LT were received at a later stage and were briefly inspected where access was obtained. 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 on by the proposed Tiara Mining Project, 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 proposed mining activities on the demarcated portions with regard to heritage resources are discussed: A Portion of the Farm Granville 767 LT and a Portion of the Remaining Extent of the Farm B.V.B. Ranch 776 LT. Two of the three additional portions, one on Portion 12 of the Farm B.V.B. Ranch 776 LT and one on the Farm Granville 767 LT, were inspected as well. The development will consist of opencast 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 areas.

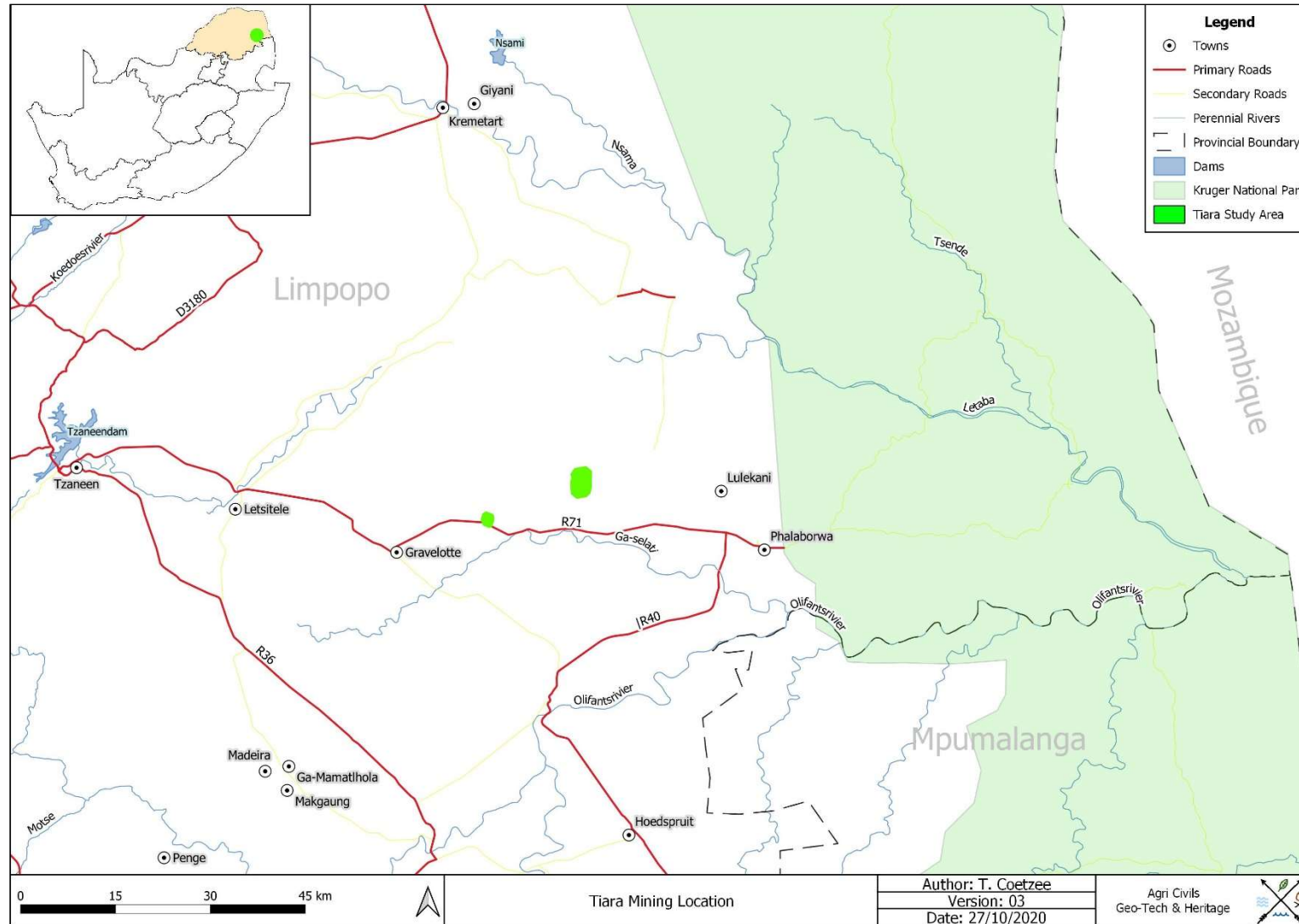


Figure 1: Regional and Provincial location of the study area.

1.2 Legislation

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

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 and AIA processes

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

All Archaeological Impact Assessment reports should include:

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

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

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;
- c. Which sites require permits for mitigation or destruction;

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

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

1.2.2 Legislation regarding archaeology and heritage sites

National Heritage Resource Act No.25 of April 1999

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

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

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

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

and

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

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

and

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

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

On the development of any area the gazette states that:

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

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

- i. *exceeding 5000m² in extent; or*
 - ii. *involving three or more existing erven or subdivisions thereof; or*
 - iii. *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv. *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) *the re-zoning of a site exceeding 10000m² in extent; or*
- (e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”(38. [1] 1999:62-64)*

and

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

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

Human Tissue Act and Ordinance 7 of 1925

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

2. Study Area and Project Description

2.1 Location & Physical Environment

The proposed Tiara Mining Project study area is situated between Phalaborwa and Gravelotte. **Table 1** lists the demarcated project areas and intersecting land parcels for the first phase of the project, while **Table 2** lists the land parcels of the larger project as obtained from the Mine Work Programme.

Table 1: Property name & coordinates

Property	Portion	Map Reference (1:50 000)	Lat (y)	Lon (x)	Parcel extent (ha)	Development Extent (ha)
B.V.B Ranch 776 LT	RE/776	2330 DC	-23.903867	30.743935	1547.8	53
B.V.B Ranch 776 LT	12/776	2330 DD	-23.910641	30.762206	1064.7	100
Granville 767 LT	0	2330 DD	-23.857985	30.877454	3110.3	686
Josephine 749 LT	RE	2330 DC	-23.923015	30.701328	1707.9	163

Table 2: Land parcels part of the larger project.

No	Parent Farm	Farm Portion
1	B.V.B Ranch 776 LT	12/776
2	Josephine 749 LT	Full extent
3	Buffalo Ranch 834 LT	Full extent
4	Danie 789 LT	RE
5	Farrel 781 LT	RE
6	Farrel 781 LT	6/781
7	Willie 787 LT	RE

Gravelotte is located about 15 km west-southwest of the proposed mine infrastructure area on the Remaining Extent of the Farm B.V.B. Ranch 776 LT, while Phalaborwa is located 44 km to the east and Giyani 66 km to the north (**Figures 1 & 2**). The proposed opencast mining block A1 on the Farm Granville 767 LT is located approximately 31 km northeast of Gravelotte, 30 km northwest of Phalaborwa and 61 km south-southeast of Giyani. The study area falls within the Ba-Phalaborwa Local Municipality and the Mopani District Municipality in the Limpopo Province. The R71 primary road runs east-west between Gravelotte and Phalaborwa and borders the proposed mining infrastructure section of the Farm B.V.B. Ranch 776 LT to the south, while the R71 is located roughly 6 km to the south of the proposed opencast mining block A1. The area proposed for overburden stockpile

1 is located just to the west of the proposed Mining Block A1, while the area demarcated for the 2nd overburden stockpile is located just to the east of the proposed mining infrastructure. The 3rd proposed overburden stockpile is located to the southwest of the proposed mining infrastructure and on the southern side of the R71.

In terms of vegetation, the study area falls within the Savanna Biome and Lowveld Bioregion. On a local scale, Granite Lowveld covers the majority of the study, while the south-eastern section of the proposed mining infrastructure and Mining Block A1, as well as the overburden stockpile no. 2 areas fall on Phalaborwa-Timbavati Mopaneveld (Mucina & Rutherford 2006).

The distribution of Granite Lowveld is described by Mucina & Rutherford (2006) as:

“Limpopo and Mpumalanga Provinces, Swaziland and marginally also KwaZulu-Natal: A north-south belt on the plains east of the escarpment from Thohoyandou in the north, interrupted in the Bolobedu area, continued in the Bitavi area, with an eastward extension on the plains around the Murchison Range and southwards to Abel Erasmus Pass, Mica and Hoedspruit areas to the area east of Bushbuckridge. Substantial parts are found in the Kruger National Park spanning areas east of Orpen Camp southwards through Skukuza and Mkuhlu, including undulating terrain west of Skukuza to the basin of the Mbyamiti River. It continues further southward to the Hectorspruit area with a narrow westward extension up the Crocodile River Valley past Malelane, Kaapmuiden and the Kaap River Valley, entering Swaziland between Jeppe's Reef in the west and the Komati River in the east, through to the area between Manzini and Siphofaneni, including the Grand Valley, narrowing irregularly and marginally entering KwaZulu-Natal near Pongola”

Granite Lowveld is considered vulnerable with a conservation target of 19%. About 17% is statutorily conserved in the Kruger National Park and roughly the same amount in private reserves. More than 20% has already been transformed, mainly by cultivation and settlement development. Erosion is considered very low to moderate (Mucina & Rutherford 2006).

Phalaborwa-Timbavati Mopaneveld is associated with the Limpopo and Mpumalanga Provinces and is distributed in a band about 40 km west and east of Phalaborwa. This vegetation unit also occurs in the area south of the Olifants River on the boundary between the Timbavati Game Reserve and the Kruger National Park. Parts of the Umbabat and Klaserie Nature Reserves are included as well. In terms of conservation, Phalaborwa-Timbavati Mopaneveld is considered least threatened with a conservation target of 19%. About 38% is statutorily conserved in the Kruger National Park with roughly the same amount in private nature reserves. About 5% has been transformed mostly by development, human settlement and mining (Mucina & Rutherford 2006).

The average elevation for Granite Lowveld varies between 250 and 700 MASL, while Phalaborwa-Timbavati

Mopaneveld varies between 300 and 600 MASL (Mucina & Rutherfords 2006). The elevation for the proposed mining infrastructure area on the Farm B.V.B Ranch 776 LT is 520 MASL and slopes from the more elevated south-eastern section towards the lower north-western area. The elevation of the demarcated portions on the Farm Granville 767 LT varies between 450 and 470 MASL and slopes from the more elevated northern section towards the lower southern section. The elevation of the proposed overburden stockpile area on portion 12 of the Farm B.V.B. Ranch 776 LT slopes from the more elevated western side at 530 MASL to the lower eastern border at 480 MASL, while the proposed stockpile no. 3 area on the Remaining Extent of the Farm Josephine 749 LT slopes from an elevation of 530 MASL in the southwest to about 490 MASL in the northeast.

The study area falls within the summer rainfall region and the average annual rainfall is roughly 543 mm per year. The average maximum temperature for the study area is recorded during January when an average of 26.1 °C is reached. The average minimum temperature is recorded during June when an average of 17 °C is reached (Climate-data.org 27/10/2020).

The majority of the study area falls within the B72J Quaternary Catchment of the Ga-Selati River Catchment, while a small section of the southern portion of the proposed mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 767 LT, as well as the area demarcated for overburden stockpile no. 2 fall within B72K of the Molatle River Catchment. The closest perennial river to the study area is the Ga-Selati River that flows 3 km to the south of the proposed area on the Farm B.V.B. Ranch 776 LT and 6 km south of the Granville 767 LT portion. A non-perennial stream is located along the western border of the B.V.B. Ranch 776 LT section, as well as on the eastern and western side of the Granville 767 LT portion. Several non-perennial streams are also intersecting the overburden stockpile no. 2 area.

There appears to be no primary utilisation for the demarcated mine infrastructure and overburden stockpile no. 2 areas as these areas are to some extent associated with mining activities that took place during the 1970's. The demarcated sections on the Farm Granville are associated with cattle grazing, mining activity and local tree logging. The area associated with overburden stockpile no.3 is located within the Selati Nature Reserve.

Access to the study areas (**Figures 1 & 2**) is mostly via tertiary and jeep tracks and farm roads turning from the R71 primary road.

Historical topographical maps (**Appendix A**) show that several huts and old mines are located in the general area, the oldest of which are likely to be M.M.E. Mine on the northern side of the R71. According to Mr Van Der Westhuizen, this mine dates to the late 1800's (Wessie van der Westhuizen, pers comm. 2020). Some open workings are also indicated on Beryl Hill directly east of the proposed mining infrastructure area and a few huts directly to the south. The only buildings within the demarcated study areas, however, appear on the 1974 topographical map.

2.2 Project description

The proposed Tiara Granville Emerald and Quartz Mine proposes to mine all emerald (gemstone- Gem), except diamonds (GS), Quartz (gemstones-GQ), Nickel ore (Ni), Antimony ore (SB), Gold ore (Au), Molybdenum ore (Mo), Silicon ore (Si), Beryl (GB), Beryllium ore (Be), Chalcedony (GCh), Chrysoberyl (GCb), Citrine (GCi), Corundum (GCm), Epidole (GEp), Feldspar (GFs), Garnet (GGa), Jade (GJd), Zircon (GZr), Tourmaline (GTm), Jasper (GJ), Platinum Group Metals (PGMs), Cobalt (Co), Topaz (GT), Copper ore (Cu), Rose Quartz (GRq), Ruby (GRb), and Sapphire (GSa) on the demarcated portions as indicated on **Figure 2**. It should be noted, however, that the entire project includes a significantly larger study area (**Table 2 & Figure 3**) with mining operations planned until 2051, but for the first phase the focus will only be on the demarcated portions as indicated by **Figure 2**.

The main reason for this particular Mining Right application is for the supply of quartz (gemstones) to various markets including the electronics and semiconductors industry, solar, building and construction industry, optical fibre and telecommunication, automotive industry and other end-user industries. The main products that are envisaged to be sold are silicon metal, quartz crystal, high purity quartz (quartz surface and tiles, fused quartz crucible and quartz glass). Roughly 60% of the products will be distributed within the Middle-East and Africa (South Africa and Saudi Arabia) while the remaining 40% is destined for the export market (South America- Brazil and Argentina; Europe-Germany, United Kingdom, Italy, France, and Russia; North-America- United States of America, Canada, Mexico and lastly Asia Pacific- China, India, Japan and South Korea).

The proposed mining will be based on the following principles:

- Mining will take place by opencast drilling, blasting, truck and shovel bench mining;
- Bench sets will be mined at approximately 300 m in length, with a width of 200 m and each cut will have a depth of 70 m;
- It is estimated that a mine cut measuring 40m x 40 m x 6m along a bench set will be mined in less than a month;
- Annual production will be about 428 400 tonnes of RoM material;
- Mining will take place to a maximum depth of 70 m;
- Overburden stripping will be required. Only 50-100 mm of topsoil might be removed for each box-cut;
- Topsoil will be stockpiled for future rehabilitation purposes;
- The processed material will be stockpiled in the product stockpile areas located close to the mine office complex.

The proposed Tiara Granville Quartz Mine Life of Mine (LoM) is estimated at 30 years ending in year 2051. Construction is expected to commence in the first quarter (Q1) of 2021, whilst the operational phase (production) is scheduled for the second quarter (Q2) of 2021. Mining will commence in the north-eastern parts of the project area (on the Granville 767 LT, BVB Ranch 776 LT and Buffalo Ranch 834 LT) moving towards the south-westerly

direction into the farm Farrel 781 LT, Josephine 749 LT, Willie 787 LT as well as Danie 789 LT.

Table 3: Proposed surface development.

Development	Portion	Farm	Approximate surface impact (ha)	Lat	Lon
Mining Block A1	0	Granville 767 LT	582	-26.118961	29.647206
Mine Infrastructure	RE	B.V.B. Ranch 776 LT	53	-26.152162	29.658789
Overburden Stockpile 1	0	Granville 767 LT	104	-26.155843	29.673130
Overburden Stockpile 2	12	B.V.B. Ranch 776 LT	100	-26.154878	29.687603
Overburden Stockpile 3	RE	Josephine 749 LT	163	-26.142753	29.662940

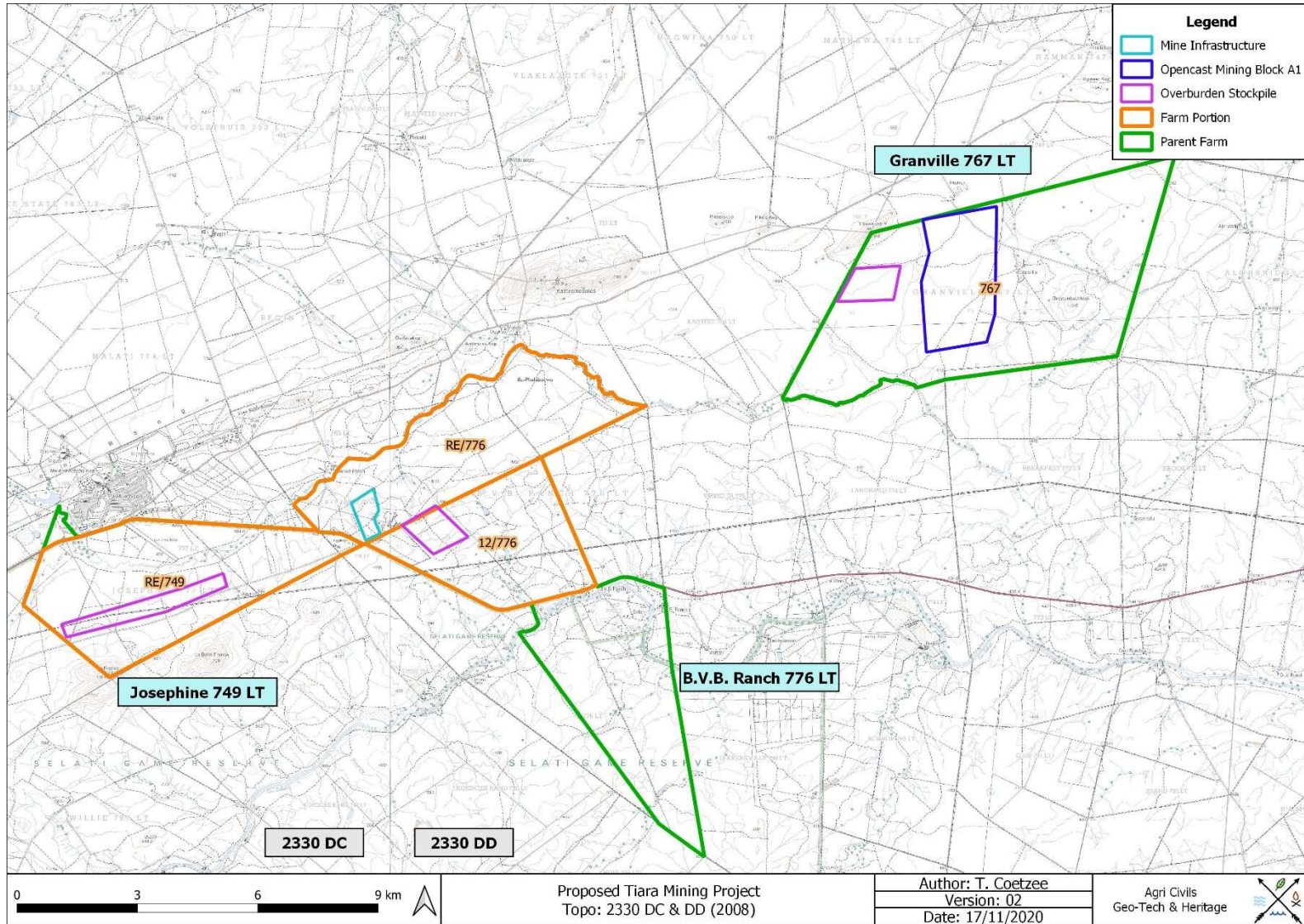


Figure 2: Segment of SA 1: 50 000 2330 DC & DD indicating the study area.

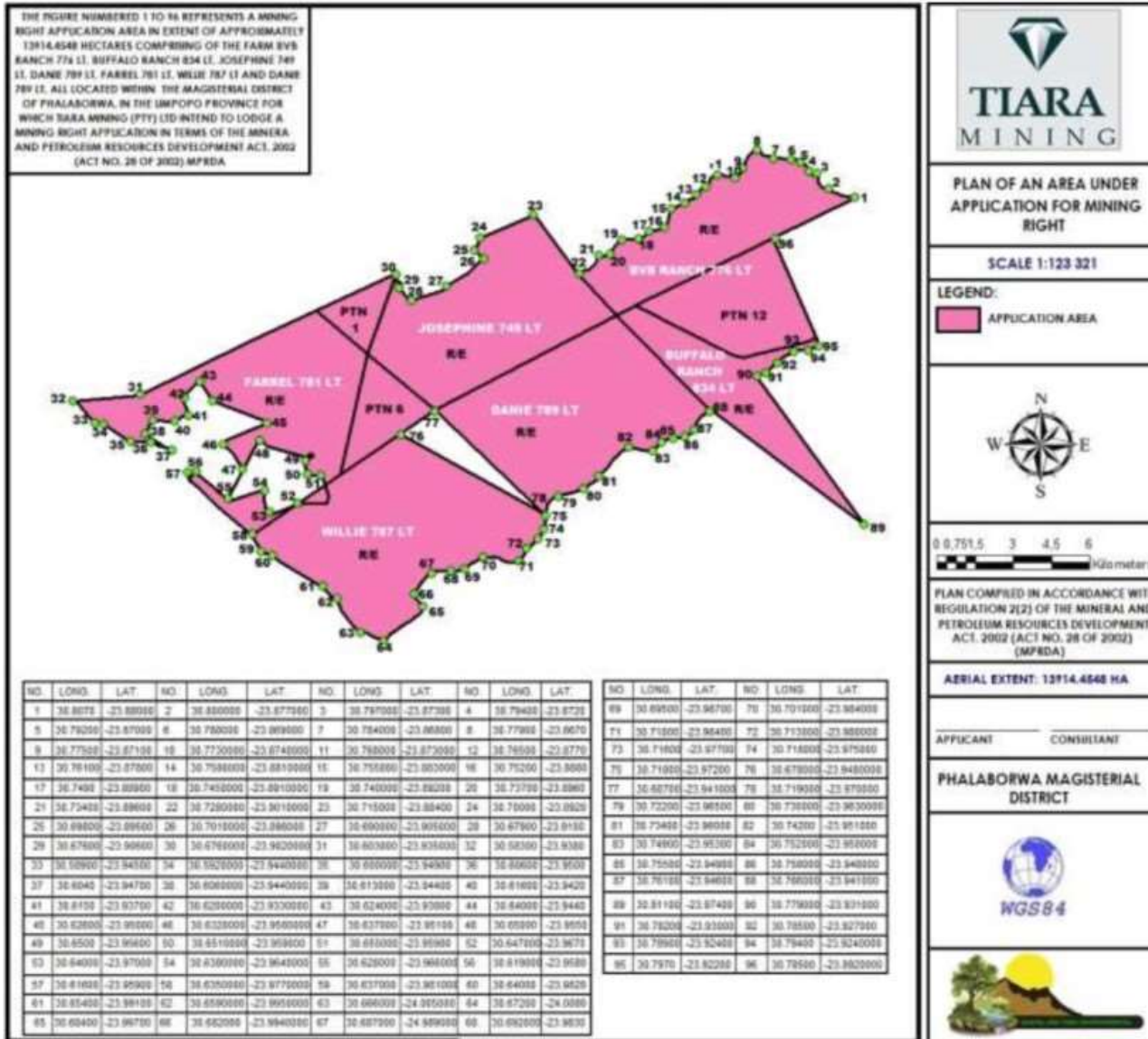


Figure 3: Regulation 2(2) plan of the greater study area (Mine Work Programme 2020).

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 artefacts started appearing about 250 000 years ago and replaced the larger Early Stone Age bifaces, handaxes and cleavers with smaller flake industries consisting of scrapers, points and blades. These artefacts roughly fall in the 40-100 mm size range and were, in some cases, attached to handles, indicating a significant technical advance. The first *Homo sapiens* species also emerged during this period. Associated sites are Klasies River Mouth, Blombos Cave and Border Cave (Deacon & Deacon 1999).

Although the transition from the Middle Stone Age to the Later Stone Age did not occur simultaneously across the whole of southern Africa, the Later Stone Age ranges from about 20 000 to 2000 years ago. Stone tools from this period are generally smaller, but were used to do the same job as those from previous periods; only in a different, more efficient way. The Later Stone Age is associated with: rock art, smaller stone tools (microliths), bows and arrows, bored stones, grooved stones, polished bone tools, earthenware pottery and beads. Examples of Later Stone Age sites are Nelson Bay Cave, Rose Cottage Cave and Boomplaas Cave (Deacon & Deacon 1999).

3.2 The Iron Age & Historical Period

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

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

The Late Iron Age 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 area between Gravelotte and Phalaborwa is characterised by numerous settlements associated with metal working as the general area is rich in iron and copper ores. The past 1200 years saw the discontinuous working of these copper ores by a succession of people representing different archaeological complexes. The metal production sites mostly date to the Late Iron Age and excavations indicate that animal husbandry was not of primary importance. Since the soils and climate of the area are not particularly suitable for herding and agriculture, the communities predominantly focussed on metal production. The subsequent production of metal objects, such as hoes, were used as replacement for cattle in bride wealth (Plug & Pistorius 1999).

Historically known groups of the areas include Makusane and Maseke-Malatji, the Majaji-Malatji, and the Bashai. Iron production was dominant in the influence spheres of the Makusane, Majaji-Malatji and the Bashai, while copper production was dominant in the influence sphere of the Maseke-Malatji. Worthy to note is that geological reports first made the earliest mention of archaeological remains at Phalaborwa and referred to ancient mining activities on Loole Hill and the Old Guide Mine. Mention is made of iron and copper smelting at Serotwe Hill in Phalaborwa, while valuable ethnographic studies were done among the Baphalaborwa (Bamatlatji) people who are associated with the metal working remains at Phalaborwa (Plug & Pistorius 1999).

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.

3.2.3 Phalaborwa & Gravelotte general history

According to Bulpin (1986: 675) Karanga metal workers from Zimbabwe ventured south, but after finding themselves in a fever area, they retraced their steps and settled to the north. Accordingly, they named the area Phalaborwa (better than the south). At the beginning of the 20th Century, European miners re-discovered the rich metal deposits in the area and people such as William Valentine, Tucker, Cleveland and Scannell started mining copper in the area. In 1935 the Merensky Trust amalgamated Vermiculite (Pty) Ltd and the Phalaborwa Phosphate Co and in 1938 the Transvaal Ore Company commenced mining vermiculite. The government financed Foskor through the Industrial Development Corporation for the purpose of making the country self-sufficient in phosphate concentrate used in agricultural fertilizers.

Gravelotte was named after the battle fought on 18 August 1970 in the Franco-German War and was established as a railway and trading centre for mining activity in the Murchison Range. Gold, cinnabar, mica, feldspar, silica and emeralds are produced in the vicinity and Alpha shaft of the Consolidated Murchison Mine, the largest and richest antimony mine at that stage, was the deepest sunk mine for the recovery of a base metal (Bulpin 1986:674)

4. Methodology

Archaeological reconnaissance of the study area was conducted during November 2020 through a combination of unsystematic vehicular and pedestrian surveys of the proposed surface infrastructure areas. Two initial areas demarcated for surface development were identified, with an additional three areas were later added (**Figure 4**). General site conditions were recorded via photographic record (**Figures 5 – 15**). Also, the project area was inspected beforehand on Google Earth, historical aerial imagery and topographical maps in order to identify possible heritage remains (**Appendix A**). Twelve sites (**Table 4**) were identified during the study through a combination of inspecting historical topographical maps, aerial images, surveying and through personal communication with the manager at Tiara Mining. Four sites were pre-identified, visited and recorded (TA01 –

TA04), while an additional eight sites (TF01 – TF08) were identified and recorded during the survey (**Tables 5 – 7 & Figure 4**). It should be noted that the prefixes ‘2330DC’ and ‘2330DD’ are not used when referring to the official site names due to the length of the name, but are recorded as such in **Table 4**. The historical topographical datasets dating to 1947, 1956, 1960, 1974, 1989 and 2002, as well as the historical aerial photographs dating to 1954, 1965 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 total area inspected was roughly 1002 ha. Dense vegetation significantly hampered free movement and visibility, resulting in mainly inspections along roads. Pedestrian surveys were limited to areas where clearings were observed (further discussed in the ‘limitations’ section).

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 during the site visit, as well as by plotting the boundaries from aerial imagery and topographical maps.

Table 4: Site coordinates & description.

Abbreviated name	Site / Survey Point Name	Longitude	Latitude	Description	Current Status	Identification Source
TA01	2330DC-TA01	30.745321	-23.910242	Building	Unknown	Topo 1974
TA02	2330DC-TA02	30.745805	-23.910174	Building	Intact	Topo 1974
TA03	2330DD-TA03	30.877649	-23.862744	Natural	N/A	Aerial
TA04	2330DD-TA04	30.880031	-23.859627	Natural	N/A	Aerial
TF01	2330DC-TF01	30.743306	-23.907301	Building	Ruin	Survey
TF02	2330DC-TF02	30.74644	-23.905505	Reservoir	Intact	Survey
TF03	2330DC-TF03	30.746818	-23.903102	Stone Cairn	Intact	Survey
TF04	2330DC-TF04	30.744627	-23.901703	Stone Cairn	Intact	Survey
TF05	2330DC-TF05	30.746189	-23.899721	Reservoir	Intact	Survey
TF06	2330DC-TF06	30.744206	-23.908282	Stone Cairn	Intact	Survey
TF07	2330DC-TF07	30.745198	-23.908446	Building	Ruin	Survey
TF08	2330DC-TF08	30.746715	-23.909845	Stone Cairn	Intact	Survey

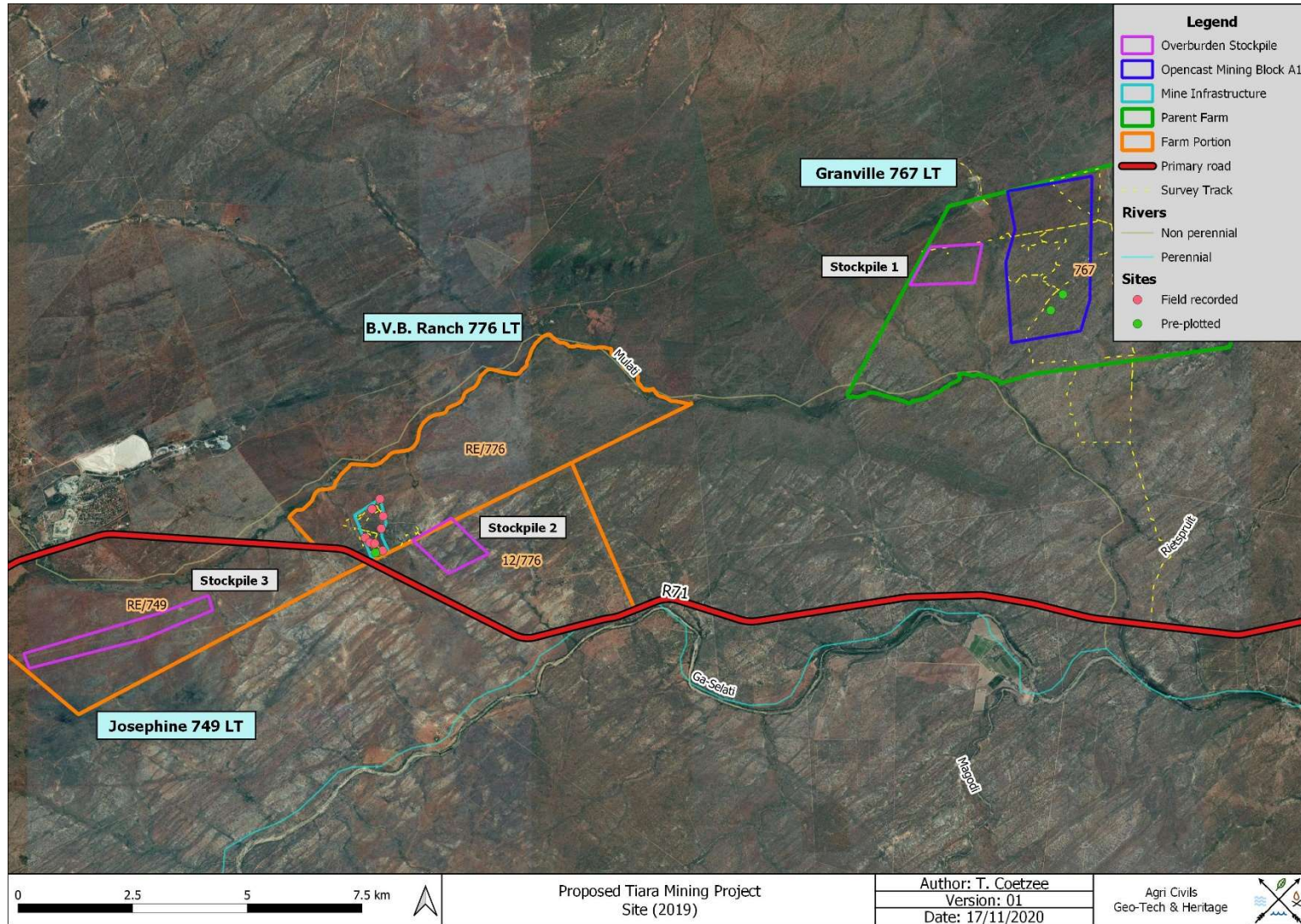


Figure 4: Study area with pre-plotted and field-recorded sites on a 2019 aerial backdrop.



Figure 5: Cattle track – north-eastern corner of proposed mining infrastructure area.



Figure 6: Dense vegetation – northern section of proposed mining infrastructure area.



Figure 7: Access road – eastern border of proposed mining infrastructure area.



Figure 8: Access road & dense vegetation – centre of proposed mining infrastructure area.



Figure 9: Dense vegetation – southern section of proposed mining infrastructure area.



Figure 10: Dense vegetation – southern section of Opencast Mining Block A1.



Figure 11: Dense vegetation – western section of Opencast Mining Block A1.



Figure 12: Dense vegetation – eastern section of Opencast Mining Block A1.



Figure 13: Dense vegetation – northern section of Opencast Mining Block A1.



Figure 14: General environment associated with Overburden Stockpile 1.



Figure 15: General environment associated with Overburden Stockpile 2.

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 was paid to disturbances; both man-made such as roads and clearings, and those made by natural agents such as burrowing animals and erosion. Locations of archaeological material remains were recorded by means of a Garmin Oregon 750 GPS and photographed these sites as well as general conditions on the terrain 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 managers proved useful in locating potential heritage sites:

- Mr Wessie vd Westhuizen (B.V.B. Rach & Granville sections) – Manager at Tiara Mining
- Mr Bryan Havemann (Josephine section) – General Manager at Selati Game Reserve.

4.1.1 Previous Heritage Studies

Mahale Quartzite Mine, Phalaborwa

A phase 1 HIA was done for the Mahale Quartzite Mine located on portions of the farms Mahale 718 LT, Silwana's Location 719 LT & Wildebeest 745 LT near Phalaborwa. The study area for the Mahale Quartzite Mine is located about 12 km northeast of the proposed Tiara Mining Project study area. The HIA recorded ceremonial remains on a hilltop within the study area and a Phase 2 assessment was recommended (Roodt 2008).

400kV Powerline from Foskor Substation to Spencer Substation

The Phase 1 AIA for the construction of a 400kV powerline from Foskor Substation to Spencer Substation was done by Vhubvo Archaeo-Heritage Consultant cc (Magoma & Muroyi 2018). The proposed powerline spans a distance of 110 km just south of Phalaborwa to approximately 40 km southwest of Giyani. The study recorded two cemeteries, an abandoned settlement and the Muti wa Vatsonga Open Museum, but notes the possibility of Stone Age/Iron Age sites in the vicinity. The closest section of the powerline project to the proposed Tiara Mining Project is approximately 15 km to the southwest of the demarcated portion on the Farm B.V.B. Ranch 776 LT.

BaPhalaborwa Waste Disposal Landfill Site

Roodt (2002) conducted an Archaeological Impact Assessment for the BaPhalaborwa Waste Disposal Landfill Site. The study recorded an Iron Age site at the base of a hill that consisted of middens and terraces. The middens were rich pottery fragments, bone and metal slag. Other material culture found include an ostrich eggshell bead and tuyere pieces. According to Roodt (2002), the site is typical of a pre-colonial BaPhalaborwa settlement but also notes that some of the pottery fragments might date to the 10th – 12th Century and belong to the Kgopolwe cultural tradition. It is also noted that the possibility exists that the hilltop might have been used in rainmaking rituals. The BaPhalaborwa Waste Disposal Landfill Site is located approximately 21 km southeast of the proposed Granville 767 LT area.

4.2 Limitations

The demarcated study areas are all characterised by extremely dense vegetation that severely restricted access, free movement and visibility during the time of surveying (November 2020). The type of vegetation consisted of thick mopane tree cover, thorn bushes and grass cover (**Figures 16 – 19**). This can be ascribed to the fact that the larger area received approximately 200mm of rain in the weeks preceding the survey. Several jeep tracks exist within the areas demarcated for the construction of mine infrastructure and Opencast Mining Block A1. These roads were followed as far as possible and clearings in the dense vegetation were inspected via a pedestrian survey where possible. In a few instances, cattle tracks were followed as well. Few or no roads were observed at the proposed overburden stockpile no. 1 and 2 areas. The proposed overburden stockpile no. 3 area is located within the Selati Nature Reserve. Personal Communication with the General Manager, Mr Havemann, revealed that access to the area is strictly controlled due to the fact that the Big Five are found within the nature

reserve. It would therefore be compulsory to be accompanied by a guide. Given the late acquisition of the overburden stockpile boundaries, access could not be arranged in time.



Figure 16: Dense vegetation associated with the area demarcated for mining infrastructure.



Figure 17: Dense vegetation associated with demarcated Mining Block A1.



Figure 18: Dense vegetation – proposed Overburden Stockpile 1.



Figure 19: Dense vegetation – proposed Overburden Stockpile 2.

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 are likely to occur in the area. These artefacts are often associated with rocky outcrops or water sources. **Figures 20 – 22** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

Archaeological studies done on 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 the study area.



Figure 20: ESA artefacts from Sterkfontein (Volman 1984).

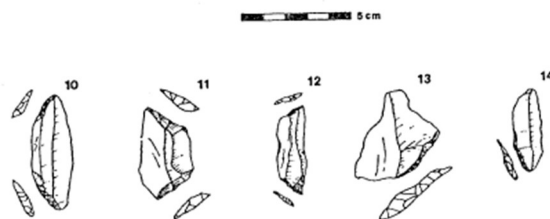


Figure 21: MSA artefacts from Howiesons Poort (Volman 1984).



Figure 22: LSA scrapers (Klein 1984).

5.2 Iron Age Farmer Remains

One site that might possibly date to the Iron Age was observed (TF06). The site, located within the proposed boundary of the demarcated mine infrastructure area on the Remaining Extent of the Farm B.V.B. Ranch 776 LT and approximately 60 m from the closest infrastructure in the south-western section, consists of what appears to be a stone cairn, but might be a short section of stone-walling as well (Table 5). Although several other stone cairns were observed, this particular stone cairn differs in style as it is partially located below the surface and are associated with few loose stones. No material culture were observed in the direct vicinity of the site.

The heritage study done for the Mahale Quartzite Mine recorded ceremonial remains on a hilltop (Roodt 2008), while the HIA done for the BaPhalaborwa Waste Disposal Landfill recorded middens rich in pottery fragments, bone and metal slag. Tuyere pieces and an eggshell bead were found as well, and according to Roodt (2002), the site is typical of a pre-colonial BaPhalaborwa settlement. Roodt (2002) also notes that some of the pottery fragments might date to the 10th – 12th Century and might belong to the Kgopolwe cultural tradition. As in the case of the Mahale Quartzite Mine, the hilltop might have been associated with ceremonial practices.

According to Mr Havemann, several objects dating to the Iron Age have in the past been discovered within the Selati Nature Reserve, located directly southwest of the proposed mining infrastructure area and where the 3rd overburden stockpile is proposed. Accordingly, material culture include complete pots, pottery fragments and iron objects (Bryan Havemann, pers comm. 2020).

Table 5: Iron Age sites.

Name	Type	Source	Year	Status	Age	Estimated extent (m ²)	Parcel
TF06	Stone cairn	Survey	Unknown	Intact	LIA	3	RE/776



Figure 23: Potential stone cairn/walling.

5.3 Historical

One Historical sites was identified within the boundary of the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 776 LT (**Table 6**). Site TF01 is located next to a road near the western boundary of the demarcated area and approximately 130 m west of the nearest proposed development. The site consists of a rectangular enclosure built using stone and mud and is heavily overgrown (**Figure 24**). The walls are approximately 0.6 m high and occupies about 6 m². One angular opening in the wall suggests a window. In terms of material culture, one lower grinding stone was observed along to the jeep track running next to the enclosure (**Figure 25**). The use of the structure and whether this structure was part of a larger complex is not known. It should also be noted that site TF01 is not visible on historical aerial imagery and is not indicated on historical topographical maps (**Appendix A**).

Table 6: Historical sites.

Name	Type	Source	Year	Status	Age	Estimated extent (m ²)	Parcel
TF01	Building	Survey	Unknown	Ruin	Historical	6	RE/776

Only the study done by Vhubvo Archaeo-Heritage Consultant cc (Magoma & Muroyi 2018) for the 400kV Powerline from Foskor Substation to Spencer Substation mentions an abandoned settlement that might date to historical times.



Figure 24: Rectangular enclosure.



Figure 25: Lower grinding stone associated with TF01.

5.4 Contemporary Remains

Table 7 lists the four pre-plotted sites, as well as six sites identified during the survey (**Figures 26 – 35**).

Sites TA01 & TA02 were identified on the 1974/1989 topographical map as buildings (**Appendix A: Figure 46**) and were visited during the survey. No evidence of site TA01, however, could be located, but a possibility exists that the associated buildings are located closer to site TA02, where two buildings constructed from bricks and cement were observed. As such, site TA02 consists of two small buildings 20 m apart with an approximate extent of 4 m² each. The structures respectively have 1 m and 1.9 m high walls on three sides, one open side and a flat roof (**Figures 26 & 27**). The buildings are located within the demarcated mining infrastructure area on the Remaining Extent of the Farm B.V.B. Ranch 776 LT near the southern boundary and in close proximity of a jeep track. No material culture was observed at the site. According to Mr Van Der Westhuizen, who has been with Tiara Mining on B.V.B. Ranch 776 LT for 18 years, these buildings were built to house explosives during previous mining operations in the 1970's (Wessie van der Westhuizen, pers comm. 2020).

Sites TA03 & TA04, identified on the 1956/1960 topographical map (**Appendix A: Figure 45**), are natural dams/pans of approximately 4000 m² each (**Figures 28 & 29**). These sites are located within the southern half of the area demarcated for the Opencast Mining Block A1 area on the Farm Granville 767 LT.

Sites TF02 and TF05 were identified as cement constructed water reservoirs on the demarcated mine infrastructure area on the Remaining Extent of the Farm B.V.B. Ranch 776 LT. Site TF02 (**Figure 30**) is located near the eastern boundary of the demarcated area and next to a jeep track and measures approximately 80 m², while site TF05 (**Figure 33**) is located in the north-eastern corner and appears to be used as a cattle drinking trough. Site TF05 measures approximately 40 m². Only site TF02 is located within close proximity of the planned development.

Sites TF03, TF04 and TF08 were identified as stone cairns within the boundary of the demarcated mining infrastructure area on the Remaining Extent of the Farm B.V.B. Ranch 776 LT. Site TF03 is located along the eastern boundary of the demarcated area, site TF04 near the northern boundary and site TF08 near the southern boundary. The stone cairn closest to a proposed development boundary is site TF04 and is located 85 m away. Sites TF03 and TF04 (**Figures 31 & 32**) consist of relatively small stone cairns of medium sized stones, while site TF08 (**Figure 35**) is characterised by a slightly elongated stone cairn consisting of small stones oriented in an east-west direction. According to Mr Van Der Westhuizen, the stone cairns associated with the area demarcated for the construction of mining infrastructure indicate the location of mining claims. Accordingly, the elongated stone cairns indicate the direction of the claim (Wessie van der Westhuizen, pers comm. 2020).

Site TF07 (**Figure 34**), a building ruin located next to a jeep track and proposed access road on the southern half of the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B.

Ranch 776 LT, consists of a dugout foundation of approximately 20 m². A pile of bricks with cement are located next to the foundation. According to Mr Van Der Westhuizen, the building was built to house mining machinery during previous mining operations in the 1970's and was subsequently demolished. No other material culture were observed at the site.

Table 7: Contemporary Remains.

Name	Type	Source	Year	Status	Age	Estimated extent (m²)	Land Parcel
TA01	Building	Topo	1974	Unknown	Contemporary	unknown	RE/776
TA02	Building	Topo	1974	Intact	Contemporary	4	RE/776
TA03	Dam/pan	Topo	1960	Intact	N/A	4000	787
TA04	Dam/pan	Topo	1960	Intact	N/A	4000	787
TF02	Reservoir	Survey	Unknown	Intact	Contemporary	80	RE/776
TF03	Stone cairn	Survey	Unknown	Intact	Contemporary	1	RE/776
TF04	Stone cairn	Survey	Unknown	Intact	Contemporary	1	RE/776
TF05	Reservoir	Survey	Unknown	Intact	Contemporary	40	RE/776
TF07	Building	Survey	±1978	Ruin	Contemporary	20	RE/776
TF08	Stone cairn	Survey	Unknown	Intact	Contemporary	2	RE/776



Figure 26: Small explosives building at site TA02.



Figure 27: Larger explosives building at site TA02.



Figure 28: Natural dam/pan at site TA03.



Figure 29: Natural dam/pan at site TA04.



Figure 30: Site TF02 – water reservoir.



Figure 31: Site TF03 – Stone cairn.



Figure 32: Site TF04 – Stone cairn.



Figure 33: Cattle drinking trough at site TF05.



Figure 34: Demolished building at site TF07.



Figure 35: TF08 – Elongated stone cairn.

Heritage studies done in the surrounding area did not record buildings or structures dating to contemporary times
See Magoma & Muroyi (2018); Roodt (2002 & 2008).

5.5 Graves

No graves or burial sites were located within the demarcated study areas. However, due to limited accessibility and visibility, the possibility exists that graves or burial sites might be located within the demarcated study areas.

Only the study for the 400kV Powerline from Foskor Substation to Spencer Substation done by Vhubvo Archaeo-Heritage Consultant cc recorded two cemeteries (Magoma & Muroyi 2018).

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 8: 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 9: Individual site ratings

Site / Survey Point Name	Type	Rating	Field Rating/Grade	Significance	Recommendation
2330DC-TA01	Building-unknown	General Protection C	4 C	Low	No recording necessary
2330DC-TA02	Building-intact	General Protection B	4 B	Medium	Record site
2330DD-TA03	Natural	General Protection C	4 C	Low	No recording necessary
2330DD-TA04	Natural	General Protection C	4 C	Low	No recording necessary
2330DC-TF01	Building-ruin	General Protection B	4 B	Medium	Record site
2330DC-TF02	Reservoir-intact	General Protection B	4 B	Medium	Record site
2330DC-TF03	Stone cairn	General Protection B	4 B	Medium	Record site
2330DC-TF04	Stone cairn	General Protection B	4 B	Medium	Record site
2330DC-TF05	Reservoir-intact	General Protection B	4 B	Medium	Record site
2330DC-TF06	Stone cairn	General Protection B	4 B	Medium	Record site
2330DC-TF07	Building-ruin	General Protection B	4 B	Medium	Record site
2330DC-TF08	Stone cairn	General Protection B	4 B	Medium	Record site

7. Statement of Significance & Recommendations

7.1 Statement of significance

The study area: Demarcated portions of the Remaining Extents of the Farms B.V.B Ranch 776 LT, Josephine 749 LT and the Farm Granville 767 LT, Phalaborwa, Limpopo

Given the significance of the larger cultural landscape, as well as cultural material remains from the Selati Nature Reserve and heritage sites located during previous heritage studies, the demarcated study areas are considered sensitive from a heritage perspective. However, due to extremely dense vegetation cover as a result of recent rainfall, the identification of culturally significant heritage sites was significantly hampered. It is therefore likely that more culturally significant sites are located within the demarcated study areas. The located sites and potentially sensitive areas are indicated on **Figures 36 & 37**.

According to the manager at Tiara Mining, Mr Van Der Westhuizen, the two explosives buildings and the building used to house mining equipment (now a ruin) on the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B Ranch 776 LT date to the 1970's, do not exceed 60 years of age and are therefore not considered significant from a heritage perspective (Sites TA02 & TF07). Also, site TA02 and the area associated with TA01 are located approximately 20 m from the proposed haul road and impact is therefore unlikely. Site TF07, however, is located in close proximity of the proposed haul road, but is not considered significant from a heritage perspective due to its relative recent construction and dilapidated state.

Sites TA03 and TA04 are natural pans/dams on the proposed Opencast Mining Block A1 area on the Farm Granville 767 LT. The sites are not considered significant from a heritage perspective. Due to the presence of water, however, the general surroundings might mean that the areas were more like to be settled during historical times and might therefore be potentially sensitive from a heritage perspective.

Sites TF02 and TF05 are respectively a water reservoir and cattle drinking trough located on the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B Ranch 776 LT. The sites appear to be of recent origin and are not significant from a heritage perspective. Also worthy to note is that only site TF02 is located in close proximity of the planned development.

According to Mr Van Der Westhuizen, the stone cairns identified on the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B Ranch 776 LT relate to mining claims and are not burial sites (Sites TF03, TF04 and TF08). Only stone cairn TF08 is located in close proximity of the proposed development. These sites are therefore not considered significant from a heritage perspective, but might not apply to all stone cairns within the study area.

Site TF06, a potential stone cairn or section of stone-walling located on the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B Ranch 776 LT, might date to the Iron Age, but could not be verified due to dense vegetation cover in the general vicinity. Also, no supportive material culture were observed. Site TF06 is not located within close proximity of the proposed infrastructure and are therefore not likely to be impacted.

Site TF01 consists of a historical building ruin on the area demarcated for the construction of mining infrastructure on the Remaining Extent of the Farm B.V.B Ranch 776 LT and is considered significant from a heritage perspective. Because this structure is likely to exceed 60 years of age, it is protected under the NHRA act 25 of 1999. The closest development is planned approximately 130 m east of the site, therefore no impact is envisaged.

The area demarcated for overburden stockpile no.3 on the Farm Josephine 749 LT is located within the Selati Nature Reserve and could not be accessed. No buildings or infrastructure were observed on historical topographical maps, but the Selati Nature Reserve General Manager, Mr Havemann, did confirm the presence of complete pots, pottery fragments and iron artefacts within the reserve, attesting to cultural significance of the area.

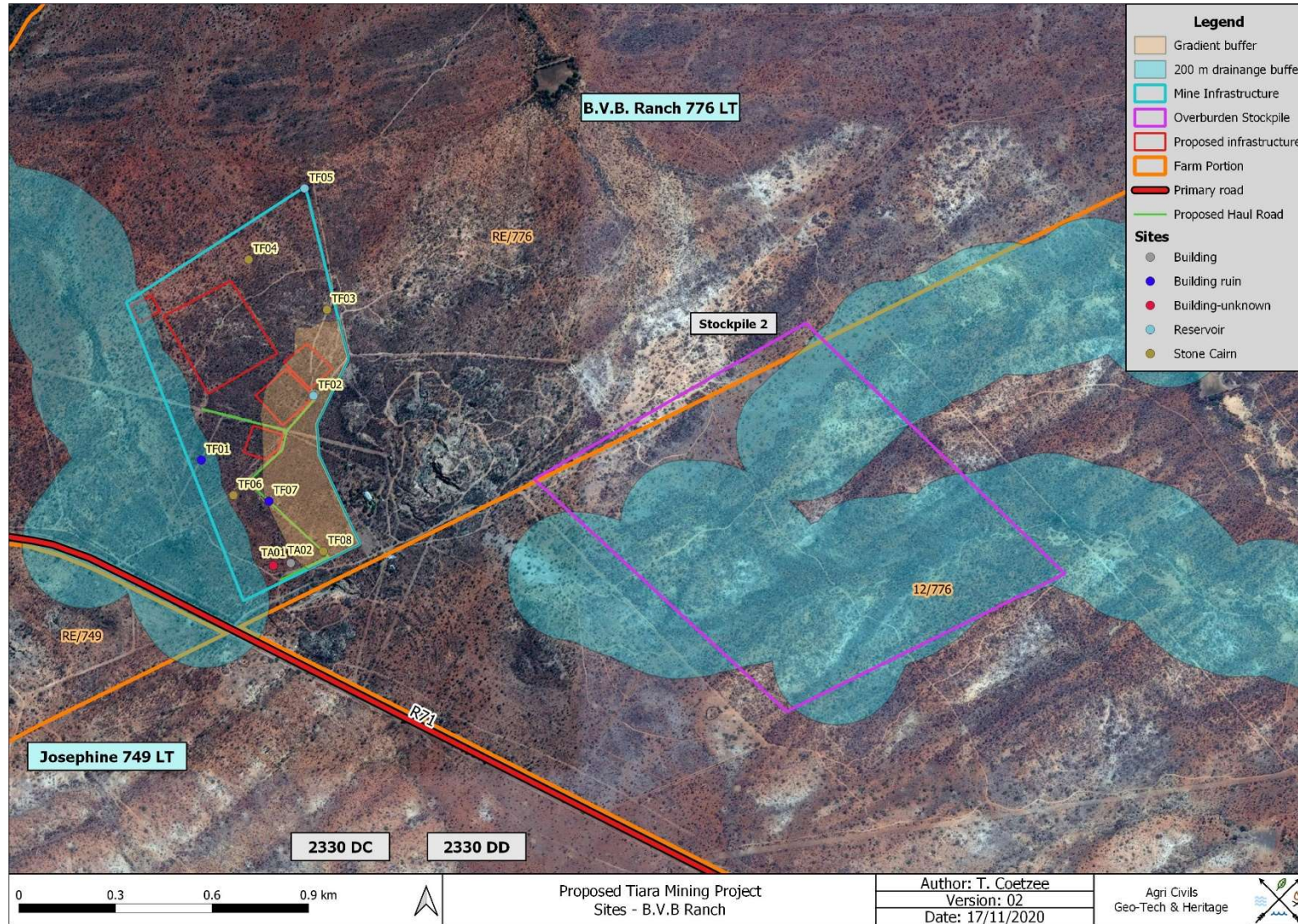


Figure 36: Sites and buffer zones indicated on a 2019 aerial backdrop – B.V.B Ranch section.

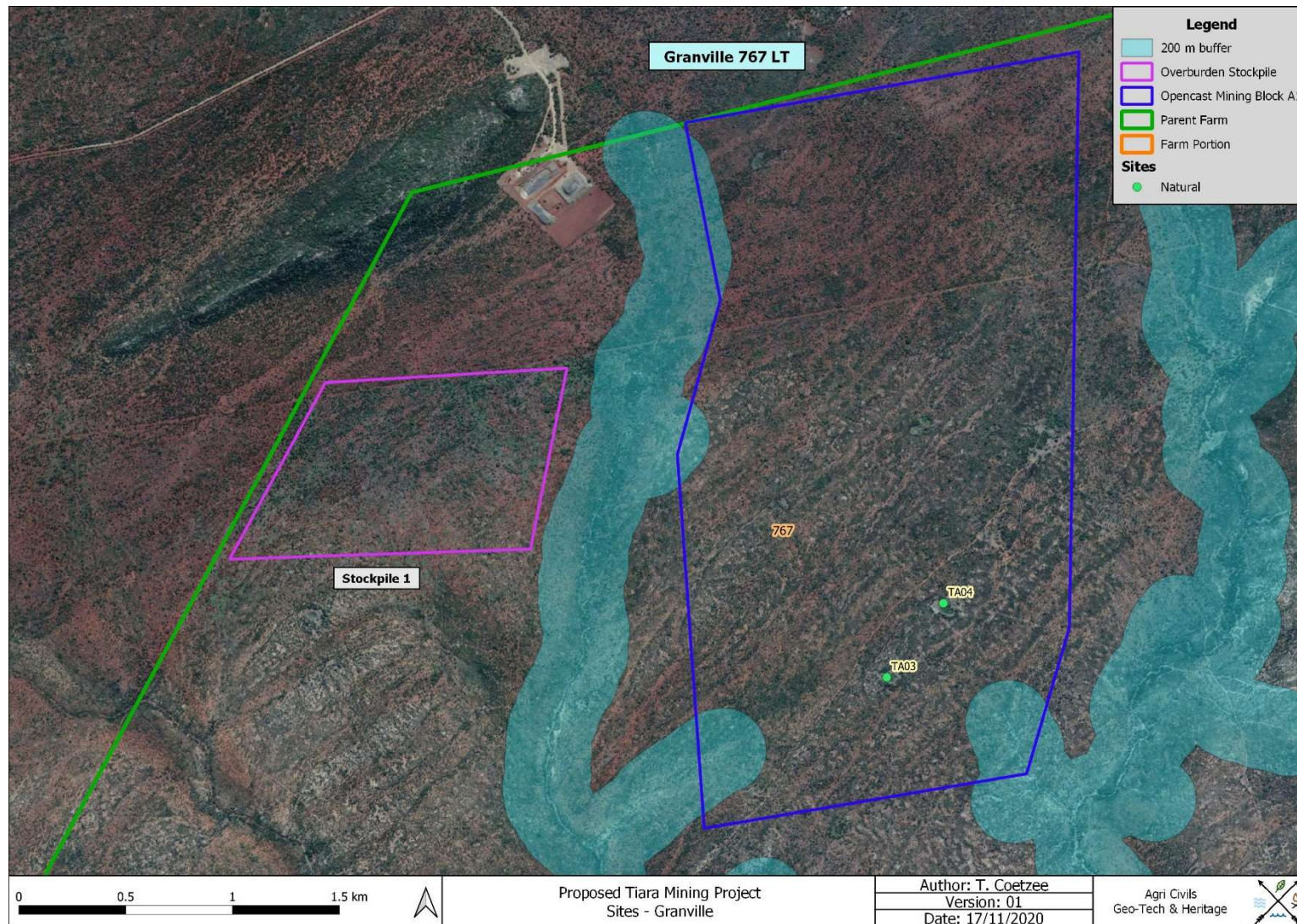


Figure 37: Sites and buffer zones indicated on a 2019 aerial backdrop – Granville section.

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:

Demarcated surface infrastructure areas & conveyor belt

- Sites TA01, TA02 and TF07 are buildings or building remains relating to previous mining operations, are of recent origin and are not regarded as significant from a heritage perspective. The recording done during the Phase 1 AIA is considered sufficient – no further action is required.
- Sites TA03 and TA04 are natural features – no further action is required.
- Site TF02 is a circular water reservoir and site TF05 a cattle water trough. These sites appear to be of recent origin and are not regarded as significant from a heritage perspective. The recording done during the Phase 1 AIA is considered sufficient – no further action is required.
- The historical building, site TF01, is significant from a heritage perspective. The site exceeds 60 years of age and are therefore protected under the NHRA act 25 of 1999. Although impact is not likely on account of the site being located a significant distance from the proposed infrastructure, it is recommended that the mine's ECO inspect the structure on a quarterly basis. Should any impact be observed, or if impact cannot be avoided, the vegetation must be cleared and the structure adequately recorded by a qualified archaeologist. A destruction permit will have to be obtained from the relevant heritage authority as well.
- According to the Tiara Mine manager, Mr Van Der Westhuizen, the stone cairns associated with the area demarcated for the development of mining infrastructure on the Remaining Extent of the Farm B.V.B. Ranch 776 LT are mining claims and not potential graves (Sites TF03, TF04 and TF08). However, it is recommended should the mine manager be uncertain about the origin of a stone cairn, the stone cairn be considered a grave, in which case a 30 m fenced-off conservation buffer with explanatory signage must be erected around the stone cairn. Also, access to the potential graves must not be refused. Alternatively, the potential 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 community leaders. Another possibility would be to make use of Ground Penetrating Radar operated by a suitably qualified professional to determine the presence of human remains at stone cairn localities of which the origin is uncertain.
- Site TF06, a stone cairn or possible section of a stone wall, might date to the Iron Age and would therefore be protected under the NHRA 25 of 1999. Due to the dilapidated state and poor level of preservation, the

extent could not be determined, but the site is located a significant distance from the proposed mining infrastructure and should therefore not be impacted. Should impact be unavoidable, it is recommended that a qualified archaeologist inspect the site after the removal of vegetation to determine the extent of the site. Should the site be verified, a destruction permit from the South African Heritage Resources Agency will be required.

- The general area is considered significant from a heritage perspective, but dense vegetation and tree cover significantly hampered free movement and site observation, thereby preventing obtaining a true representation and indication of the cultural resources within the demarcated development areas. Therefore, it is recommended that a qualified archaeologist be present on site when vegetation is cleared in order to prevent the accidental damage and destruction of heritage resources.
- Also, the area demarcated for overburden stockpile no.3 on the Farm Josephine 749 LT could not be accessed. It is assumed that at the time of reporting, vegetation and tree cover will be as restrictive as in the remaining areas. Therefore, the same recommendation regarding the presence of an on-site archaeologist is recommended once vegetation clearing is started in order to prevent the accidental damage and destruction of heritage resources.

General Recommendations

- The above recommendations are based on the specific project activities, as well as surface boundaries as indicated in this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a Phase 1 AIA on the new areas 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. 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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Human Tissue Act No. 65 of 1983, Government Gazette, Cape Town

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

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

Appendix A: Historical Aerial Photographs and Topographical Maps

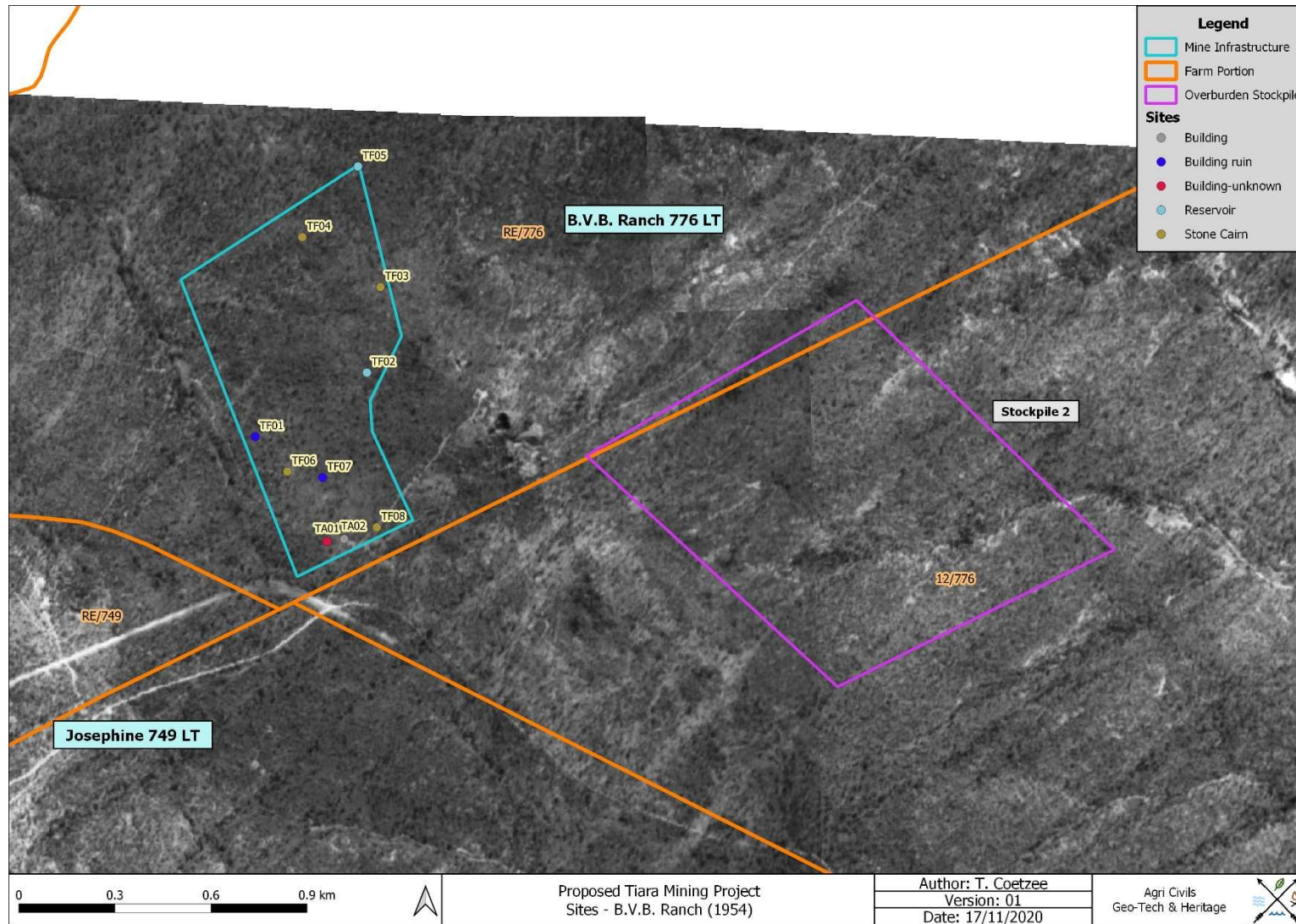


Figure 38: Study area superimposed on a 1954 aerial photograph – B.V.B. Ranch section.

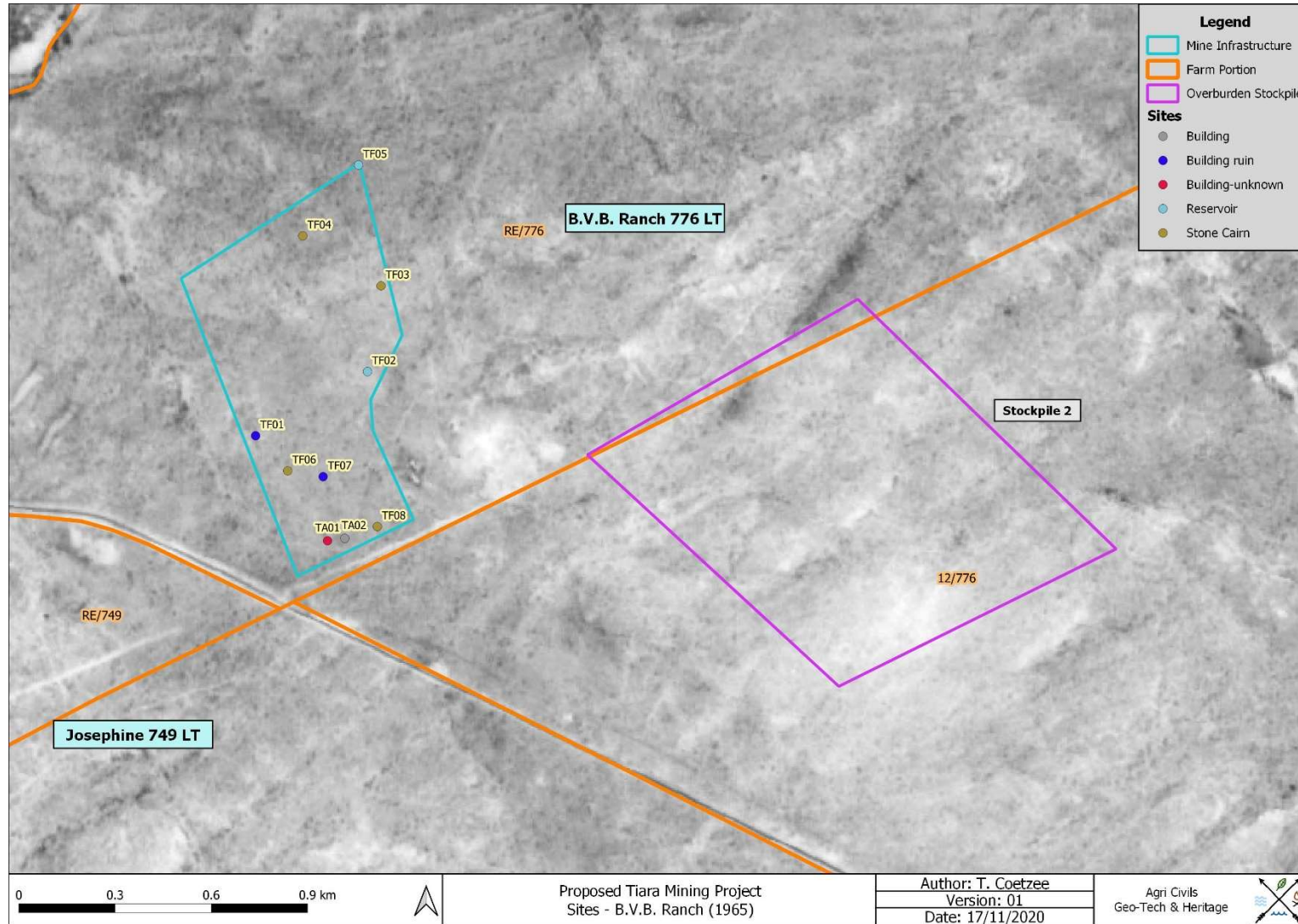


Figure 39: Study area superimposed on a 1965 aerial photograph – B.V.B. Ranch section.

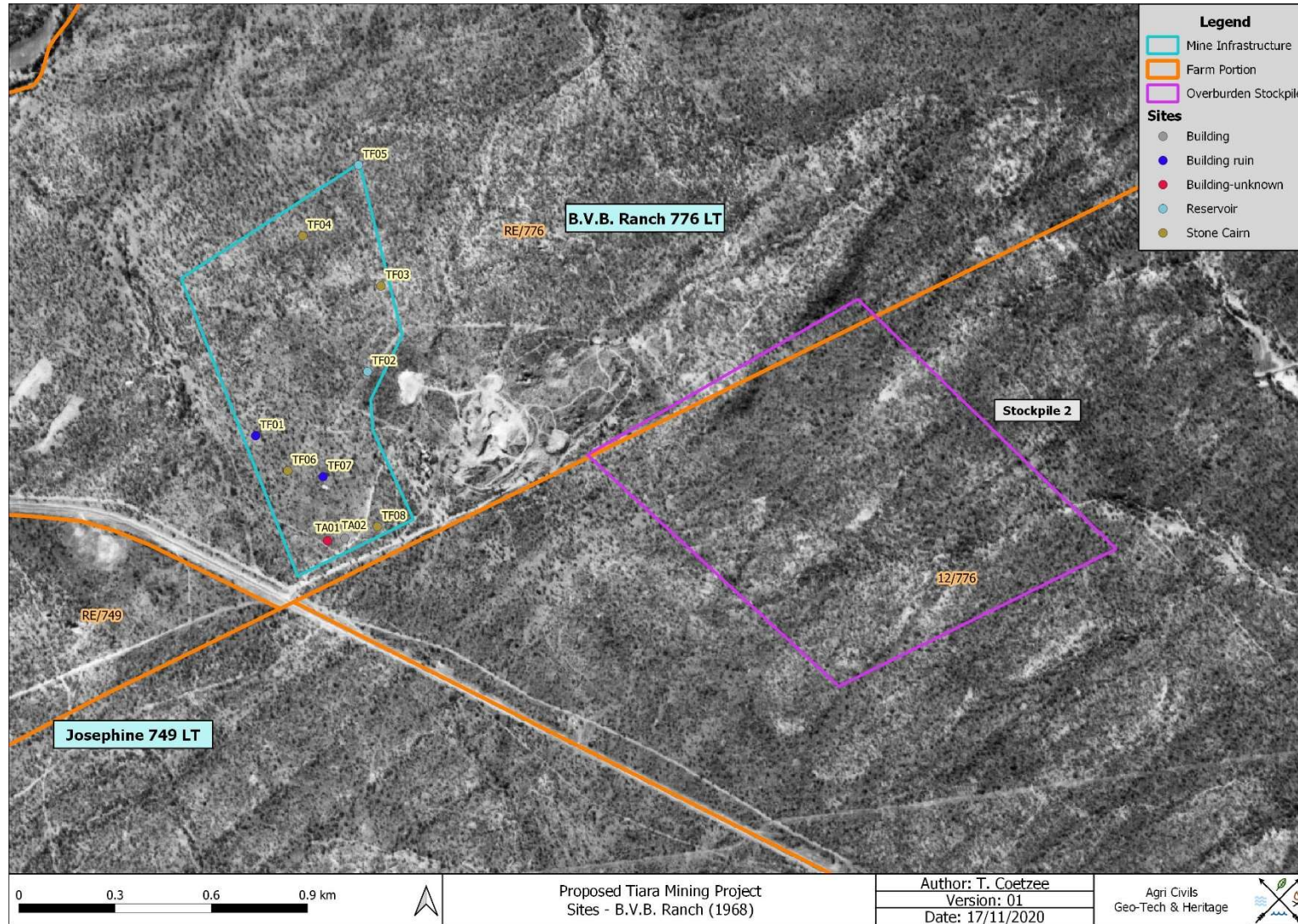


Figure 40: Study area superimposed on a 1968 aerial photograph – B.V.B. Ranch section.

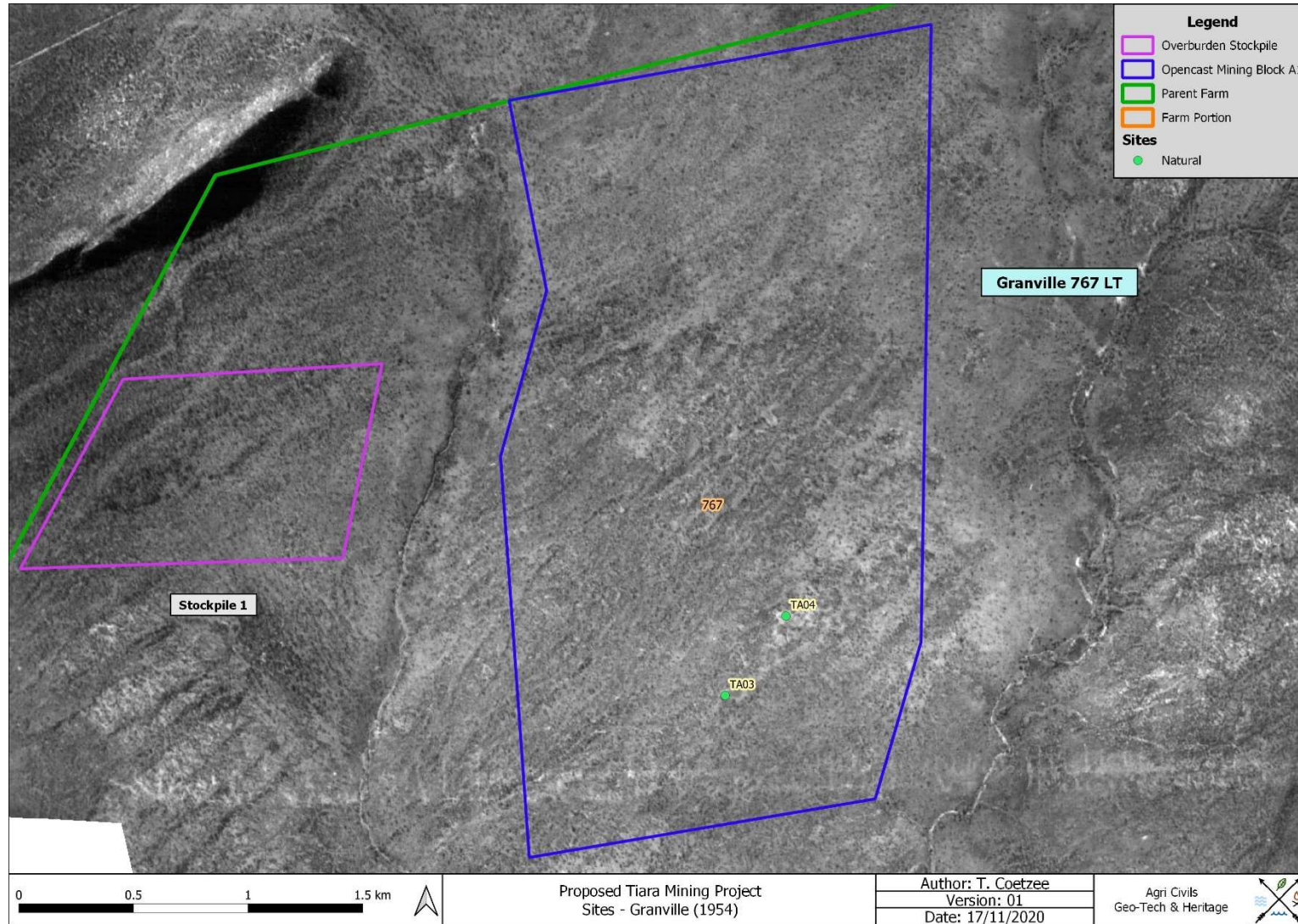


Figure 41: Study area superimposed on a 1954 aerial photograph – Granville section.

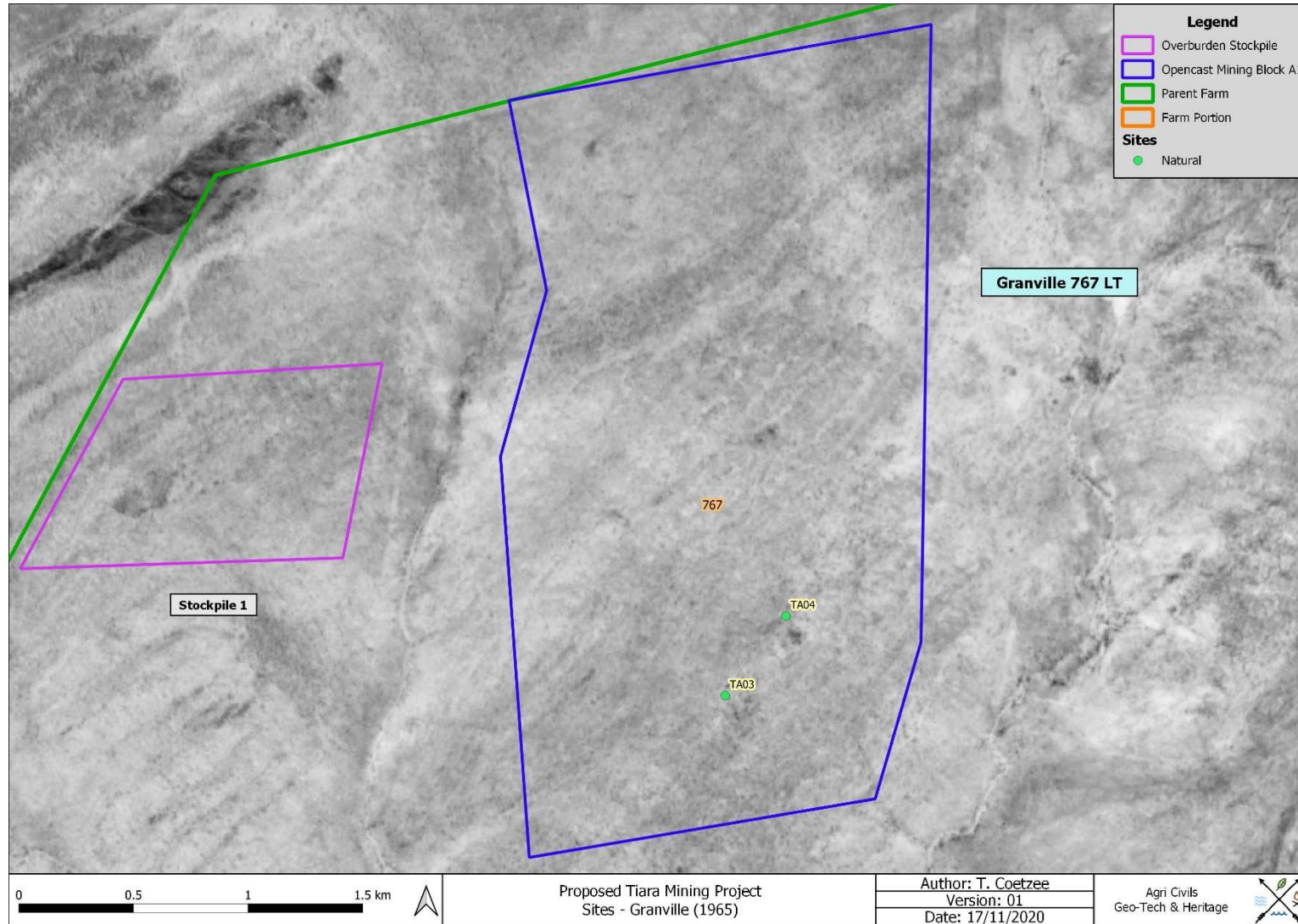


Figure 42: Study area superimposed on a 1965 aerial photograph – Granville section.

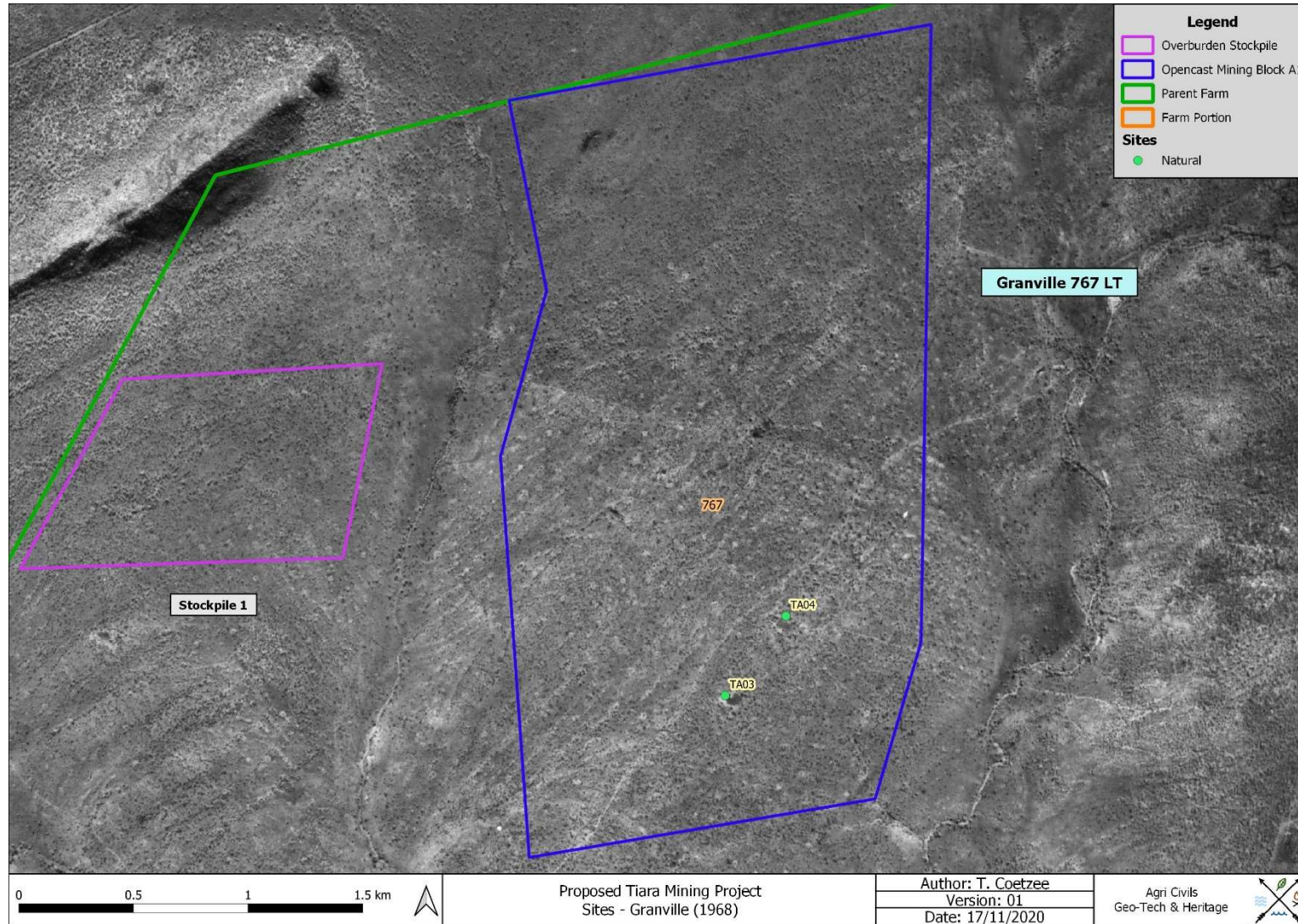


Figure 43: Study area superimposed on a 1968 aerial photograph – Granville section.

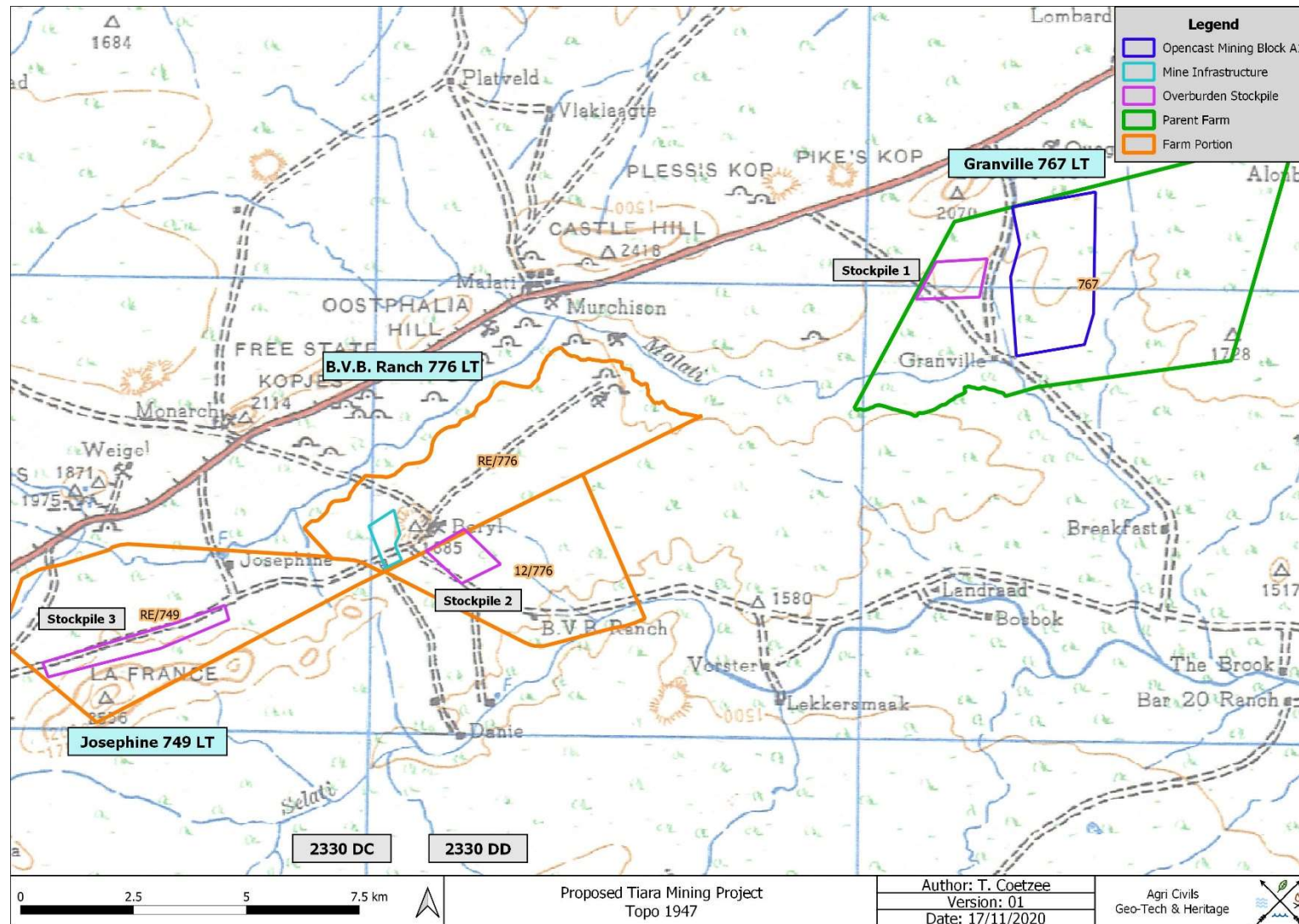


Figure 44: Segment of 1947 SA 1: 250 000 2330 indicating the area demarcated for mining development.

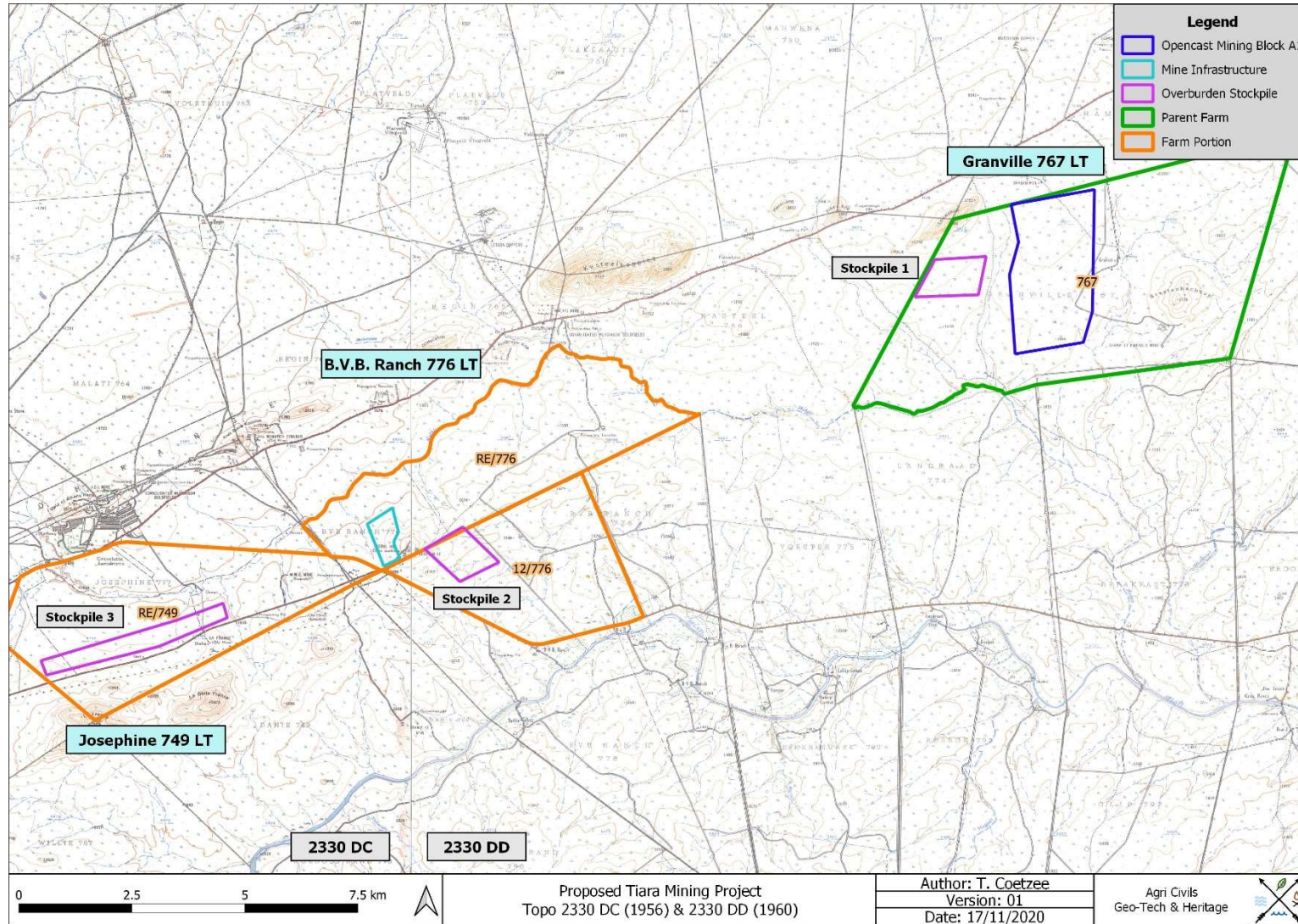


Figure 45: Study area superimposed on a 1956 & 1960 topographical map.

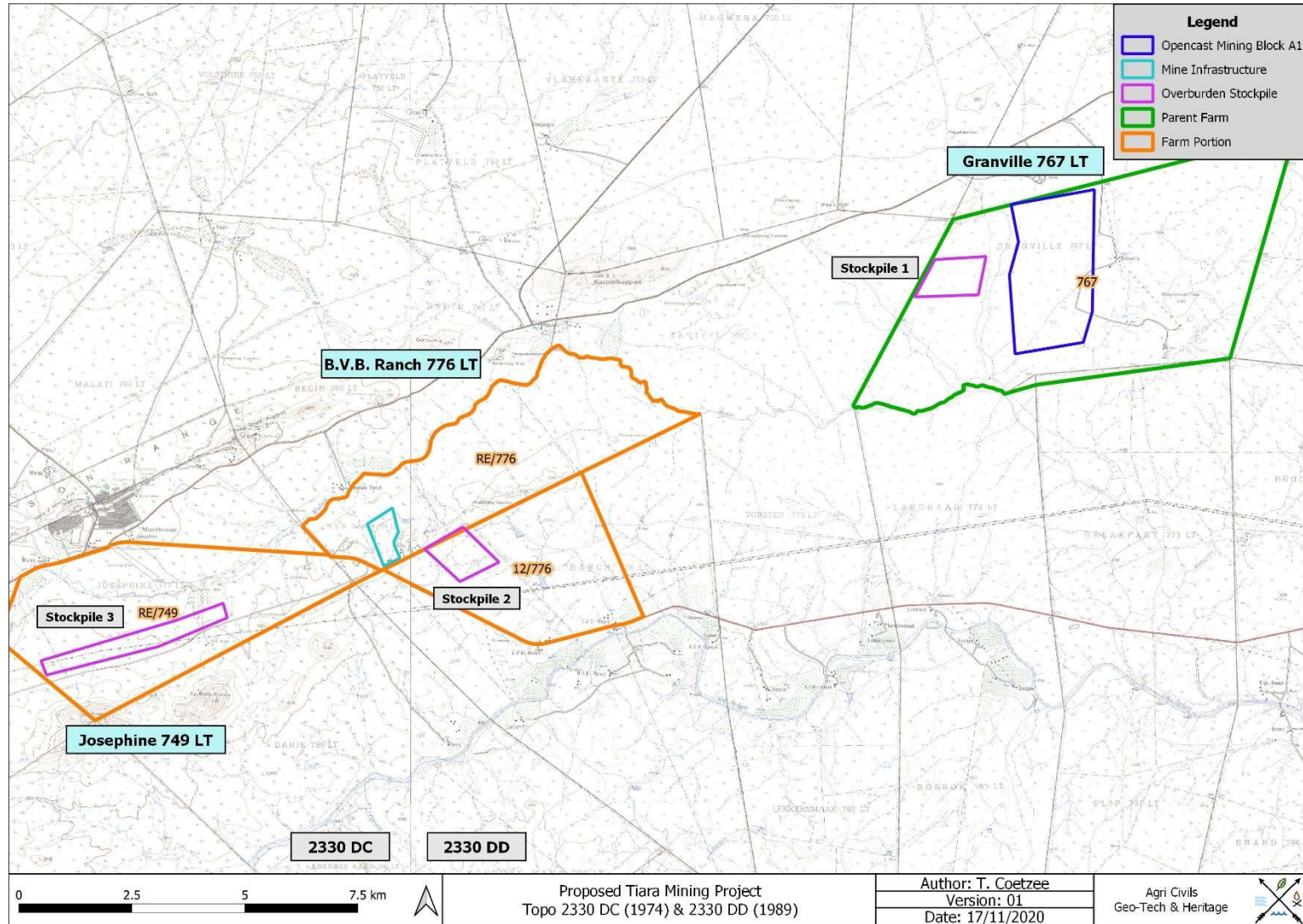


Figure 46: Study area superimposed on a 1974 & 1989 topographical map.

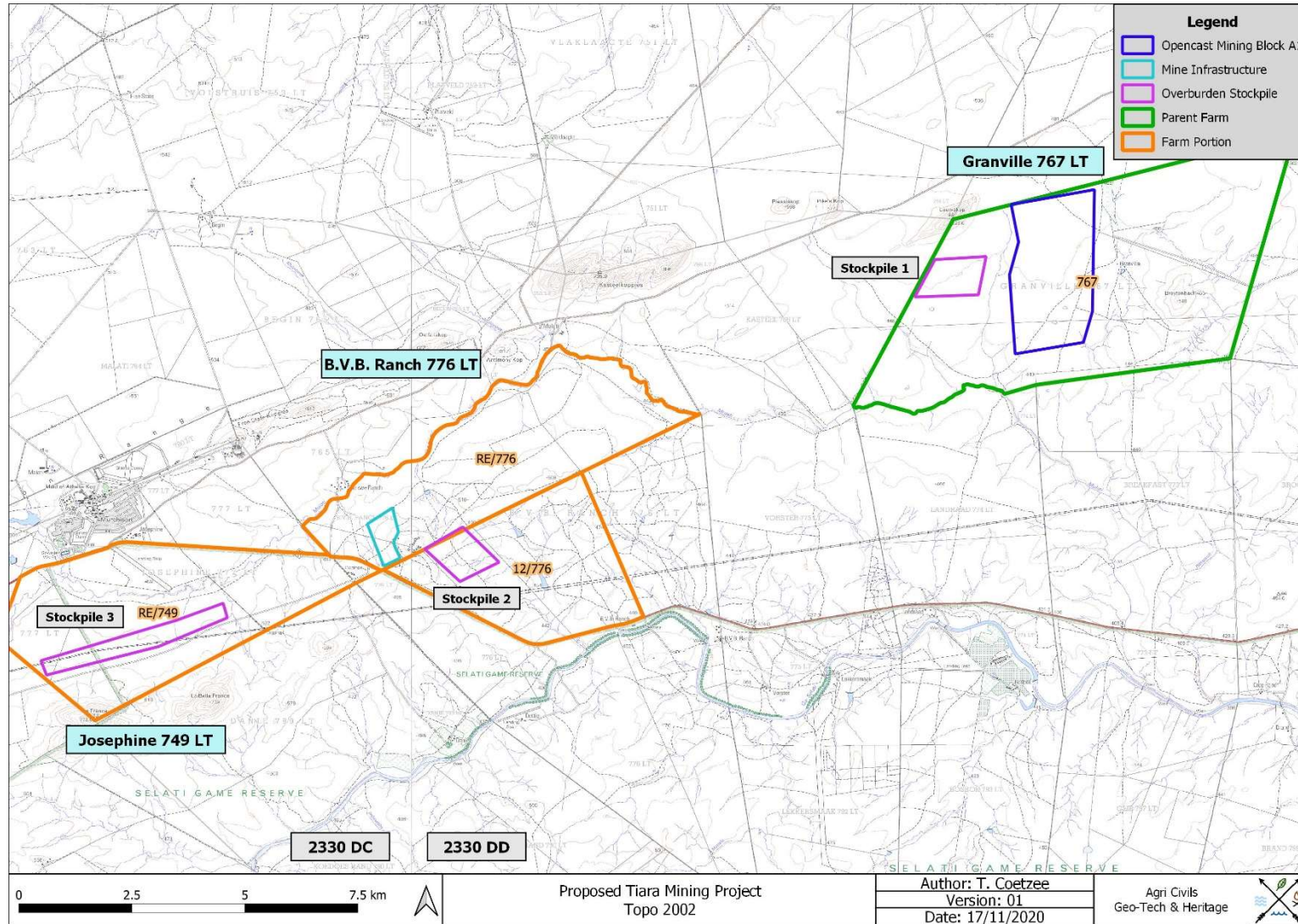


Figure 47: Study area superimposed on a 2002 topographical map.