

**A HERITAGE IMPACT ASSESSMENT STUDY FOR THE PROPOSED PANFONTEIN
COLLIERY, VEREENIGING , EMFULENI LOCAL MUNICIPALITY, GAUTENG PROVINCE,
SOUTH AFRICA**



**1st Draft
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DECLARATION OF INDEPENDENCE

This HIA report has been compiled by Nkosinathi Tomose, Principal Heritage Consultant for NGT Project and Heritage Consultants. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the project.

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EXECUTIVE SUMMARY

NGT Projects and Heritage Consultants (Pty) Ltd (Division: NGT Heritage Solutions), was contracted by TTH Invasion (Pty) Ltd to conduct a Heritage Impact Assess (HIA) study for the proposed mining rights application on farm Panfontein 437 IR as part of specialists input impact assessment studies required to fulfil the mining rights application and the environmental management process as part of the application process. The mining right application is for a mine to be called Panfontein Colliery located on the western end (from south to north) of the Farm Panfontein 437 IR. The mineral rights application is in terms of Section 22 of the Minerals and Petroleum Resources Development Act, Act 28 of 2002. The environmental management process is in term of the National Environmental Management Act, 107 of 1998 and the HIA study is in terms of Section 38 (1) of the National Heritage Resources Act, No. 25 of 1999.

Nkosinathi Tomose, principal heritage consultant at NGT Projects & Heritage Consultants, conducted the study at the proposed prospecting area in Panfontein 437 IR. This HIA study assesses a range of all manmade or human influenced/altered resources within Panfontein 437 IR mining area and immediate outside it as marked in Figure.

The physical survey of the proposed project area (footprint) took place on two occasions - first on the 28th of March 2014 and on the 22nd of April 2014. The surveys yielded a total of eleven heritage sites and features. Nine potential heritage yielding areas were also identified within the broader study area through the use of Google Spotting Mechanism.

Out of the 11 heritage sites approximately 45% of the sites will not be directly impacted by the proposed development. These sites fall within an area earmarked for underground mining activities and they include:

- PAN-01, PAN-02, PAN-03, PAN-04 and PAN-11

18.2% of the site falls outside the proposed mining boundary and they include:

- PAN-09 and PAN-10.

Only 36.4% of the identified sites will be directly impacted and they include:

- PAN-05, PAN-06, PAN-07 and PAN-08

Based on the above findings and various processes of impact assessment and evaluation, the following conclusion and recommendations are made about Panfontein 437 IR site proposed for Panfontein Colliery:

CONCLUSIONS

The following conclusions are made about the site:

- In both the scoping level and heritage impact assessment level of this project no traditional archaeological (Stone Age, Iron Age) or rock art sites were identified.
- A total of 6 burial grounds and grave sites were identified of which 2 falls outside the project footprint - PAN-09 and PAN-10.
- Other burial grounds and gravesites fall in an area earmarked for underground mining activities - PAN-03 and PAN-04.
- The rest of the burial grounds and grave sites PAN-05 to PAN-08 will be directly impacted by the proposed Panfontein Colliery because they fall directly within an area earmarked for opencast mining activities and these sites will need to be mitigated by means of relocating them to a municipality proclaimed cemetery.
- PAN-01 will need to be mitigated by means of documentation and mapping by accredited conservationist architecture.
- Based on the above it is concluded that the proposed Panfontein Colliery can be approved on condition that the developers agrees and abides to the proposed mitigation measures for the management of heritage resources within Panfontein 437IR.

RECOMMENDATIONS

The following recommendations are made about the site - Panfontein Colliery Site:

- It is recommended that the developer abides to the proposed heritage management measures for the management and mitigation of the identified heritage resources sites within the proposed development footprint prior to project construction and operational phases.
- A letter from the developer acknowledging the recommendations of this report will need to be developed and submitted to the SAHRA-BGG Unit for the management of burial ground and graves and to the PHRA-G for the management built environment and landscape features as identified in this report.
- This letter, together with this heritage report, will aid the adjudication process and assist SAHRA-BGG and PHRA-G make an informed decision in terms of the Review Comment and

on the next steps to be followed thereof from a heritage resources management point of view.

- From an independent point of view, we would encourage SAHRA-BGG Unit and PHRA-G to give the project a Positive Review Comment depending on whether the developer agrees with the finding of this report.

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ABBREVIATIONS

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
ARCH	Archaeological
BA	Basic Assessment
BID	Background Information Document
BEL	Built Environment and Landscape
BGG	Burial Grounds and Graves
BGG	Proven not to be Burial Ground and Grave
CBD	Central Business District
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
EIR	Environmental Impact Report
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
K.y.a	Thousand years ago
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NHRA	National Heritage Resources Act
NEMA	National Environmental Management Act
NWA	National Water Act
PHRA	Provincial Heritage Resources Authority
PHRA-G	Provincial Heritage Resources Authority Gauteng
PSSA	Paleontological Society of South Africa
ROD	Record of Decision
PDAFP	Proposed Development Area Footprint
SAHRA	South African Heritage Resources Agency

TERMS AND DEFINITIONS

Archaeological resources

This includes:

- material remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
- Features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in the change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;

- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil.

Heritage resources

This means any place or object of cultural significance.

1. INTRODUCTION

1.1. Project Background

Richtrau 253 (Pty) Ltd is applying for mineral right to mine coal on farm Panfontein 437 IR, Vereeniging, Emfuleni Local Municipality within Midvaal District, Gauteng Province, South Africa (*Figure 1 & 2*). The mine is to be known as Panfontein Colliery. The study area covers a total of 3 857.34 hectares, most of which is currently mined for sand (in the south and western end of the development area) and concrete (in the eastern section of the proposed development area). The concrete mine which is currently disbanded was mined by Group 5. Following various studies conducted by Richtrau 253 (Pty) Ltd (as per the BID provided) the study area has proven to contain reasonable reserves of usable coal to justify the development of the coal mine in the area. This is further supported by the result of Anglo-American Transformation Report which also states that the area is conducive for the production of local thermal coal.

The proposed Panfontein Colliery will consist of both an opencast and underground coal mining activities. According to the Background Information Document (BID) supplied to NGT Projects & Heritage Consultants - the opencast mining activities will "...will take place in consecutive long cuts or strips" within the proposed mining area. The northern section of the mining area will predominantly be underground 'in the bottom seam'. The underground mine technique will entail mining by pillar conventional board and pillar methods. This process will involve the stripping of the top layers of the soil and stockpiling them as part of the rehabilitation process. With 'drilling and blasting' undertaken to break through the overburden - the rock and soil found above the layer of coal (the coal seam). Large movable excavators, called draglines, will be used to remove the overburden'. The process is undoubtedly an intensive mining excise.

1.1.1. Proposed Project Aims

The coal mine is expected to contribute to coal supply to Lethabo Eskom Power Station located across the Vaal River and west of the study area. The BID for example suggests that, [once] "the coal has been crushed, it can either be transported directly via trucks to the Lethabo Power Station, New Vaal Colliery or to a coal processing plant for beneficiation, depending on the quality of the coal". Although no clear objectives of the mining activities on Panfontein 437IR are laid out, the above sentence makes provision for assumption that

Eskom supply and economic development are key to the process.

1.1.2. Terms of Reference for the Appointment of Archaeologist and Heritage Specialist

The nature and size of the proposed development, proposed mining activities involving open cast and underground mining which exceed a total area of 5000m² i.e. 3 857.34 hectares, requires environmental authorisation. As a result the environmental application process developed in terms of National Environmental Act (NEMA), No. 107 of 1998 as amended and read together with the 2010 Environmental Impact Assessment (EIA) Regulations. The environmental process involves the identification and assessment of environmental impacts through specialist studies. TTH Invasion (Pty) Ltd was appointed by Richtrau 253 (Pty) Ltd as a lead Environmental Assessment Practitioner (EAP) to manage the Environmental Scoping Process (ESP) and the EIA process and other associated impact studies for the proposed mining activities. In order to fulfil all the requirements for a complete ESP process, TTH Invasion (Pty) Ltd appointed NGT Projects & Heritage Consultants (Division: NGT Heritage Solutions) as an independent Cultural Resources Management (CRM) firm to conduct a Heritage Scoping and Heritage Impact Assessment study (inclusive of Paleontological study) for the proposed mining activities as part of specialists (inputs) impact assessment studies. Nkosinathi Tomose (Principal archaeologist & heritage consultant) from NGT Projects & Heritage Consultants conducted the study for the proposed Panfontein Colliery (*Figure 1 & 2*).

The appointment of NGT Projects & Heritage Consultants, as an independent CRM firm, is in terms of the National Heritage Resources Act (NHRA), No. 25 of 1999, the NEMA, No.107 of 1998 (as amended & the applicable 2010 Regulations), as well as other applicable legislations.

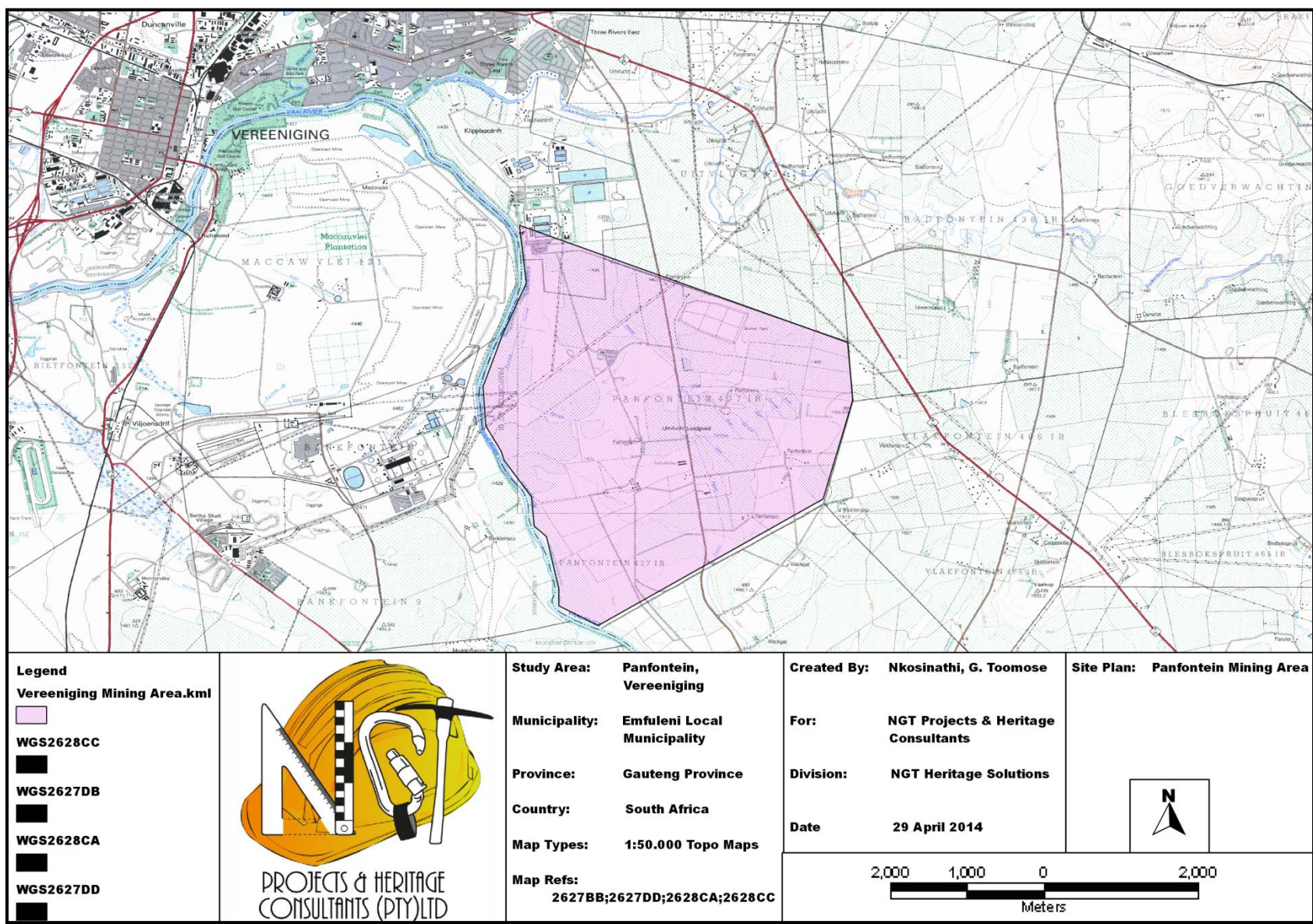


Figure 1- Topographic Map showing the location of the Panfontein Mining Area, ELM, Gauteng Province.

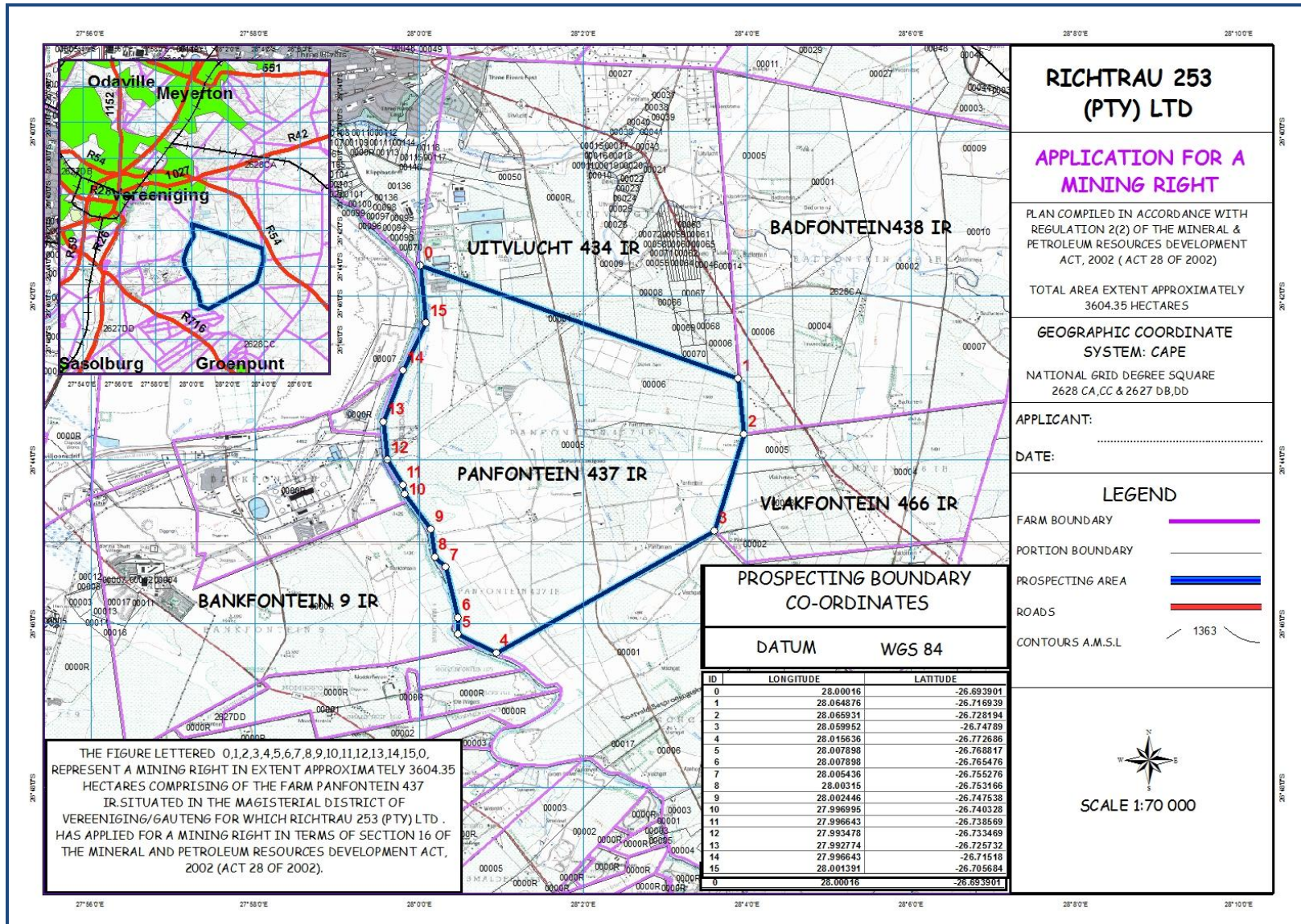


Figure 2- Map of proposed mining area provided by the clients.

2. BACKGROUND OF THE STUDY AREA

South Africa is rich in diverse forms and types of heritage, ranging from natural to cultural heritage. The natural heritage includes among other things: Geological, Paleontological, and the various plant and animal species that define the country. The cultural heritage, which dates as far back as 2.5 million years ago (m.y.a), includes - the different periods of Stone Age Archaeology, the Iron Age Archaeology, Historical and Industrial Archaeology, as well as the "Political/Historic" geographies of South Africa (reference - Tomose, 2013 a, b, c, d).

This HIA assesses the range of all the manmade or human influenced resources within Panfontein 437 IR mining area, and immediate outside but within the proposed EIA project area as marked in Figure 1 and Figure 2.

2.1. Background Information Study: A Stone Age, Iron Age and Historical Archaeology (incl. some Anthropological aspects) of Gauteng

The Gauteng province (former Central Transvaal) provides archaeologists and cultural scientists alike with rich canvas of heritage resources varying from natural to manmade or human influenced resources.

The man made environment of Gauteng dates from prehistoric to historic times (time of written documents). Among archaeological and heritage time periods, it includes: the ESA (Early Stone Age) – 2.6 m.y.a to 250 k.y.a.; MSA (Middle Stone Age)–250 k.y.a to about 35 k.y.a.; LSA (Late Stone Age) – 25 k.y.a to about 2000 k.y.a; Iron Age periods (i.e. Early Iron Age & Late Iron Age) – 2000 k.y.a; the Colonial period and historic periods - 1800s to 1994 (and most recent). Other than archaeological resources, other heritage resources found within the Gauteng region include: historical built environment and landscape features such as buildings, industrial sites, places of worship, monuments and memorials associated with events such as the two South African Wars (commonly referred as Anglo-Boer Wars) and Liberation Heritage.

The current study only plays focus on the Iron Age and the later periods because they deal more directly with the development of industries (such as mining and railway industries) and later complex communities (e.g. villages and towns) within the South African landscape.

The Early Iron Age communities first appear in the first millennium AD and they are represented in the archaeological record through: stone walls, rock art, pottery, iron implements, traded beads, rain making site features, spear sharpening groves on rock surfaces, grinding stones, hut dugga floors, vitrified dung, iron slag, evidence of early diggings (early mines), formalised burial grounds and graves etc (e.g. Huffman 2007; Mason 1974).). This transformation then led to changes in the structure of South African economy, politics and indeed social relationships (Mason 1974). Examples of the earliest Iron Age sites in South Africa and Central Transvaal include the site of Silverleaves in Pretoria that dates to AD 270 (Mason 1974).

In Gauteng, former Central Transvaal, the Iron Age has also been divided into three categories. A site that has yielded an early date close to Silverleaves is Broederstroom.

The Middle Iron Age, on the other hand, includes sites that date back to about AD 1060 to approximately AD 1580 – 1610 (Mason 1974). An example of a site within this period is the Melville Koppies Upper furnace which dates to AD 1060 (Mason 1974). Gauteng also shows activity within the Late Iron Age - a period that lasted from the mid-sixteenth century around AD 1550 to the nineteenth century (Mason 1974). These activities are associated with thousands of stone walled settlements within Gauteng; for example the Bafokeng stone wall structures near the Cradle of Humankind World Heritage sites (Huffman 1986; 1989; 1993). Some are very wide in diameter such as those in Kadetshwene (Huffman 2013). Vereeniging also has some Late Iron Age sites. These include, for example, the furnaces that fall into class 2 of Friede & Steels's (1985) typology of furnaces (van Schalkwyk 1987). These furnaces are associated with Sotho/Tswana origins and, by extension, could also be associated with Nguni (Ndebele) people (van Schalkwyk 1987).

In Southern Africa, the late Iron Age is also characterized by a variety of expansionists' battles fought by different chiefdoms, culminating to the pre-colonial southern African war called *Imfecane* (Cooper 1993). Socially and economically there was also competition for ivory trade within this Sotho-Tswana area. Within this complex and politically charged period, Mzilikazi settled in the former Central Transvaal Region which was characterized by the Sotho- Tswana people, the Bantu-speakers, constantly moving within the landscape, in 1827. Mzilikazi was constantly attacked by the various Sotho-Tswana groups and later on by the encroaching Trek Boers resulting to his displacement to settle in Rhodesia (currently known as Zimbabwe). Besides the conflicts wars that have been eluded to, the interaction

between the Trek Boers and these Late Iron Age communities and later on the advancement of the British Imperial powers into the Central Regions of South Africa led to a South African period known as Imperialism. This period led to the 19th century Industrial Revolution that came about with the discovery of diamonds in Kimberly in 1867 and the discovery of gold in the Witwatersrand in 1886. The archaeology associated with this historical period and associated industries are known as Industrial Archaeology.

2.2. Industrial Archaeology: The History of Vereeniging

Vereeniging's history dates back to the discovery of coal deposits by George William Stow in 1878 (Coulson 2012; Lewis Leigh, 1978). This was a chance find is argued to have resulted from the survey commissioned by the Orange Free State government in 1876 for George William Stow to search for diamonds and gold (Coulson 2012). Due to the lack of a local market of coal at the time, the survey was then abandoned (ibid). In 1867 diamonds were discovered and in 1871 there were New Rush discoveries, followed by the discovery of gold in 1886 in the Witwatersrand (Coulson 2012). The expansion of mining sector resulted to a more urgent need for alternative fuel sources because the traditional wood sources used for fuel did not suffice to keep the diamond and gold mining including the railway industry (developed to transport raw materials) operational (Coulson 2012). Stow was then sent to buy coal bearing land at Vereeniging (Coulson 2012). It is on this land that the first operational mine, Leeuikipit mine, was established in 1881 (Coulson 2012). This mine then gave rise to Vereeniging Estates Coal Company (Coulson 2012). Mining in the area of Vereeniging developed at a rate that sufficed to establish a town in 1892 (Coulson 2012). Later, the mining industry grew and Stow influenced Samuel Marks, a Kimberly diamond industrialist, to form the De Zuid-Afrikaansche en Oranje Vrystaatsche Kolen en Mineralen Myn Vereeniging (Leigh 1987). The town was then named Vereeniging – a name that came about due to the misspelling of the last word of Afrikaansche en Oranje Vrystaatsche Kolen en Mineralen Myn Vereeniging (Leigh 1989). Figure 3 below show some of the early coal mines in Vereeniging - which are located to the west of the Farm Panfontein 437 IR.

From there on, the rate of industrialization increased in Vereeniging. In the 1920s, Vereeniging became the principal power supplier of the Witwatersrand as mines required this service (Fair & Mallows 1959). This was because of its close proximity to the Vaal River (Fair & Mallows 1959). In 1959, Vereeniging also became the second largest steel works since World War II (Coulson 2012). This was apparent in the formation of Union Steel Corporation, formed by Lewis and Marks, to build a steel works in 1912 (Coulson 2012).

This union was eventually incorporated into the South African Parastatal ISCOR in the 1920s (Coulson 2012).

Vereeniging is also known as the town where, at the end of the Anglo-Boer war, the negotiation leading to the Treaty of Vereeniging took place although the official document was signed in Pretoria (Leigh 1987).

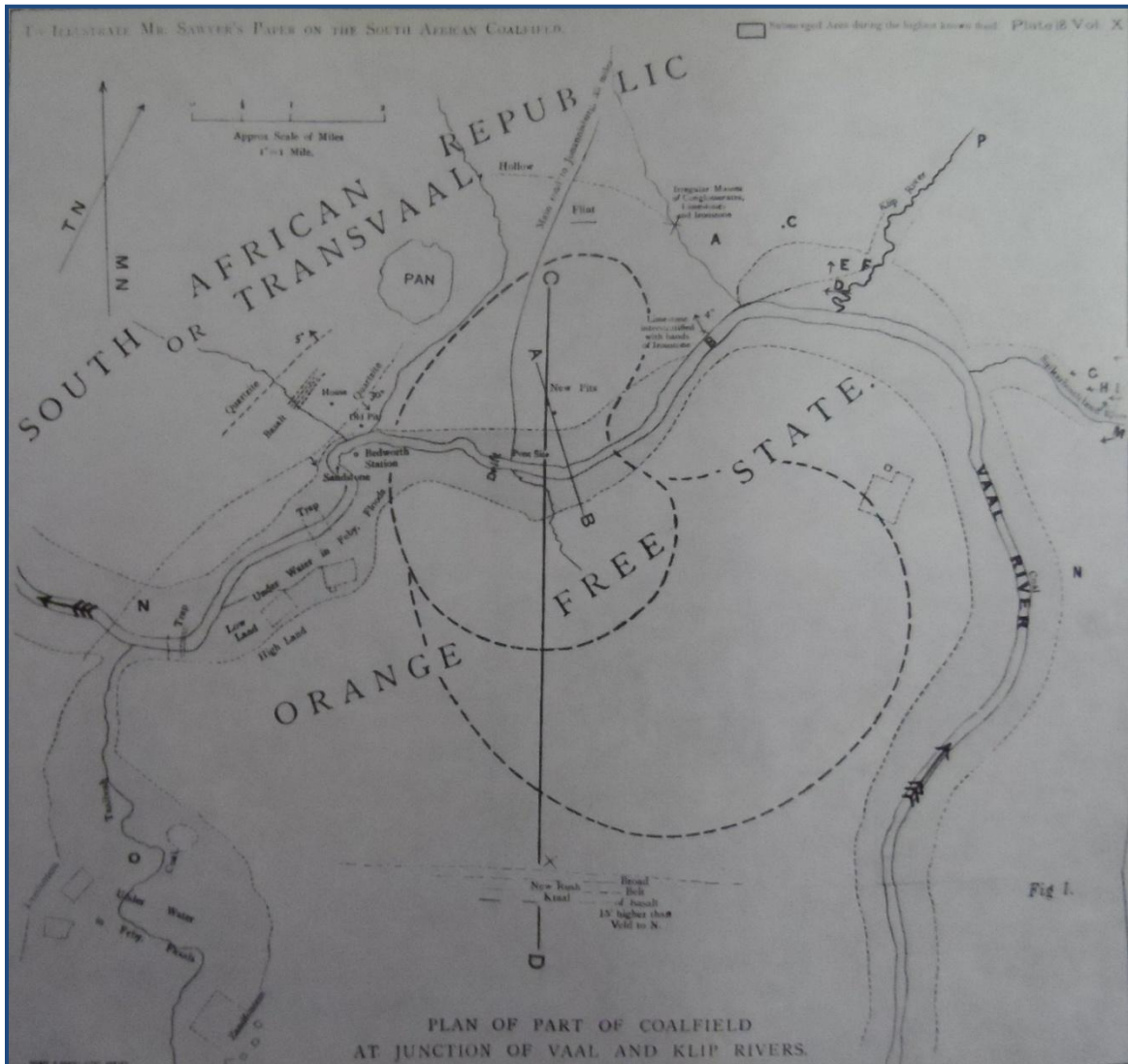


Figure 3- Map showing area marked for the early coal mines in Vereeniging east of the study area.

2.2. Description of the affected environment

Table 1 – Description of the affected environment of the proposed Vereeniging PRASA Station upgrade

Activity	Description
<ul style="list-style-type: none"> ▪ <i>Location</i> 	<ul style="list-style-type: none"> • The project area is located east of Vereeniging CBD, in Emfuleni Local Municipality, Midvaal District Municipality, Gauteng Province, and South Africa. It is within Farm Panfontein 437IR. It covers more than 5000m² i.e. 3 857.34 hectares in extent. The site centre GPS Coordinates are: 26° 44' 12.96"S 28° 01' 57.74"E (Figure 1, 2 & 4).
<ul style="list-style-type: none"> ▪ <i>Surrounding Townships/Industrial Zones/ Villages</i> 	<ul style="list-style-type: none"> • <u>Residential/Township Zones</u> <ul style="list-style-type: none"> ▪ On the northern portion of the proposed mining area is community - residential zone • <u>Farm Zones</u> • Most portions of the mining area consist farms ranging from cattle ranching, piggery to pivot farming. • <u>Industrial</u> <ul style="list-style-type: none"> ▪ Disbanded Group 5 concrete mine on the southern eastern section of the mining area. Lethabo Eskom Power Station is found across the Vaal River and west of the mining area. ▪ Within the mining area sand mining activities are found south.
<ul style="list-style-type: none"> ▪ <i>Land Uses in and around the study area</i> 	<ul style="list-style-type: none"> • <u>Industrial</u> <ul style="list-style-type: none"> ▪ North and North West of the Vereeniging PRASA Station are Factories • <u>Trading stores</u>
<ul style="list-style-type: none"> ▪ <i>Land Owner(s)</i> 	<ul style="list-style-type: none"> • Site – Group 5, Rand Water and Private Companies
<ul style="list-style-type: none"> ▪ <i>Current Conditions (on site)</i> 	<ul style="list-style-type: none"> • Disturbed landscape with housing, factories and mining activities (Refer to Figure 3)
<ul style="list-style-type: none"> ▪ <i>Applicant</i> 	<ul style="list-style-type: none"> • TTH Invasion (Pty) Ltd on behalf of Richtrau 253 (Pty) Ltd
<ul style="list-style-type: none"> ▪ <i>Proposed Development</i> 	<ul style="list-style-type: none"> • Application for prospecting rights

Activity	Description
<ul style="list-style-type: none"> ▪ <i>Access</i> 	<ul style="list-style-type: none"> • Existing national, provincial and local roads, routes and human foot paths. • <u>Provincial Roads:</u> • From Vereeniging CBD the site can be access using Malabou Main road (R54) and from Sedibeng R549 and R54. • R716 is found south and west and R821 is west and north of the project area (<i>Refer to Figure 4</i>)
<ul style="list-style-type: none"> ▪ <i>Defining natural features</i> 	<ul style="list-style-type: none"> ▪ The Vaal River acts as a buffer between the Free State Province and Gauteng Province and it is found west and south of the proposed mining area. ▪ Within the site a range of invasive plant species varying from Blue Gumtree (plantations) to Wilde Fig Tree are found as well as the small plan species. ▪ The Vaal Dam is found south of the proposed mining area
<ul style="list-style-type: none"> ▪ <i>Zoned for</i> 	<ul style="list-style-type: none"> • Mining • Farming • Residential • Industrial (e.g. Rand Water)

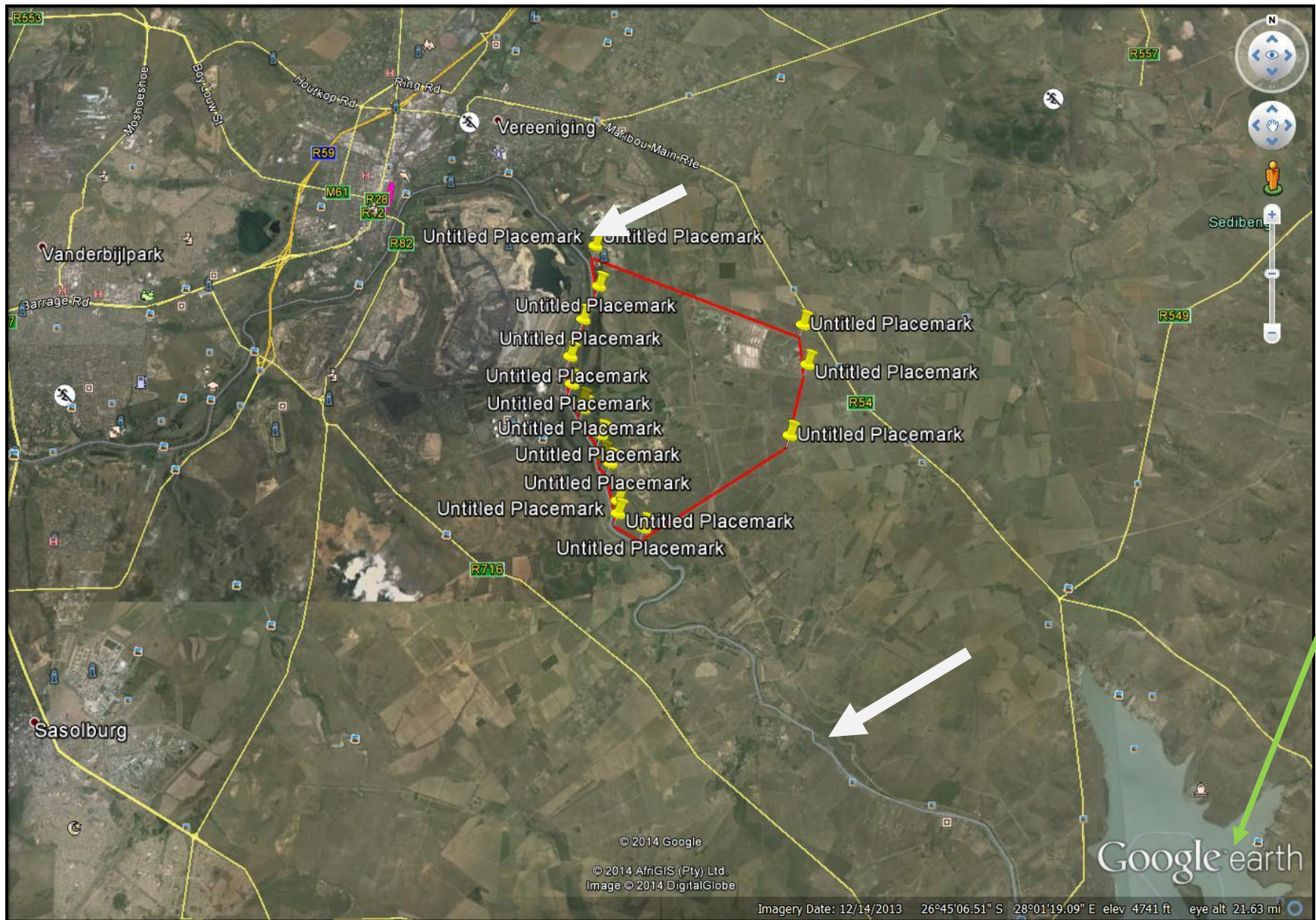


Figure 4- Location of the study area (also the development footprint) as delineated in red, in relation to the Vaal River (solid white arrows), the Vaal Dam (portion) (green arrow) Peacehaven, Duncanville and the Old Vereeniging Central Business District (white arrow) as well as the broader Vereeniging landscape.

2.3. Description of proposed activities: Proposed Infrastructure

Table 2 - List of Proposed Activities

2.4. Needs and Desirability

▪ Activity 1	• Prospecting for coal - coal mining
▪ Activity 2	Clearing of soil and construction on mining infrastructure and support infrastructure such as offices
▪ Activity 3	• Establishing open cast and underground mine

Table 3 –List of activities in-line with the project scope

▪ Activity 1	<ul style="list-style-type: none">• Desktop study of the heritage value and integrity of the area under consideration and its surrounding with a particular focus on resources within the proposed mining area as marked in Figure 1.• Physical identification, documentation and recording of cultural resources within the proposed mining area.
▪ Activity 2	<ul style="list-style-type: none">• The mapping, assessment and evaluation of the heritage value and integrity of the identified heritage resources and Go vs. No Go Area.
▪ Activity 3	<ul style="list-style-type: none">• Developing of plan of study for the EIA phase• Making recommendations to SAHRA and provincial heritage resources authority - PHRA-G

3. METHODOLOGY

This chapter outlines the methodologies used in conducting the HIA study for the proposed Panfontein Colliery, Vereeniging. The study area is located within Vereeniging, Emfuleni Local Municipality (ELM), Gauteng Province. This is done in accordance to the Terms of Reference provided by the client for the completion of this study. However, some areas of the report follow minimum standards for completion of professional HIA as stipulated in SAHRA minimum standard (2012) such as detailed account to the archaeological and historical background of the study area or region.

3. 1. Step I – Literature Review (Desktop Phase):

- Sources used in this study included, but not limited to, published academic papers, books and internet publications.
- The use of archival maps – three historical maps showing the proposed area of development and its surroundings were assessed to aid information about the proposed area of development and its surroundings.
- The above also included a review and assessment of relevant environmental and heritage legislations such as the NEMA (together with the 2010 EIA Regulations) and the NHRA.

3.2. Step II – Physical Survey:

The physical survey of the study area aimed to address the following main areas of concern raised by the client in the specialist Terms of Reference:

1. To conduct an onsite verification survey for some of the sites that have been spotted at the scoping level of this HIA study.
2. To identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the proposed mining area as marked in Figure 1.
3. Use of annotated maps will be made where appropriate.

In order to address these concerns:

- The physical survey of the proposed Panfontein Colliery development footprint was conducted on the 28th of March 2014 and on the 22nd of April 2014.
- The total the survey focus on the areas that have been marked for mining activities as depicted in the map supplied by the client (*Figure 3*).
- NGT also covered other areas of the proposed mining area and immediately outside the boundary (3 857.34 hectares).
- The survey was on foot and bakkie and track logs of the survey were recorded using Garmin GPSmap 62s.
- The objective of the survey was to locate and identify archaeological and heritage resources and/or sites and objects, occurrence within and immediately outside the proposed development footprint. To record and map them using necessary and applicable tools and technology.

- The physical survey was deemed necessary since the desktop phase of the project yielded few known archaeological resources and other heritage/historic resources about the region in which the current study area is located.
- The survey also paid special attention to disturbed and exposed layers of soils as such as eroded surfaces because these areas are more likely to be exposed or yield archaeological and other heritage resources that may be buried underneath the soil and be brought to the earth surface by animal and human activities such as animal burrow pits and human excavated grounds.
- The following technological tools and platforms were deemed important for documenting and recording located and/or identified sites:
 - Garmin GPSmap 62s – to take Lat/Long coordinates of the identified sites and to take track logs of each of the three corridors.
 - Lenovo ThinkCentre aided with Garmin Basecamp Software, Google Earth – to plot the proposed development area.
 - Quantum GIS Lisboa (1.8.0) was used to plot all the identified features and/or resources and to develop heritage maps in order to inform the heritage analysis of the proposed Vereeniging PRASA Station modern maintenance upgrade.
 - The project plan schedule provided by the client before the survey also proved invaluable
 - Survey coordinates and data provided by the client were used to map the development area footprint.
 - Samsung camera – was used to take photos of the affected environment and the identified heritage resources.

3.3. Step III – Data Consolidation and Report Writing:

During field work and on the return from the field the following were addressed:

- Assessment of the significance of the cultural resources in terms of their archaeological, built environment and landscape, historical, scientific, social, religious, aesthetic and tourism value"
- Description of possible impact of the proposed development on these cultural remains, according to a set of standard and conventions for the management of the cultural environment;
- Proposal of suitable mitigation measures to minimize possible negative impacts on the cultural resources;

- Review of applicable legislative requirements - Section 3.1. of this Chapter (i.e. Chapter 3) addresses this concern as well as Section 5.5 of Chapter 5 discusses Sections of the NHRA, No. 25 triggered by the current study findings
- Highlighting of assumptions, exclusions and key uncertainties". Chapter 4 (below) of this report addresses this concern.
- The final step involved the consolidation of the data collected using the various sources as described above. This involved the manipulation of data through Quantum GIS. Assessing the significance and potential impact of the identified sites, discussing the finds, report writing and making recommendation on the management and mitigation measures of the identified sites and resources as well as the impact and influence of these sites and resources on the proposed corridor.

3.4. Assessment of Site Significance in Terms of Heritage Resources Management Methodologies

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context)
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures)
 - Density of scatter (dispersed scatter)
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- Uniqueness and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate pylon position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site
- F - Impacts on these sites by the development will be evaluated as follows:

Measure of Heritage Site Significance

The following site significance classification minimum standards as prescribed by SAHRA (2006) and approved by ASAPA for the SADC region were used for the purpose of this report.

Table 4: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	-	Low Significance	Destruction

3.5. Methodology for Impact Assessment in terms of Environmental Impact Assessment Methodologies including Measures for Environmental Management Plan Consideration

The determination of the effects of environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the BAR. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts. This is in line with specialist requirements as required by the client. For example, the request that:-

The impact methodology [should] concentrate on addressing key issues. This methodology to be employed in the report thus results in a circular route, which allows for the evaluation of the efficiency of the process itself. The assessment of actions in each phase [that should] be conducted in the following order:

- Assessment of key issues;
- Analysis of the activities relating to the proposed development;
- Assessment of the potential impacts arising from the activities, without mitigation, and
- Investigation of the relevant mitigation measures for both the construction and operational phases.

The following Assessment Criteria is Used for Impact Assessment

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrices use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: describes the likelihood of the impact actually occurring

- **Improbable:** the possibility of the impact occurring is very low due to the circumstances, design or experience.
- **Probable:** there is a probability that the impact will occur to the extent that provision must be made therefore.
- **Highly Probable:** it is most likely that the impact will occur at some stage of the development.
- **Definite:** the impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: the lifetime of the impact

- **Short Term:** the impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.

- **Medium Term:** the impact will last up to the end of the phases, where after it will be negated.
- **Long Term:** the impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent:** the impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: the physical and spatial size of the impact

- **Local:** the impacted area extends only as far as the activity, e.g. footprint
- **Site:** the impact could affect the whole or measurable portion of the above mentioned properties.
- **Regional:** the impact could affect the area including the neighbouring residential areas.

Magnitude/Severity: Does the impact destroy the environment, or alter its function

- **Low:** the impact alters the affected environment in such a way that natural processes are not affected.
- **Medium:** the affected environment is altered, but functions and processes continue in a modified way.
- **High:** function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

- **Negligible:** the impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
- **Low:** the impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
- **Moderate:** the impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
- **High:** The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of

management intervention will be a significant factor in mitigation.

The significance is calculated by combining the criteria in the following formula:

Sum (Duration, Scale, Magnitude) x Probability (*Table -2*)

S = Significance weighting; Sc = Scale; D = Duration; M = Magnitude; P = Probability

Table 5 -The significance weightings for each potential impact are as follows:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	≤20
	Low	>20≤40
	Moderate	>40≤60
	High	>60

The significance of each activity was rated without mitigation measures (WOM) and with mitigation (WM) measures for both construction, operational and closure phases of the proposed development. To address the question of Heritage Management Plan the following table is used for Measures to be included in the EMP. This table is relevant in that it

addresses key issues at the various stages of the project by also addresses how some of the key concerns that develop from a heritage point of view can be mitigated.

Table 6 -Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; this take into account the findings of the environmental impact assessment specialist studies		
Project component/s	List of project components affecting the objective	
Potential Impact	Brief description of potential environmental impact if objective is not met	
Activity/risk source	Description of activities which could impact on achieving objective	
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion	
Mitigation: Action/control	Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures
Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.	
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting	

4. ASSUMPTIONS, EXCLUSIONS AND UNCERTAINTIES

The assumptions, exclusions and uncertainties that exist in terms of the present study are discussed in the following sub-sections.

4.1. Assumptions

The current study is a HIA study and as such, a historical and archival desktop study as well as a field survey were undertaken to identify tangible heritage resources located in and around the proposed development area footprint. The assumption is that a detailed heritage social consultative process would have taken place with some of the Interested and Affected Parties (I&AP) to ascertain known archaeological and heritage sites or resources in their properties such as presence or existence of graves and cemeteries, historic built environment and landscape features etc. However, there was no formal heritage social consultation that took place as part of the study. Informal discussion did, however, take place with some of the workers of the Sand Mine.

4.2. Exclusions

The following exclusions or limitations have direct consequence to the study and its results:

- There was no deeds search for the proposed Panfontein Colliery - because we were clearly informed about the transaction processes that have taken place between the current owners of the land and the previous owners (Anglo-American). There was therefore no need to conduct a deeds search for the property.
- There was no conservationist architectural assessment of the buildings located on site – this HIA focused on identification of archaeological, burial grounds and graves, historical buildings and other historic infrastructure found on site.

4.3. Uncertainties

Heritage studies like most other specialist studies often experience many challenges during and after the physical survey of the proposed development area. From an archaeological and general heritage perspective, the assumption is often made that, the amount of identified archaeological and heritage resources during physical survey of the proposed development area represent some of the total amount of resources that exist within the development area. This is not often true because the nature of some the archaeological and heritage resources are subterranean and as such, one cannot totally rule out their presence or existence within the proposed development area even though they are not recorded and mapped as part of the current study. These resources may be exposed or brought to the surface of the earth during the construction phase of the project which will involve excavation for infrastructure development and clearing of vegetation and top soil in some

instances. This presents one of the major uncertainties regarding the 'holistic' management of archaeological and heritage resources within and around the proposed development area.

Archaeologists and heritage specialists alike refer to discovery of such resources as chance finds and to mitigate such uncertainty, it is advisable that should such chance finds be made of archaeological and heritage resources on site, the Environmental Control Officer (ECO) responsible for the site should report them to the nearest SAHRA and PHRA-G office or the nearest museum or call an archaeologist and heritage specialist to investigate the finds to make necessary recommendations.

5. FINDINGS

5.1. Cadastral Search

The following historic maps of the study area were used to assess the evolutions of the landscape in and around the area of the proposed study:

Map 1 (refer to figure 5) – A 1902 Map of Potchefstroom sheet 25 from farm surveys of the Transvaal & Orange Free State. Work of Surveys sections R.EATTD, FID, Major HM Jackson. R.E.A.A.G for Tophy F.I. D & by A.H Duncan. ESQ for ORC Surveyor General Office. Pretoria & Bloemfontein

- The Farm Panfontein is shown east of Maaccaw Vlei 121 (white arrow) across the Vaal River
- 3 pans are shown located on the farm - yellow arrows
- 3 kraals are shown - blue circle

Map 2 (refer to figure 6) – A 1903 Map of Heidelberg sheet 25 from farm surveys of the Transvaal & Orange Free State. Work of Surveys sections R.EATTD, FID, Major HM Jackson. R.E.A.A.G for Tophy F.I. D & by A.H Duncan. ESQ for ORC Surveyor General Office. Pretoria & Bloemfontein

- The Farm Panfontein is shown as Panfontein 133 meaning that is the original farm number and it has to have been subdivided many times to become Panfontein 437 IR
- 3 pans are shown located on the farm - yellow arrows
- 3 kraals are shown - blue circle
- Roads are shown passing through the farm- white arrow.

Map 3 (ref to Figure 7) is 1892 Map of Troy showing the Physical Features of the Transvaal.

- This map is not detailed as the later maps and only shows the proximity of the study area.

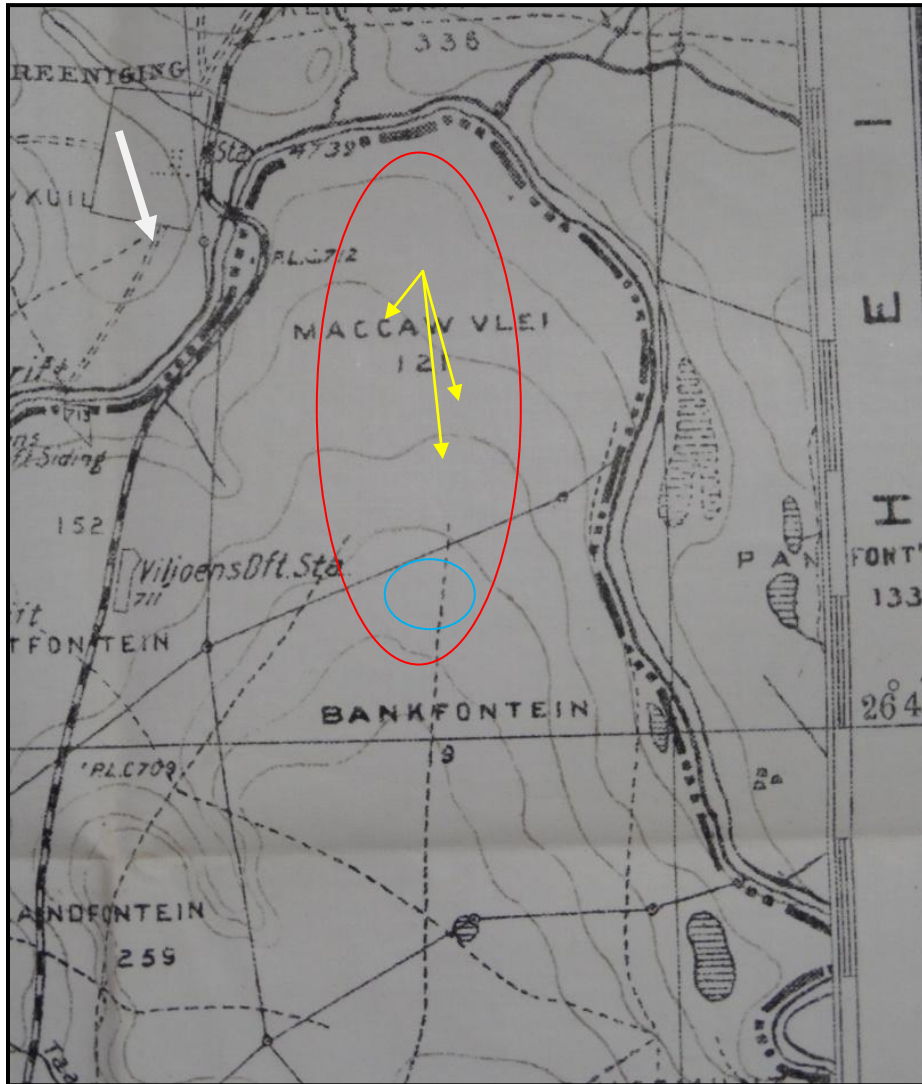


Figure 5 – A 1902 Map of Potchefstroom sheet 25 from farm surveys of the Transvaal & Orange Free State. Work of Surveys sections R.EATTD, FID, Major HM Jackson. R.E.A.A.G for Tophy F.I. D & by A.H Duncan. ESQ for ORC Surveyor General Office. Pretoria & Bloemfontein.

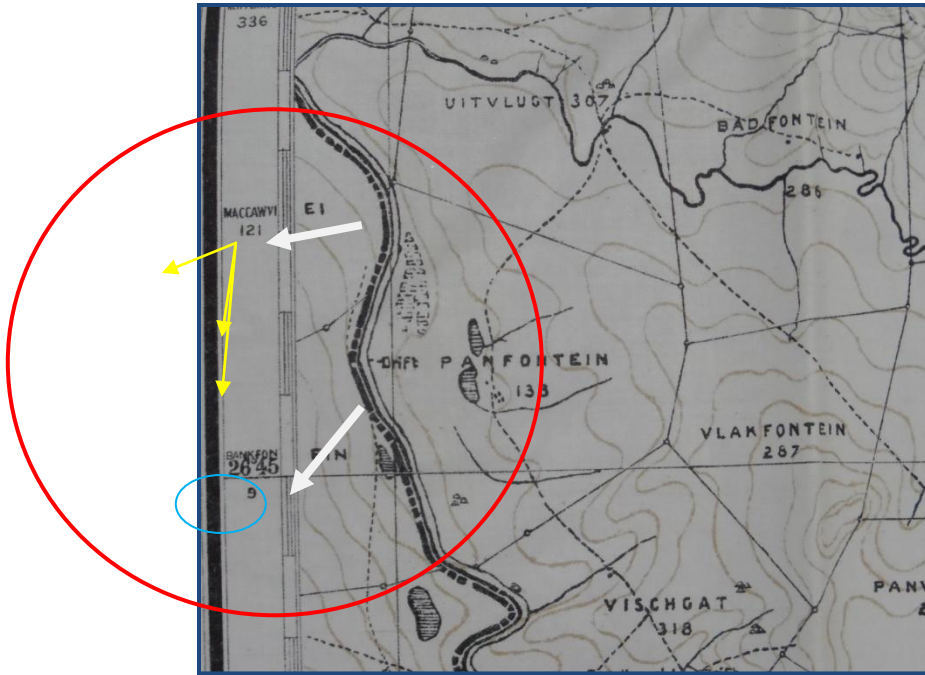


Figure 6 – A 1903 Map of Heidelberg sheet 25 from farm surveys of the Transvaal & Orange Free State. Work of Surveys sections R.EATTD, FID, Major HM Jackson. R.E.A.A.G for Tophy F.I. D & by A.H Duncan. ESQ for ORC Surveyor General Office. Pretoria & Bloemfontein.



Figure 7- Proximity location of the study area -1892 Map of Troy showing the Physical Features of the Transvaal.

5.2. Deeds Search:

Panfontein was previously the property of Anglo American and is associated with business figures such as Harry Openhemmer (Figure 6). Together with the South Rand assets they were sold to two emerging HDSA companies. The 2012 Anglo-American report suggests that Panfontein 437 IR has resources of 281 million tonnes and South Rand has 143 million tonnes, which could be used to supply coal to the domestic thermal coal market (Anglo-American, 2012 Transformation Report).



Figure 8- Picture showing Harry Openhemmer ploughing an oak tree in Panfontein 437 IR

5.3. Field Survey and Identified Archaeological/Heritage Resources

The physical survey of the project area took place on the on the 28th of March 2014 and on the 22nd of April 2014. The survey did not yield any traditional archaeological resources (from Stone Age to industrial archaeology). It yielded burial grounds and graves in form of

cemeteries and built environment and landscape feature such as an old farm house and a tree argued to be the one ploughed by Harry Openhemmer. In total, the survey yielded a total of eleven heritage sites and features. Nine potential heritage yielding areas were also identified within the broader Panfontein farm boundary on the eastern section of the farm. These were yielded through the use of Google Spotting Mechanism.

Site	PAN-01
Type	BELF - 1 x Structure
Density	Low
Location/Coordinates	S26 44 10.5 E28 01 19.9
Approximate Age (>60 Or <60 years old)	More than 60 years old
Applicable Section of the NHRA, No 25 of 1999:	Section 34
Description:	
<p>The site is an old farm house with a pitch roof. It is located behind the current mine office. The wall is built using red clay brick and is dressed in gray/dark blue paint. The front stoep has a veranda and it has side that is collapsing.</p> <p>The building is currently occupied by one of the mine labourers. It has wooden window frames and doors (<i>Figures 9</i>).</p> <ul style="list-style-type: none"> The site fall within an area earmarked for underground mining activities within the Panfontein Colliery - northern section of the study area (<i>Figures 28 & 29</i>). 	

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GPA	G3C	Localised	Moderate	Low	Low significance	Probable	Construction & Operational phase	Mapping of the site and controlled sampling before destruction and/or restorations

Nature of Activities:

Construction Phase: construction, demolition and restoration of some of the buildings on Farm Panfontein 4371R to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	WOM	WM
Probability	Highly probable (4)	Probable (5)
Duration	Permanent (5)	Short term (1)
Scale	Site (2)	Local (1)
Magnitude/Severity	Medium (6)	Low (2)
Significance	(52) Moderate	(20) Low
Status (positive or negative)	Negative	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Mapping of the site and controlled sampling of the historic building within the underground mining area by a conservationist architect before destruction and/or restorations.
- Destruction permits to should be applied for with PHRA-G since the proposed structure to be destructed/restored is older than 60years

Cumulative impacts: Such impacts are expected with the construction phases of the project if no decision is made about this structure during this current planning process and it is suddenly decided that it should be demolished or renovated or refurbished resulting to its historic fabric and integrity being compromised

Residual Impacts:

Positive: The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative: With the destruction of this historic building regardless of proposed mitigations, there will be a sense of loss of vernacular architecture of the 'old' Vereeniging.

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In		
Project component/s	Construction phase of the project	
Potential Impact	Destruction of building/structure without full recording and documentation	
Project component/s	Operational phase of the project	
Potential Impact	Refurbishment of the structure without full recording and documentation	
Activity/risk source	No keeping to recommendation of this HIA report	
Mitigation: Target/Objective	A phase 2 study of the building is required and it should be done prior to project construction phase. And as soon as possible to allow enough time for permission processes with PHRAG.	
Mitigation: Action/control	Responsibility	Timeframe
The applicant (TTH Invasion Pty Ltd) commission a heritage expert to record and document the building and associated structure	Applicant and its client	Before the construction and operational phase of the project
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the EMP against their actual implementation.	
Monitoring	<ul style="list-style-type: none"> • The applicant and appointed heritage expert • PHRAG should also do site visits during the project construction phase to monitor if heritage management objective as recommended in the current and future documents are met. 	



Figure 9- Historic farm house located on the underground mining area of Panfontein 437 IR

Site	PAN-02
Type	BELF - 1 x structure
Density	Low
Location/Coordinates	S26 44 10.1 E28 01 22.1
Approximate Age (>60 Or <60 years old)	+/- 60 years old
Applicable Section of the NHRA, No 25 of 1999:	Section 34
Description:	
<p>The site is a relatively old house with a pitch and asbestos roof. Some of the roof of the house badly damaged. The house has steel frame support, steel window and door frames (<i>Figure 10</i>).</p>	

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GPC	G3E	Localised	Low	Low	Low significance	Probable	Construction & Operational phase	Destruction

Nature of Activities:

Construction Phase: construction, demolition and restoration of some of the buildings on Farm Panfontein 4371R to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	WOM	WM
Probability	Probable (5)	Probable (5)
Duration	Short term (1)	Short term (1)
Scale	Local (1)	Local (1)
Magnitude/Severity	Low (2)	Low (2)
Significance	(8)Low	(8)Low
Status (positive or negative)	Positive	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- The site is of low heritage significance - it does not articulate any architectural language other than a simple industrial design.
- It can be destructed PHRA-G can grant the client a go ahead to destruct the structure

Cumulative impacts: No cumulative impacts are expected regarding this building

Residual Impacts:

Positive: The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative: N/A

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. This building is of low heritage significance and can be destroyed.		
Project component/s	Construction phase of the project	
Potential Impact	N/A	
Project component/s	Operational phase of the project	
Potential Impact	N/A	
Activity/risk source	N/A	
Mitigation: Target/Objective	N/A	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> N/A 	N/A	N/A
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the EMP against their actual implementation.	
Monitoring	<ul style="list-style-type: none"> N/A 	



Figure 10- Structure with asbestos roof (1960s).

Site	PAN-03
Type	Cemetery
Density	Approximately 6 graves
Location/Coordinates	S26 44 10.4 E28 01 24.8
Approximate Age (>60 Or <60 years old)	More than 60 years old
Applicable Section of the NHRA, No 25 of 1999:	Section 36
<p>Description:</p> <p>The site is a cemetery which belongs to either the farm managers or part of the owners. It consists of approximately 6 identifiable graves (<i>Figure 11 & 12</i>). All the graves in the cemetery are facing east-west a typical burial orientation. Amongst many of the identifiable graves they seem to be of children. There was no full count of the graves because the cemetery is overgrown.</p> <ul style="list-style-type: none"> • The site fall within an area earmarked for underground mining activities within the Panfontein Colliery - northern section of the study area (<i>Figures 28 & 29</i>). 	

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Localised	High	Low	High significance	Definite	Long-term : Construction & operational phases	Fence the cemetery and develop cemetery management plan

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Site (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (2)
Significance	(60) High	(24) Low
Status (positive or	Negative	Positive

negative)		
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> • The cemetery is located within an area proposed for underground mining. • It should be fenced off from the rest of the development activities and a cemetery management plan should be developed to manage it. 		
<p>Cumulative impacts: <i>cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects. The operational phase impacts are in terms of access to the graves by the descendants of the deceased.</i></p>		
<p>Positive:</p> <ul style="list-style-type: none"> • The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP. <p>Negative:</p> <ul style="list-style-type: none"> • <i>Access to the grave site will be the only impact that remains after the construction phase of the project. Families of the deceased will have to now undertake mine inductions to visit their graves. Mine induction is a standard process followed in all South African mines to gain access to them.</i> 		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be fenced off from the rest of construction activities and mining infrastructure because it is located in an area with proposed underground mining activities.		
Project component/s	Construction phase of the project	
Potential Impact	In case where the identified cemetery is not fenced off from construction activities or mining infrastructure - it will be negatively be impacted by the proposed mining activities and possible machinery storage.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> • Uncontrolled access to the gravesite may also pose security threat to the newly proposed mine. • Families of the deceased may be required from time to time to request permission to access their ancestral grave site. This will put a strain to the families of the deceased 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be fenced off and cemetery management plan be developed to manage it during the construction phase of the project.	
Mitigation: Action/control	Responsibility	Timeframe
With the approval of the project, the applicant should appoint an archaeologist/heritage consultant of his/her choice to develop the cemetery management and guide the process of fencing the graves/cemetery. A permit to undertake such work should be applied for with SAHRA-BGG Unit.	Accredited archaeologist and heritage consultant.	Prior to the construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators	

	<p>- this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.</p>
<p>Monitoring</p>	<p>With the approval of the project the applicant Environmental Control Officer should consult with the appointed archaeologist/heritage consultant to apply for a permit with SAHRA-BGG to work on the graves by fencing them off and develop a management plan that would ensure that the ECO properly and continuously monitor or inspects the graves.</p>



Figure 11- Cement and brick dressing with a collapsed stone headstone.

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Localised	High	Low	High significance	Definite	Long-term : Construction & operational phases	Avoid and treat as a No-Go Area

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Local (1)	Local (1)
Duration	Short term (1)	Short term (1)
Magnitude	Low (2)	Low (2)
Probability	Improbable (1)	Improbable (1)
Significance	(4) Negligible	(4) Negligible
Status (positive or negative)	N/A	N/A
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- The cemetery is located within an area proposed for underground mining.
- It should be avoided during the construction phase of the project and treated as no go area.

Cumulative impacts: cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects. The operational phase impacts are in terms of access to the graves by the descendants of the deceased.

Positive: The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative: Access to the grave site will be the only impact that remains after the construction phase of the project. Families of the deceased will have to now undertake mine inductions to visit their graves. Mine induction is a standard process followed in all South African mines to gain access to them.

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be avoided and treated as a No-Go Area during the construction phase and operational phase of the project. There is no need to relocate it as it is located in an area with proposed underground mining activities.		
Project component/s	Construction phase of the project	
Potential Impact	In cases where the cemetery is not avoided and treated as a No-Go Area it may be impacted by the construction activities or mining infrastructure such as machinery.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> • Uncontrolled access to the gravesite may also pose security threat to the newly proposed mine. • Families of the deceased may be required from time to time to request permission to access their ancestral grave site. This will put a strain to the families of the deceased. 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be treated as a No-Go Area and be avoided by all means.	
Mitigation: Action/control	Responsibility	Timeframe
The cemetery should be treated as a No-Go Area and be avoided by all means. .	ECO	During construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.	



Figure 13- Pictures showing the type of dressings and headstones as well as the extent of the live cemetery

Site	PAN-05
Type	Cemetery
Density	No headstone or markers
Location/Coordinates	S26 44 40.3 E28 01 18.3
Approximate Age (>60 Or <60 years old)	Suggested to be (More than 60 years old)
Applicable Section of the NHRA, No 25 of 1999:	Section 36
Description:	
<p>The site is suggested to be a cemetery near the sand mine labourer’s compound (Figure 14). The cemetery markers are suggested to have been destructed by one of the sand mine former employees who bulldozed them off. He has, however, left the company. The labourers, however, know the location of the graves even though the grave markers are no longer visible (Figure 15).</p> <ul style="list-style-type: none"> • The site fall within an area earmarked for open cast mining activities within the Panfontein Colliery - northern section of the study area (Figures 28 & 29). 	

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Site	High	High	High significance	Definite	Permanent	Search the extent of the cemetery, apply for relocation permit and Relocate the cemetery

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure). The cemetery is located directly within an area earmarked for open cast mining activities.

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Site (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	(120) High	(60) High
Status (positive or negative)	Negative	Positive
Reversibility	Low	High

Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> • The extent of the cemetery should be searched by means of test trenches • It should be mapped • A social consultative process should take place with the Interested and Affected Parties • The grave should be relocated to a new cemetery within Emfuleni Local Municipality • The reason for proposed mitigation measures is that the site falls directly within an area proposed for open cast mining activities (<i>Figures 28 & 29</i>). 		
<p>Cumulative impacts: <i>cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.</i></p>		
<p>Positive:</p> <ul style="list-style-type: none"> • The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP. <p>Negative:</p> <ul style="list-style-type: none"> • <i>Once the cemetery has been relocated there will be no further cumulative impacts.</i> 		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery extent should be mapped, graves should be relocated to a municipality proclaimed cemetery following a consultative process with interested and affected parties because the cemetery fall directly within an area proposed for open cast mining.		
Project component/s	Construction phase of the project	
Potential Impact	Destruction of the graves and disturbance of the remains from excavation	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> Destruction of the graves and disturbance of the remains from excavation 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be mapped prior the construction phase. A consultative process with I&APs should also take place and apply to SAHRA BGG Unit for relocation of the remains.	
Mitigation: Action/control	Responsibility	Timeframe
With the approval of the project, the applicant should appoint an archaeologist/heritage consultant of his/her choice to apply to SAHRA BGG to relocate the graves to a municipality proclaimed cemetery in consultation with the interested and affected parties. Other permits will include a permit from Gauteng Department of Health, Emfuleni Parks and Cemeteries; South African Police Services should also be informed of the process. .	Accredited archaeologist and heritage consultant.	Prior to the construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.	

Monitoring

The graves are proposed for relocation to a municipality proclaimed cemetery. The cemetery fall directly within the proposed open cast mining area.



Figure 14- Sand mine labourers compound





Figure 15-Women (above) and a male (below) pointing to the area in which the graves are located. There are signs of recent bulldozing in the area - could be a year older

Site	PAN-06
Type	Cemetery
Density	One visible grave - site is overgrown with vegetation
Location/Coordinates	S26 44 54.3 E28 00 24.4
Approximate Age (>60 Or <60 years old)	More than 60 years old
Applicable Section of the NHRA, No 25 of 1999:	Section 36

Description:

The site is an overgrown cemetery that has been fenced off from the existing sand mining activities (*Figure 16*). Because of vegetation cover the only one grave could be identified (*Figure 17*).

- The site fall within an area earmarked for open cast mining activities within the Panfontein Colliery - northern section of the study area (*Figures 28 & 29*).

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Site	High	Moderate	High significance	Definite	Permanent	Apply for relocation permit and Relocate the cemetery

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure). The cemetery is located directly within an area earmarked for open cast mining activities.

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Site (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (2)
Probability	Definite (5)	Definite (5)
Significance	(120) High	(40) Moderate
Status (positive or negative)	Negative	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- The cemetery should be cleared of vegetation
- A grave count should take place to ascertain the exact number of graves within the cemetery
- A permit should be applied for with SAHRA BGG Unit to relocate the graves since the cemetery is located within an area earmarked for open cast mining (*Figures 28 & 29*).
- Permits with provincial department health, Emfuleni Local Municipality parks and cemeteries and South African Police Services should also be applied for.
- Social consultation should also take place with I & APs especially families of the deceased to get their permission
- This should all be done prior to construction and operational phases of the project

Cumulative impacts: *cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.*

Positive:

- The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative:

- *Once the cemetery has been relocated there will be no further cumulative impacts.*

OBJECTIVE: Measures for inclusion in the draft Environmental Management Plan:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be clean, grave count should take place to get the number of graves in the cemetery, and the graves should be relocated to a municipality proclaimed cemetery following a consultative process with interested and affected parties because the cemetery fall directly within an area proposed for open cast mining.

Project component/s	Construction phase of the project	
Potential Impact	Destruction of the graves and disturbance of the remains from excavation and blasting for the open cast.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> Destruction of the graves and disturbance of the remains from excavation and blasting for the open cast. 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be clean and graves inventory be developed prior to construction phase. A consultative process with I & AP should also take place and application for relevant permits should also take place before construction phase.	
Mitigation: Action/control	Responsibility	Timeframe
With the approval of the project, the applicant should appoint an accredited archaeologist/heritage consultant or CRM Firm of his/her choice to apply to SAHRA BGG to relocate the graves to a municipality proclaimed cemetery in consultation with the interested and affected parties. Other permits will include a permit from Gauteng Department of Health, Emfuleni Parks and Cemeteries and the South African Police Services should also be	Accredited archaeologist and heritage consultant or CRM firm.	Prior to construction and operation phases of the project.

informed of the process. .

Performance Indicator

The type of indicator used here will be **Actionable Indicators** – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.

Monitoring

The graves are proposed for relocation to a municipality proclaimed cemetery because the cemetery falls directly within the proposed open cast mining area (Figure).





Figure 16- Overgrown cemetery which has been fenced off from the current sand mine activities. It has an access gate.

(Figure 18). Because of vegetation cover the approximately 13 grave could be identified (Figures 20 & 21). The site is located in an island because the current mine has mine around the cemetery making it difficult to access (Figure 19). This poses a great to the cultural heritage of the families of the deceased as it raised issues of access to place of their cultural ancestry.

- The site fall within an area earmarked for open cast mining activities within the Panfontein Colliery - northern section of the study area (Figures 28 & 29).

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Site	High	Moderate	High significance	Definite	Permanent	Apply for relocation permit and Relocate the cemetery

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure). The cemetery is located directly within an area earmarked for open cast mining activities.

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Site (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (2)
Probability	Definite (5)	Definite (5)
Significance	(120) High	(40) Moderate
Status (positive or negative)	Negative	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- The cemetery should be cleared of vegetation
- A grave count should take place to ascertain the exact number of graves within the cemetery
- A permit should be applied for with SAHRA BGG Unit to relocate the graves since the cemetery is located within an area earmarked for open cast mining (*Figures 28 & 29*).
- Permits with provincial department health, Emfuleni Local Municipality parks and cemeteries and South African Police Services should also be applied for.
- Social consultation should also take place with I & APs especially families of the deceased to get their permission
- This should all be done prior to construction and operational phases of the project

Cumulative impacts: *cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.*

Positive:

- The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative:

- *Once the cemetery has been relocated there will be no further cumulative impacts.*

OBJECTIVE
Measures for inclusion in the draft Environmental Management Plan:

The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be clean, grave count should take place to get the number of graves in the cemetery, and the graves should be relocated to a municipality proclaimed cemetery following a consultative process with interested and affected parties because the cemetery fall directly within an area proposed for open cast mining.

Project component/s	Construction phase of the project	
Potential Impact	Destruction of the graves and disturbance of the remains from excavation and blasting for the open cast.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> Destruction of the graves and disturbance of the remains from excavation and blasting for the open cast. 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be clean and graves inventory be developed prior to construction phase. A consultative process with I & AP should also take place and application for relevant permits should also take place before construction phase.	
Mitigation: Action/control	Responsibility	Timeframe
With the approval of the project, the applicant should appoint an accredited archaeologist/heritage consultant or CRM Firm of his/her choice to apply to SAHRA BGG to relocate the graves to a municipality proclaimed cemetery in consultation with the interested and affected parties. Other permits will include a permit from Gauteng Department of Health, Emfuleni Parks and Cemeteries and the South African Police Services should also be informed of the process. .	Accredited archaeologist and heritage consultant or CRM firm.	Prior to construction and operation phases of the project.

Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.
Monitoring	The graves are proposed for relocation to a municipality proclaimed cemetery because the cemetery falls directly within the proposed open cast mining area (Figure).



Figure 18- Fence of the cemetery - red arrows show position of corner poles of the fence



Figure 19- Disturbed area around the cemetery - big trenches have be excavated and some are now filled with water making it difficult to access the cemetery





Figure 20- Grave with visible headstones - granite headstone



Figure 21- Stone mound dressing and headstone

Site	PAN-08
Type	Cemetery
Density	No headstone or markers identified
Location/Coordinates	S26 44 58.5 E28 01 12.7
Approximate Age (>60 Or <60 years old)	Suggested to be (More than 60 years old)
Applicable Section of the NHRA, No 25 of 1999:	Section 36
Description:	

The site is suggested to be a cemetery located in between big sand mine trench and near a concentration of large pine trees (*Figure 22*). No cemetery or grave markers were found on site. The labourers, however, know the location of the graves even though the grave markers are no longer visible.

- The site fall within an area earmarked for open cast mining activities within the Panfontein Colliery - northern section of the study area (*Figures 28 & 29*).

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Site	High	High	High significance	Definite	Permanent	Search the extent of the cemetery, apply for relocation permit and Relocate the cemetery

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure). The cemetery is located directly within an area earmarked for open cast mining activities.

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Site (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	(120) High	(60) High
Status (positive or negative)	Negative	Positive
Reversibility	Low	High

Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> • The extent of the cemetery should be searched by means of test trenches • It should be mapped • A social consultative process should take place with the Interested and Affected Parties • The grave should be relocated to a new cemetery within Emfuleni Local Municipality • The reason for proposed mitigation measures is that the site falls directly within an area proposed for open cast mining activities (<i>Figures 28 & 29</i>). 		
<p>Cumulative impacts: <i>cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.</i></p>		
<p>Positive:</p> <ul style="list-style-type: none"> • The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP. <p>Negative:</p> <ul style="list-style-type: none"> • <i>Once the cemetery has been relocated there will be no further cumulative impacts.</i> 		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery extent should be mapped, graves should be relocated to a municipality proclaimed cemetery following a consultative process with interested and affected parties because the cemetery fall directly within an area proposed for open cast mining.		
Project component/s	Construction phase of the project	
Potential Impact	Destruction of the graves and disturbance of the remains from excavation	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> Destruction of the graves and disturbance of the remains from excavation 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be mapped prior the construction phase. A consultative process with I&APs should also take place and apply to SAHRA BGG Unit for relocation of the remains.	
Mitigation: Action/control	Responsibility	Timeframe
With the approval of the project, the applicant should appoint an archaeologist/heritage consultant of his/her choice to apply to SAHRA BGG to relocate the graves to a municipality proclaimed cemetery in consultation with the interested and affected parties. Other permits will include a permit from Gauteng Department of Health, Emfuleni Parks and Cemeteries; South African Police Services should also be informed of the process. .	Accredited archaeologist and heritage consultant.	Prior to the construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.	

Monitoring

The graves are proposed for relocation to a municipality proclaimed cemetery. The cemetery fall directly within the proposed open cast mining area.



Figure 22- Place/ area in which the suggested graves are said to be located. Note two male figures assisting with the search

Site	PAN-09	
Type	Cemetery	
Density	Approximately 18 graves (identified)	
Location/Coordinates	S26 46 05.1	E28 02 43.1

Approximate Age (>60 Or <60 years old)	Older than 60 years (some graves)
Applicable Section of the NHRA, No 25 of 1999:	Section 36
<p>Description:</p> <p>The site is a cemetery with approximately 18 identifiable graves. It is located near a concrete crusher plant and is fenced off from the mining activities. Like other graves found in and around Panfontein it is overgrown with vegetation (<i>Figure 23</i>). The site fall outside the proposed Panfontein Colliery site boundary as mapped out in Figures (28 & 29). It is mentioned here because it was visited under the impression that it was within the site boundaries of the proposed mine. The site is overgrown but the levels of vegetation thickness and height are shorter than those on sites located with the mining area and this made it possible to get high numbers for graves during the temporary count.</p> <ul style="list-style-type: none"> • The graves are dressed in stone mounds, some in cement and brick and granite. • The headstones include those made from cement, to stone headstone and granite • Grave orientation is east-west - typical and traditional burial orientation 	

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Localised	High	Low	High significance	Definite	Long-term : Construction & operational phases	Avoid and treat as a No-Go Area

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Local (1)	Local (1)
Duration	Short term (1)	Short term (1)
Magnitude	Low (2)	Low (2)
Probability	Improbable (1)	Improbable (1)
Significance	(4) Negligible	(4) Negligible
Status (positive or negative)	N/A	N/A
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- The cemetery is located outside the Panfontein Colliery mining area (*Figures 28 & 29*).
- It should be avoided during the construction phase of the project and treated as a No-Go Area.

Cumulative impacts: *cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.*

Positive:

- The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative:

- *The grave is located outside the proposed Panfontein Colliery mining area and will not be affected.*

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be avoided and treated as a No-Go Area during the construction phase and operational phase of the project. There is no need to relocate it as it is located outside the proposed Panfontein Colliery mining area.		
Project component/s	Construction phase of the project	
Potential Impact	In cases where the cemetery is not avoided and treated as a No-Go Area it may be impacted by the construction activities or mining infrastructure such as machinery.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> The site falls outside the proposed Panfontein Colliery mining area. 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be treated as a No-Go Area and be avoided by all means. It falls outside the proposed Panfontein Colliery mining area	
Mitigation: Action/control	Responsibility	Timeframe
The cemetery should be treated as a No-Go Area and be avoided by all means. It falls outside the proposed Panfontein Colliery mining area	ECO	During construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.	
Monitoring	ECO	



concrete crusher plant and is fenced off from the mining activities. Like other graves found in and around Panfontein it is overgrown with vegetation (*Figure 24*). The site falls outside the proposed Panfontein Colliery site boundary as mapped out in Figures (28 & 29). It is mentioned here because it was visited under the impression that it was within the site boundaries of the proposed mine. The site is overgrown but the levels of vegetation thickness and height are shorter than those on sites located within the mining area.

- The graves are dressed in stone mounds and some in cement and brick.
- The headstones include crosses made from cement and some have stone headstone
- Grave orientation is east-west - typical and traditional burial orientation

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.A	G3C	Localised	High	Low	High significance	Definite	Long-term : Construction & operational phases	Avoid and treat as a No-Go Area

1. Construction Phase: destruction or disturbance of the graves on the cemetery to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	Without mitigation	With mitigation
Scale	Local (1)	Local (1)
Duration	Short term (1)	Short term (1)
Magnitude	Low (2)	Low (2)
Probability	Improbable (1)	Improbable (1)
Significance	(4) Negligible	(4) Negligible
Status (positive or negative)	N/A	N/A
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- The cemetery is located outside the Panfontein Colliery mining area (*Figures 28 & 29*).
- It should be avoided during the construction phase of the project and treated as a No-Go Area.

Cumulative impacts: *cumulative impacts are predicated to result from the construction activities (& associated infrastructure development) and from the operational phase of the projects.*

Positive:

- The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative:

- *The grave is located outside the proposed Panfontein Colliery mining area and will not be affected.*

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the cemetery should be avoided and treated as a No-Go Area during the construction phase and operational phase of the project. There is no need to relocate it as it is located outside the proposed Panfontein Colliery mining area.		
Project component/s	Construction phase of the project	
Potential Impact	In cases where the cemetery is not avoided and treated as a No-Go Area it may be impacted by the construction activities or mining infrastructure such as machinery.	
Project component/s	Operational phase of the project	
Potential Impact	<ul style="list-style-type: none"> The site falls outside the proposed Panfontein Colliery mining area. 	
Activity/risk source	Exclusion of the above objectives from the overall Environmental Management Plan	
Mitigation: Target/Objective	The cemetery should be treated as a No-Go Area and be avoided by all means. It falls outside the proposed Panfontein Colliery mining area	
Mitigation: Action/control	Responsibility	Timeframe
The cemetery should be treated as a No-Go Area and be avoided by all means. It falls outside the proposed Panfontein Colliery mining area	ECO	During construction and operation phases of the project.
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the project against their actual implementation.	
Monitoring	ECO	





Figure 24- Cemetery located south and west of the concrete crusher plant

Site	PAN-11	
Type	BELF - Oak tree	
Density	Low	
Location/Coordinates	S26 44 10.4	E28 01 25.6
Approximate Age (>60 Or <60 years old)	More than 60 years old	
Applicable Section of the NHRA, No 25 of 1999:	Section 34	
Description:		
<p>The site is an old tree asserted to have been planted by the 'mighty' Harry Oppenheimer, former Chairman of Anglo-American who are the previous owners of the Farm Panfontein 437 IR (e.g. <i>Figure 8</i>) (Coetzee, 2009). This matured tree stands in the middle of other trees in front of the current sand</p>		

mine offices and workshop (*Figure 25*).

Nature of Impacts, Assessments & Predictions in terms of Standard Heritage & Basic Assessment (i.e. adopted from Standard Environmentally Basic Assessment Guidelines):

Field Rating	Grade	Impact	Impact Significance (WOM)	Impact Significance (WM)	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP-B	G3D	Localised	High	Low	Medium Significance	Probable	Construction & Operational phase	Mapping of the site

Nature of Activities:

1. Construction Phase: construction, demolition and restoration of some of the buildings on Farm Panfontein 4371R to make way for the proposed mining activities on site (and the associated infrastructure).

Operation Phase: N/A

	WOM	WM
Probability	Highly Probable (4)	Probable (1)
Duration	Permanent (5)	Short term (1)
Scale	Site (2)	Local (1)
Magnitude/Severity	Medium (6)	Low (2)
Significance	(52)High	(8)Low
Status (positive or negative)	Negative	Positive
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- Mapping of the site. A plaque can be placed in front or next to the tree with a photo of the tree being placed on it and the story of Panfontein narrated.
- In future should the area be considered for open cast mining the tree will need to be uprooted and replanted elsewhere.

Cumulative impacts: Such impacts are expected with the construction phases of the project if no decision is made about this structure during this current planning process and it is suddenly decided that it should be demolished or renovated or refurbished resulting to its historic fabric and integrity

being compromised

Residual Impacts:

Positive:

- The project will positively contribute to economic development of the Emfuleni local Municipality, Midvaal District, Gauteng and South Africa's GDP.

Negative:

With the destruction of this tree regardless of proposed mitigations, there will be a sense of loss of vernacular architecture of the 'old' Vereeniging.

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE:		
The overall goal is to identify, manage and conserve heritage resources within and immediately outside the proposed development footprint i.e. the Panfontein 437 IR. In order to achieve this goal it is recommended that the historic building be documented in full before its destruction or refurbishment		
Project component/s	Construction phase of the project	
Potential Impact	Destruction of the tree without uprooting and replanting it elsewhere	
Project component/s	Operational phase of the project	
Potential Impact	Destruction of the tree without uprooting and replanting it elsewhere	
Activity/risk source	No keeping to recommendation of this HIA report	
Mitigation: Target/Objective	Destruction of the tree without uprooting and replanting it elsewhere	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> Destruction of the tree without uprooting and replanting it elsewhere 	Applicant and its client	Before the construction and operational phase of the project
Performance Indicator	The type of indicator used here will be Actionable Indicators – this will measure action/progress in terms of completion of the above objectives with the approval of the EMP against their actual implementation.	
Monitoring	<ul style="list-style-type: none"> The applicant and appointed heritage expert PHRAG should also do site visits during the project construction phase to monitor if heritage management objective as recommended in the current and future documents are met. 	



Figure 25- The tree suggested to be the same tree planted by Harry Oppenhemmer in the 1930s when his company owned the property.

6. DISCUSSION OF THE RESULTS

Heritage Scoping Level:

The scoping level of this project yielded the following information about the Farm Panfontein 437 IR:

The farm was already in existence in the early 1900s and was Panfontein 133 (*Figures 4 & 5*). It contained among other features what in the old maps is referred as Kraals or African homesteads. There was also indication of three pans on the farm (*Figures 4 & 5*). In the 1930s it was under Anglo-American Group of companies and was associated with figures such as the late Harry Oppenheimer (*Figure 8*). On the current maps the farm is referred to as Panfontein 417IR meaning that it had undergone many sub-divisions over the years. The kraals provided the basis to for the hypothesis that we were more likely to

find heritage resources within the farm from a scoping level, and these resources would include from among other thing Kraals and potential of burial grounds and graves. Physical survey of the farm from a scoping level took place on the 28th of March 2014 to familiarise the team with the site and identify or confirm some of the resources identified in the early maps of the farm. A number of other farms were located within the Panfontein Colliery proposed mining footprint and this included graves and built environment and landscape features such as historic buildings and trees. An assessment of existing HIA about the site produced in year 2009 it yielded information about one particular tree suggested to have been planted by Harry Openhemmer when they use to own Panfontein. This tree was confirmed in the second phase of survey conducted the 22nd of April 2014 (*Figure 25*).

In total the two onsite physical survey of the study area yielded eleven heritage sites and features in form of graves (mostly cemeteries), historic buildings and the confirmed tree which forms part of the cultural landscape of the area. All these resources are mapped in *Figure 26* of the proposed Panfontein Colliery mining area as marked in *Figures 27 and 28*.

Heritage Impact Level:

On the receipt of the map showing the proposed mining activities within Panfontein Colliery mining area (*Figure 28*), the heritage map developed during the scoping phase of the project (e.g. *Figure 26*) was overlain on the this mining infrastructure and activities map to assess the impact of the proposed mining activities on the identified heritage resources. This process resulted to the development of a Heritage Impact Assessment (HIA) as shown in **Figure 29** of this report.

Out of the identified heritage resources to cemeteries were mapped outside the proposed Panfontein 437 IR Colliery (*Figure 26 & 29*). These resources will not be directly affected by the proposed development of the Panfontein Colliery unless there mining area is expanded in the future. These two sites are PAN-09 and PAN-10 and they make up 18.2% of the identified heritage resources. Amongst sites that fall directly within the proposed mining areas of the propose Panfontein Colliery - five sites fall directly within an area that has been earmarked for underground mining activities (*Figure 28*) - these sites include: PAN-01, PAN-02, PAN-03, PAN-04 and PAN-11 and the make up 46.4% of the total number of identified heritage resources (*Figure 29*). The heritage significance of these sites varies from high to low and the levels of impacts of the proposed mining activities also vary from

low (with mitigation) to high (without mitigation). But, because these sites are located in an area earmarked for underground mining activities their likelihood of them being directly affected by mining are very low and will not be directly affected. For PAN-03 the mitigation measure will involve the fencing of the cemetery and development of a cemetery management plan to manage the cemetery. While site PAN-04 will have to be avoided and treated as the No-Go Area - a mitigation measure also proposed for sites PAN-09 and PAN-10. Depending on what is proposed for PAN-01 the mitigation will have to involve the mapping and documentation of this historic building by a conservationist architect. The building can also be adaptively re-used as one of Panfontein Colliery offices - most preferred an office that will deal with environmental issues of the site since it is one of the cultural environmental features.

Four sites will be directly affected by the proposed development and these include PAN-05, PAN-06, PAN-07 and PAN-07 and they make up 36.4% of the total number of heritage sites identified in this project (*Figure 29*). These sites fall directly within an area earmarked for open cast mining activities (*Figure 28*). Open cast mining will have a direct impact on these resources and they should be mitigated. The levels of impact vary from high (without mitigation) to low (with mitigation). All the four sites are burial ground and graves in form of cemeteries. Their mitigation will involve the following:

- Cleaning, counting and development of graves/cemetery inventory.
- Conducting a detailed social consultation and public participation to get the relatives of the deceased and request them for permission to relocate the graves to a municipality proclaimed cemetery making way for the proposed open cast mining activities
- Once permissions have been obtained from the next of kin to relocate the graves
- Permit with SAHRA- BGG Unit will need to be applied for and other permits will be from the Gauteng Department of Health, Emfuleni Local Municipality Parks and Cemeteries as well as the South African Police Services.
- Following the completion of this process the graves can be relocated. Because each of the sites have various impacts different impact mitigations have been proposed per site.
- For example for sites such as PAN-08 and PAN-05 the mitigation will have to involve the search for cemetery extent before any relocation can be done.

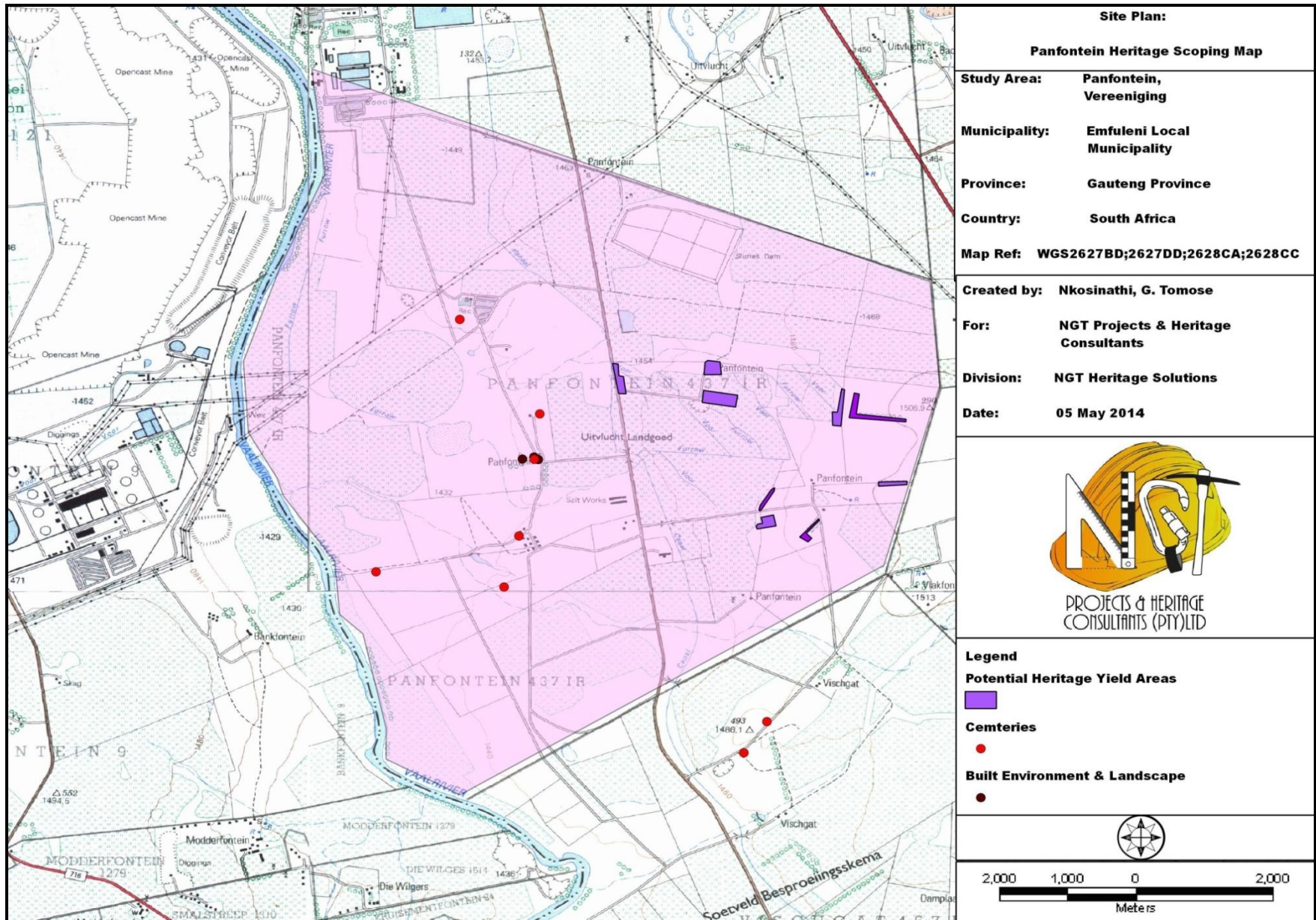


Figure 26 - Distribution of identified burial grounds and graves sites, built environment and landscape features within and immediately outside the proposed Panfontein Colliery development area, Emfuleni Local Municipality, Gauteng, South Africa.

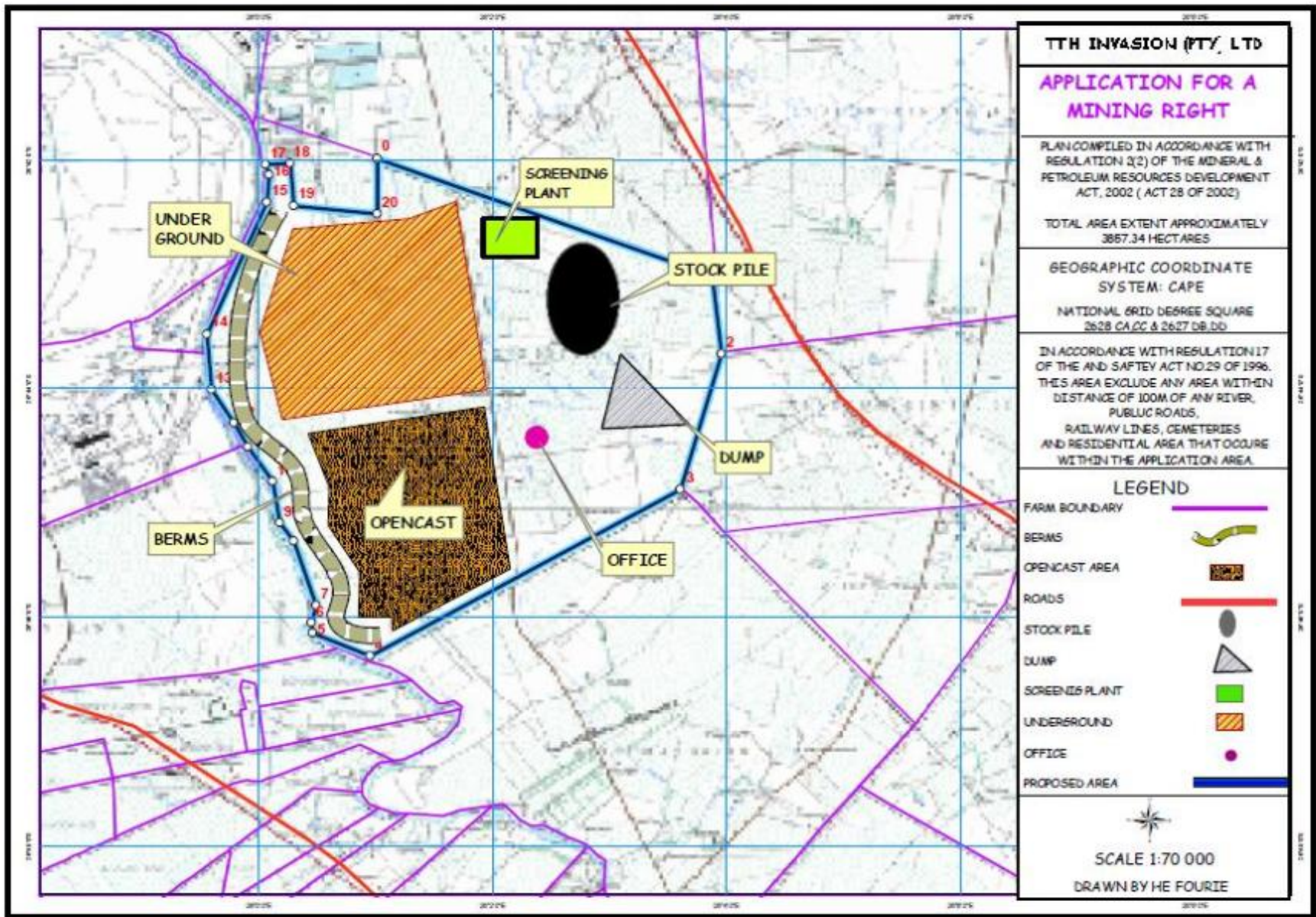


Figure 28- Map showing areas proposed for mine infrastructure within Panfontein 437 IR for the proposed Panfontein Collier.

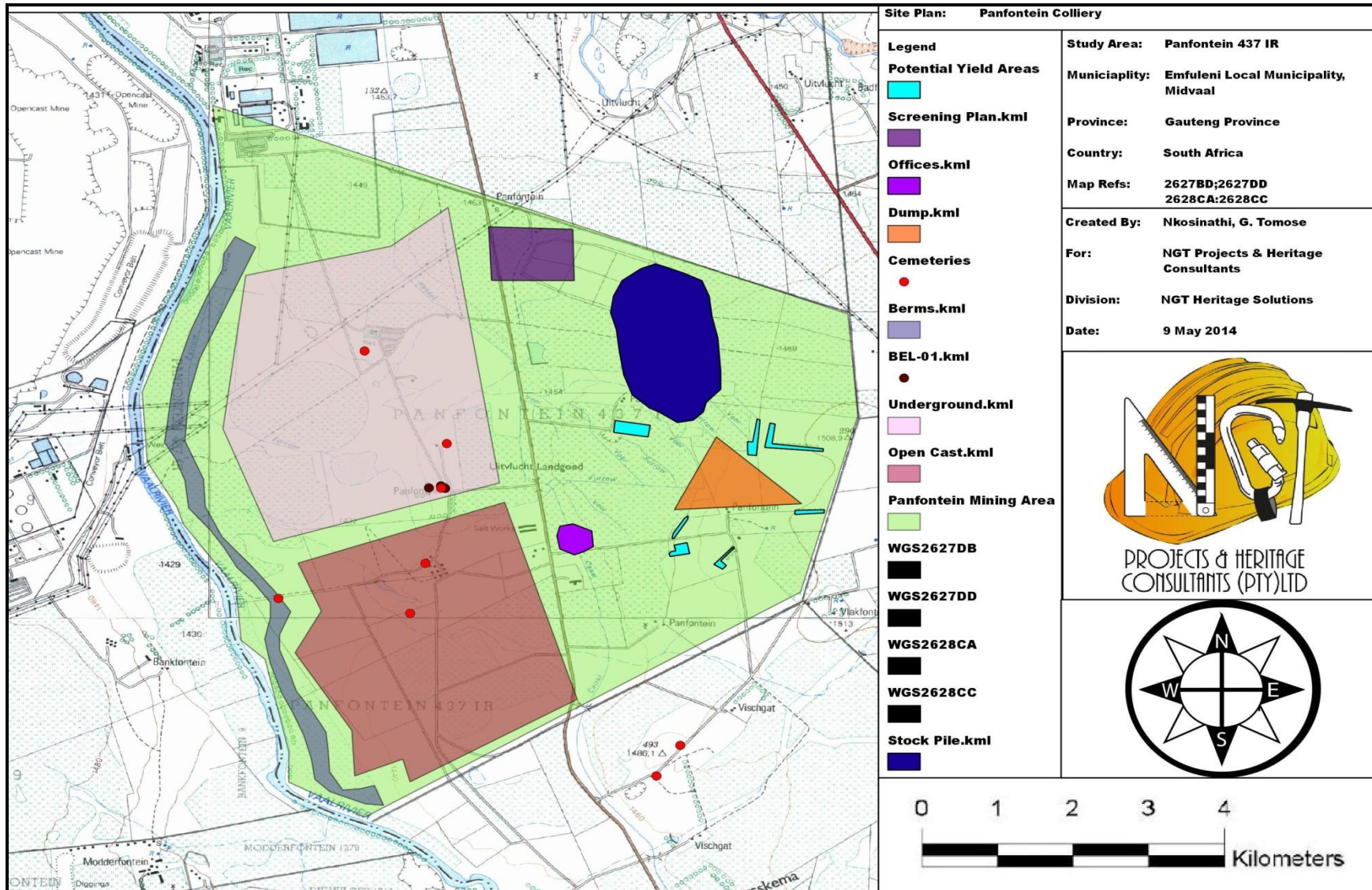


Figure 29-Map showing areas proposed for mine infrastructure within Panfontein 437 IR for the proposed Panfontein Colliery and the identified heritage resources.

7. CONCLUSIONS

The following conclusions are made about the site:

- In both the scoping level and heritage impact assessment level of this project no traditional archaeological (Stone Age, Iron Age) or rock art sites were identified.
- A total of 6 burial grounds and grave sites were identified of which 2 falls outside the project footprint - PAN-09 and PAN-10.
- Other burial grounds and gravesites fall in an area earmarked for underground mining activities - PAN-03 and PAN-04.
- The rest of the burial grounds and grave sites PAN-05 to PAN-08 will be directly impacted by the proposed Panfontein Colliery because they fall directly within an area earmarked for opencast mining activities and these sites will need to be mitigated by means of relocating them to a municipality proclaimed cemetery.
- PAN-01 will need to be mitigated by means of documentation and mapping by accredited conservationist architecture.
- Based on the above it is concluded that the proposed Panfontein Colliery can be approved on condition that the developers agrees and abides to the proposed mitigation measures for the management of heritage resources within Panfontein 437IR.

8. RECOMMENDATIONS

The following recommendations are made about the site - Panfontein Colliery Site:

- It is recommended that the developer abides to the proposed heritage management measures for the management and mitigation of the identified heritage resources sites within the proposed development footprint prior to project construction and operational phases.
- A letter from the developer acknowledging the recommendations of this report will need to be developed and submitted to the SAHRA-BGG Unit for the management of burial ground and graves and to the PHRA-G for the management built environment and landscape features as identified in this report.
- This letter, together with this heritage report, will aid the adjudication process and assist SAHRA-BGG and PHRA-G make an informed decision in terms of the Review Comment and on the next steps to be followed thereof from a heritage resources management point of view.

- From an independent point of view, we would encourage SAHRA-BGG Unit and PHRA-G to give the project a Positive Review Comment depending on whether the developer agrees with the finding of this report.

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