

Phase 1 Heritage Impact Assessment Report

DESKTOP AND FIELD BASED HERITAGE IMPACT
ASSESSMENT FOR THE PROSPECTING RIGHTS
APPLICATION FOR PORTION 1 AND 16 OF THE FARM
JAGERSFONTEIN 14, GHARIEP DISTRICT,
FREE STATE PROVINCE

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As the duly appointed representative of G&A Heritage, I Stephan Gaigher, hereby confirm my independence as a specialist and declare that neither I nor G&A Heritage have any interests, be it business or otherwise, in any proposed activity, application or appeal in respect of which the Environmental Consultant was appointed as Environmental Assessment Practitioner, other than fair remuneration for work performed on this project.

SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Prospecting Rights Application for the Remainder of Portions 1 and 16 of the Farm Jagersfontein 14, Fauresmith District, Free State

Municipal Area: Kopanong Local Municipality

Developer: Jagersfontein Developments (Pty) Ltd.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa,
38A Vorster St, Louis Trichardt, 0920

Date of Report: 21 February 2019

The purpose of the management summary is to distil the information contained in the report into a format that can be used to give specific results quickly and facilitate management decisions. It is not the purpose of the management summary to repeat in shortened format all the information contained in the report, but rather to give a statement of results for decision making purposes.

This study focuses on the Prospecting Rights Application for Portions 1 and 16 of the Farm Jagersfontein 14 in the Kopanong Local Municipality of the Free State Province:

- Farm Jagersfontein 14 Portion 1 (Remainder)
- Farm Jagersfontein 14 Portion 16 (Remainder)

This study encompasses the heritage impact investigation. The client indicated that although the whole site as indicated was applied for prospecting rights, only four core areas were earmarked for active mining. It was decided, in collaboration with SAHRA, that the four core areas indicated would be subjected to a field based HIA, while the remainder was to be subjected to only a desktop study. It was agreed that should the focus areas change, the new areas would be subjected to a full field based HIA before any environmental alterations are executed.

Scope of Work

A desktop and field based Heritage Impact Assessment (including Archaeological, Cultural heritage, Built Heritage and Basic Paleontological Assessment) was performed to determine the impacts on heritage resources within the study area from documented records. The field based HIA would only evaluate the focus areas as indicated by the client.

The following are required to perform the assessment:

- A desk-top investigation of the whole prospecting rights application area;
- A field based full HIA on the identified core areas.
- Identify possible archaeological, cultural, historic and built environment sites within the proposed prospecting area;
- Evaluate the potential impacts of construction and operation of the proposed prospecting on archaeological, cultural, historical resources; built and paleontological resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural, historical and built environment importance.

The purpose of this study is to determine the possible occurrence of sites with cultural heritage significance within the total study area. The study is based on archival and document investigations for the whole prospecting rights application area, while the four core areas were subjected to a full HIA.

Findings & Recommendations

The study area was found to be rich in heritage sites. The prospecting rights application area has in large part been subjected to previous in depth studies which has identified several sites of heritage significance. Management guidelines has previously been listed in these reports. The only site in imminent danger of

damage within the four core areas is the Cavalry Site which has also previously been identified. It is noted that Fauresmith Industry Stone Tools could occur along a drainage canal within Area D. This should be monitored during development.

Fatal Flaws

No fatal flaws were identified.

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LIST OF ABBREVIATIONS

Bp.....	Before Present
EIA.....	Early Iron Age
ESA.....	Early Stone Age
Fm.....	Femtometre (10^{-15} m)
GPS.....	Geographic Positioning System
HIA.....	Heritage Impact Assessment
I&AP.....	Interested and Affected Parties
KZN.....	KwaZulu Natal
LIA.....	Late Iron Age
LSA.....	Late Stone Age
MYA.....	Million Years Ago
MSA.....	Middle Stone Age
NHRA.....	National Heritage Resources Act no 22 of 1999
PRA.....	Prospecting Rights Application
SAHRA.....	South African Heritage Resource Agency
S&EIR.....	Scoping & Environmental Impact Reporting
Um.....	Micrometre (10^{-6} m)
WGS 84.....	World Geodetic System for 1984

HERITAGE IMPACT REPORT

DESKTOP HERITAGE IMPACT ASSESSMENT AND HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROSPECTING RIGHTS APPLICATION FOR THE REMAINDER OF PORTIONS 1 AND 16 OF THE FARM JAGERSFONTEIN 14.

1. INTRODUCTION

Legislation and methodology

G&A Heritage was appointed by *Turn 180 Environmental Consultants* to undertake a Heritage Impact Assessment for the Prospecting Rights Application for the remainders of Portion 1 and 16 of the Farm Jagersfontein 14 in the Free State Province. As part of this study a field based investigation would be done of four core areas within the PRA Area, earmarked for mining activities. The Prospecting Rights Application Area was only subjected to a desktop study while the four core areas were investigated through a full field based HIA. The paleontological sensitivity of the site has previously been evaluated as per the attached Request for Exemption – which was granted by SAHRA in 2013 (L. Rossouw, 2013).

Section 38(1) of the South African Heritage Resources Act (25 of 1999) requires that a heritage study is undertaken for:

- (a) Construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) Construction of a bridge or similar structure exceeding 50 m in length; and
- (c) Any development, or other activity which will change the character of an area of land, or water –
 - (1) Exceeding 10 000 m² in extent;
 - (2) Involving three or more existing erven or subdivisions thereof; or
 - (3) Involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or
- (d) The costs of which will exceed a sum set in terms of regulations; or
- (e) Any other category of development provided for in regulations.

While the above describes the parameters of developments that fall under this Act., Section 38 (8) of the NHRA is applicable to this development. This section states that;

- (8) *The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.*

In regards to a development such as this that falls under Section 38 (8) of the NHRA, the requirements of Section 38 (3) applies to the subsequent reporting, stating that;

- (3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2) (a): Provided that the following must be included:
- (a) The identification and mapping of all heritage resources in the area affected;
 - (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7;
 - (c) An assessment of the impact of the development on such heritage resources;
 - (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
 - (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
 - (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
 - (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.
 - (1) Ancestral graves,
 - (2) Royal graves and graves of traditional leaders,
 - (3) Graves of victims of conflict (iv) graves of important individuals,
 - (4) Historical graves and cemeteries older than 60 years, and
 - (5) Other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
 - (h) Movable objects, including ;
 - (1) Objects recovered from the soil or waters of South Africa including archaeological and paleontological objects and material, meteorites and rare geological specimens;
 - (2) Ethnographic art and objects;
 - (3) Military objects;
 - (4) Objects of decorative art;
 - (5) Objects of fine art;
 - (6) Objects of scientific or technological interest;
 - (7) Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
 - (8) Any other prescribed categories, but excluding any object made by a living person;
 - (i) Battlefields;
 - (j) Traditional building techniques.

A 'place' is defined as:

- (a) A site, area or region;
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- (c) A group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Structures' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'Archaeological' means:

- (a) Material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- (b) Rock art, being a 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 is older than 100 years including any area within 10 m of such representation; and
- (c) Wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;

(d) Features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. The South African Heritage Resources Agency (SAHRA) will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

The removal of graves is subject to the following procedures as outlined by the SAHRA:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from the SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows:

- Field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.
- It was assumed that the site layout as provided by *Turn 180 Environmental Consultants* is accurate.
- We assumed that the public participation process performed as part of the Basic Assessment process was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

Table 1. Impacts on the NHRA Sections Table 1. Impacts on the NHRA Sections

Act	Section	Description	Possible Impact	Action
National Heritage Resources Act (NHRA)	34	Preservation of buildings older than 60 years	Yes	Recommendations
	35	Archaeological, paleontological and meteor sites	Yes	Recommendations
	36	Graves and burial sites	Yes	Recommendations
	37	Protection of public monuments	Yes	Recommendations
	38	Does activity trigger a HIA?	Yes	HIA

Table 2. NHRA Triggers

Action Trigger	Yes/No	Description
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes	Prospecting Rights Application (PRA)
Construction of a bridge or similar structure exceeding 50m in length.	No	N/A
Development exceeding 5000 m ²	Yes	PRA
Development involving more than 3 erven or sub divisions	No	N/A

Development involving more than 3 erven or sub divisions that have been consolidated in the past 5 years	Yes	PRA
Re-zoning of site exceeding 10 000 m ²	Yes	PRA
Any other development category, public open space, squares, parks or recreational grounds	No	N/A

2. BACKGROUND INFORMATION

2.1 PROJECT SCOPE AND LOCATION

This study entails the Prospecting Rights Application (PRA) for The Remainder of Portions 1 and 16 of the Farm Jagersfontein 14 in the Free State Province. The study is focussed on an area around the town of Jagersfontein. Jagersfontein lies approximately 110km southwest of Bloemfontein in the Free State Province within the Kopanong Local Municipality.

The PRA is for an area of roughly 4300ha. The client has however agreed that only four core areas would be impacted within this area and SAHRA agreed that only these areas would need to be subjected to a full field based study while the rest of the site would undergo a Desktop Study. Should the focus areas change, the new sites will have to be subjected to a full HIA as per the agreement with SAHRA.



Figure 1. Google Earth © Image – Location of Jagersfontein



Figure 2. Google Earth © Image – PRA Area for Jagersfontein

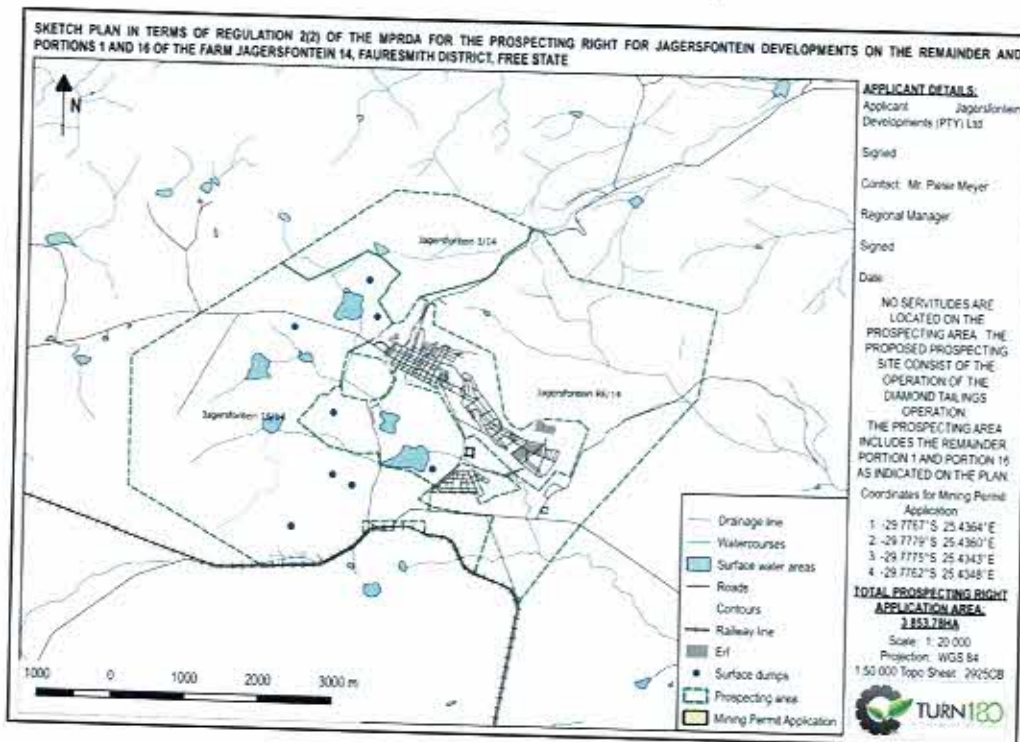


Figure 3. Proposed PRA Area

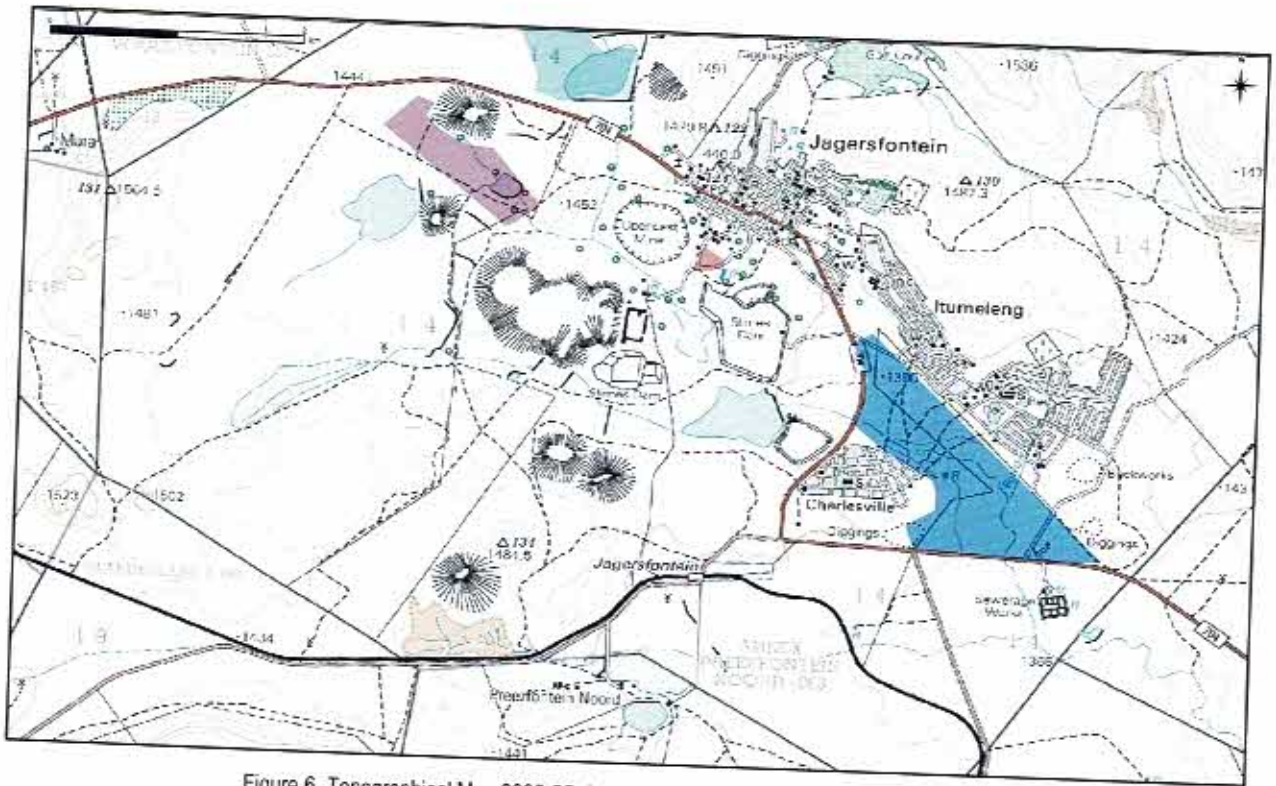


Figure 6. Topographical Map 2925 CD 2005

HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENT

3. REGIONAL CULTURAL CONTEXT

3.1 PALEONTOLOGY

Bedrock geology along the proposed route is characterized by argillaceous rocks of the Tierberg Formation. The formation represents the uppermost unit of the Eccca Group (Karoo Supergroup) and primarily comprises well-laminated, dark shales with abundant carbonate concretions, interbedded by siltstones and fine-grained sandstones. Fish scales and sponge spicules have previously been found in some of the carbonate concretions and trace fossils commonly occur throughout the sequence, but terrestrial vertebrates and plant remains are generally absent from the Tierberg Formation. Geologically recent sediments overlying the Tierberg Formation are made of Quaternary-aged channel fills and sheet-wash deposits, including unconsolidated wind-blown sands and limited alluvium from the nearby Prossespruit. Overbank deposits and alluvial terraces of large river courses such as the nearby Riet River have previously yielded numerous Quaternary vertebrate fossil remains. Unfortunately, vertebrate fossils are usually not well-preserved in shallow alluvial deposits along small river courses and stream beds in this region. (L. Rossouw, 2013).

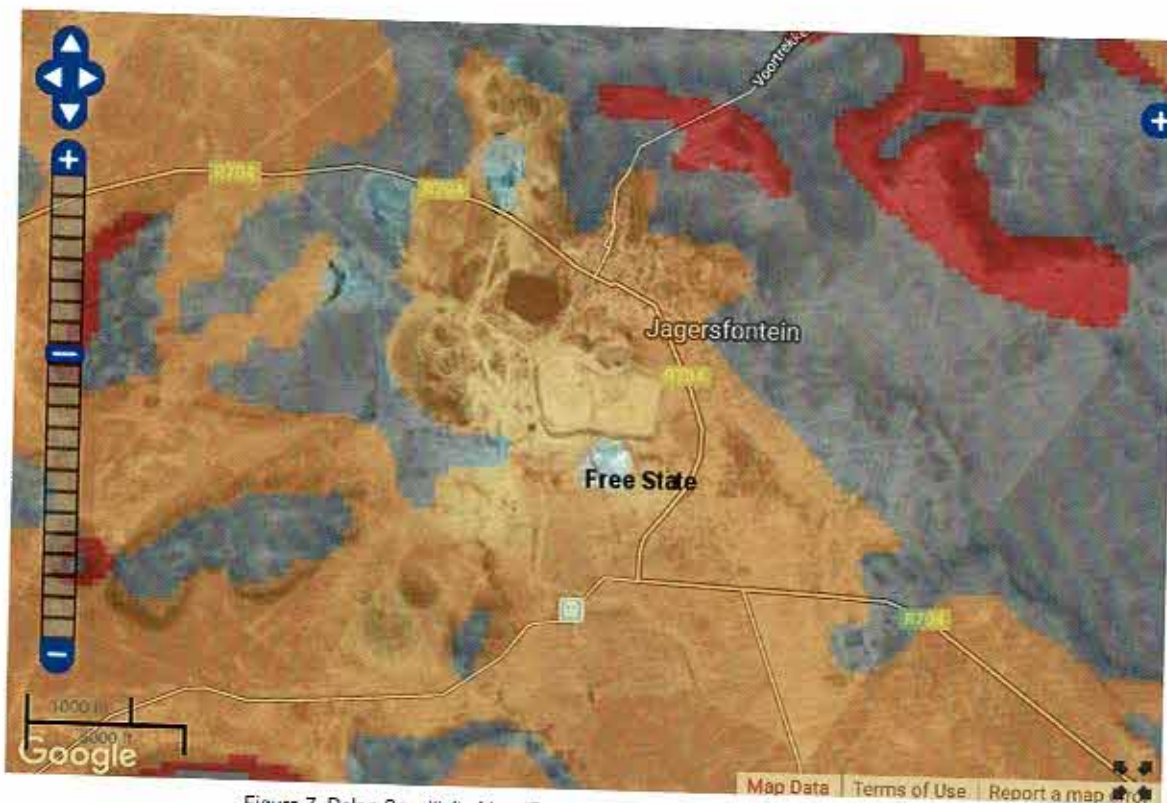


Figure 7. Paleo Sensitivity Map (Exemption study area in Blue and current areas in Purple)

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 8. PalaeoSensitivity Map Legend

From the above it can be seen that the current study areas fall within the same sensitivity zone as the area exempted by SAHRA in 2013 (L. Rossouw, 2013). The Geological Map also indicates the same formations underlying these study areas.

It is recommended that should the core areas change or expand that they be subjected to a full PIA.

3.2 STONE AGE

Extensive research on the Stone Age in this area comes from Goodwin, Van Riet Lowe and Humphreys. Humphreys compiled a map of Fauresmith manufacture sites from 1928, 1929 & 1937 published research of Goodwin and Van Riet Lowe. The map illustrates Fauresmith (circle) and "Stellenbosch" (black dot) manufacturing sites although most of these sites also contain both Smithfield A and B material but in particular Smithfield A with Fauresmith-related sites. It also does not indicate the surface finds of the Fauresmith tradition that are not manufacturing sites. The most important fact to take from this is that the subject area falls within a known area of the Fauresmith-tradition.

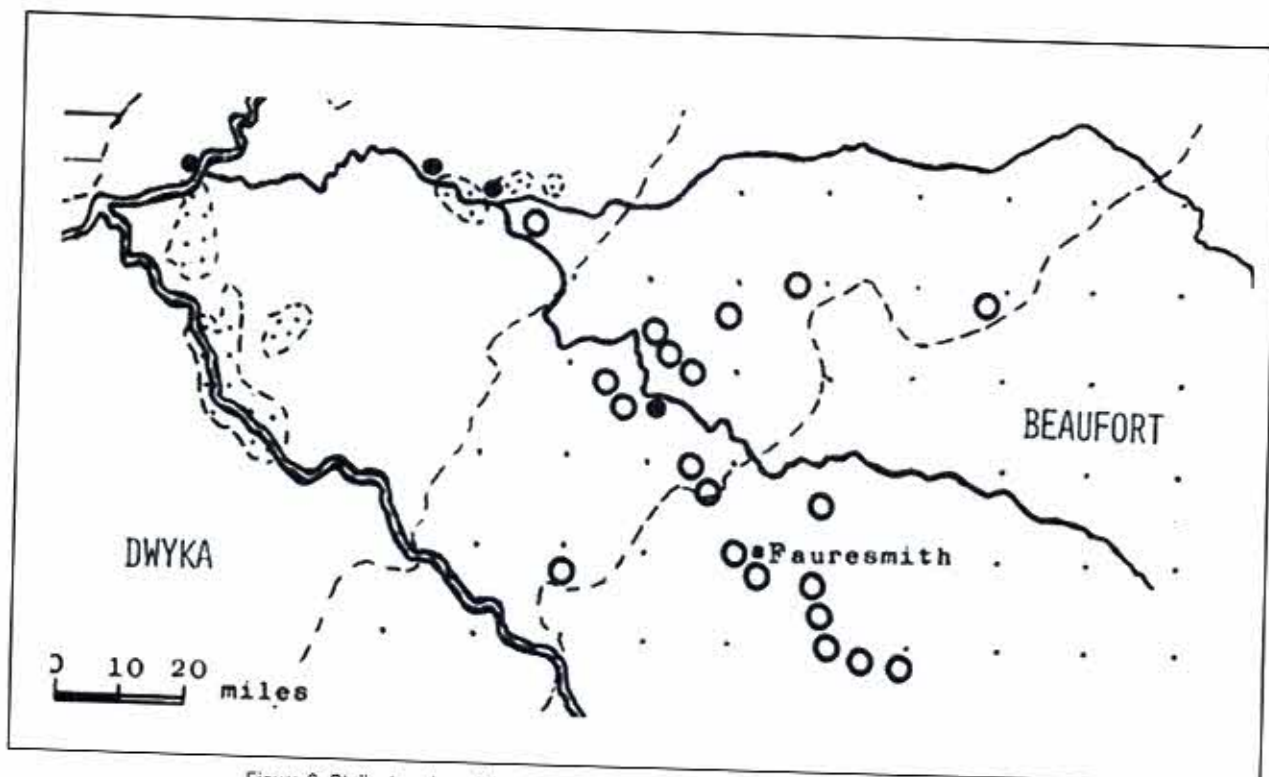


Figure 9. Stellenbosch and Fauresmith sites as per Humphreys (1971)

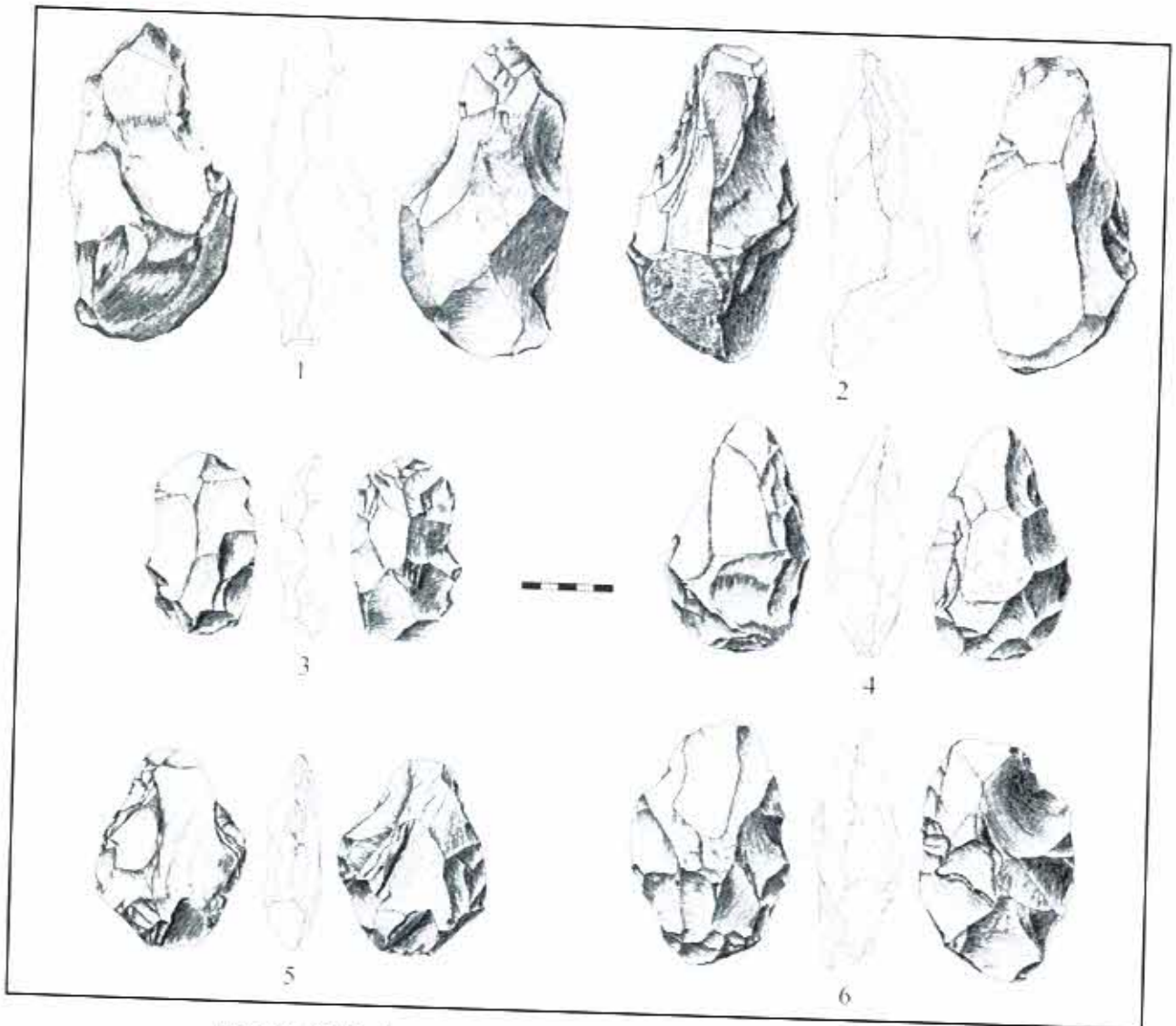


Figure 10. (1,2) Handaxes with large side removal; (3-6) handaxes (Pollarolo, Susino, Kuman, Bruxelles, 2010)

Samson (1974) states that the stratigraphic evidence from three different areas in South Africa demonstrates that the industry following the late Acheulian is not the so-called "Fauresmith", but a complex without any of the characteristics of the Acheulian samples such as hand-axes, cleavers and picks. He furthermore indicate that secondary working of tools is virtually absent in these areas.

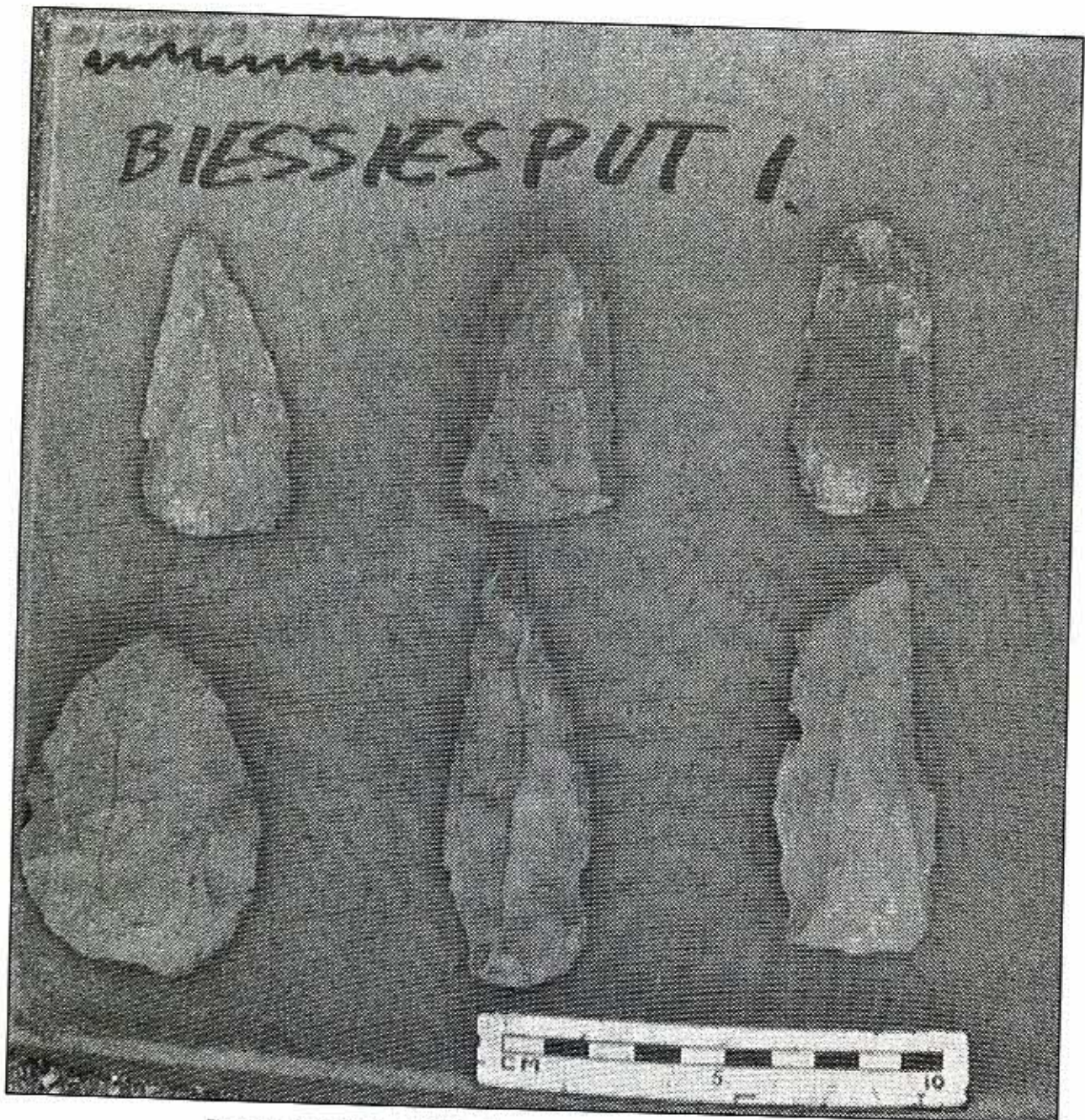


Figure 11. Fauresmith Tools (P. Mitchell, 2002)

Fauresmith Industry manufacturing sites are found on the following farms in the Xhariep District;

- Blaauwheuwel site along the Van Zyl Spruit, a tributary of the Proses Spruit
- Brakfontein (Fauresmith-tradition type site situated 19 km outside Koffiefontein on the road between Koffiefontein and Fauresmith)
- Dwarsvlei-Erfdeel-Fauresmith Townlands
- Koffiefontein
- Leeuwarden
- Petrusberg
- Rorich's Hoop
- Rooidraai
- Spitzkop I and Spitzkop II
- Valschfontein

- Zuurfontein (also along the Van Zyl Spruit)

Material catalogued as Fauresmith-tradition at the National Museum, Bloemfontein, mainly relates to the Orange River area, collected by Sampson during the rescue operation for the new Orange River Scheme (construction of the Gariep Dam).

Goodwin and Van Riet Lowe (1929, pp. 91-92) describe the finding place of the Fauresmith-tradition material at the Fauresmith Town Spruit as "...in the immediate vicinity of the village, exposed in a bed of water-borne gravel that contains vast quantities of Fauresmith Industry remains." The characteristic artefact of the Fauresmith-tradition are handaxes, described as "a neat almond, sometimes ovate.....generally small [size], and the implements are of a length and weight which make them eminently suitable for use in the hand" and are noted as in general being found in dense concentrations.

The subject area falls within the boundary of the Smithfield A distribution area as delineated by Goodwin and Van Riet Lowe (1929) in a map of the Orange Free State Smithfield Industry sites.

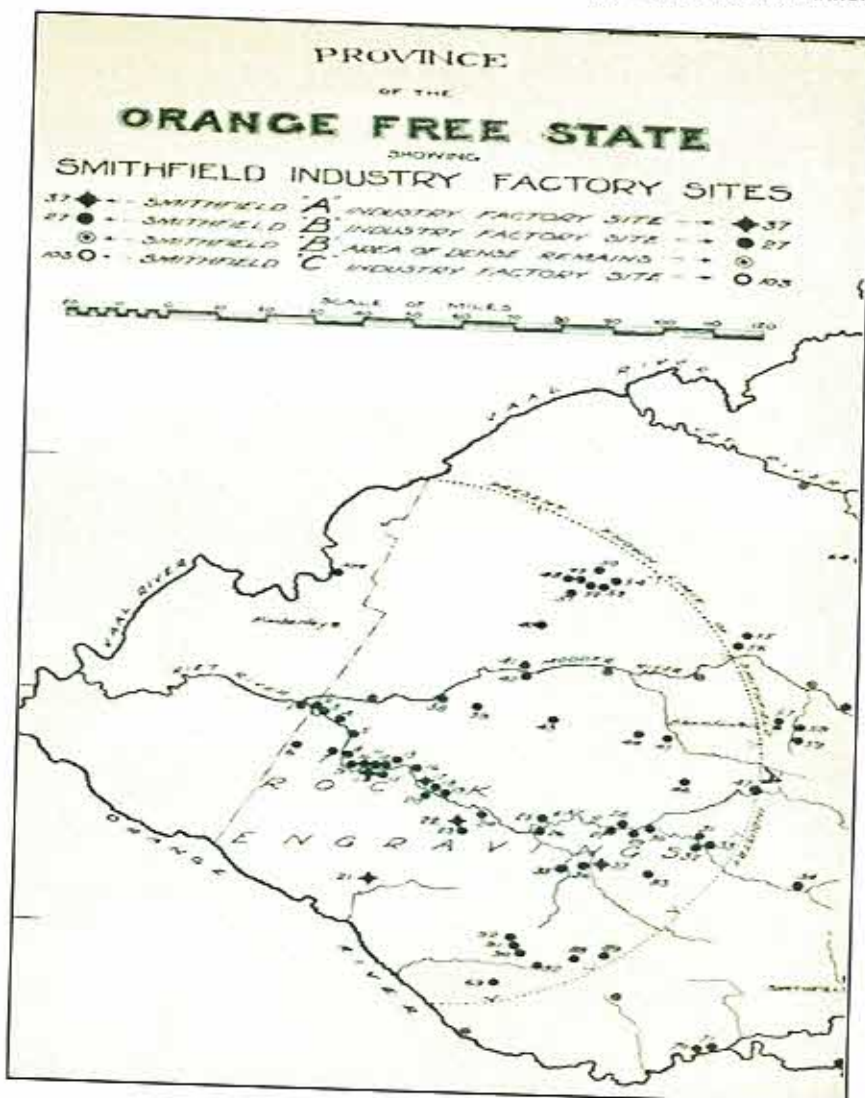


Figure 12. Smithfield A,B & C sites as per van Riet Lowe and Goodwin

- A typical factory-site assemblage is described from the Lockshoek site and include:
- Concavo-convex scrapers (restricted to Smithfield A)
 - Large circular scrapers (restricted to Smithfield A)
 - Duckbill end-scrapers

- Side-scrapers
- Trimmed points
- Stone borers
- Bored Stones
- Grooved Stones
- Grindstones
- Pounders and grinders
- Fabricators: cores; detaching-hammers; trimming-stones; anvils

According to them no notched scrapers are associated with the Smithfield A industry, while re-used Fauresmith hand axes and re-trimmed flakes are found in association with Smithfield industries (Goodwin & Van Riet Lowe, 1929, p. 153).

List of Smithfield sites in vicinity of the study area:

- Smithfield A:
 - Blaauwheuwel 425 (also a Fauresmith industry site)
 - Brakfontein No 231 (typesite for Fauresmith industry – 15 km from Fauresmith on road to Koffiefontein)
 - Lockshoek 191 (also a Fauresmith site) – 27 km north of Jagersfontein
- Smithfield B:
 - Blaauwheuwel
 - Lockshoek
- Smithfield C: None recorded in close proximity of the subject area

3.3 IRON AGE

No Iron Age Sites is known from the direct area associated with the study area.

3.4 THE HISTORIC ERA

In November 1869 diamonds were discovered on the farm Jagersfontein. The farm belonged to the widowed Mrs Visser and was situated in the District of Fauresmith in the Orange Free State. At this stage the alluvial finds on the banks of the Orange River enjoyed far more attention and Jagersfontein remained fairly unnoticed except amongst those in the immediate neighbourhood. The main reason for this was that up to that point diamonds were known only to be found in alluvial deposits. Jagersfontein was the first so-called "dry mine" to be discovered.

For a monthly licence fee of £2 family and neighbours were allowed to dig in allotted patches. In spite of the fact that progress was slow and finds few and far between the digging population grew to such a degree that the Government found it necessary to proclaim the farm as a Public Diggings in 1871. Mr Charles Hutton of the nearby town Fauresmith was appointed as the first Inspector. Wonderful finds on the Vaal River once again deferred attention from Jagersfontein as thousands swarmed there to try their luck at instant riches.

Subsequent discovery of diamonds at Du Toitspan, Bultfontein and Colesberg Kopje (Kimberley), however, once again brought attention to Jagersfontein and the illusion of finding diamonds in alluvial beds alone was finally dispelled. Primitive methods, scarcity of water and lack of sufficient capital, however, made for little success at Jagersfontein during its early years of existence.

The first organized efforts:

Towards the end of 1878 efforts at systematic working were made by a number of Fauresmith people, some of whom had gained the necessary experience in diamond digging in the Griqualand West mines. Among these were names like Beddy, Chas, Wiebe, Reid, Wertheim, Dowsett, etc. They formed the "Fauresmith Diamond Mining Company" with Mr C Bannau as manager. Their equipment, however, was primitive and not very effective. An apparatus known as the "whim", drawn by a couple of horses, formed the motive power for washing the diamondiferous soil and the ground was hauled from the mine by

Fauresmith is located 14km north-west of Jagersfontein – see Locality Map – means of Scotch carts running on roadways constructed at comparatively easy angles.

It was during that same year that the real pioneers arrived in the form of experienced Australian gold miners. Among these were the well-known Kerr brothers (renowned for having tested and laid the real foundation of the mining industry at Jagersfontein), William Miller, Thomas McCrea, Tom Dunn, Forster, Garrett Harrington and Richard Smith. At this stage the government appointed Mr J.W. Lotz as Inspector and steps were taken to have the mine surveyed and chartered. The latter was done by Mr G.C. Brand and the mine plan showed 1,244 claims, each 30 X 30 feet (9.144 X 9.144 meters).

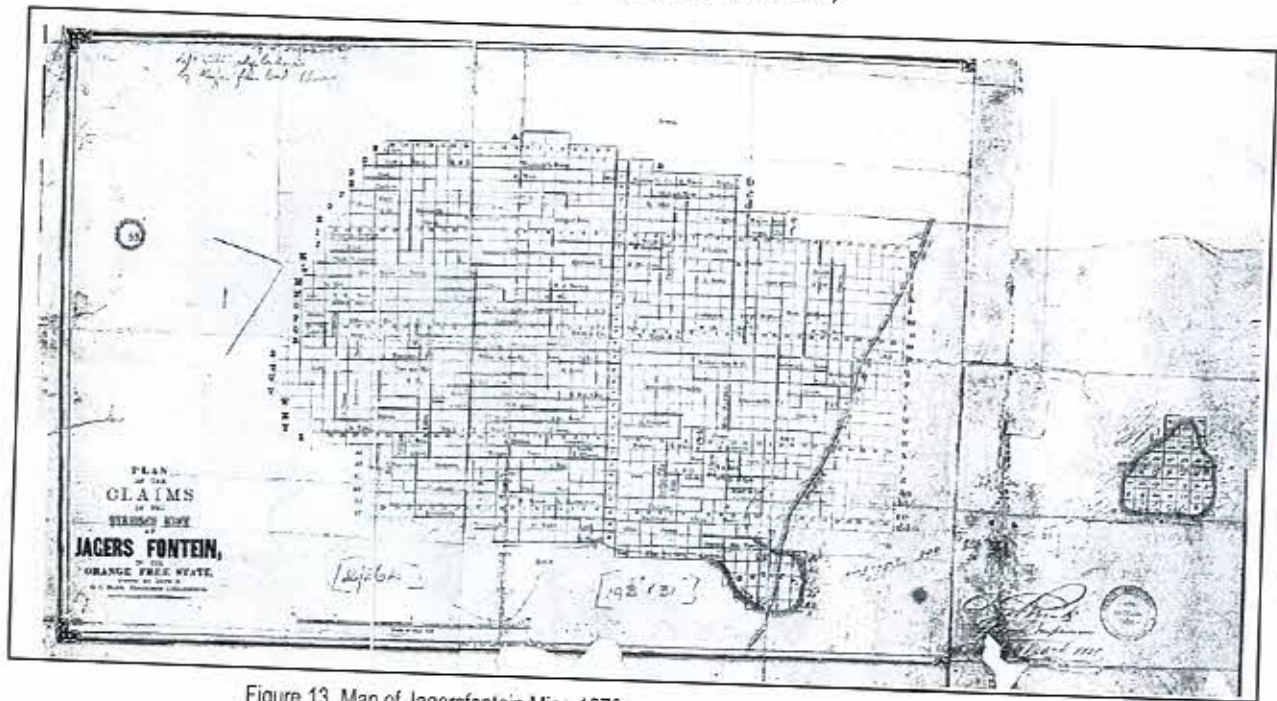


Figure 13. Map of Jagersfontein Mine 1870

At the same time the township was laid out. Although buildings shot up like mushrooms it was mostly constructed of sun-dried bricks and corrugated iron due to the uncertainty that existed as to the profitability and therefore long-term probability of the mine. In 1879 Mr. M.G. Keyter took up the position of Government Inspector with the combined function of trialing petty offences. A Management Committee was formed with Mr. Keyter as Chairman (ex officio) and Mr. J.G. Brink the Secretary. The Government offices was housed in the old farmstead situated immediately west of the mine. An old blue-gum tree in front of the house served as "goal". The prisoners were detained by being hand-cuffed together, forming a ring around the tree and in this peculiar manner served their time. In 1881 the new Government Offices (in the township) was completed and the farmhouse evacuated.

Jagersfontein directly responsible for new laws:

Illegal diamond trafficking brought Jagersfontein to the attention of the Volksraad. In March 1882 a special session of the Volksraad was convened and the President in his opening speech stated that the affairs of Jagersfontein were of such an urgent matter that he would have felt justified in calling a special session of the "Raad" for them alone. That this view was fully shared by the Volksraad was shown by the large number of laws passed – all directly affecting the welfare of Jagersfontein. They were as follow:

1. A most drastic ordinance for the suppression of the illicit traffic in diamonds;
2. An ordinance establishing a Special Court exclusively for the trial of I.D.B. (Illegal Diamond Buying) cases;
3. An ordinance providing for the appointment of an Assistant Landdrost at Jagersfontein;
4. A law for the establishment of an efficient police force;
5. A law by which Jagersfontein was proclaimed a town, and
6. An effective searching law.

Mr. J.J. Wilson was appointed as the Assistant Landdrost and Mr. J.G. Brink Landdrost Clerk and Public Prosecutor to the Special Court. The Special Court was composed of the Landdrost of Fauresmith as chairman and the Assistant Landdrost and Government Inspector of Jagersfontein as members. Major Maxwell received the appointment of Commissioner of Police and as such directed the trapping system which was now set in motion and carried on with relentless vigor during the time that he remained at head of the police.

A community divided:

It was the latter that turned Jagersfontein in a seething cauldron of discontent and anger. Public meetings were of daily occurrence, petitions to the Government and letters to the press seemed endless, and the community was divided into two distinctly hostile camps which continued with much bitterness for several years. One of the principal demands was the want of representation by the town on the Mining Board. It was only in 1884 that the Government appointed a Commission of Enquiry to investigate the matter. The evidence given before the Commission brought out clearly the extreme tension which existed between the mining community and a portion of townspeople. The enquiry, which was very exhaustive, lasted ten days and embraced the following subjects:-

1. Management of the mine
2. The searching system
3. The trapping system
4. Sanitary measures, and
5. General

The town of Jagersfontein established:

The following year, 1885, the report of the Commission came before the Volksraad with the result that the Special Court was abolished and the offices of the Government Inspector and Assistant Landdrost combined in one official, Mr. J.G. Brink. A *Dorpsbestuur* for the management of the affairs of the town was also established at this time. This division of authority promised well for the peaceful advancement of the community as a whole, and from this time forward the hatchet of discontent may be said to have been buried.

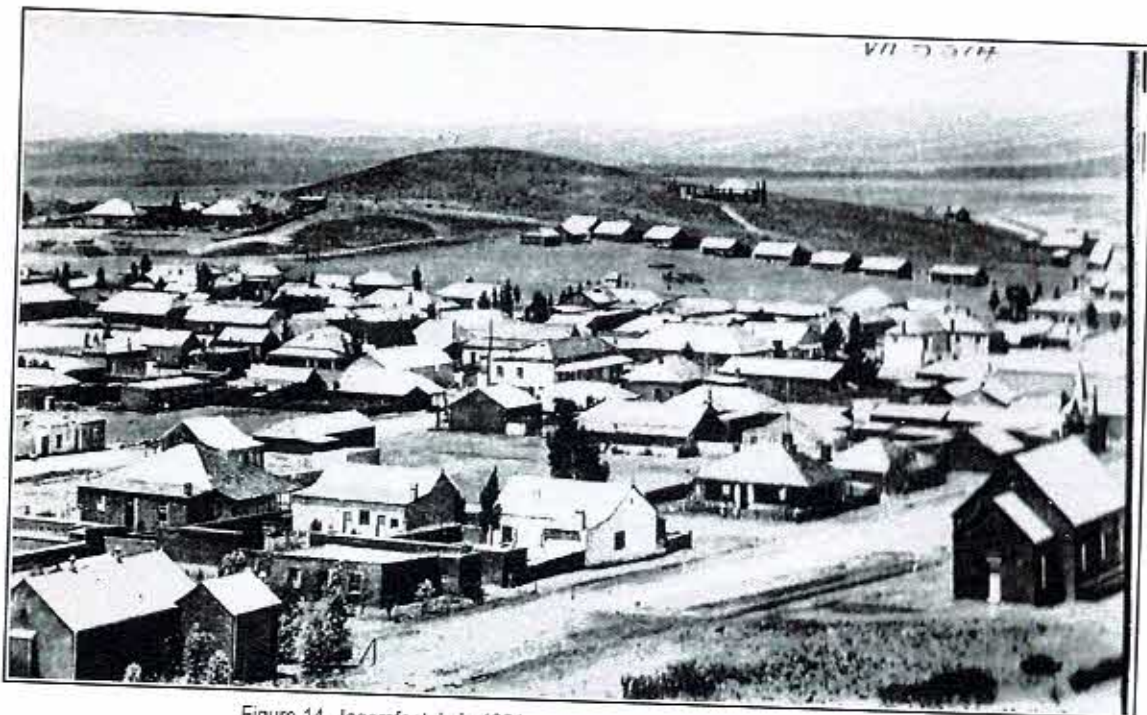


Figure 14. Jagersfontein in 1881

More amalgamations in the mining business:

In general, however, Jagersfontein was still far from prosperous. About one third of the number of claims in the mine lay abandoned.

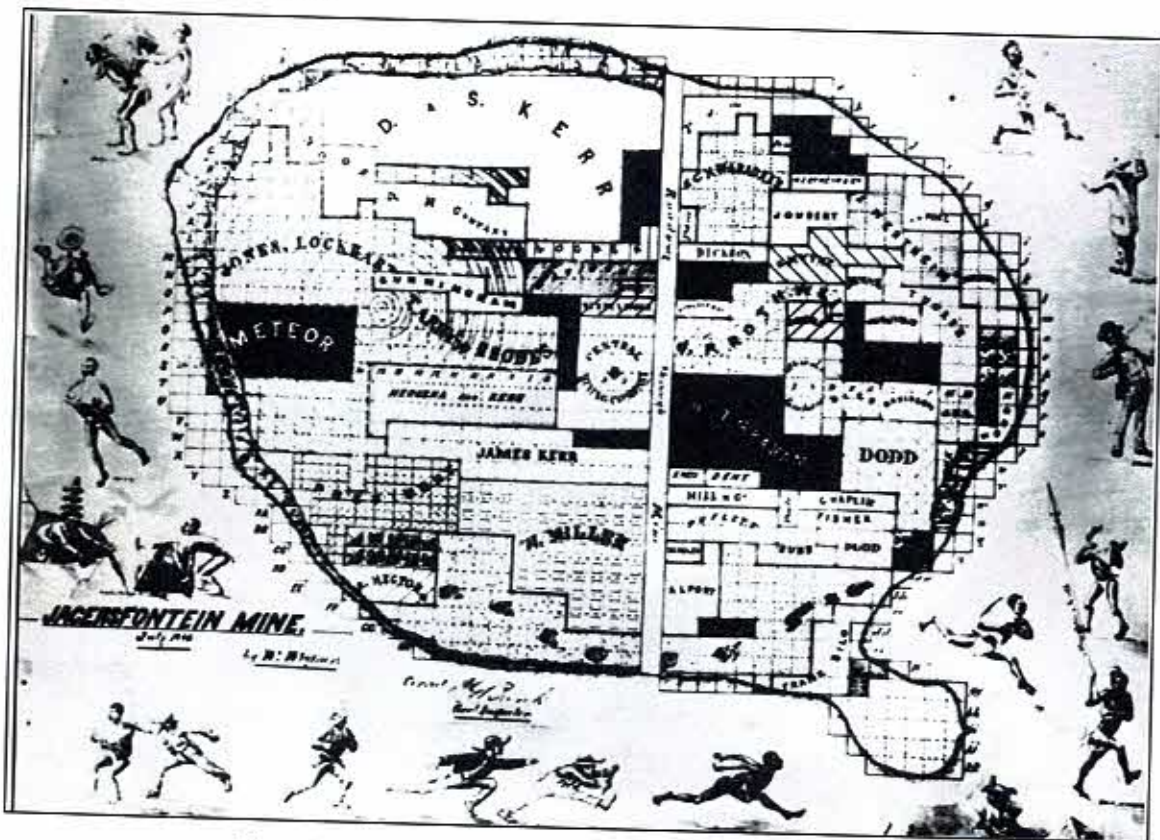


Figure 15. Mining claims in 1886 (DBMC Archives)

A change came about when a number of people, mostly from Kimberley, applied for and obtained these claims (mainly for speculation). On 1 January 1887 the New Jagersfontein Mining and Exploration Company Limited was incorporated with the object of gradually effecting the amalgamation of all the claims. They started with 220 claims, two hauling and two washing machines, 52,000 loads of blue ground (formerly the property of C.J. Rhodes and his associates), and a capital of £131,000. By February 1888 the New Jagersfontein Mining & Exploration Company acquired the holdings of four other companies and an individual viz:

Kohinoor company: 46 claims

President Company: 44 claims

Kerr Diamond Mining Co: 382 claims (including machinery, plant and blue ground on their floors)

East End Company: 164 claims

Mr. A Wertheim: 9 claims

In 1889 the Visser family sold their farm by public auction to the Jagersfontein Mine & Estate Company Ltd for £89,000. The estate company owned the farm on which the mine was situated and it also drew licenses from all the stands in the township, and in addition was entitled to 50% of the claim licenses collected by the Orange Free State Government. The Jagersfontein Mining and Exploration Company purchased 68,486 claims out of a capital of 98,500 shares in the Estate Company, thus holding nearly three quarters of the shares.

By March 1890 the Jagersfontein & South African Mining Association amalgamated their 26 claims and machinery with the New Jagersfontein Mining & Exploration Company.

In July 1891 the United Diamond Mining Company accepted 17,000 fully paid up shares in New Jagersfontein Mining and Exploration Company in exchange for their 277 claims In Jagersfontein mine 25,223 shares in the Jagersfontein Mine & Estate Company Machinery, plant, cash and diamonds on hand This amalgamation in 1891 secured total ownership of the mine for the New Jagersfontein Mining and Exploration Company with the exception of 4 shares of £1 each.

On account of this amalgamation the mining board fell away and the Government appointed a Mine Inspector. One of the directors of the newly amalgamated company became the managing director and under his able management the beneficial effects of the amalgamation were soon apparent. Steps were taken at once to enclose the area with a barbed wire fence and to further safeguard the company from illicit traffic in diamonds large compounds were erected for their native employees.

In June 1893 one of the world's largest diamonds was discovered at Jagersfontein mine. It was found by a native mine worker who received £500 as reward as well as a horse complete with saddle and bridle. The "Excelsior", a blue-white diamond, weighed $971 \frac{3}{4}$ carats and was eventually cut into 21 big diamonds with a total weight of 364 carats. (Until 1905 when the "Cullinan" was discovered at Premier mine in the Transvaal, weighing 3,106 metric carats, the "Excelsior" remained the world's largest diamond discovered.)

Two years later in November 1895 another big diamond weighing 634 carats was found at Jagersfontein. From it was obtained a faultless brilliant of 239 carats. It was initially named the "Reitz" after the then President of the Orange Free State but later renamed the "Jubilee" diamond in honour of Queen Victoria's 60th birthday.

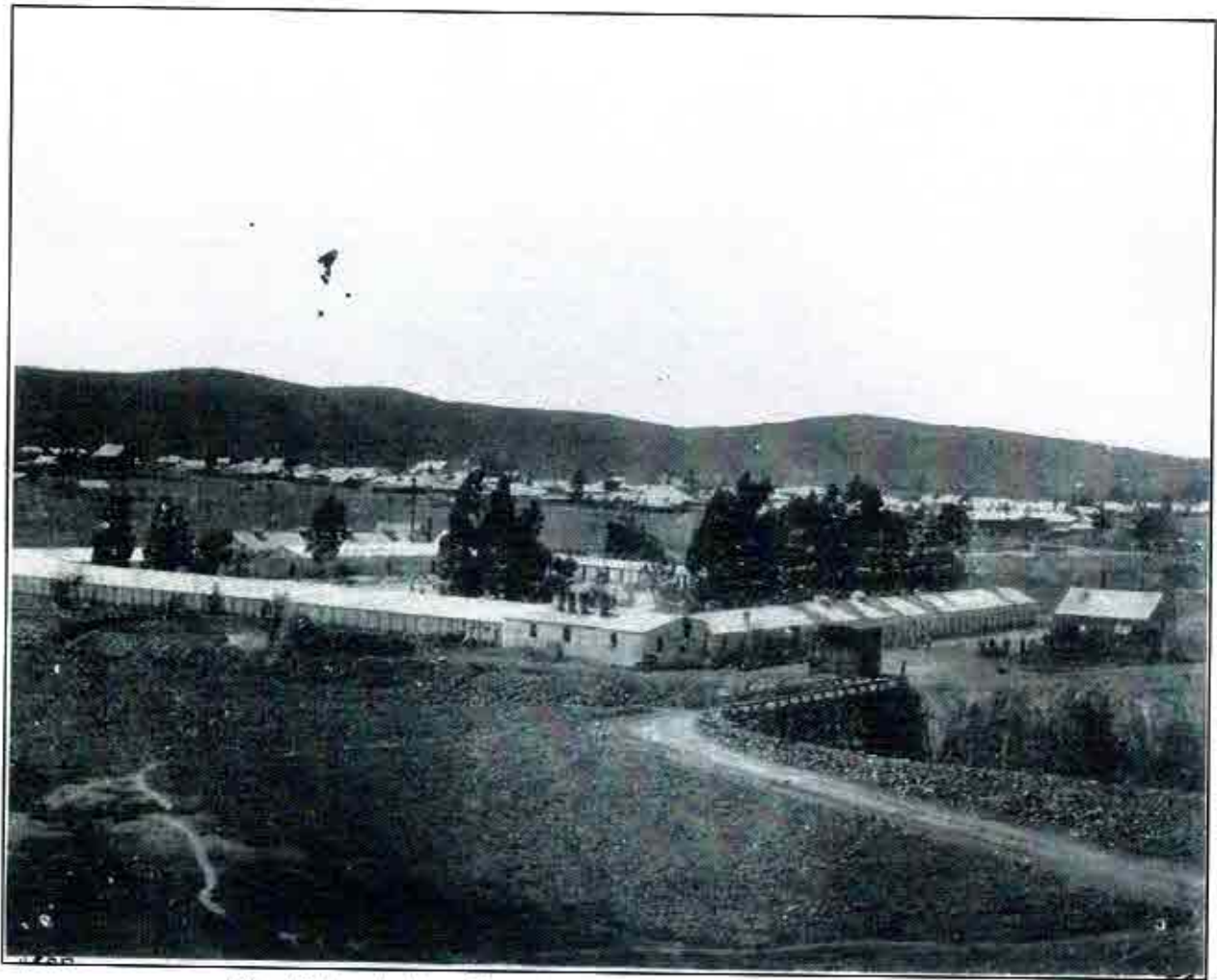


Figure 16. An early picture of the workers compound

Negative influences:

1899-1902 Anglo-Boer War: Both Jagersfontein town and mine were seriously affected by the Anglo-Boer War. For 19 months until July 1902 the town was deserted. The mine was severely damaged and water had accumulated in the mine. By 1903 the mine was dry and restoration completed.

1908 Depression in America: This led to retrenchment and the restricted output of diamonds.

1914-1916 World War I: On the outbreak of the First World War washing was suspended until the beginning of 1916 and mining operations resumed two years later.

1920 Post-war Depression: In consequence of the post-war depression of 1920 and the wholesale selling of diamonds by Russia after the Bolshevik revolution, mining operations were suspended in 1921 until November 1922.

1926 Alluvial discoveries at Alexander Bay

1928 Alluvial discoveries at Lichtenberg

1929 Wall Street crash

The beginning of De Beers Consolidated Mines Ltd involvement:

In 1931 De Beers Consolidated Mines Ltd was appointed the secretaries and consulting engineers of Jagersfontein mine to affect economies. However, in 1932 (during the Depression) underground work was stopped except for pumping and maintenance. The mine was closed and remained so until 1949. De Beers took a 10-year lease on the company's property at a specified rental in 1940. (The lease was renewed in December 1959 and 1969.) Six years later De Beers instructed their consulting engineers (AAC) to proceed with development for the re-equipping and re-opening of the mine. Production was restarted in July 1949 and the mine was officially re-opened 12 December 1949. At the same time a new hospital was built to

serve the needs of the natives. It had the most modern equipment. A new township, Charlesville, was also built to house the company's employees. The mine remained in production until 28 May 1971 when it was finally closed down.

History of mining techniques employed at Jagersfontein Mine 1871-1931

Mining operations started with open pit mining and was carried out for more than 40 years. The transition to the underground system was brought about gradually, open cast mining being finally abandoned in March 1913.



Figure 17. Early open-pit mining

Sinking of the main shaft started in 1904 but the first skip was only hoisted in February, 1911. The main hosting level was at a depth of 900 ft and blue ground above this level was removed by inclined chambering from working levels approximately 60 ft apart. During this period Jagersfontein shaft recorded the highest hoisted tons rate in the world – 12,800 tons in 24 hours. Open pit mining still continued and eventually ceased in 1913.

Until closedown in 1932 ground was treated in several small washing plants spread out over the property. The later ones had crushers but the earlier ones were for washing only – the breaking down of the ground being done on the old “floors” system. Ground from the mine was laid out on prepared surfaces in the veld for several months, where the natural weathering processes, assisted by watering and ploughing, caused it to pulverize. The early washing plants were, therefore, placed close to areas of flat veld suitable for floors, and close to koppies, up which skip haulages could be laid for tailings disposal. The dumps created during this period are referred to as the washing machine dumps and are still visible today.

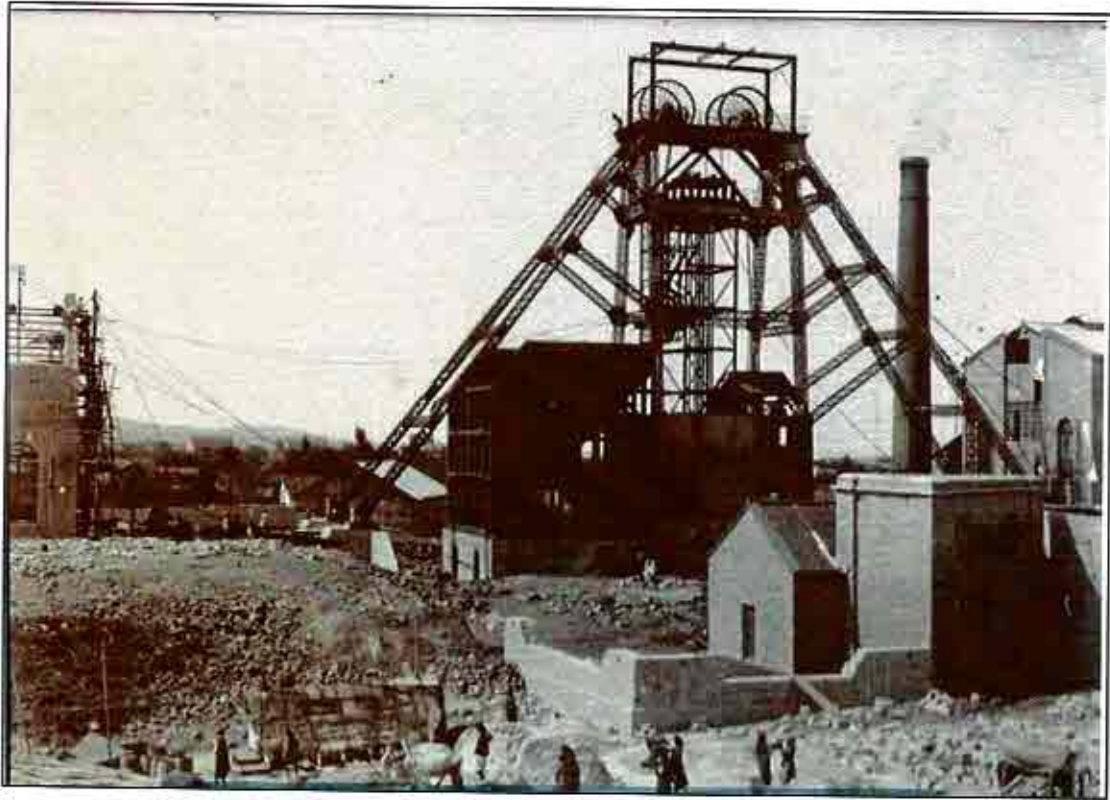


Figure 18. The first shaft hoist at Jagersfontein

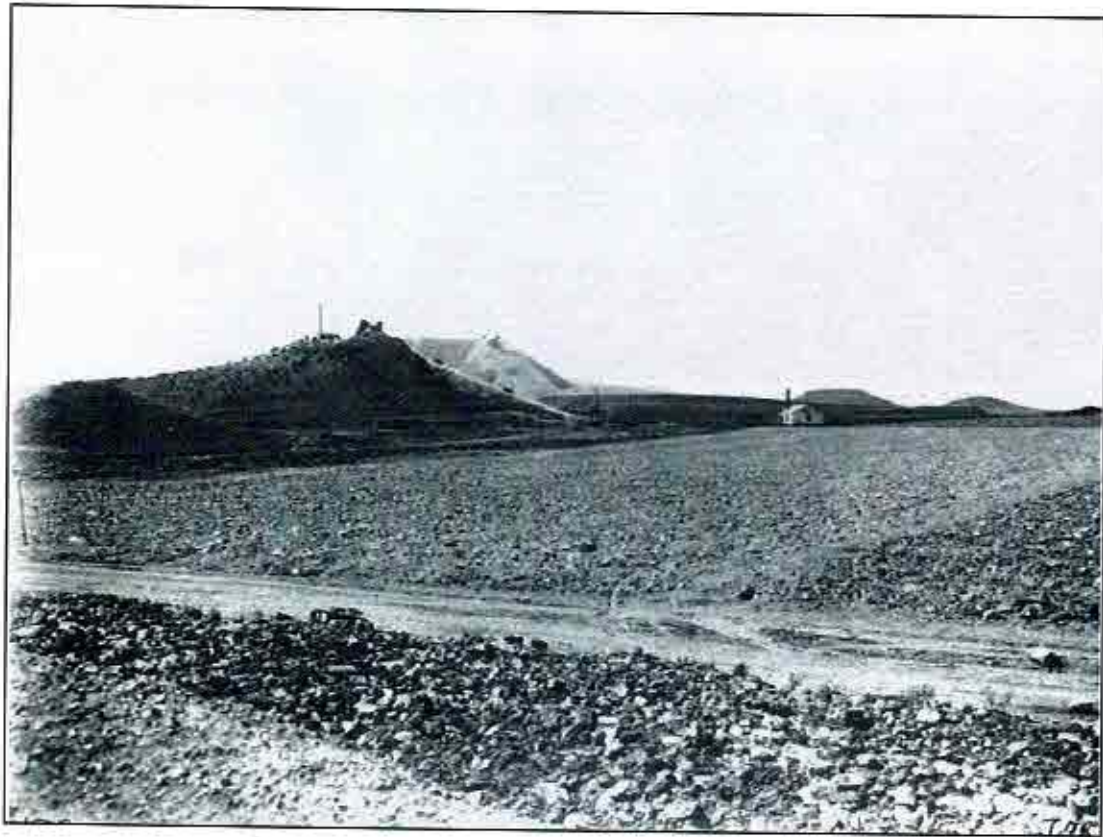


Figure 19. "Floors" at the early mine

The crushed blueground hoisted to the surface by the small air hoists was loaded from the haulage boxes into coco pans for removal to the floors, where the ground was laid out to weather (about 16" deep) for about 8 months. A small crushing plant was erected at Jagersfontein in 1909 but that was used only for cylinder-lumps of the various washing gears and "hardebank" found in the mine. From the floors the ground was taken to the various washing plants.

There were at Jagersfontein, until the building of a large central washing plant, a number of small two-pan washing plants. These washing plants were very often at the summit of high kopjes thus necessitating the incline haulages from the floors to the washing plants. The ground to be treated and the water to wash have therefore to be elevated but the disposal of the tailings was very easy as it could just be thrown down the side of the kopje.

1949-1971

More modern mining techniques were employed after the re-opening of the mines on 12 December 1949. The first "block cave" installation was on the 1840 ft level and operated successfully up until May 1968. The second installation was on the 2460 ft level with the loading station on the 2430 ft level. The Modern Tailings Dump was created during this period (i.e. 1949-1971) and represents a second period of dump creation. A new plant³ was constructed involving primary and secondary crushing with concentration using rotary pans. Diamonds were recovered using grease tables and side shaking vanners.

Brief description of the various sections of the new plant:

The Crushing Plant is adjacent the mine headgear and handled all the ground hoisted from stockpiled ground and ground for re-treatment from old dumps. Waste rock was removed by hand sorting and the remaining blue ground reduced from 6 inches to 1-1/4 inches by means of Primary and Secondary crushing screening.

The Washing Plant:

From the crushing plant the ground is conveyed to the storage bins of the washing plant where it is distributed to the various chambers. Extraction of the Concentration: Concentrates of kimberlite of specific gravity approaching and exceeding that of the diamond only constitute 0.25 per cent of the ore. However, with a valuable product, such as the diamond, a high factor of safety is allowed and therefore a primary concentrate of 2 per cent of the original feed is obtained, heavy media separation and grease tables being used for the final concentration.

Primary concentration is done in three stages. Ore fed to the primary or course pan is un-sized below 1 1/4 inches. Prior to entering the pans the ground is mixed with puddle (a viscous mixture of water and kimberlite at a S.G. of 1.430). The lighter constituents of the feed overflowing the weir of the inner periphery, pass over 3/8 and 1 1/8 inch long slot screens. The oversize from these screens passes through rolls set at 3/8 inch and rejoins the screen undersize which in turn constitutes the feed to the secondary pans. At this stage "make-up" water is added for pan control. The overflow from secondary pans passes over seven mesh screens. The seven mesh screens constitute the tailings while the minus seven mesh is pumped through hydrocyclone classifiers. The cyclone underflows are fed to the tertiary pans for the final stage of primary concentration. The overflow of the cyclones returns as puddle and re-circulates through the plant.

3.5 THE SOUTH AFRICAN WAR AND JAGERSFONTEIN

The Anglo-Boer War and its effect on Jagersfontein Special mention needs to be made of this event because it directly affected the operation of the mine and could have some connection to a certain portion of the unmarked burial grounds found within the mining area.

Colonel Sir David Harris wrote in his memoirs as follows:

5 Sir David Harris was not only the Chairman of Jagersfontein Diamond Company but also the leading Director of De Beers.

"I can give many instances of this feeling of regard for the Dutch. I will give one notable example. I have been Chairman of the Jagersfontein Diamond Mining Company for many years. I occupied the position during the Boer War. Just before the War that company employed 90 per cent, of Free Staters, and a few

Transvaalers, and the balance were tradesmen from overseas. When the war broke out these white employees joined their different Commandoes. The mine was closed for three years at a loss of three-quarters of a million of money to the shareholders. When the war was over the General Manager wrote and asked me what policy to adopt with regard to the old employees. I said that every employee who was there when war broke out, and who joined his Commando, could re-join the Company, and those who did not do so should never be re-employed. I fought against the Republic in those days, and I respected the men who fought so bravely for it. Some of those men are still in the employ of this Company."

Of the Jagersfontein Town Guard 77 members were issued medals for their support in the Anglo-Boer War.

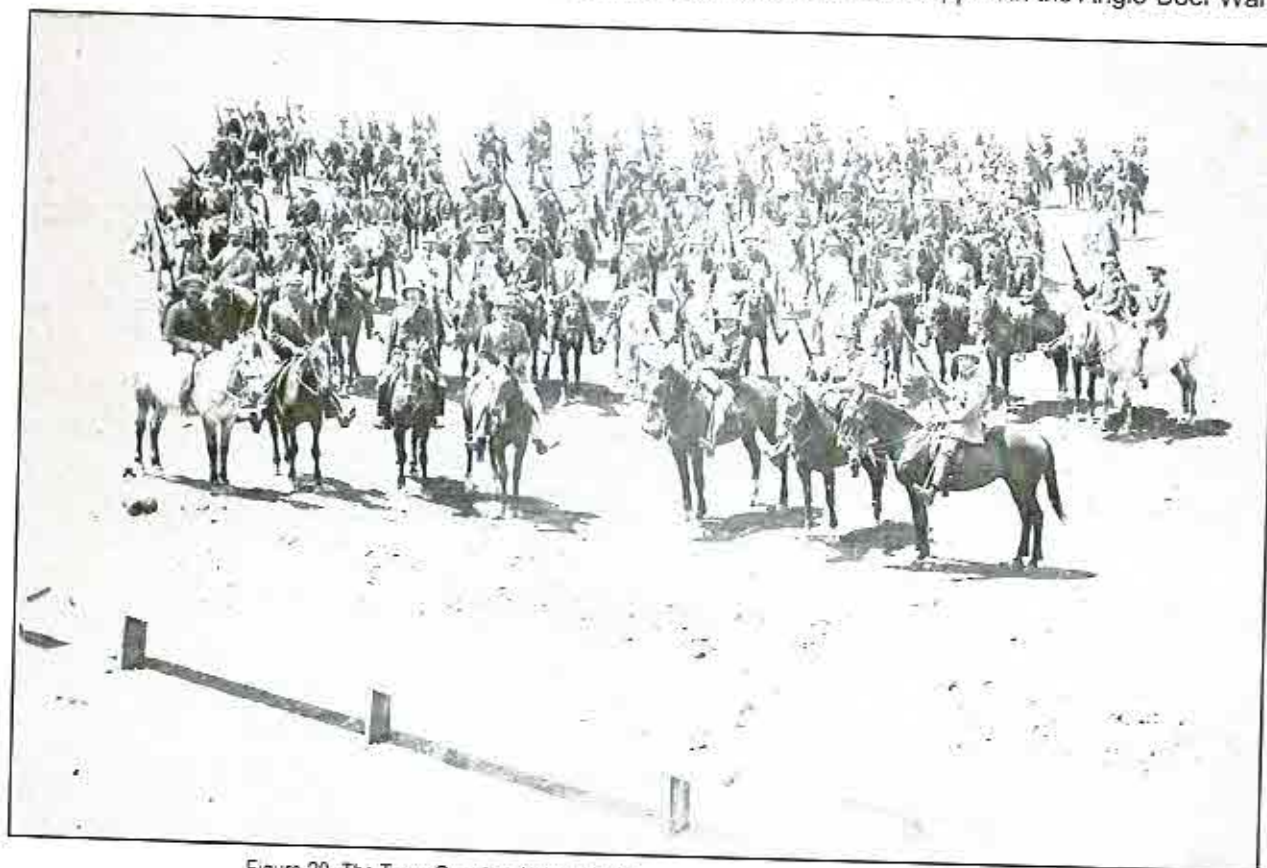


Figure 20. The Town Guard at Jagersfontein

3.6 PREVIOUS STUDIES

An extensive research into the SAHRIS database resulted in the identification of the following heritage related studies that have been performed over the last decade in the study area. Only studies within a radius of 50km from the study area were considered.

The most useful studies were two HIA,s and a PIA done for the decommissioning of the Jagersfontein Mine and the construction of a proposed canal.

L. Philip, 2013

PHASE I IMPACT ASSESSMENT OF THE DORMANT JAGERSFONTEIN MINE (FREE STATE) IN TERMS OF ARCHAEOLOGICAL AND OTHER HERITAGE SITES

This study formed the basis of the desktop study and much of it is reproduced here with the permission of the author.

The following areas were investigated during a fieldwork survey at Jagersfontein Mine during 2013.

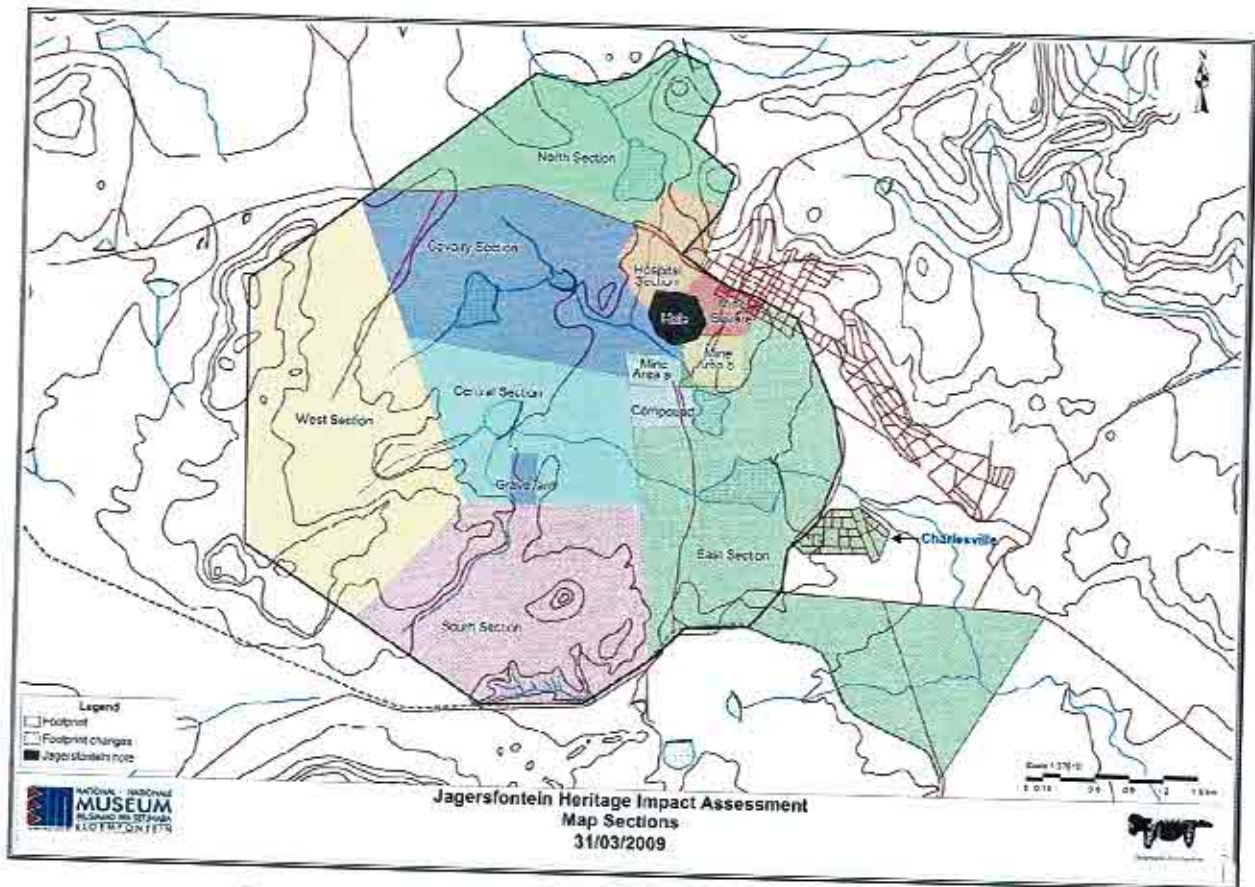


Figure 21. Area covered by Philip in 2013

Another useful study for the southern areas of the site were;

L. Philip & T. Uys, 2013. Heritage Impact Assessment of the Proposed Pipeline on subdivision 16 & Remain Extent of the farm Jagersfontein no. 14 in the Magisterial District of Xhariep, Free State Province.

Between the two studies and the fieldwork performed on the core areas during this study most of the prospecting rights application area was covered.

No studies could however be found for the area indicated in the map below;

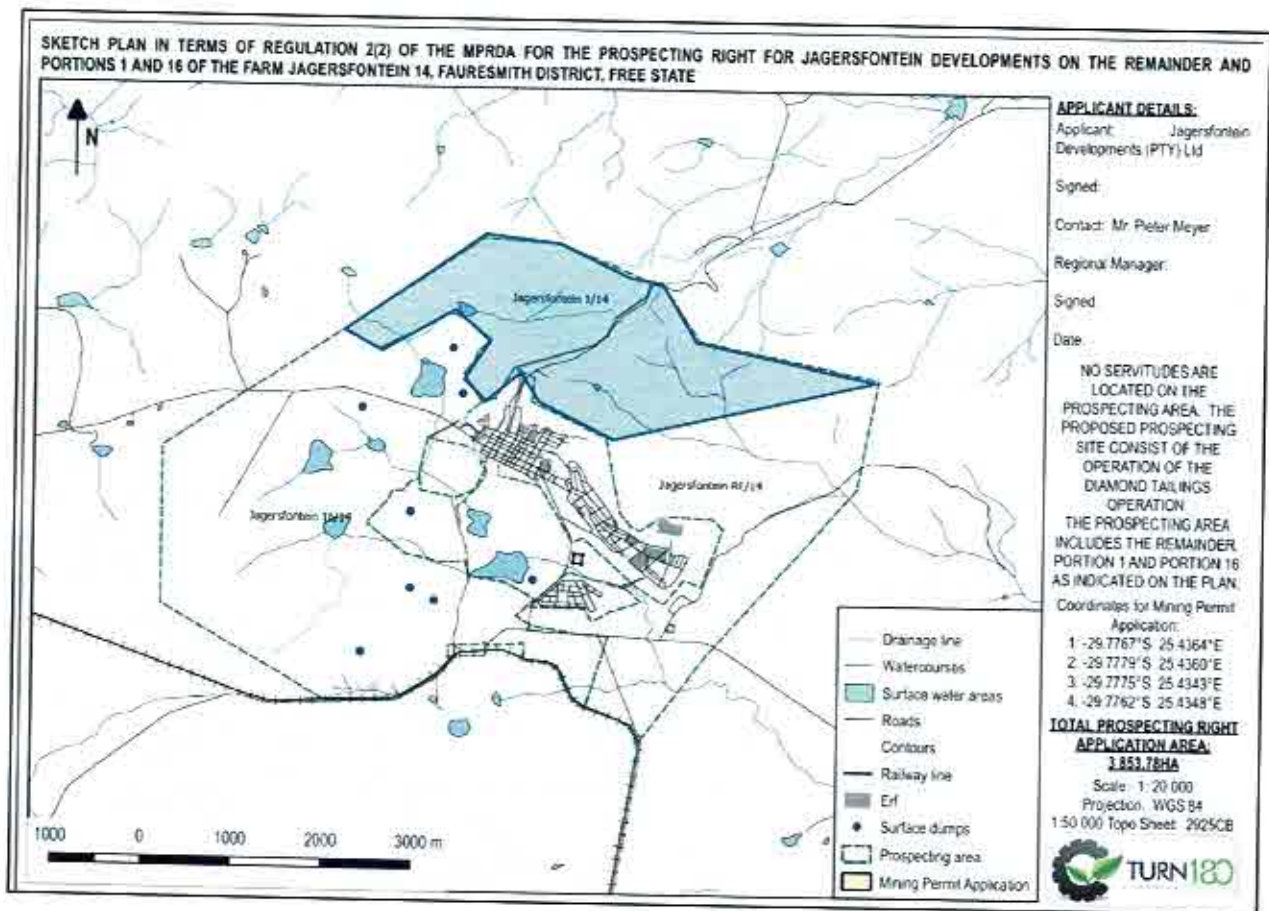


Figure 22. Blue area indicate part of study which had no desktop references

3.7 HISTORICAL MAPS AND RESULTS OF ARCHIVAL STUDY

Historic Cadastral 1 : 50 000 maps 2925 CB from 1968, 1988 and 2005, as well as 2925 CD from 1948, 1988 and 2005 could be located at the Surveyor General's Office.

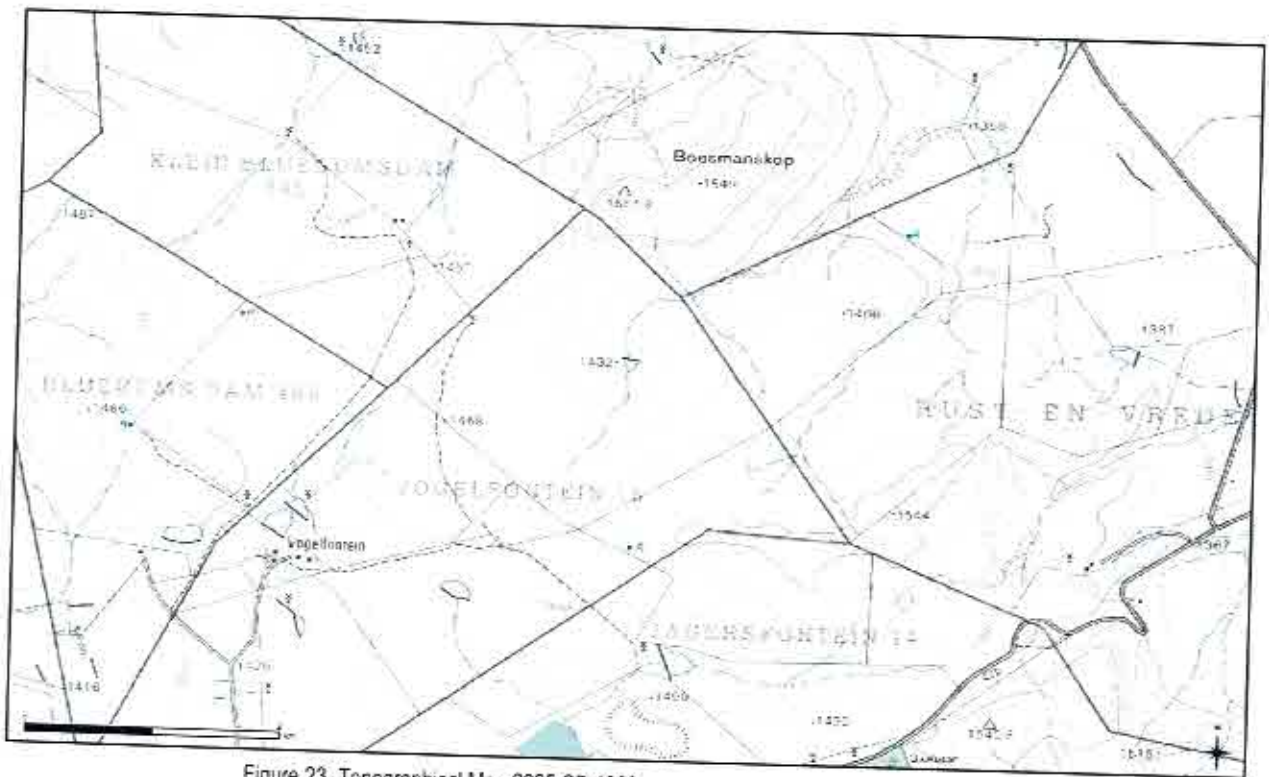


Figure 23. Topographical Map 2925 CB 1968

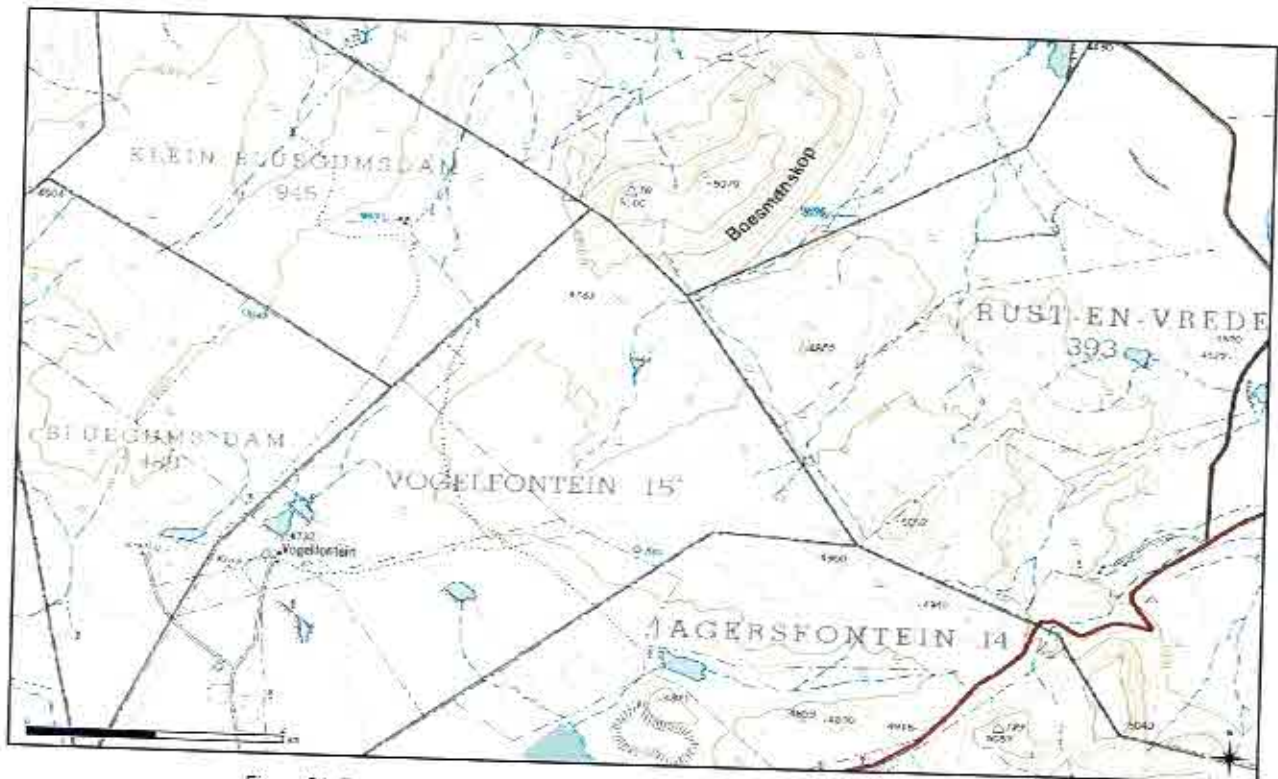


Figure 24. Topographical Map 2925 CB 1988

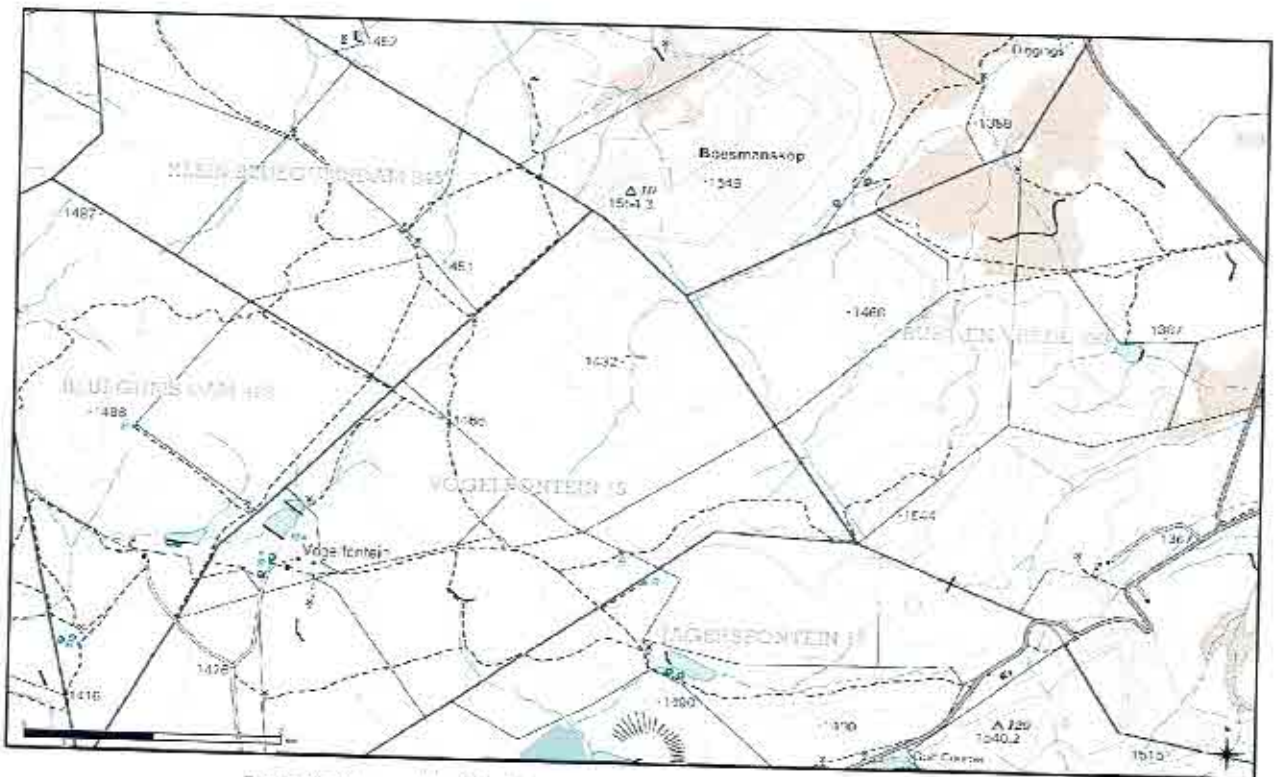


Figure 25. Topographical Map 2925 CB 2005

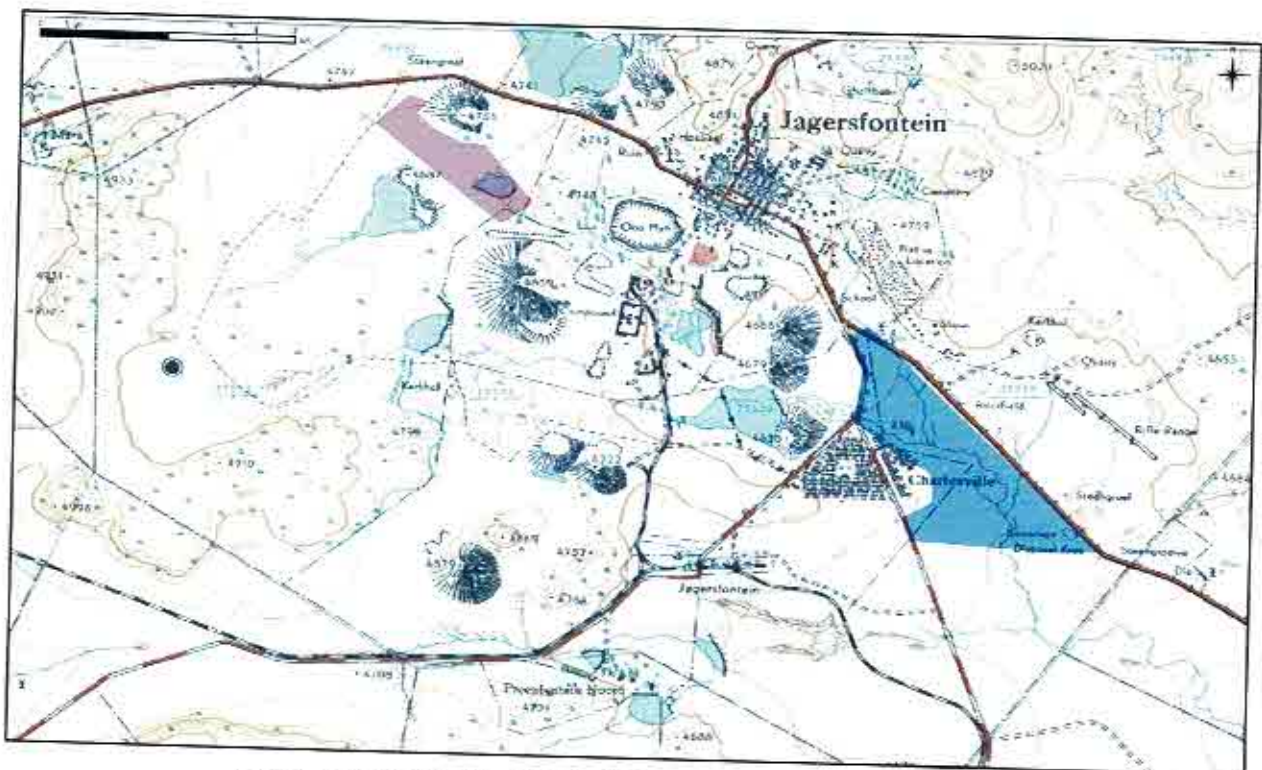


Figure 26. Topographical Map 2925 CD 1948

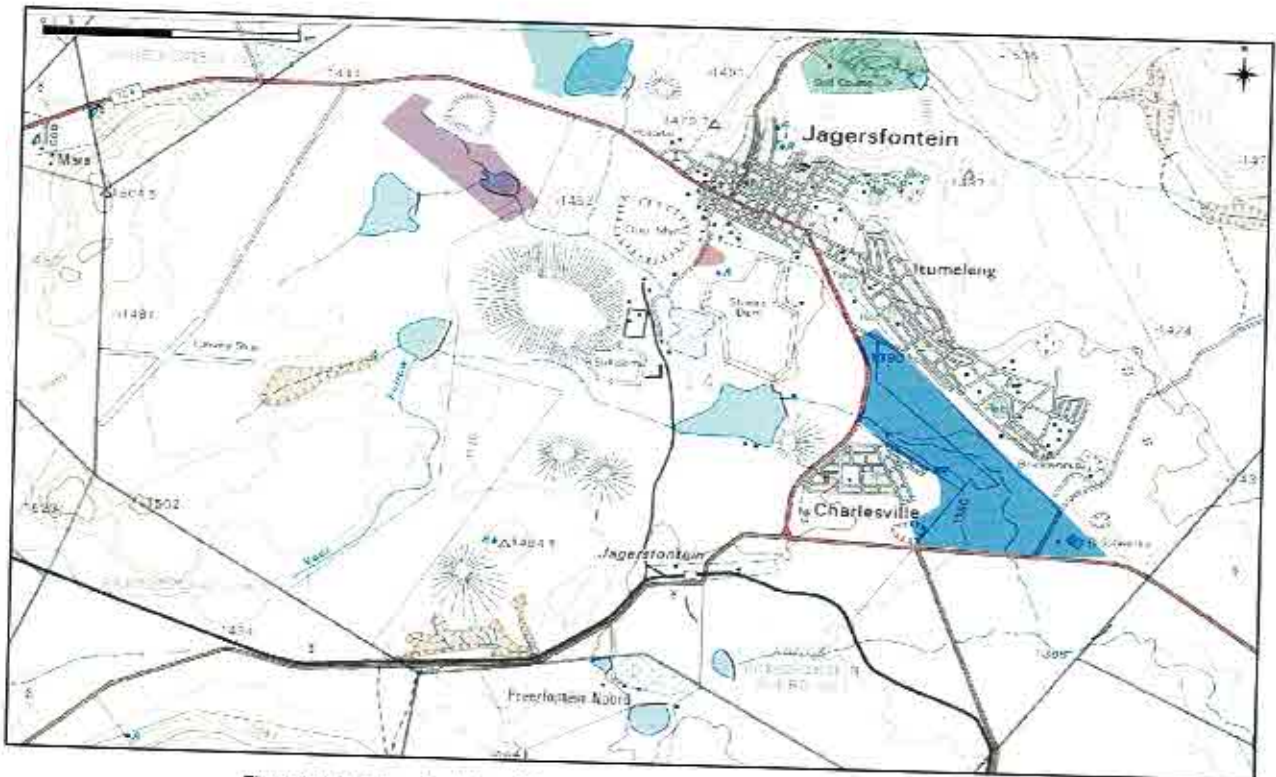


Figure 27. Topographical Map 2925 CD 1988

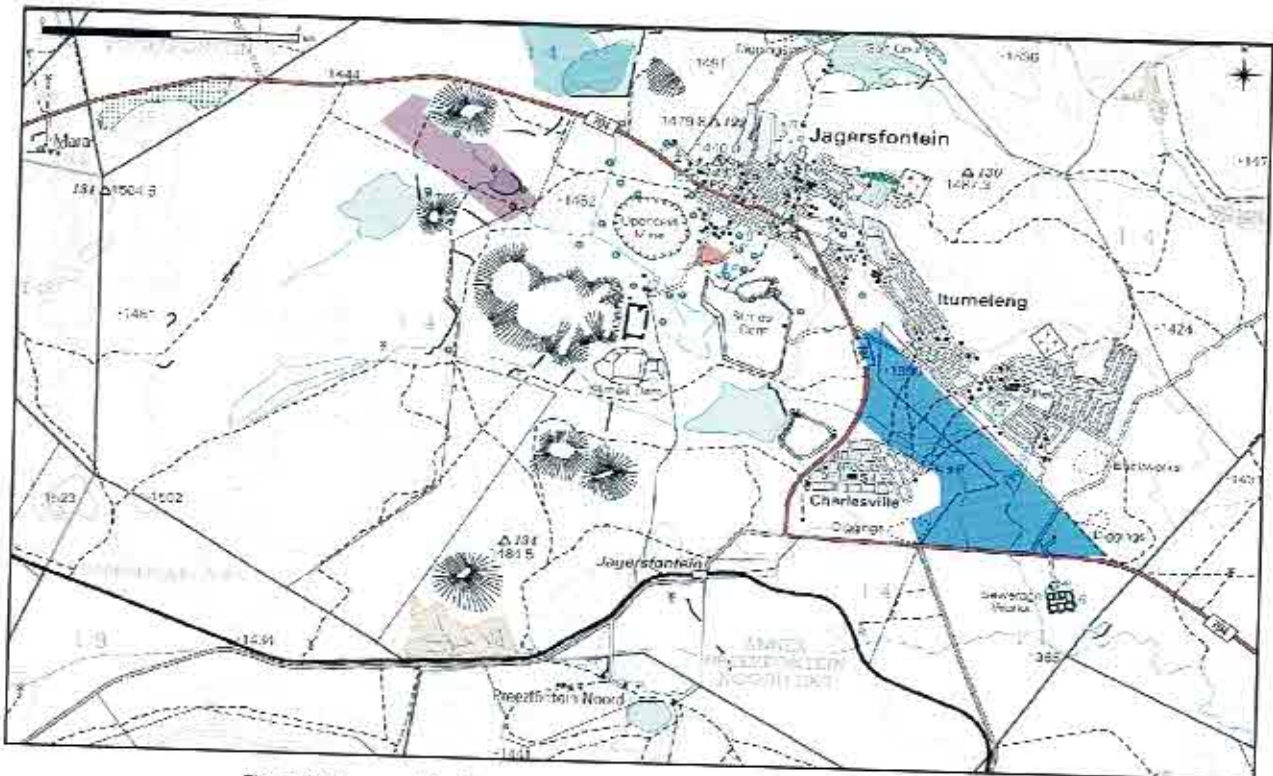


Figure 28. Topographical Map 2925 CD 2005

4. GPS TRACK PATHS

4.1 AREA A



Figure 29. Area A Track Paths

4.2 AREA B



Figure 30. Area B Track Paths

4.3 AREA C



Figure 31. Area C Track Paths

4.4 AREA D



Figure 32. Area D Track Paths

5. FINDINGS

The findings will be discussed in two separate sections. The first will discuss the findings of the fieldwork survey of the four core areas indicated. This was done during February 2019. The second section will discuss the findings of the desktop study and will focus mainly on the results achieved by Philip in 2009 and 2013.

5.1 FIELD BASED INVESTIGATION OF FOUR CORE AREAS

The mining client indicated that although they would be applying for prospecting rights within the larger Jagersfontein 14 farm, actual ground works would be limited to four core areas. These areas were surveyed during the fieldwork session of February 2019 and the results of this survey is reproduced here.



Figure 33. Four core areas indicated in white (A,B,C & D)

5.1.1 AREA A

This area is located to the north of Meteor street. Currently mining is occurring on the western section of this study block. The 2013 study by Philip indicate a stone tool concentration to the southwest of the indicated area, however this was found to be well outside of the proposed prospecting site. The site has been subjected to severe alterations due to mining activities in the past and it is not anticipated that any sites of heritage significance will be found intact here.

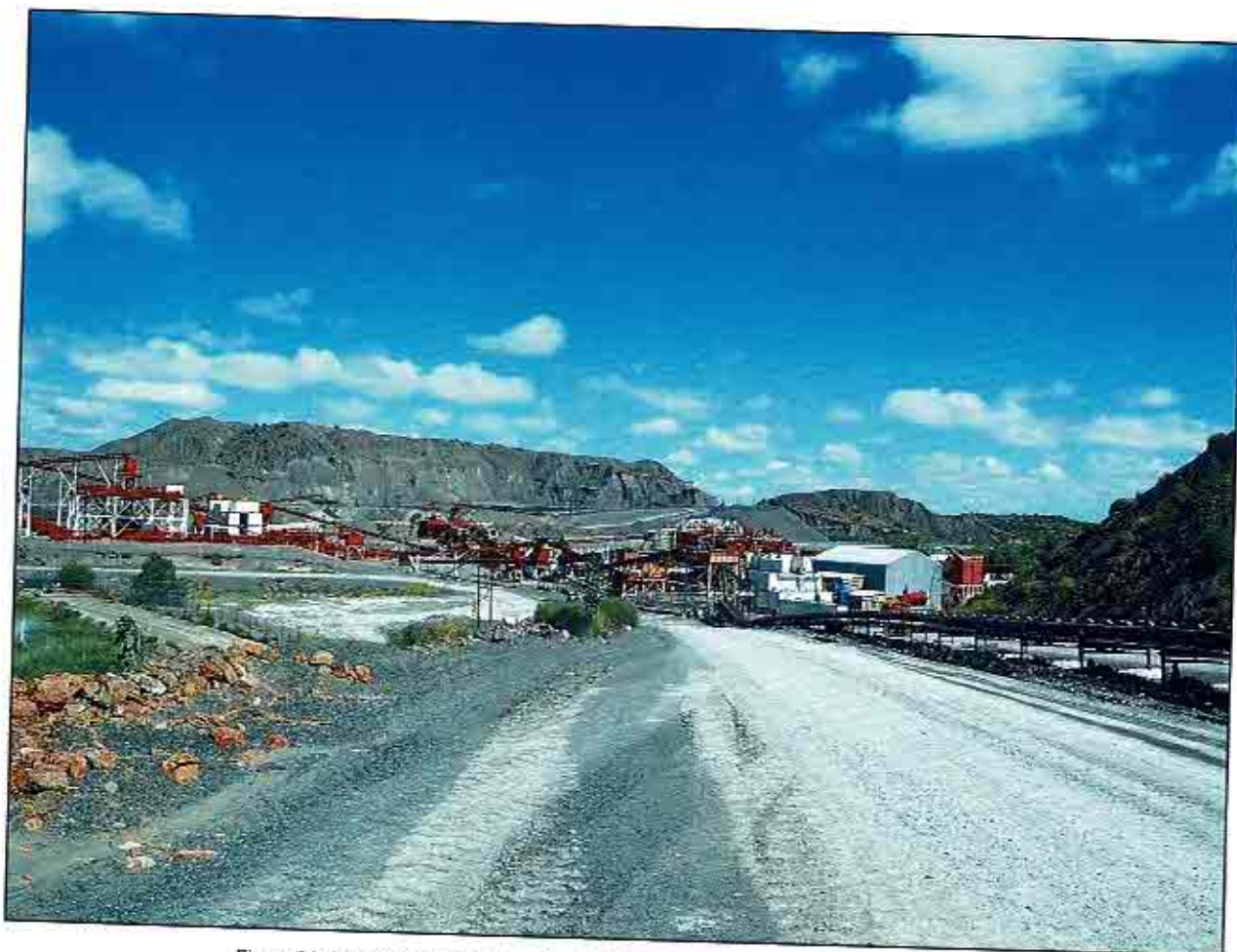


Figure 34. Approach towards Jagersfontein Mine

5.1.2 AREA B

Area B is located to the North and West of the main mining area towards the rear of the mining dumps. A new haulage road has been constructed through this area and it has undergone severe alteration in many of its parts. This site does however contain a site of high significance in terms of heritage. This is the location for the historic Cavalry Quarters.

Site 1

GPS 29° 45' 38" S
25° 24' 24" E

Much of the intricate stone walling is still in place and well preserved. Due to its historic importance and intact nature it is of paramount importance that this site be preserved. This is a large neatly constructed stone-walled enclosed area with a wide opening (approximately 6m wide) to the east. Only three of the four sides are still standing and consists of a double row of stone-packed walls with a + 3m wide space between the two walls to form an enclosed channel that presumably ran right around to form a courtyard space in the middle. The eastern and southern sides have only one opening to these areas facing the courtyard area of the enclosed area. The foundations on the northern side are too low to determine whether it had a similar opening. The western corner of the southern wall still has a portion of the original wall constructed of sun-dried mudstone brick on top and it is assumed the stone walls served as foundation for these walls. These foundation walls were constructed with large stones filled with smaller stones and blue gravel (similar to that found on the mine dumps) in-between. No associated midden (rubbish dump) could be found in the vicinity. Apparently a large amount of old horse shoes were collected from this area over the years. Feeding troughs constructed of wood and long strips of metal sheets fashioned into a hollow shape suggests an

area where animals were kept. It is, however, possible that the latter could have been a later edition and therefore might be a secondary use.

According to the war records the British occupied Jagersfontein during the Anglo-Boer War and used the old mine dumps as entrenchments. If this area was not constructed by the miners then it might have been constructed during this time to stable the cavalry soldiers' horses. The mine itself also made extensive use of horses for a variety of reasons ranging from pulling the rollers that compacted and ploughed the floors areas to patrolling the mining area. On the outside of the western wall are a long thin cement foundation and a scatter of more modern bricks.

Even if no further activities are planned within this area the impact of past developments close to the structure should be mitigated.



Figure 35. Stone walling at Cavalry Enclosure

The enclosure is rectangular with interior divisions and measure approximately 110m x 70m.



Figure 36. Interior of the Cavalry Enclosure



Figure 37. Stone walling at the Cavalry Enclosure



Figure 38. Area where the Cavalry Enclosure lies indicated in red

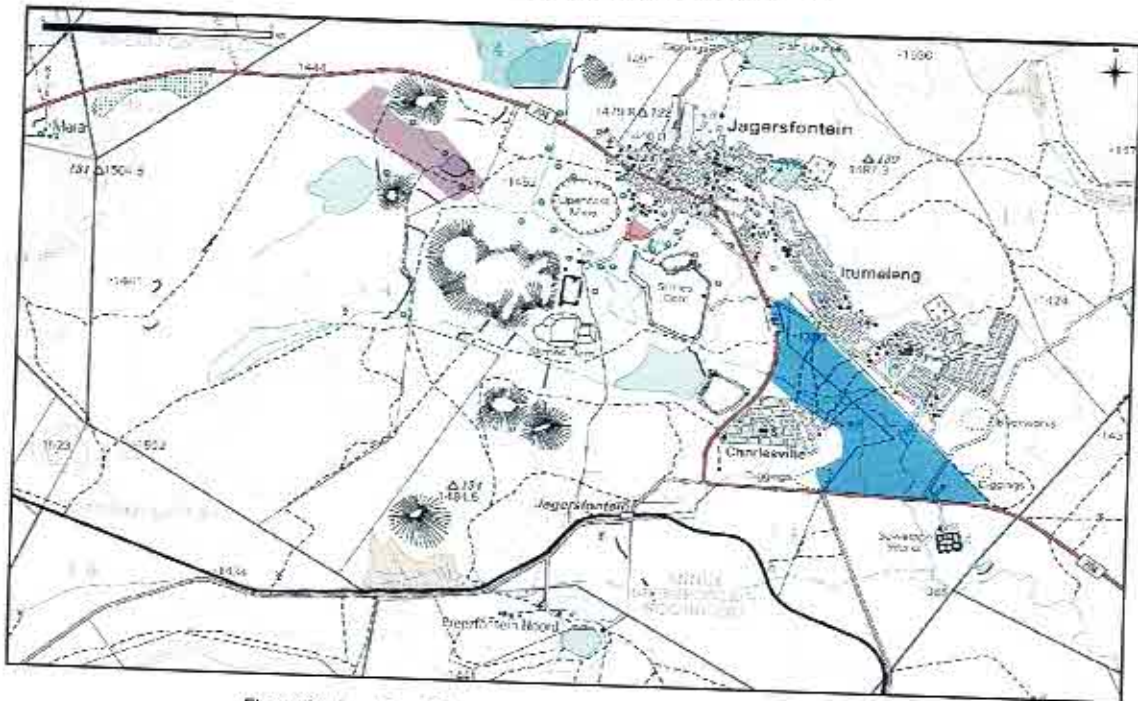


Figure 39. Location of Cavalry Enclosure

5.1.3 AREA C

Area C lies right alongside the existing mining administration buildings. Although the site might have contained mining structures of historic nature these have long since been obliterated by newer mining activities. No sites of any heritage importance was noted here.



Figure 40. Area C indicated in white lines

5.1.4 AREA D

This is the only focus area that has not previously formed part of a heritage study. The Canal Study bordered this area to the south and the paleontological information is derived from this study. The site is open and devoid of developments in most areas. It lies between the main access road to the town of Jagersfontein and the formal township of Ithumeleng.

A large drainage ditch runs diagonally through the study area. This has caused much erosion in the past and it was hoped that any Stone Age deposits would have been exposed, however none were found. Isolated stone chips and possible cores were noted, however non were thought to be diagnostic of either the Fauresmith or Smithfield Industries that would be expected in these areas.



Figure 41. Study Area D indicated in white



Figure 42. Landscape at Area D



Figure 43. Drainage ditch at Area D



Figure 44. Houses at Ithumeleng

Two areas of development were noted in Area D. The first seemed to be the remains of an old water treatment or supply plant. It had concrete flooring, a round concrete reservoir and several rectangular dams. These dams were filled with water due to the rain of the previous day.

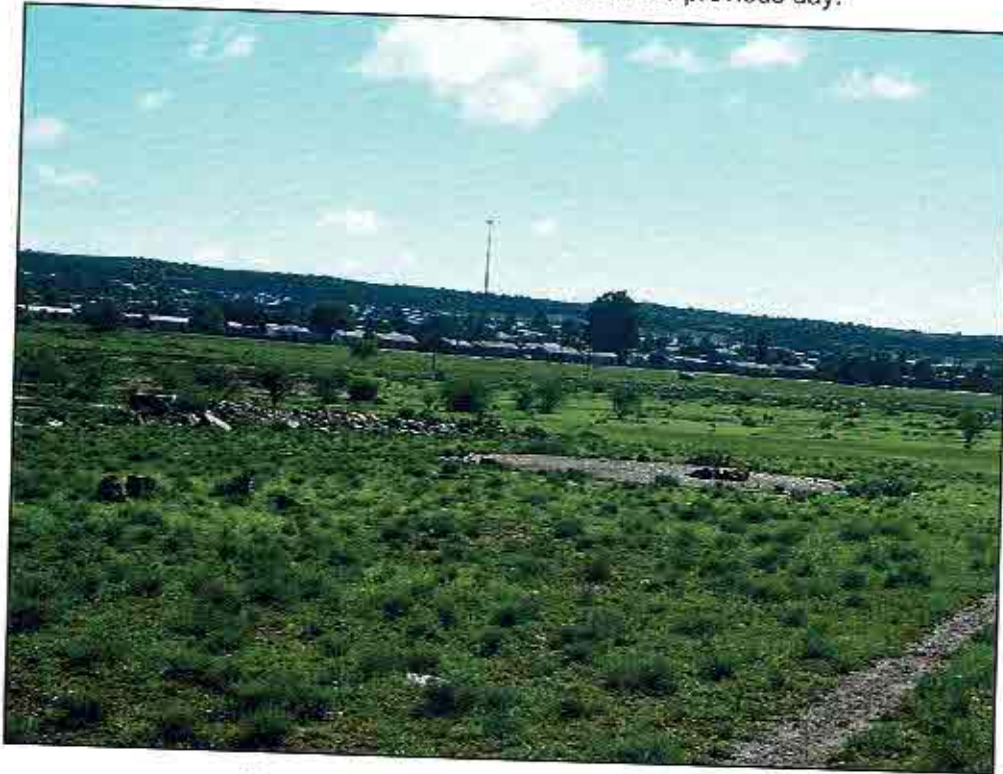


Figure 45. Concrete foundations



Figure 46. Concrete Reservoir



Figure 47. Dams filled with water

Through analysis of the historic topographic maps available it is evident that this site is only referred to as a "Reservoir" with no indications of the dams. The site is indicated on the 1988 and 2005 maps as "Res." The 1948 map does show green rectangles that could possibly be the dams. The concrete structures are however not older than 60 years and are therefore not protected under the NHRA. It is very doubtful if the dams could be older than 60 years and if they are their heritage value is negligible.

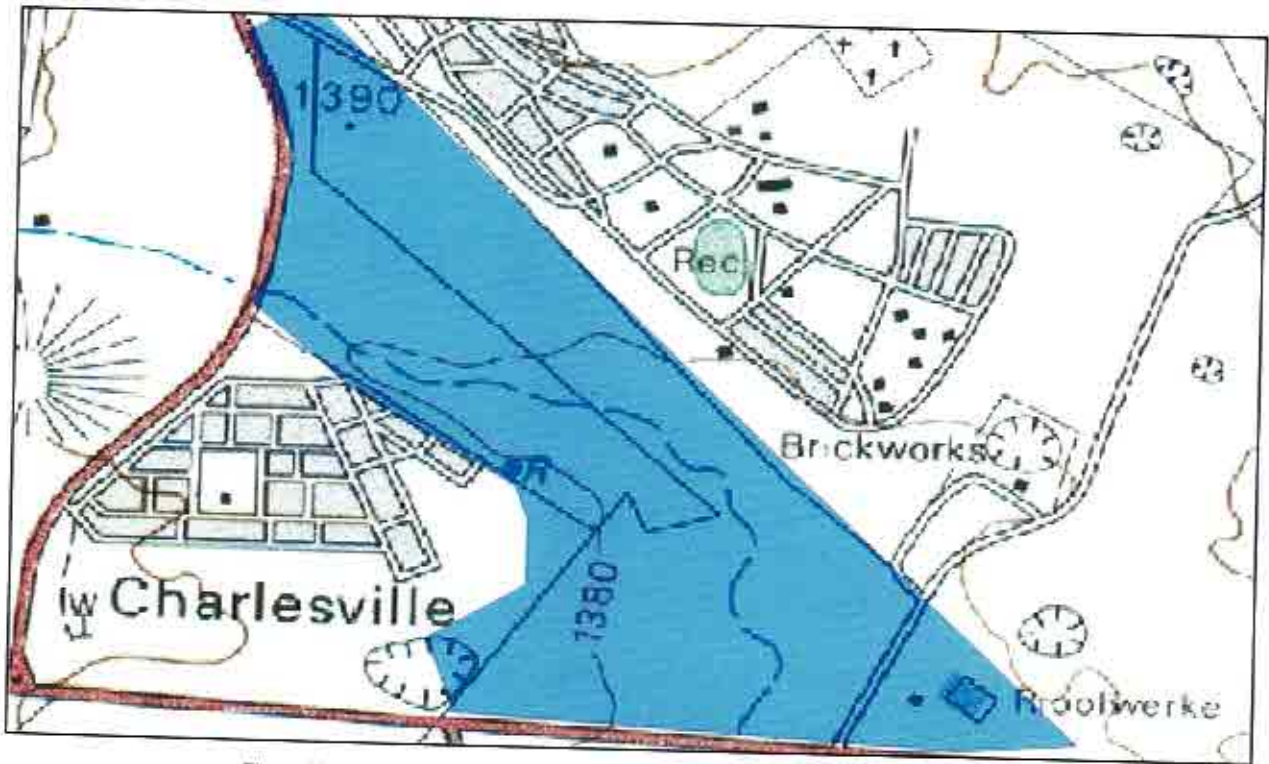


Figure 48. 2005 Map showing Reservoir

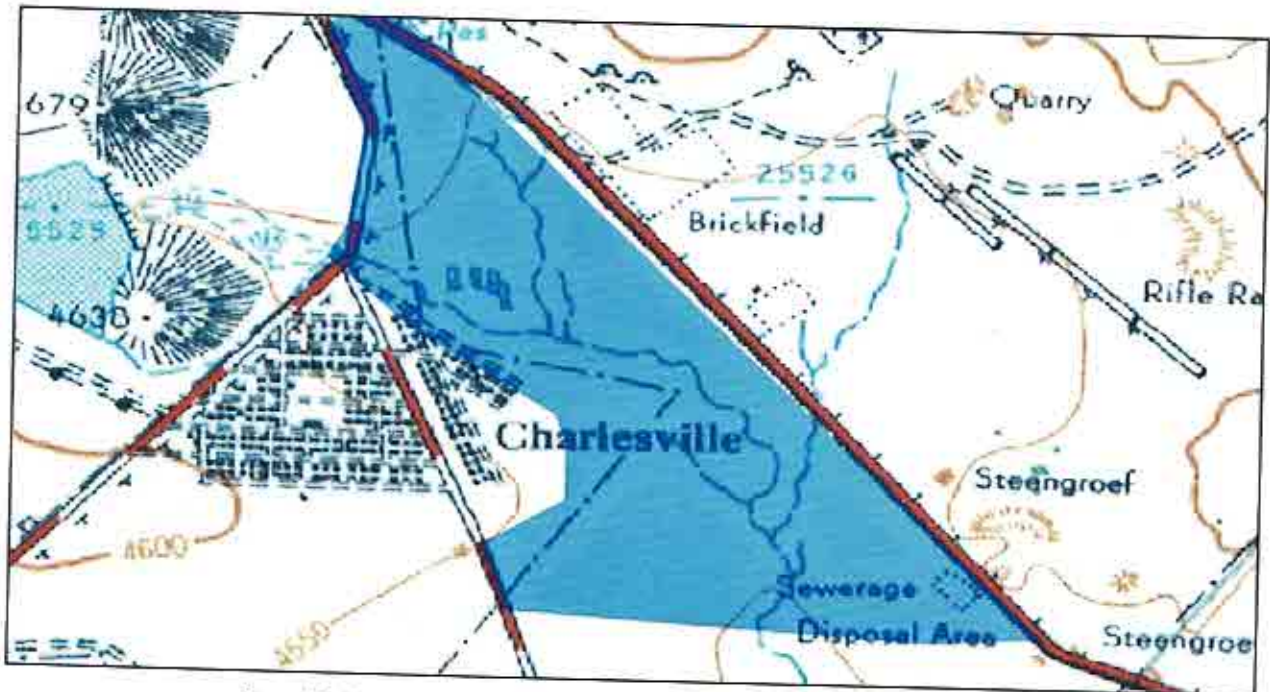


Figure 49. 1948 Map not showing the Reservoir, but possibly showing the dams

6. DESKTOP STUDY FOR THE REMAINDER OF THE PRA AREA

Figure 50. Area Covered By Philip in 2013

As indicated earlier in the document, the desktop findings rely heavily on the fieldwork performed by L. Philip and her team in 2013. These findings will largely be reproduced here with the consent of the author (pers. Comm), since it would be counterproductive to redo the study.

The sites identified by Philip in 2013 is listed and classified as per the attached tables. Google earth images will be supplied to indicated the locations, however these should be used in conjunction with the supplied KMZ files.

Sites identified are as follows;

6.1 CAVALRY SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Cavalry Section	Cavalry	Structure	Historic	2009/02/02	-29.7605	25.406	1427 m	1.1
Cavalry Section	Cavalry	Structure	Historic	2009/02/02	-29.76086	25.40685	1426 m	1.2
Cavalry Section	Cavalry	Structure	Historic	2009/02/02	-29.76038	25.40708	1427 m	1.3
Cavalry Section	Cavalry Structure	Structure	Historic	2009/02/02	-29.76	25.4063	1428 m	1.4

Cavalry Section	Cavalry Structure	Structure	Historic	2009/02/02	-29.76074	25.40687	1427 m	1.5
Cavalry Section	Cavalry Structure	Structure	Historic	2009/02/02	-29.7607	25.40689	1426 m	1.6
Cavalry Section	Cement Foundation	Cement Foundation	Mine	2009/03/02	-29.76225	25.41197		1.7
Cavalry Section	Cement Foundation	Cement Foundation	Mine	2009/03/02	-29.76222	25.41194		1.8
Cavalry Section	Cement Slab on hill	Cement Foundation	Mine	2009/03/02	-29.76321	25.41163	1439 m	1.9
Cavalry Section	Dam with pump and Trough	Dam	Mine	2009/03/02	-29.76281	25.40982	1421 m	1.10
Cavalry Section	Midden	Midden	Mine	2009/02/02	-29.762	25.41448	1425 m	1.11
Cavalry Section	Mudbrick building	Structure	Mine	2009/02/02	-29.76186	25.41487	1420 m	1.12
Cavalry Section	Packed stones	Structure	Mine	2009/03/02	-29.75814	25.40187	1437 m	1.13
Cavalry Section	Packed stones	Structure	Mine	2009/03/02	-29.75808	25.40194	1434 m	1.14
Cavalry Section	Pump House	Structure	Mine	2009/03/02	-29.76389	25.41106		1.15
Cavalry Section	Slimes Dam	Dam	Mine	2009/02/02	-29.7611	25.407	1430 m	1.16
Cavalry Section	Stone Foundation	Stone Foundation	Mine	2009/03/02	-29.76219	25.41194		1.17
Cavalry Section	Stone Foundation	Stone Foundation	Mine	2009/03/02	-29.76206	25.412		1.18
Cavalry Section	Stone Foundation	Stone Foundation	Mine	2009/03/02	-29.76222	25.412		1.19
Cavalry Section	Stone Foundation	Stone Foundation	Mine	2009/03/02	-29.76208	25.41206		1.20
Cavalry Section	Stone terraces and wall	Other	Historic	2009/03/02	-29.76306	25.41161	1434 m	1.21
Cavalry Section	Water shaft	Structure	Mine	2009/02/02	-29.76478	25.41282	1421 m	1.22

Site Table 1. Cavalry Section



Figure 51. Cavalry Section Site Map 1



Figure 52. Cavalry Section Site Map 2

6.2 CENTRAL SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Central Section	Dam Center	Dam	Mine	2009/03/02	-29.77124	25.40383	1426 m	2.1
Central Section	Dam Wall	Dam	Mine	2009/03/02	-29.77162	25.40543	1425 m	2.2
Central Section	Dam Wall	Dam	Mine	2009/03/02	-29.77334	25.40385	1428 m	2.3
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77628	25.40757	1423 m	2.4
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77397	25.40794	1417 m	2.5
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77721	25.40742	1401 m	2.6
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77641	25.40756	1422 m	2.7
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77655	25.40754	1422 m	2.8
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77383	25.40801	1417 m	2.9
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77369	25.40803	1415 m	2.10
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77359	25.40808	1416 m	2.11
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77272	25.40798	1419 m	2.12
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77232	25.4079	1418 m	2.13
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77471	25.4078	1419 m	2.14
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77442	25.40778	1418 m	2.15
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77409	25.40793	1418 m	2.16
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77483	25.40777	1416 m	2.17
Central Section	Fence Post	Fence Post	Mine	2009/03/02	-29.77536	25.40769	1420 m	2.18
Central Section	Gate Post	Gate Post	Mine	2009/03/02	-29.77185	25.40788	1422 m	2.19
Central Section	Gate Post	Gate Post	Mine	2009/03/02	-29.77156	25.40785	1423 m	2.20
Central Section	Gate Post	Gate Post	Mine	2009/03/02	-29.77148	25.4079	1423 m	2.21
Central Section	Gate Post	Gate Post	Mine	2009/03/02	-29.77189	25.40785	1420 m	2.22
Central Section	Gate Post	Gate Post	Mine	2009/03/02	-29.77138	25.40795	1423 m	2.23
Central Section	Loading Ramp	Structure	Mine	2009/03/02	-29.77447	25.41153	1423 m	2.24
Central Section	Pump House	Cement Foundation	Mine	2009/03/02	-29.77165	25.40806	1421 m	2.25
Central Section	Stone Wall	Wall	Mine	2009/03/02	-29.77165	25.40806	1422 m	2.26
Central Section	Stone Wall	Wall	Mine	2009/03/02	-29.77159	25.40818	1421 m	2.27
Central Section	Stonetool Scatter	Stonetool Scatter	Stone Age	2009/03/02	-29.77214	25.4068	1424 m	2.28

Site Table 1. Central Section Sites



Figure 53. Central Section Site Map

6.3 COMPOUND

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Compound	Compound	Structure	Mine	2009/04/02	-29.76944	25.41771	1416 m	3.1
Compound	Compound	Structure	Mine	2009/04/02	-29.76963	25.41921	1406 m	3.2
Compound	Compound	Structure	Mine	2009/04/02	-29.77093	25.41929	1409 m	3.3
Compound	Compound	Structure	Mine	2009/04/02	-29.77079	25.4193	1408 m	3.4
Compound	Compound	Structure	Mine	2009/04/02	-29.77169	25.41735		3.5
Compound	Compound	Structure	Mine	2009/04/02	-29.77187	25.41895	1409 m	3.6
Compound	Hospital	Structure	Mine	2009/04/02	-29.77181	25.41762		3.7
Compound	Hospital	Structure	Mine	2009/04/02	-29.77174	25.41765		3.8
Compound	Hospital	Structure	Mine	2009/04/02	-29.77191	25.4176		3.9
Compound	Hospital	Structure	Mine	2009/04/02	-29.77172	25.41765		3.10
Compound	Hospital	Structure	Mine	2009/04/02	-29.7718	25.41821	1413 m	3.11
Compound	Hospital	Structure	Mine	2009/04/02	-29.77169	25.41735		3.12
Compound	Hospital	Structure	Mine	2009/04/02	-29.77187	25.4182	1413 m	3.13
Compound	Hospital	Structure	Mine	2009/04/02	-29.77189	25.41744	1409 m	3.14

Compound	Hospital	Structure	Mine	2009/04/02	-29.77179	25.41746		3.15
Compound	Hospital	Structure	Mine	2009/04/02	-29.77178	25.41734	1413 m	3.16
Compound	Isolation ward	Structure	Mine	2009/04/02	-29.77232	25.41813	1410m	3.17
Compound	Isolation ward	Structure	Mine	2009/04/02	-29.77225	25.41838	1410 m	3.18
Compound	Isolation ward	Structure	Mine	2009/04/02	-29.77225	25.41818		3.19
Compound	Isolation ward	Structure	Mine	2009/04/02	-29.77233	25.41835	1411 m	3.20
Compound	Mortuary	Structure	Mine	2009/04/02	-29.7721	25.4182		3.21
Compound	Mortuary	Structure	Mine	2009/04/02	-29.77211	25.41824		3.22
Compound	Mortuary	Structure	Mine	2009/04/02	-29.77212	25.41818	1410 m	3.23
Compound	Mortuary	Structure	Mine	2009/04/02	-29.77214	25.41823	1411 m	3.24

Site Table 2. Compound Sites



Figure 54. Map of Compound Sites

6.4 EAST SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
East Section	Ash heap	Midden	Mine	2009/02/02	-29.77524	25.41806	1420 m	4.1
East Section	Cement Foundation	Cement Foundation	Mine	2009/05/02	-29.77941	25.41789	1410 m	4.2
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78396	25.4272	1410 m	4.3

East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78372	25.42694	1412 m	4.4
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78357	25.42711	1413 m	4.5
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78385	25.42717	1412 m	4.6
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78361	25.42716	1411 m	4.7
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78383	25.42721	1412 m	4.8
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.7837	25.42707		4.9
East Section	Coal Depot	Structure	Mine	2009/05/02	-29.78392	25.42725		4.10
East Section	Loading Ramp	Structure	Mine	2009/05/02	-29.78368	25.42714		4.11
East Section	Loading Ramp	Structure	Mine	2009/05/02	-29.78377	25.42721	1411 m	4.12
East Section	Loading Ramp	Structure	Mine	2009/05/02	-29.78375	25.42723	1412 m	4.13
East Section	Loading Ramp	Structure	Mine	2009/05/02	-29.7837	25.42711	1412 m	4.14
East Section	Mound Dam	Dam	Mine	2009/05/02	-29.78091	25.41861	1414 m	4.15
East Section	Power station	Cement Foundation	Mine	2009/06/02	-29.7728	25.4207	1411 m	4.16
East Section	Stores	Cement Foundation	Mine	2009/06/02	-29.77446	25.41935	1416 m	4.17
East Section	Train Bridge	Bridge	Historic	2009/03/02	-29.77778	25.42128	1411 m	4.18

Site Table 3. East Section Sites



Figure 55. East Section Site Map

6.5 GRAVEYARD

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Graveyard	Grave	Graveyard	Historic	2009/05/02	-29.77616	25.40599	1421 m	5.1
Graveyard	Grave	Graveyard	Historic	2009/05/02	-29.77615	25.406	1420 m	5.2
Graveyard	Grave	Graveyard	Historic	2009/05/02	-29.77613	25.40602	1421 m	5.3
Graveyard	Grave	Graveyard	Historic	2009/05/02	-29.77612	25.40603	1421 m	5.4
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77627	25.40578	1425 m	5.5
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77624	25.40556	1425 m	5.6
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77693	25.40551	1414 m	5.7
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77619	25.40643	1420 m	5.8
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77578	25.40636	1422 m	5.9
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77575	25.40635	1423 m	5.10
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77537	25.40568	1425 m	5.11
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77537	25.40586	1423 m	5.12
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77512	25.40567		5.13
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77621	25.40568	1423 m	5.14
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.776	25.40567	1428 m	5.15

Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77589	25.40566	1426 m	5.16
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77571	25.40569	1426 m	5.17
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77619	25.40573	1425 m	5.18
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77561	25.40573	1426 m	5.19
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77554	25.40634	1422 m	5.20
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77523	25.40627	1421 m	5.21
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77572	25.40581	1423 m	5.22
Graveyard	Graveyard	Graveyard	Historic	2009/03/02	-29.77576	25.40582	1423 m	5.23

Site Table 4. Graveyard Sites



Figure 56. Graveyard Sites Map

6.6 HOSPITAL SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Hospital Section	Building with Chimney	Cement Foundation	Mine	2009/02/02	-29.76025	25.41751	1418 m	6.1
Hospital Section	Cement foundation	Cement Foundation	Mine	2009/06/02	-29.75586	25.41912	1427 m	6.2
Hospital Section	Channel	Other	Mine	2009/02/02	-29.75928	25.4163 4	1420 m	6.3
Hospital Section	Cottage Hospital	Stone Foundation	Mine	2009/02/18	-29.75853	25.42115	1432 m	6.4

Hospital Section	Diggers Hospital	Structure	Mine	2009/02/18	-29.75784	25.42056	1427 m	6.5
Hospital Section	Diggers Hospital	Structure	Mine	2009/02/18	-29.75799	25.42072	1428 m	6.6
Hospital Section	Diggers Hospital	Structure	Mine	2009/02/18	-29.75796	25.42085	1428 m	6.7
Hospital Section	Farmstead Midden	Midden	Mine	2009/02/02	-29.75897	25.41551	1426 m	6.8
Hospital Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/06/02	-29.75656	25.41984	1430 m	6.9
Hospital Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/06/02	-29.75664	25.41992	1431 m	6.10
Hospital Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/06/02	-29.75651	25.41994	1432 m	6.11
Hospital Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/06/02	-29.75662	25.42	1432 m	6.12
Hospital Section	Moth Hall	Structure	Mine	2009/02/18	-29.75792	25.42111	1432 m	6.13
Hospital Section	Moth Hall	Structure	Mine	2009/02/18	-29.75765	25.42104	1433 m	6.14
Hospital Section	Moth Hall	Structure	Mine	2009/02/18	-29.75787	25.42117	1433m	6.15
Hospital Section	Stone Foundation 1	Stone Foundation	Mine	2009/06/02	-29.75597	25.41928	1427 m	6.16
Hospital Section	Stone Foundation 1	Stone Foundation	Mine	2009/06/02	-29.75599	25.41934	1427 m	6.17
Hospital Section	Stone Foundation 1	Stone Foundation	Mine	2009/06/02	-29.75605	25.41927	1428m	6.18
Hospital Section	Stone Foundation 1	Stone Foundation	Mine	2009/06/02	-29.75608	25.41932	1427m	6.19
Hospital Section	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.75676	25.41938	1429 m	6.20
Hospital Section	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.75652	25.41936	1427m	6.21
Hospital Section	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.75653	25.41933	1428 m	6.22
Hospital Section	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.75704	25.41945	1428m	6.23
Hospital Section	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.75706	25.41954	1427 m	6.24
Hospital Section	Stone Foundation 3	Stone Foundation	Mine	2009/02/18	-29.75748	25.42122	1432 m	6.25
Hospital Section	Stone Foundation 3	Stone Foundation	Mine	2009/02/18	-29.75752	25.42117	1432 m	6.26
Hospital Section	Stone Foundation 3	Stone Foundation	Mine	2009/02/18	-29.75764	25.42122	1432 m	6.27
Hospital Section	Stone Foundation 4	Stone Foundation	Mine	2009/02/18	-29.75774	25.42137	1436m	6.28
Hospital Section	Stone Foundation 4	Stone Foundation	Mine	2009/02/18	-29.75767	25.42139	1436m	6.29
Hospital Section	Stone Foundation 4	Stone Foundation	Mine	2009/02/18	-29.75777	25.42135	1435m	6.30

Hospital Section	Stone Foundation 6	Structure	Mine	2009/02/02	-29.75847	25.41579	1427 m	6.31
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75867	25.41566	1426 m	6.32
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75863	25.41543	1428 m	6.33
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75849	25.41554	1428 m	6.34
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.7583 1	25.41559	1429 m	6.35
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75821	25.41567	1426 m	6.36
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75793	25.41565	1429 m	6.37
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.758	25.41572	1427m	6.38
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75816	25.41627	1422 m	6.39
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75875	25.41606	1425m	6.40
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75833	25.41624	1423 m	6.41
Hospital Section	Stone walling	Structure	Mine	2009/02/02	-29.75827	25.41627	1423 m	6.42
Hospital Section	Unidentified Structure	Stone Foundation	Mine	2009/02/18	-29.75775	25.42131	1437m	6.43
Hospital Section	Unidentified Structure	Stone Foundation	Mine	2009/02/18	-29.7577	25.42127	1434m	6.44
Hospital Section	Unidentified Structure	Stone Foundation	Mine	2009/02/18	-29.75776	25.42116	1433m	6.45
Hospital Section	Water shaft	Structure	Mine	2009/02/02	-29.75946	25.41682	1417 m	6.46

Site Table 5. Hospital Section Sites



Figure 57. Hospital Section Map 1



Figure 58. Hospital Section Map 2

6.7 MINE AREA A

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Mine Area A	Bathroom	Structure	Mine	2009/06/02	-29.76841	25.41871	1417m	7.1
Mine Area A	Cement Foundation	Cement Foundation	Mine	2009/06/02	-29.76801	25.41875	1415 m	7.2
Mine Area A	Cement Foundation	Cement Foundation	Mine	2009/06/02	-29.76818	25.41874	1418 m	7.3
Mine Area A	Change House	Structure	Mine	2009/06/02	-29.76832	25.41892	1417 m	7.4
Mine Area A	Cooling Dam	Dam	Mine	2009/06/02	-29.76737	25.41851	1417 m	7.5
Mine Area A	Cooling Dam	Cement Foundation	Mine	2009/03/02	-29.76724	25.41792	1413 m	7.6
Mine Area A	Crushers	Cement Foundation	Mine	2009/06/02	-29.76848	25.41943	1417 m	7.7
Mine Area A	Dam	Dam	Mine	2009/06/02	-29.76862	25.41786	1416 m	7.8
Mine Area A	Dam	Dam	Mine	2009/06/02	-29.76864	25.41797	1415 m	7.9
Mine Area A	Engine Room	Structure	Mine	2009/02/02	-29.76714	25.41566	1418 m	7.10
Mine Area A	Engineers Offices	Structure	Mine	2009/02/02	-29.76834	25.41933	1414 m	7.11
Mine Area A	Offices	Structure	Mine	2009/06/02	-29.76904	25.41809		7.12
Mine Area A	Offices	Structure	Mine	2009/06/02	-29.76912	25.41809		7.13
Mine Area A	Offices	Structure	Mine	2009/06/02	-29.76912	25.41776	1414 m	7.14

Mine Area A	Offices	Structure	Mine	2009/06/02	-29.76904	25.41776		7.15
Mine Area A	Riggers	Cement Foundation	Mine	2009/06/02	-29.76757	25.4198	1415 m	7.16
Mine Area A	Riggers	Cement Foundation	Mine	2009/06/02	-29.76741	25.4195	1415 m	7.17
Mine Area A	Settling Dam	Dam	Mine	2009/06/02	-29.76889	25.41757	1418 m	7.18
Mine Area A	Shaft Offices	Structure	Mine	2009/06/02	-29.76819	25.41905	1418 m	7.19
Mine Area A	Shaft Timbermen	Cement Foundation	Mine	2009/06/02	-29.76738	25.41922	1414 m	7.20
Mine Area A	Structure 2	Dam	Mine	2009/06/02	-29.76734	25.41869	1417 m	7.21
Mine Area A	Study Offices	Structure	Mine	2009/06/02	-29.76724	25.41935	1413 m	7.22
Mine Area A	Underground Tunnel Entrance	Structure	Mine	2009/06/02	-29.76831	25.41886	1416 m	7.23
Mine Area A	Unidentified 1	Structure	Mine	2009/06/02	-29.76841	25.41897	1418 m	7.24
Mine Area A	Washing Plant	Dam	Mine	2009/06/02	-29.76875	25.41817	1418 m	7.25
Mine Area A	Water shaft no 2 Rock Shaft	Structure	Mine	2009/02/02	-29.76708	25.41559	1418 m	7.26

Site Table 6. Mine Area A Sites



Figure 59. Mine Area A Sites Map

6.8 MINE AREA B

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Mine Area B	Bridge over No. 2 drain	Structure	Mine	2009/06/02	-29.76837	25.42055	1418 m	8.1
Mine Area B	Cement Dam	Dam	Mine	2009/06/02	-29.76792	25.4214	1419 m	8.2
Mine Area B	Cement foundation	Cement Foundation	Mine	2009/06/02	-29.76685	25.42214	1423 m	8.3
Mine Area B	Cement foundation 1	Cement Foundation	Mine	2009/06/02	-29.76753	25.42241	1424 m	8.4
Mine Area B	Cement foundation 2	Cement Foundation	Mine	2009/06/02	-29.766	25.42364	1438 m	8.5
Mine Area B	Cement foundation 3	Cement Foundation	Mine	2009/06/02	-29.76681	25.42225	1423 m	8.6
Mine Area B	Cement foundation 3	Cement Foundation	Mine	2009/06/02	-29.76675	25.42222	1423 m	8.7
Mine Area B	Cement foundation 3	Cement Foundation	Mine	2009/06/02	-29.76678	25.4221	1423 m	8.8
Mine Area B	Clarification Dam	Dam	Mine	2009/06/02	-29.76548	25.42416	1433 m	8.9
Mine Area B	Clarification Dam	Dam	Mine	2009/06/02	-29.76578	25.42389	1432 m	8.10
Mine Area B	Clarification Dam	Dam	Mine	2009/06/02	-29.76582	25.42401	1433 m	8.11
Mine Area B	Clarification Dam	Dam	Mine	2009/06/02	-29.76546	25.42404	1432 m	8.12
Mine Area B	Fitter Shop	Stone Foundation	Mine	2009/06/02	-29.76699	25.42296		8.13
Mine Area B	Filter Shop	Stone Foundation	Mine	2009/06/02	-29.76696	25.42283		8.14
Mine Area B	Fitter Shop	Stone Foundation	Mine	2009/06/02	-29.76687	25.42281	1432 m	8.15
Mine Area B	Fitter Shop	Stone Foundation	Mine	2009/06/02	-29.76675	25.42288	1432 m	8.16
Mine Area B	Fitter Shop	Stone Foundation	Mine	2009/06/02	-29.76671	25.42289	1431 m	8.17
Mine Area B	Fitter Shop	Stone Foundation	Mine	2009/06/02	-29.76698	25.423	1433 m	8.18
Mine Area B	Filter Shop	Stone Foundation	Mine	2009/06/02	-29.76702	25.42284	1431 m	8.19
Mine Area B	Hydro Power plant	Structure	Mine	2009/05/02	-29.76677	25.4242	1447 m	8.20
Mine Area B	Loading Ramp	Structure	Mine	2009/06/02	-29.76792	25.4214	1419 m	8.21
Mine Area B	Pump House	Structure	Mine	2009/06/02	-29.76611	25.42398	1442 m	8.22
Mine Area B	Red Brick Building	Structure	Mine	2009/06/02	-29.76732	25.42099	1417 m	8.23
Mine Area B	Red Brick Building	Structure	Mine	2009/06/02	-29.76727	25.42123		8.24
Mine Area B	Red Brick Building	Structure	Mine	2009/06/02	-29.76738	25.42102	1417 m	8.25
Mine Area B	Red Brick Building	Structure	Mine	2009/06/02	-29.76733	25.42126	1418 m	8.26
Mine Area B	Reservoir	Dam	Mine	2009/06/02	-29.76694	25.42461	1448 m	8.27
Mine Area B	Reservoir	Dam	Mine	2009/06/02	-29.76688	25.42439	1446 m	8.28
Mine Area B	Reservoir	Dam	Mine	2009/06/02	-29.76665	25.42469	1447 m	8.29
Mine Area B	Reservoir	Dam	Mine	2009/06/02	-29.7666	25.42449	1448 m	8.30
Mine Area B	Reservoir	Structure	Mine	2009/05/02	-29.76701	25.42449		8.31
Mine Area B	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.76744	25.42247	1424 m	8.32

Mine Area B	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.76732	25.42291	1428 m	8.33
Mine Area B	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.76723	25.42287	1428 m	8.34
Mine Area B	Stone Foundation 2	Stone Foundation	Mine	2009/06/02	-29.76735	25.42243	1424 m	8.35
Mine Area B	Stone Foundation 3	Stone Foundation	Mine	2009/06/02	-29.76674	25.42222	1423 m	8.36
Mine Area B	Stone Foundation 3	Stone Foundation	Mine	2009/06/02	-29.76681	25.42226	1424 m	8.37
Mine Area B	Stone Foundation 3	Stone Foundation	Mine	2009/06/02	-29.76677	25.42234		8.38
Mine Area B	Stone Foundation 3	Stone Foundation	Mine	2009/06/02	-29.7667	25.42231		8.39
Mine Area B	Stone tool Scatter	Stone tool Scatter	Stone Age	2009/05/02	-29.76622	25.42167		8.40
Mine Area B	Unidentified Stone Foundation	Structure	Mine	2009/06/02	-29.7658	25.42365	1439 m	8.41

Site Table 7. Mine Area B Sites



Figure 60. Mine Area B Sites Map

6.9 MINE SQUARE

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
Mine Square	Acrobatic Club	Structure	Mine	2009/06/02	-29.76371	25.42381	1425 m	9.1
Mine Square	Bowling Clubhouse	Structure	Mine Square	2009/06/02	-29.76334	25.4237	1424 m	9.2
Mine Square	Bowling Green	Other	Mine Square	2009/06/02	-29.76318	25.42384	1425 m	9.3
Mine Square	Building	Structure	Mine	2009/06/02	-29.7648	25.42281	1421 m	9.4
Mine Square	Engineers Office	Structure	Mine	2009/05/02	-29.76399	25.42281	1422 m	9.5
Mine Square	Engineers Office	Structure	Mine Square	2009/06/02	-29.76407	25.42298	1418 m	9.6
Mine Square	Garage	Structure	Mine Square	2009/06/02	-29.76403	25.42341	1425m	9.7
Mine Square	Head Office	Structure	Mine Square	2009/06/02	-29.76271	25.42318		9.8
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76434	25.42435		9.9
Mine Square	House	Structure	Mine Square	2009/06/02	-29.7642	25.42443		9.10
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76351	25.42351		9.11
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76366	25.42282		9.12
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76437	25.42403		9.13
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76406	25.42452		9.14
Mine Square	House	Structure	Mine Square	2009/06/02	-29.7645	25.42423		9.15
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76317	25.42302		9.16
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76332	25.42296		9.17
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76353	25.42287		9.18
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76376	25.42317		9.19
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76408	25.42494		9.20
Mine Square	House	Structure	Mine Square	2009/06/02	-29.8305	25.42333		9.21
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76428	25.42386		9.22
Mine Square	House	Structure	Mine Square	2009/06/02	-29.76444	25.42383		9.23
Mine Square	Managers House	Structure	Mine Square	2009/06/02	-29.7618	25.42192	1426 m	9.24
Mine Square	Single Quarters	Structure	Mine Square	2009/06/02	-29.76246	25.42392		9.25
Mine Square	Single Quarters	Structure	Mine Square	2009/06/02	-29.76229	25.42368		9.26
Mine Square	Single Quarters	Structure	Mine Square	2009/06/02	-29.76215	25.42377		9.27
Mine Square	Single Quarters	Structure	Mine Square	2009/06/02	-29.76183	25.42289		9.28
Mine Square	Survey Office	Structure	Mine Square	2009/06/02	-29.76296	25.42303		9.29
Mine Square	Swimming pool	Other	Mine	2009/06/02	-29.76351	25.4248	1426 m	9.30
Mine Square	Tennis Courts	Other	Mine	2009/06/02	-29.76337	25.42432	1426 m	9.31
Mine Square	Underground Managers Office	Structure	Mine Square	2009/06/02	-29.76251	25.42271		9.32

Site Table 8. Mine Square Sites



Figure 61. Mine Square Sites Map

6.10 NORTH SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
North Section	Cement Foundation	Cement Foundation	Mine	2009/06/02	-29.74956	25.41847	1436 m	10.1
North Section	Cement Foundation	Cement Foundation	Mine	2009/06/02	-29.74961	25.41844	1434 m	10.2
North Section	Cement Foundation	Cement Foundation	Mine	2009/06/02	-29.74957	25.41832	1437 m	10.3
North Section	Ostrich eggshell scatter	Other	Other	2009/06/02	-29.75143	25.41209	1435 m	10.4
North Section	Stone and Cement Channel	Structure	Mine	2009/06/02	-29.75518	25.41287	1429 m	10.5
North Section	Stone and Cement Wall	Wall	Mine	2009/06/02	-29.75299	25.40907	1437 m	10.6
North Section	Stone Bridge	Bridge	Mine	2009/06/02	-29.75575	25.414	1422 m	10.7
North Section	Stone tool Scatter	Stone tool Scatter	Stone Age	2009/06/02	-29.75276	25.40995	1436 m	10.8
North Section	Stone tool Scatter	Stone tool Scatter	Stone Age	2009/06/02	-29.75207	25.41148	1436 m	10.9

Site Table 9. North Section Sites

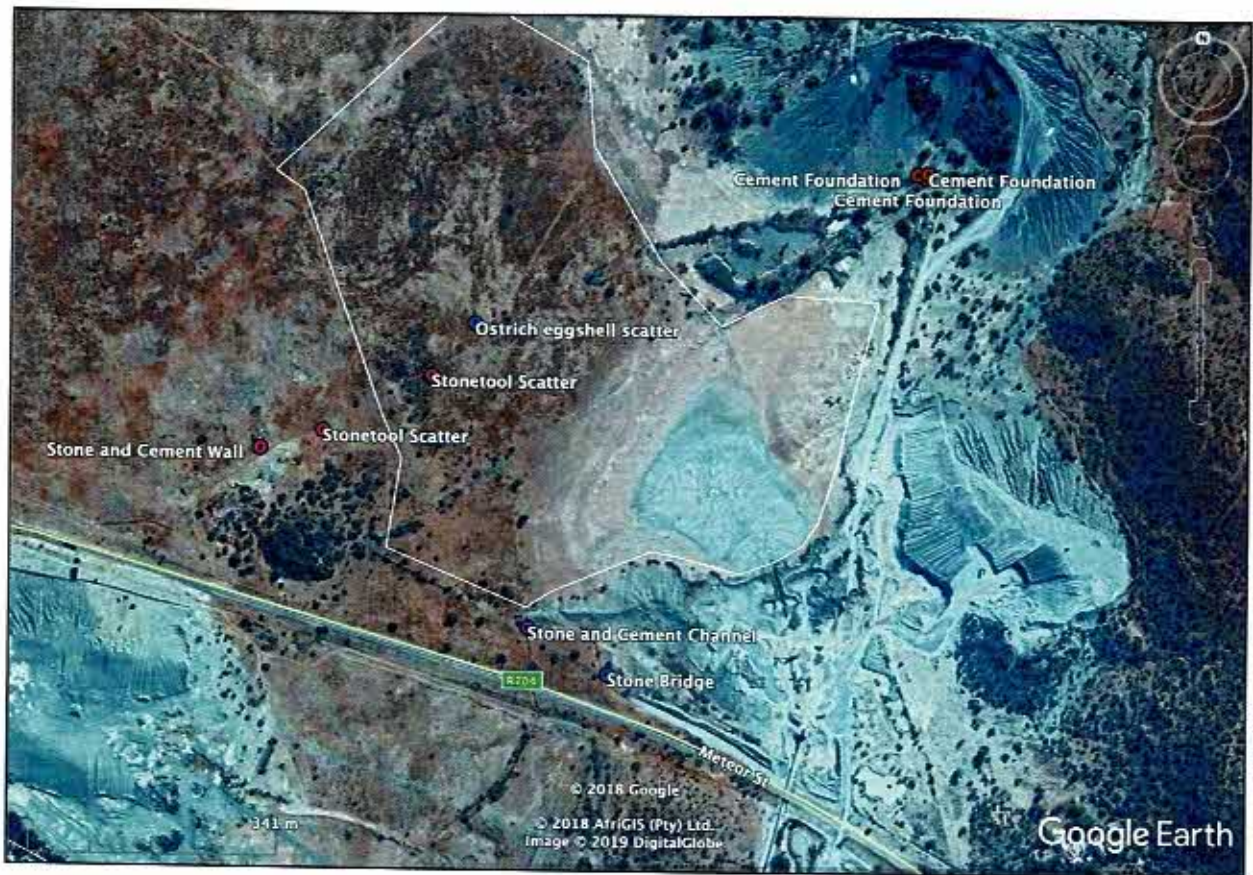


Figure 62. North Section Site Map

6.11 SOUTH SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.79005	25.39898	1434 m	11.1
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.79001	25.39887	1433 m	11.2
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78996	25.39895	1434 m	11.3
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.79017	25.40338	1426 m	11.4
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.79011	25.39895	1433 m	11.5
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78833	25.40036	1433 m	11.6
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.7829	25.40454	1430 m	11.7
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.7901	25.40344	1426 m	11.8
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.77938	25.40729	1429 m	11.9

South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.77931	25.40731	1428 m	11.10
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78832	25.40043	1432 m	11.11
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78118	25.40587	1431 m	11.12
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78114	25.4059	1431 m	11.13
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78296	25.40449	1429 m	11.14
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78648	25.40179	1433 m	11.15
South Section	Mechanical Haulage Foundation	Cement Foundation	Mine	2009/05/02	-29.78652	25.40173	1433 m	11.16
South Section	Packed stones	Structure	Mine	2009/05/02	-29.7904	25.39923	1432 m	11.17
South Section	Packed stones	Structure	Mine	2009/05/02	-29.79051	25.39939	1433 m	11.18
South Section	Packed stones	Structure	Mine	2009/05/02	-29.79049	25.39908	1432 m	11.19
South Section	Stonewall / Retainer wall	Wall	Mine	2009/05/02	-29.7826	25.40438	1440 m	11.20
South Section	Stonewall / Retainer wall	Wall	Mine	2009/05/02	-29.78578	25.40021	1438 m	11.21
South Section	Stonewall / Retainer wall	Wall	Mine	2009/05/02	-29.78698	25.39862	1441 m	11.22
South Section	Stonewall / Retainer wall	Wall	Mine	2009/05/02	-29.78774	25.39757	1441 m	11.23

Site Table 10. South Section Sites

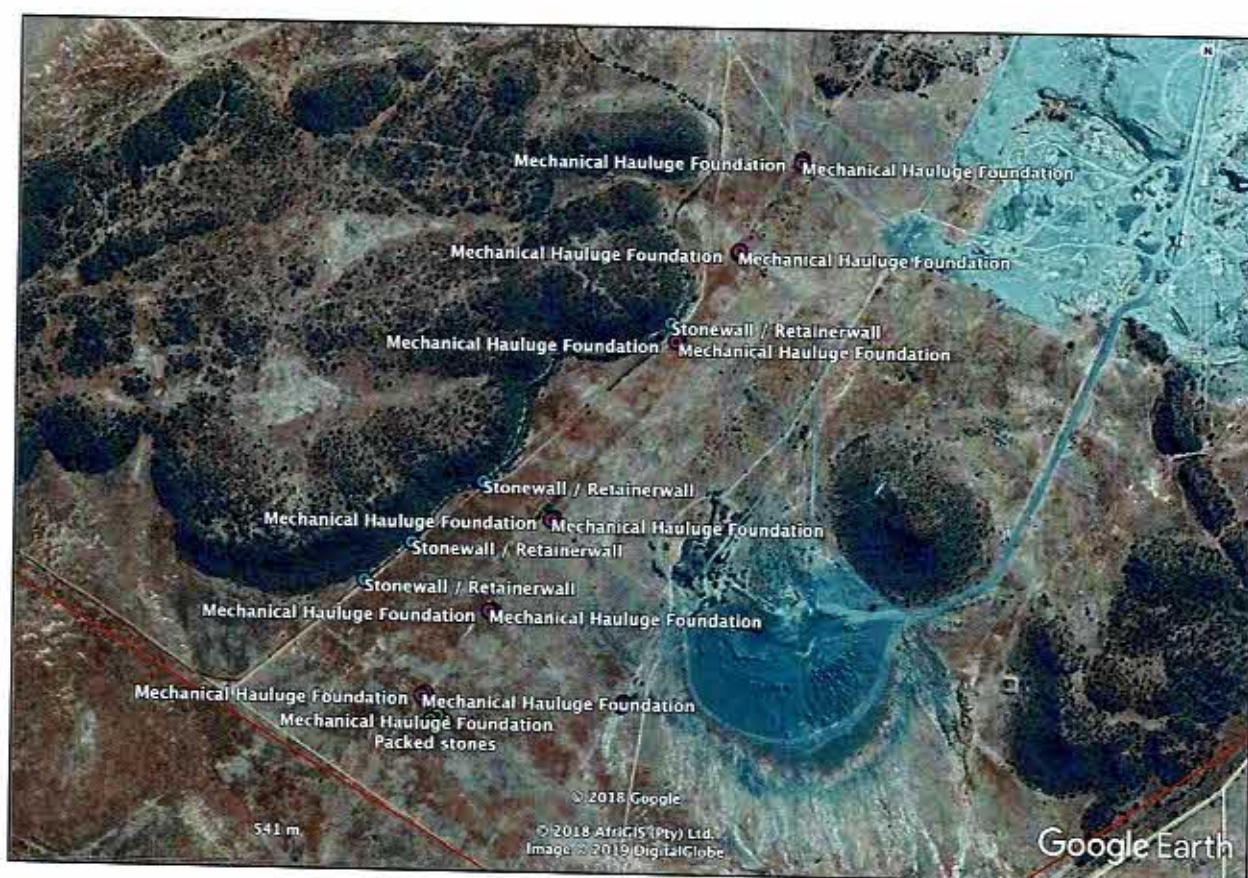


Figure 63. South Section Sites Map

6.12 WEST SECTION

Area	Map Name	Group Name	Era	Date Recorded	Latitude	Longitude	Altitude	Site No.
West Section	Airfield Bathroom	Structure	Mine	2009/03/02	-29.77421	25.38478	1460 m	12.1
West Section	Airfield Hanger	Cement Foundation	Mine	2009/05/02	-29.77431	25.38561	1460 m	12.2
West Section	Cattle Kraal	Kraal	Farming activities	2009/04/02	-29.76577	25.38248	1493 m	12.3
West Section	Dam Wall	Dam	Mine	2009/04/02	-29.77099	25.38596	1457 m	12.4
West Section	Dam Wall	Dam	Mine	2009/04/02	-29.77208	25.38563	1457 m	12.5
West Section	Dam Wall	Dam	Mine	2009/04/02	-29.77176	25.38599	1456 m	12.6
West Section	Dam Wall	Dam	Mine	2009/04/02	-29.7715	25.38622	1456 m	12.7
West Section	Dam Wall	Dam	Mine	2009/04/02	-29.77132	25.38627	1455 m	12.8
West Section	Grave	Graveyard	Historic	2009/05/02	-29.77747	25.39319		12.9
West Section	Kraal	Kraal	Farming activities	2009/05/02	-29.78239	25.3868	1481 m	12.10
West Section	Stone Heap	Stone Heap	Mine	2009/04/02	-29.76704	25.3821	1489 m	12.11
West Section	Stone Heap	Stone Heap	Mine	2009/04/02	-29.76676	25.38228	1486 m	12.12
West Section	Stone Heap	Stone Heap	Mine	2009/04/02	-29.76655	25.38213	1488 m	12.13
West Section	Stone Heap	Stone Heap	Mine	2009/04/02	-29.7656	25.38204	1493 m	12.14

West Section	Stone tool Scatter	Stone tool Scatter	Stone Age	2009/04/02	-29.78321	25.3824	1473 m	12.15
West Section	Stone tool Scatter	Stone tool Scatter	Stone Age	2009/04/02	-29.76532	25.38187	1495 m	12.16

Site Table 11. West Section Sites



Figure 64. West Section Sites Map

7. METHODOLOGY

This study defines the desktop heritage component of the EIA process being undertaken for the Prospecting Rights Application for the Remainder of Portions 1 and 16 of the Farm Jagersfontein.

It is described as a first phase (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

7.1 INVENTORY

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984*).

7.2 EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

Known Information was combined with information from an extensive literature study as well as the result of archival studies based on the SAHRA (South African Heritage Resource Agency) provincial databases.

This Desktop Heritage Impact Assessment relies on the analysis of written documents, maps, aerial photographs and other archival sources. Site investigations were not performed.

The following documents were consulted in this study;

- South African National Archive Documents
- SAHRIS (South African Heritage Resources Information System) Database of Heritage Studies
- Historic Maps
- 2925 CB 1968, 1988 & 2005 and 2925 CD 1948, 1988 & 2005 Surveyor General Topographic Map series
- 1952 1:10 000 aerial photo survey
- Google Earth 2018 imagery
- Published articles and books
- JSTOR Article Archive

8. MEASURING IMPACTS

In 2003 the SAHRA (South African Heritage Resources Agency) compiled the following guidelines to evaluate the cultural significance of individual heritage resources:

8.1 TYPE OF RESOURCE

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

8.2 TYPE OF SIGNIFICANCE

8.2.1 HISTORIC VALUE

It is important in the community, or pattern of history

- Important in the evolution of cultural landscapes and settlement patterns
- Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

8.2.2 AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

8.2.3 SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

(a) Does the site contain evidence, which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

- internal stratification and depth
- chronologically sensitive cultural items
- materials for absolute dating
- association with ancient landforms
- quantity and variety of tool type
- distinct intra-site activity areas

- tool types indicative of specific socio-economic or religious activity
 - cultural features such as burials, dwellings, hearths, etc.
 - diagnostic faunal and floral remains
 - exotic cultural items and materials
 - uniqueness or representativeness of the site
 - integrity of the site
- (b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?
- monitoring impacts from artificial or natural agents
 - site preservation or conservation experiments
 - data recovery experiments
 - sampling experiments
 - intra-site spatial analysis
- (c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?
- topographical, geomorphological context
 - depositional character
 - diagnostic faunal, floral data
- (d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

8.2.4 SOCIAL VALUE / PUBLIC SIGNIFICANCE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?

8.2.5 ETHNIC SIGNIFICANCE

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

- ethnographic or ethno-historic reference
- documented local community recognition or, and concern for, the site

8.2.6 ECONOMIC SIGNIFICANCE

- (a) What value of user-benefits may be placed on the site?
- visitors' willingness-to-pay
 - visitors' travel costs

8.2.7 SCIENTIFIC SIGNIFICANCE

- (a) Does the site contain evidence, which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?
- (b) Does the site contain evidence, which can make important contributions to other scientific disciplines or industry?

8.2.8 HISTORIC SIGNIFICANCE

- (a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?
- (b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?
- (c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?
- (d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

8.2.9 PUBLIC SIGNIFICANCE

- (a) Does the site have potential for public use in an interpretive, educational or recreational capacity?
- visibility and accessibility to the public
 - ability of the site to be easily interpreted
 - opportunities for protection against vandalism
 - economic and engineering feasibility of reconstruction, restoration and maintenance
 - representativeness and uniqueness of the site
 - proximity to established recreation areas
 - compatibility with surrounding zoning regulations or land use
 - land ownership and administration
 - local community attitude toward site preservation, development or destruction
 - present use of site
- (b) Does the site receive visitation or use by tourists, local residents or school groups?

8.2.10 OTHER

- (a) Is the site a commonly acknowledged landmark?
- (b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?
- (c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?
- (d) Is the site representative of a particular architectural style or pattern?

8.3 DEGREES OF SIGNIFICANCE

8.3.1 SIGNIFICANCE CRITERIA

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information, which, if properly recovered, will enhance understanding of Southern African human history, is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population (*Smith, L.D. 1977*).

8.3.2 RARITY

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

8.3.3 REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.

9. ASSESSMENT OF HERITAGE POTENTIAL

9.1 ASSESSMENT MATRIX

9.1.1 DETERMINING ARCHAEOLOGICAL SIGNIFICANCE

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (J) and Whitelaw (1997) for assessing archaeological significance has been developed for Eastern Cape settings (Morris 2007a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

Estimating site potential

In 2006 SAHRA prescribed classification standards for determining the heritage significance of sites within the SADC region. These recommendations were subsequently approved by ASAPA and are reproduced here to indicate the measuring standards for heritage sensitivity used in this report;

Field Rating	Grade	Significance	Mitigation
National Significance (NS)	Grade 1	-	Conservation; National Heritage Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Heritage Sites nomination
Local Significance (LS)	Grade 3A	High	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation with part of site retained in original
Generally Protected A (GP.A)	-	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium	Recording before destruction
Generally Protected C (GP.C)	-	Low	Destruction

Table 3. SAHRA Assigned Heritage Site Significance Grading

Table 4 (below) is a classification of landforms and visible archaeological traces used for estimating the potential of archaeological sites (after J. Deacon and, National Monuments Council). Type 3 sites tend to be those with higher archaeological potential, but there are notable exceptions to this rule, for example the renowned rock engravings site Driekopseiland near Kimberley which is on landform L1 Type 1 – normally a setting of lowest expected potential. It should also be noted that, generally, the older a site the poorer the preservation, so that sometimes any trace, even of only Type 1 quality, could be of exceptional significance. In light of this, estimation of potential will always be a matter for archaeological observation and interpretation.

Table 4. Classification of landforms and visible archaeological traces for estimating the potential for archaeological sites (after J. Deacon, NMC as used in Morris)

Class	Landform	Type 1	Type 2	Type 3
L1	Rocky Surface	Bedrock exposed	Some soil patches	Sandy/grassy patches
L2	Ploughed land	Far from water	In floodplain	On old river terrace
L3	Sandy ground, inland	Far from water	In floodplain or near features such as hill/dune	On old river terrace
L4	Sandy ground, coastal	>1 km from sea	Inland of dune cordon	Near rocky shore
L5	Water-logged deposit	Heavily vegetated	Running water	Sedimentary basin

L6	Developed urban	Heavily built-up with no known record of early settlement	Known early settlement, but buildings have basements	Buildings without extensive basements over known historical sites
L7	Lime/dolomite	>5 myrs	<5000 yrs	Between 5000 yrs and 5 myrs
L8	Rock shelter	Rocky floor	Loping floor or small area	Flat floor, high ceiling
Class	Archaeological traces	Type 1	Type 2	Type 3
A1	Area previously excavated	Little deposit remaining	More than half deposit remaining	High profile site
A2	Shell of bones visible	Dispersed scatter	Deposit <0.5 m thick	Deposit >0.5 m thick; shell and bone dense
A3	Stone artefacts or stone walling or other feature visible	Dispersed scatter	Deposit <0.5m thick	Deposit >0.5 m thick

Table 5. Site attributes and value assessment (adapted from Whitelaw 1997 as used in Morris)

Class	Landforms	Type 1	Type 2	Type 3
1	Length of sequence /context	No sequence Poor context Dispersed distribution	Limited sequence	Long sequence Favourable context High density of arte / ecofacts
2	Presence of exceptional items (incl. regional rarity)	Absent	Present	Major element
3	Organic preservation	Absent	Present	Major element
4	Potential for future archaeological investigation	Low	Medium	High
5	Potential for public display	Low	Medium	High
6	Aesthetic appeal	Low	Medium	High
7	Potential for implementation of a long-term management plan	Low	Medium	High

9.2 ASSESSING SITE VALUE BY ATTRIBUTE

Table 5 is adapted from Whitelaw (1997), who developed an approach for selecting sites meriting heritage recognition status in KwaZulu Natal. It is a means of judging a site's archaeological value by ranking the relative strengths of a range of attributes (given in the second column of the table). While aspects of this matrix remain qualitative, attribute assessment is a good indicator of the general archaeological significance of a site, with Type 3 attributes being those of highest significance.

9.3 IMPACT STATEMENT

9.3.1 ASSESSMENT OF IMPACTS

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions, which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined below:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

9.4 INDICATORS OF IMPACT SEVERITY

Magnitude

The amount of physical alteration or destruction, which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts, which result in a totally irreversible and irretrievable loss of heritage value, are of the highest severity.

Duration

The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or on-going nature.

Diversity

The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (Zubrow, Ezra B.A., 1984).

9.5 BUILT ENVIRONMENT

Several structures associated with mining and industrial activities was identified on site. A large amount of these buildings have significant heritage value.

9.6 HISTORIC SIGNIFICANCE

No	Criteria	Significance Rating
1	Are any of the identified sites or buildings associated with a historical person or group? Yes. Early Mining activities. Cecil John Rhodes	Grade 3A
2	Are any of the buildings or identified sites associated with a historical event? Yes. Emergence of mining in the Free State	Grade 3A
3	Are any of the identified sites or buildings associated with a religious, economic social or political or educational activity? Colonial Mining Activities	Grade 3B
4	Are any of the identified sites or buildings of archaeological significance? No, only historical significance	-
5	Are any of the identified buildings or structures older than 60 years? All the buildings listed above are older than 60 years.	Grade GP. A

9.7 ARCHITECTURAL SIGNIFICANCE

No	Criteria	Rating
1	Are any of the buildings or structures an important example of a building type? Yes.	Grade 3B
2	Are any of the buildings outstanding examples of a particular style or period? Yes. Early Mining Vernacular	Grade 3A
3	Do any of the buildings contain fine architectural details and reflect exceptional craftsmanship? No.	-
4	Are any of the buildings an example of an industrial, engineering or technological development? Yes. Early mining	Grade 3B

5	What is the state of the architectural and structural integrity of the building? All the buildings were in a reasonable state of structural integrity.	Grade 3B
6	Is the building's current and future use in sympathy with its original use (for which the building was designed)? Yes.	Grade 3B
7	Were the alterations done in sympathy with the original design? No	Grade 3B
8	Were the additions and extensions done in sympathy with the original design? No	Grade 3B
9	Are any of the buildings or structures the work of a major architect, engineer or builder? Unknown	Grade 3B

9.8 SPATIAL SIGNIFICANCE

Even though each building needs to be evaluated as single artefact the site still needs to be evaluated in terms of its significance in its geographic area, city, town, village, neighbourhood or precinct. This set of criteria determines the spatial significance.

No	Criteria	Rating
1	Can any of the identified buildings or structures be considered a landmark in the town or city? Yes	Grade 3A
2	Do any of the buildings contribute to the character of the neighborhood? Yes	Grade 3 A & B
3	Do any of the buildings contribute to the character of the square or streetscape? Yes	Grade 3A
4	Do any of the buildings form part of an important group of buildings? Yes	Grade 3A & B

10. IMPACT EVALUATION

This HIA Methodology assists in evaluating the overall effect of a proposed activity on the heritage environment. The determination of the effect of a heritage impact on a heritage parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the heritage practitioner through the process of heritage impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

10.1 DETERMINATION OF SIGNIFICANCE OF IMPACTS

Significance is determined through a synthesis of impact characteristics, which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance 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. The total number of points scored for each impact indicates the level of significance of the impact.

10.1.1 IMPACT RATING SYSTEM

Impact assessment must take account of the nature, scale and duration of effects on the heritage environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact will be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

10.1.2 RATING SYSTEM USED TO CLASSIFY IMPACTS

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 10: Classification of Impacts

NATURE		
Including a brief description of the impact of the heritage parameter being assessed in the context of the project. This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.

2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which heritage resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

DURATION

This describes the duration of the impacts on the heritage parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).

CUMULATIVE EFFECT

This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.

1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects.
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects.
3	Medium Cumulative impact	The impact would result in minor cumulative effects.

4	High Cumulative Impact	The impact would result in significant cumulative effects.
INTENSITY / MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance 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. This describes the significance of the impact on the heritage parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.

51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

1 1. ANTICIPATED IMPACT OF THE DEVELOPMENT

1 1.1 RESERVOIR SITE AT SECTION D

Table 11: Mitigation of Impacts

IMPACT TABLE FORMAT		
Issue/Impact/Heritage Impact/Nature	<i>Concrete Reservoir Structures at Area D</i>	
<i>Extent</i>	<i>Local (2)</i>	
<i>Probability</i>	<i>Unlikely (1)</i>	
<i>Reversibility</i>	<i>Partly reversible (2)</i>	
<i>Irreplaceable loss of resources</i>	<i>Insignificant loss of resources (1)</i>	
<i>Duration</i>	<i>Medium term (2)</i>	
<i>Cumulative effect</i>	<i>Low cumulative effect (2)</i>	
<i>Intensity/magnitude</i>	<i>Low (1)</i>	
<i>Significance Rating of Potential Impact</i>	<i>10 points: Positive Low impact. The anticipated impact will have minor positive effects.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
<i>Extent</i>	2	2
<i>Probability</i>	1	1
<i>Reversibility</i>	2	2
<i>Irreplaceable loss</i>	1	1
<i>Duration</i>	2	2
<i>Cumulative effect</i>	2	2
<i>Intensity/magnitude</i>	1	1
<i>Significance rating</i>	10 (low negative)	10 (low negative)
<i>Mitigation measure</i>	<i>No further mitigation is needed</i>	

1 1.2. UNIDENTIFIED STONE AGE DEPOSITS

IMPACT TABLE FORMAT	
Issue/Impact/Heritage Impact/Nature	<i>Heritage sites of significance including Palaeontology</i>
<i>Extent</i>	<i>Local (2)</i>
<i>Probability</i>	<i>Possible (2)</i>
<i>Reversibility</i>	<i>Barely reversible (3)</i>

<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources (3)</i>	
<i>Duration</i>	<i>Medium term (2)</i>	
<i>Cumulative effect</i>	<i>Low cumulative effect (2)</i>	
<i>Intensity/magnitude</i>	<i>High (3)</i>	
<i>Significance Rating of Potential Impact</i>	<i>42 points: Positive Medium impact. The anticipated impact will have moderate positive effects.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	2	1
Reversibility	3	2
Irreplaceable loss	3	1
Duration	2	2
Cumulative effect	2	2
Intensity/magnitude	3	1
Significance rating	42 (medium negative)	10 (low negative)
Mitigation measure	<i>It is recommended that any ground works in Area D be monitored by a qualified heritage expert to assess the possible occurrence of Fauresmith and Smithfield Industry remains.</i>	

1 1.3 THE CAVALRY ENCLOSURE

IMPACT TABLE FORMAT		
Issue/Impact/Heritage Impact/Nature	<i>The stone walled Cavalry Enclosure at Area B</i>	
<i>Extent</i>	<i>Local (2)</i>	
<i>Probability</i>	<i>Definite (4)</i>	
<i>Reversibility</i>	<i>Irreversible (4)</i>	
<i>Irreplaceable loss of resources</i>	<i>Significant loss of resources (3)</i>	
<i>Duration</i>	<i>Long term (4)</i>	
<i>Cumulative effect</i>	<i>Low cumulative effect (2)</i>	
<i>Intensity/magnitude</i>	<i>High (3)</i>	
<i>Significance Rating of Potential Impact</i>	<i>57 points: Negative High impact. The anticipated impact will have minor positive effects.</i>	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	1
Reversibility	4	2
Irreplaceable loss	3	1
Duration	4	2
Cumulative effect	2	2

Intensity/magnitude	3	1
Significance rating	57 (negative high)	10 (low negative)
Mitigation measure	<i>It is recommended that the Cavalry Enclosure site be subjected to a second phase of investigation. No alteration to the site may be done without a permit from SAHRA.</i>	

1 1.4 EVALUATING DESKTOP STUDY SITES (As per Philip, 2013)

Level	Heritage component	Action
National (Grade I) (National significance) preferably World Heritage Site	Open pit mine	Should be nominated to be declared by SAHRA
Provincial (Grade II) (Provincial significance)	Mine Square	Should be nominated to be declared by Provincial Authority
Local Grade IIIA (High significance locally)	Graveyard	The site should be retained as heritage site. Urgent maintenance and management plan for future maintenance required
Local Grade IIIA (High significance locally)	Compound (native hostel)	The site should be retained as heritage site pending results of specialist report from Heritage Architect on soundness of structure.
Local Grade 1I 1B (High significance locally)	Historical buildings/structures includes Diggers Hospital, train bridge, "cavalry" area and sites described as mud-brick and stone-wall enclosed "farmsteads" but excludes stonewalled dam	These sites should be mitigated and part retained as heritage site
Local Grade 1I 1B (High significance locally)	All mining related structures within the mining area related to mining operations but excluding office buildings	These sites should be mitigated and part retained as a heritage site
Generally Protected A	Office buildings within mining area	Mitigation necessary before destruction

Generally Protected B (Provisional rating pending specialist report from heritage architect)	Charlesville	The site needs to be recorded before destruction (should the latter be required on any of the buildings older than 60 years)
Generally Protected C	Stone- wall dam (Historical farming area)	No further recording is required

Recommendations

Cultural Heritage sites are fragile and can easily be destroyed if sufficient care is not taken during any development or activity in its vicinity. However, the presence of cultural heritage sites does not necessarily mean that no further development can take place. Sites can be mitigated under permit and then destroyed should they not be deemed worthy of conservation (refer to table 3 above). The entire town of Jagersfontein and its associated mine and mining activities, however, has the potential to be utilized as tourist attraction and its associated mine and mining activities, however, has the potential to be utilized as tourist attraction to a similar fashion as is the case with Pilgrim's Rest in Mpumalanga. Jagersfontein mine is a perfect example of early mining practices and there is sufficient information by means of photographic and other records as well as remaining structures to recreate at least certain facets of the mining history for tourism purposes.

A socio-economic study was done in 1968 prior to the closure of the mine in 1971 in an attempt to determine the effect the closure of the mine would have on the social and economic wellbeing of the town and its inhabitants. In this report it was recommended that Jagersfontein and Fauresmith be combined under one municipality and that the mining town Charlesville be demolished. Then already it was predicted that should these recommendations not be followed, the result would be three struggling small towns. This prediction seems to be true for at least two of these towns, being Jagersfontein and Charlesville. Several attempts have been made since to create some form of economy, to include a brickmaking factory utilizing the material from one of the old dumps. None seem to have been successful to date in terms of sustainability and the overall condition of the town suggests a serious lack of economically viable industries and very few employment opportunities for a large portion of its inhabitants. The preservation of the heritage components should, therefore, be weighed against the economic possibilities of other activities such as the mining of the dumps that would improve the economic well-being of the town but not in such a way that it destroys its potential for tourism purposes which also has the potential to boost the local economy. The following recommendations, therefore, are with this factor in mind. In the case of cultural heritage sites and material recorded during this survey, the following recommendations are made:

1. That application is made for the open pit area to be nominated as National Heritage Site and that no further development takes place that would alter its appearance or endanger it in any way.
2. That all the buildings in the mine square area are nominated to be declared as Provincial Heritage sites and that the necessary precaution is taken to maintain it accordingly. It is worthy of mentioning that all of these buildings are older than 60 years and are already protected in terms of the National Heritage Resources Act and should be maintained accordingly.
3. That immediate attention is paid to the maintenance of the graveyard in the following:
 - a. Ensuring it is properly fenced in
 - b. Graves that have eroded out require immediate repair by a suitably qualified person (e.g. an archaeologist specializing in grave relocation). Please note that under provisions of section 36(3)(a) of the National Heritage Resources Act no 25 of 1999 a permit is required for these operations.
 - c. That a specialist report is obtained regarding the condition of the graveyard as well as providing a maintenance plan for its upkeep.
 - d. That a concerted effort is made in determining its origin
 - e. That the cattle pen immediately adjacent the graveyard is moved to a suitable distance away from the graveyard so that underground seepage and cattle traffic can cause no further damage

4. That a specialist report is obtained from a suitably qualified person, e.g. a heritage architect, on all structures within the mining area to include the historical components mentioned in table 3, compound, offices and remains of support service buildings, e.g. study office, etc.
5. That arrangements are made for the necessary mitigation (under permit) of structures and buildings as identified in table 3 above
6. That care is taken that no buildings/structures with a field rating of "Local Grade III" and higher deteriorate any further than its current recorded state and in that render it (or portion thereof depending on its rating) useless for retaining as heritage site (refer to section 45 of the National Heritage Resources Act, no 25 of 1999) and similarly that no site that requires mitigating in any way is allowed to fall in such a state that mitigation is no longer possible.
7. That no further mining activities (e.g. reworking the mine dumps) or any other development and/or activities take place within the reported area unless the necessary mitigation of structures as recommended in table 3 have been completed and the Heritage Management Plan mentioned in point 9 below is in place.
8. It is further recommended that a complete heritage audit be done of the remainder of the town not included in this report. The majority of these structures were erected during the early lifetime of the mine, not to mention as a direct result of the mine, and provided the necessary infrastructure by means of shops, churches, recreation, etc. and should therefore not be viewed as separate from the mine (and its associated buildings).
9. As a final measure a Heritage Management and Maintenance Plan should be drawn up for all the heritage structures and features mentioned in this report and should form part of the global environmental management plan to ensure future preservation of all heritage factors.

11.5 ASSESSING VISUAL IMPACT

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV Architects and The Department of Environmental Affairs and Development Planning (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalised. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimise the visual impact.

11.6 ASSUMPTIONS AND RESTRICTIONS

- It is assumed that the South African Heritage Resources Information System (SAHRIS) database locations are correct
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the social impact assessment and public participation process of the Basic Assessment will result in the identification of any intangible sites of heritage potential.

12. RESOURCE MANAGEMENT RECOMMENDATIONS AND CHANCE FINDS PROTOCOL

Sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in some areas as well as heavy plant cover in other areas. The following indicators of unmarked sub-surface sites could be encountered:

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
- Bone concentrations, either animal or human;
- Ceramic fragments such as pottery shards either historic or pre-contact;
- Stone concentrations of any formal nature.
- Paleontological remains such as fossils.

The following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above:

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site) should cease.
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the South African Police Services (SAPS) should be notified.
- Mitigation measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

13. CONCLUSION

The Remainder of Portion 1 and Portion 16 of the Farm Jagersfontein 14 was subjected to a two phased HIA. Four core areas were identified that the client intends to disturb. These areas were subjected to a field based survey. The rest of the PRA area was only subjected to a Desktop Study.

The study found the following;

An important site in terms of the Cavalry Enclosure is within one of the areas earmarked for prospecting. This site needs to be managed and mitigated before any impact on it is allowed. The site is of major heritage importance.

The Area D where prospecting is proposed could produce Stone Age deposits of the Fauresmith and Smithfield types and any excavations here should be monitored.

Several other sites of significance was identified within the larger prospecting rights application area and these should be mitigated as per the recommendations supplied.

Should the client decide to alter the size or location of any of the prospecting sites labelled A,B,C & D in this report, the new areas should be subjected to a field based HIA before any work can commence. This HIA and Desktop study only applies to the areas indicated as A,B,C & D.

A previous Palaeontological Assessment of the area indicated that there is a negligible possibility of finding any paleontological deposits within the area. The whole PRA area is underlain by the same strata as for which SAHRA has previously issued an exemption (L. Rossouw, 2013).

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