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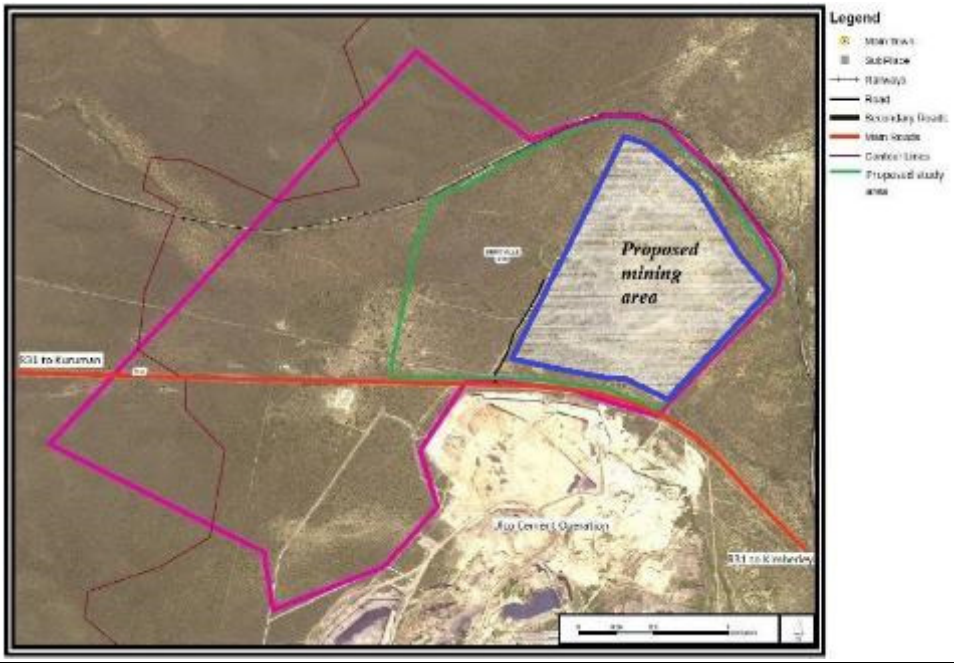
1st phase H.I.A. of a study area that includes portion 3 (Bergville) of the farm Hondefontein 216, portion 2 of the farm Vogelfontein 176 and a portion of Erven 4 Delportshoop, Kimberley district Northern Cape

for: AfriSam – Ulco. Northern Cape

Date. July 2018.



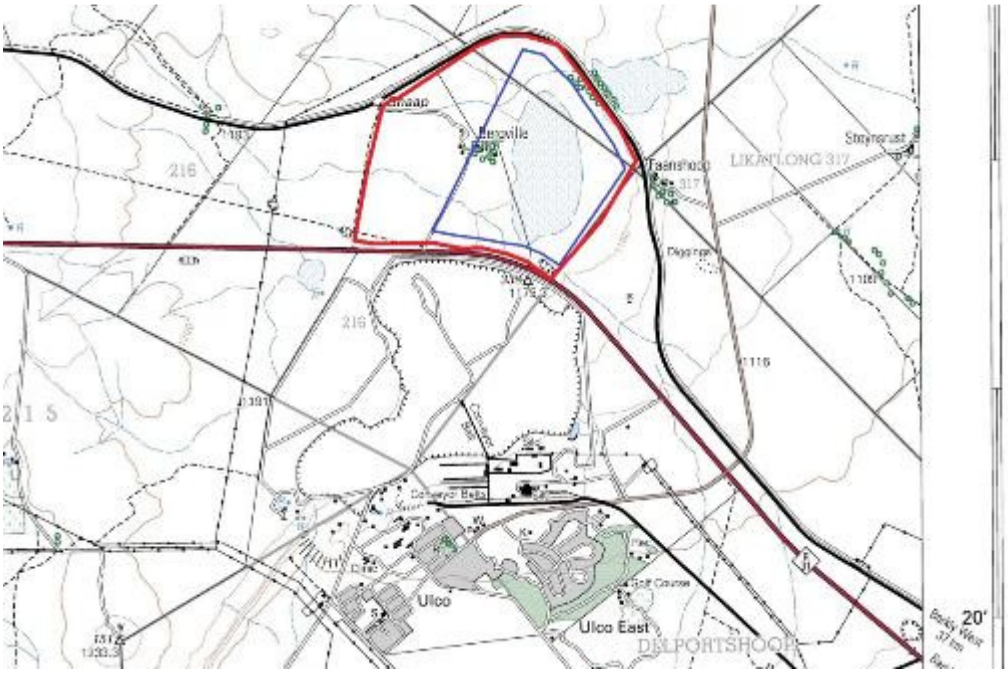
Project coordinator: - Shangoni management services. ***(For contact details see page 4.)***

Report prepared by: -

SIDNEY MILLER.
B.Sc (Engineering) Civil, M. (Architecture) Conservation. Asapa member no 087.

Index.

1. Location and GPS Coordinates of the study area.



Figs. 01 and 02. These images shows the location of the study area. The red line indicates the extent of the area investigated. (1:50 000 map 2824AC ULCO), and the five yellow markers define the extent of the study area. (Google Earth 2018.) The blue lines indicate the proposed mining area.

1. G.P.S. Coordinates of the limits of the site under assessment.

Beacon	Degrees south	Degrees east	Beacon	Degrees south	Degrees east
1	28°18'22.65"S	24°12'11.65"E	2	28°17'46.13"S	24°12'20.07"E
3	28°17'22.28"S	24°13'4.24"E	4	28°18'5.41"S	24°13'38.11"E
5	28°18'27.75"S	24°13'3.57"E			

Fig. 03. Above table shows G.P.S. coordinates that are defining the study area. (GPS coordinates from Google Earth.)

2. Contact Details.

2.1. Client.

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2.2. Consultants.

Environment.	**Heritage**.
Shangoni Management Services. Physical address. Unit C8, Block@Nature, 472 BotterklapperStreet,The Willows,0081. Postal address. PO Box 74726, Lynnwood Ridge, Pretoria, 0040. Contact person. Minnette Le Roux. Telephone. (27)12 807 7036. E-mail. minette@shangoni.co.za	**Sidney Miller.** Physical address. 328 Malherbe Street, Capital Park, 0084, Tshwane. Postal address. Postnet suite 427, P.B. X15, Menlo Park, 0102, Tshwane. Contact person. Sidney Miller. Telephone. 082 939 6536. E-mail. sidneymears@gmail.com.

2.3. Type of Development.
Mining.

2.4. Zoning of Site.
Mining.

2.5 Description of the site.[1]
It includes portion 3 (Bergville) of the farm Hondefontein 216, portion 2 of the farm Vogelfontein 176 and a portion of Erven 4 Delportshoop, Kimberley district Northern Cape.[2] At present it is farmland. It lies adjacent to the Ulco Cement Operation near Delportshoop, Northern Cape, some 400 hectares in extent. In the past limited exploration was carried out by

[1] *See appendix 2.*
[2] *from now on collectively to be called "the study area"*

ground penetrating radar as a pre-amble to the currently proposed larger scale sampling by drilling.

3. Executive Summary.

3.1. Mandate of Shangoni Management services.

Shangoni's mandate is to procure a first phase heritage impact assessment of their client's proposed impact on the study area described above. Initial impact will be drilling for sampling of the ore body as inferred by the Ground Penetrating Radar *(from now on the GPR.)* Depending on the results of this drill sampling, mining of the ore body will eventually proceed. ***This report will then serve as the 1st phase heritage impact assessment studies for both the planned drilling program as well as for the possibility of mining***.

3.2. Intent of Afrisam - Ulco.

It is the intent of the client to explore the mineral potential of this property. (Limestone.) If the drilling results prove to be positive *Afrisam - Ulco* will eventually commence mining on a section of the property.

3.3 The project description.[3]

Shangoni has been instructed in the following way to forward the above project: -.

> *The mine is located 80 km north-west of Kimberley, 42 km north-west of Barkley West, 17 km north-west of Delportshoop and 24 km south-east of Koopmansfontein. The Mine and all the towns mentioned above are accessible along the R31 between Kimberley and Kuruman. AfriSam's Ulco Cement Operation has been operating in the Northern Cape Province since 1936. Mining of the secondary limestone reserves began in 1936, when Union Lime mined it for lime, using two Beckenbach Shaft kilns and nine Spencer kilns for burning the limestone. In 1949, it was decided to mine the low-grade limestone material for cement and the company built two wet process kilns (Kiln 1 and Kiln 2) and cement mills for the cement manufacturing process. Subsequently in 1964 two further kilns (Kiln 3 and Kiln 4) were added on to increase the cement production capacity. In 1985, Union Lime Company was purchased by Anglo Alpha. In 1985, Anglo Alpha began mining primary limestone reserves and commissioned a fifth kiln (UK5), with a capacity to produce 4500 tons of clinker per day. The old lime kilns and cement kilns were decommissioned in 1992. Anglo Alpha has changed name several times and as of June 2007 is now known as AfriSam (South Africa) Properties (Pty) Ltd. The limestone and secondary components are all mined in multi-bench opencast quarries. Primary and secondary limestone is blended together through selective mining and crushing operations to ensure the correct chemical mix of limestone for cement production. In addition to limestone, shale and dolerite are also mined on site. Crushed limestone, shale and dolerite are stockpiled on blending beds and reclaimed for further processing through the cement kiln and cement mills.*
>
> *Acceptable secondary limestone reserves in the current mining area at Ulco are starting to run low. The estimated time horizon remaining is less than 5 years. Already quality consistency on the limestone stockpiles is getting more difficult to maintain. Therefore, AfriSam is investigating the possibility of expanding operations onto the north-eastern portion of the farm Bergville 216 which is adjacent to the current operation.*
> *Limestone resources are available north of Ulco on the opposite side of the R31 provincial road and bounded by the rail line further north (Figure 1). In*

[3] ***E-mail from Shangoni (Minnette le Roux). Tuesday 26 June, 2018***

prospecting terms these resources are referred to as "Indicated" and "Inferred" but not yet a Proved Reserve.

In the latter part of 2017, a prefeasibility study was commissioned to consider the best solutions to confirm these reserves, what legislative requirements there are to access these reserves as well as the most cost-effective solution to mine the limestone. A Ground Penetrating Radar (GPR) investigation was done to highlight the area and extent of the deposit. This area now needs to be close spaced drilled and sampled to provide a 10-year proved reserve and a further 20 years probable reserve as well as to develop a block model for proper mine planning. The GPR as well as previous drill records from the area indicated that mining should be similar to what is happening on the existing mining area. i.e. several benches going down from ground level to between 20 and 40 m.

The new quarry will be most likely accessed via a slot in the limestone barrier (~100 m) between the mining areas and the R31, and twin tunnels under the R31 large enough to safely get the existing side tipping road trucks through. Mining will be as currently done on a blast, load and haul back under the road basis to the existing crusher until a new crusher will be commissioned at a suitable place in the new quarry area.

3.4. Historical milieu.[4]

A. The general area is known to contain both Early as well as Later Stone Age sites as well as engraving sites. On Bergville though no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed.

B. The area investigated revealed no indication of Iron Age settlement.

C. On and around the farmyard of the property under investigation there remain some buildings and structures related to farming activities that fall under the protection of the heritage law under the 60 year rule. These include a reservoir, a well, a milking shed and several canals related to flood irrigation.

D. The graves observed are those of two white pioneer farmers, as well as approximately 20 other graves that could not be linked to any family as they bear no engraved head stones. These are most probably the graves of labourers on the farm as well as their families.

E. Work on the AfriSam-Ulco cement factory, on the western portion of portion 3 of Bergville 216, had already commenced in 1936. Even so, this mine and cement factory had absolutely no impact on the present study area.

F. There are no sites of cultural/spiritual significance located on or near the property under investigation.

G. There are no sites connected to slavery located on or near the property under investigation.

H. There are no people of importance connected to the history of the study area.

I. There is no special technological or scientific advancement of standing that can be linked to the property under investigation.

[4] ***For full description see chapter 8.***

3.5. Environmental milieu.[5]

Geology. The geology of the Northern Cape is possibly of the best known in the world owing to its diamondiferous nature especially around the Kimberley area. The extended deposit of limestone in the general area is also well-known. These accrued from the leaching of dolomite structures and or the deposit from large masses of aquatic bodies caused either directly or indirectly by living organisms and their skeletal remains. The present proposed project of prospecting in the study area will add to this understanding of the areas geology.

Vegetation. The site under investigation is located at a focal point of three veld types namely zones 16, 17 and 40. Acocks describes these as Kalahari Thornveld, Kalahari Thornveld invaded by Karoo and as False Orange River Broken Veld. (Acocks, 1988.) In general though the areas vegetation fits best as described in category 3 of the Kalahari Thornveld Proper.

3.6. Summary of findings.

Although the investigation was conducted on foot, by vehicle and by means of interviews with the present farm owners and workers, no sign of either Stone Age or Iron Age remains could be located in the study area.

On the other hand some of the remains associated farmyard of the property may be considered as important. The structural remains to be considered are the well, the reservoir, the milking shed and the various forms of flood irrigation canals. If the mine eventually becomes a reality, and these heritage remains become an impediment, second phase studies may be undertaken and demolition applications could be made at the provincial Heritage Authorities in Kimberley.

In the same way the white pioneer graves and the other 20 unmarked graves may be treated similarly. These graves may be relocated to the most suitable position.

3.7. Recommendation.

Provided that the described heritage remains are respected there is no reason why the drilling program cannot proceed.

The above recommendation, on the other hand, does not hold for full scale mining. Before such an event the mine plan and the locations of the heritage remains must be married, and the outcome of this should be treated as described in act 25 of 1999.

This include the following:-
3.7.1. A full-scale second phase heritage impact assessment to document the well, the reservoir, the milking shed and the position and character of all early flood irrigation systems.
3. 7. 2. Application for demolishing permits for the above-mentioned.
3. 7. 3. The relocation of all the graves to an appropriate site.

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[5] ***For full description see chapter 7.***

4. Definitions.

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

5. Protected Sites in Terms of the National Heritage Act, Act. no. 25 of 1999.[6]

The following are the most important sites and objects protected by the National Heritage Act:

a. Structures or parts of structures older than 60 years
b. Archaeological sites and objects
c. Paleontological sites
d. Meteorites
e. Ship wrecks
f. Burial grounds
g. Graves of victims of conflict
h. Public monuments and memorials
i. Structures, places and objects protected through the publication of notices in the Gazette and Provincial Gazette
j. Any other places or object which are considered to be of interest or of historical or cultural significance
k. Geological sites of scientific or cultural importance
l. Sites of significance relating to the history of slavery in South Africa
m. Objects to which oral traditions are attached
n. Sites of cultural significance or other value to a community or pattern of South African history

Fig. 04. The routes for the vehicle and on-foot inspection was recorded in the Google Earth Image above. The yellow lines indicate the route taken by vehicle. The red lines represent the route that was followed on foot. The yellow lines represent infrastructure (roads) associated with the farming period on Bergville. The foot survey was conducted in such a manner as to search for Stone and Iron Age remains along and around possible water sources. The farm roads were utilised to investigate historical remains associated farming.

[6] ***For the present study the highlighted lines are applicable.***

6. Methodology.

6.1. The study area was visited between the 2nd and the 5th h of July 2018. The routes taken during the vehicle and on-foot inspection was recorded in the Google Earth Image *(Fig. 04)* above.

6.2. The site was traversed in an appropriate manner so as to collect data for the evaluation of the heritage remains on the farm.

6.3. It was clear that the farm was not seriously impacted upon in the past, apart from farming activities.

6.4. Information regarding the background of farming activities was collected from the farm owner Mr François Botha and his wife Mrs Jean Botha.

6.5. Finds were recorded by GPS readings and photography.

6. 6. The above information was recorded and collated in section 9 of this report.

6.7. Background information concerning the geology and vegetation of the region was collected from reliable resources and is presented in section 7 of this report.

6.8. Background information concerning the archaeology and historical milieu of the region was collected from reliable resources (especially from the McGregor Museum in Kimberley), and is presented in section 8 of this report.

6.9. In sections 10 and 11 field ratings (SAHRA minimum standards May 2007) and statements of significance (SAHRA minimum standards May 2007) were attributed as necessitated by situation.

6.10. Section 12 contains a summary of the research results with a recommendation in section 13.

6.11. The collective gist of the information collated in the report is summarised in the executive summary in section 3.

7. Environment.

7.1. Geology.[7]

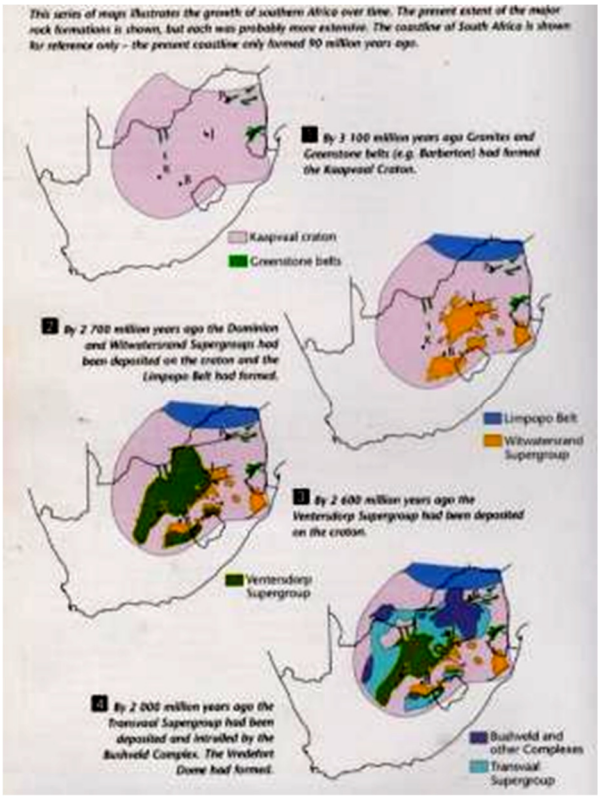

Fig. 05. Left is illustrated the formation of the South African geological substructure between 3100 million years ago and 2000 million years ago. In our present study area the Kaapvaal Craton had formed and the Transvaal Supergroup had been deposited. The Bushveld Complex had appeared and the Vredefort meteorite impact had occurred. K in the illustrations marks Kimberly, adjacent to the study area. (McCarthy& Rubidge: 334.)

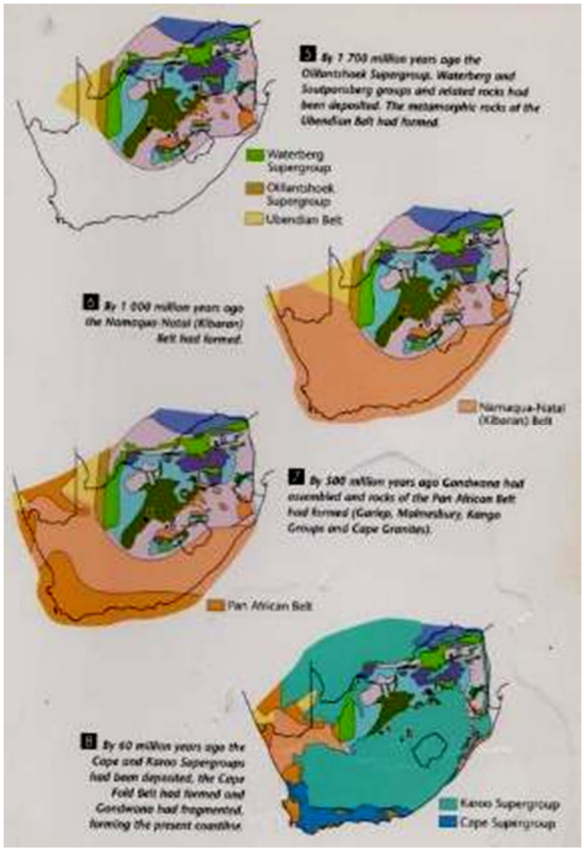

Fig. 06. Right is illustrated the formation of the South African geological substructure between 2000 million years ago and 60 million years ago. As can be seen above it is only the Karoo Supergroup that had `any further significant impact on the study area. K, in the illustrations, marks Kimberly. (McCarthy& Rubidge: 335.)

[7] ***See McCarthy & Rubidge 2005 and Haughton 1940 for full description.***

Limestone[8] is a relatively young sedimentary formation that consists mainly of calcium carbonate with varying quantities of magnesium iron alumina and silica. With the increase of magnesium carbonate limestone eventually occurs as dolomite. Dolomite is a formation that contains a minimum of 45.65% of magnesium carbonate.

Limestone is formed by the precipitation of calcium carbonate from bodies of water either sweet or salty. This precipitation is caused either directly or indirectly by living organisms. It can also be formed by the accumulation of calcareous organic remains. According to *Haughton* "primary limestone" is limestone sediments that have already partially metamorphosed and belongs to the older family of geological formations."Secondary limestone" on the other hand is of more recent origin normally as the result of erosion of older limestone and dolomite and any other formations containing lime.

According to *Haughton* two thirds of South Africa's geological structure consists of sedimentary rock formations. Even so limestone layers that present our limestone resources are relatively rare. Dolomite formations on the other hand occur more frequently and the erosion of these represent the origin of most of our South African "secondary" limestone sources.

According to *Haughton's* estimates approximately 85% of all limestone utilised in South African economy is for the production of cement: -The rest is being utilised for the production of fertiliser, other chemical additives and the fabrication of fireproof ware. At the time of his writing he also mentioned the problem of its distribution in South Africa. The location of lucrative limestone deposits does not overlap centres of high population. Access to sites and the transportation of the product often limits the exploitation of such mineral bodies.

The property under investigation is located 35 kilometres to the north-west of Barkly West along the R 31 towards Kuruman.

[8] For a full description see McCarthy and Rubidge, 2005 page 335 and Haughton, 1940 pages 391 to 394

7.2. Vegetation.

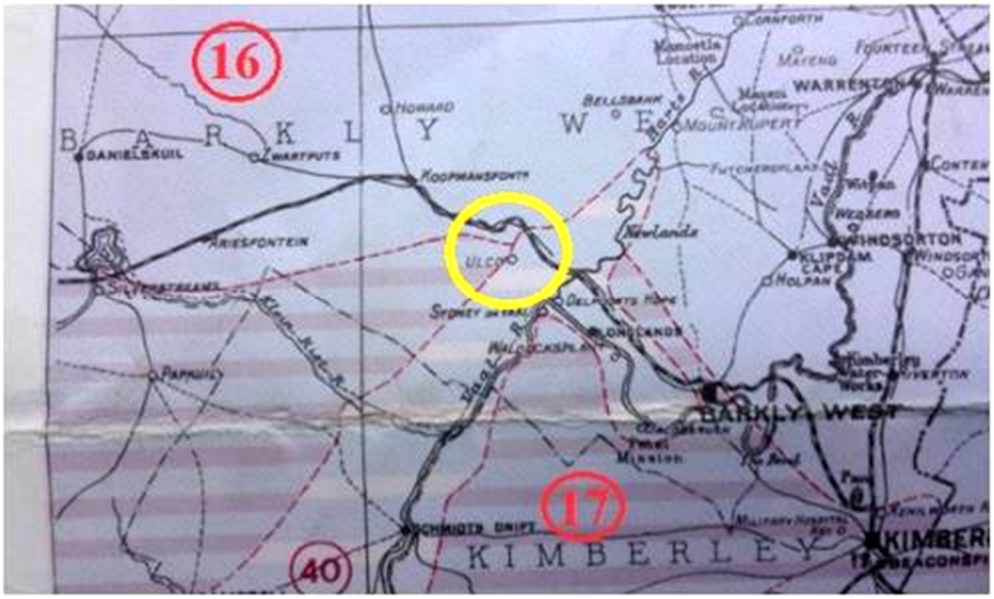

Fig. 07. The site under investigation (Portion 3 of Bellville 216) is located at a focal point of three veld types namely zones 16, 17 and 40. Acocks describes these as Kalahari Thornveld, Kalahari Thornveld invaded by Karoo and as False Orange River Broken Veld. (Acocks, 1988.)[9]

7.2.1. Type 16. Kalahari Thornveld. *(Acocks, pp44.)*

According to Acocks there are two different types in this category. 16a is Kalahari Thornveld Proper and 16b represents the Vryburg Shrub Bushveld. Both these are again subdivided in several categories.

The present study area fits best in category 3 of the Kalahari Thornveld Proper. This is called "Central Form" and it extends from Hopetown to Kimberly and onwards to Vryburg This is essentially an *Acacia erioloba* - Savannah with some of the grasses of the Dry *Cymbopogon - Themeda* veldt and some of those in the Western Form. Rainfall is only about 400 mm per annum so that the veld has not been disturbed by ploughing as such. The "purple grasses" of the Dry *Cymbopogon - Themeda* veldt have fallen out except *Themeda* and have been replaced by the white grasses of the Kalahari. *Themeda* however is the natural dominant, which mainly distinguishes it from the Western Form, even though it is to be found today, as dominant, only on exceptionally well cared farms. Further overgrazing will in turn cause the "white grasses" to be replaced entirely by uniform growth of *Schmidtia pappophoroides*; this change can happen quite suddenly, in a few years. *Pentzia incana* and *Chtysocoma ciliate* are steadily invading, and today these Karoo bushes will be more important than they were 14 years ago when the daughter about this veldt were collected. Dominant trees and shrubs are as follows: - Acacia tortillus, subsp, heteracantha, Lucium cinerium, Diospyros pallens, Rhus ciliate Grewia flava, Lycium hirsutum, Tarchonanthus camphorates, Ziziphus mucronata, Acacia erioloba, Acacia mellifera subsp, detinens, Protoasparagus laricinus, Acacia hebeclada subsp, hebeclada and Ehretia rigida.

The grasses on the other hand are extremely abundant. Acocks lists in his relative abundance table at least 270 species. It is a rich flora, with the forbs and annuals playing an important

[9] The author is aware of the updated version of Acocks's work by Mucina &Rutherford, 2010, but for the purposes of this investigation Acocks version is preferred by the present author.

role. The cover, however is sparse, the grasses being tall and tufted. *Gregeria ornativa* is relatively scarce; other poisonous plants, which may be locally common, include *Gregeria brevifolia. Gregeria obtusifolia* and *Urgenia sanguine.*

7.2.2. Type 17. Kalahari Thornveld invaded by Karoo*. (Acocks, pp49.)*
According to Acocks, in this region one finds the grassveld constituent of the Thornveld being replaced by Karoo, where it has been reduced by grazing mismanagement. Apparently this invasion takes on various forms.

1. On the deep sand of the western form of the Kalahari Thornveld, *Eriocephalus ericoides* invades and *Gregeria brevifolia*, *G obtusifolia* and *Salvia radula* thickens up.
2. On the rocky hills and on calcareous tufa, a fully mixed Karoo flora invades. The species recorded by Acocks includes 27 species that can be viewed on page 49 of his publication. It is a fairly comprehensive list, including elements of the central Upper Karoo, the Arid Karoo and the Orange River Broken Veld.
3. On the hard red sandy loam of the Kimberly area, *Chrysocoma ciliate* is the principal invader, while the local *Chrysocoma sp* thickens up.
4. On the sandy calcareous tufa, besides the Karoo bushes listed, *Hertia pallens, Euryops asparagoides, Gnidia polycephala* and sometimes *Psilocaulon absimile* also becomes common.

7.2.1. Type 40. False Orange River Broken Veldt. *(Acocks, pp90.)*
In the Orange River Valley and the Strydenburg area, this takes the form of the development of thickets of *Acacia mellifera* subsp. *detinens* and *Rigozum trichotomum*, with a little *Paeoptilum spinosum, Boscia albitrunca, Cadaba aphylla and stunted Acacia tortillus* subsp. *heteracantha* in False Arid Karoo. In valleys and on silted flats *Sphalmanthus tetragonus* and packages for donkey becomes abundant.

In the Vaal River Valley, it takes the form of invasion of the Vryburg scrub bushveld by *Acacia mellifera* subsp. *detinens* and our *Acacia tortillus* subsp. *heteracantha*, often forming thickets, with more or less of the constituent of the Orange River Broken Veldt. Similar batches of False Orange River Broken Veldt are developing on a small scale on limestone outcrops in the valleys between Kuruman and the Langeberg, at least as far north as Kathu.

8. Archaeological and Historical Background.

8.1. Stone Age.

In a Phase 1 Archaeological Impact Assessment in August 2005 Morris wrote: -

….The archaeology of the Northern Cape is rich and varied, covering long spans of human history. Concerning Stone Age sites here, C.G. Sampson has observed: "It is a great and spectacular history when compared to any other place in the world" (Sampson 1985). Some areas are richer than others, and not all sites are equally significant. (In the present case, Stone Age traces of any significance were noted only on Dorstfontein/Rietpan, as reported by Morris 1992).....[10]

Early human presence in the region is captured at Taung to the north but no major Early Stone Age site is present around Delportshoop itself. Along the Vaal River numbers of Early Stone Age artifacts may be found in numerous sites, but seldom in stratified deposits that assist archaeologists in adding to dated data. In the direct Delportshoop area there are no recorded major sites of significance.

From a geological point of view there exist a lot of life-giving water sources in the area. The farm names given by the European settlers also reflect the situation regarding water sources in the area during the near distant past such as Koopmansfontein, Alexandersfontein, Donkerboschfontein, Voëlfontein Ariesfontein, Danielskuil, Papkuil and many others. Last but not least one has to mention the Vaal and Harts Rivers all of which presents the presence of life-giving water in this relatively dry area. This would have brought animals to the area, on which the Later Stone Age peoples could prey and exist. The rock-art sites of Driekopseiland and Wildebeestfontein show places of ceremony associated with Later Stone Age people. This reality is then also reflected in the presence of numbers of stone tools from that period in the general region. Owing to the vigorous mining and other related activities associated with the Delportshoop lime industry none of this survives in disturbed areas. Bergville is relatively undisturbed and may yield small windows of opportunity to record Stone Age remains.

Regarding the study area it is expected that no Stone Age remains may be encountered.

8.2. Iron Age.[11]

The nature of Iron Age settlement in southern Africa is well understood and well documented. Iron Age settlers were not only users of the natural environment's resources, but they were essentially farmers. They raised stock and also planted crops that needed specific environmental conditions such as summer rainfall and soils suited for cultivation. Owing to the large tracts of "suitable environmental conditions" land available to the north, northeast and southeast of this region during their migrations, they seldom utilized this region. No sites of importance are known in the Bergville area.

Regarding the study area it is expected that no Iron Age remains may be encountered.

8.3. Historical Period.

The arrival of Europeans in the region was possibly heralded by the notorious Coenraad Buis early in the nineteenth century amongst the Basotho and Batswana to the east and the Northeast. This was soon followed up by missionaries such as Burchell in 1811, Campbell in the 1820's and in May 1821 the notorious Reverend Robert Moffat established himself at Kuruman. Later, in 1834, Moffat accompanied the explorer Smith on his journey to Mzilikazi then living just north of the Magaliesberg along the Crocodile River. Soon after, the Great Trek followed in 1836, and Natal, the Freestate and the Transvaal were settled in with various levels of success for the Europeans from the Cape Colony.

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[10] David Morris :-Phase 1 A.I.A. for De Beers Consolidated Mines Ltd. August 2005 .
[11] See Huffman 2007.

In 1866 the *Hopetown Diamond* was found by one Schalk Van Niekerk on the farm of the Boer family named Jacobs, a prospective buyer for the farm, *De Kalk*. In March 1869 Van Niekerk had acquired an 83.5 carats stone from a man named *Swartbooi* that became the *Star of South Africa*.[12] These events set in motion the first "Diamond Rush" of 1870 in search of alluvial diamonds in the region with attention being focussed on the drainage lines of the major rivers. The rest is well known history.

As far as could be established the farm Bergville at first belonged to one François Jacobus Jacob Van Den Berg, born in 1888 and passed in 1952. One may assume that this person was the first farmer on Bergville. It is likely that he and his labourers were the ones that started cattle farming as well as the first irrigation crop farming. One must also then assume that it was under his directions that the well was excavated and the reservoir and milking shed was constructed. He was then possibly also already the resident farmer when the original Ulco was established in 1936. At his death he was only 64 years old. As the second headstone in the graveyard (with the same first names as Van Den Berg senior) indicates that he was born in 1947 and passed away in 2002 it is reasonable to assume that he was the grandson of Van Den Berg senior and became the third full-time farmer on Bergville.

Regarding the irrigation on the farm the smaller canals was most probably built and utilised by Van Den Berg senior, and that the larger scheme damning the pans and excavating the large canal to the east of the pans came about under the tenure ship of son and grandson.

Furthermore it is apparent that under the second Van Den Berg water became scarce and that he started pumping water and sprinkle irrigating is fields.

Regarding the original farmhouse in which Van Den Berg senior must have lived; there is no sign of such a building. The present farmhouse possibly built in the 1970s must have been the dwelling of the grandson Van Den Berg Jr. The presence of old doors doorframes and sash windows in the labourers quarters may have belonged to the original farmhouse and had been recycled with the building of the new farmhouse. The above scenario may or may not be true but that is the only possibility according to the facts observed.

Regarding the Van Den Berg cemetery it is the opinion of the present author that Van Den Berg Jr was most probably cremated and his ashes strewn in this grave yard. The presence of a headstone on his grandfather's grave rather than separately erected is regarded as an indication of the above deduction.

8.4. Ulco and AfriSam.

AfriSam is South Africa's second-largest cement producer, and its Ulco cement plant in the Northern Cape is one of the company's two fully integrated cement plants operating in the country. First established in 1936 to manufacture industrial lime, today the plant has an annual cement production capacity of 1 250 000 tonnes.

Over the past nine decades, the global demand for cement has increased 50-fold, from 100 million tonnes in 1926 to around five billion tonnes in 2016, with the majority of this demand being from China (56%, or 2.8 billion tonnes). In comparison, estimated cement demand in Africa in 2016 was 240 million tonnes (4.8% of global demand), with South Africa accounting for 5.4% of that amount (13 million tonnes).

However, according to AfriSam sales and marketing executive Richard Tomes, there is currently a massive oversupply of cement globally. Declining global cement demand has resulted in worsening capacity utilization, lower EBITDA margins, and increased mergers and acquisitions (M&A) activity in the sector. Over the past five years, there has been notable M&A activity in China, India, Europe, and Latin America and, to a lesser extent, in Africa.

[12] ***See Roberts 1984***

Tomes described the situation as being "pretty dire", saying that there is a definite need for some form of consolidation in the market.

AfriSam's Ulco cement plant, situated about 80km outside of Kimberley, is one of the company's two fully integrated South African cement plants. "Our on-site operations go right from the quarrying of limestone and shale through to raw materials preparation, manufacturing clinker, manufacturing cement, and then packing and dispatching to the customer," explains executive Hannes Meyer.

8.5. Key Milestones

AfriSam's Ulco cement plant started operations in 1936 as the Union Lime Company, capitalizing on massive high-quality limestone deposits in the area to produce high-quality industrial lime for the gold industry, and later on to the steel and ferrous industries. In the intervening 81 years, the plant has grown to become one of the company's largest cement factories, and one of its two fully integrated plants located in South Africa. In addition to an increase of one million tonnes per year in production capacity — up to 1 250 000 tonnes from 250 000 when it first opened — the plant has undergone a number of capacity and efficiency upgrades.

In 1949, 13 years after its establishment, the first two cement kilns were established, with a combined production capacity of 250 000 tpa. Both were wet process kilns, which are highly energy-intensive and inefficient in comparison to today's technology. In 1964, two larger, more efficient kilns were built, increasing the plant's capacity to 350 000 tpa. However, these kilns still made use of wet chemistry, which limited production capacity and resulted in significant energy consumption.

Twenty years later, in 1984, the current kiln — Kiln 5, a pre-calciner dry process kiln — was built, with 1.25 million tonnes of clinker capacity per year. Kiln 5 is a four-stage pre-heater kiln and is highly energy efficient compared to the earlier wet process kilns. While this kiln has now been operating for over 30 years, Meyer explains that a number of upgrades have been carried out over this period.

"One of the reasons we have managed to improve our energy consumption by 30% since 2000 is that we have invested a lot of capital in improving and modernizing this kiln. This is not an original model; it is actually closer to the modern kilns than people think," explains Meyer.

1934	Anglovaal Cement Company founded and listed on the JSE
1936	Union Lime Company (Ulco) established to produce lime
1937	Merger with Atlas Cement; name changed to Anglo-Alpha Cement
1949	Cement production starts at Ulco – Kilns 1&2 (wet process kilns): 250 000tpa
1964	Commissioning of Cement Kilns 3&4 (wet process kilns): 350 000tpa
1984	Commissioning of Cement Kiln 5 (pre-calciner dry process): 1 250 000tpa
1984–2017	Capacity and efficiency upgrades, including: • Raw mill separator • Kiln cascade fan • Kiln clinker cooler • Packers and palletisers • Bag filter • Cement Mill 6 separator
2013	Ulco receives Clean Air Award from National Association for Clean Air (NACA).

Regarding the study area it is expected that historical period remains may be encountered.

9. Documentation of Data on the Premises under Investigation.

Fig. 08. The above image shows the location from which positions photographs were taken to record the heritage sites in the study area. (Google Earth 2018.)

G.P.S. Coordinates of the position of heritage remains.

Beacon	**Degrees south**	**Degrees east**
Reservoir	28°17'57.01"S	24°12'50.79"E
Well	28°17'57.71"S	24°12'50.82"E
Milking shed	28°17'58.09"S	24°12'53.67"E
Van Der Berg grave	28°18'2.73"S	24°12'53.67"E
Grave site added by client and	**28°17'51.68"S**	**24°12'55.3"E**
20 un-marked graves	28°17'53.78"S	24°13'3.18"E
Sheep dip	28°17'54.87"S	24°13'1.17"E
Irrigation canal	28°17'56.26"S	24°12'56.99"E
Buried irrigation pipe	28°17'53.29"S	24°12'55.56"E
Labourers quarters	28°17'56.51"S	24°12'43.12"E
Sluice gate	28°17'57.20"S	24°13'5.52"E
Large irrigation canal	28°17'55.04"S	24°13'7.44"E
Dumping site	28°18'2.64"S	24°12'18.97"E
General view 1	28°18'13.67"S	24°12'18.97"E
General view 2	28°18'12.75"S	24°12'47.62"E
General view 3	28°18'18.34"S	24°13'15.80"E
General view 4	28°17'33.24"S	24°13'0.75"E
Station	28°17'43.13"S	24°12'20.92"E
Cattle loading platform	28°17'46.64"S	24°12'18.74"E

Fig. 10. Above table shows the G.P.S. coordinates of the positions from which the photographs were taken. (GPS coordinates from Google Earth.)

9.1. Background to the documentation of data.

Fig.09. Detail of the Bergville farmyard showing location of the labourers quarters, the old reservoir and well as well as the milking shed. On this image one can also clearly see the position of the two irrigation lines leading towards the fields that were laid out to and on the periphery of the pans (Google Earth 2018.)

A large section of the property contains two pans that were formed owing to the subsidence of the dolomite geological substructure. In the general area these two pans are minor features relative to other water sources such as the Harts River and the Vaal River, other larger pans and the very impressive Kuruman fountain system. Furthermore the outcropping of dolomite and the large deposits of lime was inhibitive to the growing of grasses which would have also controlled the movement of game in the distant past. These two factors then most probably limited this area for occupation by both Stone Age as well as Iron Age peoples. It is therefore not unreasonable that no signs of the artefacts of these peoples were encountered during the foot survey.

On the other hand the occupation by white farmers that had knowledge of irrigation the planting of crops and the husbandry of domesticated animals such as cattle and sheep made it viable for subsistence living on a small scale. It is therefore also not strange to find no trace of a large old farmhouse and other structures and implements normally associated with an affluent farmer.

Even though the property was intensely investigated no sign could be found of either Stone Age or Iron Age impact. The only heritage remains to be considered then is the impact of farming on the property over the last hundred years. This impact can be seen as radiating out from the Bergville farmyard located approximately in the centre of the property. It is also then here that the original water source of Bergville is located. *(See blue circle in figure 09 above.)*

No trace could be found of the original homestead which most probably belonged to the person buried in the small cemetery indicated on the map in *figure 08.* He was Francois Jacobus Jacob Van Den Berg, born in 1888 and died in 1952. A second headstone that rests on the senior's Van Den Berg grave, is that of a person of the same name who was born in 1947 and passed away 2002. Owing to the different in ages it is possible that the second Francois Jacobus Jacob Van Den Berg, was the grandson of Van Den Berg senior It is the

opinion of the present author that this man was most probably cremated and his ashes strewn in this grave yard. It is not clear if the son was also buried on these premises.

According to the present farm owner Mr François Botha, there was another owner that occupied Bergville after the Van Den Bergs, before it became his property. His name is unknown.

From what could be observed during the survey, it is clear that farming consisted of both animal husbandry as well as planting of crops that could be irrigated from waters contained in the Dolomites underlying the farm, as well as surface water that periodically collected east of the present homestead.

The large and well-built milking shed which is most probably older than 60 years as well as the sheep dip encountered is evidence of animal husbandry.

On the other hand the commodious reservoir, also built from limestone blocks, and the extensive network of irrigation canals is evidence of crop production through means of irrigation, first by flood irrigation and later by mechanical sprinkler irrigation.

The evidence of all of the above has been documented and was evaluated sections 10 and 11 of this report.

9.2. Main farmhouse.

Figs. 10 to 12. Aspects of the present farmhouse that dates to the 1970s or 1980s. This building is not protected by act 25 of 1999. (Photos S.M. Miller 2018.)




Fig. 13 to 16. Aspects of the garden surrounding the existing farmhouse. There appears to be no plants or trees that fall under the protection of act 25 of 19. (Photos S.M. Miller 2018.)

Figs. 17 and 18. Signpost to the farm and the "old garages" on the farmyard. Neither is older than 60 years (Photos S.M. Miller 2018.)

Fig. 19. This area of approximately half a hectare in extent was cultivated in the past. Its proximity to the well and the reservoir may indicate that it was one of the first pieces of land to be cultivated on the property. (Photo S.M. Miller 2018.)

9. 3. Labourers quarters and associated buildings.

Figs. 20 and 21. General aspect of the labourers quarters on the left and detail of the oldest of the three buildings. (Photos S.M. Miller 2018.)

Figs. 22 and 23. Detail of 1930s door and sash window. It is not clear if these fittings were recycled or part of the original building. (Photos S.M. Miller 2018.)

Fig. 24. Detail of the frame of the sash window with cavity for counter balancing weights which can still be seen. (Photo S.M. Miller 2018.)

Fig. 25. In the two other labourers quarters buildings we again find the anomaly of an old door and frame possibly dating to the 1930s with modern cement bricks and modern steel frames as part of the building. (Photo S.M. Miller 2018.)

Figs. 26 and 27. Water reservoir and corrugated iron building possibly associated with slaughtering. (Photo S.M. Miller 2018.)

Figs. 28 and 29. North and south aspects of the corrugated iron building adjacent to the labourers quarters. This building and machinery are obviously modern and are not protected by act 25 of 1999. (Photos S.M. Miller 2018.)

9. 4. Reservoir and well.

Fig. 30. Northern aspect of the water reservoir. Even though if it is difficult to place the structure beyond the 60 year rule, it is still a remarkable structure associated with farming in the Northern Cape. Local limestone blocks rather than concrete or bricks were used for its construction. The reservoirs position, adjacent to the well and the original water source, points in the direction that it was one of the first structures erected for the management of water resources of the farm in the beginning of the 20th century. (Photo S.M. Miller 2018.)

Figs. 31 to 32. Detail of the reservoir (Photos S.M. Miller 2018.)

Figs. 33 and 34. Original outlet of reservoir and drinking crib as well as irrigation furrow now in disuse (Photos S.M. Miller 2018.)

Figs. 35 and 36. A corrugated iron building was erected over the old well as well as to accommodate the farms Escom transformer. (Photos S.M. Miller 2018.)

Fig. 37. The original farm well now enclosed in this corrugated iron building. As can be seen water is now being directly pumped from the well for the cattle on the farm. This well is protected under the 60 year rule of act 25 of 1999. (Photo S.M. Miller 2018.)

Figs. 38 and 39. The corrugated iron building that was erected over the old well. Adjacent to this building hidden under the vegetation is an implement that in Afrikaans is known as a "damskrop". (Earth-scoop.) Basically it is a scoop drawn by draft animal used to shift soil for an array of purposes. (Photos S.M. Miller 2018.)

9. 5. Milking shed.

Fig. 40. Apart from the graves on Bergville this milking shed is most probably the most important heritage relic on the farm. It is difficult to actually date it on architectural features only. It is certainly related to the construction of the reservoir and the early part of flood irrigation. Very few of this type of structures survive in the general area. This is a protected building under the heritage Act. (North elevation.) (Photo S.M. Miller 2018.)

Figs. 41 and 42 Western and Eastern elevations of the Milk shed. (Photos S.M. Miller 2018.)

Figs. 43 and 44. Interior of the milk shed on the left is the remains of the milking stalls for 10 animals. On the right can be seen the roof construction. (Photos S.M. Miller 2018.)

9. 6. Irrigation features.

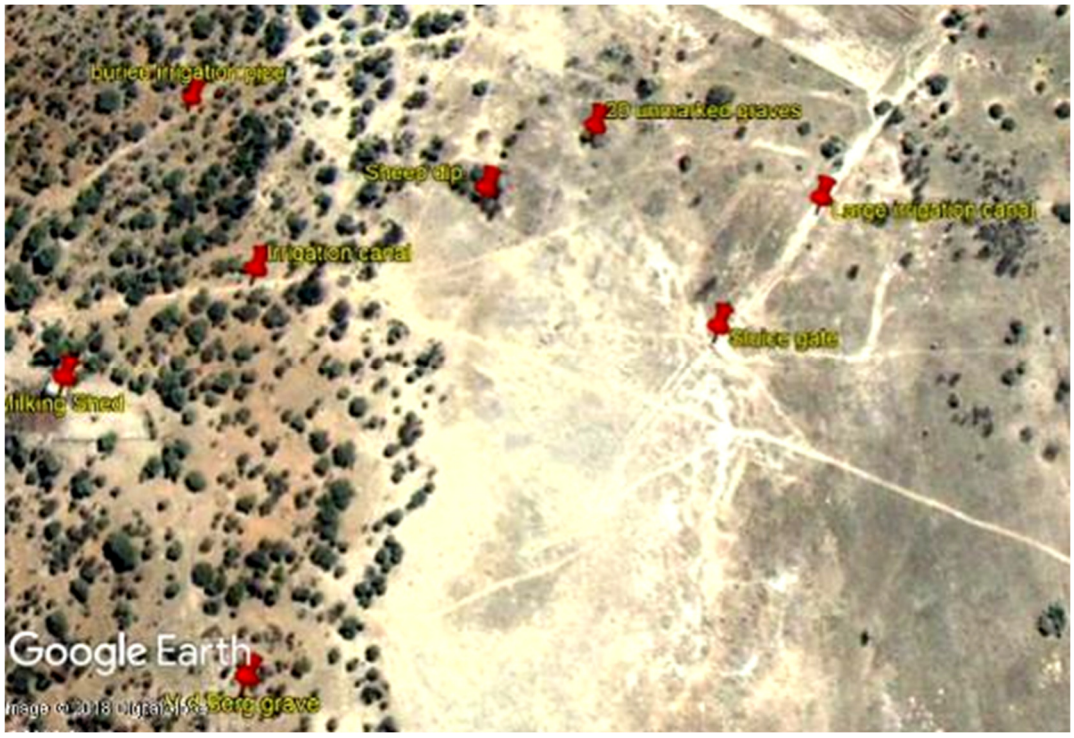

Fig. 45. Detail of the area to the east of the milking shed. (Google Earth 2018.)

Fig. 46. The sluice gate control from the pans to the irrigation fields on the eastern part of the property. (Photo S.M. Miller 2018.)

Figs. 47 and 48. Above is the large irrigation canal leading from the pans to the field in the right-hand photograph. (Photos S.M. Miller 2018.)

Figs. 49 and 50. Old and new methods of irrigation illustrated by the metal sluice gate on the left and irrigation piping on the right that were both used on this field. (Photos S.M. Miller 2018.)

Figs. 51 to 52. General images of the irrigation canals located to the east of the well and milking shed towards the fields. The actual general function of these cannot be determined by this first phase heritage assessment. However if these are documented in a second phase study and a permit for their demolition is provided by the local Heritage Resources Agency then they may be demolished. (Photos S.M. Miller 2018.)

9. 7. Sheep dip.

Figs. 53 and 54. This is the remains of a sheep dip that is obviously constructed of modern materials and is not related to the first phase occupation of the farm. This is not a protected structure. (Photos S.M. Miller 2018.)

9. 8. Graves.

9. 8. 1 European Graves.

Figs. 55 and 56. The gravestones of Françoise Jacobus Jacob van den Berg senior, which lived between 1888 and 1952, and possibly his grandson of the same name that lived between 1947 and 2005. (Photos S.M. Miller 2018.)

9. 8. 2. Unmarked Graves.

Fig. 57. These sisal plants also known as Agave mark the location of approximately 20 unmarked graves. It is the opinion of the author that these are the graves of labourers and their families that has worked on the farm over the last century (Photo S.M. Miller 2018.)

Figs. 58 and 59. The appearance of the graves is rather ragged. This can be ascribed to the fact that they have been untended for a long time and the passage of wild animals and cattle have disturbed the regular features of the graves. For initial protection it is suggested that the vegetation is removed and that the area is fenced off in an appropriate manner. (Photos S.M. Miller 2018.)

Fig. 60. For the layman's eye is difficult to identify these graves. Once the vegetation has been removed then it will become clear how many graves are located in this position. (Photo S.M. Miller 2018.)

9. 9. Dumping site.

Figs. 61 and 62. In the dumping site large numbers of artefacts and debris from the modern farm can be seen. All of these relate to the period younger than 60 years. (Photos S.M. Miller 2018.)

9. 10. Station and cattle loading ramp.

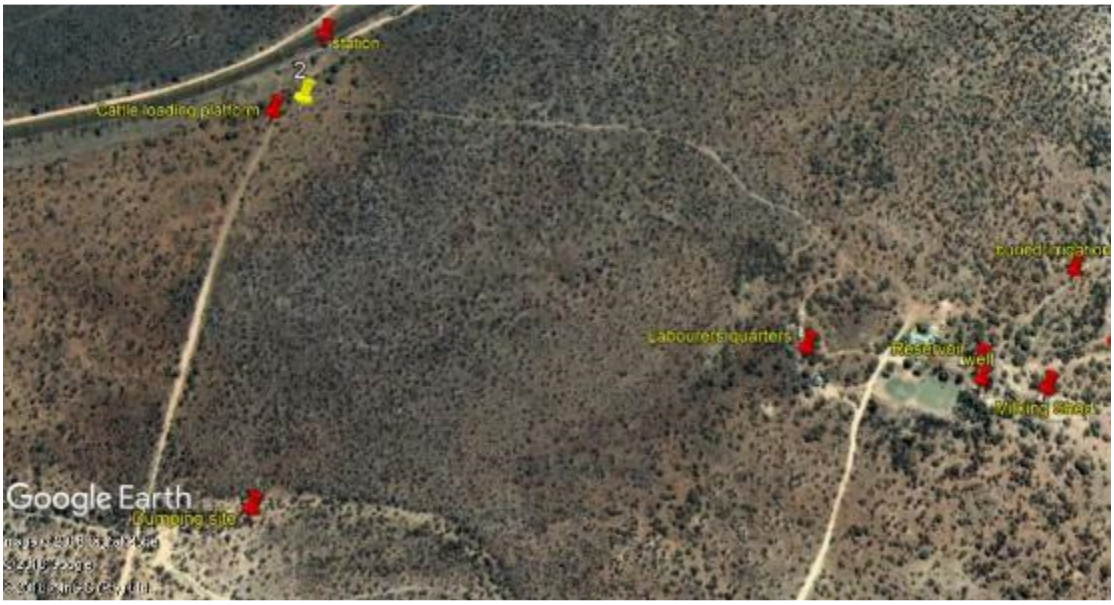

Fig. 63. Detail of the western side of Bergville showing the position of the dumping site as well as station and cattle loading platform. (Google Earth 2018.)

Fig. 64. Ghaap station. This is not a station building but merely a building containing the signal control system for this section of the railway line. (Photo S.M. Miller 2018.)

Figs. 65 and 66. Somewhere in the distant past there used to be an official siding at the Ghaap station for the use of the farm. (Photos S.M. Miller 2018.)

Fig. 64. Cattle loading platform adjacent to the Ghaap station. This is a modern construction but the limestone blocks suggest that there was an earlier structure year as well. (Photos S.M. Miller 2018.)

9. 11. General views confirming that no heritage sites exist in those areas.

Fig. 65. In the areas where nothing was found, general views was taken for purposes of completeness of the report. (Google Earth 2018.)

Figs. 66 to 75. In the areas where nothing was found general views was taken for purposes of completeness of the report. (Photos S.M. Miller 2018.)

Fig. 78. In the pan area in the eastern portion of the study area several of these drill hole markers were observed. This specific one was marked B243. Approximately ten of these were observed during the foot survey. (Photo S.M. Miller 2018.)

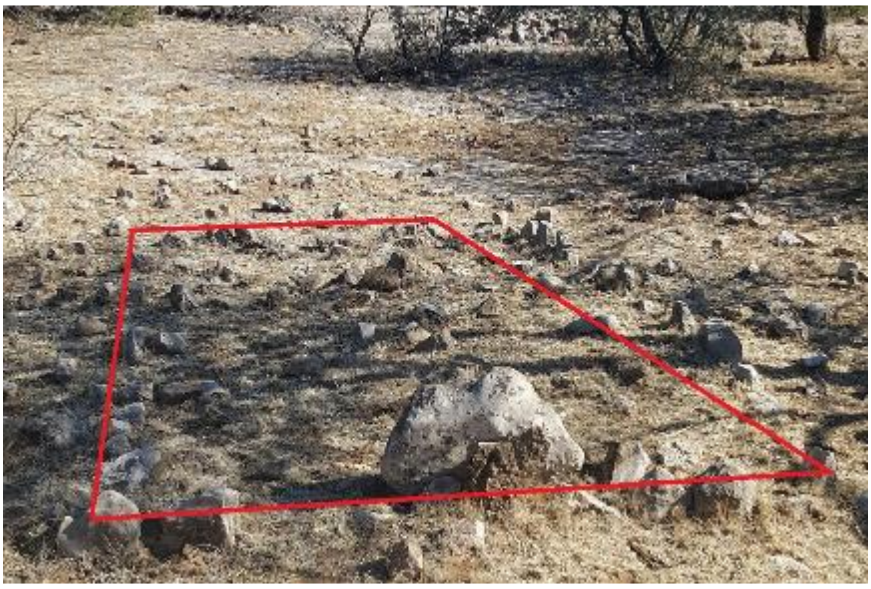

Fig. 79.This grave was observed by personnel of Afrisam after initial impact assessment was completed this. (Photo Afrisam2018.)

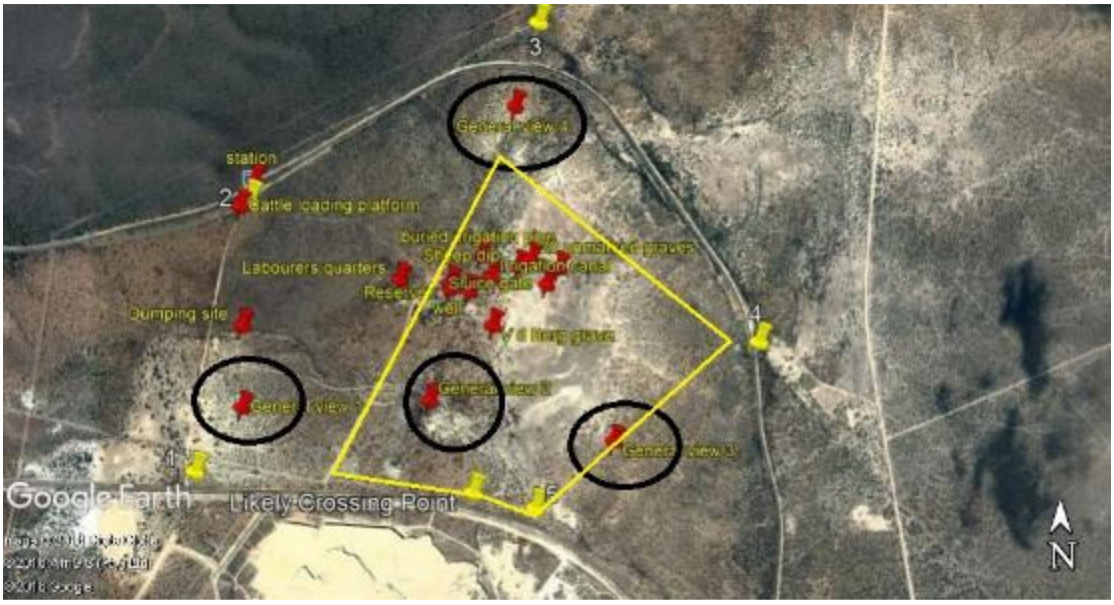

Fig. 80. In the above Google Earth image one can see the proposed mining area outlined in yellow superimposed on the location of the heritage resources. (Google Earth 2018.)

9. 12. Discussion of finds.

9.12.1. Well.
The well is located directly adjacent to the original water source of the farm. With the general fluctuation of water in a dolomite area, well most probably represent the focal point of all farming activities from the beginning of the 20th century up till today.. Owing to its location within a corrugated iron building and the encumbering steel construction and pumping equipment surrounding it, its exact format and construction is not known. In the possible event of mining operations proceeding a full second phase study should be compiled, and on the results of that study further decisions may be made. ***It is a protected structure under act 25 of 1999. An application for a demolition permit will be necessary.***

9.12.2. Reservoir.
The reservoir is located directly adjacent to the well and the original water source of the farm. It is constructed from limestone blocks and still operates as a functional structure It is a protected structure under act 25 of 1999. In the possible event of mining operations proceeding a full second phase study should be compiled, and on the results of that study further decisions may be made. ***It is a protected structure under act 25 of 1999. An application for a demolition permit will be necessary.***

9.12.3. Milking shed.
The milking shed is located a short distance to the east of the well and the original water source of the farm. It is constructed from limestone blocks up to plinth height. Upper walls are built from home for limestone building blocks. Roofing is corrugated iron but it could not be determined from what period these date. The corrugated iron sheets are laid on pine trusses and purloins appearing to be in good repair. Even though it is difficult to determine its original date of construction regarded as a protected building. It is therefore regarded as a protected structure under act 25 of 1999. In the possible event of mining operations proceeding a full second phase study should be compiled, and on the results of that study further decisions may be made. ***It is a protected structure under act 25 of 1999. An application for a demolition permit will be necessary.***

9.12.4. The modern farmyard.
This building and its associated outbuildings are all younger than 60 years. Neither do the structures signify any architectural merit for conservation purposes. Therefore it may be demolished or altered according to the needs of future mining operations.

9.12.5. Smaller irrigation canals.
The smaller irrigation canals are generally in a bad maintenance condition. Even so they are most probably older than 60 years and therefore enjoy the protection of act 25 of 1999. In the possible event of mining operations proceeding a full second phase study should be compiled, and on the results of that study further decisions may be made. ***It is a protected structure under act 25 of 1999. An application for a demolition permit will not be necessary.***

9.12.6. Large irrigation canal and sluice gate.
The larger irrigation canal is also generally in a bad maintenance condition. Even so it is most probably not older than 60 years and therefore does not enjoy the protection of act 25 of 1999.

9.12.7. Graves.
9.12.7.1. The van Den Berg cemetery is clearly marked, so for the purposes of the exploration drilling no further action is necessary. In the event of mining relocation will be necessary.

9.12.7.2. The labourers cemetery is at present not clearly marked. It is suggested that the vegetation is removed from the graves and that for the present purpose of the exploration drilling it ought to be fenced off and clearly marked. In the event of mining relocation will be necessary.

9.12.7.3. This grave was not observed by the author of this report. After the initial review of the report this grave was reported by personnel of Afrisam. As there is no headstone is not clear who the deceased was. In the event of mining relocation will be necessary.
9.12.8. Labourers quarters.
Although elements such as doors and sash windows were used in the construction of these three buildings they clearly are not protected by the heritage Act.

Similarly, the corrugated iron building in the same location is not older than 60 years and is also not protected by the Heritage Act.

9.12.9. Sheep dip.
The sheep dip is not older than 60 years and is also not protected by the Heritage Act.

9.12.10. Dumping site.
Material in the dumping site is not older than 60 years and is also not protected by the Heritage Act.

9.12.11. Ghaap station.
The Ghaap station is neither older than sixty years nor does it fall in the prospecting and is also not protected by the Heritage Act.

9.12.12. Cattle loading ramp.
The cattle loading ramp is not located on the study area.

10. Field Rating. (SAHRA minimum standards May 2007.)

No.	Description	Rating according to minimum standards May 07
1	Well.	'General' Protection A. (Field Rating IV A): This site should be mitigated before mining. (High/Medium significance.).
2	Reservoir.	'General' Protection A. (Field Rating IV A): This site should be mitigated before mining. (High/Medium significance.).
3	Milking shed.	'General' Protection A. (Field Rating IV A): This site should be mitigated before mining. (High/Medium significance.).
4	The modern farmyard.	No protection
5	Smaller irrigation canals.	'General' Protection B. (Field Rating IV B): These sites should be recorded before mining. (Medium significance.)
6.	Large irrigation canal and sluice gate	No protection
7.	All Graves.	'General' Protection A. (Field Rating IV A): graves may be relocated before mining commences. (High/Medium significance.).
8.	Labourers quarters.	No protection
9.	Sheep dip.	No protection
10.	Dumping site.	No protection
11.	Ghaap station.	No protection
12.	Cattle loading ramp.	No protection

11. Statements of Significance. (SAHRA minimum standards May 2007.)

No.	Description	Rating according to minimum standards May 07
1	Well.	a. its importance in the community, or pattern of South African History; c. its importance to yield information that will contribute to an understanding of South Africa's natural or cultural heritage: d. its importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects;
2	Reservoir.	a. its importance in the community, or pattern of South African History; c. its importance to yield information that will contribute to an understanding of South Africa's natural or cultural heritage: d. its importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects;
3	Milking shed.	a. its importance in the community, or pattern of South African History; c. its importance to yield information that will contribute to an understanding of South Africa's natural or cultural heritage: d. its importance in demonstrating the principle

		characteristics of a particular class of South Africa's natural or cultural places or objects;
4	**The modern farmyard.**	**n/a**
5	**Smaller irrigation canals.**	**a. its importance in the community, or pattern of South African History;**
6.	**Large irrigation canal and sluice gate**	**n/a**
7.	**All graves.**	**a. its importance in the community, or pattern of South African History;** **c. its importance to yield information that will contribute to an understanding of South Africa's natural or cultural heritage:** **d. its importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects;** **g. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons:**
8.	**Labourers quarters.**	**n/a**
9.	**Sheep dip.**	**n/a**
10.	**Dumping site.**	**n/a**
11.	**Ghaap station.**	**n/a**
12.	**Cattle loading ramp.**	**n/a**

12. Summary.

12 .1. Mandate of Shangoni Management services.

Shangoni's mandate is to procure a first phase heritage impact assessment of their client's proposed impact on the study area described above. Initial impact will be drilling for sampling of the ore body as inferred by the Ground Penetrating Radar *(from now on the GPR.)* Depending on the results of this drill sampling, mining of the ore body will eventually proceed. ***This report will then serve as the 1st phase heritage impact assessment studies for both the planned drilling program as well as for the possibility of mining***.

12 .2. Intent of Afrisam - Ulco.

It is the intent of the client to explore the mineral potential of this property. (Limestone.) If the drilling results prove to be positive *Afrisam - Ulco* will eventually commence mining on the property.

12 .3 The project description.[13]

Shangoni has been instructed in the following way to forward the above project: -.

> *The mine is located 80 km north-west of Kimberley, 42 km north-west of Barkley West, 17 km north-west of Delportshoop and 24 km south-east of Koopmansfontein. The Mine and all the towns mentioned above are accessible along the R31 between Kimberley and Kuruman. AfriSam's Ulco Cement Operation has been operating in the Northern Cape Province since 1936. Mining of the secondary limestone reserves began in 1936, when Union Lime mined it for lime, using two Beckenbach Shaft kilns and nine Spencer kilns for burning the limestone. In 1949, it was decided to mine the low-grade limestone material for cement and the company built two wet process kilns (Kiln 1 and*

[13] ***E-mail from Shangoni (Minnette le Roux). Tuesday 26 June, 2018***

Kiln 2) and cement mills for the cement manufacturing process. Subsequently in 1964 two further kilns (Kiln 3 and Kiln 4) were added on to increase the cement production capacity. In 1985, Union Lime Company was purchased by Anglo Alpha. In 1985, Anglo Alpha began mining primary limestone reserves and commissioned a fifth kiln (UK5), with a capacity to produce 4500 tons of clinker per day. The old lime kilns and cement kilns were decommissioned in 1992. Anglo Alpha has changed name several times and as of June 2007 is now known as AfriSam (South Africa) Properties (Pty) Ltd. The limestone and secondary components are all mined in multi-bench opencast quarries. Primary and secondary limestone is blended together through selective mining and crushing operations to ensure the correct chemical mix of limestone for cement production. In addition to limestone, shale and dolerite are also mined on site. Crushed limestone, shale and dolerite are stockpiled on blending beds and reclaimed for further processing through the cement kiln and cement mills.

Acceptable secondary limestone reserves in the current mining area at Ulco are starting to run low. The estimated time horizon remaining is less than 5 years. Already quality consistency on the limestone stockpiles is getting more difficult to maintain. Therefore, AfriSam is investigating the possibility of expanding operations onto the north-eastern portion of the farm Bergville 216 which is adjacent to the current operation.
Limestone resources are available north of Ulco on the opposite side of the R31 provincial road and bounded by the rail line further north (Figure 1). In prospecting terms these resources are referred to as "Indicated" and "Inferred" but not yet a Proved Reserve.

In the latter part of 2017, a prefeasibility study was commissioned to consider the best solutions to confirm these reserves, what legislative requirements there are to access these reserves as well as the most cost-effective solution to mine the limestone. A Ground Penetrating Radar (GPR) investigation was done to highlight the area and extent of the deposit. This area now needs to be close spaced drilled and sampled to provide a 10-year proved reserve and a further 20 years probable reserve as well as to develop a block model for proper mine planning. The GPR as well as previous drill records from the area indicated that mining should be similar to what is happening on the existing mining area. i.e. several benches going down from ground level to between 20 and 40 m.

The new quarry will be most likely accessed via a slot in the limestone barrier (~100 m) between the mining areas and the R31, and twin tunnels under the R31 large enough to safely get the existing side tipping road trucks through. Mining will be as currently done on a blast, load and haul back under the road basis to the existing crusher until a new crusher will be commissioned at a suitable place in the new quarry area.

12.4. Historical milieu.[14]

A. The general area is known to contain both Early as well as Later Stone Age sites as well as engraving sites. On Bergville though no Stone Age (either Early, Middle or Later) artefacts were observed. Neither were there any engravings or other rock art observed.

B. The area investigated revealed no indication of Iron Age settlement.

C. On and around the farmyard of the property under investigation there remain some buildings and structures related to farming activities that fall under the protection of the

[14] ***For full description see chapter 8.***

heritage law under the 60 year rule. These include a reservoir, a well, a milking shed and several canals related to flood irrigation.

D. The graves observed are those of two white pioneer farmers, as well as approximately 20 other graves that could not be linked to any family as they bear no engraved head stones. These are most probably the graves of labourers on the farm as well as their families.

E. Work on the AfriSam-Ulco cement factory, on the western portion of Bergville 3 property, had already commenced in 1936. Even so, this mine and cement factory had absolutely no impact on the study area.

F. There are no sites of cultural/spiritual significance located on or near the property under investigation.

G. There are no sites connected to slavery located on or near the property under investigation.

H. There are no people of importance connected to the history of the study area.

I. There is no special technological or scientific advancement of standing that can be linked to the property under investigation.

12.5. Environmental milieu.[15]

Geology. The geology of the Northern Cape is possibly of the best known in the world owing to its diamondiferous nature especially around the Kimberley area. The extended deposit of limestone in the general area is also well-known. These accrued from the leaching of dolomite structures and or the deposit from large masses of aquatic bodies caused either directly or indirectly by living organisms and their skeletal remains. The present proposed project of prospecting on the farm Bellville will add to this understanding of the areas geology.

Vegetation. The site under investigation is located at a focal point of three veld types namely zones 16, 17 and 40. Acocks describes these as Kalahari Thornveld, Kalahari Thornveld invaded by Karoo and as False Orange River Broken Veld. (Acocks, 1988.) In general though the areas vegetation fits best as described in category 3 of the Kalahari Thornveld Proper.

13.1. Summary of findings.

Although the investigation was conducted on foot, by vehicle and by means of interviews with the present farm owners and workers, no sign of either Stone Age or Iron Age remains could be located on portion 3 of Bergville 216.

On the other hand some of the remains associated farmyard of the property may be considered as important. The structural remains to be considered are the well, the reservoir, the milking shed and the various forms of flood irrigation canals. If the mine eventually becomes a reality, and these heritage remains become an impediment, second phase studies may be undertaken and demolition applications could be made at the provincial Heritage Authorities in Kimberley.

In the same way the white pioneer graves and the other 20 labourers graves may be treated similarly. If they do not impede the mining process they may be left in place. On the other hand, depending on the proposed mining plans, these graves may be relocated to the most suitable position.

[15] ***For full description see chapter 7.***

13 .2. Recommendation.

3.7.1. A full-scale second phase heritage impact assessment to document the well, the reservoir, the milking shed and the position and character of all early flood irrigation systems.

3. 7. 2. Application for demolishing permits for the above-mentioned.

3. 7. 3. The relocation of all the graves to an appropriate site.

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Bibliography.

Publications

Acocks J.P.H.	1988	Veld Types of South Africa. *Revised third edition. Memoirs of the Botanical Survey of South Africa*. Dept. of Agriculture and Water Supply.
Campbell. J.	1815	*Travels in South Africa.* Undertaken at the request of the Missionary Society. Printed for the author by T. Rutt. Shacklewell.
Coates-Palgrave, M.	2002	*Trees of Southern Africa.* 3rd edition, 2nd impression, Struik Publishers..
Deacon, J.	1999	*Human Beginnings in South Africa*: Uncovering the Secrets of the Stone Age. Altamira Press.
De Kock, V.	1950	*Those in Bondage.* An account of the life of the slave at the Cape in the days of the Dutch East India Company. Howard.B.Timmins, 58 Long Street CapeTown. George Allen & Unwin, Ltd, London. N. G. Kerkpers, Roodebloen Road, Woodstock, Cape Town.
Haughton, S. Direkteur, Geologiese opname.	1940	*Delfstowwe van die Unie van Suid Afrika.* Saamgestel deur die Afdeling Geologiese Opname. Staatsdrukker. Pretoria.
Huffman, T.	2007	*Handbook to the Iron Age.* The Archaeology of Pre-Colonial Farming Societies in Southern Africa. University of Kwa-Zulu-Natal Press.
Lunderstedt, S.	2002	*The Big Five mines of Kimberly.* Kimberly African Library.
Lye, W.F. (edt.)	1975	*Andrew Smith's Journal of his expedition into the Interior of South Africa.* A.A. Balkema. Cape Town
McCarthy,T & Rubidge, B,	2005	*The story of earth and life.* A southern African perspective on a 4,6 billion-year journey. Struik Publishers.
Mucina, L. & Rutherford, M.C. (eds).	2006	The vegetation map of South Africa, Lesotho and Swaziland. *Strelitzia 19,* South African National Biodiversity Institute.
Maggs, T.M.O'C	1976	*Iron Age Communities of the Southern Highveld.* Council of the Natal Museum. Pietermaritzburg.
Mason, R.	1969	*Prehistory of the Transvaal.* A record of humanity. Witwatersrand University Press. Johannesburg.
Morris, D.	2005	Phase 1 Archaeological Impact Assessment for De Beers Consolidated Mines Ltd. (Contract 0616-AC-244-05)
Naude, M.	1998	Oral evidence of vernacular buildings and structures on

Farmsteads in the Waterberg (Northern Province) in the *Research by the National Cultural Museum,* vol. **7:** pp 47 - 92 V & R Printing Works.

Notcutt, H. C. (edt.) 1950 *Travels in the Interior of Southern Africa.* Lowe & Brydone Printers Ltd, London

Phillipson, D 2005 *African Archaeology.* Cambridge University Press.

Potgieter, F. J. 1959 *Die Vestiging van die Blanke in die Transvaal. (1837 – 1886.)*

Roberts, Brian. 1984 *Kimberly. Turbulent City.* Printpak. Cape.

Sampson, C.G. 1974 *The Stone Age Archaeology of Southern Africa*. Academic Press, New York and London.

Van Schalkwyk, J. N/D *Kimberly. The city that Sparkles*. Frances Baard District Municipality and Tourism Board.

Vilgoen, M.J. & Reimold, W.U, 1999 *An introduction to South Africa's geological and mining heritage*. Mintek,

Guidlines

SAHRA. Mar. 2006 and edtd May 2007. *Guideline:* - Minimum standards for the Archaeological & Paleontological Components of Impact Assessment Reports

Appendix 1: Declaration of Independence.

I, Sidney Mears Miller (ID 5412135029082) declare that:
I act as an independent environmental practitioner in this application;
I will perform the work relating to the application in an objective manner, even if this result in views and findings that is not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting environmental impact assessments, including knowledge of the National Heritage Resources Act (No 25 of 1999) and any guidelines that have relevance to the proposed activity;
I will comply with the Act, regulations and all other applicable legislation;
I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
I will keep a register of all interested and affected parties that participated in a public participation process;
I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
all the particulars furnished by me in this form are true and correct;
will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations;
I realize that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest
I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity AND OR proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations.

SIDNEY MEARS MILLER.

Appendix 2: Ground Penetrating Radar investigation. (For the full report contact represent Afrisam whose contact details can be found at the beginning of this report.)

Afrisam (South Africa) (Pty) Ltd
Shared Service Centre Raw Material Services PO Box 6367 Weltevreden Park 1715

Attention: Mr. Nyikadzino Matura

Dear Mr. Matura it is my pleasure to present to you this report entitled;

RESULTS OF THE ULCO EAST GROUND PENETRATING RADAR SURVEY

I thank you for the opportunity to employ UltraGPR in your exploration project. It is my hope that you will continue to take advantage of the considerable benefits of this technique in future mining and exploration endeavours.

Sincerely
Thomas Aquinas Sithole PH.D, Pri Sci Nat

EXECUTIVE SUMMARY

Victory Ticket 889 CC was requested by Afrisam (Pty) Ltd to carry out a Ground Penetrating Radar (GPR) survey at Ulco, Northern Cape. The objectives of the exercise were as follows; To map the contact between primary and secondary limestone. To outline the 3-Dimensional structure of the secondary limestone body and determine its 'centre of mass'. To estimate the quantity of secondary limestone. To ascertain the presence of underground cavities and; To determine ground water-related structures in the area. Findings from the exercise are as following: The fault system that forms the boundary between the primary and secondary limestone was identified and mapped. A digital terrain model (DTM) of the secondary limestone was extracted from the ground radar data and a 'centre of mass' was located. An estimated resource of 30Mt (thirty million) tonnes of non-compact secondary limestone is estimated to the present in area of interest. The transition from non-compact to compact secondary limestone is gradational. No estimate of the quantity of compact secondary limestone could be made as the material appears to grade into the bedrock without a distinct break that is mappable by GPR. Underground cavities were identified during the survey and mapped. o Underground cavities in the area have the same trends as the main topographic lineaments in the area. The relationship is an indication that underground water flow is likely to be strongly influenced by faults and joint systems in the area.

INTRODUCTION

A Ground Penetrating Radar (GPR) survey was carried out at Berg Farm, east of the current mining area across the R31 at Ulco. The survey was undertaken primarily in order to investigate the disposition and quantity of secondary limestone and to precisely map the boundary between primary and secondary limestone. GPR lines were conducted in mostly in a north-southerly orientation but several lines in an east-west orientation were undertaken when deemed necessary.

GROUND PENETRATING RADAR: METHODOLOGY

Ground Penetrating Radar (GPR) is a high resolution geophysical method that uses electromagnetic energy to image the subsurface. At its simplest GPR equipment comprises a transmitter that sends radio waves into the ground and a receiver that picks up the returning waves. The specific instrumentation that was employed for the Shinyanga exercise is known as UltraGPR and it employs the latest technology available to address to shortcomings of most commercial GPR systems in mining applications. Such shortcomings include; cumbersome operation (large and heavy equipment) that is difficult to use in rugged terrain Slow and lower quality data acquisition Fragile design. The method by which GPR data are

captured by the receiver is perhaps the most critical portion of a system's design. In the early 1990's, systems employed analogue recorders and electrostatic plotters to display the radar scans. By 1996, electronic circuitry was available which was sufficiently fast to permit analogue to digital conversion of the recorded data. However, GPR signal sampling is inherently challenging due to the need to sample returned signals which are travelling near the speed of light. For example, for a system with a centre frequency of 40 MHz, the effective bandwidth is 20 MHz to 60 MHz. Nyqvist's sampling theory stipulates that the returned signal must then be sampled at 3X the centre frequency, in this case at 120 MHz. Every GPR system currently commercially available employs what is known as sequential sampling to capture information. With sequential time sampling, single, successive, samples are made after each transmitted pulse. Thus, to reconstruct a single stacked radar trace of 256 points, the transmitter is activated 256 times. A trace consisting of 64 stacks would require over 16,000 repeated transmit pulses whilst the antennas are stationary.

In recent years, high-speed analogue-to-digital (ADC) chips have become available, with sampling speeds of up to 1600 million samples per second. Such technology enables the design of real-time sampling GPR systems, which permits the entire transmitted waveform to be captured simultaneously, thereby dramatically increasing the practical number of stacks possible. Rather than being limited to 32 or 64 stacks, these systems can acquire 10,000 stacks, thereby providing an additional 40 dB of dynamic range. An additional 40 dB of dynamic range equates to more than doubling the effective penetration of a real-time GPR system as compared to traditional sequential time sampling technologies used on commercial systems. The UltraGPR system employs the fastest ADC chips available to create a highly efficient and sensitive real-time sample GPR instrument for long-range imaging. In addition to advances in depth of penetration, the system has been designed by extreme ruggedness and portability in mind. All wires and fibre optic links, a source of constant reliability issues on commercial systems, have been replaced by wireless Bluetooth® connections. The system has also been designed to conserve power for use in remote environments. The entire GPR system may be used continuously for nearly 60 hours before a recharging of the custom lithium polymer batteries is required.

Miniaturisation was also a foremost priority using the design phase of the instrumentation (Fig. 1). The entire system is housed within a 9 m long flexible snake with two shielded pods for the receiver and transmitter electronics. No backpack console unit is required as the data are fed directly into a Windows Mobile PocketPC or mobile phone. Positioning is achieved using two independent methods for cross-referencing. A NMEA-0183 compatible GPS device is attached to the system to provide real-time x,y,z co-ordinates at 5 Hz. A second method employs an accurate digital odometer using survey thread to provide a measurement of the distance surveyed.

LOCALITY

The survey (Farm Berg) area lies just across the R31 road, east of the current mining area at Ulco (Fig. 2). Farm Berg is accessible directly from the R31.

CONTACT BETWEEN PRIMARY AND SECONDARY LIMESTONE

The contact between the secondary and primary limestone is distinct within the radar sections and appears to be a structure that dips steeply to the south. The contact manifests as a sharp change in the signature of the two types of limestone and the thickness of the upper layer of both types (Fig. 3) A composite map of the radar sections shows that the structure is NW-SE trending and is commonly marked by a sudden change in the depth to compact 'bedrock'. Secondary limestone occurs to the south of the fault zone that separates the two types of limestone (Figs. 4 -6).

Figure 3GPR Section line showing the fault - bound (red line) contact between primary limestone and secondary limestone. The green line denotes the interpreted base of non-compact secondary limestone.
Figure 4 Map showing the depth to 'bedrock' in the survey area
Figure 5 Fault zone separating primary limestone (northern side) from secondary limestone
Figure 6 Area underlain by secondary limestone

THICKNESS AND VOLUME OF SECONDARY LIMESTONE

The thickness of non-compact secondary limestone varies from less than one metre to a maximum of 34 metres (Fig. 7). There is a general trend in which the thickness of secondary limestone increases towards the south-east, culminating in localized areas where it exceeds 30m (Fig. 7). A digital terrain model (DTM) of the secondary limestone (Fig. 8) indicates a volume of 15 million cubic metres of this upper layer of secondary limestone. The 'centre of mass' of the DTM lies close to the south-eastern extent of the survey area (Figs. 9). Approximate coordinates for the area are provided in Table 1 below; The base of the non-compact secondary limestone is irregular throughout the survey area (Figs. 10-11).

Figure 7 Contours of non-compact secondary limestone
Figure 8 Digital terrain model of the non-compact secondary limestone.
Figure 9 'Centre of mass' of the non-compact secondary limestone
Figure 10 Position of section lines across the 'centre of mass'
Figure 11 Cross sections showing the base of non-compact secondary limestone

RESOURCE ESTIMATE

Utilising the volume of the DTM from GPR and using a conservative SG values of 2.0, a tonnage of 30Mt of non-compact secondary limestone is estimated in the survey area.

UNDERGROUND CAVITIES

A number of underground cavities were detected during the survey, some of which occur in clusters (Fig. 12). The coordinates of all identified cavities are listed in Appendix 1. Of the clustered cavities, two main trends are apparent, a NNW-SSE trend and a NW-SE trend (Fig. 13). The NNW-SSE trend is parallel to topographic lineaments in the area while the NW-SE trend parallels the fault zone (Fig. 14). The co-incident trends of the underground cavities and the lineaments suggest that underground water flow is influenced by structural features (faults and joint systems). Water table analysis could not be undertaken owing to the absence of a regular grid in place during the survey.

Figure 12 Underground cavities in identified during the survey
Figure 13 Cluster analysis of the occurrence of underground cavities in the survey area
Figure 14 Trends of underground cavity clusters in relation to topographic lineaments

CONCLUSIONS

An estimated resource of 30Mt (thirty million) tonnes of secondary limestone is estimated to the present in area of interest. A volume of 15 million cubic metres was estimated from the secondary limestone DTM and a specific gravity of 2.0 was used. Underground cavity in the area has the same trends as major topographic lineaments in the area. The relationship is likely to be an indication that underground water flow is strongly influenced by faults and joint systems in the area.

Appendix 3: Provisional indemnity.

Declaration by author.

I Sidney Miller hereby declare that all reasonable steps were taken to identify the heritage resources on Bergville. For obvious reasons heritage remains that occurred underground cannot be vouched for. In the event of such remains being uncovered during the drilling and all mining operations work should be stopped and a heritage practitioner or the heritage authorities must be informed. The cost of such new investigation will be for the account of the client.

SIDNEY MEARS MILLER.