



Gaigher & Associates

PO Box 522
Louis Trichardt
0920
South Africa

TEL/FAX: +27 082 5515 082
E-mail: stephan@lajuma.com

Heritage Impact Assessment

HERITAGE IMPACT ASSESSMENT FOR A
PROSPECTING APPLICATION— ALLDAYS LIMPOPO
PROVINCE.

PREPARED BY:
GAIGHER & ASSOCIATES

PREPARED FOR:
VENETIA MINE

NOVEMBER 2009



CREDIT SHEET

Project Director

STEPHAN GAIGHER (BA Hons, Archaeology, UP)
Principal Investigator for GAIGHER & ASSOCIATES
Member of ASAPA (Site Director Status)
SAHRA Accredited Heritage Practitioner
Tel.: (015) 593 0352
Cell.: 082 551 5082
E-mail: stephan@lajuma.com
Website: www.lajuma.com

Report Author

STEPHAN GAIGHER

***Disclaimer;** Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. GAIGHER & ASSOCIATES and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Copper Prospecting Application - Venetia Mine – Alldays - Limpopo Province.

Municipal Area: Capricorn District Municipality

Developer: *De Beers Consolidated Mines Limited*

Consultant: GAIGHER & ASSOCIATES, PO Box 522, Louis Trichardt, 0920, South Africa

Date development was mooted: September 2009

Date of Report: 25 November 2009

Proposed date of commencement of prospecting: January 2010

This project proposes to prospect for copper identified at the eastern extreme of the existing Venetia diamond mine and extending into the farm Rugen. The size of the proposed mining area is approximately 98ha.

The social benefits of the proposed project will be the creation of new mining job opportunities for the surrounding communities as well as a financial gain for the country as local copper production is very limited and the industry relies heavily on imported copper from Zambia.

This report contains the findings of the first phase Heritage Impact Assessment that was performed as part of the larger Environmental Impact Management investigation conducted by the Environmental Services Section of the Venetia Mine, part of De Beers Consolidated Mines Ltd. Venetia Mine Mines.

Findings;

In terms of tangible historic and archaeological structures; none were identified within the proposed study area. Large areas of the proposed mining area, however lies underneath existing mine tailings dumps. These areas were investigated in a previous study in 1989, however the parameters of heritage significance has been more closely defined in the last two decades and once the area has been opened up it should be re-investigated for sites of heritage significance.

In terms of structures and archaeological sites the proposed development will have little or no impact on the study area.

The impact on the Mapungubwe Cultural Landscape was also evaluated and it was found that with sufficient monitoring the impact should be minimal.

Recommendations;

- No negative impacts are anticipated on the cultural landscape
- Procedures should be put in place to ensure the safety of any sub-surface sites of archaeological, historic or social value (as outlined later in this report)
- Should bedrock be affected a paleontological investigation should be performed
- Periodic monitoring of the mining activities is proposed

TABLE OF CONTENTS

Introduction	6
Proposed Project	6
Project Area	7
Urban Edge	7
Alternatives	7
Resource Inventory	8
Resource Evaluation	8
Impact Identification and Assessment	8
Resource Management Recommendations	8
Cultural Landscape Analysis	9
Landscape Unit A	9
Recommendations	13
References Cited	14
Methodology	16
Inventory	16
Site Surveying	16
Survey Sampling	16
Systematic Survey Sampling	17
Judgemental Survey Sampling	17
Assessment	17
Site Evaluation	17
Significance Criteria	17
Assessing Impacts	18

LIST OF FIGURES, TABLES & APPENDICES

Table 1.	Site significance (Pre-Contact).
Table 2.	Site significance (Post-Contact).
Table 3.	Pre-contact site characteristics.
Table 4.	Post-contact site characteristics.
Appendix A	Methodology.
Appendix B	Location Map



HERITAGE IMPACT ASSESSMENT (HIA)

EXPLOITATION OF A COPPER DEPOSIT ON THE EASTERN EXTREMES OF THE EXISTING VENETIA DIAMOND MINE - LIMPOPO PROVINCE.

INTRODUCTION

Gaigher & Associates was contracted by De Beers Consolidated Mines Ltd to conduct a first phase Heritage Impact Assessment (HIA) on the proposed prospecting for copper on the eastern extremes of the existing Venetia Diamond mine, near Alldays - Limpopo Province.

This HIA forms part of the Environmental Impact Assessment (EIA) as required by the Environmental Conservation Act (ECA) 73 of 1989, the Minerals & Petroleum Resources Development Act, 28 of 2002 and the Development Facilitation Act (DFA), 67 of 1995. The HIA is performed in accordance with section 38 of the National Heritage Resources Act (NHRA), 25 of 1999 and is intended for submission to the South African Heritage Resources Agency (SAHRA).

Qualified personnel from Gaigher & Associates conducted the assessment. The team comprised a Principal Investigator with a minimum of an Honours degree in an applicable science as well as at least five years of field experience in heritage management assisted by a fieldworker with at least a BA degree in an applicable science. All of our employees are also registered members of the Association of South African Professional Archaeologists (ASAPA).

A member of Gaigher & Associates performed the assessment on 22 and 23 August 2009.

The indicted study area was investigated for signs of sites with any heritage significance. Any sites identified were plotted using a Global Positioning System (GPS) using the WGS 84 datum and photographed digitally. The sites were surveyed on foot and by vehicle.

All results will be relayed in this report, firstly outlining the methodology used and then the results and recommendations for the identified resources.

PROPOSED PROJECT

Venetia Mine is proposing prospecting for copper on 98ha on the eastern boundary of their existing diamond mine at Venetia.

After researching the National Archive records as well as the SAHRA records it was determined that only one previous heritage investigation was performed in this immediate area. In 1989, EOM Hanisch produced a report titled *ARCHAEOLOGICAL SURVEY: VENETIA NOVEMBER/DECEMBER 1989*.

The project was tabled during July 2009 and the developer intends to commence as soon as possible after receipt of the ROD from the Department of Environmental Affairs.

PROJECT AREA

The study area is located approximately 25km to the northeast of the town of Alldays. The area that is undisturbed is typical Mopani Bushveld (*Collosperrum Mopani*). Much of the site has been buried under the tailings of the diamond mine. (See Appendix C: Location Map).

The visual qualities of the landscape have been severely degraded by quarrying as well as the dumping of mining tailings.

Good weather conditions were experienced during the field investigations.

URBAN EDGE

The study area is outside of any urban edge, with Alldays being the closest town and Musina lying approximately 70km to the east.

ALTERNATIVES

No alternatives were provided for the proposed development.



RESOURCE INVENTORY

This section will contain the results of the heritage site inventory. Any identified sites will be indicated on the accompanying map plotted using the ArcView Geographic Information System (GIS).

No sites of any heritage value were identified during the investigations. This finding was collaborated by the 1989 study of Hanisch

RESOURCE EVALUATION

No resources were identified that needed evaluation.

IMPACT IDENTIFICATION AND ASSESSMENT

No impacts are anticipated as no sites were identified.

RESOURCE MANAGEMENT RECOMMENDATIONS

Although unlikely, sub-surface remains of heritage sites could still be encountered during the excavations. Especially the areas underneath the present mining dumps should be closely monitored. Such sites would offer no surface indication of their presence due to the high state of development in the area. 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

Although no sites of heritage significance were identified within the proposed study area, 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 SAPS should be notified.
- Mitigative 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.

CULTURAL LANDSCAPE ANALYSIS

The cultural landscape and its associated heritage resources will be evaluated in this section. As the development is relatively small, it will be discussed as a single unit with homogenous cultural characteristics.

LANDSCAPE UNIT A

The landscape in the Venetia mining area is particularly rich in significant heritage resources. The main focus of recent research has been the Early Iron Age (EIA) sites of *Mapungubwe*, *Shroda*, *K2* and *Pons 5*. These sites all lie within 10km of the proposed mining area. The area is also well known for Stone Age sites as well as rock art sites (such as the ones identified by Ed Eastwood on Venetia property). For this reason it can be seen that the cultural landscape is very sensitive.



The Mapungubwe Cultural Landscape

Hunter-gatherers of the Stone Age roamed the river flood plains and cave sandstone hills of the Limpopo valley from time to time and left their stone tools there. Paintings in rock shelters and a few rock engravings are evidence of San hunter-gatherer communities in the Stone Age landscape. The first communities who made iron tool and clay pots arrived in the central Limpopo valley during the early Iron Age, possibly by AD 500. These people were the forerunners of larger farming communities of the Iron Age who settled in the Limpopo River valley between AD 800 and AD 1400.

The Iron Age sites at K2 and Mapungubwe were inhabited between AD 1000 and Ad 1300. Archaeologists believe that both sites were once capitals of African kings. Unfortunately the inhabitants identity remains a mystery since this part of history goes back before the written record and no known oral traditions can be recorded over a period of a thousand years, therefore the inhabitants are merely known as the 'Mapungubweans'.

THE SETTLEMENTS

Mapungubwe is the site of three royal graves and was the center of a terraced settlement. Stonewalls buttressed the slopes and homesteads were scattered about. The king and his soldiers lived near the top of the hill and were supported by the people on the lower levels. The neighbouring village of K2 indicates that the inhabitants were subsistence farmers, raising both stock and crops. A valuable feature of K2 is the large central refuse site, from which archaeologists have been able to glean a store of information. Human remains from various graves indicate that these communities enjoyed a healthy, varied diet. People were prosperous and kept domesticated cattle, sheep, goats and dogs. The charred remains of storage huts have also been found, showing that millet, sorghum and cotton were cultivated.

TECHNOLOGY AND TRADE

Findings on Greefswald are typical of the Iron Age. Smiths created objects of iron, copper and gold for practical and decorative purposes – both for local use and for trade. Pottery, wood, ivory, bone, ostrich eggshells and the shells of snails and freshwater mussels indicate that many other materials were used and traded with cultures as far away as East Africa, Persia, Egypt, India and China.

It seems foreign trade was an important part of life in the area and large quantities of glass beads were obtained in exchange for gold and animal skins. At K2, numerous garden roller beads were made from imported glass beads.

NATIONAL & WORLD HERITAGE STATUS

The two main sites, Mapungubwe and K2, were proclaimed National Monuments in the early 1980's. Boundaries are being set for the creation of a cross-border peace Park, named Mapungubwe National Park, this is also now a World Heritage Site.

AFRICAN FARMING COMMUNITIES and KINGDOMS: traditions, subsistence, technology and trade

The traditions of African farming communities were central to their social life, settlement patterns, animal husbandry, agriculture, technology and trade. Many of these cultural aspects are reflected in the remains from K2 and Mapungubwe. A traditional African village is organized around family relationships, and creates household activity areas and places for special social occasions such as initiation schools and religious ceremonies. The close relationship of the villagers with their cattle is often symbolized by the position of the cattle kraal in the village. The domestic animals kept by African Iron Age people included cattle, sheep, goats and dogs. These people cultivated plants such as varieties of sorghum, millet and beans. The Iron Age people were skilled miners and metal workers. Some evidence of their skills are the numerous gold mines in Zimbabwe and some tin and copper mines in South Africa.

K2 – AN IRON AGE SITE: at the foot of Bambandyanalo Hill

K2 is 1 km southwest of Mapungubwe Hill in a small valley surrounded by cliffs. G A Gardner, who excavated there during the 1930's, named K2. Between about AD 1030 and AD 1220, for nearly 200 years, many generations of farming people lived at K2. The main site of about 5 hectares includes the remains of a central homestead area, a central cattle kraal and a central midden, surrounded by smaller homesteads.

EVIDENCE OF DAILY LIFE AT K2: the village of a successful farming and trading community

K2 is a particularly large Iron Age site with vast deposits containing a wealth of artifacts such as glass beads and pottery, often found in the numerous graves of the villagers. Huge quantities of bone fragments from slaughtered domestic animals and burnt seeds of domesticated plants such as sorghum and bullrush millet indicate that the K2 people were successful farmers. They were generally healthy people due to their nutritious diet. They were skilled craftsmen who produced characteristic pottery, large glass beads, tools and body ornaments of iron, copper bangles and figurines of humans and

domesticated animals. They hunted elephants and traded the ivory for glass beads imported via the African East Coast by traders such as the Swahili.

MAPUNGUBWE: stratigraphic pages of African history

Mapungubwe Hill is a sandstone hill with vertical cliffs and a flat top approximately 30m high and 300, long. A substantial deposit with layers of soil covers it; remains of floors, burnt houses and household refuse. The Southern Terrace below was inhabited from around AD 1030 to 1290 (about 260 years). The hilltop was inhabited for about 70 years from AD 1220 to Ad 1290.

GOLD SYMBOLS

The gold objects from the Mapungubwe graves, such as the rhinoceros, sceptre and bowl, were originally gold sheet or foil covering wooden carvings. The gold sheet was folded around the wooden core and held in place with tacks. In some cases, the gold cover was decorated with punched indentations or incised lines.

Some of these objects, such as the sceptre and rhinoceros, were possibly symbols associated with a person of special significance or high status, such as a king. The person was eventually buried with these objects in accordance with traditional customs and social or religious beliefs. Numerous beads and bangles from graves on Mapungubwe Hill indicate that some members of the community adorned themselves with different types of golden jewellery. These ornaments probably belonged to senior members of the royal family at Mapungubwe.

CLAY ARTEFACTS

Many objects were made of fired clay, or pottery. They were used for various purposes, some still unknown. Human figurines, usually with an elongated body and stumps for heads, arms and legs, were common at K2. They are often decorated with incisions or rows of dots. Some are highly simplified, like the conical figurine found at Mapungubwe.

Animal figurines, mostly from K2, include cattle, sheep and goats. At Mapungubwe, a giraffe figurine was also found. The conical figurines often found at Mapungubwe may have had symbolic significance. Some everyday practical items include spoons, whistles, a funnel and spindle whorls used in the production of cotton cloth. Large pottery beads and mould were used to manufacture large cylindrical glass beads, known as garden roller beads.

ARTEFACTS OF ANIMAL ORIGIN

The Iron Age villagers adorned themselves with numerous beads made of ostrich eggshell, large land snails, bone and ivory.

They wore bracelets made of ivory, decorated their clothes and hair with pins made of bone and ivory, and wore perforated cowrie shells imported from the East Coast.

Some of the last inhabitants of Mapungubwe made and used polished bone arrowheads and arrow link shafts, similar to the arrows used by the San or Bushmen.

Some bone arrowheads from Mapungubwe have flattened front ends into which iron tips were fitted. The people used awls and flat needles made of bone, probably to manufacture clothes from animal skins.

GLASS BEADS: TRADITIONS AND TRADE

Thousands of glass beads have been found in the middens and graves at K2 and Mapungubwe. Burial customs show that children and adults wore strings of beads in a traditional African way. Large quantities of these beads were traded through Swahili ports on the East coast of Africa. Trade beads were imported from foreign countries such as Egypt or India in exchange for ivory and gold from Africa.

The K2 people manufactured large beads, known as garden roller beads. Whole and broken trade glass beads were melted and the molten glass was wound into a prefabricated clay mould to set. The clay

mould was then broken to remove the new garden roller glass bead. These are the oldest glass objects made in Southern Africa. (c/o University of Pretoria Museum)

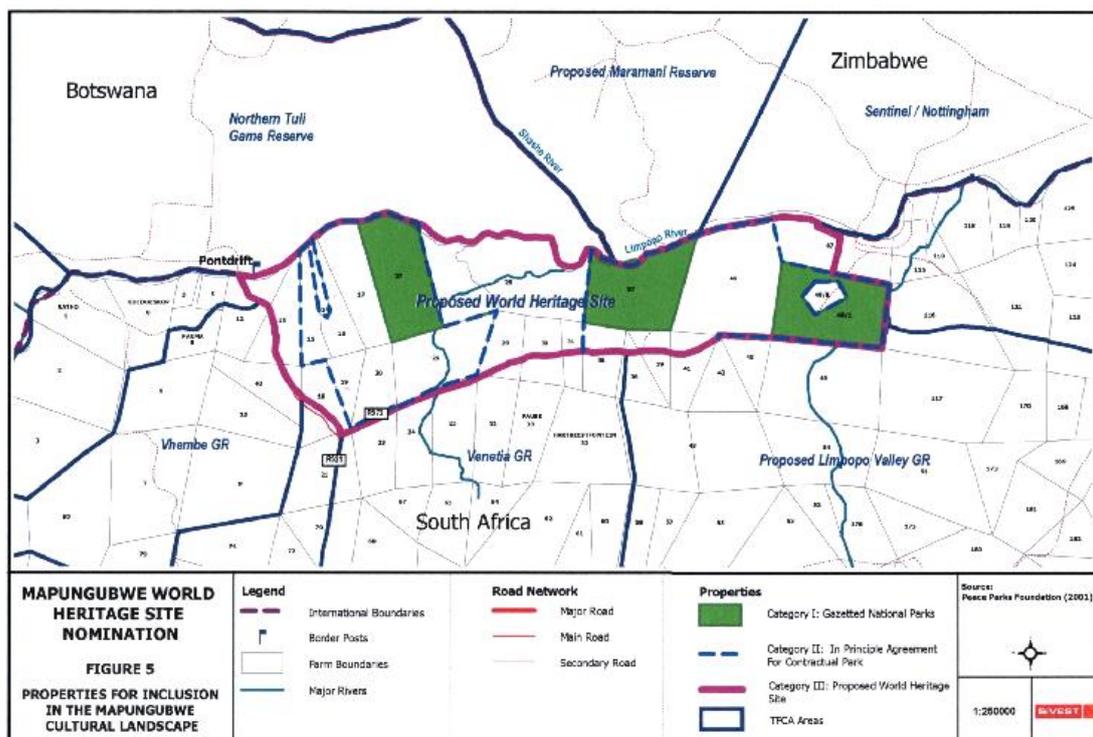
The Mapungubwe Cultural Landscape in Terms of this Project

The Mapungubwe Conservation Area includes the areas under the administration of the Venetia Mine and especially its nature reserve. Much of the areas now included in the Mapungubwe National Park were once under the management and protection of the Venetia Conservation Society. These areas are being managed as natural areas around the central mining area of the Venetia mine itself. In itself it serves as a buffer zone for the industrial activities at the mine and the recently formed Mapungubwe National Park.

A buffer zone serves to provide an additional layer of protection to a World Heritage property. The concept of a buffer zone was first included in the Operational Guidelines for the implementation of the World Heritage Convention in 1977. In the most current version of the Operational Guidelines of 2005 the inclusion of a buffer zone into a nomination of a site to the World Heritage List is strongly recommended but not mandatory.

Many World Heritage properties face problems that directly or indirectly derive from the situation of their buffer zone. New constructions within a buffer zone may have an impact on the World Heritage property and could threaten its Outstanding Universal Value; a different legal status of a buffer zone could also impact the conservation, the protection or management plan of a site.

The activities described in this report is concentrated and limited to the fenced mining area within the Venetia Mine immediate surrounds. This means that the boundaries of the Mapungubwe Cultural Node (as defined in the World Heritage Site application) are around 30km away from the proposed activity. Secondary impacts such as visual, dust and noise impacts will be mitigated in part by the Environmental Management Plan Report but also in a large part by the distance from these sites of the proposed activities.



The purple line in the above map shows the extent of the Mapungubwe WHS. The mining area is indicated as Venetia GR. From this it is clear that the proposed mining area falls well outside of the WHS

area. The site does however fall within the Sashe Limpopo Trans Frontier Conservation Area but will not be affecting it.

RECOMMENDATIONS

Taking the cultural sensitivity of the area into account the investigators not only looked at the direct impacts of this development on sites located within the study area, but also at the possible visual impact of the development on significant sites within the surrounding areas. It was however found that the existing mine already has such a detrimental visual impact that the development of the new area would not significantly contribute to worsening the situation.

As far as the impacts on the Mapungubwe Cultural Landscape and the Mapungubwe WHS go, it is not anticipated that this new development would have any detrimental effect on it.

Due to the nature of mining activities and possible changes to the EMPR it is recommended that the proposed mining activity undergoes monitoring on site by a heritage practitioner, once every two weeks on inception of the project for the first year and thereafter once every two months for the next five years. This will ensure that the mining activities are well managed and that any unforeseen impacts on the cultural heritage of the area are mitigated in time.

Table 1. Proposed Monitoring Program

Mining Phase	Activity	Frequency
1 st Year	Field monitoring, evaluating recommendations, fixed point photography, implementation of EMPR	Every two weeks
Year 2 - 5	Site monitoring	Once a month



REFERENCES CITED

1. Aldenderfer, M. S. and Hale-Pierce, C.A. 1984. *The Small-Scale Archaeological Survey Revisited*. American Archaeology 4(1):4-5.
2. Butler, W. 1984. *Cultural Resource Management: The No-Collection Strategy in Archaeology*. American Antiquity 44(4):795-799.
3. Deacon, J. 1996. *Archaeology for Planners, Developers and Local Authorities*. National Monuments Council. Publication no. PO21E.
4. Deacon, J. 1997. *Report: Workshop on Standards for the Assessment of Significance and Research Priorities for Contract Archaeology*. In: Newsletter No. 49, Sept.1998. South African Association of Archaeology.
5. Dincause, D. F., Wobst, H.M., Hasenstab, R.H., and Lacy, D.M. 1984. *A Retrospective Assessment of Archaeological Survey Contracts In Massachusetts, 1970-1979*. Massachusetts Historical Commission, Survey and Planning Grant 1980. 3 volumes.
6. Dunnell, R.C., and Dancey, W.S. 1983. *The Siteless Survey: A Regional Scale Data Collection Strategy*. In: Advances in Archaeological Method and Theory 6:267-287. M.B. Schiffer, ed.
7. Evers, T.M. 1983. *Oori or Moloko? The origins of the Sotho/Tswana on the evidence of the Iron Age of the Transvaal*. S. Afr. J. Sci. 79(7): 261-264.
8. Hall, M.1987. *The changing past: Farmers, kings and traders in Southern Africa, 200-1860*. Cape Town: David Phillip.
9. Hall, S.L. 1981. *Iron Age sequence and settlement in the Rooiberg, Thabazimbi area*. Unpublished MA thesis, University of the Witwatersrand.
10. Huffman, T.N. 1989. "Zimbabwe ruins and Venda prehistory." The Digging Stick, 6(3), 11.
11. King, T.F. 1978. *The Archaeological Survey: Its Methods and Uses*. Interagency Archaeological Services, Department of the Interior, Washington, D.C.
12. Lightfoot, K.G. 1989. *A Defense of Shovel Test Sampling: A Reply to Short*. American Antiquity 54(2):413-416.
13. Maggs, T.M. O'C. 1976(a). *Iron Age communities of the southern Highveld*. Pietermaritzburg: Natal Museum.
14. McManamon, F.P. 1984. *Discovering Sites Unseen*. In Advances in Archaeological Method and Theory 8:223-292, edited by M.B. Schiffer, Academic Press, New York.
15. Miller, C. L. 1989. *Evaluating the Effectiveness of Archaeological Surveys*. Ontario Archaeology 49:3-12.
16. Loubser, J.H.N. 1994. *Ndebele Archaeology of the Pietersburg Area*. Navors. Nas. Mus., Bloemfontein. Volume 10, Part 2: 62-147.
17. Pistorius, J.C.C. 1992. *Molokwane, an Iron Age Bakwena Village*. Johannesburg: Perskor Printers.
18. Schiffer, M. B., Sullivan A.P., and Klinger T.C. 1978. *The Design of Archaeological Surveys*. World Archaeology 10:1-28.
19. Smith, L.D. 1977. *Archeological Sampling Procedures For Large Land Areas: A Statistically Based Approach*. USDA Forest Service, Albuquerque.
20. Stayt, H. 1931. *The Bavenda*. London: Oxford University Press.
21. Zubrow, E.B.A. 1984. *Small-Scale Surveys: A Problem For Quality Control*. American Archeology 4(1):16-27.



APPENDIX A

METHODOLOGY



METHODOLOGY

INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

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*).

SITE SURVEYING

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing. For the purposes of heritage investigations, *archaeological sites* refer to any site with heritage potential (i.e. historic sites, cultural sites, rock art sites etc.).

A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative area coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area. Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

- (a) assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and
- (b) help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing, which is a considerably more intensive method of assessing site significance (*King, Thomas F., 1978*).

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.

Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, alluvial till, etc.).

Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. (*Lightfoot, Keng G. 1989*).

SURVEY SAMPLING

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological or other heritage sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy.

Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum area coverage will provide the most comprehensive understanding of archaeological and other heritage resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria (*Butler, W., 1984*).

SYSTEMATIC SURVEY SAMPLING

A systematic sample survey is designed to locate a representative sample of archaeological or heritage resources within the project area. A statistically valid sample will allow predictions to be made regarding total resource density, distribution and variability. In systematic sample surveys it may be necessary to exempt certain areas from intensive inspection owing to excessive slope, water bodies, landslides, land ownership, land use or other factors. These areas must be explicitly defined. Areas characterized by an absence of road access or dense vegetation should not be exempted. (Dunneil, R.C., Dancey W.S. 1983).

JUDGEMENTAL SURVEY SAMPLING

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological or heritage sites are surveyed.

However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total heritage resource density and variability are required (McManamon F.P. 1984).

ASSESSMENT

Assessment studies are only required where conflicts have been identified between heritage resources and a proposed development. These studies require an evaluation of the heritage resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals.

SITE EVALUATION

Techniques utilized in evaluating the significance of a heritage site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.

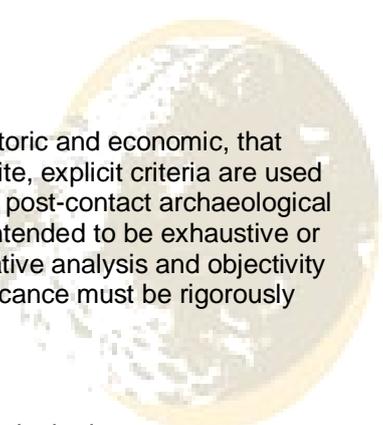
Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required.

Site significance is determined following an analysis of the surface collected and/or excavated materials (Miller, C.L. II, 1989).

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. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix B and Appendix C. 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*).

ASSESSING 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.

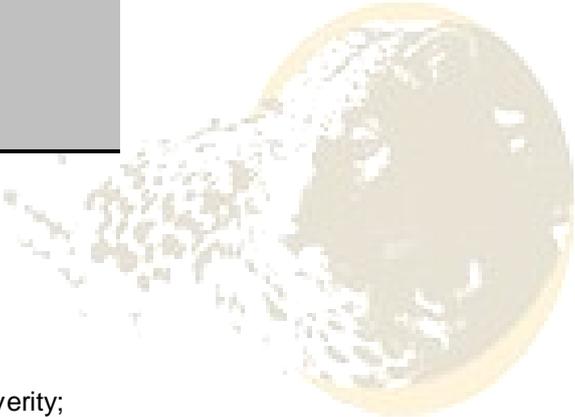
The assessment should include careful consideration of the following level-of-effect indicators, which are defined in Appendix D:

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

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).

<i>Impact Effect</i>	<i>Score</i>
Magnitude	0-4
Severity	0-4
Duration	0-4
Range	0-4
Frequency	0-4
Diversity	0-4
Cumulative effect	0-4
Rate of change	0-4
Total score:	0-32

Impact severity table.



Impacts will be defined along the following parameters of severity;

Effect	Score
No effect on site	0
Insignificant impact on site	1-5
Significant impact on site	6-16
Major destruction of site and attributes	17-24
Total destruction of sites and attributes	25-32

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a **eTrex Legend** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, field walking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).



All sites or possible sites found were classified using a hierarchical system wherein sites are assessed using a scale of zero to four according to their importance. These categories are as follows;

<i>Degree of significance</i>	<i>Justification</i>	<i>Score</i>
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	13 – 16
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	9 – 12
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	5 – 8
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 4
Intrusive	Damaging to the item's heritage significance.	0

Table 1. Site significance table for pre-contact sites.

<i>Degree of significance</i>	<i>Justification</i>	<i>Score</i>
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	29 – 24
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	13 – 18
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	7 – 12
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 6
Intrusive	Damaging to the item's heritage significance.	0

Table 2. Site significance table for post contact sites.

The qualitative value of a site's significance will be calculated by tabling its significance characteristics (as outlined in appendix B & C) on a sliding value scale and determining an accumulative value for the specific site. Two tables will be used;

Site significance characteristics slide scale (Pre-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
					Total Score

Table 3. Pre-contact site criteria (0- no value, 4- highest value)

Site significance characteristics slide scale (Post-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Historic Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Other Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
					Total Score

Table 4. Post-contact site criteria (0- no value, 4- highest value)

The values calculated (as specified in appendix B&C) are attributed to a category within the site significance table to provide the site with a quantifiable significance value. This will only be done for identified sites. Should an area under investigation not show any evidence of human activity this will be stated and no further qualifying will be done.

This information will be contained in a report that will strive to;

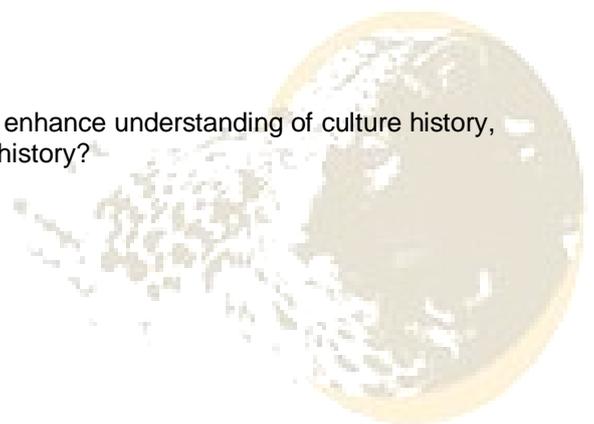
Review the purpose, approach, methodology and reporting of archaeological assessment and monitoring and propose guidelines on how to adequately address four key questions:

- i. What is the research value and potential of the archaeological remains?
- ii. What will the impact of development be?
- iii. What types of mitigation (by design modification or further investigation) would be appropriate to mitigate the impact of development and/or make a useful contribution to knowledge?
- iv. What will be the likely cost and timescale of any further investigation, analysis and reporting, given the nature of the archaeology and the type and extent of further work required?

Scientific Significance

(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?

Public Significance

(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?



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

Economic Significance

(a) What value of user-benefits may be placed on the site?

visitors' willingness-to-pay

visitors' travel costs

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?

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?

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?



Ethnic Significance

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

Economic Significance

(a) What value of user-benefits may be placed on the site?

visitors' willingness-to-pay

visitors' travel costs

Integrity and Condition

(a) Does the site occupy its original location?

(b) Has the site undergone structural alterations? If so, to what degree has the site maintained its original structure?

(c) Does the original site retain most of its original materials?

(d) Has the site been disturbed by either natural or artificial means?

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?

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

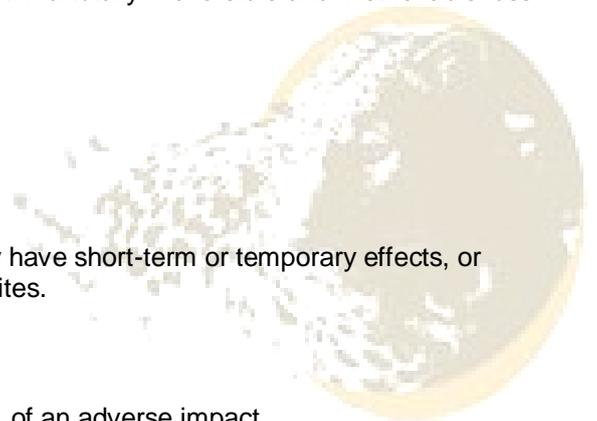
The irreversibility of an impact. Adverse impacts which result in a totally irreversible and irretrievable loss of heritage value are of the highest severity.

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 ongoing 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.



APPENDIX B

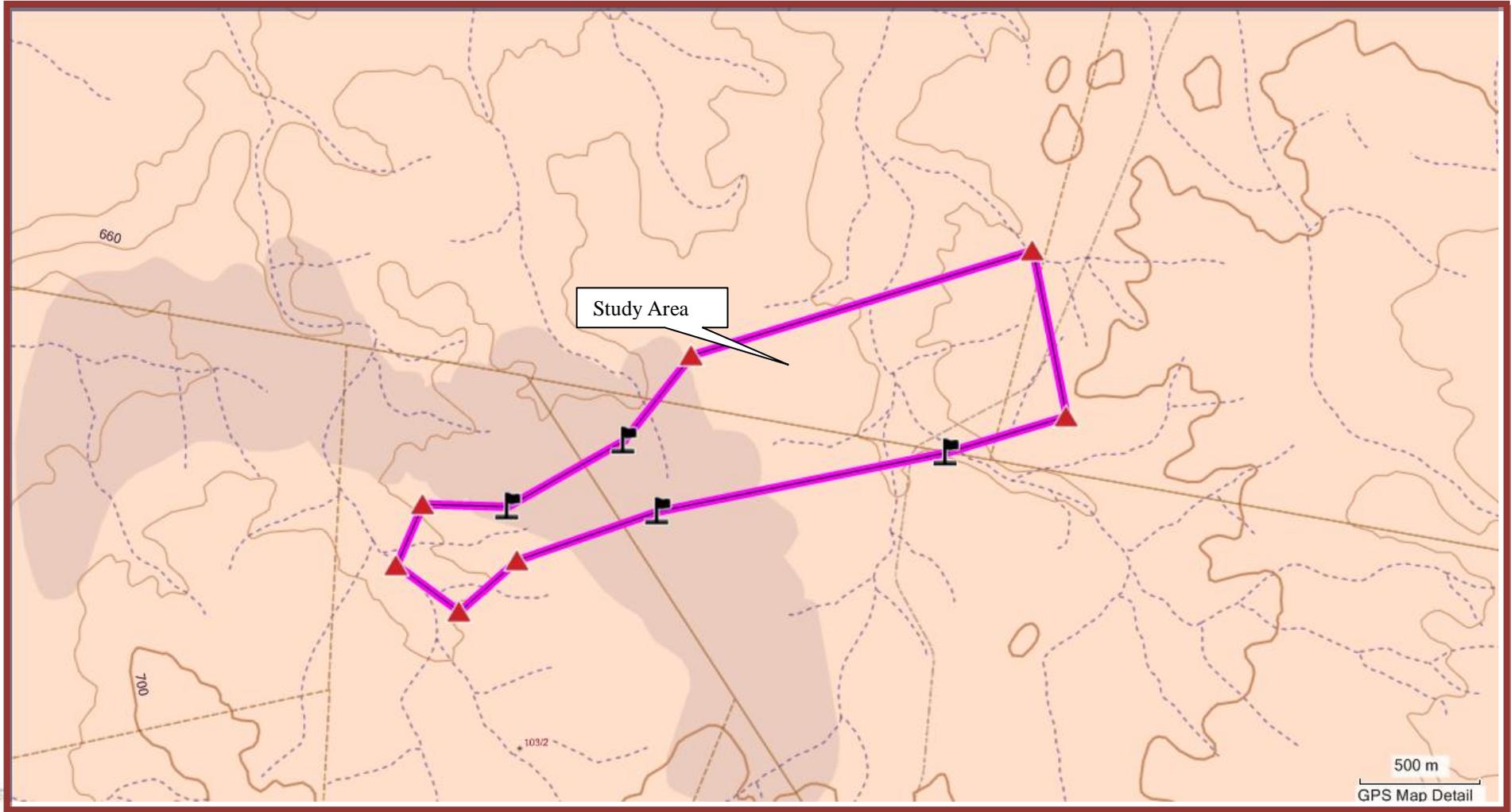
LOCATION MAPS

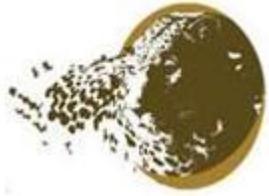




Venetia Copper Deposit HIA Alldays – Limpopo Province

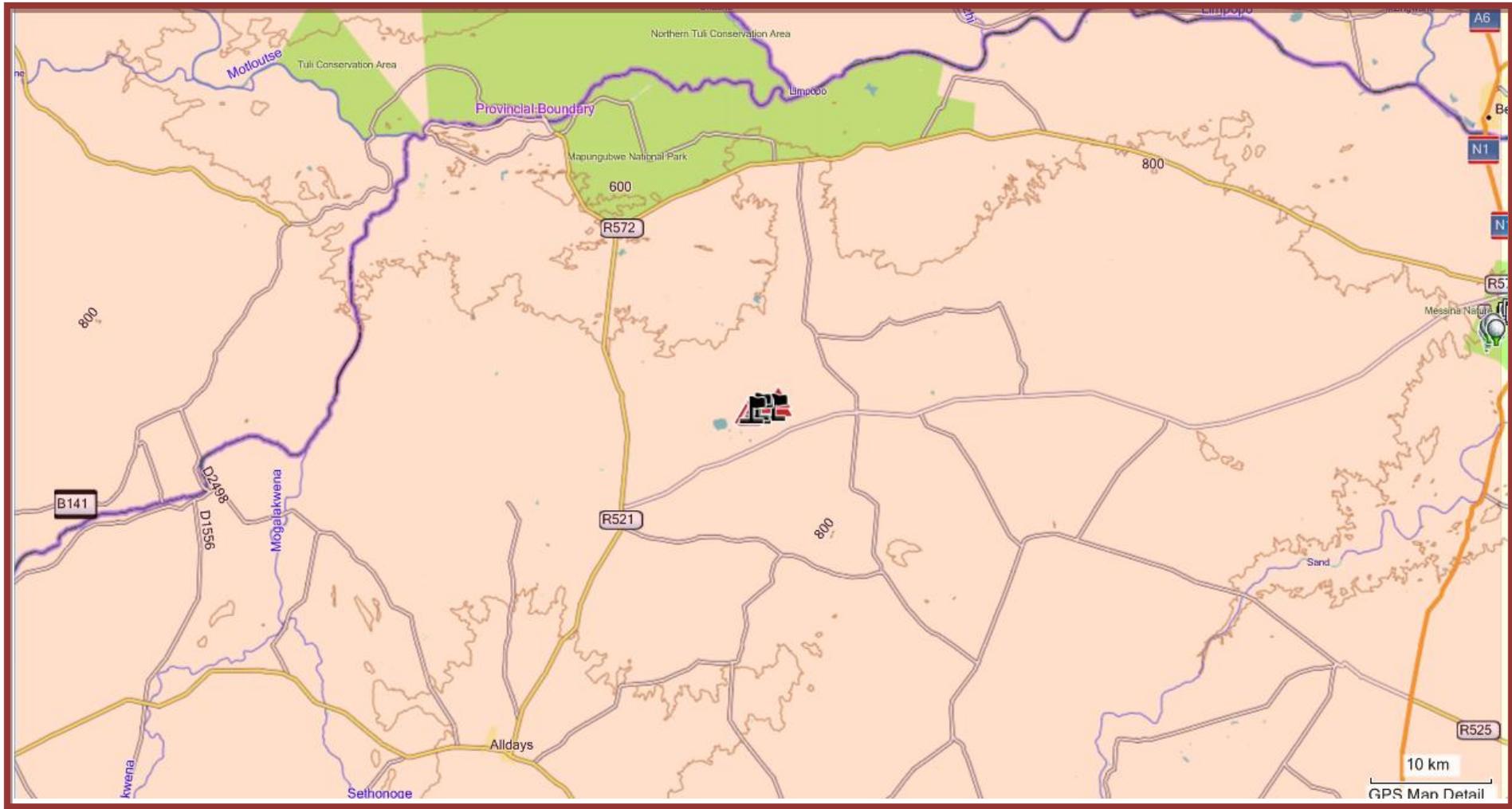
Compiled for Venetia Mine.
Compiled by Gaigher & Associates
2009-11-25





Venetia Copper Deposit HIA Alldays – Limpopo Province

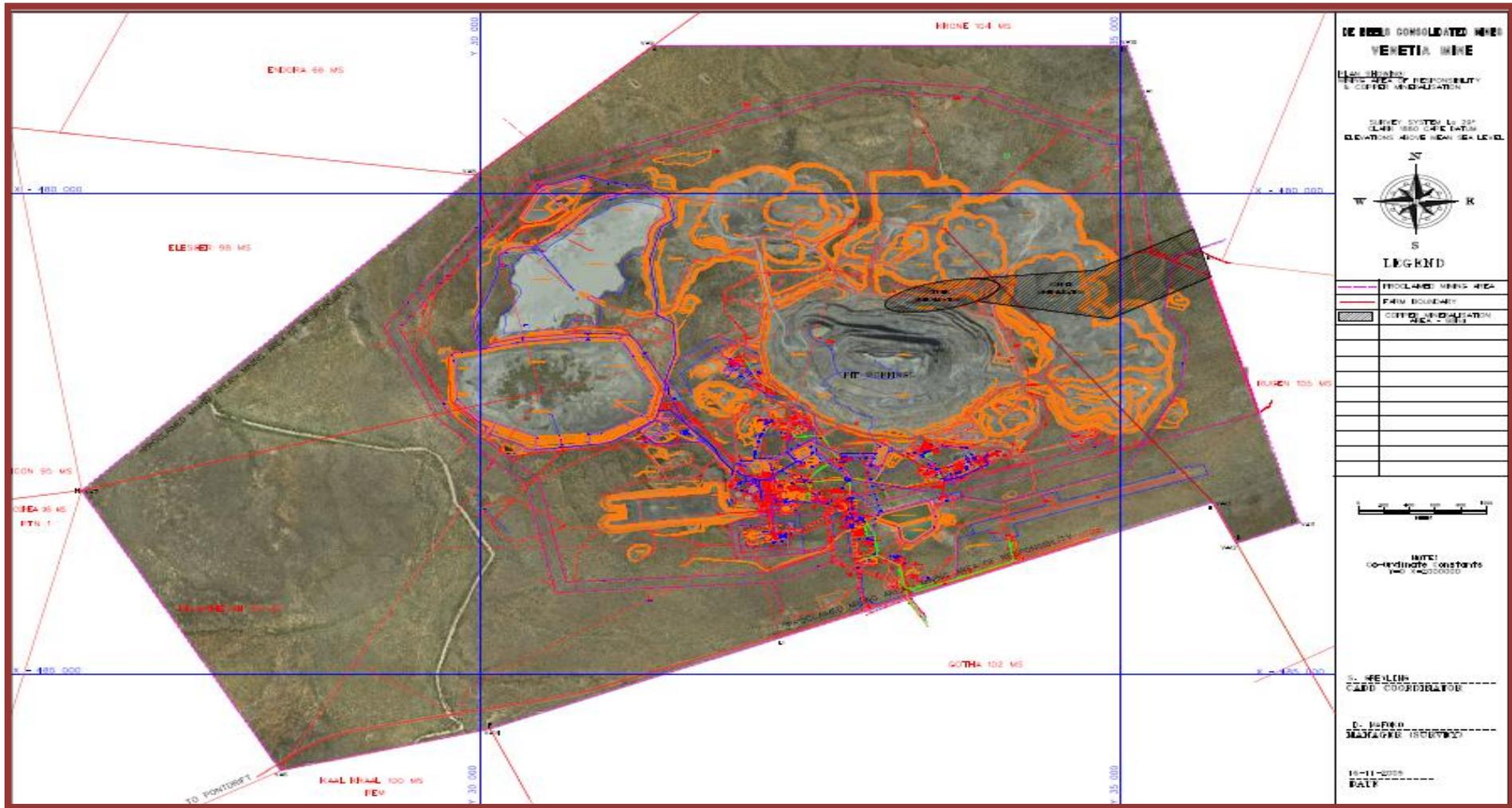
Compiled for Venetia Mine.
Compiled by Gaigher & Associates
2009-11-25





Venetia Copper Deposit HIA Alldays – Limpopo Province

Compiled for Venetia Mine.
Compiled by Gaigher & Associates
2009-11-25





Venetia Copper Deposit HIA Alldays – Limpopo Province

Compiled for Venetia Mine.
Compiled by Gaigher & Associates
2009-11-25

