



Phase 1 Archaeological Impact Assessment Report

**DELSAND PORTION 10, PIENAARSPOORT 339JR
KUNGWINI MUNICIPAL AREA, GAUTENG PROVINCE**

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Compiled by N. Kruger



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ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF DEMARCATED SURFACE AREAS ON THE FARM PIENAARSPORT 339JR AT DELFSAND, GAUTENG PROVINCE

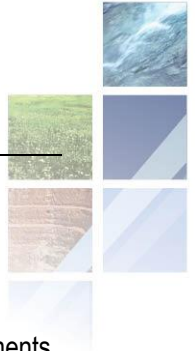
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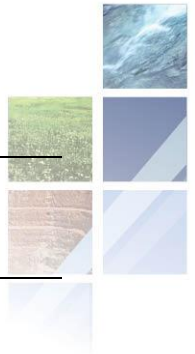
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AGES (Pty) Ltd. promotes the conservation of sensitive archaeological and heritage resources and therefore uncompromisingly adheres to relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980). In order to ensure best practices and ethics in the examination, conservation and mitigation of archaeological and heritage resources, AGES (Pty) follows the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment as set out by the South African Heritage Resources Agency (SAHRA) and the CRM section of the Association for South African Professional Archaeologists (ASAPA).



NOTATIONS AND TERMS

Absolute dating:

Absolute dating provides specific dates or range of dates expressed in years.

Archaeology:

The study of the human past through its material remains.

Archaeological record:

The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

Artefact:

Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artifact are not altered by removal of the surroundings in which they are discovered. In the southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

Assemblage:

A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

¹⁴C or radiocarbon dating:

The ¹⁴C method determines the absolute age of organic material by studying the radioactivity of carbon. It is reliable for objects not older than 70 000 years by means of isotopic enrichment. The method becomes increasingly inaccurate for samples younger than ±250 years.

Ceramic Facies:

In terms of the cultural representation of ceramics, a facies is denoted by a specific branch of a larger ceramic tradition. A number of ceramic facies thus constitute a ceramic tradition.

Ceramic Tradition:

In terms of the cultural representation of ceramics, a series of ceramic units constitutes as ceramic tradition.

Context:

An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context*, disturbance or displacement by later ecological action or human activities occurred.

Culture:

A contested term, "culture" could minimally be defined as is the learned and shared things that people have, do and think.

Cultural Heritage Resource:

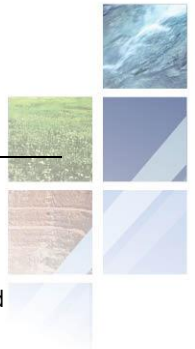
The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological,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

Cultural landscape:

A cultural landscape refers to a distinctive geographic area with cultural significance.

Cultural Resource Management (CRM):

A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.



Culvert:

A device or structure used to channel water where it allows water to pass underneath a road, railway, or embankment.

Ecofact:

Non-artifactual material remains that has cultural relevance which provides information about past human activities. Examples would include remains or evidence of domesticated animals or plant species.

Excavation:

The principal method of data acquisition in archaeology, involving the systematic uncovering of archaeological remains through the removal of the deposits of soil and the other material covering and accompanying it.

Feature:

Non-portable artifacts, in other words artifacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features.

GIS:

Geographic Information Systems are computer software that allows layering of various types of data to produce complex maps; useful for predicting site location and for representing the analysis of collected data within sites and across regions.

Historical archaeology:

Primarily that aspect of archaeology which is complementary to history based on the study of written sources. In the South African context it concerns the recovery and interpretation of relics left in the ground in the course of Europe's discovery of South Africa, as well as the movements of the indigenous groups during, and after the *mfecane* or *difaqane*.

Iron Age:

Also known as "Farmer Period", the "Iron Age" is an archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture.

Lithic:

Stone tools or waste from stone tool manufacturing found in on archaeological sites.

Matrix:

The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

Megalith:

A large stone, often found in association with others and forming an alignment or monument, such as large stone statues.

Midden:

Refuse that accumulates in a concentrated heap.

Microlith:

A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

Monolith:

A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

Oral Histories:

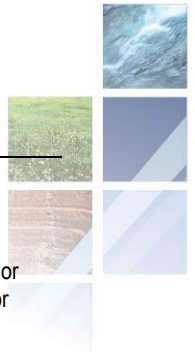
The historical narratives, stories and traditions passed from generation to generation by word of mouth.

Pre-Phase 1 CRM Assessment:

An initial pre-assessment (scoping) phase, where the specialist establishes the scope of the project and terms of reference for the developer.

Phase 1 CRM Assessment:

An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.



Phase 2 CRM Study:

In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

Phase 3 CRM Measure:

A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

Prehistoric archaeology:

That aspect of archaeology which concerns itself with the development of humans and their culture before the invention of writing. In South Africa, prehistoric archaeology comprises the study of the Early Stone Age, the Middle Stone Age and the greater part of the Later Stone Age and the Iron Age.

Probabilistic Sampling:

A sampling strategy that is not biased by any person's judgment or opinion. Also known as statistical sampling, it includes systematic, random and stratified sampling strategies.

Provenience

Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association*, the co-occurrence of an artefact with other archaeological remains; and *superposition*, the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

Random Sampling:

A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

Relative dating:

The process whereby the relative antiquity of sites and objects are determined by putting them in sequential order but not assigning specific dates.

Remote Sensing:

The small or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing device(s) that is not in physical or intimate contact with the object (such as by way of aircraft, spacecraft or satellite). Here, ground-based geophysical methods such as Ground Penetrating Radar and Magnetometry are often used for archaeological imaging.

Rock Art Research:

Rock art can be "decoded" in order to inform about cultural attributes of prehistoric societies, such as dress-code, hunting and food gathering, social behaviour, religious practice, gender issues and political issues.

Sensitive:

Often refers to graves and burial sites although not necessarily a heritage place, as well as ideologically significant sites such as ritual / religious places. *Sensitive* may also refer to an entire landscape / area known for its significant heritage remains.

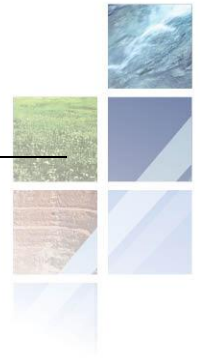
Site (Archaeological):

A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

Slag:

The material residue of smelting processes from metalworking.

Stone Age:



An archaeological term used to define a period of stone tool use and manufacture.

Stratigraphy:

This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

Stratified Sampling:

A probabilistic sampling strategy whereby a study area is divided into appropriate zones – often based on the probable location of archaeological areas, after which each zone is sampled at random.

Systematic Sampling:

A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

Tradition:

Artefact types, assemblages of tools, architectural styles, economic practices or art styles that last longer than a phase and even a horizon are describe by the term *tradition*. A common example of this is the early Iron Age tradition of Southern Africa that originated ± 200 AD and came to an end at about 900 AD.

Tuyère:

A ceramic blow-tube used in the process of iron smelting / reduction.

LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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1 EXECUTIVE SUMMARY

This AIA Report is the result of an Archaeological Impact Assessment (AIA) study of selected surface areas on the farm Pienaarspoort 339JR at Delfsand in the Rayton area where an expansion of current sand mining areas is planned. The report includes background information on the archaeology and history of the Highveld area, its representation in southern Africa, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the South African Heritage Resources Agency (SAHRA) and recommendations contained in this document will be reviewed in order to consider the conservation priority of sites located in the area. During the pedestrian survey of a total surface area of approximately 15ha demarcated for expansion of the mine, the following observations were made:

Paleontological Remains

No paleontological occurrences were observed in the survey area.

Stone Age Remains:

No Stone Age occurrences were observed in the survey area.

Iron Age (Farmer Period) Remains

No Iron Age (Farmer Period) occurrences were observed in the survey area.

Historical /Recent Remains

The partially intact remains of a historical period railway culvert occur on the south-eastern periphery of the survey area. The single arch bridge structure, constructed at around 1890 formed a viaduct over the wetland area east of Pienaarspoort for the historical NZASM Delagoa Bay (Maputo) railway line which was in use until the first part of the 20th century. The structure is of high provincial significance as it exemplifies significant technological and architectural advances in the interior of southern Africa during the inception of the British Colonial Conquest of the Trans-Vaal interior. In addition, it promotes our understanding of the regional history of contact and conflict of the South African hinterland in the last part of the 19th century AD.

Graves

No graves / burial places were observed in the survey area.

Considering the rich and diverse archaeological and historical landscape of the Highveld and specifically the eastern Magaliesberg around Pienaarspoort, which covers human cultural development from the Stone Ages up to recent times, a careful watching brief monitoring process is recommended for mining expansions at Delfsand. The heritage significance and conservation priority of the late 19th century railway culvert requires careful conservation and management measures in terms of standard archaeological site management and protection. A broad outline for such procedures is supplied in this Report.

This report details the methodology, limitations and recommendations relevant to heritage areas, as well as areas of proposed development. It should be noted that recommendations and mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

2 BACKGROUND

2.1 Scope and Motivation

AGES (Pty) Ltd. was approached by Infrasors for an Archaeological Impact Assessment (AIA) Study of surface areas on a portion of the farm Pienaarspoort 339JR in the Rayton area, where Delfsand is planning an expansion of existing sand mining areas. The rationale of the proposed study was to determine the presence of heritage resources such as paleontological, archaeological and historical sites and features, graves and places of religious and cultural significance; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

2.2 Project Direction

AGES (Pty) Ltd.'s expertise ensures that all projects be conducted to the highest ethical and professional standards. As archaeological specialist for AGES, Mr Neels Kruger acted as field director for the project, responsible for the assimilation of all information, the compilation of the final AIA report and recommendations. Mr Kruger is an accredited archaeologist and CRM practitioner with the Association of South African Professional Archaeologists (ASAPA) and a Masters Degree candidate in archaeology at the University of Pretoria.

2.3 Terms of Reference

Environmental Impact Assessments (EIA's) should, in all cases, include the assessment of Heritage Resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years (see Section 34), archaeological sites and material (see Section 35) and graves as well as burial sites (see Section 36). The objective of this legislation is to enable and to facilitate developers to employ measures to limit the potentially negative effects that the development could have on heritage resources.

Based hereon, this project functioned on the following **terms of reference**:

- *Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements, if any.*
- *Estimate the level of significance/importance of the archaeological remains within the area.*
- *Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible mitigation measures provided that such action is necessitated by the development.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA).*

2.4 CRM: Legislation, Conservation and Heritage Management

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 palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

2.4.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation contained in the Government Gazette of the Republic of South Africa at all times.

- *National Heritage Resources Act No 25 of 1999, section 35*

According to the National Heritage Resources Act of 1999 a historical site is “any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years.” This clause is commonly known as the “60-years clause”. Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. “Tell” refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

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

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

and

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

- destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and*

palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."

And:

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

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

- *Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925*

Graves 60 years or older fall under the jurisdiction of the Human Tissues Act of 1983 and the National Heritage Resources Act, as these sites areas are heritage resources. The Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws protect graves younger than 60 years. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

2.4.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and paleontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIA's & AIA's) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites.

HIA's and AIA's should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and paleontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact of the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

"38. (1) *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:*

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*

- (b) the construction of a bridge or similar structure exceeding 50 m in length;
- (c) any development or other activity which will change the character of a site:
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”

And:

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

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

Consequently, section 35 of the Act requires Heritage Impact Assessments (HIA's) or Archaeological Impact Assessments (AIA's) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, paleontological sites and objects.

3 REGIONAL CONTEXT

3.1 Area Location

The Infrasons Delfsand Sand Mine is situated at **S25°44'1.89" E28°28'3.85"** on the farm Pienaarspoort 339JR, some 25km east of Pretoria and 6km west of the small town of Rayton in Gauteng Province. The R104 alternative route from Pretoria East to Bronkhorstspuit passes the area to the south and a regional road from Mamelodi to the west leads through the Pienaarspoort to pass directly north of the property. Various smaller dirt roads intersect the survey area, connecting the various mining areas with the processing plant and main access routes.

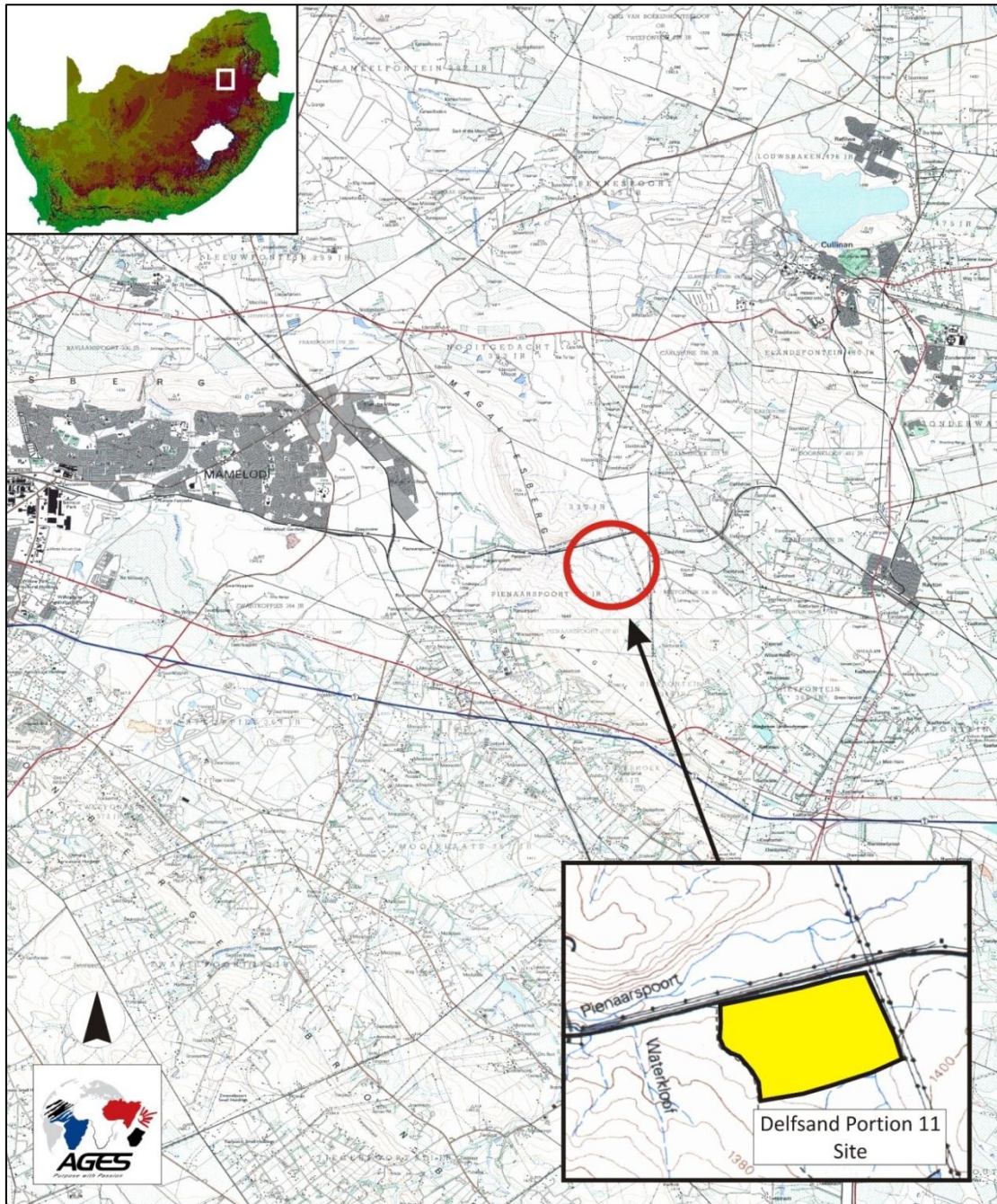


Figure 1: 1:50000 Map representation of the Delfsand survey area (2528CB).

3.2 Area Description

The farm Pienaarspoort is situated about 25km east of Pretoria in the Ethekwini Municipal area at an altitude of 1370 m above sea level. The area occurs to the extreme north of the grassland biome in South Africa. Acocks (1988) recognised the vegetation type as Bankenveld, and more specifically the Rand Highveld Grassland. The Bankenveld vegetation type consists of diverse plant communities such as forest in sheltered ravines, woodland, grassland and wetlands. The largest portion of the survey area is situated in a dense wetland. The area's geology is characterised by formations of the Waterberg Group overlain by Karoo sediments.

3.3 Site Description

The area demarcated for further sand mining at Delfsand covers a surface area of more or less 15ha in a wetland area hydrated by a tributary of the Edendalspruit which ultimately drains into the Roodeplaats Dam. The site is bordered by the Delfsand Mining Plant to the south, the Pretoria – Middelburg railway line to the north and foothills of the Magaliesberg to the west (see Figure 2). The site is located directly east of Pienaarspoort in the Magaliesberg mountain range.

The entire western section of the property bordering the survey area has been severely disturbed where mining activities is currently being executed (see Figures 2 & 4).

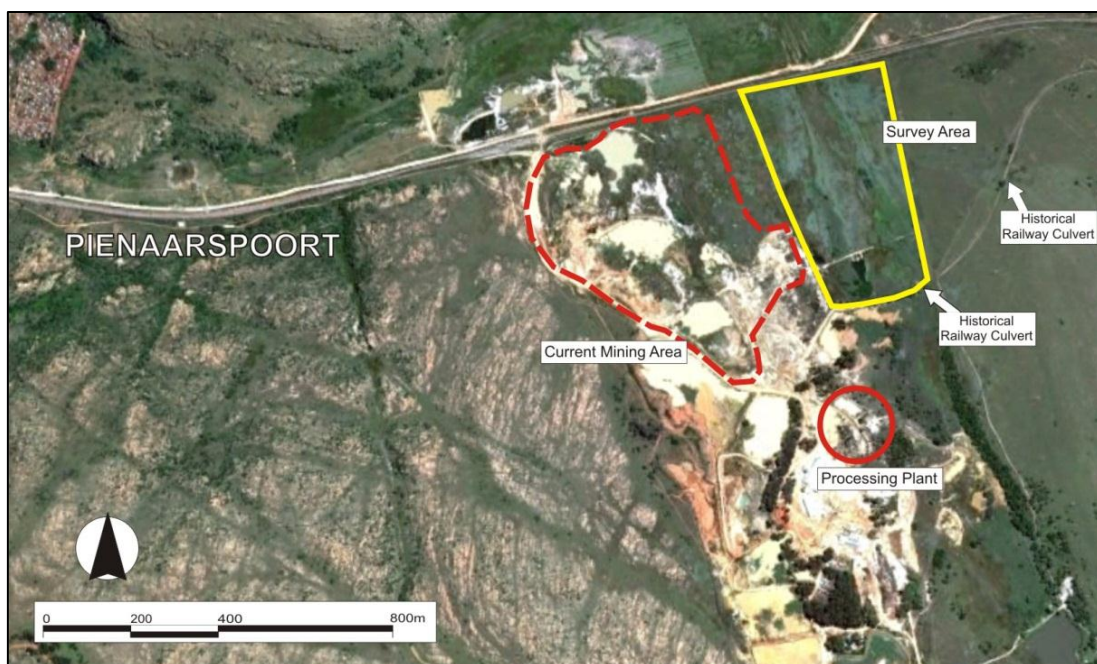


Figure 2: Regional setting of the survey area at Delfsand Portion 10.



Figure 3: General surroundings looking south, the Delfsand survey area to the left.



Figure 4: General surroundings of mining areas directly west of the survey area. Pienaarspoort is visible in the distance.

4 METHOD OF ENQUIRY

4.1 Sources of Information

4.1.1 Desktop Study

A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies in the area, archaeological and archival sources, aerial photographs, historical maps and local histories.

4.1.2 Aerial Representations and Survey

Aerial photography is often employed to locate and study archaeological sites. This method was applied to aid the pedestrian survey of the surface areas at Delfsand, where contour lines of elevations, depressions, variation in vegetation, soil marks and landmarks were examined. Specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g.

differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result precipitation frequently occur over walls or embankments. By superimposing high frequency aerial photographs with images generated with Google Earth, potentially sensitive areas were subsequently identified. These areas served as referenced points from where further transect surveys were carried out. The method proved to be particularly successful as the surface remains of the historical NZASM railway line route present in the area, is best visible on aerial photographs (see Figure 5).



Figure 5: Aerial representation of the Delfsand survey area with the route of the historical NZASM railway route clearly visible in the landscape (white arrows).

4.1.3 Field Survey



Figure 6: Aerial map illustrating transect system used as reference for the pedestrian survey at Delfsand.

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the Delfsand site was done by means of a systematic pedestrian survey in accordance with standard archaeological practise by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording, transect grids in a

frequency of 10m were digitally superimposed on maps of the area (see Figure 6). These transect lines were applied as guide for the pedestrian survey which focused around potentially sensitive areas identified during the aerial survey. Walking along the transect system with a Garmin E-trex Legend GPS, objects and structures of archaeological / heritage value were recorded and photographed with a Canon 450D Digital camera. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was given to disturbances, both man-made such as roads and clearings, as well as those made by natural agents such as burrowing animals and erosion.

4.2 Limitations

4.2.1 Access

The Delfsand property is fenced and access restrictions apply. However, access to and on the survey site is not restricted or controlled and a network of smaller dirt roads connect areas within the property. No access constraints were encountered to, and on the site during the site survey.

4.2.2 Visibility

The surrounding vegetation at the study area is mostly comprised out of mixed grasslands and wetland vegetation. The general visibility at the time of the survey (March 2011) was moderate in the grassland areas (see Figure 7), and moderate to low in the densely overgrown wetland vegetation (see Figure 8). In single cases during the survey sub-surface inspection was possible, particularly in excavation trenches and erosion gullies. Where applied, this revealed no archaeological deposits (see Figure 9).



Figure 7: Looking north across the study area, indicating vegetation in the general landscape.



Figure 8: View of study area, looking west. The wetland covering most of the area is clearly visible in the foreground.



Figure 9: Sub-surface deposits exposed by excavation and mining activities.

4.2.3 Constraints

During the survey at Delfsand, the most pertinent constraint proved to be the vegetation, specifically in the wetland and deep marsh areas where pedestrian access was difficult. However, no major constraints were encountered during the remainder of the survey. Maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the survey results from the study do not necessarily represent *all* the heritage resources present on the property. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations. Therefore, any additional heritage resources located during consequent development phases are to be reported to the Heritage Resources Authority or an archaeological specialist.

5 RESULTS: ARCHAEOLOGICAL SURVEY

5.1 Palaeontology

No paleontological occurrences were observed in the survey area.

5.2 The Stone Age

No Stone Age occurrences were observed in the survey area.

5.3 The Iron Age (Farmer Period)

No Iron Age (Farmer Period) occurrences were observed in the survey area.

5.4 Historical / Colonial Period and recent times

The remains of a Historical Period railway culvert occur on the south-eastern periphery of the survey area at **S25°44'10.67" E28°28'11.67"** (see Figure 14). The culvert has in recent years been modified to act as a retaining dam wall for the wetland and diversion structure for the drainage line which passes through the property (see Figure 11). The structure carried the historical NZASM Pretoria – Delagoa Bay railway line across the wetland at Pienaarspoort towards the Van der Merwe Station (Rayton) at the end of the 19th century. It was probably built by A.L. Lawley or C.M. Fall somewhere between August 1890 and January 1893 when the Pretoria section of the NZASM railway line was constructed (see Section 6.2.6). The path followed by the railway route through the Pienaarspoort area is still clearly visible in the landscape (see Figure 12). The structural integrity of sandstone structure, consisting of a single arch bridge had been severely compromised where sections of the structure has been demolished and altered in order to construct the retaining dam wall (see Figure 11).



Figure 10: Position of the historical stone culvert on the southern extremity of the survey area.



Figure 11: Partially intact historical sandstone culvert structure which currently forms part of a retaining dam wall.



Figure 12: Vegetation disturbance where the historical NSAZM Railway approached the Van Der Merwe railway halt.

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Another small sandstone culvert occurs on the historical NZASM railway route approximately 350m north-east of the larger structure at Delfsand, at **S25°44'2.37" E28°28'18.83"**. Even though the well preserved structure, also dating to the early 1890's, is situated well outside the survey area it forms part of the larger historical railway feature and as such it is of equal historical significance where its conservation priority is equal to that of the culvert in the study area.



Figure 13: Well preserved stone culvert east of Delfsand Property.

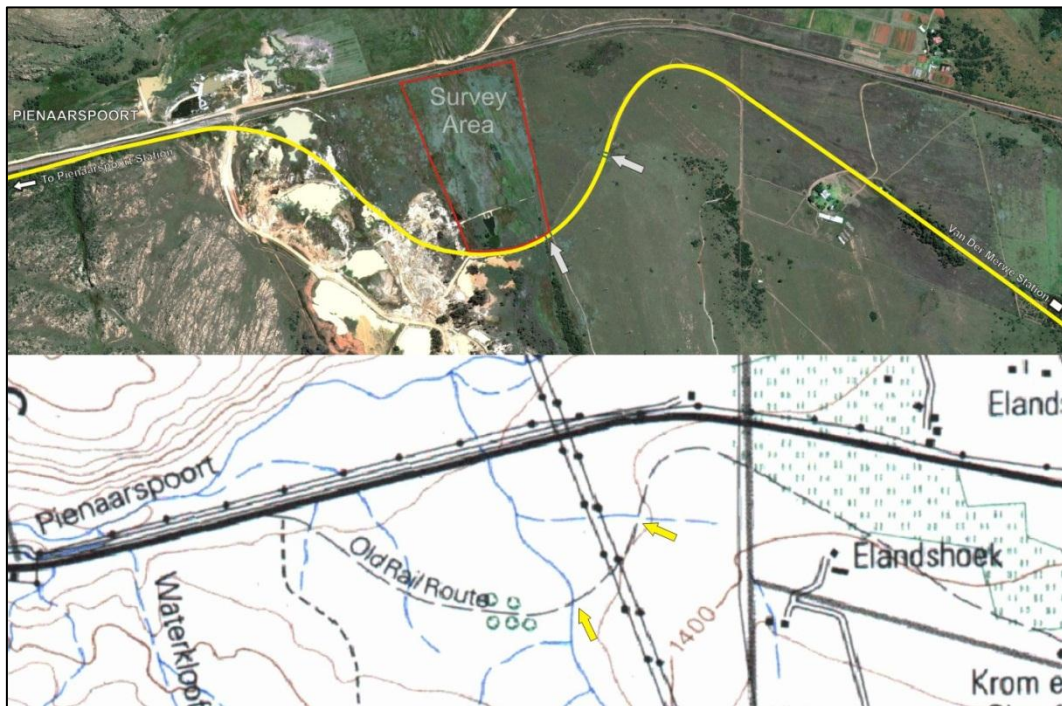


Figure 14: Route of the historical NZASM Railway line through Pienaarspoort and the survey area. The stone culverts referred to in the text are indicated by the arrows.

5.5 Graves

No graves / burial places were noted in the survey area.

6 ARCHAEO-HISTORICAL CONTEXT

6.1 The archaeology of Southern Africa

Archaeology in southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table gives a concise outline of the chronological sequence of periods in Southern African history:

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens sapiens</i> including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homestead, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

Figure 15: Chronological table of major time periods in southern African archaeology.

6.1.1 The Stone Ages

- The Earlier Stone Age (ESA)

Earlier Stone Age deposits typically occur on the flood-plains of perennial rivers and may date to between 2 million and 250 000 years ago. These ESA open sites sometimes contain stone tool scatters and manufacturing debris ranging from pebble tool choppers to core tools such as handaxes and cleavers. These stone tools were made by the earliest hominins. These groups seldom actively hunted and relied heavily on the opportunistic scavenging of meat from carnivore kill sites.

- The Middle Stone Age (MSA)

The majority of Middle Stone Age (MSA) sites occur on flood plains and sometimes in caves and rock shelters. Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in

hafting, seldom remain preserved in the archaeological record. Limited drive-hunting activities are also associated with the MSA.

- **The Later Stone Age (LSA)**

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

6.1.2 The Iron Age (Farmer Period)

- **Early Iron Age (Early Farming Communities)**

The Early Iron Age (also Early Farmer Period) marks the movement of Bantu speaking farming communities into South Africa at around 200 A.D. These groups were agro-pastoralists that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Artefact evidence from Early Farmer Period sites is mostly found in the form of ceramic assemblages and the origins and archaeological identities of this period are largely based upon ceramic typologies and sequences, where diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. Early Farmer Period ceramic traditions are classified by some scholars into different “streams” or trends in pot types and decoration that, over time emerged in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). More specifically, in the northern regions of South Africa at least three settlement phases have been distinguished for prehistoric Bantu-speaking agro-pastoralists. The first phase of the Early Iron Age, known as Happy Rest (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of Diamant is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the Eiland tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Northern Province, Gauteng and Mpumalanga. This phase has been dated to about AD 900 - AD 1200. Early Farmer Period ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. The Early Iron Age continued up to the end of the first millennium AD.

- **Middle Iron Age / K2 Mapungubwe Period (early Later Farming Communities)**

The onset of the middle Iron Age dates back to ±900 AD, a period more commonly known as the Mapungubwe / K2 phase. These names refer to the well-known archaeological sites that are today the pinnacle of South Africa’s Iron Age heritage. The inhabitants of K2 and Mapungubwe, situated on the banks of the Limpopo, were agriculturalists and pastoralists and were engaged in extensive trade activities with local and foreign traders. Although the identity of this Bantu-speaking group remains a point of contestation, the Mapungubwe people were the first state-organized society southern Africa has known. A considerable amount of golden objects, ivory, beads (glass and gold), trade goods and clay figurines as well as large amounts of potsherds were found at these sites and also appear in sites dating back to this phase of the Iron Age. Ceramics of this tradition take the form of beakers with upright sides and decorations around the base (K2) and shallow-shouldered bowls with decorations as well as globular pots with long necks (Mapungubwe). The site of Mapungubwe was deserted at around 1250 AD and this also marks the relative conclusion of this phase of the Iron Age.

- **Later Iron Age (Later Farming Communities)**

The late Iron Age of southern Africa marks the grouping of Bantu speaking groups into different cultural units. It also signals one of the most influential events of the second millennium AD in southern Africa, the difaqane. The

difaqane (also known as “the scattering”) brought about a dramatic and sudden ending to centuries of stable society in southern Africa. Reasons for this change was essentially the first penetration of the southern African interior by Portuguese traders, military conquests by various Bantu speaking groups primarily the ambitious Zulu King Shaka and the beginning of industrial developments in South Africa. Different cultural groups were scattered over large areas of the interior. These groups conveyed with them their customs that in the archaeological record manifests in ceramics, beads and other artefacts. This means that distinct pottery typologies can be found in the different late Iron Age group of South Africa.

6.1.3 Historical and Colonial Times and Recent History:

The Historical period in southern Africa encompass the course of Europe's discovery of South Africa and the spreading of European settlements along the East Coast and subsequently into the interior. In addition, the formation stages of this period are marked by the large scale movements of various Bantu-speaking groups in the interior of South Africa, which profoundly influenced the course of European settlement. Finally, the final retreat of the San and Khoekhoen groups into their present-day living areas also occurred in the Historical period in southern Africa.

6.2 Pienaarspoort: Specific Themes

The cultural landscape of the eastern Gauteng area encompasses a period of time that spans millions of years, covering human cultural development from the Stone Ages up to recent times. It depicts the interaction between the first humans and their adaptation and utilization to the environment, the migration of people, technological advances, warfare and contact and conflict. Contained in its archaeology are traces of conquests by Bantu-speakers, Europeans and British imperialism encompassing the struggle for land, resources and political power.

6.2.1 Early History: Stone Age

The Highveld areas of Gauteng were inhabited by humans since the Earlier Stone Age (ESA) times and stone tools dating to this period, typically found in the vicinity of watercourses, are abundantly scattered in the landscape. A significant ESA site has been documented on the farm Kaalfontein (366JR) near the Willem Prinsloo Agricultural Museum where an Earlier Stone Age habitation site occurs about 1m sub-surface. The site yielded some of the oldest and largest Stone Age implements found in South Africa. The Middle Stone Age (MSA) marked the occupation of formerly unoccupied areas on the Highveld near water sources and tools belonging to this period mostly occur in the open or in erosion dongas. Later Stone Age (LSA) people displayed advanced technologies and therefore occupied larger and more diverse environments. Most LSA sites are found in association with rock shelters and caves with material found across the Magaliesberg, to the north and east of Mamelodi and scattered throughout Pretoria's surroundings.

6.2.2 Early History: Iron Age

Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes and other resources. Remains of Early Iron Age occupation on the Highveld is scarce, with isolated sites occurring in the Magaliesberg, e.g. at Broederstroom. Large scale occupation of the larger Gauteng area by Bantu speaking farming communities occurred only in the second millennium AD. The 16th century was marked by a warmer and wetter climate, providing conditions favourable for Later Iron Age (LIA) farmer occupation in areas in the Witwatersrand, the Free State and the Mpumalanga escarpment. This, in turn resulted in increased food production with expanding populations on the central Highveld by the 19th century. Due to ever expanding territories and resulting conflict situations these Later Iron Age farmers preferred protective mountain slopes close to areas fit for cattle grazing. A number of Later Iron Age stone-walled

archaeological sites, conventionally associated with Tswana and Ndebele speakers occur, in amongst other areas, across the Pienaars River around Wallmannsthal, Roodeplaat dam and southwards across the N4 Highway. Large concentration of Later Iron Age sites in the larger Pienaarspoort area have been documented on the farms Downbern 494JR, Elandshoek 337JR, Leeuwkloof 258 JR, the Windybrow Game Farm and Buffelskloof 281JR.

6.2.3 Early History & Ethno-history

It should be noted that terms such as “Nguni”, “Sotho”, “Venda” and others refer to broad and comprehensive language groups that demonstrated similarities in their origins and language. It does not imply that these Nguni / Sotho groups were homogeneous and static; they rather moved through the landscape and influenced each other in continuous processes marked by cultural fluidity.

Whereas it is impossible to attribute any living group of people to Early Iron Age communities, ethnographic evidence enables us to identify some of the groups of people that entered the region in Pre-colonial times and are currently settled in the larger region. Ethnographers generally divide major Bantu-speaking groups of southern Africa into two broad linguistic groups, the Nguni and the Sotho with smaller subdivisions under these two main groups. Nguni groups were found in the eastern parts of the interior of South Africa and can be divided into the northern Nguni and the southern Nguni. The various Zulu and Swazi groups were generally associated with the northern Nguni whereas the southern Nguni comprised the Xhosa, Mpondo, Thembu and Mpondomise groups. The same geographically based divisions exist among Sotho groups where, under the western Sotho (or Tswana), groups such as the Rolong, Hurutshe, Kwena, Fokeng and Kgatla are found. The northern Sotho included the Pedi and amalgamation of smaller groups united to become the southern Sotho group or the Basutho. Other smaller language groups such as the Venda, Lemba and Tshonga Shangana transpired outside these major entities but as time progressed they were, however to lesser or greater extent influenced and absorbed by neighbouring groups. The Highveld areas of Gauteng and Mpumalanga were occupied during the last 500 years mainly by Ndebele and Pedi (Kgatla) groups. These Ndebele groups originated from the Hlubi, a small split group that moved to the north-eastern parts of the Transvaal where they became known as the Transvaal Ndebele (not to be confused with the Ndebele of Mzilikazi). Ndebele groups settled in areas surrounding present-day Pretoria, at Kwa Maza near present-day Stoffberg, at Polokwane and Modimole and across large parts of Mpumalanga. The Kgatla, a Pedi group was established at the end of the 15th century by chief Mokgatla, who broke away from the Hurutshe group to settle in the Witwatersrand area. The Kgatla resided in an expansive area that included present-day Pretoria, the surroundings of the Magaliesberg and areas around present-day Brits, Rustenburg, Modimolle and Warmbaths as well as the Pilansberg area. Isolated Kgatla communities also settled in the surroundings of Lydenburg, Middelburg, Bronkhorstspuit and the Soutpansberg.

6.2.4 Later History: The Colonial Period

For centuries the area east of Pretoria proved to be ideal farmland because of its water richness and the first white settlers trekked into this area during the early part of the 19th century. Specifically Lucas Bronkhorst and the Erasmus brothers occupied stretches of land surrounding the area that was later to become Pretoria. The first farms in the areas were registered at around 1850 and from the onset farmers practiced mixed farming. Most farmers in the region had at least two farms: a Highveld (summer) and a Bushveld (winter) farm. The farmers would move their cattle and other animals between winter and summer grazing; a practise that later manifested in place names in the area such as Rust de Winter and Winterfelt. The Berlin Mission Society established a mission station at Wallmannsthal in 1869 and the first missionary to server in this area was Mr Grünberger. The mission station became an important meeting place for displaced Tswana and Ndebele groups.

6.2.5 Later History: The South African War

Possibly the most prominent colonial remnants on the Highveld and in Mpumalanga can be attributed to the South African War or the Anglo-Boer War (1899-1902). The various battles and skirmishes resulting from this influential conflict left a legacy of heritage sites scattered across the Highveld where fortifications, war cemeteries and battlefields still remain. Of note is the Battle of Donkerhoek (also the Battle of Diamond Hill) where the last conventional battle of the Anglo-Boer War took place.

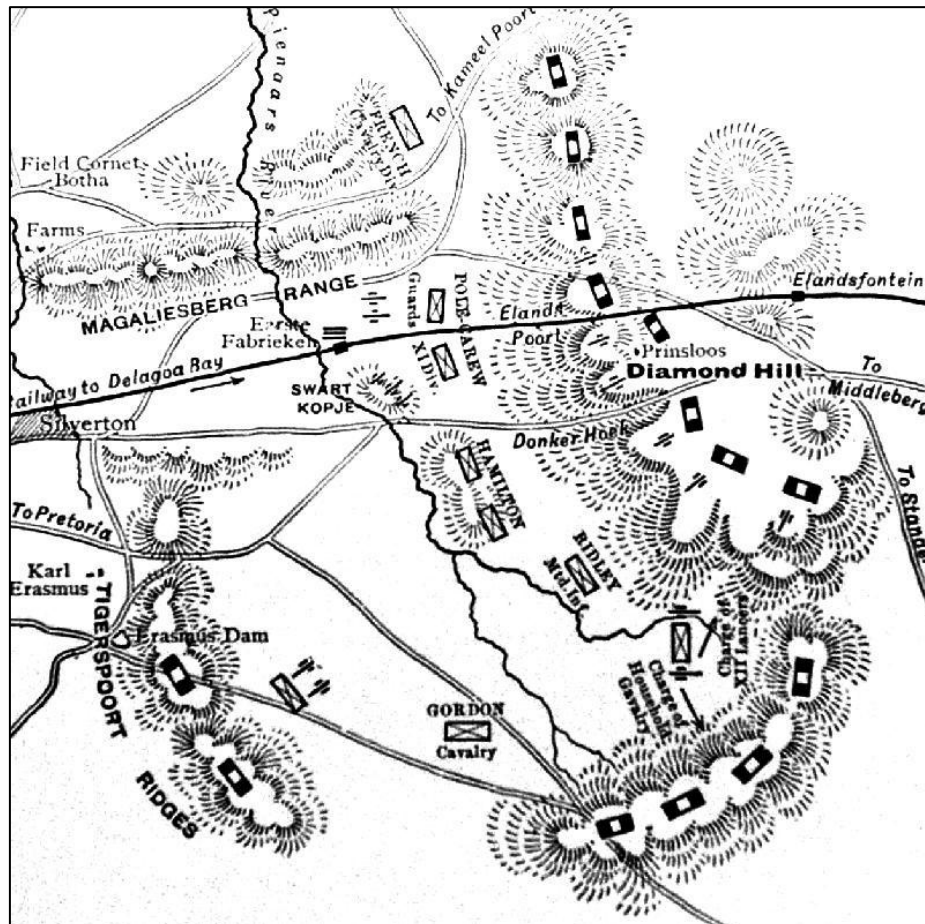


Figure 16: Historical map indicating Boer and English military positions and fortifications during the Battle of Donkerhoek (after Duxbury 1880).

After their defeats in Natal and the Southern Free State during the first phase of the South Africa War, the Boers slowly adopted a new strategy whereby mobile mounted commandos would be used to wage war over large distances. Lord Roberts was under the impression that if Pretoria fell, the Republican armies would lay down arms. He therefore pressed onwards from Johannesburg. The well-known boer general, Genl. Louis Botha had decided not to defend the city and ordered the retreat of his commandos along the Delagoa Bay (Maputo) railway line. On the 5th of June 1900 Roberts entered Pretoria unhindered and presumed that the war would be over. The Republican forces were however far from surrendering and Roberts had to continue the war by capturing the rest of Transvaal. The Boer forces had retreated from Pretoria and fortifications were erected all along the Magaliesberg mountain range (see Figure 15). On 11 June the Battle of Donkerhoek or Diamond Hill ensued sixteen miles east of Pretoria at a position to which Genl. Botha had retreated in order to defend the Delagoa Bay railway line as well as the approach to the remaining Boer stronghold on the east. He also planned a counter attack on Pretoria and, stationed at the railway line in Pienaarspoort, he commanded the Donkerhoek and Diamond Hill ridges. A fortification was erected at the Van der Merwe railway halt east of the Pienaarspoort in

defence of the railway line.



Figure 17: Block house fortification erected at Van der Merwe railway hart, east of Pienaarspoort.

The battle, involving 14 000 English troops and 4000 Boer fighters, lasted two days and three Boer fighters and 19 English troops lost their lives in the skirmish that was eventually won by the British Forces. Donkerhoek and Diamond Hill was seen as a turning point in the South African War, as all hope of recapturing Pretoria was lost. Later, concentration camps were erected for black farm workers east of Pienaarspoort at the Van der Merwe railway halt on the farm Elandshoek (337JR) as well as at Elands River on the farm Kaalfontein.

6.2.6 Later History: The NZASM Railroad

The Nederlandsche Zuid-Afrikaansche Spoorweg Maatschappij (NZASM) was established in June 1887 and officially received a concession from ZAR President Paul Kruger to construct a railway line that would connect Pretoria to Delagoa Bay (Maputo). Construction material for tracks was imported from Germany and Indonesia and other building materials were sourced locally. Steam engines were imported from Germany and the Netherlands. Construction on the eastern section of the line commenced at the border between Transvaal and Mozambique in 1890 and the western portion of the railroad were constructed in 1893. In June 1894 the railheads met near Brugspruit (Clewer) with the ceremonial tightening of the last screw by Pres. Kruger near Wilge River Station in November 1894. The first section of the line from Delagoa Bay was opened shortly thereafter and the route from Pretoria to Delagoa Bay was fully operational by 1895, realising President Paul Kruger's vision to create a free passage for the land-locked ZAR to the sea, without having to pass through British territory. The entire operation utilized steam engines and numerous railway halts and stations were constructed along the line to supply water and coal for the 3 day journey from Pretoria to Delagoa Bay. With the outbreak of the Anglo-Boer war in 1899 the NZASM was mobilised to assist the ZAR's war efforts. Troops, artillery, provisions, ammunition and horses were transported by rail. It also transported wounded soldiers in so-called hospital trains. It even became the temporary ZAR Government offices (government on wheels). During the war, tracks, bridges, wagons, locomotives and signals were often demolished to slow down the British invasion of the Boer republics. In order to protect the line, blockhouses were built at regular intervals of about a mile and a half along the extent of the line from Pretoria. This the so-called 'Blockhouse System' introduced by Lord Kitchener in January 1901 to fence off the country, was a vital element in the successful defence of the Pretoria - Delagoa Bay railway during the last fifteen months of the war. After the siege of Pretoria in 1900, the British Forces seized all documents and transferred NZASM operations to the Imperial Military Railways. The current railway from Pretoria to Mpumalanga generally follows the route of the historical NZASM route but sections of the old railroad fell into dereliction after the construction of the new line in the first part of the 20th century. Remains of the old railway, such as those on the farm Pienaarspoort, can still be seen across Gauteng, Mpumalanga and Mozambique.

Bridges and Culverts

A series of railway bridges and culverts were constructed around Pretoria and across the NZASM route towards Delagoa Bay in the 1890's. Some of these structures include:

- Apies River Bridge

The remnants of Pretoria's best-known old railway bridge are situated to the west of the Maria van Riebeeck Drive next to the present-day concrete railway bridge. The bridge, completed by the end of 1893, consisted of two sandstone abutments, supporting a single span plate-girder structure 15 m in length.

- Moreleta Spruit Bridge

The Moreleta Spruit Bridge was situated immediately north of the concrete railway bridge spanning Moreleta Spruit, east of Silverton station. The bridge, constricted by C.M. Fall between June 1893 and May 1894 was 20m long. It had two sandstone abutments and a free-standing central sandstone pillar, supporting between them two plate-girder spans of 10 m each.



Figure 18: Remaining sandstone abutments of the Moreleta Spruit bridge (after De Jongh 1988).

- Pienaars River Bridge

Built by C .M. Fall between June 1893 and May 1894, the Pienaars River bridge was situated to the west of the "Eerste Fabrieken" station, immediately to the south of the concrete railway bridge. This bridge was very similar to the Moreleta Spruit bridge, except that it is longer having two free standing pillars instead of one. The bridge was made up of two plate-girders of 10 m each as well as a 20m central girder.

- Culverts

Because of their relatively small size, the NZASM culverts in and around Pretoria are the least-known historical railway structures in the railway history of the area. However, their significance should not be underestimated as many are still in use, supporting the tracks of present-day railroads. A number of culverts, built by A.L. Lawley and C.M. Fall between August 1890 and January 1893, still remain in the Pretoria region. These include:

- A 14 m long arched sandstone culvert carrying the railway across the rivulet dividing Salvokop and Skanskop in Pretoria.
- A large arched sandstone culvert, situated in a detour or loop in the old railway line, opposite the entrance to the Fountains Valley (see Figure 18).
- A small sandstone culvert of the rectangular type, situated above the present railway line to the north of the

Fountains Station.

- The partially intact single arch sandstone culvert on the farm Pienaarspoort east of Pretoria (see Figure 18).



Figure 19: A NZASM culvert at Pienaarspoort (left) and another in Pretoria at the Fountains Valley (right) (after De Jongh 1988).

7 STATEMENT OF SIGNIFICANCE

7.1 Heritage resources management and conservation

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable*. Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

7.2 Categories of significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while

other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites.

In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

- *Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

- *Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

- *Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

- *Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low.


The significance of archaeological sites is generally ranked into the following categories:

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, augering), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

A fundamental aspect in assessing the significance and protection status of a heritage resource is often whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed. These are generally sites graded as of low or medium significance.

7.3 Evaluation of Results

7.3.1 Site 1: Historical Period Railway Culvert

1. SITE DESCRIPTION :							
1.1 General Site Description							
							
Historical Period Railway Culvert Structure							
1.2 Site features / artefacts / Other							
Site Location							
Province / District	Gauteng			Map Number	2528CB		
Farm Name	Pienaarspoort 339JR			Co-ordinates	S25°44'10.67"	E28°28'11.67"	
Site Type							
Surface sites	X			Caves and rock shelters			
Larger open-air sites				Sealed sites (deposits)			
River deposits				Other			
Site Function							
Living / habitation				Kill			
Ceremonial				Burial			
Trading / Barter				Art			
Quarry / Mining / Smelting				Other	X – Architectural Structure		
Site Placement							
Valley floor		Hill top		Vlei/swamp	X	River Mouth	
Dam	X	River Bank		Slope		Plains	
Other / Comments							
Vegetation							
Riverine forest	X	Bushveld		Savannah		Mountain forest	
Thornveld		Grassland	X	Cultivated	X	Other	

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Age Classification							
Stone Age		Early Iron Age		Middle Iron Age		Later Iron Age	
Historical	X	Other					
Material Culture							
Midden		House Remains		Stone Walling		Stone Structures	X
Granary		Grinding Stone (L)		Grinding Stone (U)		Granary Stand	
Metal		Ceramics (Pottery)		Ceramics (Porcelain)		Stone (non-lithic)	
Metal slag		Tuyere		Fauna		Bead (Glass)	
Bead (OES / Shell)		Glass		Lithics		Smelting Residues	
Other:				Other:			
1.3 Site Condition							
<p>The condition of the culvert, consisting of a single arch bridge structure is fair. Its structural integrity has been compromised where the structure has been modified , and sections demolished in order to construct a retaining dam wall and a diversion for the draining system in the area.</p>							
2. SITE EVALUATION							
2.1 HERITAGE VALUE (NHRA, Section 2 [3])				High	Medium	Low	
It has importance to the community or pattern of South Africa's history or pre-colonial history.					X		
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.					X		
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.					X		
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.					X		
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.					X		
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.				X			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).					X		
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.				X			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.					X		
It has significance relating to the history of slavery in South Africa.					X		
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.				X			
FIELD REGISTER RATING							
National/Grade 1 [should be registered, retained]							
Provincial/Grade 2 [should be registered, retained]						X	
Local/Grade 3A [should be registered, mitigation not advised]							
Local/Grade 3B [High significance; mitigation, partly retained]							
Generally Protected A [High/Medium significance, mitigation]							
Generally protected B [Medium significance, to be recorded]							
Generally Protected C [Low significance, no further action]							
C. SPHERE OF SIGNIFICANCE				High	Medium	Low	
International							
National							
Provincial				X			
Local							

Specific community			
E. GENERAL STATEMENT OF SITE SIGNIFICANCE			
Low			
Medium			
High			X
F. RATING OF POTENTIAL IMPACT OF DEVELOPMENT			
None			
Peripheral			
Destruction			X
Uncertain			
G. RECOMMENDED MITIGATION			
- Phase 3 Archaeological Site Management and Conservation Plan			
H. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS			
- National Heritage Resources Act (Act no. 25 of 1999)			

7.4 Discussion

The larger Highveld area encompasses a rich and varied historical landscape that spans across the Stone and Iron Ages into the Colonial period and present-day. It is therefore imperative that cognisance be taken of archaeological material associated with various histories contained in the landscape in order to reduce the possible destruction of heritage remains. Considering the presence of Stone Age and Iron Age sites in the general surroundings of the Magaliesberg, the occurrence of further archaeological remains associated with these periods should be anticipated. Specifically with regards to Iron Age sites, these remains could include:

- Decorated and undecorated potsherds.
- Iron objects such as spear heads, hoes and bangles.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Elaborate stone walling and site demarcation by means of stone structures, usually round and irregular.
- Copper, iron and gold objects.
- Animal bones and faunal remains.
- Circular stone foundation structures for houses.
- Smaller stone structures such as fireplaces or granary stands.
- Upper and lower grindstones.
- House floors and rubble from hut wall structures.

In addition, historical period remains might occur in subsurface deposits since the survey area occurs directly inside the area where the Anglo Boer War “Battle of Donkerhoek” was concluded, and on the historical NZASM railway route. The possible presence of historical remains associated with these histories should be carefully observed. These remains could include:

- Decorated and undecorated potsherds.
- Glass fragments.
- European porcelain.
- Tin cans.
- Bullet shells.
- Metal objects.
- War graves and burials.

- Stone bridges, culverts and related structures.

Should any objects or material of archaeological / historical nature be encountered, all construction activities should be suspended and the archaeological specialist notified immediately.

8 RECOMMENDATIONS

8.1 General Recommendations

The author of this report proposes the following recommendations, based on findings contained in this Phase 1 AIA Report:

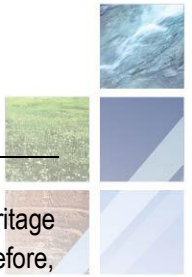
- As no Stone Age or Iron Age (Farmer Period) remains were observed at areas demarcated for development at Delfsand, no immediate further investigation of these surface areas, excluding the historical route of the NZASM Railway, is recommended prior to further developments in the area.
- As significant Stone Age, Iron Age and Historical sites, such as the 19th century Boer War site of the Battle of Donkerhoek, are present in the landscape, a careful watching brief monitoring process is recommended for all stages of development. Should any subsurface paleontological / archaeological material be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately.
- The site of the NZASM railway culvert cannot be mitigated due to its intrinsic heritage value. The structure should be adequately stabilised and managed in terms of standard archaeological site management procedures. It is recommended that a basic Phase 3 Archaeological Site Management Plan be implemented in a process separate from this Phase 1 AIA (see following section).

8.2 Delfsand Archaeology Management

Archaeological site management involves the control of elements that make up the physical and social environment of a site and that have an effect on it. These elements often include the site's physical condition, land use, human visitors, interpretation and monitoring. Site management procedures may be aimed at preservation or, if necessary, at minimising damage or destruction where good management principles aim to preserve the values of the site and retain its significance. It is generally recommended that conservation management plans be developed for all archaeological sites that are open to the public, regardless of their protection status. Here, management involves all measures to protect and preserve the values that make a place culturally significant. Similarly, the proximity of the NZASM railway culvert structure to areas demarcated for mining at Delfsand provides a valuable opportunity for the heritage of the area to be developed in terms of such heritage conservation and management strategies. It is therefore strongly recommended that a conservation management plan for this historical site be developed in a process separate from the initial archaeological impact assessment, as endorsed by the provincial and national heritage resources authority and the National Heritage Resources Act and/or the National Environmental Management Act.

9 GENERAL COMMENTS AND CONDITIONS

This Phase 1 AIA report serves to confirm that a historical-period railway culvert, dating to the last part of the 19th century, was documented at Delfsand. Even though the larger area is rich in archaeological sites, no other sites of paleontological, archaeological and historical importance were recorded in the area demarcated for mining at Delfsand. Consequent evaluations and recommendations pertaining to these observations included in this report should be adhered to in close consultation with the South African Heritage Resources Agency (SAHRA). Please note that this report is a Phase 1 Archaeological Impact Assessment only and does not include or exempt possible future required heritage impact assessments or mitigation projects.



It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

It must also be clear that Heritage Impact Assessment Reports (HIA's) and Archaeological Specialist Reports (AIA's) will be assessed by the relevant heritage resources authority (SAHRA). The final decision rests with the heritage resources authority (SAHRA), which should give a permit or a formal letter of permission for the destruction of any cultural sites.

With reference to the potential impacts that may occur as a result of the operational activities of the proposed development it should be noted that such impacts are considered to be of a similar nature to those related to the construction phase. However certain aspects with regard to the intensity of the impact are considered to change as a result of the sites proximity to the proposed developments infrastructure.

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