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## **AGES LIMPOPO: PROPOSED NIGEL DIESEL DEPOT, EKURHULENI METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE**

**Archaeological Impact Assessment**



**EOH**

Prepared for: **AGES Limpopo**

Prepared by: **Exigo Sustainability**

## **ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) OF AREAS DEMARCTED FOR THE PROPOSED NIGEL DIESEL DEPOT ON PORTION 36 OF THE FARM VARKENSFONTEIN 169IR, EKURHULENI METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE**

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**DECLARATION**

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I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Nigel Diesel Depot Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the 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), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA, AMAFA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this declaration are true and correct.



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Signature of specialist

**Company:** Exigo Sustainability

**Date:** 25 August 2015

## EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study, subject to an Environmental Impact Assessment (EIA) for the proposed Nigel Diesel Depot on Portion 36 of the farm Varkensfontein 169IR in the Ekurhuleni Metropolitan Municipality, Gauteng. The owners are planning the development of a diesel depot facility across a surface area of approximately 5ha directly south of the Nigel Gold Mine. The AIA was conducted subject to requirements as set out by the National Environmental Management Act (Act 107 of 1998), the National Heritage Resources Act (NHRA - Act 25 of 1999). The report includes background information on the area's archaeology, its representation in southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the provincial heritage agency (Gauteng-PHRA) and recommendations contained in this document will be reviewed.

A number of archaeological and historical studies have been conducted in the southern Gauteng region and many of these studies infer a varied heritage landscape. Sites dating to the Colonial Period, primarily related to the Gold Mining industry of the past century and resulting urbanization and industrialization, occur widely in the Highveld and the Witwatersrand. Locally, the project area has been altered in totality by historical and recent development activities largely sterilising surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times. However, Colonial Period structures as well as more recent features occur in the Nigel Diesel Depot Project study area.

- A number of recent period buildings and foundation structures in the study area (**Site EXIGO-VF169-FT01, Site EXIGO-VF169-FT02, Site EXIGO-VF169-FT03, Site EXIGO-VF169-FT04, Site EXIGO-VF169-FT05**) are of low significance due to their recent temporal context. No further action is required for these structures in terms of heritage mitigation.
- Historical Period heritage structures occur in the project area. These structures (**Site EXIGO-VF169-HP01, Site EXIGO-VF169-HP02, Site EXIGO-VF169-HP03**) are of medium significance since they form part of Nigel history and specifically, they are part of the Mine historical legacy. The structures can potentially add to a better understanding of architectural, industrial and social developments at the Nigel Gold Mine. It is primarily recommended that impact on the buildings be avoided and that the buildings be retained in their current state with the implementation of a 20m conservation buffer around the structures. Alternatively, retaining the structures and restoring the buildings to their original state based on historiographical information could be considered. This measure will include the implement a heritage conservation buffer of at least 20m around the heritage resources and restoration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency. The incorporation of the structures in the layout of the diesel depot, while retraining the structural and historical integrity of the structures, could also be an option. It should be noted that re-appropriation and alteration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency. In all instances mentioned above, a heritage site management plan for the conservation of the heritage resources during construction and operational phases of the depot will be required. Should the destruction of the buildings prove inevitable they should be carefully documented (e.g. physical dimensions, building material, architectural style, general appearance, site condition) by means of a detailed investigation prior to demolition. Such an investigation should minimally include mapping and site surveying, a photographic record, a desktop and archive study,

possible sub-surface sampling and possible analysis of material culture from the site. This measure is subject to excavation and destruction permitting requirements, if and when required from the relevant Heritage Resources Authorities.

- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. Should any subsurface paleontological / archaeological / historical material and /or graves/human remains be uncovered, all activities should be suspended and the archaeological specialist should be alerted immediately.
- It should be noted that 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).

A Palaeontological Impact Assessment and / or Desktop Study should be considered for the study area and, should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should be carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.

#### Nigel Diesel Depot Project - Documented Site Locations:

Site Code	Short Description	Coordinate S E	Mitigation Action
Site EXIGO-VF169-HP01	Historical Period Structure	S26.414683° E28.460745°	<b>Preferred:</b> Retain and avoid impact / retain and restore structures / alter and incorporation structures. Compile a site management plan for the conservation of the heritage resources during construction and operational phases of the depot. Alteration / destruction permitting. <b>Alternative (of sites will be destroyed):</b> Phase 2 Site Investigation to document all physical and contextual attributes of the structures. Excavation / destruction permitting.
Site EXIGO-VF169-HP02	Historical Period Structure	S26.415040° E28.460533°	
Site EXIGO-VF169-HP03	Historical Period Structure	S26.415162° E28.460852°	
Site EXIGO-VF169-FT01	Recent Period Structure	S26.415233° E28.460061°	No further heritage action required.
Site EXIGO-VF169-FT02	Recent Period Structure	S26.415583° E28.460288°	
Site EXIGO-VF169-FT03	Recent Period Structure	S26.415459° E28.459968°	
Site EXIGO-VF169-FT04	Recent Period Structure	S26.415548° E28.460778°	
Site EXIGO-VF169-FT05	Recent Period Structure	S26.414933° E28.461251°	

*Sensitive heritage resources occur inside areas proposed for the Nigel Diesel Depot development and the mitigation and management of some of these resources are required for the duration of the development. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Nigel Diesel Depot Project on Portion 36 of the farm Varkensfontein 169IR may proceed from a culture resources management perspective, provided that mitigation measures, endorsed by the relevant Heritage Resources authority, are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction.*

It is essential that cognisance be taken of the larger archaeological and historical landscape of Nigel in order to avoid the destruction of previously undetected heritage sites. Should any previously undetected heritage resources be exposed or uncovered during construction phases of the proposed project, these should immediately be reported to Gauteng-PHRA. Since the intrinsic heritage and social value of graves and cemeteries are highly significant, these resources require special management measures. Should human remains be discovered at any stage, these should be reported to the Heritage Specialist and relevant authorities (Gauteng-PHRA, SAHRA) and development activities should be suspended until the site has been inspected by the Specialist. The Specialist will advise on further management actions and possible relocation of human remains in accordance with the Human Tissue Act (Act 65 of 1983 as amended), the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), the National Heritage Resources Act (Act no. 25 of 1999) and any local and regional provisions, laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible 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).

## NOTATIONS AND TERMS/TERMINOLOGY

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### **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 artefact 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.

### **<sup>14</sup>C or radiocarbon dating:**

The <sup>14</sup>C method determines the absolute age of organic material by studying the radioactivity of carbon. It is reliable for objects not older 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 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.

### **Ecofact:**

Non artefactual 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 artefacts, in other words artefacts 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 "Great Scattering" of Bantu-speaking groups – known as the *mfecane* or *difaqane*.

**Impact:** A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**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 on archaeological sites.

**Management / Management Actions:**

Actions – including planning and design changes - that enhance benefits associated with a proposed development, or that avoid, mitigate, restore, rehabilitate or compensate for the negative impacts.

**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.

**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.

**Scoping Assessment:**

The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision making is expected to focus and to ensure that only key issues and reasonable alternatives are examined. The outcome of the scoping process is a Scoping Report that includes issues raised during the scoping process, appropriate responses and, where required, terms of reference for specialist involvement.

**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.

**Trigger:** A particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an *issue* and/or potentially significant *impact* associated with that proposed development that may require specialist input. Legal requirements of existing and future legislation may also trigger the need for specialist involvement.

**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
CRM	Culture Resources Management
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
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
KZNHA	KwaZulu-Natal Heritage Act of 2008
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)
MRA	Mining Right Area
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authorities
SAFA	Society for Africanist Archaeologists
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
<b>1 BACKGROUND.....</b>	<b>15</b>
1.1 SCOPE AND MOTIVATION .....	15
1.2 PROJECT DIRECTION .....	15
1.3 PROJECT BRIEF .....	15
1.4 TERMS OF REFERENCE .....	17
1.5 CRM: LEGISLATION, CONSERVATION AND HERITAGE MANAGEMENT.....	17
1.5.1 <i>Legislation regarding archaeology and heritage sites</i> .....	17
1.5.2 <i>Background to HIA and AIA Studies</i> .....	19
1.6 ASSESSING THE SIGNIFICANCE OF HERITAGE RESOURCES.....	20
- CATEGORIES OF SIGNIFICANCE .....	21
<b>2 REGIONAL CONTEXT.....</b>	<b>23</b>
2.1 AREA LOCATION .....	23
2.2 AREA DESCRIPTION: RECEIVING ENVIRONMENT .....	23
2.3 SITE DESCRIPTION .....	23
<b>3 METHOD OF ENQUIRY .....</b>	<b>26</b>
3.1 SOURCES OF INFORMATION .....	26
3.1.1 <i>Desktop Study</i> .....	26
3.1.2 <i>Aerial Representations and Survey</i> .....	27
3.1.3 <i>Field Survey</i> .....	27
3.2 LIMITATIONS.....	28
3.2.1 <i>Access</i> .....	28
3.2.2 <i>Visibility</i> .....	28
3.2.3 <i>Limitations and Constraints Summary</i> .....	31
3.3 IMPACT ASSESSMENT .....	31
<b>4 ARCHAEO-HISTORICAL CONTEXT .....</b>	<b>31</b>
4.1 THE ARCHAEOLOGY OF SOUTHERN AFRICA.....	31
4.1.1 <i>The Stone Ages</i> .....	32
4.1.2 <i>The Iron Age Farmer Period</i> .....	33
4.1.3 <i>Pastoralism and the last 2000 years</i> .....	35
4.1.4 <i>Historical and Colonial Times and Recent History</i> .....	35
4.2 THE SOUTHERN HIGHVELD: SPECIFIC THEMES. ....	35
4.2.1 <i>Early History and the Stone Ages</i> .....	35
4.2.2 <i>Iron Age / Farmer Period</i> .....	36
4.2.3 <i>Later History: Nigel and the Nigel Gold Mine</i> .....	37
4.2.4 <i>Burial Sites / Human Remains</i> .....	38
<b>5 RESULTS: ARCHAEOLOGICAL SURVEY .....</b>	<b>39</b>
5.1 THE STONE AGE .....	39
5.2 THE IRON AGE FARMER PERIOD .....	39
5.3 HISTORICAL / COLONIAL PERIOD .....	39
5.4 RECENT / CONTEMPORARY PERIOD .....	43
5.5 GRAVES / HUMAN BURIALS .....	46
<b>6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING .....</b>	<b>48</b>
6.1 POTENTIAL IMPACTS AND SIGNIFICANCE RATINGS .....	48

6.1.1	<i>General assessment of impacts on resources .....</i>	<i>48</i>
6.1.2	<i>Direct impact rating .....</i>	<i>48</i>
6.1.3	<i>Discussion: Evaluation of Results and Impacts .....</i>	<i>49</i>
6.2	MANAGEMENT ACTIONS .....	50
<b>7</b>	<b>RECOMMENDATIONS.....</b>	<b>52</b>
<b>8</b>	<b>GENERAL COMMENTS AND CONDITIONS .....</b>	<b>53</b>
<b>9</b>	<b>BIBLIOGRAPHY .....</b>	<b>55</b>
<b>10</b>	<b>ADDENDUM 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE.....</b>	<b>58</b>
10.1	SITE SIGNIFICANCE MATRIX .....	58
10.2	IMPACT ASSESSMENT CRITERIA.....	58
10.3	DIRECT IMPACT ASSESSMENT CRITERIA .....	60
10.4	MANAGEMENT AND MITIGATION ACTIONS.....	61

## LIST OF FIGURES

Figure 1-1: Map indicating the location of the proposed for the Nigel Diesel Depot Project. ....	16
Figure 2-1: 1:50 00 Map representation of the location of the Nigel Diesel Depot Project Area (sheet 2628AD). ....	24
Figure 2-2: Aerial representation of the regional setting for the Nigel Diesel Depot Project area. ....	25
Figure 3-1: View of exciting structures in the project area. ....	28
Figure 3-2: View of a cleared area in the project footprint where warehouses were demolished. ....	28
Figure 3-3: View of a cleared area in the project footprint where warehouses were demolished. Note old mine dumps in the distance. ....	29
Figure 3-4: Pioneering species and natural vegetation along the east of the project area. ....	29
Figure 3-5: Surface disturbance ad a result of digging towards the east of the project area. ....	29
Figure 3-6: An existing small fuel depot in the project area. ....	30
Figure 3-7: A walled are indicating the presence of subterranean power lines to the west of the project area. ....	30
Figure 3-8: Existing buildings and dumping heaps in the project area. ....	30
Figure 4-1: Characteristic Klipriviersberg-type stone walled settlements east of Vereeniging on the Highveld (after Huffman [2007]). ....	37
Figure 4-2: Archive photo of Nigel taken at the turn of the 19 <sup>th</sup> century. ....	38
Figure 4-3: Aerial photo of the Nigel CBD dating to 1934. ....	38
Figure 5-1: Aerial views of the project area (top: 2014, bottom 1934) indicating the presence of Colonial Period structures discussed in the text. ....	40
Figure 5-2: A small Colonial Period face brick building at Site EXIGO-VF169-HP01. ....	41
Figure 5-3: A large Colonial Period warehouse building at Site EXIGO-VF169-HP02. ....	42
Figure 5-4: A warehouse building at Site EXIGO-VF169-HP03. ....	42
Figure 5-5: A large warehouse at Site EXIGO-VF169-FT01. ....	43
Figure 5-6: A small residential flat at Site EXIGO-VF169-FT02. ....	44
Figure 5-7: A small office building at Site EXIGO-VF169-FT03. ....	44
Figure 5-8: A deserted red face brick structure Site EXIGO-VF169-FT04. ....	45
Figure 5-9: A residential complex at Site EXIGO-VF169-FT04. ....	45
Figure 5-10: Aerial imagery dating to 2001 (left) and 2014 (right) indicating the earlier presence of demolished structures at Site EXIGO-VF169-FT05. ....	46
Figure 5-11: Dilapidated structures and foundations at Site EXIGO-VF169-FT05. ....	46
Figure 5-12: Aerial map indicating the location of heritage sites discussed in the text. ....	47

## **1 BACKGROUND**

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### **1.1 Scope and Motivation**

Exigo Sustainability was commissioned by AGES Limpopo for an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the proposed Nigel Diesel Depot on Portion 36 of the farm Varkensfontein 169IR in the Ekurhuleni Metropolitan Municipality, Gauteng Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; 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.

### **1.2 Project Direction**

Exigo Sustainability's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for Exigo Sustainability, Mr Neels Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA) as well as a Master's Degree candidate in archaeology at the University of Pretoria.

### **1.3 Project Brief**

A diesel depot is planned on Portion 36 of the farm Varkensfontein 169IR directly north of the town of Nigel in the Gauteng Province. A surface area of approximately 5ha has been identified as footprint for the proposed development (see Figure 1-1).



AGES Limpopo: Nigel Diesel Depot

Archaeological Impact Assessment Report

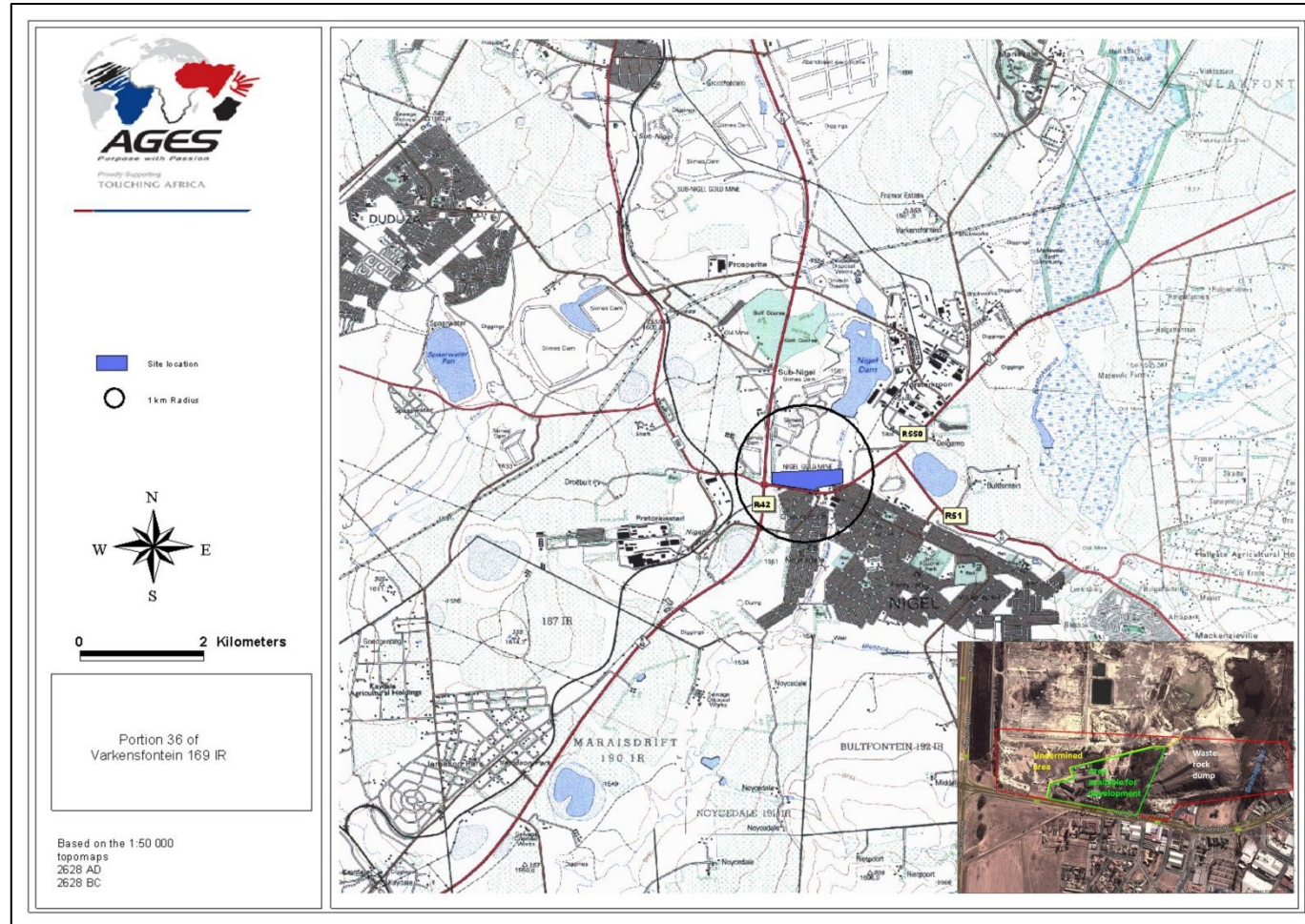


Figure 1-1: Map indicating the location of the proposed for the Nigel Diesel Depot Project.

## 1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that through the management of change, developments still conserve our heritage resources. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain development categories which may have an impact on heritage resources (Refer to Section 2.5.2).

Thus, EIAs should always include an 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)** and the **KwaZulu-Natal Heritage Act (KZNHRA - Act of 2008)**. In addition, the NHRA and the KZNHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources.

Based hereon, this project functioned according to the following **terms of reference** for heritage specialist input:

- *Provide detailed updated description of all additional archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance.*
- *Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Obtain a comment from the EC-PHRA.*

## 1.5 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.

### 1.5.1 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 at all times.

**a. 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-*

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) 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*
- (d) 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)."*

#### **b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925**

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by 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. 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.

#### **1.5.2 Background to HIA and AIA Studies**

South Africa's unique and non-renewable archaeological and palaeontological 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 (HIAs & AIAs) 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. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on 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 50m in length;*
- (c) *any development or other activity which will change the character of a site:*
  - (i) *exceeding 5 000 m<sup>2</sup> 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 m<sup>2</sup> 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 (HIAs) or Archaeological Impact Assessments (AIAs) 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, palaeontological sites and objects. Heritage resources management and conservation**

## **1.6 Assessing the Significance of Heritage Resources**

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.

#### **- 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.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of

heritage resources; i.e. formally protected and generally protected sites:

**Formally protected sites:**

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (EC-PHRA).
- Grade 3 or local heritage sites.

**Generally protected sites:**

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 70 years.
- Structures older than 60 years.

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]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

**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.**

## **2 REGIONAL CONTEXT**

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### **2.1 Area Location**

The Nigel Diesel Depot Project study area is located directly north of Nigel on Portion 36 of the farm Varkensfontein 169IR in the Ekurhuleni Metropolitan Municipality, Gauteng Province. The project area is situated directly south of the Nigel Gold Mine and it is bordered to its south by the R550 Road connecting Nigel and Springs. The study areas appear on 1:50000 map sheet 2628AD (see Figure 2-1) and coordinates for the proposed project are as follows:

**E26.415141° S28.460743°**

### **2.2 Area Description: Receiving Environment**

The development site lies within the Savanna biome which is the largest biome in Southern Africa. It is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). Even though the area has been completely urbanized, the original vegetation in the larger landscape is classified as Moist Cool Highveld Grassland. The general landscape is characterised by undulating, Highveld grassland that is drained by the Blesbokspruit. The Vaal River flows approximately 20km south of the study area. The Nigel area is situated approximately 1 500m above sea level. It has an annual summer rainfall of 650 mm per annum.

### **2.3 Site Description**

The Study Area is situated along the southern periphery of the Nigel Gold Mine along the R550 Nigel – Springs road. The proposed footprint for the diesel depot is situated in areas that have been altered and developed where a number of industrial buildings, vacated houses and ruin structures as well as existing fuel storage facilities occur. Old mine dumps emanating from historical mining at the Nigel Gold Mine occur along the eastern periphery of the study area. Here, surfaces have been altered extensively as a result of digging of trenches and refuse dumping. The Blesbokspruit flows east of the mine property draining into a large wetland system.



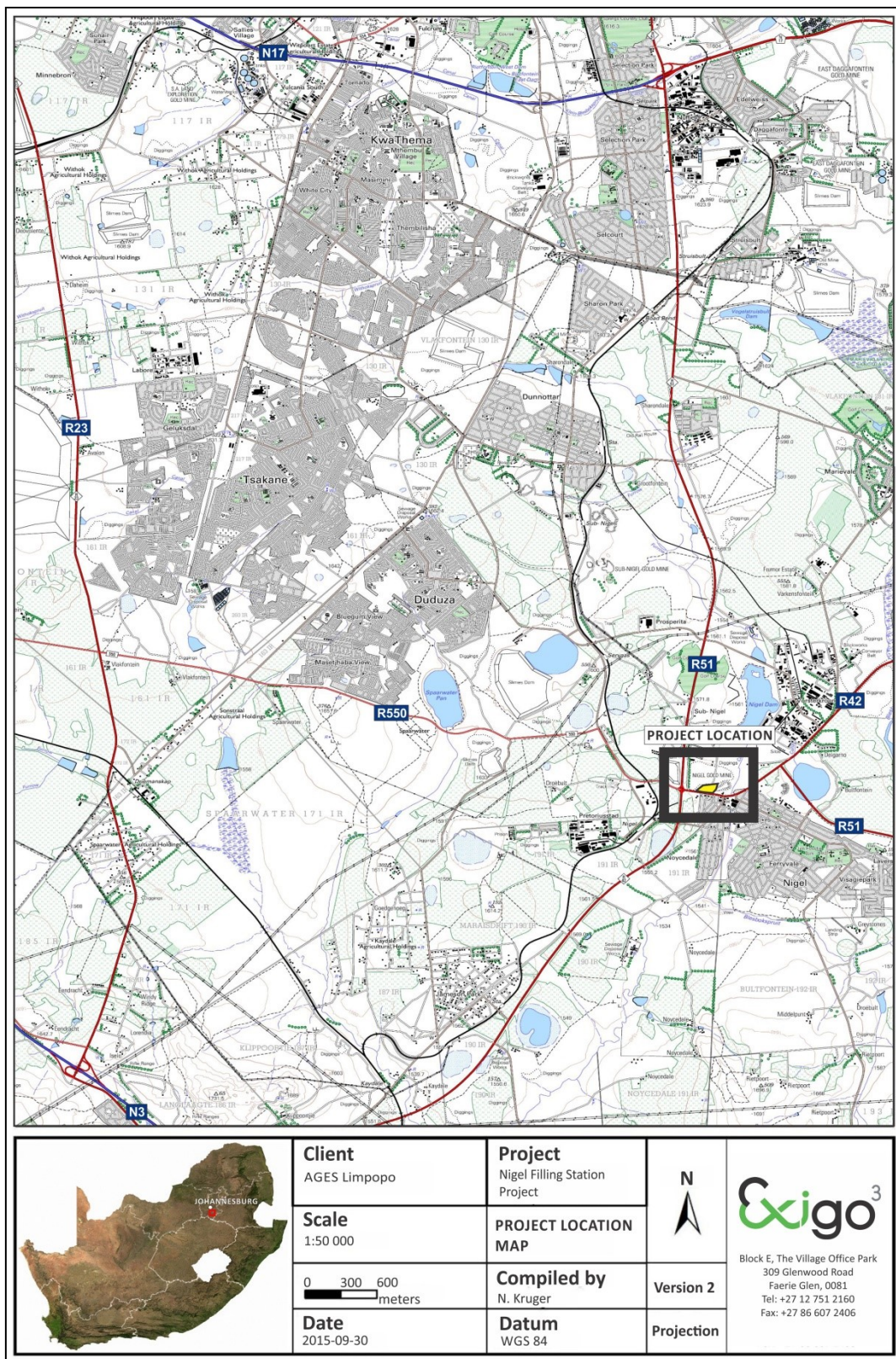


Figure 2-1: 1:50 00 Map representation of the location of the Nigel Diesel Depot Project Area (sheet 2628AD).





Figure 2-2: Aerial representation of the regional setting for the Nigel Diesel Depot Project area.

### 3 METHOD OF ENQUIRY

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#### 3.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage site recording.

##### 3.1.1 Desktop Study

The larger landscape in and around Pretoria has been well documented in terms of its archaeology and history. A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. The study focused on relevant previous studies, archaeological and archival sources, aerial photographs, historical maps and local histories, all pertaining to the Pretoria east area and the larger landscape of this section of the Gauteng Province. A number of Heritage Impact Assessments have been conducted around Nigel and these were consulted:

Tomose, N.G. 2014. A Heritage Impact Assessment Study for the Proposed Fortune Metaliks South Africa Nigel Steel Processing Plant, Pretoriusstad, Nigel, Ekurhuleni Metropolitan Municipality, Gauteng Province, South Africa.

Van Der Walt, J. 2008. Archaeological Impact Assessment: Sluice Gate Upgrade at the Marrievale Nature Reserve, Nigel, Gauteng.

Fourie, W. 2003. Van Ryn Open Cape Archaeological Survey CC: Project: Nigel Gold Mining Company Pty Ltd: Cultural Heritage Survey

Van Schalkwyk, J. & Pelser, A. 2000. A Survey of Cultural Resources on the Farm Winterhoek 314 IR Nigel District, Gauteng. Previous Studies in the Springs Area:

Van Der Walt, J. 2008. Archaeological Impact Assessment for the Chief Albert Luthuli Primary School, Springs, Gauteng Province

Van Vollenhoven, A. 2012. A Report on a Heritage Impact Assessment for the Steynol Umthombo Project near Springs in the Gauteng Province.

Van Vollenhoven, A. 2013. A Report on a Cultural Impact Assessment for a Proposed Shopping Mall Development close to Springs, Gauteng Province.

Van Vollenhoven, A. 2012. A Report on a Cultural Heritage Impact Assessment for the Proposed Return Water Dam at the New Kleinfontein Gold Mine close to Springs, Gauteng Province.

Van Der Walt, J. 2008. Archaeological Impact Assessment: Daggafontein Extension 6, Portions 107 of the Farm Daggafontein 125 IR, Springs, Gauteng Province.

Van Schalkwyk, J. 2010. Heritage Impact Assessment for the Proposed Payneville Extension 1 Development, Springs Magisterial District, Gauteng Province.

Van Vollenhoven, A. 2011. A Report on a Cultural Heritage Baseline Study and Impact Assessment for the Proposed New Kleinfontein Goldmine (Modder East Operations) close to Springs, Gauteng Province.

Kaplan., J. 2013. Recommended Exemption from having to conduct an Archaeological Impact Study: The Proposed Impala Platinum Precious Metals Refinery Expansion Project in Springs, Gauteng Province.

Pelser, A & Van Vollenhoven, A. 2008. A Report on a Basic Archaeological Assessment for Apollo Bricks on the Farm Grootvaly 124 JR near Springs, Gauteng.

Van Schalkwyk, J. & Mith, S. 1997. A Survey of Cultural Resources in the Proposed Erwat Sewer Outfall Route, North of Springs, Gauteng Province.

Gaigher S. 2014. Heritage Impact Assessment for the Proposed Ergo Road Residential Development, Springs, Ekurhuleni.

Van Der Walt, J. 2008. Archeological Impact Assessment for the Proposed Tsakane Primary School, Tsakane Extension 9, Gauteng Province.

Kusel, U. 2007. Cultural Heritage Resources Impact Assessment of the Farm Vlaklaagte 161 Tsakane Benoni Gauteng.

### **3.1.2 Aerial Representations and Survey**

Aerial photography is often employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. This method was applied to assist the foot site survey where 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 of precipitation frequently occurs over walls or embankments. By superimposing historical photographs, high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as referenced points from where further vehicular and pedestrian surveys were carried out.

From the aerial survey it is evident that surface areas subject to the Nigel Diesel Depot Project have been subjected to vast disturbances and impacts as a result of urbanisation and mining.

### **3.1.3 Field Survey**

Archaeological survey implies the systematic procedure of the identification of archaeological sites. An archaeological survey of the route alignment proposed for the Nigel Diesel Depot Project was conducted in March 2014. The process encompassed a systematic field survey in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording, the alignment identified for the sewer line was systematically surveyed on foot, GPS reference points were visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Legend GPS objects and structures of archaeological / heritage value were recorded and photographed with a Canon 450D Digital camera. Real time aerial orientation, by means of a mobile Google Earth application was also employed to investigate possible disturbed areas during the survey. 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.

### 3.2 Limitations

#### 3.2.1 Access

The Study Area is accessed directly via the R550 Nigel – Springs road. Access control is not applied to the area relevant to this assessment and no access restrictions were encountered during the site visit.

#### 3.2.2 Visibility

The surrounding vegetation in the study area is mostly comprised out of mixed grasslands and trees with and riverine bush to the extreme east. Even though large sections of the study area have been altered as a result of urbanization and mining, areas to the east of the study area is more densely overgrown by pioneering species and natural vegetation. Generally, the visibility at the time of the AIA site inspection (March 2014) was moderate to high (see Figures 3-1 to 3-8). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 3-1: View of existing structures in the project area.



Figure 3-2: View of a cleared area in the project footprint where warehouses were demolished.





Figure 3-3: View of a cleared area in the project footprint where warehouses were demolished. Note old mine dumps in the distance.



Figure 3-4: Pioneering species and natural vegetation along the east of the project area.



Figure 3-5: Surface disturbance as a result of digging towards the east of the project area.





Figure 3-6: An existing small fuel depot in the project area.



Figure 3-7: A walled area indicating the presence of subterranean power lines to the west of the project area.



Figure 3-8: Existing buildings and dumping heaps in the project area.

### 3.2.3 Limitations and Constraints Summary

The foot survey for the Nigel Diesel Depot Project AIA primarily focused around areas tentatively identified as sensitive and of high heritage probability (i.e. those noted during the aerial survey) as well as areas of high human settlement catchment. The following constraints were encountered:

- **Visibility:** Visibility proved to be a constrain in areas with denser surface cover, as well as portions where vegetation is more pristine.

Even though it might be assumed that survey findings are representative of the heritage landscape of the project area, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

### 3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by AGES Specialist are generally done using the Plomp<sup>1</sup> impact assessment matrix scale supplied by AGES. According to this matrix scale, each heritage receptor in the study area is given an impact assessment. A cumulative assessment for the proposed project is also included.

## 4 ARCHAEO-HISTORICAL CONTEXT

### 4.1 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 provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

Table 1 Chronological Periods across southern Africa

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	Holocene	Bantu-speaking groups,	Typically distinct ceramics, bead ware and

<sup>1</sup> Plomp, H., 2004



(Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD		ancestors of present-day groups	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. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

#### 4.1.1 The Stone Ages

##### - The Earlier Stone Age (ESA)

The Earlier Stone Age from between 1.5 million and 250 000 years ago refers to the earliest that *Homo sapiens sapiens* predecessors began making stone tools. The earliest stone tool industry was referred to as the Olduvai Industry originating from stone artefacts recorded at Olduvai Gorge, Tanzania. The Acheulian Industry, the predominant southern African Early Stone Age Industry, replaced the Olduvai Industry approximately 1.5 million years ago, is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. Bifaces emerged in East Africa more than 1.5 million years ago but have been reported from a wide range of areas, from South Africa to northern Europe and from India to the Iberian coast. Earlier Stone Age deposits typically occur on the flood-plains of perennial rivers. 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 groups seldom actively hunted and relied heavily on the opportunistic scavenging of meat from carnivore kill sites. The most well-known Early Stone Age site in southern Africa is Amanzi Springs, situated about 10km north-east of Uitenhage, near Port Elizabeth (Deacon 1970). In a series of spring deposits a large number of stone tools were found in situ to a depth of 3-4m. Wood and seed material preserved remarkably very well within the spring deposits, and possibly date to between 800 000 to 250 000 years old.

##### - The Middle Stone Age (MSA)

The Middle Stone Age (MSA) spans a period from 250 000-30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art and symbolism. Various stone artefact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean 2008). The large handaxes and cleavers were replaced by smaller stone artefacts called the MSA flake and blade industries. Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains. It is also common for these stone artefacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may in rare cases be associated with MSA occurrences (Gess 1969). These stone artefacts, like the Earlier Stone Age handaxes are usually observed in secondary context with no other associated archaeological material. The MSA is distinguished from the ESA by the smaller-sized and distinctly different stone artefacts and chaîne opératoire (method) used in manufacture, the introduction of other types of artefacts and evidence of symbolic behaviour. The prepared core technique was used for the manufacture of the stone artefacts which display a characteristic faceted striking platform and includes mainly unifacial and bifacial flake

blades and points. The Howiesons Poort Industry (80 000-55 000 years ago) is distinguished from the other MSA stone artefacts: the size of tools are generally smaller, the range of raw materials include finer-grained rocks such as silcrete, chalcedony, chert and hornfels, and include segments, backed blades and trapezoids in the stone toolkit which were sometimes hafted (set or glued) onto handles. In addition to stone artefacts, bone was worked into points, possibly hafted, and used as tools for hunting (Deacon & Deacon 1999). Other types of artefacts that have been encountered in archaeological excavations include tick shell beads, the rim pieces of ostrich eggshell (OES) water flasks, ochre-stained pieces of ostrich eggshell and engraved and scratched ochre pieces, as well as the collection of materials for purely aesthetic reasons. The majority of 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 associated with the MSA.

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

The Later Stone Age (LSA) spans the period from about 20 000 years ago until the colonial era, although some communities continue making stone tools today. The period between 30 000 and 20 000 years ago is referred to as the transition from the MSA to LSA; although there is a lack of crucial sites and evidence that represent this change. By the time of the Later Stone Age the genus *Homo*, in southern Africa, had developed into *Homo sapiens sapiens*, and in Europe, had already replaced *Homo neanderthalensis*. The LSA is marked by a series of technological innovations, new tools and artefacts, the development of economic, political and social systems, and core symbolic beliefs and rituals. The stone toolkits changed over time according to time-specific needs and raw material availability, from smaller microlithic Robberg, Wilton Industries and in between, the larger Albany/Oakhurst and the Kameelous Industries. Bored stones used as part of digging sticks, grooved stones for sharpening and grinding and stone tools fixed to handles with mastic also become more common. Fishing equipment such as hooks, gorges and sinkers also appear within archaeological excavations. Polished bone tools such as eyed needles, awls, linkshafts and arrowheads also become a more common occurrence. Most importantly bows and arrows revolutionized the hunting economy. It was only within the last 2000 years that earthenware pottery was introduced, before then tortoiseshell bowls were used for cooking and ostrich eggshell (OES) flasks were used for storing water. Decorative items like ostrich eggshell and marine/fresh water shell beads and pendants were made. Hunting and gathering made up the economic way of life of these communities; therefore, they are normally referred to as hunter-gatherers. Hunter-gatherers hunted both small and large game and gathered edible plant foods from the veld. For those that lived at or close the coast, marine shellfish and seals and other edible marine resources were available for the gathering. The political system was mainly egalitarian, and socially, hunter-gatherers lived in bands of up to twenty people during the scarce resource availability dispersal seasons and aggregated according to kinship relations during the abundant resource availability seasons. Symbolic beliefs and rituals are evidenced by the deliberate burial of the dead and in the rock art paintings and engravings scattered across the southern African landscape. Sites dating to the 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.

#### 4.1.2 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 agropastoralists. 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  $\pm 900$  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 manifest in ceramics, beads and other artefacts. This means that distinct pottery typologies can be found in the different late Iron Age groups of South Africa.

- **Bantu Speaking Groups in the South African interior**

*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.*

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.

#### 4.1.3 Pastoralism and the last 2000 years

Until 2000 years ago, hunter-gatherer communities traded, exchanged goods, encountered and interacted with other hunter-gatherer communities. From about 2000 years ago the social dynamics of the southern African landscape started changing with the immigration of two 'other' groups of people, different in physique, political, economic and social systems, beliefs and rituals. One of these groups, the Khoekhoe pastoralists or herders entered southern Africa with domestic animals, namely fat-tailed sheep and goats, travelling through the south towards the coast. They also introduced thin-walled pottery common in the interior and along the coastal regions of southern Africa. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers.

#### 4.1.4 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.

### 4.2 The Southern Highveld: Specific Themes.

A number of Archaeological Impact Assessments (e.g. van Schalkwyk 2000, Gaiger 2015, Coetzee 2003, Roodt 2008, Van Schalkwyk 2010 and Pistorius 2007) have been conducted in the south-eastern highveld area. Generally, sites documenting Earlier, Middle and Later Stone Age habitation occur across the Highveld, mostly in open air locales or in sediments alongside rivers or pans. Sites dating to the Iron Age occur on the Highveld where environmental factors and population density delegated that the spread of Iron Age farming. Moving into recent times, the archaeological record reflects the development of a rich colonial frontier, characterised by, amongst others, a complex industrial archaeological landscape such as mining developments and war events, which herald the modern era in South African history.

#### 4.2.1 Early History and the Stone Ages

According to archaeological research, the earliest ancestors of modern humans emerged some two to three million years ago. The remains of *Australopithecine* and *Homo habilis* have been found in dolomite caves and underground dwellings in the Bankeveld at places such as Sterkfontein and Swartkrans near Krugersdorp. *Homo habilis*, one of the Early Stone Age hominids, is associated with Oldowan artefacts, which include crude implements manufactured from large pebbles. The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across South Africa and is associated with *Homo erectus*, who manufactured hand axes

and cleavers from as early as one and a half million years ago. Oldowan and Acheulian artefacts were also found four to five decades ago in some of the older gravels (ancient river beds and terraces) of the Vaal River and the Klip River in Vereeniging. The earliest ancestors of modern man may therefore have roamed the Vaal valley at the same time that their contemporaries occupied some of the dolomite caves near Krugersdorp. Middle Stone Age sites dating from as early as two hundred thousand years ago have been found all over South Africa. Middle Stone Age hunter-gatherer bands also lived and hunted in the Orange and Vaal River valleys. These people, who probably looked like modern humans, occupied campsites near water but also used caves as dwellings. They manufactured a wide range of stone tools, including blades and points that may have had long wooden sticks as hafts and were used as spears. Two Middle Stone Age sites at the Withoek Spruit (Brakpan) were researched 17 years ago, but no information on this discovery has been published. The various types of Stone Age industries scattered across the country are associated with the historical San and Khoi-Khoi people. The San were renowned as formidable hunter-gatherers, while the Khoi-Khoi herded cattle and small stock during the last two thousand years. Late Stone Age people manufactured tools that were small but highly effective, such as arrow heads and knives and they were also known for their rock art skills. San hunter-gatherer bands with their small (microlithic) stone tools may have lived in Eastern Gauteng, as a magnificent engraving site near Duncanville attests to their presence in Vereeniging, south of, but close to Ekurhuleni. Stone Age hunter-gatherers lived well into the 19th century in some places in SA, but may not have been present in this area when the first European colonists crossed the Vaal River during the early part of the 19th century. Stone Age sites may occur all over the area where an unknown number may have been obliterated by mining activities, urbanization, industrialization, agriculture and other development activities during the past decades (Morris 2004).

#### 4.2.2 Iron Age / Farmer Period

Complex stone wall clusters are scattered across the landscapes of the Southern Highveld and the Free State. These stone structures, commonly associated with Bantu speaking farming communities, are the remnants of a complex 500 year old sequence of stone wall building in central interior of South Africa. Tim Maggs, noted archaeologist of the later Farmer Period in southern Africa, named the first phase in this sequence "Type N" walling, dating to the 15<sup>th</sup> to 17<sup>th</sup> centuries AD (Maggs 1976). This phase, which mostly developed in the Free State, was characterised by central cattle kraals linked by outer walls, while the whole settlement was surrounded by a perimeter wall which also incorporated small stock enclosures. After the 17<sup>th</sup> century, the "Type N" style of building spread across the Vaal River in consecutive phases where it later became known as "Klipriviersberg" type walling (Taylor 1979a). These settlements typically displayed outer scalloped walls that demarcated back courtyards, a large number of small stock kraals and straight walls which separated household units in the domestic zone. Beehive huts would have housed communities on these sites. The Klipriviersberg walling type dates to the 18<sup>th</sup> and 19<sup>th</sup> centuries and are associated with the Fokeng cluster of the Sotho-Tswana speaker group. Knowledge of the early history of the Fokeng is limited but we do know that a group of Fokeng predecessors settled in the Free State by the 14<sup>th</sup> century. Later, two Fokeng groups detached from the main entity and settled near Broederstroom at the foot of the Magaliesberg, and near the Vaal River respectively. The latter yet again divided and one of these divisions settled over a large area in the northern Free State and the southern Highveld.

No evidence for Iron Age settlement occurs in the Nigel area. It is doubtful whether Iron Age people would've settled in the area, as there is not ample building material (stone) for the construction of their huts and cattle enclosures. The fact that large portions of the landscape around Nigel are marshy, and unfertile and therefore not suitable for agriculture, would also have deterred their settling in the area.





Figure 4-1: Characteristic Klipriviersberg-type stone walled settlements east of Vereeniging on the Highveld (after Huffman [2007]).

#### 4.2.3 Later History: Nigel and the Nigel Gold Mine

Nigel, is a small town in Gauteng Province, came about as a result of rich gold deposits along the Witwatersrand. A certain prospector, Mr Johnstone discovered gold on the farm Varkensfontein in 1882. He obtained permission from the farm owner, Petrus Johannes Marais (nicknamed Oom Lang Piet) to prospect for gold on the farm. Mr Johnstone's prospecting operations continued for a considerable time shrouded in secrecy. After a random offer to purchase the farm by a stranger, Mr Marais - who was incidentally reading "The Fortunes of Nigel" by Sir Walter Scott at the time – became suspicious and he decided to visit his farm. At the farm his suspicions were confirmed and, determined not to allow himself to be cheated by cunning fortune seekers, he establish the Nigel Gold Mining Company in July 1888, two years after the discovery of gold on the Witwatersrand. Mr Marais attributed his luck to the novel he had been reading and, therefore, called his company Nigel, also giving rise to the town of Nigel. In 1888 the State President Paul Kruger declared Nigel a "public digging" under Notice No. 331 and since then the history and development of Nigel are inseparable from those of the gold mines. The town was little more than a mining camp until 1923, when the control of the town was passed into the hands of a Dorpvillage. The Sub Nigel Mine was opened and proved to be a lucrative operation. As a result a great influx of people occurred. Within 7 years the local authority's status was increased to Town Council in 1930. C.L. Mackle was elected as the first Mayor . In these 5 years (hampered only by the outbreak of World War II), 5 new suburbs were proclaimed. A railway line between Springs, Nigel and Heidelberg was opened in October of 1935. In these 5 years (hampered only by the outbreak of World War II), 5 new suburbs were proclaimed. A railway line between Springs, Nigel and Heidelberg was opened in October of 1935. It was the discriminatory racial segregation (*apartheid*) legislation, enacted by the Nationalist Party (after coming to power in 1948) that extensively transformed the land-use. Citizens were separated into different townships according to their race with buffer strips of at least 100m wide or by environmental buffer zones. Nigel, with most of the East Rand, became part of the Ekurhuleni Metropolitan Municipality following the creation of the new local government structures. Today the town is focused primarily on mining and also has various heavy industries. Nigel's municipal government became part of the much larger Ekurhuleni Metropolitan Municipality following the creation of new local government structures in 2000, along with most of rest of the East Rand.



Figure 4-2: Archive photo of Nigel taken at the turn of the 19<sup>th</sup> century.



Figure 4-3: Aerial photo of the Nigel CBD dating to 1934.

#### 4.2.4 Burial Sites / Human Remains

Human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500).

## 5 RESULTS: ARCHAEOLOGICAL SURVEY

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In terms of heritage resources, the general landscape around the project area is primarily well known for its Historical Period occurrences, primarily related to the Gold Mining industry of the past century and resulting urbanization and industrialization. Locally, the project area has been altered in totality by historical and recent development activities largely sterilising surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times. However, Colonial Period structures as well as more recent features occur in the Nigel Diesel Depot Project study area and these occurrences were uniquely coded **EXIGO-VF169-HPxx** (Exigo Varkensfonein 169 Historical Period xx) and **EXIGO-VF169-FTxx** (Exigo Varkensfonein 169 Feature xx).

### 5.1 The Stone Age

No Stone Age scatters or occurrences were observed in any of the project area.

### 5.2 The Iron Age Farmer Period

No Iron Age (Farmer Period) occurrences were observed in any of the project area.

### 5.3 Historical / Colonial Period

Archive photos and historical aerial photographic records of the Nigel area, and specifically the Nigel Gold Mine, indicate that most of the structures and features currently present in the project footprint area have been established after 1940. In addition, the records suggest that only three of the original buildings on the Nigel Mine Property remain today (see Figure 5-1). Even though direct temporal contexts for the structures could not be ascertained, it might be assumed that these features date to (at least) the first part of the 20<sup>th</sup> century.





Figure 5-1: Aerial views of the project area (top: 2014, bottom 1934) indicating the presence of Colonial Period structures discussed in the text.

- **EXIGO-VF169-HP01: S26.414683° E28.460745°**

A single storey multi-room structure, similar to a residential house, occurs along the northern periphery of the project area. The structure was constructed out of red face brick and it has a steep gabled corrugated iron roof. The structure, which measures approximately 15m x 9m is primarily rectangular with smaller single room extensions to the sides. An apparent car garage with galvanised rolling car garage door forms the façade of the building with an access entrance to the eastern side. The structure is not currently occupied and it is not maintained but preservation thereof is fairly good. An absolute temporal context for the structure is not known but cognisant of its existence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, it clearly older than 60 years and thus a protected heritage resource.

The structure forms part of Nigel history and specifically, it is part of the Nigel Gold Mine historical legacy and it can add to a better understanding of architectural, industrial and social developments at the Nigel Gold Mine. The site is of medium heritage significance and since it occurs within the Nigel Diesel Depot Project study area, unmitigated impact on the site is expected to be direct and permanent.



Figure 5-2: A small Colonial Period face brick building at Site EXIGO-VF169-HP01.

- **EXIGO-VF169-HP02: S26.415040° E28.460533°**

A large rectangular warehouse building occurs in a central part of the project area. The structure, which consists of a large central factory hall and smaller rooms to the sides, was constructed out of face brick with certain sections plastered up and painted. The warehouse has a gabled corrugated iron roof with an industrial air ventilation chamber along the ridge of the roof structure. The building measures approximately 70m x 17m with windows along the side walls and a large access door. The structure is currently used as manufacturing and distribution facility for Hi-Performance Feeds which supplies animal feeding products. The building is maintained and preservation thereof is fairly good. An absolute temporal context for the structure is not known but cognisant of its existence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, it clearly older than 60 years and thus a protected heritage resource. The structure, which was probably part of the old Nigel Gold Mine processing plant, forms part of Nigel history and specifically, it is part of the Mine historical legacy and it can add to a better understanding of architectural, industrial and social developments at the Nigel Gold Mine. The site is of medium heritage significance and since it occurs within the Nigel Diesel Depot Project study area, unmitigated impact on the site is expected to be direct and permanent.





Figure 5-3: A large Colonial Period warehouse building at Site EXIGO-VF169-HP02.

- **EXIGO-VF169-HP03: S26.415162° E28.460852°**

A square storage building and shed structure occurs adjacent to the warehouse building (**EXIGO-VF169-HP02**) in a central part of the project area. The structure, which consists of a large open room and a covered shed area, was constructed out of white plastered walling. The structure has a gabled corrugated iron roof. The building measures approximately 24.5m x 24.5m with windows along the side walls and a large vehicle access door facing east. The structure is not currently used and it is not maintained. The preservation thereof is fair. An absolute temporal context for the structure is not known but cognisant of its existence on the early 20<sup>th</sup> century Nigel Gold Mine property as well as the architectural style used, it clearly older than 60 years and thus a protected heritage resource. The structure, which was probably part of the old Nigel Gold Mine processing plant, forms part of Nigel history and specifically, it is part of the Mine historical legacy and it can add to a better understanding of architectural, industrial and social developments at the Nigel Gold Mine. The site is of medium heritage significance and since it occurs within the Nigel Diesel Depot Project study area, unmitigated impact on the site is expected to be direct and permanent.



Figure 5-4: A warehouse building at Site EXIGO-VF169-HP03.

#### 5.4 Recent / Contemporary Period

- **EXIGO-VF169-FT01: S26.415233° E28.460061°**

Another large rectangular warehouse building occurs towards a western portion of the project area. The structure was constructed out of a lower face brick level and an upper corrugated iron level. The warehouse has a gabled corrugated iron roof with an industrial air ventilation chamber along the entire ridge of the roof structure. The building measures approximately 45m x 17m with windows and a door along the side walls. The structure is currently used as office facility. An absolute temporal context for the structure is not known but cognisant of its absence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, it probably of recent date. As such, the site is of low heritage significance. The building occurs within the Nigel Diesel Depot Project study area and unmitigated impact on the site is expected to be direct and permanent.



Figure 5-5: A large warehouse at Site EXIGO-VF169-FT01.

- **EXIGO-VF169-FT02: S26.415583° E28.460288°**

A small rectangular building occurs along the southern portion of the project area. The double storey structure was constructed out of face brick which is plastered up in places. The building, which measures approximately 18m x 10m, has low slope flat roof with windows and doors along its sides. The structure is currently used as a residential apartment complex. An absolute temporal context for the structure is not known but cognisant of its absence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, it probably of recent date. As such, the site is of low heritage significance. The building occurs within the Nigel Diesel Depot Project study area and unmitigated impact on the site is expected to be direct and permanent.





Figure 5-6: A small residential flat at Site EXIGO-VF169-FT02.

- **EXIGO-VF169-FT03: S26.415459° E28.459968°**

Another small rectangular building occurs west of the car dealership and apartment building (**EXIGO-VF169-FT02**) along the southern portion of the project area. The single storey structure was constructed out of face brick which is plastered up in places. The building, which measures approximately 28m x 8m, has low slope flat roof with single windows and a door along its southern side. The building is currently used as upholstery facility for the Selina's Jupetson Motor Trimmers Company. An absolute temporal context for the structure is not known but cognisant of its absence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, it probably of recent date. As such, the site is of low heritage significance. The building occurs within the Nigel Diesel Depot Project study area and unmitigated impact on the site is expected to be direct and permanent.

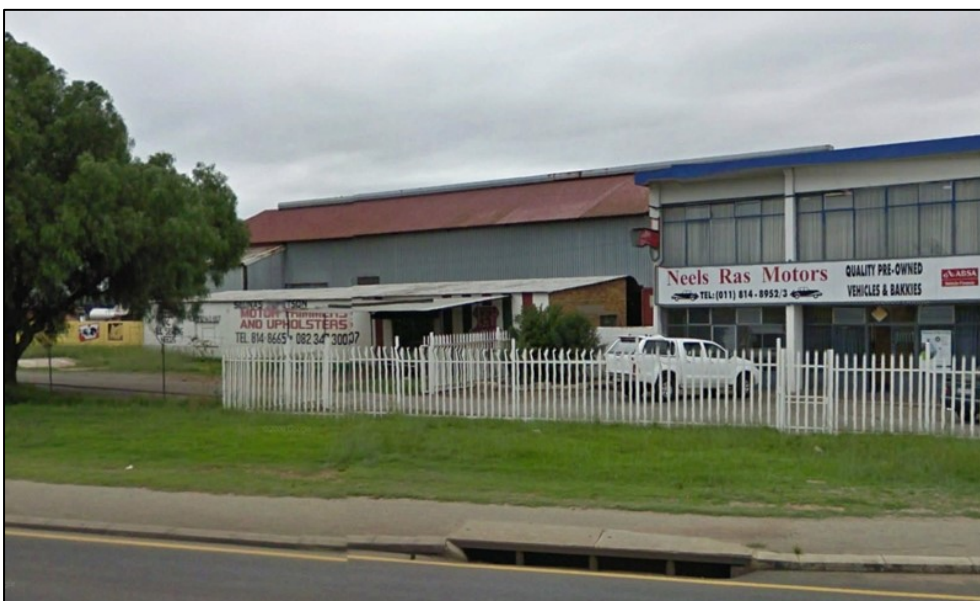


Figure 5-7: A small office building at Site EXIGO-VF169-FT03.

- **EXIGO-VF169-FT04: S26.415548° E28.460778°**

Two multi-room structures occur along the southern periphery of the project area. The structures are constructed out of red face brick with a gabled corrugated iron roof and a low slope flat roof respectively. The buildings, which are rectangular and of varying sizes, have single windows and doors built into the structures. One of the structures is dilapidated and poorly preserved and the other structure is currently used as residential space. Preservation of the latter is fairly good. An absolute temporal context for the structures is not known but cognisant of its absence on the early 20<sup>th</sup> century Nige Gold Mine property as well as the architectural style used, they are of recent date. As such, the site is of low heritage significance. The building occurs within the Nigel Diesel Depot Project study area and unmitigated impact on the site is expected to be direct and permanent.



Figure 5-8: A deserted red face brick structure Site EXIGO-VF169-FT04.



Figure 5-9: A residential complex at Site EXIGO-VF169-FT04.

- **EXIGO-VF169-FT05: S26.414933° E28.461251°**

A dilapidated multi-room building as well as a number of foundation structures occur in a central portion of the project area. The walls of the remaining structure were constructed out of plastered and painted bricks



and the partial remains a low slope flat roof appear on one side. The remaining foundations consist out of concrete and bricks. Aerial imagery of the site suggest that the buildings were decommissioned at around 2006 where after they were demolished (see Figure 5-10). The buildings so not appear on imagery of the early 20<sup>th</sup> century Nigel Gold Mine property and they were probably of more recent date. As such, the site is of low heritage significance. The building occurs within the Nigel Diesel Depot Project study area and unmitigated impact on the site is expected to be direct and permanent.



Figure 5-10: Aerial imagery dating to 2001 (left) and 2014 (right) indicating the earlier presence of demolished structures at Site EXIGO-VF169-FT05.



Figure 5-11: Dilapidated structures and foundations at Site EXIGO-VF169-FT05

## 5.5 Graves / Human Burials

No graves or human burials were observed in the survey area.





Figure 5-12: Aerial map indicating the location of heritage sites discussed in the text.

## 6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

### 6.1 Potential Impacts and Significance Ratings<sup>2</sup>

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the study area is supplied in Section 10.2 of the Addendum.

#### 6.1.1 General assessment of impacts on resources

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

#### 6.1.2 Direct impact rating

**Direct or primary effects** on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected).

Heritage receptors were found in the **Nigel Diesel Depot Project area** and potential impacts to heritage resources is foreseen.

The following table summarizes impacts to **Site EXIGO-VF169-FT01, Site EXIGO-VF169-FT02, Site EXIGO-VF169-FT03, Site EXIGO-VF169-FT04, Site EXIGO-VF169-FT05** of **low** significance located within the project area.

<b>NATURE OF IMPACT:</b> Impacts could involve displacement or destruction of structures or features in the proposed Project area.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>EXTENT</b>	Local	Local
<b>DURATION</b>	Permanent	Permanent
<b>MAGNITUDE</b>	Minor	Minor
<b>PROBABILITY</b>	Definite	Negligible
<b>SIGNIFICANCE</b>	Low	Low
<b>STATUS</b>	Negative	Neutral

<sup>2</sup> Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1*.

REVERSIBILITY	Non-reversible	Non-reversible
IRREPLACEABLE LOSS OF RESOURCES?	Yes	No
CAN IMPACTS BE MITIGATED?	N.A	
MITIGATION: Site monitoring by ECO.		
CUMULATIVE IMPACTS: No cumulative impact is anticipated.		
RESIDUAL IMPACTS: n/a		

The following table summarizes impacts to **Site EXIGO-VF169-HP01, Site EXIGO-VF169-HP02, Site EXIGO-VF169-HP03** of **medium** significance located within the project area.

<b>NATURE OF IMPACT:</b> Impacts could involve displacement or destruction of heritage structures or features in the project area.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>EXTENT</b>	Local	Local
<b>DURATION</b>	Permanent	Permanent
<b>MAGNITUDE</b>	Major	Minor
<b>PROBABILITY</b>	Definite	Negligible
<b>SIGNIFICANCE</b>	Medium	Low
<b>STATUS</b>	Negative	Neutral
<b>REVERSIBILITY</b>	Non-reversible	Non-reversible
<b>IRREPLACEABLE LOSS OF RESOURCES?</b>	Yes	No
<b>CAN IMPACTS BE MITIGATED?</b>	N.A	
<b>MITIGATION:</b> Avoidance, site management, Phase 2 site documentation, destruction permitting, site monitoring by ECO.		
<b>CUMULATIVE IMPACTS:</b> No cumulative impact is anticipated.		
<b>RESIDUAL IMPACTS:</b> n/a		

### 6.1.3 Discussion: Evaluation of Results and Impacts

Previous studies conducted in the larger landscape around the project area indicate a rich heritage horizon with sites dating to the Colonial Period, primarily related to the Gold Mining industry of the past century and resulting urbanization and industrialization, occurring widely. Locally, the project area has been altered in totality by historical and recent development activities largely sterilising surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times. However, Colonial Period structures as well as more recent features occur in the Nigel Diesel Depot Project study area. Cognisance should be taken of archaeological or historical material that might be present in surface and sub-surface deposits.

A number of recent period buildings and foundation structures in the study area (**Site EXIGO-VF169-FT01, Site EXIGO-VF169-FT02, Site EXIGO-VF169-FT03, Site EXIGO-VF169-FT04, Site EXIGO-VF169-FT05**) are of low significance. The potential impact on the resources is considered to be LOW but this impact rating can be limited to a NEGLIBLE impact by the implementation of mitigation measures (site monitoring) for the sites, if / when required.

Historical Period heritage structures occur in the project area. These structures (**Site EXIGO-VF169-HP01, Site EXIGO-VF169-HP02, Site EXIGO-VF169-HP03**) are of medium significance and the potential impact on the resource is considered to be MODERATE but this impact rating can be limited to a NEGLIBLE impact by the implementation of mitigation measures (avoidance, site management, Phase 2 site documentation, destruction permitting, site monitoring by ECO) for the sites, if / when required.

***Sensitive heritage resources occur inside areas proposed for the Nigel Diesel Depot development and the mitigation and management of some of these resources are required for the duration of the development. In the opinion of the author of this Archaeological Impact Assessment Report, the proposed Nigel Diesel Depot Project on Portion 36 of the farm Varkensfontein 169IR may proceed from a culture resources management perspective, provided that mitigation measures, endorsed by the relevant Heritage Resources authority, are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction.***

## 6.2 Management actions

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of the Addendum. The following management measures would be required during implementation of the proposed Nigel Diesel Depot Project.

**OBJECTIVE:** prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

***No further action in terms of mitigation is required for the recent period buildings and foundation structures (Site EXIGO-VF169-FT01, Site EXIGO-VF169-FT02, Site EXIGO-VF169-FT03, Site EXIGO-VF169-FT04, Site EXIGO-VF169-FT05) occurring within the proposed project footprint.***

***For the Historical Period buildings (Site EXIGO-VF169-HP01, Site EXIGO-VF169-HP02, Site EXIGO-VF169-HP03) within the project area the following are required in terms of heritage management and mitigation:***

<b>PROJECT COMPONENT/S</b>	All phases of construction.
<b>POTENTIAL IMPACT</b>	Damage, destruction of structures of heritage significance. Loss of historical fabric of the site. Damage/disturbance of previously undetected heritage remains.
<b>ACTIVITY RISK/SOURCE</b>	Demolishing of heritage structures to clear development footprint. Digging foundations and trenches into sensitive deposits that are not visible at the surface.
<b>MITIGATION: TARGET/OBJECTIVE</b>	To preserve the historic fabric of the site and heritage features, to locate and document previously undetected heritage remains as soon as possible after disturbance so as to maximize the chances of successful



	rescue/mitigation work.	
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME
<b>Fixed Mitigation Procedure (required)</b>		
<b>Site Monitoring:</b> Regular examination of trenches and excavations in order to detect and preserve previously undocumented heritage receptors.	ECO HERITAGE ASSESSMENT PRACTITIONER	Monitor as frequently as practically possible.
<b>Preferred Mitigation Procedures</b>		
<p><b>Retain and Avoid Impact:</b> Retain structures in their current state and implement a heritage conservation buffer of at least 20m around the heritage resources; avoid impact on the heritage resource and the proposed conservation buffer.</p> <p><b>Retain and Restore:</b> Retain structures but restore the buildings to their original state based on historiographical information. Implement a heritage conservation buffer of at least 20m around the heritage resources; avoid impact on the heritage resource and the proposed conservation buffer. Restoration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency.</p> <p><b>Alter and Incorporation:</b> Design layout of the diesel depot in such a way as to incorporate the structures into infrastructure, retraining the structural and historical integrity of the structures. Re-appropriation and alteration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency.</p> <p><b>Site Management Plan:</b> Compile a site management plan for the conservation of the heritage resources during construction and operational phases of the depot.</p>	DEVELOPER HERITAGE ASSESSMENT PRACTITIONER	Prior to the commencement of construction and earth-moving.
<b>Alternative Mitigation Procedure (if any of the preferred mitigation procedure is not feasible and the structures have to be destroyed)</b>		
<p><b>Phase 2 Site Investigation:</b> Carefully document all physical and contextual attributes of the structures e.g. physical dimensions, building material, architectural style, general appearance, site condition by means of a detailed investigation (mapping and site surveying, photographic record, desktop and archive study, possible sub-surface sampling). This measure is subject to excavation and destruction permitting requirements, if and when required.</p>	HERITAGE ASSESSMENT PRACTITIONER	Prior to the commencement of construction and earth-moving.
<b>PERFORMANCE INDICATOR</b>	Preservation of the historic fabric of heritage resources. Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.	

<b>MONITORING</b>	Successful conservation of the historical fabric of the heritage resources. Location of previously undetected heritage sites by person/s monitoring.
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## 7 RECOMMENDATIONS

The larger landscape around Nigel is rich in mostly Colonial Period remnants, significantly so sites associated with mining and industrialization during the previous centuries. However, the study area has been altered extensively by recent and historical activities largely sterilising the area of heritage remains, especially those dating to prehistoric times. The following recommendations are made based on general observations in the proposed Nigel Diesel Depot Project Area:

- A Palaeontological Desktop Study should be considered for the development. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- A number of recent period buildings and foundation structures in the study area (**Site EXIGO-VF169-FT01, Site EXIGO-VF169-FT02, Site EXIGO-VF169-FT03, Site EXIGO-VF169-FT04, Site EXIGO-VF169-FT05**) are of low significance due to their recent temporal context. No further action is required for these structures in terms of heritage mitigation.
- Historical Period heritage structures occur in the project area. These structures (**Site EXIGO-VF169-HP01, Site EXIGO-VF169-HP02, Site EXIGO-VF169-HP03**) are of medium significance since they form part of Nigel history and specifically, they are part of the Mine historical legacy. The structures can potentially add to a better understanding of architectural, industrial and social developments at the Nigel Gold Mine. It is primarily recommended that impact on the buildings be avoided and that the buildings be retained in their current state with the implementation of a 20m conservation buffer around the structures. Alternatively, retaining the structures and restoring the buildings to their original state based on historiographical information could be considered. This measure will include the implement a heritage conservation buffer of at least 20m around the heritage resources and restoration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency. The incorporation of the structures in the layout of the diesel depot, while retraining the structural and historical integrity of the structures, could also be an option. It should be noted that re-appropriation and alteration of the structures for this purpose will be subject to the application of a destruction / alteration permit and approval of the relevant heritage agency. In all instances mentioned above, a heritage site management plan for the conservation of the heritage resources during construction and operational phases of the depot will be required. Should the destruction of the buildings prove inevitable they should be carefully documented (e.g. physical dimensions, building material, architectural style, general appearance, site condition) by means of a detailed investigation prior to demolition. Such an investigation should minimally include mapping and site surveying, a photographic record, a desktop and archive study, possible sub-surface sampling and possible analysis of material culture from the site. This measure is subject to excavation and destruction permitting requirements, if and when required from the relevant Heritage Resources Authorities.
- A careful watching brief monitoring process is recommended whereby an informed ECO inspect the construction site on regular basis in order to monitor possible impact on heritage resources. Should any subsurface paleontological, archaeological or historical material or heritage resources be exposed during construction activities, all activities should be suspended and the

archaeological specialist should be notified immediately

- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. Should any subsurface paleontological / archaeological / historical material and /or graves/human remains be uncovered, all activities should be suspended and the archaeological specialist should be alerted immediately.
- It should be noted that 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).

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.

## 8 GENERAL COMMENTS AND CONDITIONS

This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Nigel Diesel Depot Project Development area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognisance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools.
- Formal Middle Stone Age stone tools.
- Formal Later Stone Age stone tools.
- Potsherds
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such sites or material remains were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by SAHRA, the National Resources Act and the CRM section of ASAPA will be required.

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 Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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## 10 ADDENDUM 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

### 10.1 Site Significance Matrix

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

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.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
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.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
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]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

### 10.2 Impact Assessment Criteria

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.



### Significance of the heritage resource

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. sitespecific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

### Nature of the impact

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

### Extent

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

### Duration

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention; or
- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

### Intensity

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

### Probability

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will definitely occur regardless of any mitigation measures

### Confidence

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.

- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

#### Impact Significance

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

### 10.3 Direct Impact Assessment Criteria

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
<b>CONTEXT 1</b> High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
<b>CONTEXT 2</b> Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
<b>CONTEXT 3</b> Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
<b>CONTEXT 4</b> Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected
<b>NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.</b>				
HERITAGE CONTEXTS		CATEGORIES OF DEVELOPMENT		
<b>Context 1:</b> Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources  <b>Context 2:</b> Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.  <b>Context 3:</b> Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources  <b>Context 4:</b> Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.		<b>Category A: Minimal intensity development</b> <ul style="list-style-type: none"> <li>- No rezoning involved; within existing use rights.</li> <li>- No subdivision involved.</li> <li>- Upgrading of existing infrastructure within existing envelopes</li> <li>- Minor internal changes to existing structures</li> <li>- New building footprints limited to less than 1000m2.</li> </ul> <b>Category B: Low-key intensity development</b> <ul style="list-style-type: none"> <li>- Spot rezoning with no change to overall zoning of a site.</li> <li>- Linear development less than 100m</li> <li>- Building footprints between 1000m2-2000m2</li> <li>- Minor changes to external envelop of existing structures (less than 25%)</li> <li>- Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%).</li> </ul> <b>Category C: Moderate intensity development</b> <ul style="list-style-type: none"> <li>- Rezoning of a site between 5000m2-10 000m2.</li> </ul>		

	<ul style="list-style-type: none"> <li>- Linear development between 100m and 300m.</li> <li>- Building footprints between 2000m2 and 5000m2</li> <li>- Substantial changes to external envelop of existing structures (more than 50%)</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%)</li> </ul> <p><b>Category D: High intensity development</b></p> <ul style="list-style-type: none"> <li>- Rezoning of a site in excess of 10 000m2</li> <li>- Linear development in excess of 300m.</li> <li>- Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven.</li> <li>- Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)</li> </ul>
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#### 10.4 Management and Mitigation Actions

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

##### No further action / Monitoring

Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.

##### Avoidance

This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.

##### Mitigation

This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.

##### Compensation

Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.

##### Rehabilitation

Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:

- The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
- Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
- Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource.

##### Enhancement

Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources.

In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should, however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored