THE PROPOSED RAPID LAND RELEASE PROGRAMME FOR THE GAUTENG DEPARTMENT OF HUMAN SETTLEMENT: RIETFONTEIN SITE

Heritage Impact Assessment

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Project No.: 435HIA

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Declaration of Independence

I, Cherene de Bruyn, declare that –

General declaration:

- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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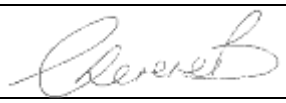
ACKNOWLEDGEMENT OF RECEIPT

Report Title	***The Proposed Rapid Land Release Programme for the Gauteng Department of Human Settlement: Rietfontein Site***		
Control	**Name**	**Signature**	**Designation**
Author	**Cherene de Bruyn**		**Archaeologist/ PGS Heritage**
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The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**Relevant section in report**
1.(1) (a) (i) Details of the specialist who prepared the report	Page 2 of Report – Contact details and company
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to **Appendix C**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 4
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 6 and **Appendix B**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 3.6
(g) An identification of any areas to be avoided, including buffers	Section 6
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3.6
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 3.6 and 4
(k) Any mitigation measures for inclusion in the EMPr	Section 6
(l) Any conditions for inclusion in the environmental authorisation	Section 6
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6.5
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 7
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 6
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process will be handled as part of the EIA and EMPr process.
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no comments have been raised regarding heritage resources that require input from a specialist.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 38(3) of the NHRA

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by GA Environment (Pty) Ltd (GA Environment) to undertake a **Heritage Impact Assessment (HIA) and Palaeontological Impact Assessment (PIA)** which will serve to inform the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the proposed Rapid Land Release Programme for the Gauteng Department of Human Settlement: Rietfontein Site. The site is located on the Remaining Extent of Portion 129 of the Farm Rietfontein No. 301 IQ within the City of Johannesburg Metropolitan Municipality, Gauteng Province.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focusses specifically on the newly proposed housing infrastructure.

The HIA has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries. Through data analysis and a site investigation the following issues were identified from a heritage perspective.

Heritage Sites

Heritage Sites in the vicinity of the Rietfontein Site

The fieldwork identified 10 heritage features (**RFS01-RFS10**). **RFS01, RFS02** and **RFS03** are Open-Air Churches, while **RFS04-RFS06** are the ruins of several brick or concrete structures. **RFS08** is the only grave identified, while **RFS07, RFS09 and RFS10** could potentially also be graves.

Built Environment

RFS01, RFS02 and **RFS03** (Open-Air Churches) have a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the Open-Air Churches will be MEDIUM negative. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

Historical structures

RFS04-RFS06 has no heritage significance and has no cultural significance.

The impact significance before mitigation on the historical structures **(RFS04-RFS05)** will be MEDIUM to LOW negative. During the construction of the proposed development it is **very unlikely** that **RFS06** will be impacted. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

Burial Grounds and graves

The grave at **RFS08**, and potential graves at **RFS07, RFS09** and **RFS10** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be HIGH negative. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

The communities of Lenasia have also indicated that the possibility of graves in the north-western corner does exist even though fieldwork has revealed no evidence of this.

Palaeontological Impacts

The Rietfontein site, according to SAHRIS falls within a Very High (red) to High (yellow/orange) sensitivity area. However, no fossiliferous outcrop was found in the proposed development area during the paleontological site visit. For this reason, an overall low palaeontological sensitivity is allocated to the development footprint. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

General

It is the author's considered opinion that overall impact on heritage resources is High to Low. Provided that the recommended mitigation measures are implemented, the impact would be acceptably low or could be totally mitigated to the degree that the project could be approved from a heritage perspective. The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources.

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TERMINOLOGY AND ABBREVIATIONS

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age between 700 000 and 3 300 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

Holocene

The most recent geological time period which commenced 10 000 years ago.

Late Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Iron Age

The archaeology of the period between 900-1300AD, associated with the development of the Zimbabwe culture, defined by class distinction and sacred leadership.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontology

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

Table 1 – List of abbreviations used in this report

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIA practitioner	Environmental Impact Assessment Practitioner
ESA	Earlier Stone Age
FLISP	Finance Linked Individual Subsidy Programme
GDHS	Gauteng Department of Human Settlement
GPS	Global Positioning System
FLISP	Finance Linked Individual Subsidy Programme
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LAS	Land Availability Stream
LCTs	Large Cutting Tools
LIA	Late Iron Age
LSA	Late Stone Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No 25 of 1999)
PGS	PGS Heritage (Pty) Ltd
PIA	Palaeontological Impact Assessment
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
RLRP	Rapid Land Release Programme
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

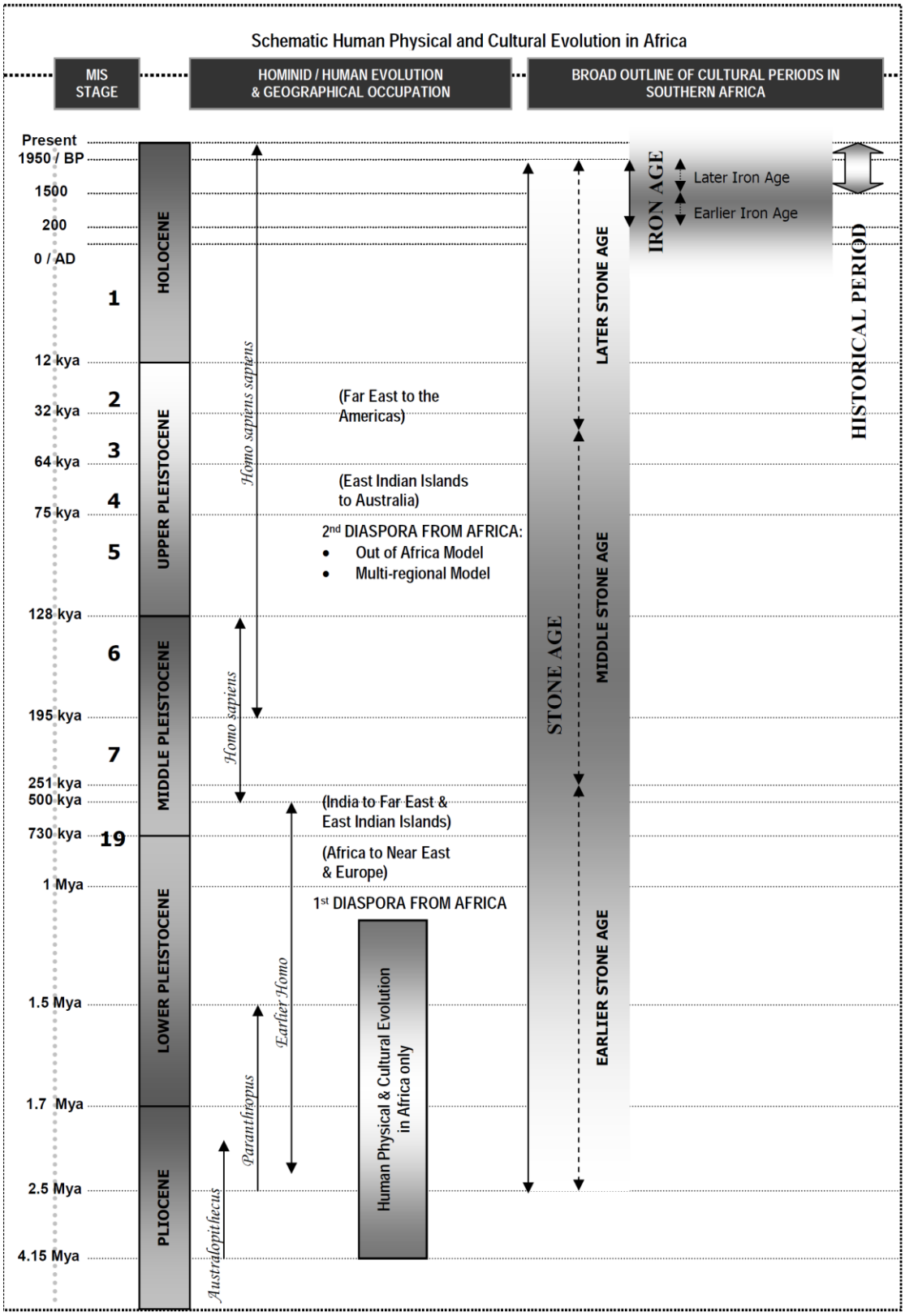

Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by GA Environment (Pty) Ltd (GA Environment) to undertake a Heritage Impact Assessment (HIA) and Palaeontological Impact Assessment (PIA) which will serve to inform the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the proposed Rapid Land Release Programme for the Gauteng Department of Human Settlement (GDHS): Rietfontein Site. The site is located on the Remaining Extent of Portion 129 of the Farm Rietfontein No. 301 IQ within the City of Johannesburg Metropolitan Municipality, Gauteng Province.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The HIA aims to inform the EIA in the development of a comprehensive EMPr to assist the project applicant in managing the identified heritage resources in a responsible manner in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

This Heritage Impact Assessment was compiled by PGS Heritage (PGS).

The staff at PGS have a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Cherene de Bruyn author of this report, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator and Field Director, she is further also a member of the International Association for Impact Assessment South Africa (IAIASA). She holds a MA in Archaeology, BSc (Hons) in Physical Anthropology and a BA (Hons) in Archaeology.

Wouter Fourie, the Project Coordinator, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the research undertaken, it is necessary to realise that the heritage resources located during the desktop research do not necessarily represent all the possible heritage resources present within the area.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well.

Please note that the heritage visibility was obscured in some areas due to dense vegetation and extensive dumping.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA), Act 107 of 1998
- National Heritage Resources Act (NHRA), Act 25 of 1999

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- National Environmental Management Act (NEMA) Act 107 of 1998 – Environmental Impact Assessment Regulations 326 (7 April 2017) GN R982 of 8 December 2014, as amended
    - Basic Environmental Assessment (BEA) – Appendix 1 s (2)(d)
    - Environmental Scoping Report (ESR) – Appendix 1 s (3)(h)(iv) and Appendix 2 s(2)(g)(iv)
    - Environmental Impact Assessment (EIA) – Appendix 3 s (3)(h)(iv)/
- National Heritage Resources Act (NHRA) Act 25 of 1999
    - Protection of Heritage Resources – Sections 34 to 36; and
    - Heritage Resources Management – Section 38

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under s38(8) and requires comment from the relevant heritage resources authority.

2 SITE LOCATION AND DESCRIPTION

2.1 Locality and Site Description (provided by GA Environment)

The Rietfontein site is located on in Lenasia, on the Remaining Extent of Portion 129 of the Farm Rietfontein No. 301 IQ which is approximately 24km north west of the Johannesburg CBD and is located within Ward 8 of the City of Johannesburg Metropolitan Municipality. The site is approximately 73Ha in size and the co-ordinates of the approximate centre point are 26°20'51.58"S; 27° 51' 54.07 "E.

The site is bounded by Lenasia Ext. 10 to the immediate north, the residential area of Lehae to the east, a largely vacant area (excluding the Lenasia Muslim School) to the immediate south and the Klipspruit Valley Road (M10) road to the west. Currently, direct key access points to the site is available from the Klipspruit Valley Road (M10) as well as through an informal access road from Lehae.

The following infrastructure is encountered in the vicinity of the site:

- National and provincial roads (M10, R554, R553, N1);
- Residential and commercial properties:
- Industrial properties;
- Power lines (some runs across the site);
- Sewage pipelines (some run parallel to the site's southern boundary and some possibly occur within the site).

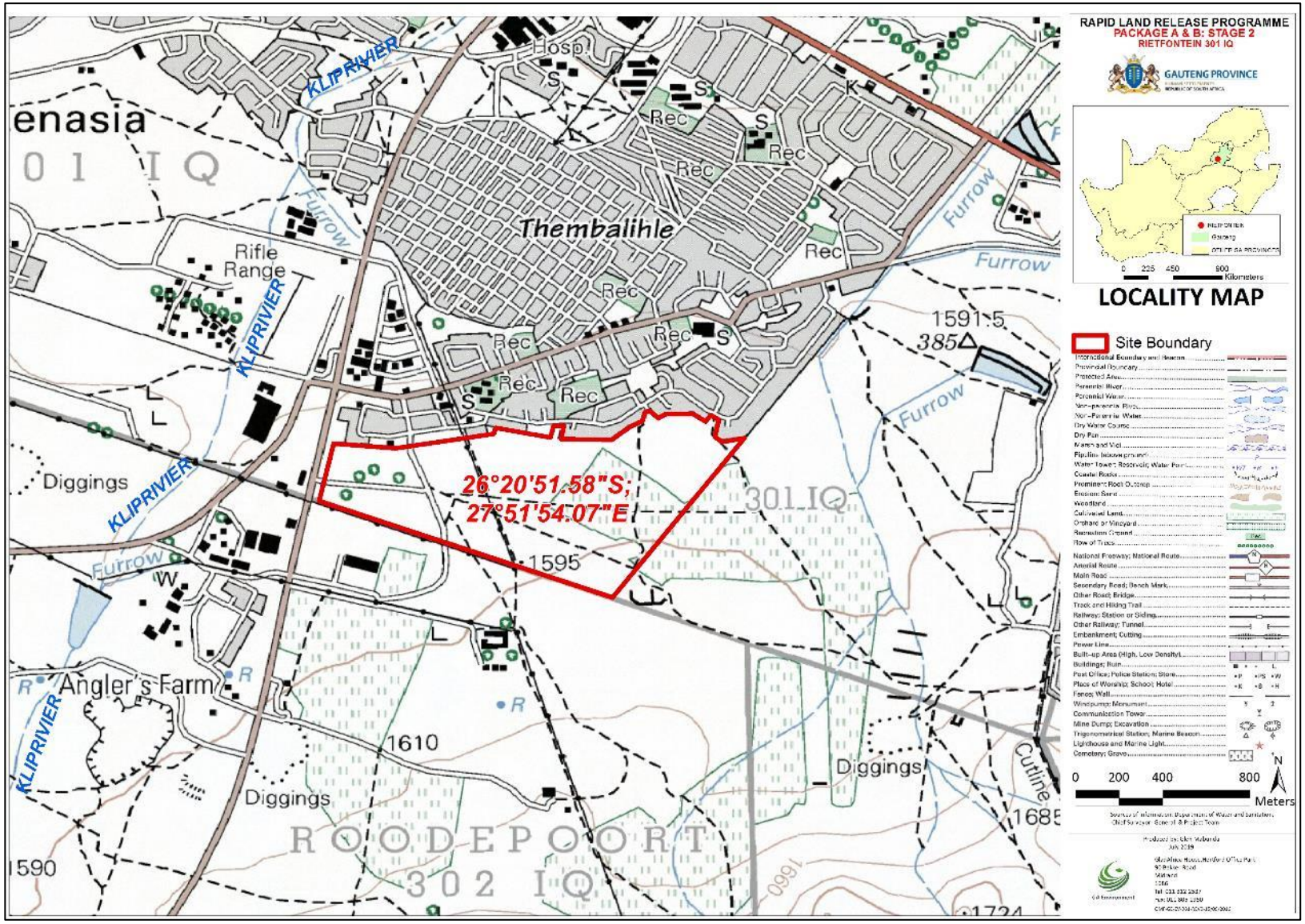

Figure 2 - Site Locality Map

2.2 Project description (provided by GA Environment)

The GDHS is proposing to construct affordable housing in Rietfontein which is located within the City of Johannesburg Metropolitan Municipality. The proposed housing project is part of the Gauteng Rapid Land Release Programme (RLRP). The RLRP is a component of the broader land reform programme in the Province and the Republic of South Africa and is aimed at unlocking economic value through the release of land to qualifying individuals. The GDHS is leading the Land Availability Stream (LAS), of the RLRP to identify suitable sites for release to qualifying beneficiaries for use as:

- Serviced Sites for Self-build under the Finance Linked Individual Subsidy Programme (FLISP);
- Agricultural Sites;
- Commercial Buildings; and
- Multi-Storey Buildings.

The key aims of the RLRP are as follows:

- to ensure that unused land is released for either housing or agricultural activities; and
- to address the housing backlog in the Gauteng Province while catering for social and economic development.

The proposed Rietfontein housing project forms part of the RLRP project.

2.2.1 *Consideration of Alternatives:*

The economic opportunities available within the Gauteng Province attract a large number or individuals from other Provinces of South Africa as well as abroad. The provision for adequate housing is therefore a priority for the GDHS who must ensure that housing is provided for all qualifying beneficiaries. Specific to the Rietfontein area in the south of Johannesburg, protests related to housing are a common and regular occurrence in the area and are often covered in the media. In addition to this, land grabs and invasions to demonstrate society's frustration with the lack of housing/land have become common in the area. For this project however, no other alternatives have been proposed. Alternative sites for the project could be proposed depending on the outcome of the several specialist studies forming part of the EIA process.

3 CURRENT STATUS QUO

3.1 Site Description

The project area falls in the vicinity of the existing residential areas of Lenasia, Thembélihle and Lehae.

Existing surrounding land uses associated with the project area include a combination of:

- informal settlements, low-cost residential areas;
- community and municipal facilities;
- open land, and
- road infrastructure.
- The Lenasia Military Base.

As a result, the vast majority of the Rietfontein Site footprint overlays highly disturbed terrain. There is evidence of illegal dumping and burning activities within the project area. Overall, the accessibility of the project footprint area was fairly good, with some sections more accessible than others. In the accessible areas the site detection visibility was fair as some areas were obscured by dense vegetation (**Figure 3 - Figure 8**).

Figure 3 - Access to site from Klipspruit Valley Road

Figure 4 - Illegal dumping throughout project area

Figure 5 - Housing to the East and North of the proposed project site, in the Lehae areas

Figure 6 - Powerlines running through project area

Figure 7 - Sewage pipelines located in south-western corner of project area

Figure 8 - Concrete markers found within project area

3.2 Overview of Study Area and Surrounding Landscape

Southern Africa has one of the longest human species occupations record in the world. The occupation dates to approximately 2 million years ago (Mitchell 2002). The archaeology of South Africa is divided into three periods, which are mainly the Stone Age, Iron Age and the Historical Period. Each period is characterised by unique cultural material. Both archaeological and historical sites have been identified all over South Africa, including the Gauteng Province.

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Early Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago (Korsman, & Meyer, 1999; Klein, 2000). The Gauteng Province hosts one of the most significant heritage sites; the Cradle of Humankind. Several archaeological discoveries have been made in the Cradle of Humankind, which is located approximately 57 km north of Lenasia. At Sterkfontein skeletal remains such as Mrs Ples and Acheulean and Oldowan stones tools have been found (Mitchell, 2002; Reynolds & Kibii, 2011); at the Rising Star Cave a site where several hominin species such as *Homo Naledi* was found (Berger *et al.,* 2015), and Oldowan stone tools where found at Swartkrans (Sutton, 2012). *No ESA sites are known from the immediate vicinity of the project area.*
250 000 to 40 000 years ago	The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. It is widely debated to be the phase that marked a change in hominin species to anatomically modern humans (Wadley, 2007). This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique (Korsman, & Meyer, 1999). MSA stone tools have been found at the Melville Koppies. Nature Reserve in Johannesburg located approximately 35km North-East of Lenasia. *No MSA sites are known from the immediate vicinity of the project area.*
40 000 years ago, to the historic past	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. (Korsman, & Meyer, 1999). This period is also associated with rock art. Evidence of symbolic behaviour has been found in southern African archaeological sites during this time. Symbolic behaviour of LSA period is shown by deliberate burial (Hall, 1990), decorating using ostrich eggshell beads and the use of ochre (Hall & Binneman, 1987). *No LSA sites are known from the immediate vicinity of the project area.*

DATE	DESCRIPTION
AD 450 – AD 750	Early Iron Age sites in the Witwatersrand area date between 500 AD and 900 AD. The Magaliesberg mountain range represents the most southern point of distribution of these sites. The Mzonjani facies of the Kwale Branch of the Urewe Ceramic Tradition represents the earliest known Iron Age period within the surroundings of Pretoria and Johannesburg. The decoration on the ceramics from these facies is characterised by punctates on the rim as well as spaced motifs on the shoulder (Huffman, 2007). *No Early Iron Age sites are known from the immediate vicinity of the footprint area.*
	The Late Iron Age (LIA) occupation of this area by Sotho-Tswana communities is represented by four ceramic sequences of the Urewe tradition: Ntsuanatsatsi (1450-1650), Olifantspoort (AD 1500 -1700), Uitkomst (AD 1700-1850) and Buispoort (1700-1840) (Huffman, 2007). In the Gauteng Province there is evidence of LIA iron smelting in the Broederstroom, a site near Hartbeespoort Dam, located to 80km north of Lenasia (Friede, 1980).
AD 1450 – AD 1650	The Ntsuanatsatsi facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the second known Iron Age period within the surroundings of the study area. The decoration on the ceramics from this facies is characterised by a broad band of stamping in the neck, stamped arcades on the shoulder and appliqué. Huffman (2007) suggest that the Ntsuanatsatsi facies can be directly linked to the early Bafokeng who were the first Mbo Nguni people to leave present-day KwaZulu-Natal.
AD 1500 - AD 1700	The Olifantspoort facies holds an important position in the sequence of the Moloko or Sotho-Tswana group. The earliest facies to be associated with the Moloko is the Icon facies (AD 1300 – 1500), with sites found across large sections of what is today the Limpopo Province.
AD 1650 – AD 1850	The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the third Iron Age period to be identified for the surroundings of the study area. This facies can likely be dated to between AD 1650 and AD 1820. The decoration on the ceramics associated with this facies is characterised by stamped arcades, appliqué of parallel incisions, stamping and cord impressions and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho) (Huffman, 2007). The Uitkomst pottery is viewed as a combination of Ntsuanatsatsi and Olifantspoort, and with the Makgwareng facies is seen as the successors to the Ntsuanatsatsi facies. The Ntsuanatsatsi facies is closely related to the oral histories of the Early Fokeng people and represents the earliest known movement of Nguni people out of Kwazulu-Natal into the inland areas of South Africa. Regarding this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present-day Free State Province. Extensive Stone walled sites have been recorded to the north east at the Klipriviersberg Nature reserve, located approximately 20 km East of Lenasia, and is associated with the LIA. These sites (Taylor's Type N, Mason's Class 2 & 5) are now collectively referred to as Klipriviersberg (Huffman, 2007). These settlements are complex in that aggregated settlements are common, the outer wall sometimes includes scallops to mark back courtyards, there are more small stock kraals, and straight walls separate households in the residential zone. These sites date to the 18th and 19th centuries and was built by people in the Fokeng cluster (Van der Walt, 2015b). *No LIA sites are known from the immediate vicinity of the project area.*

3.3 Previous Archaeological and Heritage Studies in and around the Study Area

A scan of the SAHRIS database has revealed the following studies conducted in and around the study area of this report. These studies are summarised below in ascending date order:

- **Huffman, T. H. 2008a. Lenasia South Extension, Gauteng Archaeological and Heritage Impact Assessment. A Phase I Report Prepared for Seaton Thompson & Associates.** No potential heritage resources were observed in the project area.

- **Huffman, T. H. 2008b. Lenasia South Impact Assessment, Gauteng. A Phase I report prepared for Seaton Thompson and Associates.** An extensive complex of Anglo Boer War fortifications covers the ridge on Portions 58 and 59 of the Farm Roodepoort 302 IQ, Lenasia South in Gauteng. Late Stone Age tool scatters of low significance were also observed in the area.
- **Beater, J. 2014. Proposed New 15ml Concrete Reservoir, Lenasia South. Heritage Impact Assessment. Prepared for Johannesburg Water.** No visible heritage resources including archaeological material or sites were found.
- **Van der Walt, J. 2015a. Archaeological Impact Assessment for the Proposed Anchorville Extension 12 Township Development In Lenasia, Gauteng Province. Prepared For Prism Ems.** No sites of archaeological significance were identified within the study area.
- **van Schalkwyk, J. 2015. Heritage Impact Assessment for the Proposed Installation of Storm Water Management Systems in Poortjie Township, Southwest Of Lenasia, City of Johannesburg District Municipality, Gauteng Province. Prepared for Envirolution Consulting.** No site, features or objects of cultural significance were observed in the project area.
- **Van der Walt, J. 2016a. Draft Archaeological Impact Assessment for the Proposed Etna-Trade Route 88kv Powerline and Switching Station, Lenasia, Gauteng Province. Prepared for Nsovo Environmental Consulting.** A single ruin was observed in close proximity to the proposed powerline, several stone cairns were recorded and should be treated as graves, and in the Northern section several structures that could not be accessed was observed.
- **Van der Walt, J. 2016b. Archaeological Impact Assessment for the Proposed Ennerdale X6 Residential Development, Gauteng Province. Prepared for LEAP.** No significant cultural landscapes or viewscapes were noted.
- **van Schalkwyk, J. 2018. Phase 1 Cultural Heritage Impact Assessment: The proposed development of a new concrete Water Reservoir close to Lenasia South, City of Johannesburg Metropolitan Municipality, Gauteng Province. Prepared for Envirolution Consulting.** No site, features or objects of cultural significance were observed in the project area.

3.4 Historical Background of Johannesburg, including Lenasia

3.4.1 *Johannesburg,*

By the 1840's, white farmers established a permanent settlement in the Transvaal highveld, and drew up farm boundaries in the what is presently known as Johannesburg (Bergh, 1999; Van Schalkwyk, 2016). These farms were mainly Doornfontein, Braamfontein and Turffontein (Van Schalkwyk, 2016). However, the farms formally surveyed and mapped in the 1880's (Van Schalkwyk, 2016).

The City of Johannesburg developed from a mining camp after gold-bearing conglomerate was discovered on the farm Langlaagte in 1886 by George Harrison and George Walker, more or less at the same time as discoveries in the Krugersdorp/Roodepoort area by JG Bantjies and the Struben brothers. By September 1886, around 2500 people were living in the general area and 1300 diggers licenses had been issued (Erasmus, 2014). Due to the discovery of the reef and the sudden influx of miners, a special proclamation was issued by the ZAR government, also in September 1886, listing nine farms that were proclaimed as public diggings. The southern portion of the farm Doornfontein was one of these farms. Another of the farms, Randjieslaagte, was owned by the State and was chosen as the site for the new mining town in order to provide revenue for the Government (Erasmus, 2014). The farm Randjeslaagte was one of the first farms where a township was established in the Johannesburg region (Marais-Botes, 2015), due to the need for a town center for the newly discovered goldfields (Van Schalkwyk, 2016).

The town was accordingly surveyed and named Johannesburg (apparently, since both the vice-president, Joubert and the survey clerk Rissik were named Johannes (Erasmus, 2014). A health committee was elected in November 1887. On 1 October 1897, the fledging town was granted a town council followed by municipal status. However, ongoing issues with the so-called *uitlander* population of the town and the British government, which were realised to be due to the rich gold resources, ultimately resulted in the First and Second South African Wars. Notwithstanding this, Johannesburg was relatively unaffected by the conflict until it was occupied by the British forces on 31 May 1900 with virtually no resistance. On 31 May 1902, the British forces captured the Johannesburg region, after a battle that occurred in Klipriviersberg (Wessels, 2010). The war halted gold production until 1902, when the British took direct control over the highveld area and the associated mines (Bonner & Segal, 1998). The mines which had been closed reopened almost immediately after the end of the war in 1902. By 1904, the British colonial government established a proper municipal government and transformed the Johannesburg region into a town. Soon after, the government invested in development of new suburbs and amalgamating existing ones (Marais-Botes 2015). After this Johannesburg and its suburbs grew very rapidly (Erasmus, 2014).

3.4.2 *Lenasia*

During World War II (1939-1945) the Lenz Military base was located on the farm Rietfontein 301. The base was named after Captain Lenz, a German national, who owned the original plot (Mesthrie, 2010). Lenz had acquired the property and settled there much earlier but later sold the property to the government for housing developments (SA History, 2016). In 1948, when the National Party won the elections, they considered various areas to be developed for Indian housing. By 1950 when the Group Areas Act was passed Indians communities had formed in various suburbs in and around Johannesburg, including Turffontein Fordsburg, Doornfontein, Vrededorp, Sophiatown and Newclare

The area where Lenasia is currently located would provide enough space for a housing development, located only 35 km from Johannesburg (SA History, 2016). The area derived its name from combining 'Lenz' (after General Lenz) and 'Asia'. Once the Indian communities were moved into Lenasia people were initially living in the barracks (SA History, 2016). Later however when the first extension was developed people could by plots for R60,00 from the government (SA History, 2016).

By 1955 infrastructure in Lenasia was still non-existent as houses in Extension 1 had no piped water, electricity or sewage (SA History, 2016). Under the Group Areas Act Lenasia was proclaimed an Indian township in 1958 (SA History, 2016). According to an article by Dickenson in The Star Newspaper (1966) Indian communities who lived in Lenasia during 1966 were still living in poor conditions. Later 12th Street, a single U-shaped street became the first residential area, with the first families settling here (SA History, 2016). The first high school, Lenz High School, was opened in 1955 and consisted of Asbestos infrastructure. Students traveling to the school via bus or train, as they were not granted access to other schools within Johannesburg (SA History, 2016). After Apartheid ended in 1994, a brick structure replaced the asbestos structure.

3.4.3 *Conclusions*

The archival and historical research has revealed that the Rietfontein farm has a history of occupation. To the north-west of the project area, the portion of the farm was used as a military base and later redeveloped as housing for Indian communities under the Group Areas Act of 1950.

3.5 Archival/historical maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Topographic maps (1:50 000) for various years (1944 1956 and 1977) were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The maps were also used to assess the possible age of structures located, to determine whether they could be considered as heritage sites. Map overlays were created showing the possible heritage sites identified within the areas of concern, as can be seen below **(Figure 9-Figure 12).**

The relevant topographical maps include:

- Grasmere 2627BD, First Edition, Compiled and drawn in 1944 by Survey Depot (Tech) S.A.E.C. and printed by G.P.W. in 1944.

- Grasmere 2627BD, Second Edition, which was surveyed in 1954, drawn in 1956 by the Trigonometric Survey Office and printed by the Government Printer in 1972.
- Grasmere 2627BD, Third Edition, 1976; which was published by the Chief Director of Surveys and Mapping and printed by the Government Printer.

It can be seen that all the map sheets consulted depict the entire project area surrounded by numerous built structures and huts, as well as old mining excavations. Historical roads and railway lines are also depicted.

Only those heritage structures that are situated within or immediately adjacent to the proposed project area have been highlighted by orange polygons. Apart from the Lenz Military base to the north-west of the project area no other formal infrastructure was observed on the topographic maps.

Also, important to note, is the graves that are depicted on the topographic maps. On the First Edition 1944 Topographic map (Grasmere 2627BD) a grave was marked to the north-east of the project area. On the Second Edition 1956 Topographic map (Grasmere 2627BD) 4 graves were marked to the north and north east of the project area, while only one grave appears to the north of the project area on Third Edition Topographic map 1976 (Grasmere 2627BD). From these maps no graves were marked within the project area.

Furthermore, from the Chief Surveyor General database (http://csg.dla.gov.za/) the Farm Rietfontein 301 was surveyed in 2005 by S.A. Strydom **(Figure 13).**

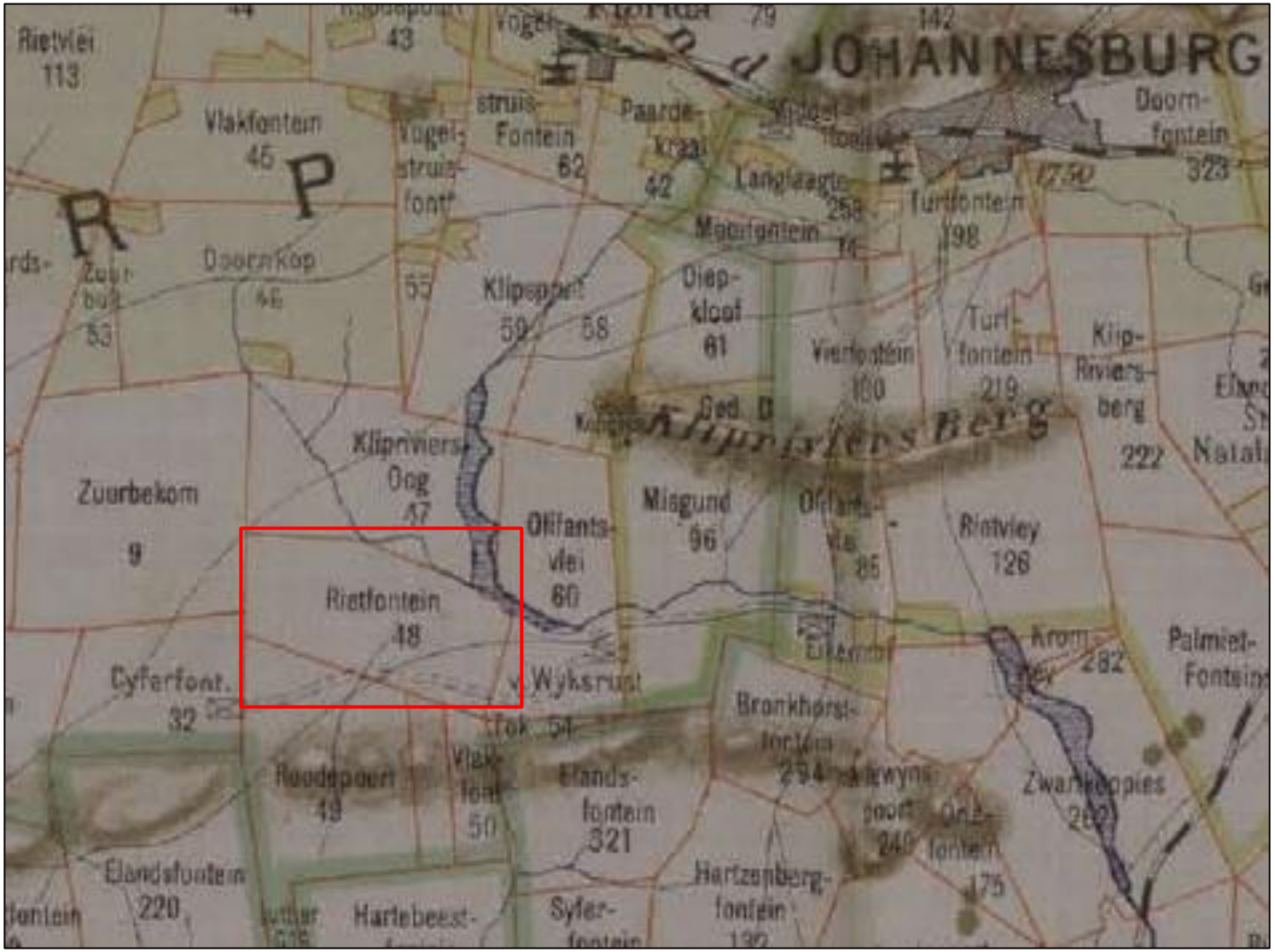

Figure 9 - Farm Rietfontein on which Lenasia would later be located (Jeppe's map of the Transvaal of the South African Republic and surrounding territories 1899)

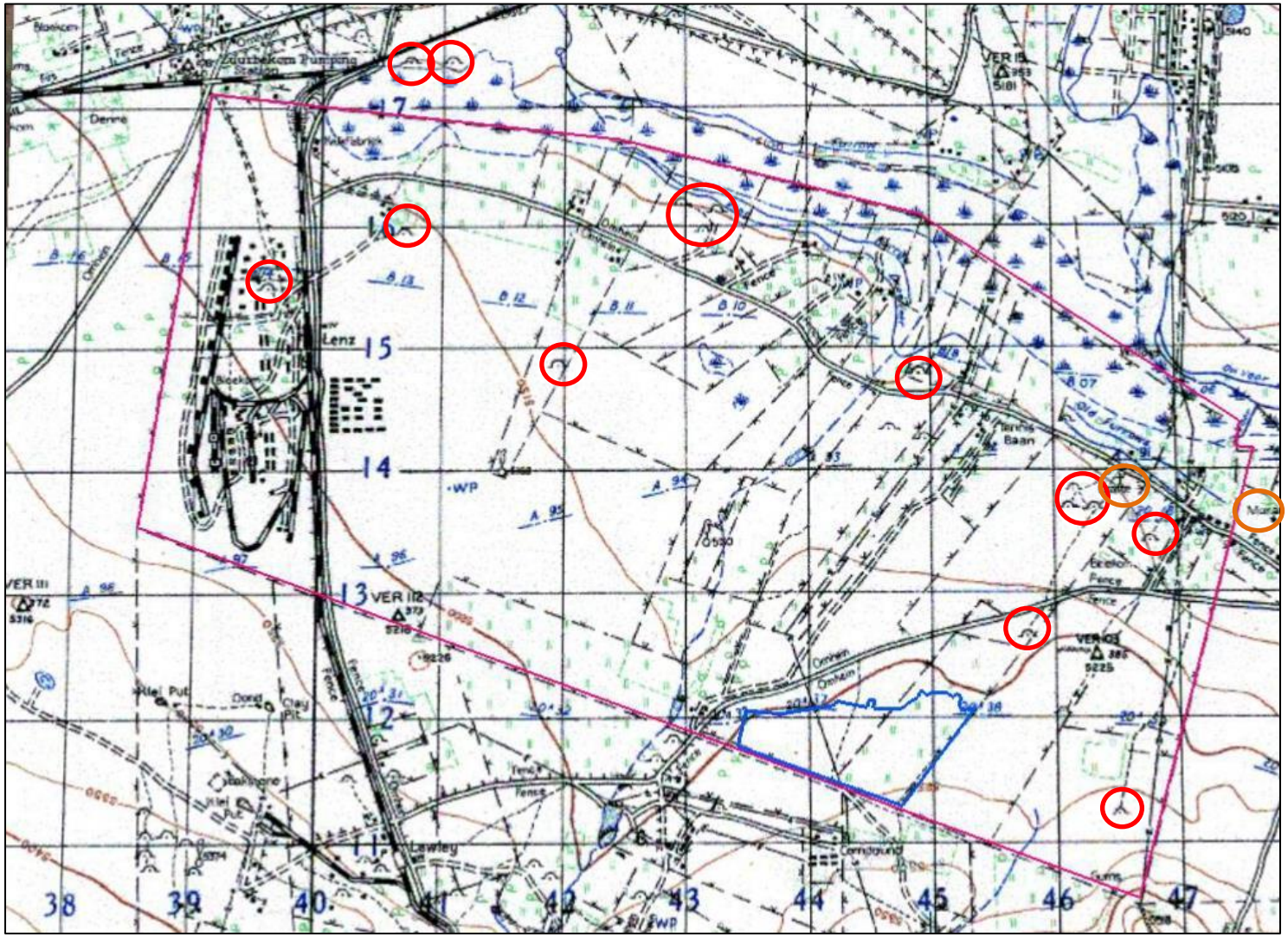

Figure 10 – First Edition Topographic map (1:50 000) Grasmere 2627BD dating to 1944 showing the Farm Rietfontein, with several heritage features (orange polygons) and huts (red polygons) located in close proximity to the project area (blue polygon).

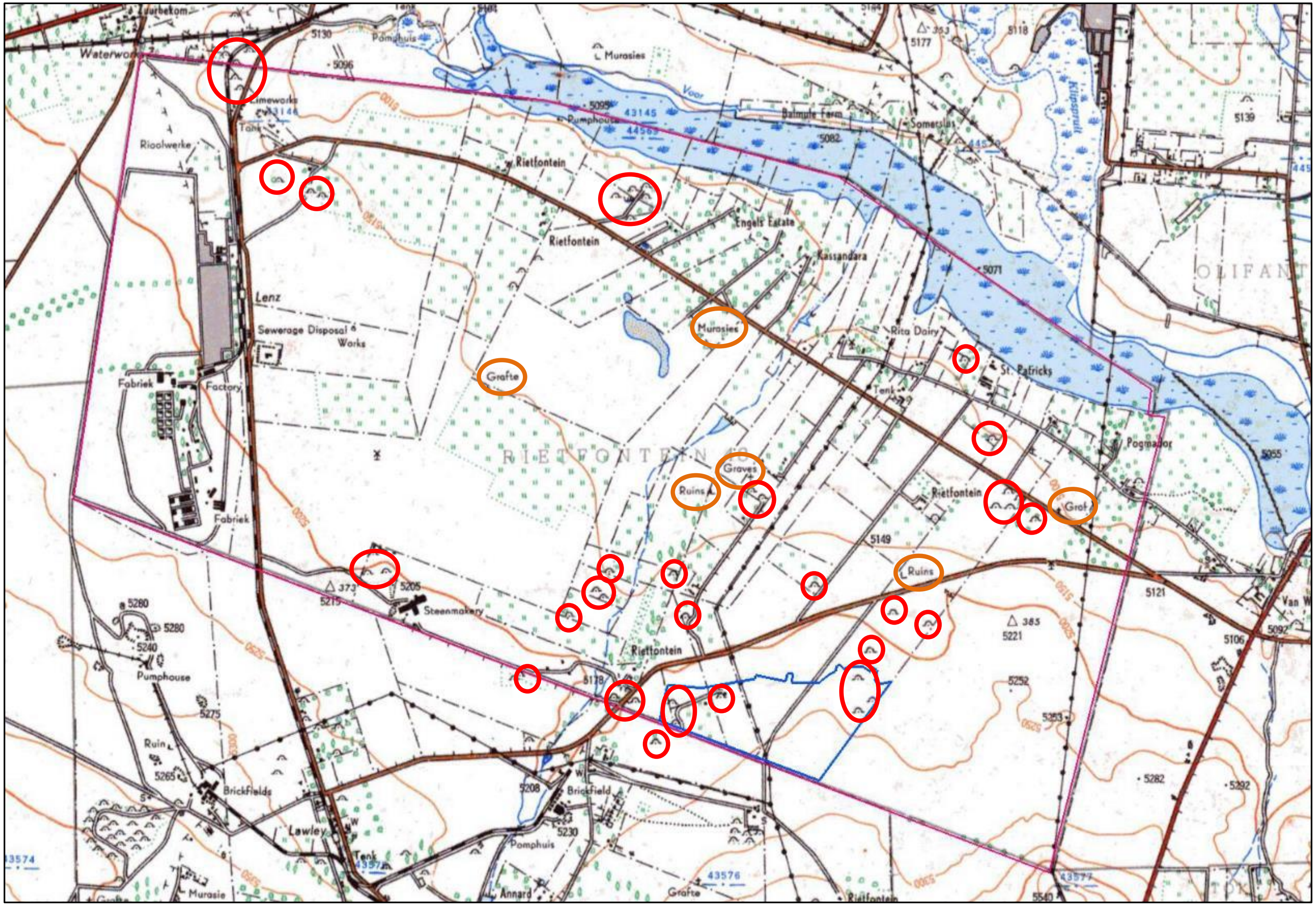

Figure 11 – Second Edition Topographic map (1:50 000) Grasmere 2627BD dating to 1956 showing the Farm Rietfontein, with several heritage features (orange polygons) and huts (red polygons) located in close proximity to the project area (blue polygon).

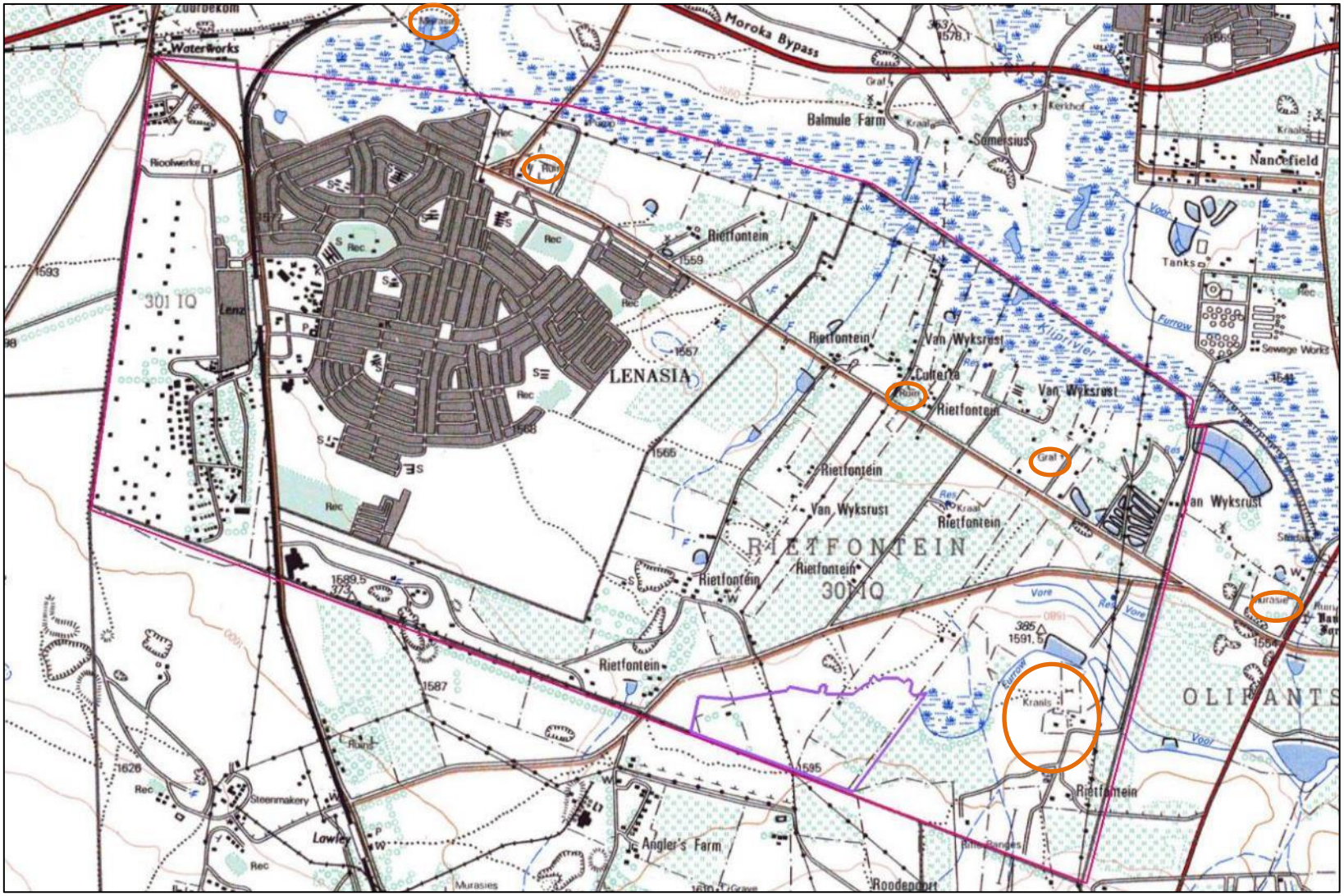

Figure 12 –Third Edition Topographic map (1:50 000) Grasmere 2627BD dating to 1976 showing the Farm Rietfontein and Lenasia, with several heritage features (orange polygons) located in close proximity to the project area (purple polygon).

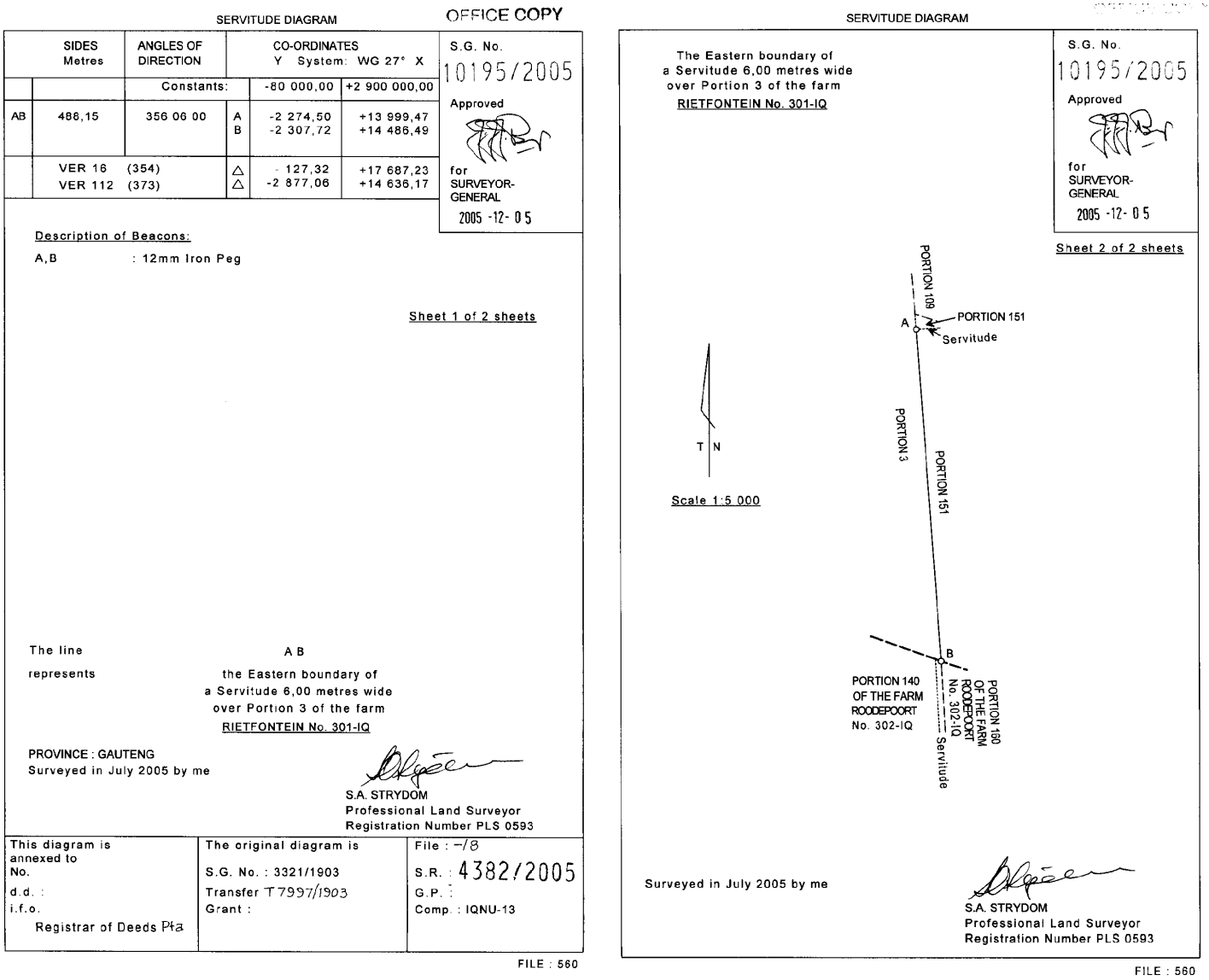

Figure 13 – SG-Diagram from the Chief Surveyor General database for the Farm Rietfontein 301, surveyed in 2005 by S.A. Strydom.

3.6 Findings of historical desktop study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (**Figure 14**).

3.6.1 *Heritage Sensitivity*

The sensitivity maps were produced by overlying:

- Satellite Imagery;
- Current Topographical Maps; and
- First to third edition Topographical Maps dating from the 1940's to 1970s.

This enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Archaeological Sensitive areas; and
- Structures/Buildings.

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in ***Table 2***.

Table 2 -Tangible heritage sites in the study area

Name	Description	Legislative protection
Archaeology - Iron Age Sites	Older than 100 years	NHRA Sect 3 and 35
Architectural Structures	Possibly older than 60 years	NHRA Sect 3 and 34
Graves and Burial Grounds	60 years or older	NHRA Sect 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix in ***Table 3*.**

Table 3 - Landform type to heritage find matrix

LANDFORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters, LIA settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Watering holes/pans/rivers	LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements
Forested areas	LIA sites

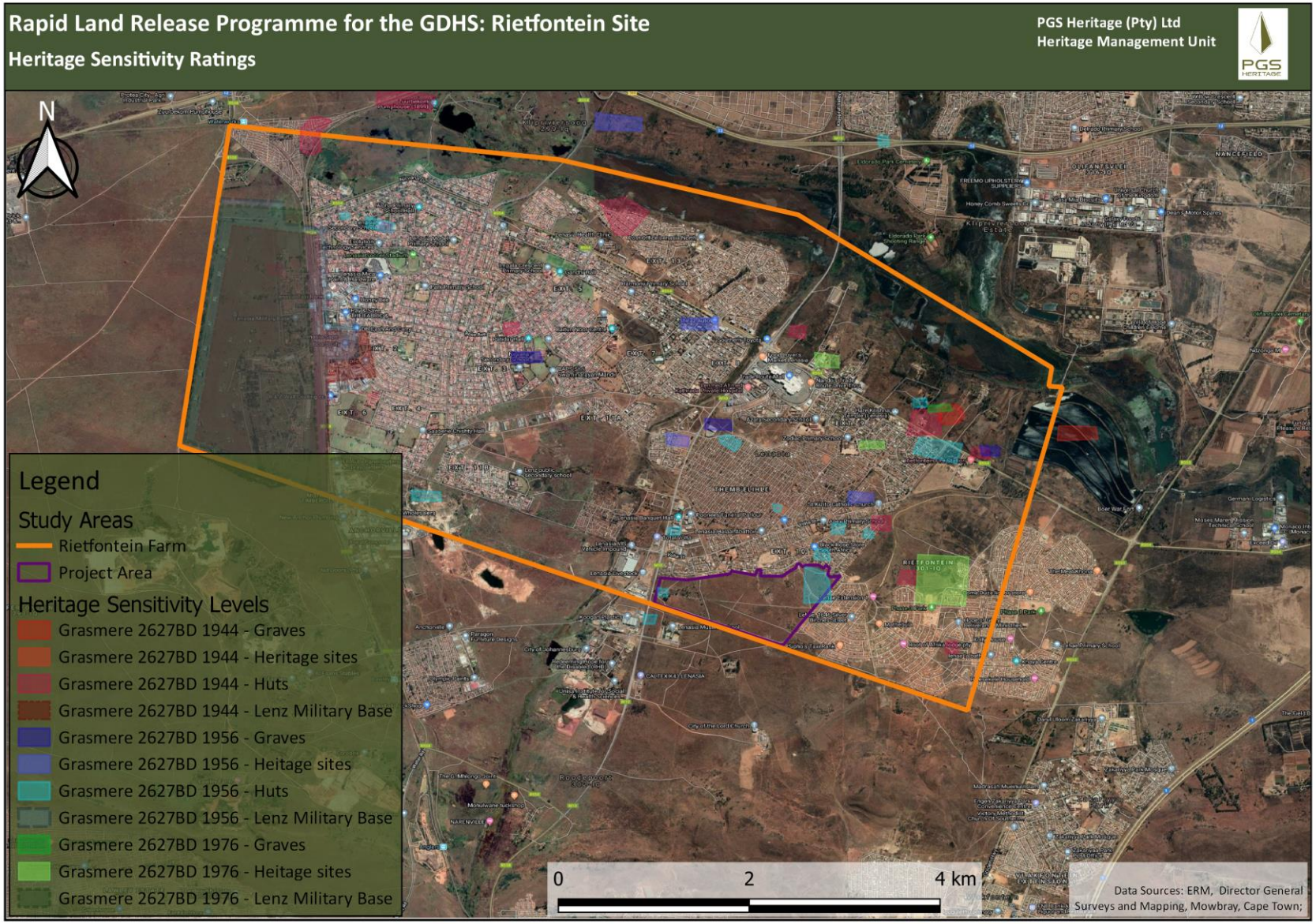

Figure 14 – Heritage sensitivity map indicating possible sensitive areas for Rietfontein site area – Overview map.

4 FIELDWORK AND FINDINGS

A controlled surface survey was conducted on foot and by vehicle over a period of one day by a heritage specialists and field technician from PGS. The fieldwork was conducted on 16 January 2029. The track logs (in blue) for the survey are indicated in **Figure 15**.

The fieldwork identified 10 heritage features (**RFS01-RFS10**). **RFS01, RFS02** and **RFS03** are Open-Air Churches, while **RFS04-RFS06** are the ruins of several brick or concrete structures. **RFS08** is the only grave identified, while **RFS07, RFS09 and RFS10** could potentially also be graves.

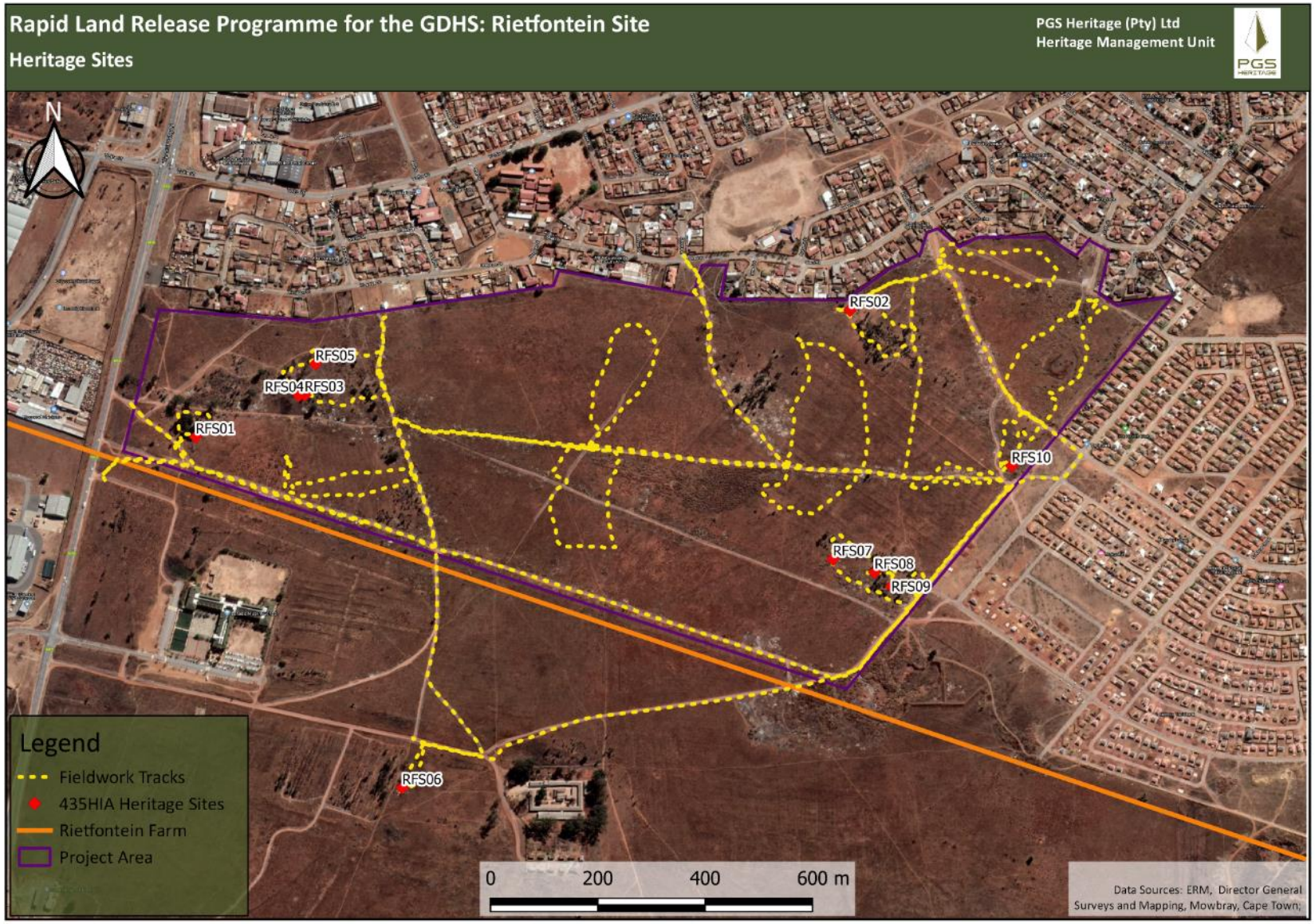

Figure 15 – Locality of the heritage resource in the study area

Table 4 - Sites identified during heritage survey

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS01	26°20'50.16"S	27°51'23.12"E	The site consists of an Open-Air Church. The church was demarcated with white painted rocks arranged in two circles around several trees **(Figure 16).** Two white lines were also painted on the trees. Two smaller brick structures located 30 north-east of the church were also observed. The two structures are associated with the church and are used as toilets. No information relating to the establishment of the church could be found. And although no members of the church community were present at the site during the field visit, it is clear from the nature of the site (cleared grass and assess roads) that the site is currently used. Typically circles of white stones under the trees are associated with Shembe outdoor churches (Mchunu, 2018). Churches and places of cultural or religious significance to a community are protected under Section 3 of the National Heritage Resources Act, No. 25 of 1999. Thus, the site is provisionally rated as having a medium heritage significance with a heritage rating of IIIB. In the event that the site cannot be excluded from the planned development: *It is recommended that through consultation and involvement of the church presiding elders, the church be relocated to an alternative location, with the costs associated covered by the developer.*	Medium	Grade IIIB

[1] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
  *Figure 16 – Open Air Church at RFS01*					
RFS02	26°20'42.78"S	27°52'2.48"E	The site consists of an Open-Air Church. The site is demarcated with rocks and rope **(Figure 17 - Figure 19)**. Three flags (red, green and white) were located on the eastern border of the church. A small open pit toilet was located to the west of the church. Churches and places of cultural or religious significance to a community are protected under Section 3 of the National Heritage Resources Act, No. 25 of 1999. Thus, the site is provisionally rated as having a medium heritage significance with a heritage rating of IIIB. In the event that the site cannot be excluded from the planned development: *It is recommended that through consultation and involvement of the church presiding elders, the church be relocated to an alternative location, with the costs associated covered by the developer.*	Medium	Grade IIIB

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 17 – Open Air Church at RFS02

Figure 18 - Flags associated with the Open-Air Church.

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 19 - Pit toilet associated with RFS02

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS03	26°20'47.89"S	27°51'29.61"E	The site consists of an Open-Air Church. The site is demarcated with packed rocks place along the western border **(Figure 20-Figure 21)**. Churches and places of cultural or religious significance to a community are protected under Section 3 of the National Heritage Resources Act, No. 25 of 1999. Thus, the site is provisionally rated as having a medium heritage significance with a heritage rating of IIIB. In the event that the site cannot be excluded from the planned development: *It is recommended that through consultation and involvement of the church presiding elders the church be relocated to an alternative location, with the costs associated covered by the developer.*	Medium	Grade IIIB

Figure 20 – Open Air Church at RFS03

Figure 21 – Heaps of packed stones marking the church grounds

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS04	26°20'47.91"S	27°51'29.26"E	A circular feature was identified approximately 10m west of RSF03. The circular structure is approximately 1m in diameter and made from stone and concrete (Figure 22). It has no relation or association with the Open-Air Church. The feature is contemporary in nature, not of heritage significance and requires no mitigation.	No research potential or other cultural significance	NCW

Figure 22: Feature identified at RFS04

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS05	26°20'46.02"S	27°51'30.27"E	A rectangular structure was identified towards the north-western section of the project area. The structure appears to be the remains of a concrete floor (**Figure 23**). The structure is dilapidated and overgrown with vegetation. The feature is contemporary in nature, not of heritage significance and requires no mitigation.	No research potential or other cultural significance	NCW

Figure 23 - Feature identified at RFS05

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS06	26°21'11.58"S	27°51'35.49"E	A dilapidated brick structure was observed about 400m to the south of the project area. The brick structure falls outside the current project area but within the 500m zone of influence. The structure consists of several brick steps leading to a platform (**Figure 24 - Figure 25).** The structure most likely formed part of the previous farming activities that took place on the property and could have been used to house two reservoirs. Although the feature was most likely used when the area was still a farm, it is not of heritage significance and requires no mitigation.	No research potential or other cultural significance	NCW

Figure 24 - Feature identified at RFS06

Figure 25 - View of the northern section of the feature.

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS07	26°20'57.80"S	27°52'1.46"E	A possible grave was identified in the south-eastern section of the project area. The site consists of an anthill with neatly placed concrete stones next to it (**Figure 26).** The feature is about 1m wide. The possible age of the feature could not be determined as no other grave markers were present. However, the area where the possible grave was located was also identified by community members as containing graves during the site visit. Potential impact on the possible grave is very high as the site falls directly within the proposed development area, and the area in which the feature is located is heavily disturbed by overgrown vegetation and illegal dumping. Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the site is provisionally rated as having a high heritage significance with a heritage rating of IIIA. It is recommended that: ▪ The site be demarcated with a 50-meter buffer and the grave should be avoided. ▪ Undertake archaeological monitoring at earth clearance stage. ▪ If human remains are discovered a grave relocation process for site RFS07 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations. ▪ If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.	High	IIIA

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 26 - Possible grave identified at RFS07

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS08	26°20'58.59"S	27°52'3.97"E	A grave was identified in the south-eastern section of the project area. The site consists of stones packed in a circle and is located approximately 70m east of RSF07 (**Figure 27**). Potential impact on the grave is very high as the site falls directly within the proposed development area. The area in which the grave is located is heavily disturbed by overgrown vegetation and illegal dumping. Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the site is provisionally rated as having a high heritage significance with a heritage rating of IIIA. It is recommended that: ▪ The site be demarcated with a 50-meter buffer and that the grave should be avoided. ▪ A grave relocation process for site RFS08 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations.	High	IIIA

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 27 - Grave identified at RFS08

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS09	26°20'59.44"S	27°52'4.98"E	A second possible grave was identified to the approximately 40m east of RFS08. The grave is rectangular in shape with what appears to be corner dressings on the eastern side of the grave (**Figure 28**). The grave is passioned south-east to north-west. To the south of the possible grave approximately 4 m is a tree with a yellow tape around it, that could possibly be serving as a marker for the grave, since the area is heavily disturbed (**Figure 29**). Potential impact on the possible grave is very high as the site falls directly within the proposed development area, and the area in which the feature is located is heavily disturbed by overgrown vegetation and illegal dumping. Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the site is provisionally rated as having a high heritage significance with a heritage rating of IIIA. It is recommended that: ▪ The site be demarcated with a 50-meter buffer and the grave should be avoided. ▪ Undertake archaeological monitoring at earth clearance stage. ▪ If human remains are discovered a grave relocation process for site RFS09 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations. ▪ If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.	High	IIIA

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 28 - Possible grave identified at RFS09

Figure 29 - Possible grave next to tree with yellow tape around it

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
RFS10	26°20'52.17"S	27°52'12.24"E	A third possible grave was identified approximately 300m north-east of RFS09. The site consists of an anthill with neatly placed concrete stones next to it (**Figure 30**Figure 26). The feature is about 1m wide. The possible age of the feature could not be determined as no other grave markers were present. Potential impact on the possible grave is very high as the site falls directly within the proposed development area, and the area in which the feature is located is heavily disturbed by overgrown vegetation and illegal dumping. Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the site is provisionally rated as having a high heritage significance with a heritage rating of IIIA. It is recommended that: ▪ The site be demarcated with a 50-meter buffer and the grave should be avoided. ▪ Undertake archaeological monitoring at earth clearance stage. ▪ If human remains are discovered a grave relocation process for site RFS10 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations. ▪ If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.	High	IIIA

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 30 - Possible grave identified at RFS10

5 PALAEONTOLOGY

The Proposed Project area is partially underlain by Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group) within the Transvaal Supergroup and Vryheid Formation of the Ecca Group as well as the Volksrust Formation which falls partially in the Ecca Group and partially in the Adelaide Subgroup of the Beaufort Group.

According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Malmani Subgroup and Vryheid Formation is Very High while that of the Volksrust formation a High (Almond and Pether 2008, SAHRIS website). Groenewald and Groenewald 2014 allocated a high Sensitivity to the Malmani Subgroup. They noted that potentially fossiliferous Late Caenozoic Cave breccias within the "Transvaal dolomite" outcrop area could be present. These breccias are not individually mapped on geological maps. As can be seen in **Figure 31,** the proposed area of the project footprint occurs in an area where the palaeontology is assessed as being entirely of Very High (red) to High (yellow/orange) sensitivity. As such a field assessment and protocol for fins is required.

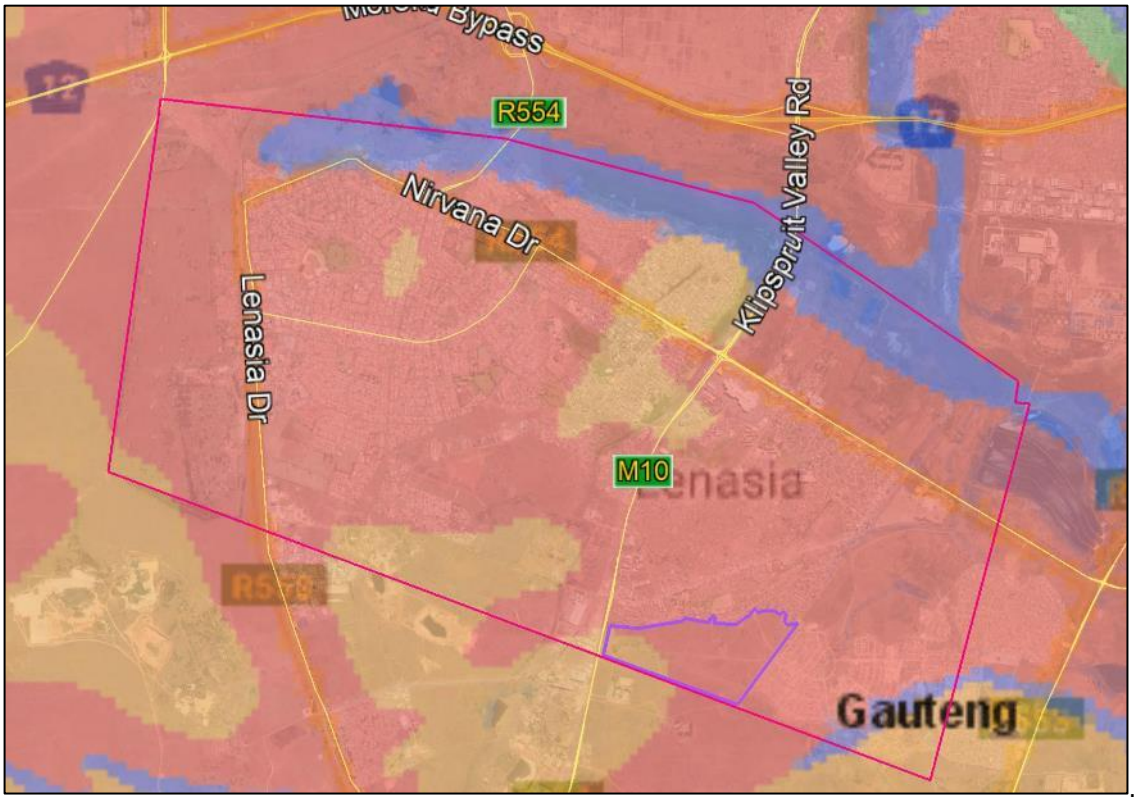

Figure 31 – Overlay of the Rietfontein site area in Lenasia on the palaeosensitivity map from the SAHRIS database. This shows that most of the area is coloured red, which is rated as Very High to High sensitivity

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

Figure 32 - SAHRIS palaeosensitivity ratings table

6 IMPACT ASSESSMENT

The following section provides the impact of the proposed development on identified heritage resources.

Activities within the framework of the proposed development and their respective construction and operational phases, give rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into three phases from which impacting activities can be identified. These are the Construction, the Operational and the Decommissioning Phase. Each of these are discussed below:

Construction phase:
This phase refers to all the pre-construction and construction related activities on site, until the contractor leaves the site.

Operational phase:
This includes all post construction activities, including the operation and maintenance of the proposed development.

Decommissioning Phase:
This includes all activities associated with the closure and decommissioning of the proposed development, including any removal of infrastructure and rehabilitation that may need to occur.

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared

with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in **Table** 5.

Table 5 - Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	Proposed site	Incidental
2	LOW	Study area	Short-term
3	MODERATE	Local	Medium/High-term
4	HIGH	Regional / Provincial	Long-term
5	VERY HIGH	Global / National	Permanent

A more detailed description of each of the assessment criteria is given in the following sections.

6.1 Significance Assessment

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1 000 km2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in **Table 6** below.

Table 6 - Description of the significance rating scale

RATING		DESCRIPTION
5	Very high	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	High	Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.

3	Moderate	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	Very low	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity are needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	No impact	There is no impact at all - not even a very low impact on a party or system.

6.2 Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 7.**

Table 7 - Description of the significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible and will be felt at a regional scale (District Municipality to Provincial Level).
3	Local	The impact will affect an area up to 10 km from the proposed site.
2	Study Site	The impact will affect an area not exceeding the Eskom property.
1	Proposed site	The impact will affect an area no bigger than the ash disposal site.

6.3 Duration Scale

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in **Table 8**.

Table 8 - Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium/High term	The environmental impact identified will operate for the duration of life of facility.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

6.4 Degree of Probability

Probability or likelihood of an impact occurring will be described as shown in **Table 9** below.

Table 9 - Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely
5	It's going to happen / has occurred

6.5 Degree of Certainty

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used as discussed in **Table 10**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 10 - Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.
Don't know	The consultant cannot, or is unwilling, to make an assessment given available information.

6.6 Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus, the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

$$\textbf{\textit{Impact Risk}} = \frac{(\text{SIGNIFICANCE} + \textit{Spatial} + \text{Temporal}) \times \text{Probability}}{3 \qquad\qquad 5}$$

An example of how this rating scale is applied is shown in **Table 11**.

Table 11: Example of Rating Scale

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	LOW	Local	Medium/High-term	Could Happen	
Impact to air	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the **Table 12** below.

Table 12 - Impact Risk Classes

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	**Very Low**
1.1 – 2.0	2	**Low**
2.1 – 3.0	3	**Moderate**
3.1 – 4.0	4	**High**
4.1 – 5.0	5	**Very High**

Therefore, with reference to the example above, an impact rating of 1.6 will fall in the Impact Class 2, which will be a low impact.

6.7 Heritage Impacts

The fieldwork identified 10 heritage features (**RFS01-RFS10**). **RFS01, RFS02** ad **RFS03** are Open-Air Churches, while **RFS04-RFS06** are the ruins of several brick or concrete structures. **RFS08** is the only grave identified, while **RFS07, RFS09 and RFS10** could potentially also be graves.

6.7.1 *Built Environment*

RFS01, RFS02 and **RFS03** (Open-Air Churches) have a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the Open-Air Churches will be HIGH negative before mitigation. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

6.7.2 *Historical structures*

RFS04-RFS06 has no heritage significance and has no cultural significance.

The impact significance before mitigation on the historical structures **(RFS04-RFS05)** will be LOW negative before mitigation. During the construction of the proposed development it is **very unlikely** that **RFS06** will be impacted. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

6.7.3 *Burial Grounds and graves*

The grave at **RFS08**, and potential graves at **RFS07, RFS09** and **RFS10** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be HIGH negative before mitigation. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

The communities of Lenasia have also indicated that the possibility of graves in the north-western corner does exist even though fieldwork has revealed no evidence of this.

6.8 Palaeontological Impacts

As noted in Section 5 above, the Rietfontein site, according to SAHRIS falls within a Very High (red) to High (yellow/orange) sensitivity area. However, no fossiliferous outcrop was found in the proposed development area during the paleontological site visit. For this reason, an overall low palaeontological sensitivity is allocated to the development footprint. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

6.9 Impact Assessment Table

Table 13 - Impact Assessment Table (pre-mitigation)

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	MODERATE	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on Open Air Church (RFS01)	-	3	1	5	5	**3,00**
	Negative	MODERATE	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on Open Air Church (RFS02)	-	3	1	5	5	**3,00**
	Negative	MODERATE	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on Open Air Church (RFS03)	-	3	1	5	5	**3,00**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on circular concrete structure (RFS04)	-	1	1	5	5	**2,33**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on concrete structure (RFS05)	-	1	1	5	5	**2,33**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Practically impossible	
Impact on dilapidated brick structure (RFS06)	-	1	1	5	1	**0,47**
	Negative	HIGH	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on possible grave (RFS07)	-	4	1	5	5	**3,33**
	Negative	HIGH	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on grave (RFS08)	-	4	1	5	5	**3,33**
	Negative	HIGH	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on possible grave (RFS09)	-	4	1	5	5	**3,33**
	Negative	HIGH	Isolated Sites / proposed site	Permanent	It's going to happen / has occurred	
Impact on possible grave (RFS10)	-	4	1	5	5	**3,33**

Table 14 - Impact Assessment Table (post-mitigation)

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on Open Air Church (RFS01)	-	2	1	4	2	**0,93**
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on Open Air Church (RFS02)	-	2	1	4	2	**0,93**
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on Open Air Church (RFS03)	-	2	1	4	2	**0,93**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Unlikely	
Impact on circular concrete structure (RFS04)	-	1	1	5	2	**0,93**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Unlikely	
Impact on concrete structure (RFS05)	-	1	1	5	2	**0,93**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Practically impossible	
Impact on dilapidated brick structure (RFS06)	-	1	1	5	1	**0,47**
	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Unlikely	
Impact on possible grave (RFS07)	-	1	1	5	2	**0,93**
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on grave (RFS08)	-	2	1	4	2	**0,93**
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on possible grave (RFS09)	-	2	1	4	2	**0,93**
	Negative	LOW	Isolated Sites / proposed site	Long term	Unlikely	
Impact on possible grave (RFS10)	-	2	1	4	2	**0,93**

6.10 Management recommendations and guidelines

6.10.1 *Construction phase*

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camp areas and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

6.10.2 *Chance find procedure*

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

6.10.3 *Possible finds during construction and operation (mining activities)*

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities, could uncover the following:

- stone foundations;
- ash middens associated with the historical structures that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives.
- unmarked graves

6.11 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 15** gives guidelines for lead times on permitting.

Table 15 - Lead times for permitting and mobilisation

Action	Responsibility	Timeframe
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial grounds or graves in the way of construction	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

6.12 Heritage Management Plan for EMPr implementation

Table 16 - Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case where possible heritage finds are uncovered	Construction and operation	During construction and operation	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS01	In the event that the site cannot be excluded from the planned development: • It is recommended that through consultation and involvement of the church presiding elders, the church be relocated to an alternative location, with the costs associated covered by the developer.	Construction through to operation	Prior to and during construction	Applicant ECO Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS02	In the event that the site cannot be excluded from the planned development: • It is recommended that through consultation and involvement of the church presiding elders, the church be relocated to an alternative location, with the costs associated covered by the developer.	Construction through to operation	Prior to and during construction	Applicant ECO Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS03	In the event that the site cannot be excluded from the planned development: • It is recommended that through consultation and involvement of the church	Construction through to operation	Prior to and during construction	Applicant ECO Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	presiding elders, the church be relocated to an alternative location, with the costs associated covered by the developer.					Section 36 and 38 of NHRA	
RFS04	The feature is contemporary in nature, not of heritage significance and requires no mitigation.	Construction through to Operational	Prior to and during construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS05	The feature is contemporary in nature, not of heritage significance and requires no mitigation.	Construction through to Operational	Prior to and during construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS06	The feature is contemporary in nature, not of heritage significance and requires no mitigation.	Construction through to Operational	Prior to and during construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS07	The site be demarcated with a 50-meter buffer and the grave should be avoided. Undertake archaeological monitoring at earth clearance stage. If human remains are discovered a grave relocation process for site RFS07 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be	Construction through to Operational	During Construction and Operation	Applicant Environmental Control Officer (ECO) Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	applied for with the SAHRA under the NHRA and National Health Act regulations. If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.						
RFS08	Demarcate site with a 50-meter buffer and avoid. A grave relocation process for site RFS08 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations.	Construction through to Operational	Prior to and during construction	Applicant ECO Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
RFS09	The site be demarcated with a 50-meter buffer and the grave should be avoided. Undertake archaeological monitoring at earth clearance stage. If human remains are discovered a grave relocation process for site RFS09 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations. If during the test excavations it is determined that the feature is	Construction through to Operational	During Construction and Operation	Applicant Environmental Control Officer (ECO) Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	not a grave, the site will then have no heritage significance and require no further mitigation.						
RFS10	The site be demarcated with a 50-meter buffer and the grave should be avoided. Undertake archaeological monitoring at earth clearance stage. If human remains are discovered a grave relocation process for site RFS10 is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA under the NHRA and National Health Act regulations. If during the test excavations it is determined that the feature is not a grave, the site will then have no heritage significance and require no further mitigation.	Construction through to Operational	During Construction and Operation	Applicant Environmental Control Officer (ECO) Heritage specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

7 CONCLUSIONS

The HIA has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries. Through data analysis and a site investigation the following issues were identified from a heritage perspective.

Heritage Sites

7.1.1 *Heritage Sites in the vicinity of the Rietfontein Site*

The fieldwork identified 10 heritage features (**RFS01-RFS10**). **RFS01, RFS02** and **RFS03** are Open-Air Churches, while **RFS04-RFS06** are the ruins of several brick or concrete structures. **RFS08** is the only grave identified, while **RFS07, RFS09 and RFS10** could potentially also be graves.

7.1.2 *Built Environment*

RFS01, RFS02 and **RFS03** (Open-Air Churches) have a medium heritage significance with a heritage grading of IIIB.

The impact significance before mitigation on the Open-Air Churches will be MEDIUM negative. *Only the study site will be affected by the proposed development*. T**he possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

7.1.3 *Historical structures*

RFS04-RFS06 has no heritage significance and has no cultural significance.

The impact significance before mitigation on the historical structures **(RFS04-RFS05)** will be MEDIUM to LOW negative. During the construction of the proposed development it is **very unlikely** that **RFS06** will be impacted. *Only the study site will be affected by the proposed development*. **The possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

7.1.4 *Burial Grounds and graves*

The grave at **RFS08**, and potential graves at **RFS07, RFS09** and **RFS10** has a high heritage rating and a heritage grading of IIIA.

The impact significance before mitigation on the cemetery and graves sites will be HIGH negative. *Only the study site will be affected by the proposed development*. **The possibility of the impact occurring is highly possible.** The expected duration of the impact is assessed as potentially permanent. Implementation of the recommended mitigation measures will modify this impact rating to an acceptable LOW negative.

The communities of Lenasia have also indicated that the possibility of graves in the north-western corner does exist even though fieldwork has revealed no evidence of this.

7.2 Palaeontological Impacts

As noted in Section 5 above, the Rietfontein site, according to SAHRIS falls within a Very High (red) to High (yellow/orange) sensitivity area. However, no fossiliferous outcrop was found in the proposed development area during the paleontological site visit. For this reason, an overall low palaeontological sensitivity is allocated to the development footprint. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

7.3 General

It is the author's considered opinion that overall impact on heritage resources is High to Low. Provided that the recommended mitigation measures are implemented, the impact would be acceptably low or could be totally mitigated to the degree that the project could be approved from a heritage perspective. The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources

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Appendix A

Heritage Assessment Methodology

The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted by vehicle through the proposed project area by a qualified heritage specialist. The survey was conducted over one day (21 August 2019), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on four 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)
    - Low - <10/50m2
    - Medium - 10-50/50m2
    - High - >50/50m2
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate development activity position;
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (Error! Reference source not found. and Error! Reference source not found.**)**.

Table A 1: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table A 2: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

Appendix B

Project team CV's

PROFESSIONAL CURRICULUM FOR CHERENE DE BRUYN

Name:	Cherene de Bruyn
Profession:	Archaeologist
Date of Birth:	1991-03-01
Parent Firm:	PGS Heritage (Pty) Ltd
Position in Firm:	Archaeologist
Years with Firm:	1 Month
Years' experience:	2
Nationality:	South African
HDI Status:	White Female

EDUCATION:

Name of University or Institution	:	University of Pretoria
Degree obtained:	:	BA
Major subjects	:	Archaeology and Anthropology
Year	:	2010-2012

Name of University or Institution	:	University of Pretoria
Degree obtained	:	BA (Hons)
Major subjects	:	Archaeology
Year	:	2013

Name of University or Institution	:	University of Pretoria
Degree obtained	:	BSc (Hons)
Major subjects	:	Physical Anthropology
Year	:	2015

Name of University or Institution	:	University College London
Degree obtained	:	MA
Major subjects	:	Archaeology
Year	:	2016/2017

Professional Qualifications:

Association of Southern African Professional Archaeologists - Professional Member (#432)

International Association for Impact Assessment South Africa - Member (#6082)

Association of Southern African Professional Archaeologists - CRM Accreditation

- Principle Investigator: Grave relocation
- Field Director: Colonial period archaeology, Iron Age archaeology
- Field Supervisor: Rock art, Stone Age archaeology
- Laboratory Specialist: Human Skeletal Remains

Languages:

Afrikaans

English

KEY QUALIFICATIONS

Heritage Impact Assessment Management, Historical and Archival Research, Archaeology, Physical Anthropology, Grave Relocations, Fieldwork and Project Management including *inter alia*

Summary of Experience

Involvement in various grave relocation projects and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa

- Heritage Impact Assessments for various projects

HERITAGE ASSESSMENT PROJECTS

Below a selected list of Heritage Impact Assessments (HIA) Projects involvement:

- Heritage Impact Assessment for the proposed Prospecting Right Application on the Farm Reserve No 4 15823 And 7638/1, near St Lucia, within the jurisdiction of the Mfolozi Local Municipality in the King Cetshwayo District Municipality, KwaZulu-Natal Province.
- Heritage Public Participation report for the refurbishments of Lyttleton Primary School, Lyttleton Manor, Centurion, Gauteng Province.
- Heritage Public Participation report for the proposed alterations Of Erf 1/966 Rosettenville or 94 Main Street Rosettenville within the City Of Johannesburg Metropolitan Municipality, Gauteng Province.
- Heritage Impact Assessment for the proposed mining rights on the Farm Waterkloof 95 located between Griekwastad and Groblershoop in the Pixley Ka Seme District Municipality within the Northern Cape Province.
- Heritage Impact Assessment for the proposed East Coast Gas 400 Kv Power Lines, located in Richards Bay, within the Umhlathuze Local Municipality in the King Cetshwayo District Municipality in the Kwazulu-Natal Province.
- Heritage Impact Assessment for the mining right application for the Farm Woodlands 407, situated in the Free State Province.
- Heritage Impact Assessment for the refurbishments of Lyttelton Primary School, Lyttelton Manor, Centurion, Gauteng Province.
- Heritage Impact Assessment for the refurbishments of the Caledonian Stadium in Pretoria, Gauteng Province.
- Heritage Impact Assessment for the amendment of an existing prospecting right and environmental authorization for Bothaville NE Ext A, situated in the Free State Province.
- Heritage Impact Assessment Study for the Proposed New Lambano Sub Acute Facility on Stand 5454, 5455, 5456,5457 and New Training Facility on Stands 5458 and 5460 in Kensington, Johannesburg.
- Heritage Impact Assessment for the Prospecting Right and Environmental Authorization Application for Ventersburg B situated in the Free State Province.
- Heritage Impact Assessment for the proposed prospecting rights application and environmental authorisation for the farm Three Sisters in Barberton, within the city of Mbombela Local District, Mpumalanga.

- Heritage Impact Assessment and Integrated Cultural Resources Management Study for The Proposed Mfolozi-Mbewu 765kv Transmission Line, Zululand And King Cetshwayo District Municipality, KwaZulu-Natal.
- Heritage Impact Assessment for the proposed for the Construction of the Bulk Water Supply Pipeline and Feeder Pipes in Dunnottar, Gauteng Province.
- Heritage Impact Assessment for the Proposed KwaThema to Grundlingh WWTW Bulk Outfall Sewer: Capital Project Implementation near Nigel, Gauteng Province.
- Heritage Impact Assessment the prospecting right and environmental authorisation application for Kroonstad South situated in the Free State Province.
- Heritage Impact Assessment the prospecting right and environmental authorisation application for Vredefort West situated in the Free State Province.
- Archaeological impact assessment for a mining permit application for portion 19 of the farm Syferfontein 303 IP within the city of Matlosana Local Municipality in the North West Province.

GRAVE RELOCATION PROJECTS

Below, a selection of grave relocation projects involvement:

- Grave exhumation and relocation of 19 graves on erf 3 of Holding 87 North Riding Agricultural Holdings, City of Johannesburg, Gauteng Province.
- Report on the exhumation and reburial report of 16 graves from Doornkop, to Voortrekker Cemetery in Middelburg, Mpumalanga Province
- Exhumation and reburial report of 4 graves located at Tombo, Eastern Cape Province.
- Report on rescue excavations and skeletal analyses of two archaeological graves inadvertently uncovered in Boitekong, North-West Province.
- Rescue excavation of an unmarked graveyard at Diamond Park, Greenpoint, Kimberley, Northern Cape Province.
- Report on Follow-up site visit excavation and physical anthropological analyses of archaeological human remains transferred from SAPA Victim Identification Centre to Department of Anatomy. Mamelodi East Phase 2 House 566.
- Excavation of human remains from Marulaneng village, Bakenberg Limpopo Province.
- Follow up site visit on human remains found at Bothlokwa (Ramatjowe & Mphakahne), Limpopo Province.
- Follow up site visit on human remains found in Waterpoort, Soutpansberg, Limpopo Province.

EMPLOYMENT SUMMARY:

Positions Held

- 2020 – to date: Archaeologist - PGS Heritage (Pty) Ltd
- 2019: Manager of the NGT ESHS Heritage Department – NGT Holdings (Pty) Ltd
- 2018 – 2019: Archaeologist and Heritage Consultant – NGT Holdings (Pty) Ltd
- 2015-2016: Archaeological Contractor - BA3G, University of Pretoria
- 2014 – 2015: DST-NRF Archaeological Intern, Forensic Anthropological Research Centre

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
- Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

Key Work Experience

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng
1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Malawi, Mauritius, Zimbabwe and the Democratic Republic of the Congo