SOFILINE (PTY) LTD

Proposed Establishment of the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province

Heritage Impact Report

Issue Date: 29 May 2014
Revision No.: 1
Project No.: 11913

Date:	29.05.2014
Document Title:	Eastside Junction - Heritage Impact Report
Author:	Wouter Fourie
Revision Number:	1
Checked by:	Rebecca Thomas
Signature:	
For:	SiVEST Environmental Division

Executive Summary

PGS Heritage (PGS) was appointed by SiVEST Environmental Division to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the Proposed Eastside Junction for Sofiline (Pty) Ltd near Delmas, Mpumalanga Province.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

The Heritage Scoping Report has shown that the Eastside Junction project area may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites.

The archival research has indicated the possible existence of historical ruins as well as possible cemeteries and graves.

General Heritage

The subsequent field work during the impact assessment phase has revealed that no heritage resources are present on the property.

Palaeontology

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation, Ecca Group, Karoo Supergroup. The Vryheid Formation consists predominantly of coarse-grained grey sandstone and grit, with inter-bedded prominent shale beds and coal seams. The sediments are interpreted as having been deposited in deltaic conditions or on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that are mined in this part of Mpumalanga.

The sediments of the Vryheid Formation are known to contain abundant fossil remains of plants and trace fossils, requiring the allocation of a High Palaeontological sensitivity to the site. Due to the deep soils and probably deeply weathered nature of the Vryheid Formation, the High Palaeontological sensitivity is lowered and a Moderate Palaeontological sensitivity is allocated to the site, with the proviso that a professional palaeontologist be appointed during the clearing phase as well as during excavation of trenches and foundations, to complete a Phase I Palaeontological Impact Assessment.

Recommendations:

1. The Project Manager and ECO of the project must be made aware of the fact that the Vryheid Formation sediments are very rich in plant and ichnofossils (trace fossils).
2. A professional palaeontologist must be appointed to do a Phase I PIA assessment of the area just before clearing for development, during clearing for development as well as during deep (>1m) excavations for foundations and installation of infrastructure, complying with the procedures required by SAHRA, including permit application.

3. If fossils are recorded during the initial clearing or trenching (Phase I PIA) the palaeontologist will proceed with a Phase II PIA during the excavation of deeper foundations.

SOFILINE (PTY) LTD

HERITAGE SCOPING REPORT

Contents Page

1 INTRODUCTION 7

1.1 Scope of the Study 7

1.2 Specialist Qualifications 7

1.3 Assumptions and Limitations 8

1.4 Legislative Context 8

Terminology 9

2 TECHNICAL DETAILS OF THE PROJECT 13

2.1 Site Location and Description 13

2.2 Technical Project Description 13

3 ASSESSMENT METHODOLOGY 14

3.1 Impact 15

3.2 Evaluation 15

3.3 Methodology for Impact Assessment 16

4 ARCHIVAL FINDINGS 21

4.1 SAHRIS Background 21

4.2 Topographical Map 2628BA Delmas – First Edition 1965 21

4.3 Topographical Map 2628BA Delmas – First Edition 1965 22

4.4 Google Satellite Imagery – 2008 23

4.5 Historic Overview of Study Area and Surrounding Landscape 25

4.6 Palaeontology 28

5 FIELD WORK FINDINGS 28

5.1 Impact Matrix 31

5.2 Confidence in Impact Assessment 34

5.3 Cumulative Impacts 34

5.4 Reversibility of Impacts 34

5.5 Site specific management measures 34

6 GENERAL MANAGEMENT GUIDELINES 34

6.1 All phases of the project 36

7 CONCLUSIONS AND RECOMMENDATIONS 37

7.1 Palaeontology 37

8 REFERENCES 38

8.1 Published References 38

8.2 Historic Topographic Maps 38

8.3 Google Earth 38

Appendices

A: LEGISLATIVE PRINCIPLES
B: TRACKLOGED MAP
C; PALAEONTOLOGICAL DESKTOP ASSESSMENT

1 INTRODUCTION

PGS Heritage (PGS) was appointed by SiVEST Environmental Division to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the Proposed Eastside Junction for Sofiline (Pty) Ltd near Delmas, Mpumalanga 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 impact areas identified for the EIA study. The Heritage Impact Assessment aims to inform the Environmental Impact Assessment in the development of a comprehensive Environmental Management Programme to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

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

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

Wouter Fourie, Principal Heritage Specialist for this project, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation, as well as being accredited as a Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

Dr Gideon Groenewald has a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

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. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out in this report.

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
- Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002
- Development Facilitation Act (DFA), Act 67 of 1995

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
    - Basic Environmental Assessment (BEA) – Section (23)(2)(d)
    - Environmental Scoping Report (ESR) – Section (29)(1)(d)
    - Environmental Impact Assessment (EIA) – Section (32)(2)(d)
    - Environmental Management Programme (EMP) – Section (34)(b)
- National Heritage Resources Act (NHRA) Act 25 of 1999
    - Protection of Heritage Resources – Sections 34 to 36; and
    - Heritage Resources Management – Section 38
- Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Section 39(3)
- Development Facilitation Act (DFA) Act 67 of 1995
    - The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years

without a permit issued by the relevant provincial heritage resources authority…" The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008):

The NEMA 23(2)(b) states that an integrated Environmental Management Programme should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage".

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

Refer to for further information on the interpretation of heritage in Appendix A.

Terminology

ABBREVIATIONS	DESCRIPTION
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs and Sanitation
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party

LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

- **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;
- 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 2 500 000 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

- **Holocene**

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

- **Late Stone Age**

  The archaeology of the last 20 000 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 Stone Age**

  The archaeology of the Stone Age between 20-300 000 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.

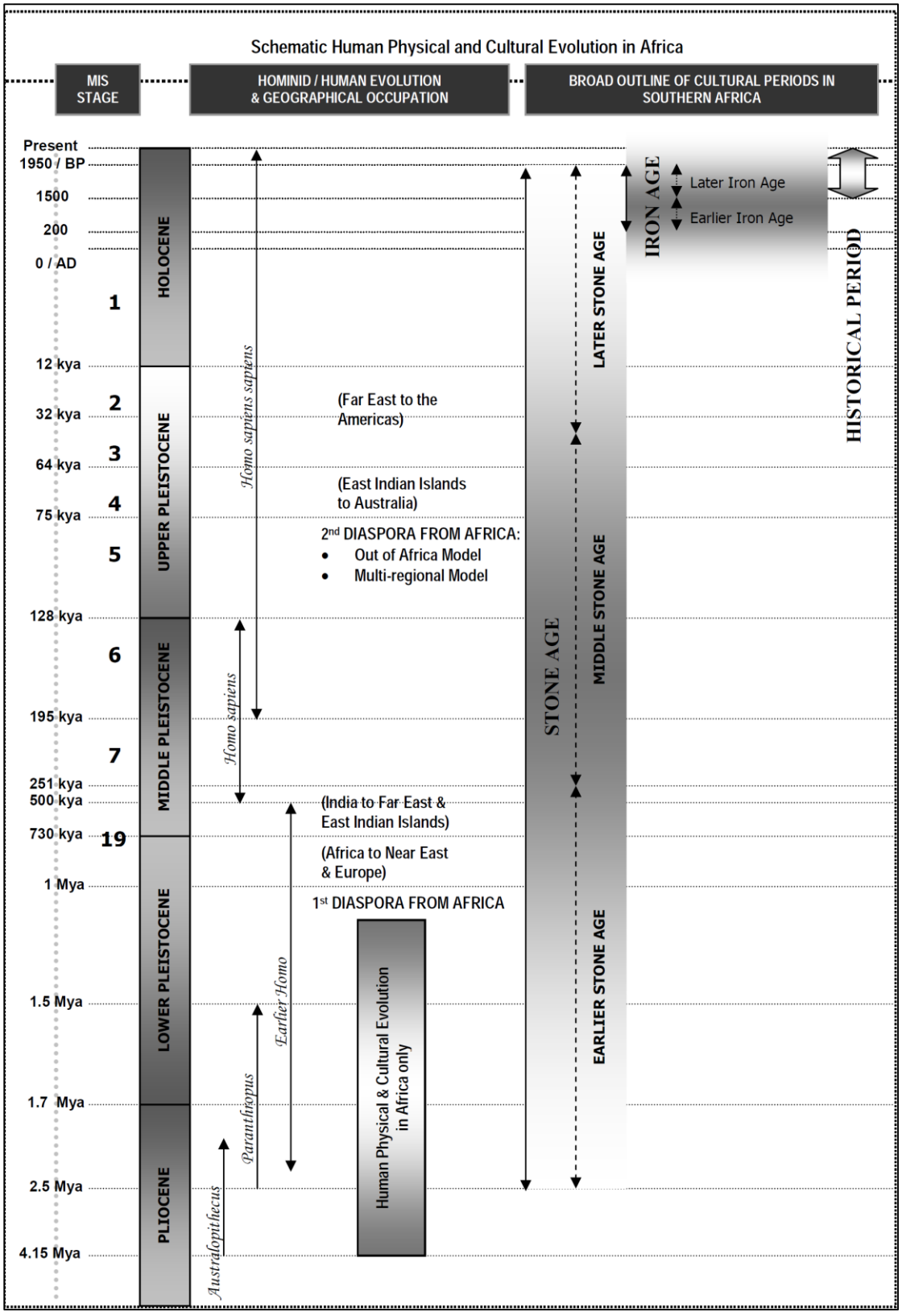


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

Location	E28.53378 S26.14680 The site is situated 13km east of the town of Delmas in Mpumalanga.
Land	127 Hectares of land under option of which 95% is agricultural land currently under cultivation.

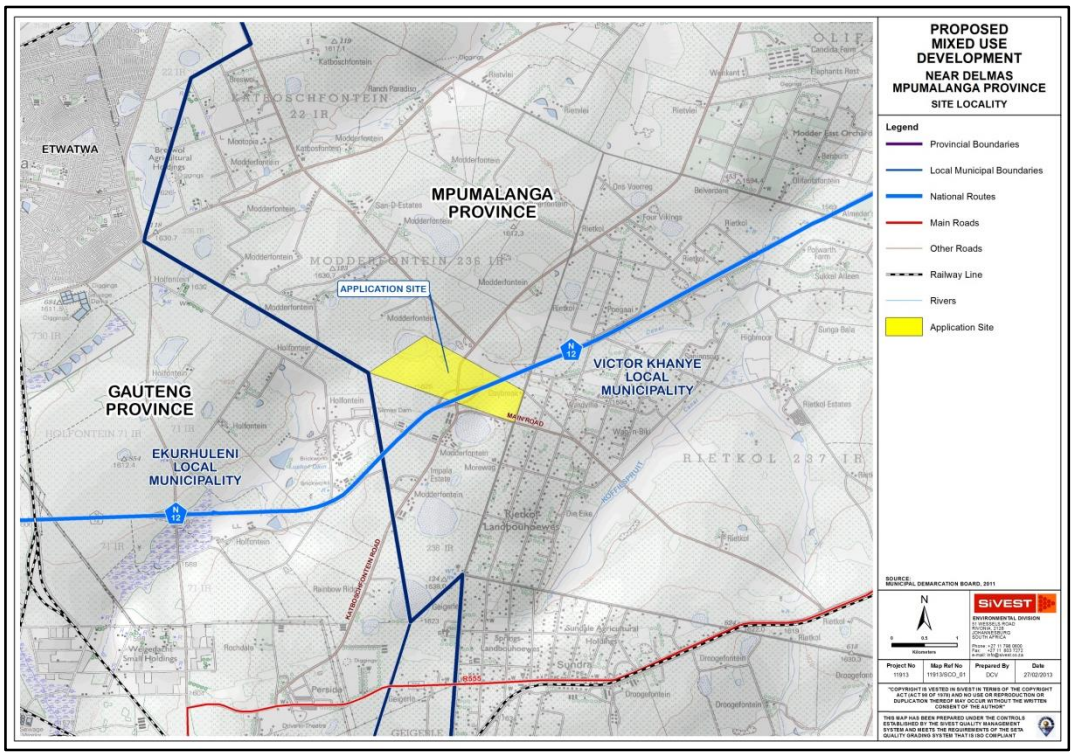


Figure 2 – Eastside Junction Project locality

2.2 Technical Project Description

Portion 7 of Farm Modderfontein No 236 zoned "Special" for a proposed mixed-use development to include the following:

- Hotel/Theme Park/Amusement Park for purposes such as a hotel with accommodation, sport, recreational facilities, health spa and conference facilities, a theatre, cinemas, skating rink, music hall, concert hall, gaming, dancing, night club, exhibition hall, sports arena for live concerts and performances, restaurants, sports bar, ATM and any other related and subsidiary use

- Shopping facilities
- Accommodation for workers

- Light industrial, commercial (packaging and warehousing) and offices
- Place of instruction to include a crèche and facilities for training

Figure 3 – Eastside Junction – Propose layout

3 ASSESSMENT METHODOLOGY

This chapter describes the evaluation criteria to be utilised during the EIA phase for the evaluation of the heritage significance of heritage resources to be identified during the field work in the EIA report.

The significance of archaeological 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 pylon 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

3.1 Impact

The potential environmental impacts that may result from the proposed development activities are detailed in the sub sections below.

3.1.1 Nature and existing mitigation

Natural conditions and conditions inherent in the project design that alleviate (control, moderate, curb) impacts. All management actions, which are presently implemented, are considered part of the project design and therefore mitigate impacts.

3.2 Evaluation

3.2.1 Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 2: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction

3.3 Methodology for Impact Assessment

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

3.3.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

3.3.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

3.3.3 Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Description

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country

PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects

INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

4 ARCHIVAL FINDINGS

The aim of the archival background research is to identify possible heritage resources that could be encountered during the field work. The archival research included in this report covers the larger study area and will be updated with detailed information based on discussions with the local landowners and inhabitants during the field work in the EIA phase of the HIA.

The archival work was done on available historical maps and aerial photography. This data assisted in the identification of known structures and where obvious disturbances could be detected from the data.

4.1 SAHRIS Background

A search on the South African Heritage Resources Information System (SAHRIS) has indicated two cases lodged on the system that is in close vicinity to the current study; however none of the projects contains a heritage study.

4.2 Topographical Map 2628BA Delmas – First Edition 1965

The 1:50 000 topographical map 26228BA Delmas 1966 First Edition, was drawn in 1966 utilising 1958 aerial photography and surveyed data of 1965. Evaluation of the map indicates the presence of a farmstead inside the study area (**Figure 4**). On the southern perimeter of the study area a group of homesteads and graves are visible. The 1995 map shows that this area was impacted by the construction of the N12 off-ramp, with possibly only the graves still present (**Figure 5**).

Another farmstead and graves are visible on the northern boundary of the study area.

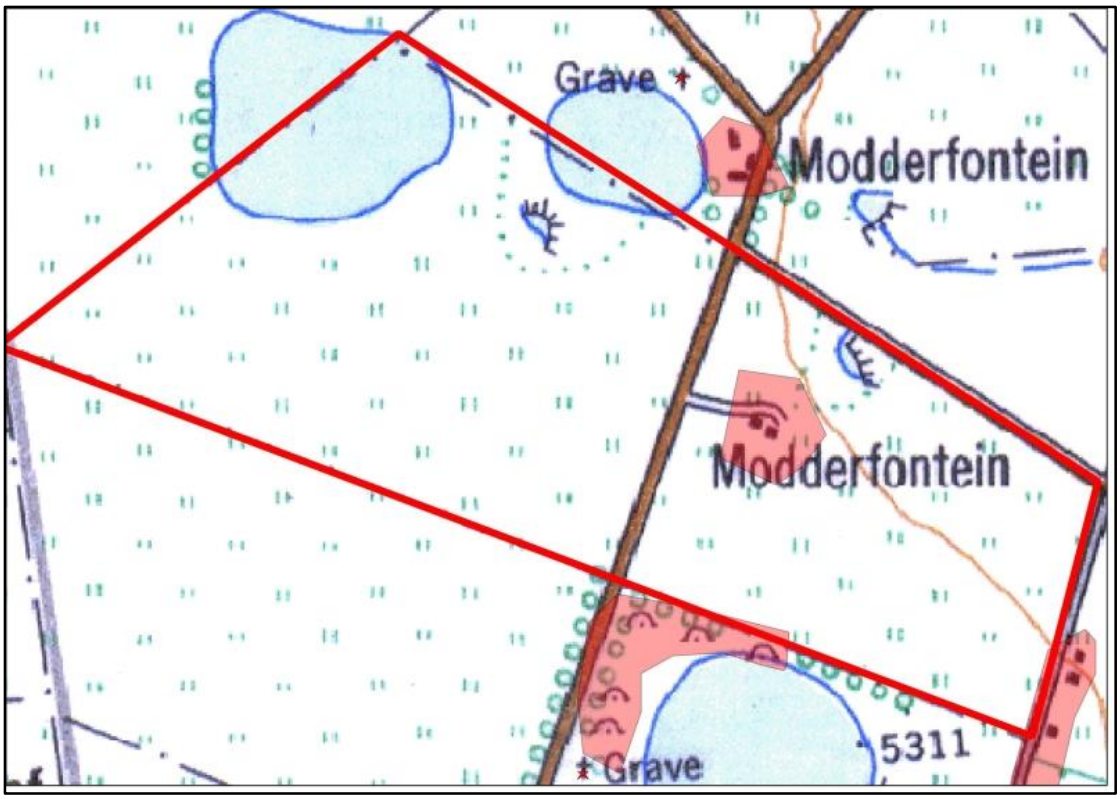


Figure 4 – The study area as indicated on the 1966 topographical map (red shaded areas indicating possible heritage sensitive areas)

4.3 Topographical Map 2628BA Delmas – First Edition 1965

The 1:50 000 topographical map 26228BA Delmas 1995 Third Edition, was drawn in in 1995. Evaluation of the map shows the farmstead identified on the 1966 map to be removed (possibly due to the construction of the N12 (**Figure 5**). On the southern perimeter of the study area a group of homesteads and graves have been replaced by the N12 off-ramp. The northern homestead areas indicate a change of land use to that of a school (**Figure 5**).

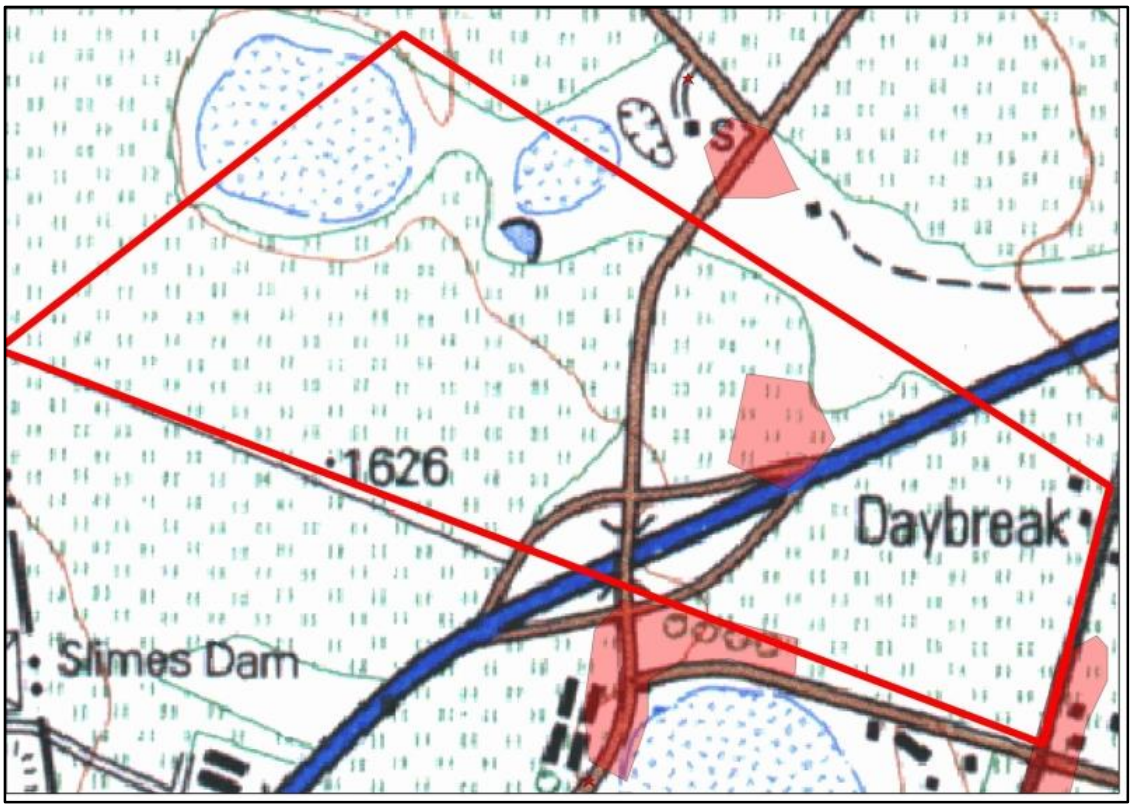


Figure 5 – The study area as indicated on the 1995 topographical map (red shaded areas indicating possible heritage sensitive areas)

4.4 Google Satellite Imagery – 2008

Evaluation of the Google Satellite Imagery has shown the 2008 edition to be the most revealing toward the identification of disturbances in the landscape of the study area (**Figure 6**). The imagery indicates two large pans in the north western section of the study area, while the other disturbances are located just north of the N12 and the study area boundary intersection. This is most probably the remains of the "Modderfontein" farmstead indicated in the 1966 map **(Figure 4**).

Two other disturbances in the north eastern corner of the study area indicate more recent structures that were constructed in the past 30 years.

Figure 7 provides a combination of the areas identified as possible heritage sensitive in a 1 kilometre radius from the study area boundary. Refer to Section 5 for a synopsis of the sensitivity analysis

Figure 6 – The study area as indicated on the 2008 Google map Imagery (red circles indicating possible heritage sensitive areas)

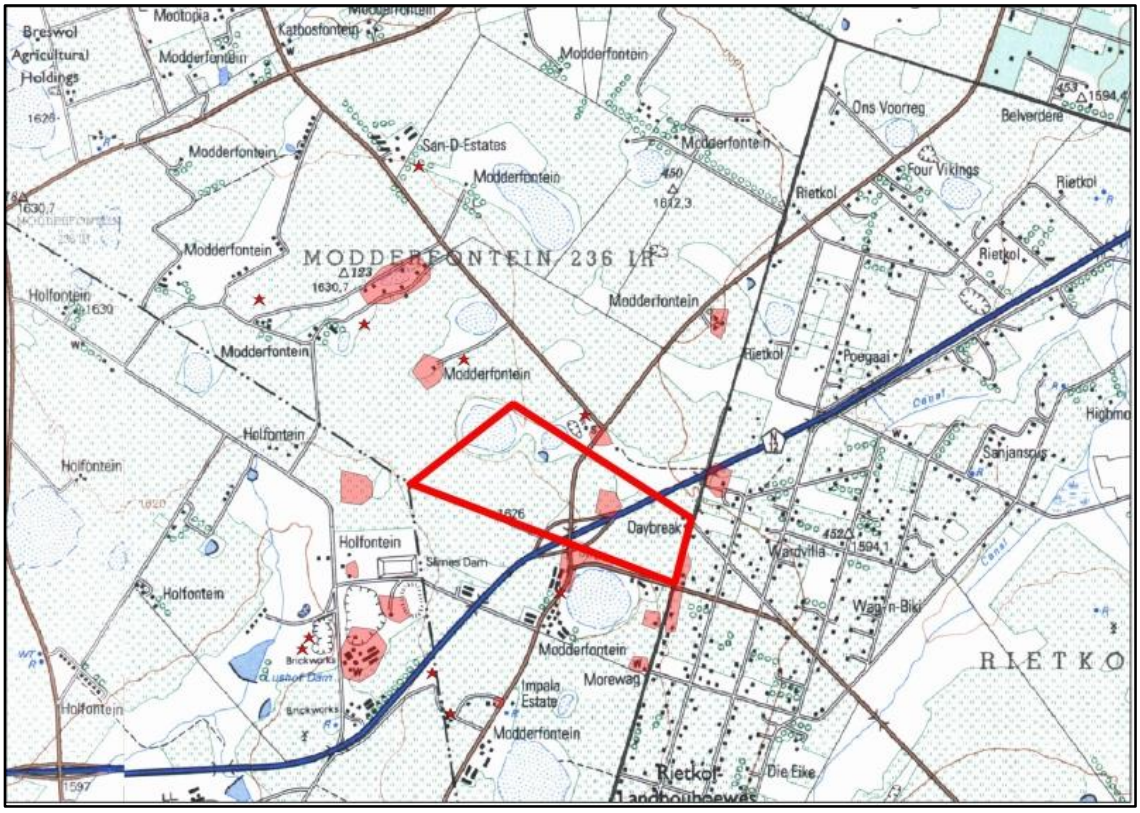


Figure 7 – 1995 Topographical map of the greater study area with combined areas of possible sensitivity.

4.5 Historic Overview of Study Area and Surrounding Landscape

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age is the first 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. No Early Stone Age sites are known from the vicinity of the study area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the study area than a lack of sites.
250 000 to 40 000 years ago	The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. No Middle Stone Age sites are known from the vicinity of the study area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the study area than a lack of sites.
40 000 years ago to the historic past	The Later Stone Age is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. No Later Stone Age sites are known from the vicinity of the study area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the study area than a lack of sites.
AD 1450 – AD 1650	The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the first 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 as well as cord impressions and is described as a mixture of the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho). The Uitkomst facies (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 and represent the earliest known movement of Nguni people out of Kwazulu-Natal into the inland areas of South Africa. In terms of this theory, the Bafokeng settled at Ntsuanatsatsi Hill in the present-day Free State Province. Subsequently, the BaKwena lineage broke away from the Bahurutshe cluster and crossed southward over the Vaal River to come in contact with the Bafokeng. As a result of this contact a Bafokeng-Bakwena cluster was formed, which moved northward and became further 'Sotho-ised' by coming into increasing contact with other Sotho-Tswana groups. This eventually resulted in the appearance of Uitkomst facies type pottery which contained elements of both Nguni and Sotho-Tswana speakers (Huffman, 2007).

	No sites associated with the Uitkomst facies are known from the surroundings of the study area.
AD 1700 – AD 1840	The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the study area's surroundings. It is most likely dated to between AD 1700 and AD 1840. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007).It is believed that the Madikwe facies developed into the Buispoort facies. The Buispoort facies is associated with sites such as Boschhoek, Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007). No sites associated with the Buispoort facies are known from the surroundings of the study area.
AD 1821 – AD 1823	After leaving present-day KwaZulu-Natal the Khumalo Ndebele (more commonly known as the Matabele) of Mzilikazi migrated through the general vicinity of the study area under discussion before reaching the central reaches of the Vaal River in the vicinity of Heidelberg in 1823 (www.mk.org.za). Two different settlement types have been associated with the Khumalo Ndebele. The first of these is known as Type B walling and was found at Nqabeni in the Babanango area of KwaZulu-Natal. These walls stood in the open without any military or defensive considerations and comprised an inner circle of linked cattle enclosures (Huffman, 2007). The second settlement type associated with the Khumalo Ndebele is known as Doornspruit, and comprises a layout which from the air has the appearance of a 'beaded necklace'. This layout comprises long scalloped walls (which mark the back of the residential area) which closely surround a complex core which in turn comprises a number of stone circles. The structures from the centre of the settlement can be interpreted as kitchen areas and enclosures for keeping small stock. It is important to note that the Doornspruit settlement type is associated with the later settlements of the Khumalo Ndebele in areas such as the Magaliesberg Mountains and Marico and represent a settlement under the influence of the Sotho with whom the Khumalo Ndebele intermarried. The Type B settlement is associated with the early Khumalo Ndebele settlements and conforms more to the typical Zulu form of settlement. As the Khumalo Ndebele passed through the general vicinity of the study areas shortly after leaving Kwazulu-Natal, one can assume that their settlements here would have conformed more to the Type B than the Doornspruit type of settlement. It must be stressed however that no published information could be found which indicates the presence of Type B sites in the general vicinity of the study area. No sites associated with this period of the archaeological history of the surroundings of the study area are presently known.
1832	At the time a Zulu impi of King Dingane moved through the general vicinity of the study area on their way to attack the Matabele of Mzilikazi who were settled along the Magaliesberg Mountains (Bergh, 1999).

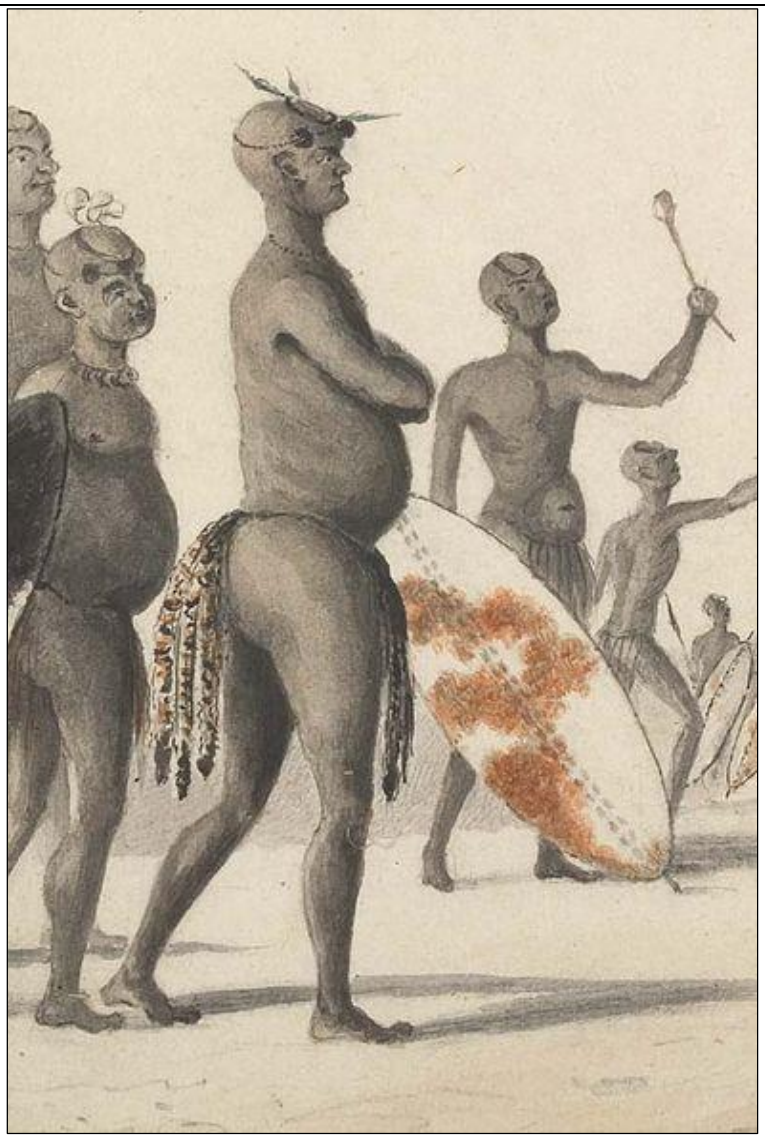


Figure 8

King Mzilikazi of the Matabele. This illustration was made by Captain Cornwallis Harris in c. 1838 (www.sahistory.org.za).

1836	The first Voortrekker parties started crossing over the Vaal River at the time. The earliest Voortrekker party to cross over the Vaal River was the one under the leadership of Louis Trichardt and Johannes Jacobus Janse van Rensburg. Although the exact route followed by the Trichardt-Van Rensburg party was not recorded, one suggestion is that they passed through the section of land in-between the Bronkhorst Spruit in the west and the Wilge River in the east (Bergh, 1999). The Wilge River and Bronkhorst Spruit are located roughly 1.8km and 17.8km west of the study area, which provides an indication of where the Voortrekker party travelled through the landscape in relation to the present study area.
1841 – 1850	These years saw the early establishment of farms by the Voortrekkers in the general vicinity of the study area (Bergh, 1999).
1845	Both the district and town of Lydenburg was established in this year (Bergh, 1999). The study area fell within the Lydenburg district at the time.
20 October 1894	On this day the railway line between Pretoria and Delagoa Bay (present-day Maputo) was completed near Balmoral located roughly 40km north-east of the study area.

	This event was very significant for the study area and surroundings as the completion of the line meant that the vast deposits of coal known to have existed in this area since the mid 19th century could now be commercially mined (Bulpin, 1989) and easily transported to the Witwatersrand gold mines and the populated centres of Pretoria and Johannesburg where they were most required.
1907	The town of Delmas was laid out on the farm Witklip and comprised 192 residential stands, 48 smallholdings (of 4 hectares each) with a commonage of 134 hectares. It was established by the owner of Witklip, Frenchman Frank Dumat (Erasmus, 2004). The name Delmas was derived from the French phrase '*de le mas*' which means 'of the small farm' (www.sa-venues.com). Delmas is located some 21.2km south-west of the present study area.
1909	In this year the government of the Transvaal Colony added roughly 5 500 hectares to the town of Delmas. This addition comprised 85 smallholdings of which each was roughly 64 hectares in extent (Erasmus, 2004).

4.6 Palaeontology

The following is an extract from the Palaeontological Desktop Assessment (**Appendix C**) completed for the project.

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation, Ecca Group, Karoo Supergroup. The Vryheid Formation consists predominantly of coarse-grained grey sandstone and grit, with inter-bedded prominent shale beds and coal seams. The sediments are interpreted as having been deposited in deltaic conditions or on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that are mined in this part of Mpumalanga.

The sediments of the Vryheid Formation are known to contain abundant fossil remains of plants and trace fossils, requiring the allocation of a High Palaeontological sensitivity to the site. Due to the deep soils and probably deeply weathered nature of the Vryheid Formation, the High Palaeontological sensitivity is lowered and a Moderate Palaeontological sensitivity is allocated to the site, with the proviso that a professional palaeontologist be appointed during the clearing phase as well as during excavation of trenches and foundations, to complete a Phase I Palaeontological Impact Assessment.

5 FIELD WORK FINDINGS

Due to the nature of cultural remains, with the majority of artefacts occurring below the surface, a controlled-exclusive surface survey was conducted over a period of 1 day by vehicle and on foot by an archaeologist from PGS (on 27 May 2014) Refer to **Appendix C** for tracklog map.

The survey focused directly on the proposed study area. The general area was documented by means of various photographs (**Figure 9** to **Figure 12**) and, where sites of heritage significance were identified, a GPS coordinate was taken as well as a more detailed site recording.

The study area is utilized as agricultural fields with 90 present of the site planted with maize (**Figure 10**). At the time of the field work the maize was already harvested and visibility of the area to be impacted was excellent (**Figure 11**).

Figure 9 – View of study area from the north towards the N12 intersection

Figure 10 – View of western section of the proposed development (note the wetland/pan area to the right of the photo)

Figure 11 – View of south eastern section as taken from the eastern on-ramp

Figure 12 – View from the east toward the eastern section of development

The field work revealed no heritage features on site

5.1 Impact Matrix

Note that the impact assessment tables all refer to impacts during construction and not operational, as the foreseen impacts on the heritage resources will primarily be during the construction phase.

Table 2: Impact Assessment table for chance finds

IMPACT TABLE		
Environmental Parameter	*Discovery of previously unidentified heritage sites (archaeological, historical or grave sites)*	
Issue/Impact/Environmental Effect/Nature	*During construction activity and earthmoving archaeological material could be unearthed that was previously unidentified due to its position.*	
Extent	*In most cases confined to small areas on the site*	
Probability	*Due to the close proximity to water course, localised archaeological finds may possibly occur*	
Reversibility	*In most cases where such finds are made damaged is irreversible*	
Irreplaceable loss of resources	*Significant loss but in most cases the scientific data recovered will mitigate such losses*	
Duration	*Permanent*	
Cumulative effect	*Low cumulative impact*	
Intensity/magnitude	*Medium*	
Significance Rating	*The impact is anticipated as being low and localised but will vary due to type of heritage find that could be made*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	4	2
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	2	1
Significance rating	-24(Low negative)	-11 (low negative)

IMPACT TABLE	
Mitigation measures	*Monitoring that will identify finds during construction will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.*

5.1.1 Palaeontology

The following is an extract from the Palaeontological Desktop Assessment (**Appendix C**) completed for the project.

Following an interpretation of the Google image, there are however, very few, if any exposures of the Vryheid Formation in the proposed development site and it is likely that the area is underlain by relatively thick soil layers and deeply weathered sediments. Fossils will therefore only be exposed during initial clearing of the site for development and during excavation for foundations and installation of infrastructure. For this reason the Very High Palaeontological sensitivity rating is lowered to a Moderate Palaeontological Sensitivity, allowing for the planning of the project to proceed without any further Palaeontological investigation.

It is however likely that fossil bearing strata will be exposed during the clearing of the site for development as well as during the excavation of trenches and foundations for installation of infrastructure. It is therefore essential that a professional palaeontologist be appointed to do a Phase 1 PIA investigation at the onset of the site clearing phase, during the site clearing phase as well as during the excavations for deep (>1m) foundations and trenches associated with the installation of infrastructure. The results of the Phase 1 PIA might lead to an increase in the Palaeontological Sensitivity to a High Sensitivity rating, necessitating a Phase II PIA during excavation of larger foundation areas where deep (>2m) excavations are planned.

Table 3: Impact Assessment table for palaeontology

IMPACT TABLE		
Environmental Parameter	*Discovery of previously unidentified palaeontological remains*	
Issue/Impact/Environmental Effect/Nature	*During construction activity and earthmoving palaeontological material could be unearthed that was previously unidentified due to its position.*	
Extent	*In most cases confined to small areas on the site*	
Probability	*If deep excavations are to be done the possibility does exist*	
Reversibility	*In most cases where such finds are made damaged is irreversible*	
Irreplaceable loss of resources	*Significant loss but in most cases the scientific data recovered will mitigate such losses*	
Duration	*Permanent*	
Cumulative effect	*Low cumulative impact*	
Intensity/magnitude	*Medium*	
Significance Rating	*The impact is anticipated as being low and localised but will vary due to type of heritage find that could be made*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	4	4
Irreplaceable loss	4	3
Duration	4	4
Cumulative effect	2	1
Intensity/magnitude	3	2
Significance rating	-51 (High negative)	-30 (Medium negative)
Mitigation measures	*Monitoring that will identify finds during construction will be able to mitigate the impact on the finds through scientific documentation of finds and provide valuable data on any finds made.*	

5.2 Confidence in Impact Assessment

It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some heritage sites.

The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.

5.3 Cumulative Impacts

None foreseen.

5.4 Reversibility of Impacts

Although heritage resources are seen as non-renewable the mitigation of impacts on possible finds through scientific documentation will provided sufficient mitigation on the impacts on possible heritage resources.

5.5 Site specific management measures

5.5.1 Palaeontology

1. The Project Manager and ECO of the project must be made aware of the fact that the Vryheid Formation sediments are very rich in plant and ichnofossils (trace fossils).
2. A professional palaeontologist must be appointed to do a Phase I PIA assessment of the area just before clearing for development, during clearing for development as well as during deep (>1m) excavations for foundations and installation of infrastructure, complying with the procedures required by SAHRA, including permit application.
3. If fossils are recorded during the initial clearing or trenching (Phase I PIA) the palaeontologist will proceed with a Phase II PIA during the excavation of deeper foundations.

6 GENERAL MANAGEMENT GUIDELINES

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-

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

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

  (i) exceeding 5 000 m^2 in extent; or

  (ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the South African Heritage Resources Agency (SAHRA) needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.

2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).

   This survey and evaluation must include:

   (a) The identification and mapping of all heritage resources in the area affected;

   (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Cultural Resources Act;

   (c) An assessment of the impact of the development on such heritage resources;

   (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

   (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

   (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

   (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:

   a. Heritage;

   b. Graves;

   c. Archaeological finds; and

   d. Historical Structures.

   This module must be tailor made to include all possible finds that could be expected in that area of construction.

4. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.

5. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
6. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
7. After mitigation an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
8. If during the initial survey sites of cultural significance is discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
9. In the event that human remains are uncovered or previously unknown graves are discovered a qualified archaeologist needs to be contacted and an evaluation of the finds made.
10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA needs to be followed. This includes an extensive social consultation process.

6.1 All phases of the project

6.1.1 Graves

In the case where a grave is identified during construction the following measures must be taken.

Mitigation of graves will require a fence around the cemetery with a buffer of at least 20 meters.

If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a rescue permit must be applied for with SAHRA and the local South African Police Services must be notified of the find.

Where it is then recommended that the graves be relocated a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
ii. Site notices indicating the intent of the relocation
iii. Newspaper Notice indicating the intent of the relocation
iv. A permit from the local authority;
v. A permit from the Provincial Department of health;
vi. A permit from the South African Heritage Resources Agency if the graves are older than 60 years or unidentified and thus presumed older than 60 years;

vii. An exhumation process that keeps the dignity of the remains intact;
viii. An exhumation process that will safeguard the legal implications towards the developing company;
ix. The whole process must be done by a reputable company that are well versed in relocations;
x. The process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

7 CONCLUSIONS AND RECOMMENDATIONS

The Heritage Scoping Report has shown that the Eastside Junction project area may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites.

The archival research has indicated the possible existence of historical ruins as well as possible cemeteries and graves.

The subsequent field work during the impact assessment phase has revealed that no heritage resources are present on the property.

7.1 Palaeontology

Due to the deep soils and probably deeply weathered nature of the Vryheid Formation, the High Palaeontological sensitivity is lowered and a Moderate Palaeontological sensitivity is allocated to the site, with the proviso that a professional palaeontologist be appointed during the clearing phase as well as during excavation of trenches and foundations, to complete a Phase I Palaeontological Impact Assessment.

1. The Project Manager and ECO of the project must be made aware of the fact that the Vryheid Formation sediments are very rich in plant and ichnofossils (trace fossils).
2. A professional palaeontologist must be appointed to do a Phase I PIA assessment of the area just before clearing for development, during clearing for development as well as during deep (>1m) excavations for foundations and installation of infrastructure, complying with the procedures required by SAHRA, including permit application.
3. If fossils are recorded during the initial clearing or trenching (Phase I PIA) the palaeontologist will proceed with a Phase II PIA during the excavation of deeper foundations.

8 REFERENCES

8.1 Published References

Bergh, J.S. (ed.). 1999. Geskiedenis Atlas van Suid-Afrika: Die Vier Noordelike Provinsies. J.L. van Schaik. Pretoria.

Bulpin, T.V. 1989. Lost Trails of the Transvaal.

Erasmus, B.J. On Route in South Africa. Jonathan Ball Publishers, Johannesburg.

Fourie, W., 2008. Archaeological Impact Assessments within South African Legislation. South African Archaeological Bulletin, 63(187), pp. 77-85.

Huffman, T.N. 2007. Handbook to the Iron Age: The archaeology of Pre-Colonial Farming Societies in Southern Africa. University of KwaZulu-Natal Press, Scottsville.

Morris, D., 2008. Archaeological and Heritage Phase 1, Impact Assessment for proposed upgrading of Sishen Mine Diesel Depot Storage Capacity at Kathu, Northern Cape. Kimberley: McGregor Museum.

8.2 Historic Topographic Maps

South African Surveyor General, 1966. 1: 50:000 Topographical map. 2628BA Delmas
South African Surveyor General, 1995. 1: 50:000 Topographical map. 2628BA Delmas

The historic topographic maps used in this report were obtained from the Directorate: National Geo-spatial Information of the Department of Rural Development & Land Reform, Cape Town.

8.3 Google Earth

All the aerial depictions used in this report are from Google Earth.

Appendix A

LEGISLATIVE PRINCIPLES

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

3.1 General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In the new legislation, permits are required to damage, destroy, alter, or disturb them. People who already possess material are required to register it. The management of heritage resources are integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have interest in the graves: they may be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle will be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the developer's cost. Thus, developers will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:
An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection, to all historic and pre-historic cultural remains, including graves and human remains.

3.2 Graves and cemeteries

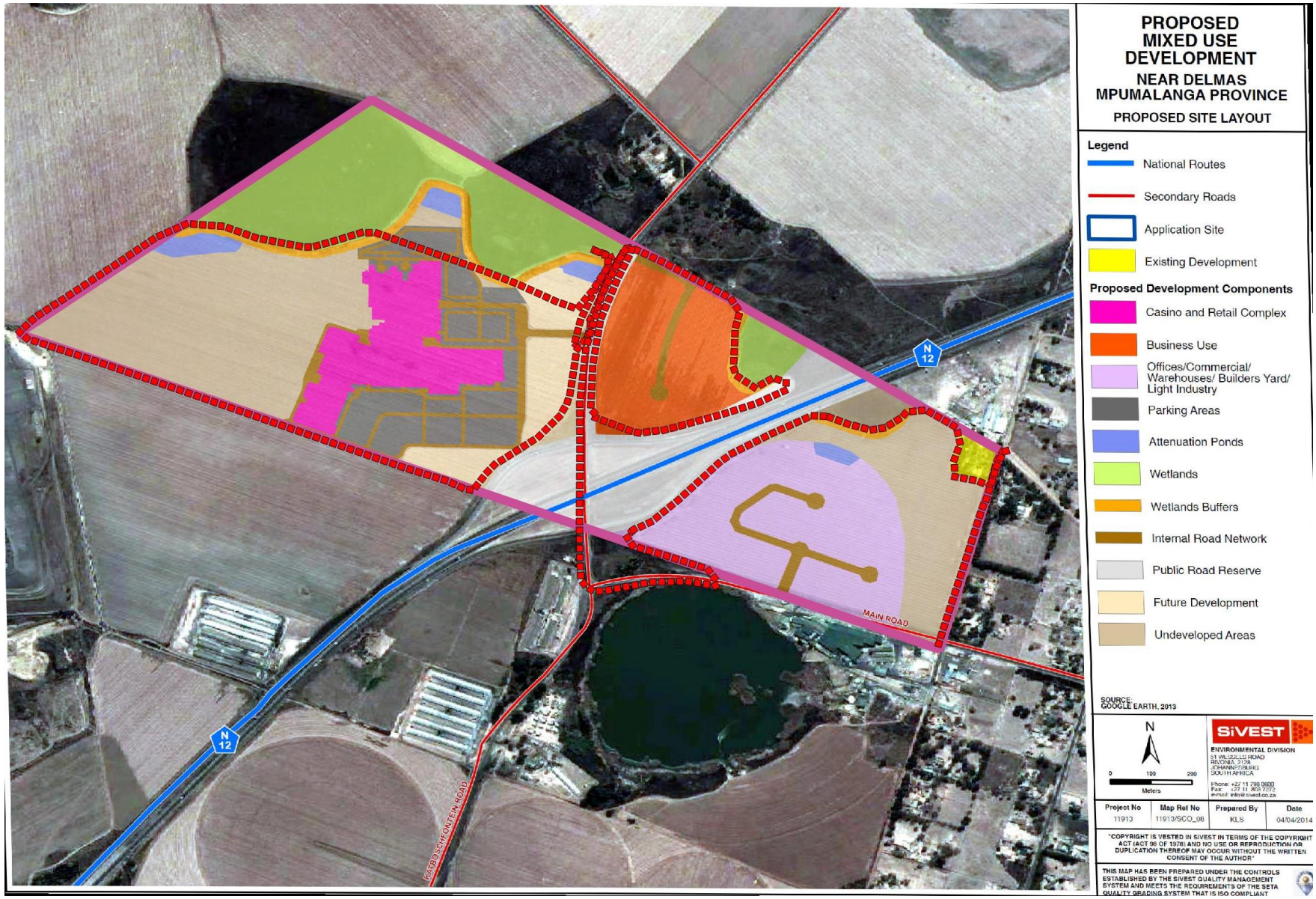
Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Appendix B

TRACKLOG OF FIELD WORK



PROPOSED MIXED USE DEVELOPMENT

NEAR DELMAS MPUMALANGA PROVINCE

PROPOSED SITE LAYOUT

Legend

- National Routes
- Secondary Roads
- Application Site
- Existing Development

Proposed Development Components

- Casino and Retail Complex
- Business Use
- Offices/Commercial/ Warehouses/ Builders Yard/ Light Industry
- Parking Areas
- Attenuation Ponds
- Wetlands
- Wetlands Buffers
- Internal Road Network
- Public Road Reserve
- Future Development
- Undeveloped Areas

SOURCE:
GOOGLE EARTH, 2013

N

0 100 200
Meters

SiVEST
ENVIRONMENTAL DIVISION
51 WIERDA ROAD
BRONKHORSTSPRUIT
JOHANNESBURG
SOUTH AFRICA
Phone: +27 11 798 0600
Fax: +27 11 803 7272
e-mail: info@sivest.co.za

Project No	Map Ref No	Prepared By	Date
11913	11913/SCO_08	KLS	04/04/2014

Appendix C

PALAEONTOLOGICAL DESKTOP

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED MIXED USE DEVELOPMENT ON PORTION 7 OF THE FARM MODDERFONTEIN NUMBER 236, MPUMALANGA PROVINCE

For:

HIA CONSULTANTS

DATE: 28 May 2014

By

GIDEON GROENEWALD

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by PGS Heritage to undertake a desktop survey, assessing the potential palaeontological impact of the proposed East Side Junction, a mixed-use development, on portion 7 of the Farm Modderfontein number 236 located near Delmas, Mpumalanga Province.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the development.

The proposed East Side Junction is located on the N12 between Daveyton and Delmas next to Rietkol Agricultural Holdings. The development is expected to include the following:

- Hotel/Theme Park/Amusement Park for purposes such as a hotel with accommodation, sport, recreational facilities, health spa and conference facilities, a theatre, cinemas, skating rink, music hall, concert hall, gaming, dancing, night club, exhibition hall, sports arena for live concerts and performances, restaurants, sports bar, ATM and any other related and subsidiary use
- Shopping facilities
- Accommodation for workers
- Light industrial, commercial (packaging and warehousing) and offices
- Place of instruction to include a crèche and facilities for training

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation, Ecca Group, Karoo Supergroup. The Vryheid Formation consists predominantly of coarse-grained grey sandstone and grit, with inter-bedded prominent shale beds and coal seams. The sediments are interpreted as having been deposited in deltaic conditions or on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that are mined in this part of Mpumalanga.

The sediments of the Vryheid Formation are known to contain abundant fossil remains of plants and trace fossils, requiring the allocation of a High Palaeontological sensitivity to the site. Due to the deep soils and probably deeply weathered nature of the Vryheid Formation, the High Palaeontological sensitivity is lowered and a Moderate Palaeontological sensitivity is allocated to the site, with the proviso that a professional palaeontologist be appointed during the clearing phase as well as during excavation of trenches and foundations, to complete a Phase I Palaeontological Impact Assessment.

Recommendations:

1. The Project Manager and ECO of the project must be made aware of the fact that the Vryheid Formation sediments are very rich in plant and ichnofossils (trace fossils).
2. A professional palaeontologist must be appointed to do a Phase I PIA assessment of the area just before clearing for development, during clearing for development as well as during deep (>1m) excavations for foundations and installation of infrastructure, complying with the procedures required by SAHRA, including permit application.
3. If fossils are recorded during the initial clearing or trenching (Phase I PIA) the palaeontologist will proceed with a Phase II PIA during the excavation of deeper foundations.

TABLE OF CONTENT

1. INTRODUCTION 4
1.1. Background 4
1.2. Aims and Methodology 4
1.3. Scope and Limitations of the Desktop Study 5
2. DESCRIPTION OF THE PROPOSED DEVELOPMENT 6
3. GEOLOGY 7
4. PALAEONTOLOGY OF THE AREA 8
5. PALAEONTOLOGICAL SENSITIVITY 9
6. CONCLUSION AND RECOMMENDATIONS 10
7. REFERENCES 10
8. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR 11
9. DECLARATION OF INDEPENDENCE 11

LIST OF FIGURES

Figure 2.1 Image showing the locality and proposed layout of the development **Error! Bookmark not defined.**
Figure 2.2 Layout of the East Side Junction 7
Figure 3.1 Geology and Legend for study area 8
Figure 5.1 A Moderate Palaeontological sensitivity is allocated to the study area 9

LIST OF TABLES

Table 1.1Palaeontological Sensitivity Analysis Outcome Classification 5

1 INTRODUCTION

1.1 Background

Gideon Groenewald was appointed by PGS Heritage to undertake a desktop survey, assessing the potential palaeontological impact of the proposed East Side Junction, a mixed-use development, on portion 7 of the Farm Modderfontein number 236 located near Delmas, Mpumalanga Province.

This report forms part of the Environmental Impact Assessment and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint of the development.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

1.2 Aims and Methodology

Following the *"SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports"* the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

In preparing a palaeontological desktop study the potential fossiliferous rock units (groups, formations etc.) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature and previous palaeontological impact studies in the same region.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1.1 below.

Table Error! No text of specified style in document.**.4**Palaeontological Sensitivity Analysis Outcome Classification

Sensitivity	Description
Low Sensitivity	Areas where a negligible impact on the fossil heritage is likely. This category is reserved largely for areas underlain by igneous rocks. However, development in fossil bearing strata with shallow excavations or with deep soils or weathered bedrock can also form part of this category.
Moderate Sensitivity	Areas where fossil bearing rock units are present but fossil finds are localised or within thin or scattered sub-units. Pending the nature and scale of the proposed development the chances of finding fossils are moderate. A field-based assessment by a professional palaeontologist is usually warranted.
High Sensitivity	Areas where fossil bearing rock units are present with a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops and the chances of finding fossils during a field-based assessment by a professional palaeontologist are very high. Palaeontological mitigation measures need to be incorporated into the Environmental Management Plan

1.3 Scope and Limitations of the Desktop Study

The study will include: i) an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units; ii) a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports; iii) data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and iv) where feasible, location and examination of any fossil collections from the study area (e.g. museums).

The key assumption for this scoping study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing. There is also an inadequate database for fossil heritage for much of the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA. Most development study areas have never been surveyed by a palaeontologist.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and without supporting field assessments may lead to either:

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium etc.).

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed East Side Junction (Figures 2.1 and 2.2) is located on the N12 between Daveyton and Delmas next to Rietkol Agricultural Holdings. The development is expected to include the following:

- Hotel/Theme Park/Amusement Park for purposes such as a hotel with accommodation, sport, recreational facilities, health spa and conference facilities, a theatre, cinemas, skating rink, music hall, concert hall, gaming, dancing, night club, exhibition hall, sports arena for live concerts and performances, restaurants, sports bar, ATM and any other related and subsidiary use
- Shopping facilities
- Accommodation for workers
- Light industrial, commercial (packaging and warehousing) and offices
- Place of instruction to include a crèche and facilities for training
-

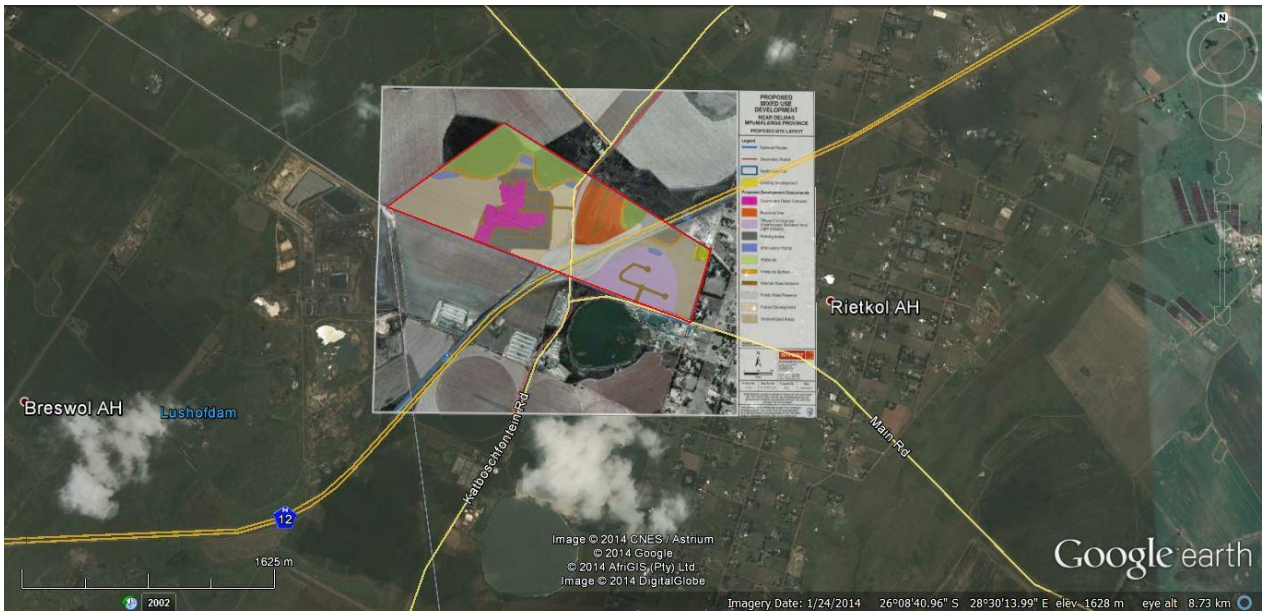


Figure Error! No text of specified style in document.**.13 Image showing the locality and proposed layout of the development**

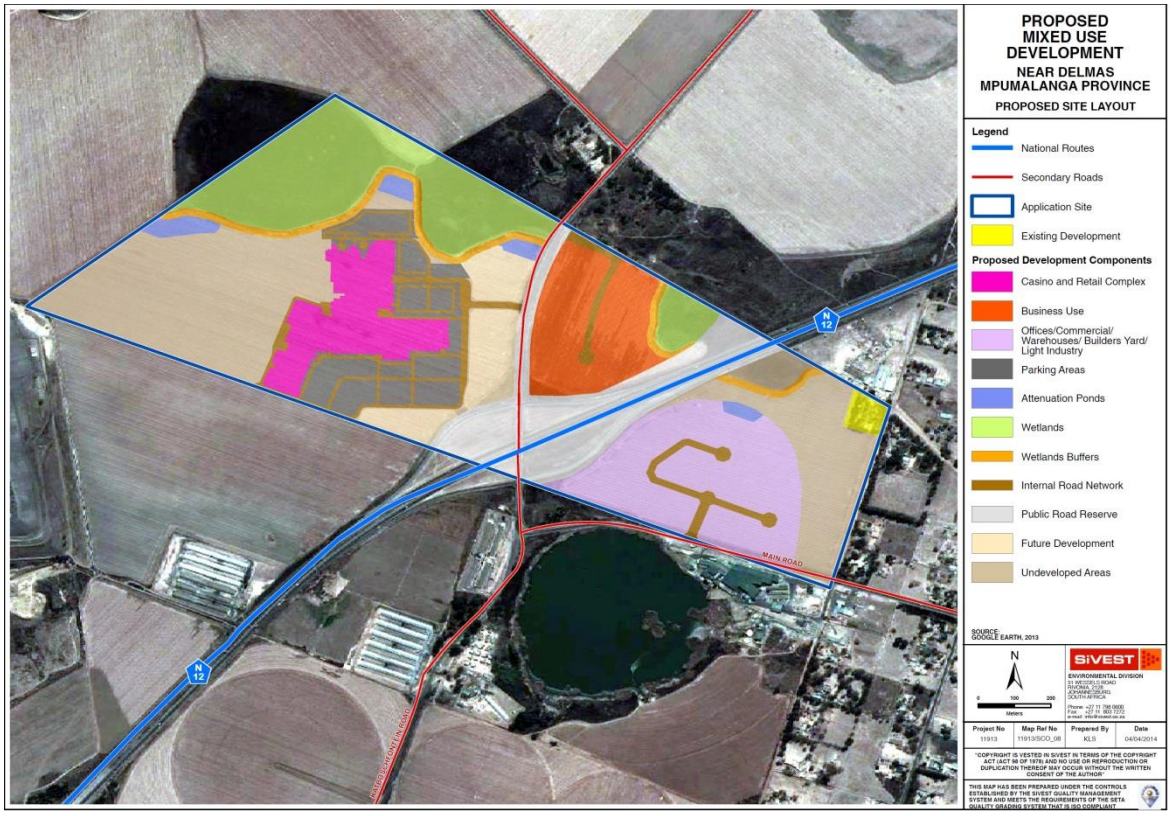


Figure Error! No text of specified style in document..**14 Layout of the East Side Junction**

3 GEOLOGY

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation (Pv), Ecca Group, Karoo Supergroup (Figure 3.1). The Vryheid Formation consists predominantly of coarse-grained grey sandstone and grit, with inter-bedded prominent shale beds and coal seams. The sediments are interpreted as having been deposited in deltaic conditions or on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that are mined in this part of Mpumalanga (Johnson et al, 2006).

The proposed development area is located on previously arable farm land and the soils are expected to be relatively deep (>1m), with deep (>1,5m) weathering of the sandstone and mudstone of the Vryheid Formation.

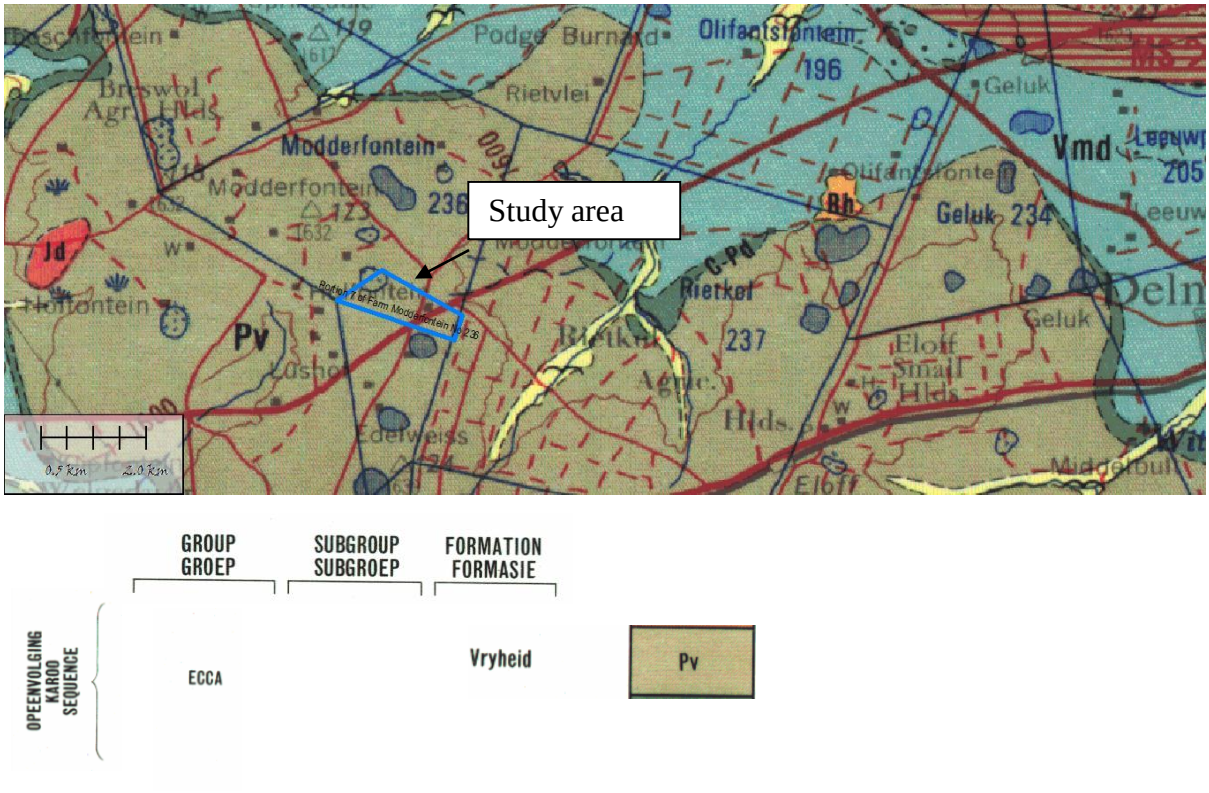


Figure 3.15 Geology and Legend for study area

4 PALAEONTOLOGY OF THE AREA

The Permian aged Vryheid Formation is well-known for the occurrence of plant fossils of the *Glossopteris* assemblage and coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; *Azaniodendron fertile, Cyclodendron leslii, Sphenophyllum hammanskraalensis, Annularia sp., Raniganjia sp., Asterotheca spp., Liknopetalon enigmata, Glossopteris > 20 species, Hirsutum 4 spp., Scutum 4 spp., Ottokaria 3 spp., Estcourtia sp., Arberia 4 spp., Lidgetonnia sp., Noeggerathiopsis sp. and Podocarpidites sp.*

According to Bamford (2011), little data has been published on these potentially fossiliferous deposits. Good fossil material is likely around the coal mines and yet in other areas the exposures may be too poor to be of interest. When they do occur fossil plants are usually abundant and it would not be feasible to preserve and maintain all the sites. In the interests of heritage and science, however, such sites should be well recorded, sampled and the fossils kept in a suitable institution.

It should be noted, however, that the aquatic reptile, *Mesosaurus*, which is the earliest known reptile from the Karoo Basin, as well as fish (*Palaeoniscus capensis*), have been recorded in equivalent-aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999). Indications are that the Whitehill Formation in the main basin might be correlated with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that Mesosaurus could be found in the Vryheid Formation.

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1986). The Vryheid Formation is

almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the north-eastern part of the Karoo basin was marine. The depositional environment was most probably a shallow basin margin accommodating a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly *Corophioides*) which are assigned to ichnogenus *Diplocraterion* (Mason and Christie, 1986).

5 PALAEONTOLOGICAL SENSITIVITY

The Permian aged Vryheid Formation is known to contain abundant fossils of plants, as well as ichnofossils, giving it a High Palaeontological sensitivity rating. The fossils of tree stems are normally preserved as petrified wood in the sandstone beds with leave remains associated with the inter-bedded shale units in the formation. Ichnofossils have been described from both sandstone and shale beds.

Following an interpretation of the Google image, there are however, very few, if any exposures of the Vryheid Formation in the proposed development site and it is likely that the area is underlain by relatively thick soil layers and deeply weathered sediments. Fossils will therefore only be exposed during initial clearing of the site for development and during excavation for foundations and installation of infrastructure. For this reason the Very High Palaeontological sensitivity rating is lowered to a Moderate Palaeontological Sensitivity, allowing for the planning of the project to proceed without any further Palaeontological investigation.

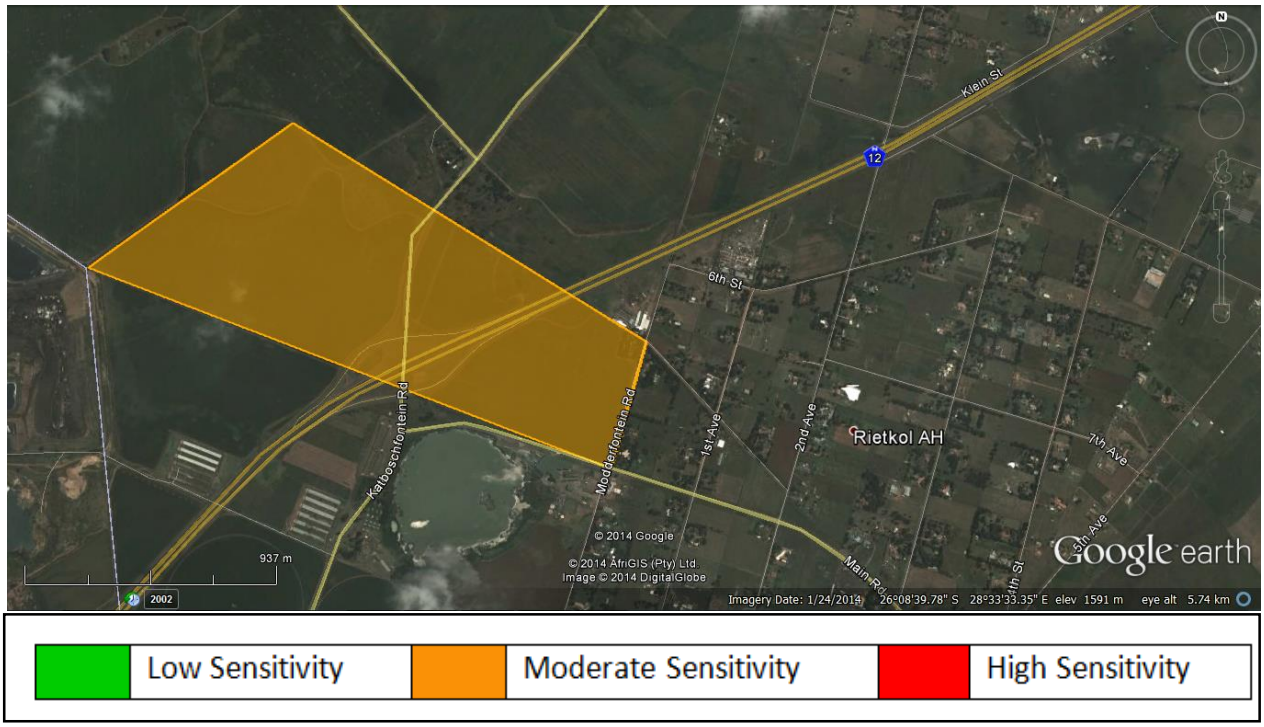


Figure Error! No text of specified style in document.**.16 A Moderate Palaeontological sensitivity is allocated to the study area**

It is however likely that fossil bearing strata will be exposed during the clearing of the site for development as well as during the excavation of trenches and foundations for installation of infrastructure. It is therefore essential that a professional palaeontologist be appointed to do a Phase 1 PIA investigation at the onset of the site clearing phase, during the site clearing phase as well as during the excavations for deep (>1m) foundations and trenches associated with the installation of infrastructure. The results of the Phase 1 PIA might lead to an increase in the Palaeontological Sensitivity to a High Sensitivity rating, necessitating a Phase II PIA during excavation of larger foundation areas where deep (>2m) excavations are planned.

6 CONCLUSION AND RECOMMENDATIONS

The study area for the proposed East Side Junction development is underlain by sedimentary rocks of the Permian Aged Vryheid Formation of the Karoo Supergroup. The sediments of the Vryheid Formation are known to contain abundant fossil remains of plants and trace fossils. Due to the deep soils and probably deeply weathered nature of the Vryheid Formation, the High Palaeontological sensitivity is lowered and a Moderate Palaeontological sensitivity is allocated to the site, with the proviso that a professional palaeontologist be appointed during the clearing phase as well as during excavation of trenches and foundations, to complete a Phase I Palaeontological Impact Assessment.

Recommendations:

4. The Project Manager and ECO of the project must be made aware of the fact that the Vryheid Formation sediments are very rich in plant and ichnofossils (trace fossils).
5. A professional palaeontologist must be appointed to do a Phase I PIA assessment of the area just before clearing for development, during clearing for development as well as during deep (>1m) excavations for foundations and installation of infrastructure, complying with the procedures required by SAHRA, including permit application.
6. If fossils are recorded during the initial clearing or trenching (Phase I PIA) the palaeontologist will proceed with a Phase II PIA during the excavation of deeper foundations.

7 REFERENCES

Bamford M. 2011. Desktop study Palaeontology Ermelo to Empangeni – Eskom powerline. Internal report Bernard Price Institute for Palaeontological Research, University of the Witwatersrand.

Johnson MR, Anhausser CR and Thomas RJ. 2006. The Geology of South Africa. Geological Society of South Africa.

MacRae C. 1999. Life Etched in Stone. Geological Society of South Africa.

Mason TR and Christie ADM 1986. Palaeoevironmental significance of ichnogenus *Diplocraterion* torell from the Permian Vryheid Formation of the Karoo Supergroup, South Africa. Palaeogeography, Palaeoclimatology, Palaeoecology 53(3-4):249-265.

8 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

9 DECLARATION OF INDEPENDENCE

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

Dr Gideon Groenewald
Geologist

SiVEST Environmental Division
51 Wessels Road, Rivonia. 2128. South Africa
PO Box 2921, Rivonia. 2128. South Africa

Tel + 27 11 798 0600
Fax +27 11 803 7272
Email info@sivest.co.za
www.sivest.co.za

Contact Person: Rebecca Thomas
Cell No.: +27 82 302 9010
Email: rebeccat@sivest.co.za