EXXARO PAARDEPLAATS PROJECT

HERITAGE STUDY: SCOPING LEVEL REPORT

Issue Date: **22 June 2012**

Revision No.: **2**

Project No.: **EIMS REF NO. 0888**

FOR

ENVIRONMENTAL IMPACT MANAGEMENT SERVICES (PTY) LTD

Professional Grave Solutions (Pty) Ltd T/A PGS Heritage & Grave Relocation Consultants
PO Box 32542 Totiusdal 0134, T +27 12 332 5305 F: +27 86 675 8077
Reg No 2003/008940/07

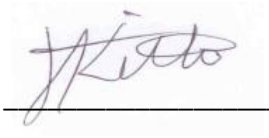
ACKNOWLEDGEMENT OF RECEIPT

CLIENT: Environmental Impact Management Services (Pty) Ltd

CONTACT PERSON: Khalid Patel, Environmental Impact Management Services (Ltd)
Tel: (011) 789-7170, Fax: (011) 787- 3059, email: khalid@eims.co.za

LEADING CONSULTANT: PGS - Heritage & Grave Relocation Consultants

CONTACT PERSON: Jennifer Kitto, Tel: 086 111 4771,
Email: jennifer@gravesolutions.co.za

SIGNATURE: 

COPYRIGHT

The Client, on acceptance of any submission by PGS and on condition that the Client pays to PGS Heritage and Grave Relocation Consultants the full price for the work as agreed, shall be entitled to use for its own benefit and for the specified project only:

i. The results of the project;
ii. The technology described in any report; and,
iii. The recommendations delivered to the Client.

DECLARATION OF INDEPENDENCE

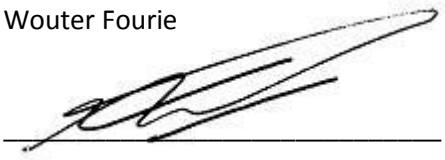
The report has been compiled by PGS Heritage & Grave Relocation Consultants, an appointed Heritage Specialist for Environmental Impact Management Services (Ltd). The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment Process.

HERITAGE CONSULTANT: PGS Heritage & Grave Relocation Consultants

CONTACT PERSON: Jennifer Kitto

SIGNATURE: 

PRINCIPAL INVESTIGATOR: Wouter Fourie

SIGNATURE: 

EXECUTIVE SUMMARY

PGS Heritage & Grave Relocation Consultants was appointed by Environmental Impact Management Services (Ltd) to undertake a Heritage Scoping Report that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed Exxaro Paardeplaats Colliery located near the town of Belfast, Mpumalanga Province.

The purpose of the Heritage Scoping report is to identify at a desktop level what the probability is of heritage resources being identified in the study area. This is important because heritage resources are protected in terms of the National Heritage Resources Act, No 25 of 1999, (NHRA) from *inter alia*, destruction or damage, excavation or removal, or other disturbance, without a permit from the responsible heritage resources authority. The National Heritage Resources Act, No 25 of 1999, (NHRA) states that heritage resources are unique and non-renewable and, as such, any impact on such resources must be seen as significant (NHRA, section 5(1)(a)). NHRA specifically protect certain categories of heritage resources, i.e.: structures, archaeological and paleontological (including meteorological) sites and material and graves and burial grounds (NHRA, sections 34, 35 and 36). Furthermore, Section 38 of the NHRA provides for and regulates the compilation of impact assessment reports of heritage resources that may be affected by construction or development activities.

The findings of the desktop research for the Heritage Scoping Report have shown that the study area and surrounding areas have a rich historical and archaeological history and that there is potential for archaeological and historical sites and material to exist within the study area (including grave sites). The initial research has also identified specific possible heritage sensitive areas within the study area that will need further investigation during the HIA/EIA phase. The Heritage Impact Assessment (HIA) phase will consist of a physical walk-over of the study area, focussing on the areas and sites that were identified during the desktop research phase. This should confirm the presence or absence of sites/areas with heritage significance identified from the Scoping assessment. Based on the results of the HIA report, recommendations for mitigation (destruction, recording and/or avoidance) of the confirmed heritage resources will be made for incorporation into the EMP for the project.

Palaeontology

A desktop palaeontological impact assessment (PIA) report is to be included in the final HIA report. The NHRA defines ‘palaeontological', as “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;”. Palaeontological sites and material are protected under section 35 of the NHRA from destruction, damage, excavation, or other disturbance without a permit from the responsible heritage resources authority (NHRA, section 35(4)). The PIA will identify any specific rock types underlying the study area which are known to contain fossilised remains or trace of plants or animals and which could be negatively impacted by the proposed coal mining activities.

Archaeology

An examination of the literature has indicated that archaeological sites and material (structures and man-made features older than 100 years) are very common in the general area. The findings provide the basis for the recommendation of field confirmation through an archaeological walk down covering the whole of the study area. The aim of this will be to compile a comprehensive database of archaeological sites and material in the study area, with the aim of developing a mitigation or management plan for inclusion in the EMP as derived from the EIA.

Historical Sites and structures

Evaluation of topographical maps and satellite imagery has indicated the presence of numerous farmsteads, ruins and farm workers housing. As the age cannot be determined at this stage, field survey and evaluation of each structure and its locality, with regards to the proposed mining activity, will be required to determine the possible impacts on them and suggest appropriate mitigation measures during a detailed EIA Phase.

The data on the different types of heritage resources identified from the field work will be compiled in a final HIA report. This report will utilise the Plan of Study for the EIA/HIA (***Section 6***) as well as the significance rating (***ANNEXURES A and B***) to identify and rank the impacts on the heritage resources into the final detailed EIA investigation.

Potential impacts to be identified and evaluated during the EIA include:

- Disturbance/destruction of archaeological sites or material – Archaeological survey of the impacted area
- Disturbance/destruction of palaeontological material – Desktop study to be included in HIA report
- Destruction/damage/removal of unidentified cemeteries and graves - Archaeological survey of the impacted area
- Destruction/damage of historical structures – Physical survey of the impacted area
- Destruction/alteration of cultural landscape – Visual Impact Assessment to address this issue

The desktop evaluation of the study area and surrounds has shown that the possibility exists of finding various heritage resources in the proposed study area. This includes archaeological sites or material, historical structures and graves or cemeteries. This desktop evaluation does not, however, exclude the need for physical ground thruthing during the EIA phase of the project. ***Table 1*** provides a guideline on possible finds that could be made during the ground thruthing and the next steps to be taken during the site evaluation in the EIA Phase.

Table 1- Potential Impacts to Consider for EIA and EMP Phase

	IMPACT	STAGE OF PROJECT
ISSUE	**IMPACT ON ARCHAEOLOGICAL SITES**	**CONSTRUCTION**

DISCUSSION	As seen from the archival work and discussion, the possibility of archaeological finds has been identified and thus further fieldwork is required to develop a comprehensive Heritage Management Plan for the construction activities.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified archaeological sites can seriously hamper construction and development activities and timelines. Destruction or damage of such sites requires a permit from the responsible heritage authority (NHRA, section 35). Fieldwork can provide valuable information on such sites in the study area and provide timeous management of such sites through various mitigation measures, including the realignment of the construction activities, if necessary.	Destruction or damage during construction of haul roads, pipelines or pollution control dams
EIA INVESTIGATION REQUIRED	Archaeological field survey of the entire study area, focussing on areas identified in the desktop study as heritage sensitive.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures, such as excavations and destruction of sites, planned and scheduled to fit within the timing of the project phases
	IMPACT	STAGE OF PROJECT
ISSUE	**IMPACT ON HISTORICAL SITES**	**CONSTRUCTION, OPERATION**
DISCUSSION	As seen from the archival work and discussion, the possible presence of historical structures has been identified as being high and thus fieldwork is required to develop a comprehensive Heritage Management Plan for the development	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Damage/destruction by blasting (vibration) and	Destruction or damage during

	other mining activities e.g. bench box cut mining (direct impacts), on historical structures. Destruction or damage of such sites requires a permit from the responsible heritage authority (NHRA, section 34).	construction of haul roads, pipelines or pollution control dams Damage during the mining operations in most cases as direct result of blasting. This type of impact on historical structures can extend beyond the mining boundary
EIA INVESTIGATION REQUIRED	Field survey of selected sites within the study area will confirm possible impacted sites and provide timeous management of such sites through various mitigation measures. Identification of structures outside the mining boundary but within the blast circle impact area. Further evaluation of such structures may include pre-mining status documentation to provide a baseline against which any changes to the structures during mining can be assessed.	
WHEN IS MITIGATION REQUIRED		During design and before construction, - Baseline assessment of structures - Permitting and controlled destruction of sites Operational - Evaluation of structures during mining against baseline data
	IMPACT	STAGE OF PROJECT
ISSUE	**IMPACT ON GRAVES AND CEMETERIES SITES**	**CONSTRUCTION**
DISCUSSION	The existence of graves and cemeteries has not been verified during the archival research. It has however, been found that such sites are rarely noted in maps and documents and can only be identified during field work.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified graves and cemeteries and the discovery of such sites can seriously hamper construction and development timelines.	Destruction or damage during construction of haul roads, pipelines or pollution control dams

	Damage, destruction or removal of such sites requires a permit from various responsible authorities, including the Heritage Authority (NHRA, section 36), Provincial Health Department and the SA Police Service. Such a process can take up to 12 months to finalise. Fieldwork can provide valuable information on the presence of such sites in the study area and provide timeous management of such sites, which may include the realignment of the proposed development activities. In the event that identified graves and cemeteries cannot be avoided, a grave relocation process needs to be initiated, bearing in mind that such a process impacts on the spiritual and social fabric of the next of kin and associated communities.	During the operational phase of the mine, the mining direction and subsequent box cutting and earth works can possibly impact on graveyards and cemeteries in the way of the mining activities.
EIA INVESTIGATION REQUIRED	Archaeological field survey of selected areas will identify possible impacted sites.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures such as grave relocations planned and scheduled to fit within the timing of the project phases
	IMPACT	STAGE OF PROJECT
ISSUE	**IMPACT ON PALAEONTOLOGICAL RESOURCES**	**CONSTRUCTION**
DISCUSSION	The existence of palaeontological will be addressed during the HIA phase through a desktop study completed by a palaeontologist.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified palaeontological resources and the discovery of such resources can seriously hamper construction and development	Destruction or damage during construction of haul roads, pipelines or pollution control dams

	timelines. Damage, destruction or removal of such sites requires a permit from the responsible heritage authority (NHRA, section 35). The desktop assessment would provide valuable information on the study area and provide timeous management of identified resources, which may include the realignment of the proposed construction footprints. In the event that such resources cannot be avoided, the necessary mitigation measures, that could include initial sampling, followed-up with the excavation and collection of representative specimens. This can however only be done with a permit issued by SAHRA under Section 35 of the NHRA..	During the operational phase of the mine, the mining direction and subsequent box cutting and earth works can possibly impact on palaeontological resources.
EIA INVESTIGATION REQUIRED	Paleontological Desktop Assessment to assess the possibility of occurrences of fossiliferous rocks.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures such as grave relocations planned and scheduled to fit within the timing of the project phases

TABLE OF CONTENTS

1. INTRODUCTION _____ 12

1.1 Scope of the Study _____ 12

1.2 Site Location _____ 12

1.3 Legislative Framework _____ 13

1.4 Assumptions and Limitations _____ 15

1.5 Terminology/Abbreviations _____ 15

2. TECHNICAL DETAILS OF THE PROJECT (from Exxaro Mining Works Program document) _____ 18

3. RECEIVING ENVIRONMENT _____ 18

3.1 Methodology _____ 18

3.2 Regional Background _____ 19

4. CONSIDERATION OF RELATED/SIGNIFICANT ASPECT MANAGEMENT PLANS IN THE AREA _____ 23

4.1 Belfast and Surrounding Area _____ 23

4.1.1 Belfast and the Battle of Bergendal _____ 23

4.1.2 Examination of Google Earth satellite imagery _____ 25

4.1.3 Within the study area _____ 26

4.1.4 Outside the study area _____ 27

4.1.5 Archival research of specific farm portions _____ 31

5. DESCRIPTION OF POTENTIAL IMPACTS _____ 31

5.1 Potential Fatal Flaws _____ 31

5.1.1 Identified Non-fatal flaws _____ 31

5.1.2 Identification of areas for further specific field work study _____ 32

6. DETAILED PLAN OF STUDY FOR THE EIA AND EMP _____ 33

6.1 Methodology _____ 33

7. Potential Impacts and Further Work for EIA Phase _____ 33

8. CONCLUSION _____ 37

9. REFERENCES _____ 40

Method of Assessing Impacts _____ 43

ANNEXURES

ANNEXURES A - HERITAGE ASSESSMENT METHODOLOGY

ANNEXURES B - THE SIGNIFICANCE RATING RANKINGS FOR THE EIA

ANNEXURES C - POSSIBLE HERITAGE SENSITIVE AREAS

TABLE OF FIGURES

Figure 1 - Paardeplaats study area with farm portions indicated (provided by Exxaro) *13*

Figure 2 - Paardeplaats mining rights application area (provided by Exxaro) *19*

Figure 4 - Lydenburg Heads (Iziko Museum; from Delius, 2009) *22*

Figure 5 - Map: Battle of Bergendal (vd Merwe, 1952) *24*

Figure 6- Locality map with major historical sites marked in yellow (study area in red) *25*

Figure 7 -Topographical map showing the study area (in red) *30*

Figure 8- Locality map overlaid on Google Earth image *30*

Figure 9 -- Heritage sensitivity map *32*

1. INTRODUCTION

PGS Heritage & Grave Relocation Consultants was appointed by Environmental Impact Management Services (Ltd) (EIMS) to undertake a Heritage Scoping Report that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed Exxaro Paardeplaats Colliery located near the town of Belfast, Mpumalanga Province.

1.1 Scope of the Study

PGS Heritage & Grave Relocation Consultants was appointed by EIMS, to undertake a Heritage Impact Assessment (HIA), that is structured into a Heritage Scoping Report (HSR) (this document) that feeds into the Scoping Level Report and a Heritage Impact Report (HIR) that contributed to the EIA/EMP Level Report for the proposed mining and ancillary service activities to take place on site. The HSR is aimed at identifying potential heritage resources located within the study area and surrounds and to identify the potential impacts that may be experienced by the resources as a result of the proposed mining project. In addition, the scoping study will serve as a Plan of Study for the HIR, which will include a detailed investigation of the heritage resources and the impact mining may have on them. Mitigation measures will then also be suggested that will contribute to the overall EMPr for the whole mining project.

1.2 Site Location

The Paardeplaats project is located on:

- Portions 28, 29, 30 and 40 of the farm Paardeplaats 380 JT;
- Remaining Extent (RE) of Portion 2 of the farm Paardeplaats 425 JS; and
- Portion 13 of Paardeplaats 380JT

The Paardeplaats project covers an area of approximately 1 415 ha and falls within the jurisdiction of the Nkangala District Municipality and Emakhazeni Local Municipality (ELM) (***Figure 1***).

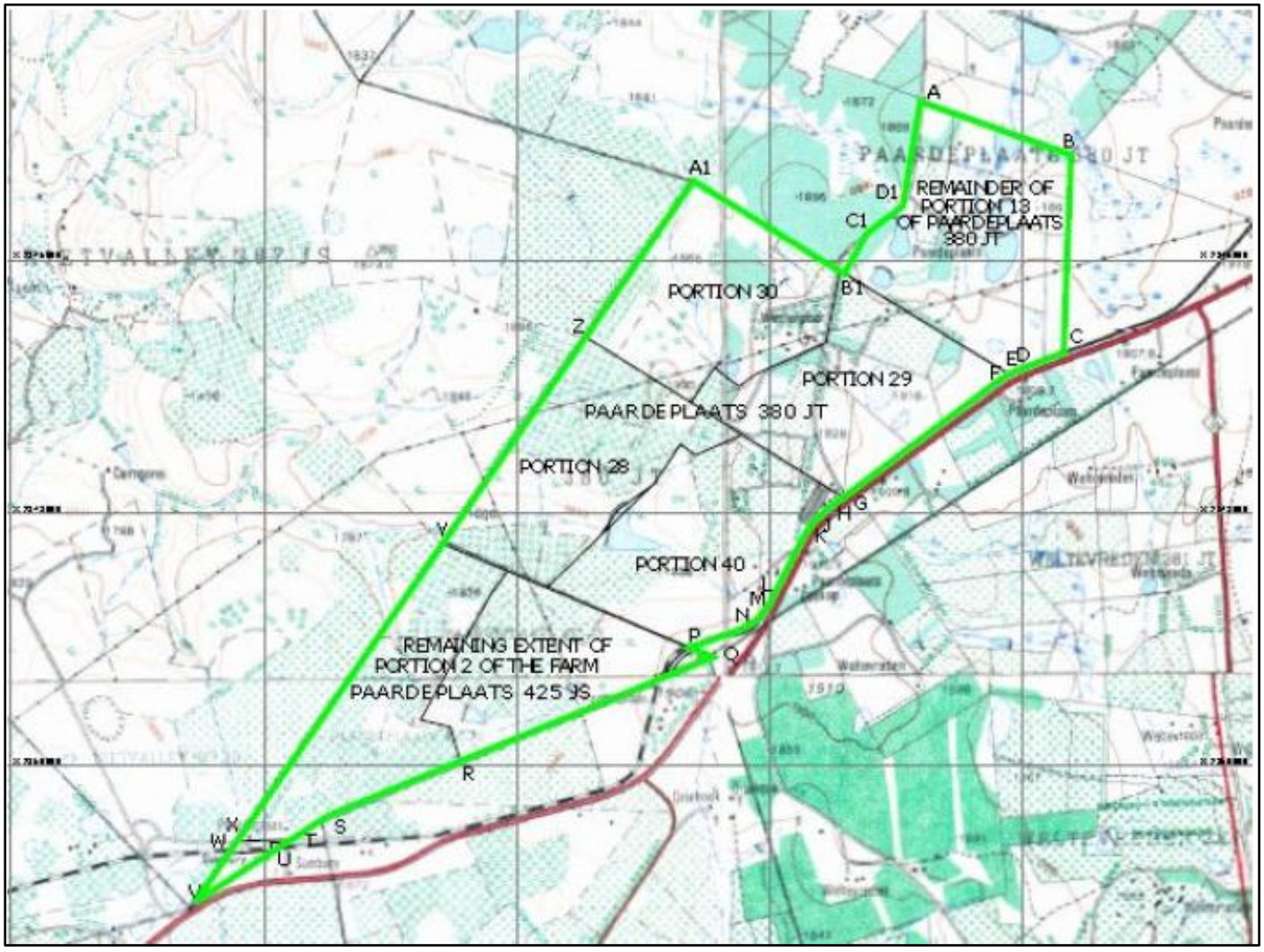


Figure 1 - Paardeplaats study area with farm portions indicated (provided by Exxaro)

1.3 Legislative Framework

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:

i. National Environmental Management Act (NEMA), Act 107 of 1998
ii. National Heritage Resources Act (NHRA), Act 25 of 1999
iii. Minerals and Petroleum Resources Development Act (MPRDA), Act 28 of 2002
iv. 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:

i. National Environmental Management Act (NEMA), Act 107 of 1998:
    a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
    b. Environmental Scoping Report (ESR) – Section (29)(1)(d)

c. Environmental Impacts Assessment (EIA) – Section (32)(2)(d)
d. Environmental Management Plan (EMP) – Section (34)(b)

ii. National Heritage Resources Act (NHRA), Act 25 of 1999:
a. Protection of Heritage resources – Sections 34 to 36; and
b. Heritage Resources Management – Section 38

iii. Minerals and Petroleum Resources Development Act (MPRDA), Act 28 of 2002:
a. Section 39(3)

iv. Development Facilitation Act (DFA), Act 67 of 1995:
a. 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…" 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, 2008b):

The NEMA 23(2)(b) states that an integrated environmental management plan 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, 2008b).

MPRDA defines 'environment' as it is in the NEMA and therefore acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the National Heritage Resources Act that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any

State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities (Fourie, 2008b).

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible HSR report is compiled.

The heritage impact assessment criteria to be utilised in the HIR are described in more detail in ***Annexure A***; while the Environmental Impact Scoring criteria to be utilised in the HIR, are provided in ***Annexure B***.

1.4 Assumptions and Limitations

The aim of the HSR is to identify the possible types of heritage resources that might be present in the study area, as well as possible hotspots for the locality of such resources. From this the possible impacts from mining and ancillary activities must be predicted. However, the results of this report will require confirmation by undertaking a physical survey as part of the final evaluation of the study area. Since the current information is based only on a literature and archival search and investigation of other desktop resources (maps and satellite imagery), with no site visits or interaction with residents of the area that may be able to contribute to the understanding of the history of the area, this report can only be seen as a high level evaluation.

1.5 Terminology/Abbreviations

Table 2- Abbreviations

ACRONYMS	*DESCRIPTION*
AIA	**Archaeological Impact Assessment**
ASAPA	**Association of South African Professional Archaeologists**
CRM	**Cultural Resources Management**
DEA	**Department of Environmental Affairs**
DWA	**Department**: **Water Affairs**
DMR	**Department of Mineral** Resources
EIA practitioner	**Environmental Impact Assessment Practitioner**
EIA	**Environmental Impact Assessment**
EMPr	Environmental Management Programme Report
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**
RoD	**Record of Decision**
SADC	**Southern African Development Community**
SAHRA	**South African Heritage Resources Agency**

The following definitions are taken from the National Heritage Resources Act, no 25 of 1999 (NHRA, section 2):

Archaeological resources

This includes:

i. 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;

ii. 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;

iii. 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;

iv. 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 the change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

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

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.

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.

2. TECHNICAL DETAILS OF THE PROJECT (from Exxaro Mining Works Program document)

The Paardeplaats project will supply coal (RoM) to the Glisa mine beneficiation plant at a rate of 4.2 – 4.4 mtpa and supply to Eskom at a rate of 2.4 mtpa. The mining method will be a hybrid between roll-over mining as well as bench mining. The roll-over mining will be used where only one seam is present, as well as where the overburden has a thickness less than 20m. The bench mining will be used where two or more seams are present and where the overburden has a thickness of more than 20m.

The stripping operation removes the topsoil and exposes the overburden of the next cut. The continuity of this process is essential in order to ensure that sufficient workroom is maintained. The initial topsoil will be hauled to a designated area and be used for rehabilitation later on. When steady state is reached, topsoil is replaced in a continuous operation. The overburden will be drilled and blasted. The operation will be done in two phases. The top portion will be loaded and hauled; the lower portion will be done via a dozing process. This will ensure that the rehabilitation is adequately addressed by means of a backfilling process. Once the overburden has been removed, the coal (RoM) is transferred to the plant by means of a load and hauls operation. The mineral deposit consists of the No 2 seam of the Springs-Witbank Coalfield in Mpumalanga.

The Paardeplaats project area is within the Witbank Coalfield and is very close to the north-eastern edge of the main Karoo basin. The Karoo Sequence is represented by the Dwyka Formation, which consists of diamictite and the overlying Ecca Group. The coal seams of the Witbank Coalfield are found at the base of the Vryheid Formation of the Ecca Group. The strata in which the coal seam occurs consist predominantly of fine, medium and coarse grained sandstone with subordinate mudstone, shale, siltstone and carbonaceous shale (***Figure 2***).

3. RECEIVING ENVIRONMENT

Section 3 provides background information obtained from research undertaken at the National Archives and from other written sources (see Reference section), as no site visit could be undertaken.

3.1 Methodology

An evaluation of the archaeological and historical background of the study area was required to establish the possible heritage resources to be found. Therefore a literature search of published sources (Academic Literature, national Archives and popular publications), an examination of topographical maps and an examination of the study area by means of Google Earth were conducted.

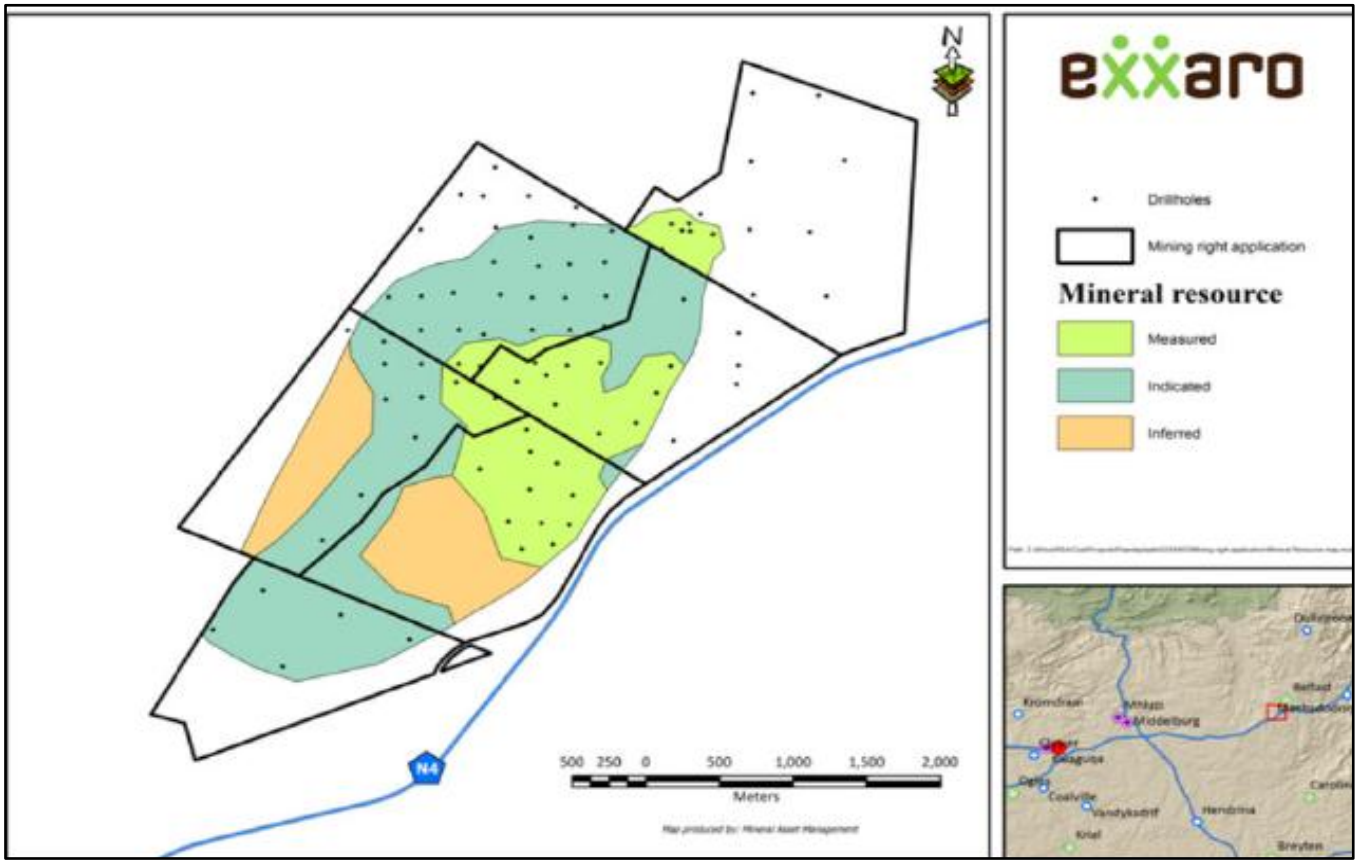


Figure 2 - Paardeplaats mining rights application area (provided by Exxaro)

3.2 Regional Background

Archaeological Background

The province of Mpumalanga is known to be rich in archaeological sites that tell the story of humans and their predecessors in the region going back some 1,7 million years (Delius & Hay, 2009). The pre-colonial period is divided broadly into the Stone Age and the Iron Age (*Refer to **Figure 3** for a visual representation of the human time lin*e).

The Stone Age refers to the earliest people of South Africa who relied mainly on stone for their tools and were hunter-gatherers. This period is divided into the Earlier, Middle and Later Stone Age:

- *Earlier Stone Age:* The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant.
- *Middle Stone Age*: Various stone tool industries in SA dating from ± 250 000 yrs. – 40 000 yrs. before present.
- *Later Stone Age:* The period from ± 40 000 yrs. before present to the period of contact with either Iron Age farmers or European colonists. (Delius & Hay, 2009; Morris, 2008)

The Iron Age as a whole represents the spread of Bantu speaking people whose way of life was pastoral-agricultural and includes both the Pre-Historic and Historic periods. As indicated by the name, this period is distinguished by the

knowledge of extraction and use of various metals, mainly iron. Similarly to the Stone Age, it can also be divided into three periods:

- *The Early Iron Age:* Most of the first millennium AD.
- *The Middle Iron Age*: 10th to 13th centuries AD
- *The Late Iron Age:* 14th century to colonial period. (Delius & Hay, 2009; Morris, 2008)

The archaeological literature does not contain much information on the Stone Age archaeology of this area, since this period has not been researched extensively in Mpumalanga (Esterhuysen & Smith, 2007). However, it is clear from the general archaeological record that the larger Mpumalanga region has been inhabited by humans since Earlier Stone Age (ESA) times. Although no Stone Age sites are known from the immediate vicinity of the study area, there are some sites recorded in the greater region (Esterhuysen & Smith, 2007). Examples of such sites are noted below.

Stone Age Sites

An Earlier Stone Age site is located at Maleoskop near Groblersdal. Concentrations of ESA stone tools were found in erosion gullies along the Rietspruit (Esterhuysen & Smith, 2007). Evidence for the Middle Stone Age (MSA) period has been excavated from Bushman Rock Shelter, situated on the farm Klipfonteinhoek in the Ohrigstad District. The MSA layers indicated that the cave was visited repeatedly over a long period, between approximately 40 000 years ago and 27 000 Before Present (Esterhuysen & Smith, 2007). Two Later Stone Age (LSA) sites were found at the farm Honingklip near Badplaas in the Carolina District, (Esterhuysen & Smith, 2007).

Iron Age Sites

Early Iron Age

Early farming communities moved into the Mpumalanga area around AD 500. These early farmers used metal tools and pottery and lived in fairly permanent agricultural villages. The most well-known EIA site in the area is the Lydenburg Heads site in the Sterkstroom Valley. A brief account of the discovery is provided by Esterhuysen and Smith (2007):

In 1957 a young boy, Ludwig von Bezing, found some strangely shaped pieces of pottery on his father's farm near Lydenburg, which seemed like pieces of human masks. Over the next few years he collected more fragments as well as other artefacts, including pot shards, iron and copper beads, ostrich eggshell beads, and millstones. Whilst studying at the University of Cape Town, he brought the fragments to the attention of Ray Inskeep, professor of archaeology. Inskeep then excavated the site and supervised the masks' reconstruction. Known as the Lydenburg Heads, they immediately became famous, partly because of their rarity and intriguing appearance, and partly because they reveal aspects of past cultural and ritual practices. They are on permanent display at the South African

Museum in Cape Town. The heads have been carbon-dated to about AD 500. Similar pottery heads dating to the same period have been found near the KwaZulu-Natal coast.

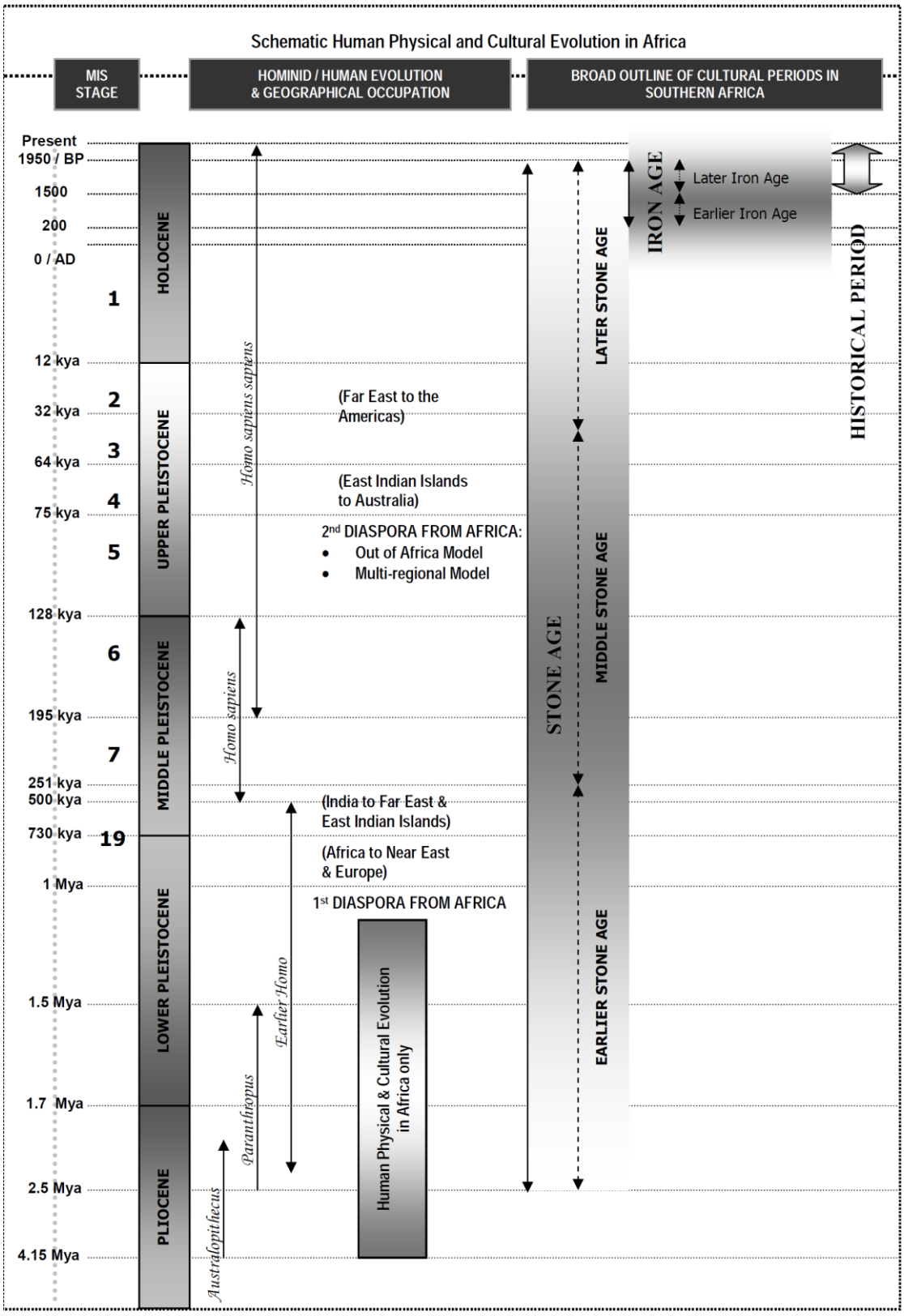


Figure 3 – Human and Cultural Time line in Africa (Morris, 2008)

Figure 4 - Lydenburg Heads (Iziko Museum; from Delius, 2009)

Late Iron Age

Late Farmer societies developed extensive stone settlements around Lydenburg, Badfontein, Sekhukhuneland, Roossenekal and Steelpoort (Delius & Hay, 2009). The greater Belfast area specifically, is known for its large complexes of LIA stonewalling. Although there was some early research on the stone ruins in the general region of the then-named eastern Transvaal, systematic investigation of the ruins only began in the last decade (Collett, 1982). Evers (1975) and Mason (1968) both undertook surveys of aerial photographs of the general area and identified a vast number of such settlements between Lydenburg and Machadodorp. Evers noted that settlements are not evenly distributed over the area, largely for topographical reasons (1975).These settlements typically consisted of three interrelated elements: homesteads, with cattle kraals surrounded by enclosures for human habitation; stone-edged paths or roadways, probably for movement of cattle; and stone terraces, for agricultural cultivation. Most of the homesteads were built in symmetrical patterns, some of which were reproduced in rock engravings found close to these settlements (Delius and Hay; 2009).

With regard to dating, the beginning of the Late Iron Age in this region is obscure. At the time of Evers' article there were no sites known that were intermediate in age between the Early Iron Age sites and the later stone-walled sites. However, since elsewhere in the then-named Transvaal and Orange Free State, stone-walled building appeared to start around A.D. 1450-1500, this was thought to be true in this region as well (Evers, 1975).

Rock Engravings

An article by Maggs (1995), explains that these agriculturist engravings are mainly dominated by depictions of ground plans representing the shape of settlements people built and lived in. Virtually all known engraved sites are

in the vicinity of Late Iron Age settlements and it is now known that such engravings are much more common than was previously thought. Fieldwork in several such regions has produced many formerly unrecorded sites within the limited areas searched. Therefore, Maggs recommended that future fieldwork on the stone-built settlements should incorporate an examination of neighbouring rock outcrops for possible engravings (*ibid*). Maggs' article highlights that such images may represent abstract or symbolic spatial arrangements reflecting the cosmology of the society that made them. He uses an example taken from the Pedi, a northern Sotho group linked geographically and culturally with the Mpumalanga engravings. Within this system, social and religious structure was, and among many rural communities still is, clearly inseparable. Each member literally knows their place within the homestead according to their age, sex and status (*ibid*).

Historical Background

The South African (Anglo-Boer) War

Delius & Hay (2009) note that the area between Belfast and Machadodorp was very active during the Anglo Boer War (1899-1902) with numerous skirmishes, railway sabotage and battle sites occurring in the Mpumalanga Highveld area. The Anglo-Boer War or South African War was waged between Great Britain and the two Boer Republics, the ZAR and the Oranje Vrystaat, from 1899 to 1902 (*ibid*). Pretoria was captured by the British on 5 June 1900, but this did not result in the end of the war, as had been anticipated. British forces then embarked upon the defeat of the Boer forces still occupying the then Eastern ZAR. Various British forces advanced towards the ridge of the eastern Highveld, (Jooste, 2001). In August 1900, it was decided by the Boer forces that the line must be defended at all costs, as Machadodorp, the temporary seat of the ZAR government (5 June 1900 – 27 August 1900), was to be protected to safeguard a retreat toward Lydenburg and Barberton (Fourie, 2008a). After the battle of Bergendal (see below), where the Boer forces were defeated; on 28 August 1900, and the town of Machadodorp was occupied by the British troops and on 1 September 1900, Lord Roberts, Commander-in-chief of the British troops in Southern Africa, proclaimed the Transvaal as part of the British Empire (Jooste, 2008).

4. CONSIDERATION OF RELATED/SIGNIFICANT ASPECT MANAGEMENT PLANS IN THE AREA

4.1 Belfast and Surrounding Area

4.1.1 Belfast and *t*he Battle of Bergendal

The Battle of Bergendal, also known as the Battle of Belfast and the Battle of Dalmanutha, is called the "last set-piece battle of any size in the [Anglo-Boer] war" by Pakenham (1979). However, although the Boer forces were defeated and the British won the battle, Botha's main force remained intact. The commandos dispersed to Lydenburg and Barberton, and a phase of guerrilla warfare began. This second phase of the war lasted even longer than the first. Peace would only be declared at the end of May 1902 (Jooste, 2002). Jooste (*ibid*) provides a brief summary of the Battle of Bergendal in an article in the Military History Journal of December 2002. Because Machadodorp had become the temporary seat of the ZAR government (5 June 1900 – 27 August 1900), a defensive line was set up with

the central part occupied by the Zuid Afrikaansche Republiek Politie (ZARP) under command of Commandant G.M.J. van Dam on a rocky outcrop on the farm Bergendal. On 26 August 1900, the Battle of Bergendal commenced and the British forces advanced on the Boer Lines. The Boer lines were breached in certain sections but the main resistance was coming from the ZARP position. On 27 August a major offensive was concentrated on the ZARP position, with a three hour bombardment of the ZARP kopje commencing at 11 am. The Boer defences were breached on 28 August and Buller's troops marched into Machadodorp. Five days later, on 1 September 1900, Lord Roberts proclaimed the annexation of the ZAR as the Transvaal Colony.

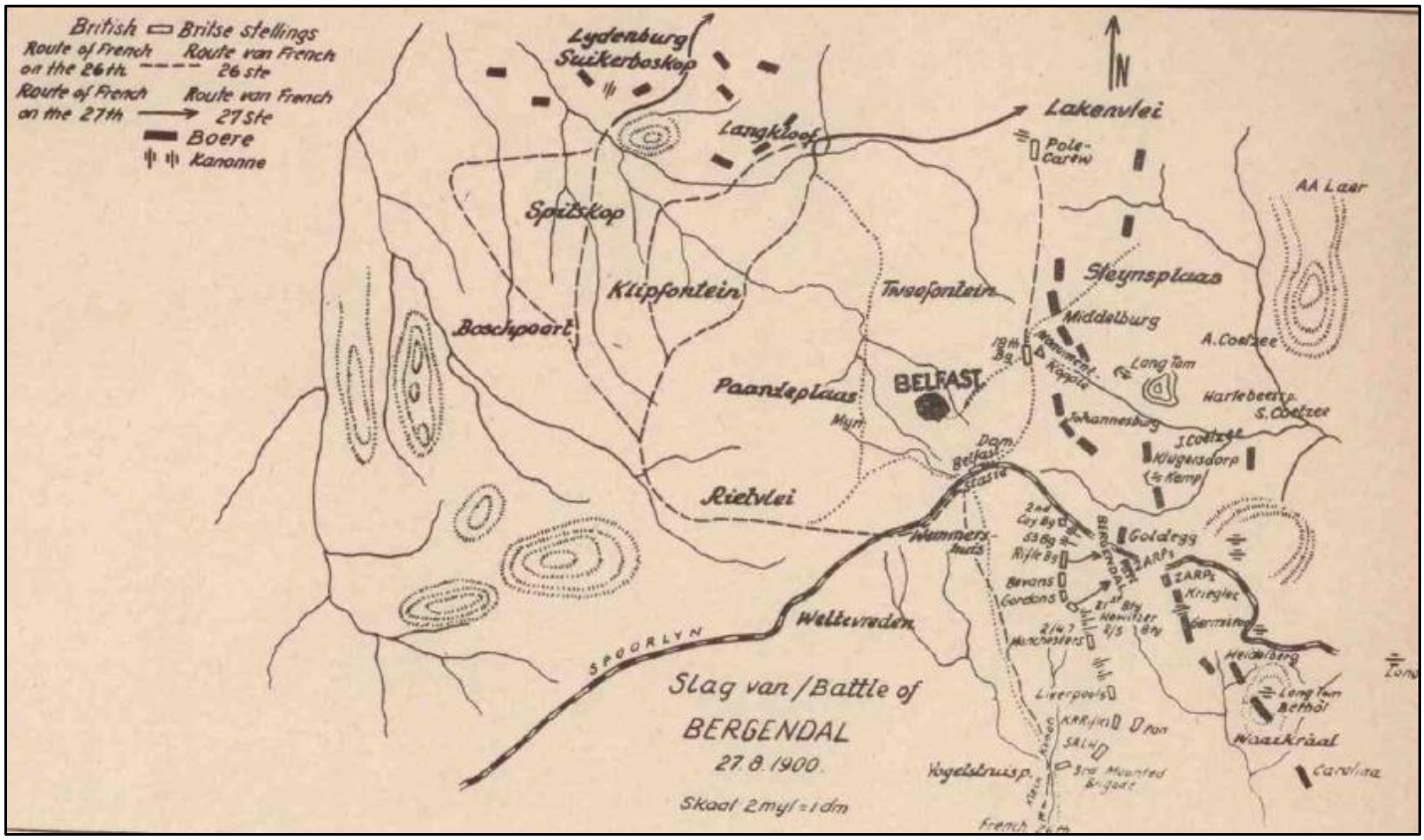


Figure 5 - Map: Battle of Bergendal (VD Merwe, 1952)

4.1.2 Belfast Concentration Camp Graves and British Military Graves

During the Second South African (Anglo-Boer) War, the British established a concentration camp in and around Belfast. The cemetery containing the graves of Boer/Afrikaans civilians who died in the camp is located on the outskirts of the south-western edge of the town. The cemetery also contains British and Commonwealth military graves from the Second South African War. (UCT database of British Concentration Camps of the South African War 1900-1902; http://www2.lib.uct.ac.za/mss/bccd/)

4.2 The Study Area - Paardeplaats 380 JT and Paardeplaats 425 JS

4.2.1 Examination of Topographical Maps

An examination of the 1:50 000 topographical maps for the area in which the study area is located (2529D and 2530C), identified the following heritage resources:

- In the immediately surrounding area:
  - A site of English War graves on the outskirts of Belfast town (S25 41 19.0 E30 01 36.9)
  - The site of the Bergendal battle (on the farm Berg-en-dal 378 JT, SE of the study area) (S25 44 04.5 E30 06 03.9)
  - Gelofte Monument Feeshuis (NE of Belfast) (S25 40 23.2 E30 04 22.8)
  - Various kraals (possible Iron Age/historical sites) (S25 40 33.7 E30 08 15.4)
  - Various ruins (possible Iron Age/historical sites)
  - Various built structures, some of which may be of historical date (Refer to Figure 9 -)
- Within the study area:
  - Various (±9) built structures, some of which may be of historical date Refer to Figure 9 -)

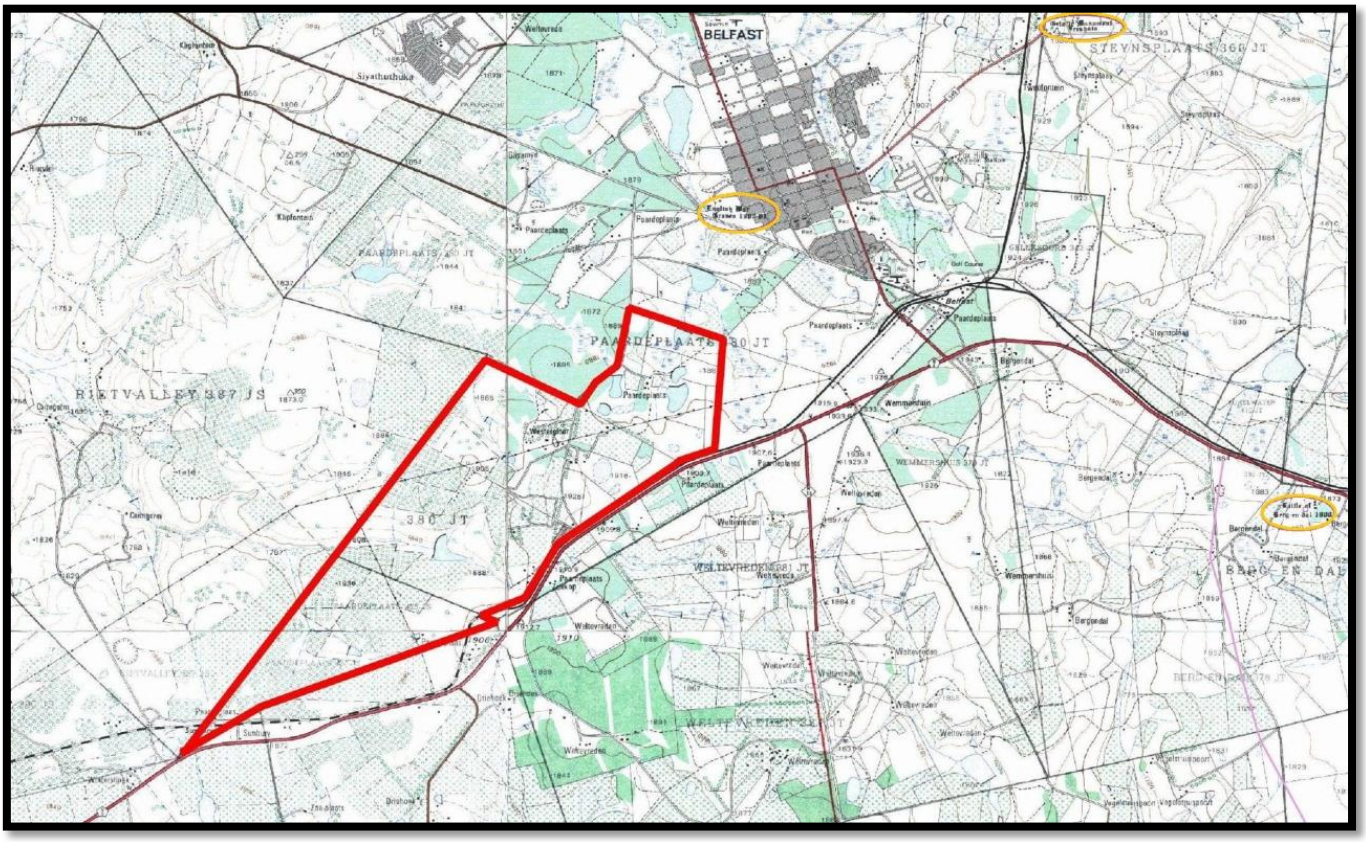


Figure 6- Locality map with major historical sites marked in yellow (study area in red)

4.1.2 Examination of Google Earth satellite imagery

A copy of the locality plan of the study area was overlaid on Google Earth satellite images to compare and verify the presence of built structures (**Figures 6 and 7**). No indications of possible archaeological sites were visible, which is

probably due to the current use of the land for agriculture. This usually destroys any above ground archaeological remains; however, there is still a possibility that archaeological material is present under the ground surface, which could be exposed during construction excavations.

4.1.3 Within the study area

A total of approximately fourteen built structures (single or groups) are indicated within or on the boundaries of the study area on the topographic map section provided by EIMS (**Figure 8**). However, when the study area was overlaid on the same area in Google Earth images, the number of visible built structures and possible sensitive areas appeared to be approximately 55. Some of the structures indicated on the locality map are not visible on the Google Earth images, while other structures are visible that are probably more recent. The demarcated sensitive areas were processed to produce a centroid for reach area and are listed in ***Table 3***.

Table 3- List of structures/features with coordinates within study area

Name	X	Y
Train Station	29.9617	-25.7629
Structure	29.9653	-25.7616
Structure	29.9655	-25.7605
Structure	29.9617	-25.7614
Structure	29.9663	-25.7598
Structure	29.9659	-25.7576
Structure	29.9657	-25.7566
Old Mining Infrastructure?	29.9747	-25.7488
Exposed bedrock	29.9731	-25.7539
Exposed bedrock	29.9758	-25.7539
Exposed Bedrock - Possible Rock Art areas	29.9794	-25.7511
Structures	29.9807	-25.7551
Structures	29.9832	-25.7544
Exposed bedrock	29.9822	-25.7538
Structures	29.9846	-25.7512
Homestead	29.9892	-25.7513
Structures	29.9901	-25.7490
Structure	29.9853	-25.7455
Structure	29.9864	-25.7478
Structure	29.9849	-25.7534
Structure	29.9916	-25.7514
Structure	29.9968	-25.7494
Structure	29.9920	-25.7461
Structure	29.9960	-25.7464
Structure	29.9968	-25.7457
Structure	29.9824	-25.7409
Exposed bedrock	29.9833	-25.7376

Expose bedrock - Rock art	29.9921	-25.7373
Structure	29.9934	-25.7352
Exposed bedrock	29.9950	-25.7409
Farmstead and infrastructure	30.0027	-25.7437
Farmstead	30.0004	-25.7381
Farmstead	30.0028	-25.7365
Structure	30.0033	-25.7351
Workers housing	30.0066	-25.7381
Structure	29.9933	-25.7323
Structure	29.9940	-25.7248
Structure	30.0028	-25.7219
Farmstead	30.0035	-25.7264
Workers housing	30.0089	-25.7291
Structure	30.0135	-25.7296
Structure	30.0107	-25.7269
Farmstead	30.0174	-25.7188
Structure	30.0257	-25.7138
Structure	29.9625	-25.7618
Structures	29.9633	-25.7634
Structures	29.9944	-25.7320
Structures	30.0003	-25.7300
Structures	30.0032	-25.7187
Structures	30.0100	-25.7225
Structure	30.0127	-25.7252
Structure	30.0168	-25.7254
Structure	30.0240	-25.7133
Structure	30.0184	-25.7127

4.1.4 Outside the study area

Approximately 65 built structures/clusters are indicated on the topographic locality map/Google overlay as being situated outside the study area, but within the 3500 meter blasting impact circle (Developed for the EIA study by Blast Specialist). This does not include the large sections of Belfast town and Siyathuthuka Township that is situated on the north western edge of the blast circle. These structures and clusters are listed in ***Table 4***.

Table 4- List of structures/features with coordinates outside the study area, but within the blasting impact zone

Name	X	Y
structures	29.955541	-25.762392
structures	29.954667	-25.763993
structures	29.954736	-25.764728
structure	29.953703	-25.765464
structures	29.952029	-25.768472

station structures	29.961613	-25.762841
station structures	29.958987	-25.762992
ruin	29.965895	-25.764241
structures	29.952986	-25.76945
structures	29.948642	-25.767155
structures	29.946048	-25.767699
structures	29.949173	-25.762242
ruin	29.965791	-25.763189
structures	29.942016	-25.770184
structures	29.94332	-25.773223
structures	29.933841	-25.777324
structures	29.934567	-25.788278
farmstead	29.951874	-25.779851
structures	29.952381	-25.782805
farmstead	29.961125	-25.782837
structures	29.979647	-25.787742
farmstead	29.991998	-25.782707
structures	29.971965	-25.762616
structures	29.97235	-25.763839
structures	29.98588	-25.762367
structures	29.991153	-25.760295
structures	29.989663	-25.758308
farmstead	29.988369	-25.772043
farmstead	29.999232	-25.759931
structures	29.998056	-25.751507
farmstead	29.999037	-25.749039
structures	30.007727	-25.748175
structures	30.012386	-25.747368
structures	30.004855	-25.745085
structures	30.007119	-25.743831
cemetery	30.006839	-25.741207
structures	30.016045	-25.73704
structures	30.009209	-25.765005
structures	30.01946	-25.764485
structures	30.023166	-25.766861
structures	30.02996	-25.764054
farmstead	30.038021	-25.755051

structures	30.046697	-25.752047
structures	30.053248	-25.731314
farmstead	30.0424	-25.731675
farmstead	30.034655	-25.736068
structures	30.035242	-25.745361
farmstead	30.023692	-25.732105
farmstead	30.03397	-25.728642
structures	30.041	-25.723203
structures	30.044825	-25.721902
structures	30.043646	-25.723077
structures	30.046067	-25.726561
structures	30.045549	-25.72527
structures	30.04739	-25.722141
structures	30.050058	-25.721914
structures	30.057475	-25.716086
substation	30.040489	-25.717613
farmstead	30.044579	-25.711482
structures	30.032347	-25.702168
structures	29.973614	-25.698153
structures	29.980754	-25.724226
structures	29.966911	-25.728729
structures	29.950994	-25.735419
structures	29.93493	-25.761419
structures	29.927399	-25.761618

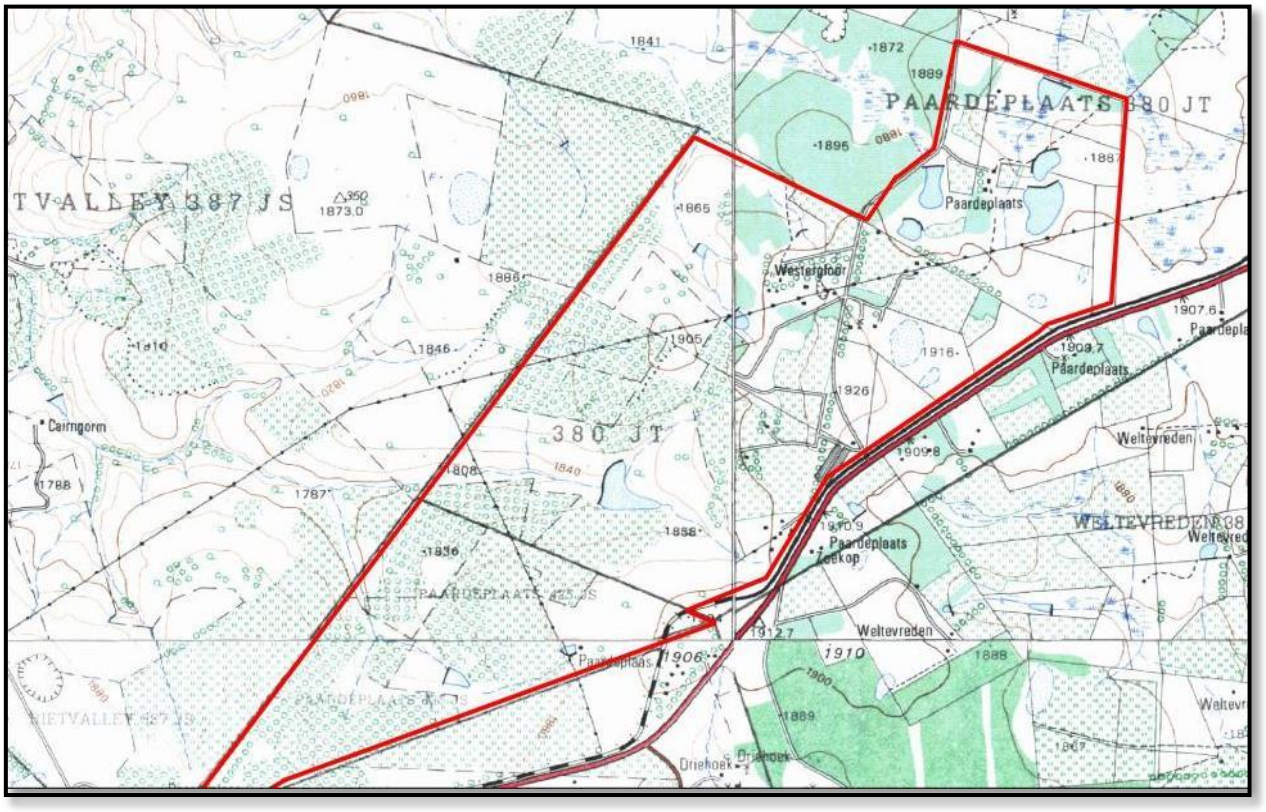


Figure 7 -Topographical map showing the study area (in red)

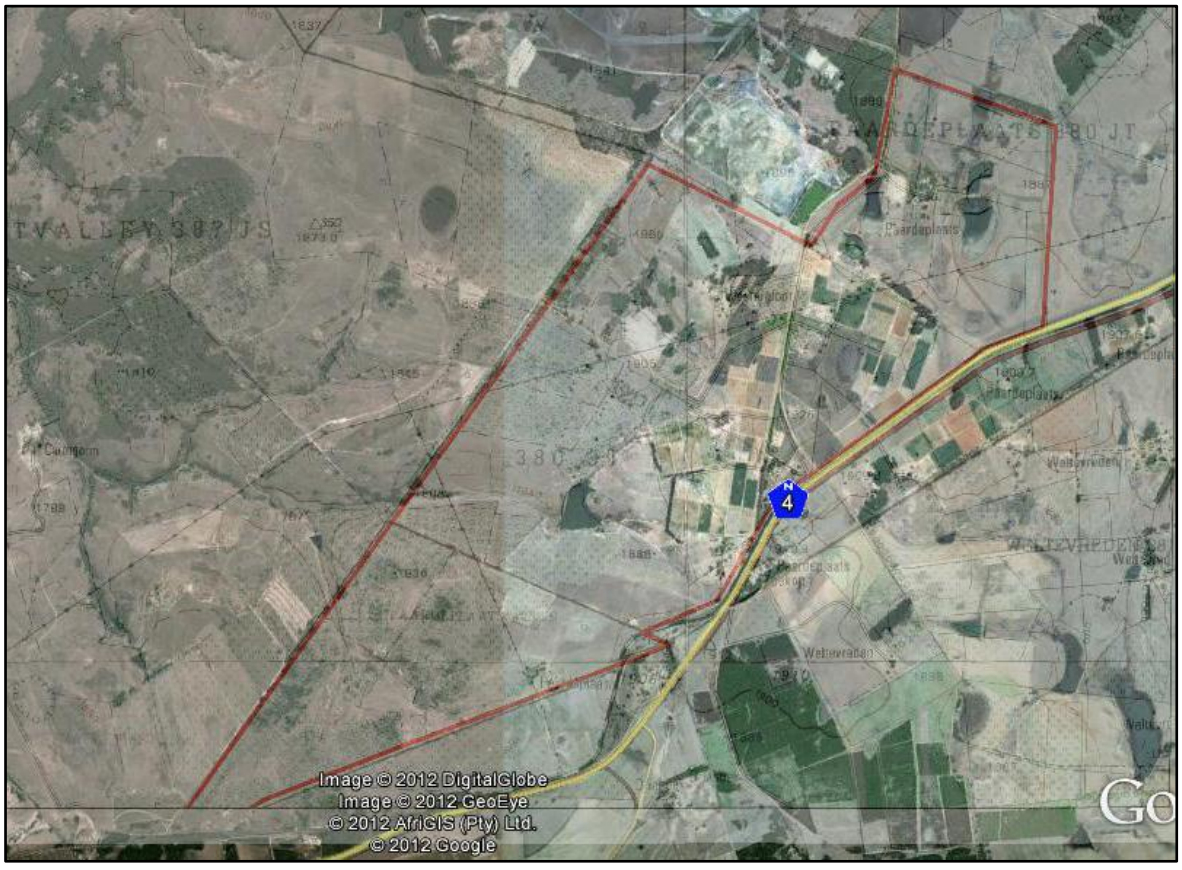


Figure 8- Locality map overlaid on Google Earth image

4.1.5 Archival research of specific farm portions

A search of documents held at the National Archives in Pretoria did not locate any documents with information on the two farms on which the study area is located.

5. DESCRIPTION OF POTENTIAL IMPACTS

5.1 Potential Fatal Flaws

Fatal flaws would constitute environmental characteristics which cannot or may not interact with the proposed development. From a heritage point of view, fatal flaws can be seen as a heritage resource/s present on the site that will halt the project and that cannot be mitigated due to site constraints such as limited space to implement buffer or no-go zones. In most case the implementation of buffer zones and extensive conservation management plans can change possible fatal flaws as noted in ***Table 5***.

Table 5- - Below indicates broad heritage resources that could constitute a fatal flaw on a development site where buffer zones and exclusion zones are impossible to implement

Heritage Resource	Example
Rock Art	Rock Art, paintings or engravings situated within a development area – Seen as immovable resources and can only be moved under exceptional circumstances
National or Provincial Heritage Sites	Site specific monuments like battles or major sites or structures with considerable significance
Sacred Sites	Immovable sites associated with religion or cultural groupings, such as sacred pools, historic initiation school sites, etc.
Archaeological sites of National Significance	Sites such as Mapungubwe Hill or an archaeological landscape such as the Limpopo Valley or The Cradle of Humankind
Cultural Landscapes of significance	Landscapes such as valleys and vistas held as being of national or international importance

5.1.1 Identified Non-fatal flaws

i. Within the study area, the main heritage sites identified at the desk top level are various built structures, some of which are likely to be of historical date. However, the significance of these built structures can only be assessed at the ground verification stage. A heritage architect would probably need to be appointed to provide specialist input on these structures. It is also important to note that the presence of historical

structures is often associated with individual graves or cemeteries. The possible presence of graves can only be verified at the ground verification stage.

ii. The various kraals, ruins and built structures, which may be archaeological and/or historical sites, and which have been identified at the desktop level as occurring outside the immediate study area will probably not be directly impacted by the proposed development and therefore, would probably not require further specialist investigation.

5.1.2 Identification of areas for further specific field work study

As noted in section 4.1.3 and 4.1.4 various structures and areas have been identified from the map and aerial photographic analysis. The structures and sites will be evaluated during the field verification stage and incorporated into the HIR. Refer to **Annexure C** for further maps

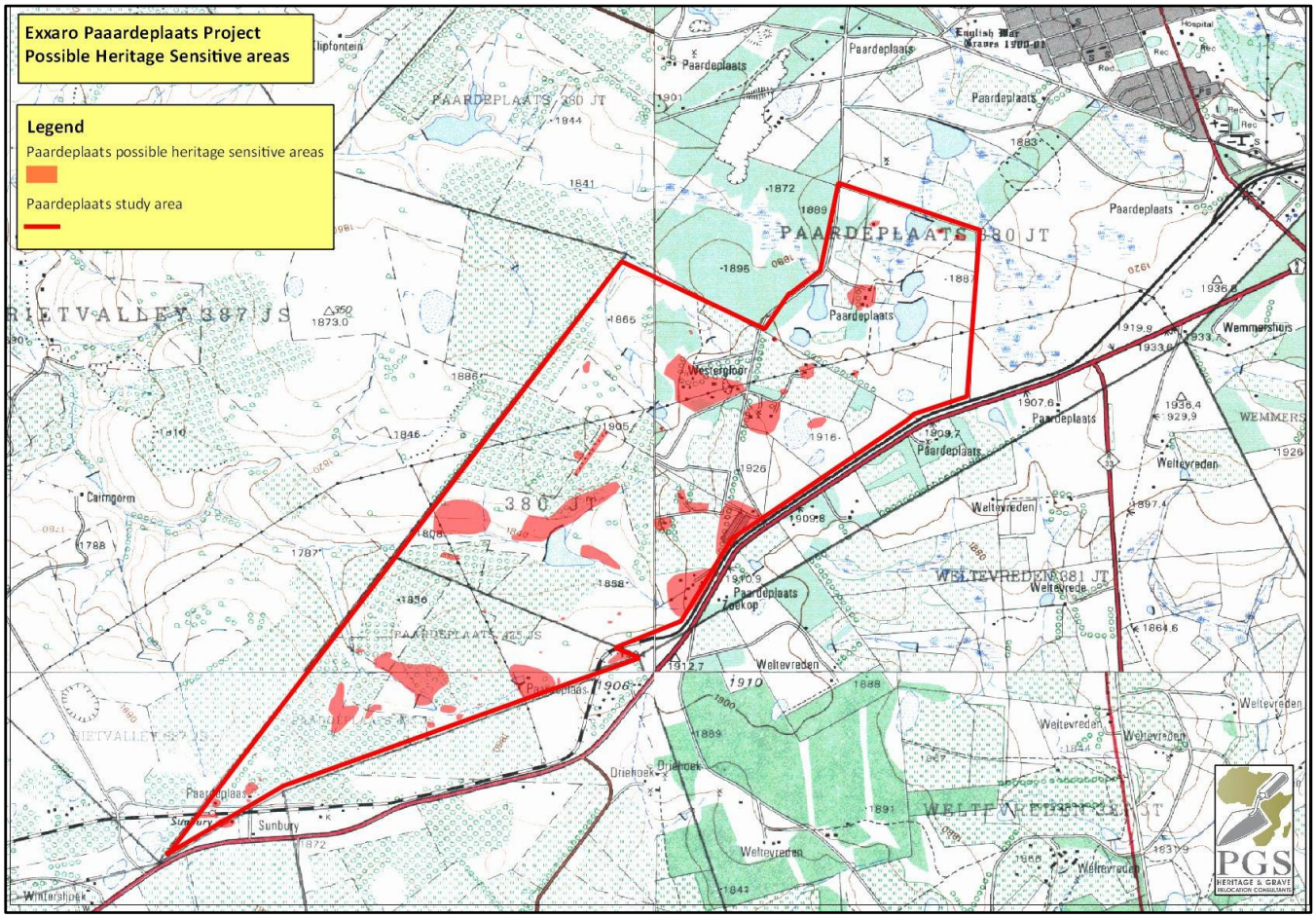


Figure 9 -- Heritage sensitivity map

6. DETAILED PLAN OF STUDY FOR THE EIA AND EMP

The following will be required to develop a final HIA to manage the heritage resources within the proposed mining area.

6.1 Methodology

Physical Surveying

The fieldwork component will consist of a selective walk through/site visit of the proposed mining area and is aimed at locating heritage resources falling within (and directly adjacent to) the proposed study area. The locations of all heritage resources that are recorded during the survey will be documented using a hand-held GPS. Furthermore, the documentation will reflect a brief qualitative description and statement of significance for each site and include a photographic record of all the sites.

It is important to also note that informal social consultation (i.e. with local community members, residents and knowledgeable individuals) will be undertaken during the fieldwork component. The aim of social consultation is to identify any tangible and intangible resources (i.e. sacred places, myths and indigenous knowledge resources) that may exist.

6.2 Deliverable

A report will be written which would include the following components:

- The identification and mapping of all heritage resources in the affected area;
- An assessment of the significance of such resources in terms of the heritage assessment criteria;
- An assessment of the impact of the development of such heritage resources;
- If heritage resources will be adversely affected by the proposed development, consideration of the
- alternatives; and
- Proposed mitigation of any adverse effects during and after the completion of the proposed development.

7. POTENTIAL IMPACTS AND FURTHER WORK FOR EIA PHASE

The desktop evaluation of the study area and surrounds has shown that the possibility exists of finding various heritage resources in the proposed study area. This includes archaeological sites or material, historical structures and graves or cemeteries. This desktop evaluation however, does not exclude the need for proper field verification and survey during the EIA phase of the project. ***Table 6*** provides a guideline on possible finds that could be made during ground thruthing and the next steps to be taken during the site evaluation in the EIA Phase.

Table 6- Potential Impacts to Consider for EIA and EMP Phase

	IMPACT	STAGE OF PROJECT
ISSUE	**IMPACT ON ARCHAEOLOGICAL SITES**	**CONSTRUCTION**
DISCUSSION	As seen from the archival work and discussion, the possibility of archaeological finds has been identified and thus further fieldwork is required to develop a comprehensive Heritage Management Plan for the construction activities.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified archaeological sites can seriously hamper construction and development activities and timelines. Destruction or damage of such sites requires a permit from the responsible heritage authority (NHRA, section 35). Fieldwork can provide valuable information on such sites in the study area and provide timeous management of such sites through various mitigation measures, including the realignment of the construction activities, if necessary.	Destruction or damage during construction of haul roads, pipelines or pollution control dams
EIA INVESTIGATION REQUIRED	Archaeological field survey of the entire study area, focussing on areas identified in the desktop study as heritage sensitive.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures, such as excavations and destruction of sites, planned and scheduled to fit within the timing of the project phases
	IMPACT	**STAGE OF PROJECT**
ISSUE	**IMPACT ON HISTORICAL SITES**	**CONSTRUCTION, OPERATION**
DISCUSSION	As seen from the archival work and discussion, the possible presence of historical structures has been identified as being high and thus fieldwork is required to develop a comprehensive Heritage Management Plan for the development	

EXISTING IMPACT	None known.	
PREDICTED IMPACT	Damage/destruction by blasting (vibration) and other mining activities e.g. bench box cut mining (direct impacts), on historical structures. Destruction or damage of such sites requires a permit from the responsible heritage authority (NHRA, section 34).	Destruction or damage during construction of haul roads, pipelines or pollution control dams Damage during the mining operations in most cases as direct result of blasting. This type of impact on historical structures can extend beyond the mining boundary
EIA INVESTIGATION REQUIRED	Field survey of selected sites within the study area will confirm possible impacted sites and provide timeous management of such sites through various mitigation measures. Identification of structures outside the mining boundary but within the blast circle impact area. Further evaluation of such structures may include pre-mining status documentation to provide a baseline against which any changes to the structures during mining can be assessed.	
WHEN IS MITIGATION REQUIRED		During design and before construction, - Baseline assessment of structures - Permitting and controlled destruction of sites Operational - Evaluation of structures during mining against baseline data
	IMPACT	**STAGE OF PROJECT**
ISSUE	**IMPACT ON GRAVES AND CEMETERIES SITES**	**CONSTRUCTION**
DISCUSSION	The existence of graves and cemeteries has not been verified during the archival research. It has however, been found that such sites are rarely noted in maps and documents and can only be identified during field work.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified graves and cemeteries and the	Destruction or damage during

	discovery of such sites can seriously hamper construction and development timelines. Damage, destruction or removal of such sites requires a permit from various responsible authorities, including the Heritage Authority (NHRA, section 36), Provincial Health Department and the SA Police Service. Such a process can take up to 12 months to finalise. Fieldwork can provide valuable information on the presence of such sites in the study area and provide timeous management of such sites, which may include the realignment of the proposed development activities. In the event that identified graves and cemeteries cannot be avoided, a grave relocation process needs to be initiated, bearing in mind that such a process impacts on the spiritual and social fabric of the next of kin and associated communities.	construction of haul roads, pipelines or pollution control dams During the operational phase of the mine, the mining direction and subsequent box cutting and earth works can possibly impact on graveyards and cemeteries in the way of the mining activities.
EIA INVESTIGATION REQUIRED	Archaeological field survey of selected areas will identify possible impacted sites.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures such as grave relocations planned and scheduled to fit within the timing of the project phases
	IMPACT	**STAGE OF PROJECT**
ISSUE	**IMPACT ON PALAEONTOLOGICAL RESOURCES**	**CONSTRUCTION**
DISCUSSION	The existence of palaeontological will be addressed during the HIA phase through a desktop study completed by a palaeontologist.	
EXISTING IMPACT	None known.	
PREDICTED IMPACT	Unidentified palaeontological resources and the	Destruction or damage during

	discovery of such resources can seriously hamper construction and development timelines. Damage, destruction or removal of such sites requires a permit from the responsible heritage authority (NHRA, section 35). The desktop assessment would provide valuable information on the study area and provide timeous management of identified resources, which may include the realignment of the proposed construction footprints. In the event that such resources cannot be avoided, the necessary mitigation measures, that could include initial sampling, followed-up with the excavation and collection of representative specimens. This can however only be done with a permit issued by SAHRA under Section 35 of the NHRA.	construction of haul roads, pipelines or pollution control dams During the operational phase of the mine, the mining direction and subsequent box cutting and earth works can possibly impact on palaeontological resources.
EIA INVESTIGATION REQUIRED	Paleontological Desktop Assessment to assess the possibility of occurrences of fossiliferous rocks.	
WHEN IS MITIGATION REQUIRED		During design and before construction, no-go areas needs to be demarcated, or mitigation measures such as grave relocations planned and scheduled to fit within the timing of the project phases

8. CONCLUSION

The findings of the desktop research for the Heritage Scoping Report have shown that the study area and surrounding areas have a rich historical and archaeological history and that there is potential for archaeological and historical sites and material to exist within the study area (including grave sites). The initial research has also identified specific possible heritage sensitive areas within the study area that will need further investigation during the HIA/EIA phase. The Heritage Impact Assessment HIA) phase will consist of a physical walk-over of the study area, focussing on the areas and sites that were identified during the desktop research phase. This should confirm the

presence or absence of sites/areas with heritage significance identified from the Scoping assessment. Based on the results of the HIA report, recommendations for mitigation (destruction, recording and/or avoidance) of the confirmed heritage resources will be made for incorporation into the EMP for the project.

Palaeontology

A desktop palaeontological impact assessment (PIA) report is to be included in the final HIA report. The NHRA defines 'palaeontological', as "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;". Palaeontological sites and material are protected under section 35 of the NHRA from destruction, damage, excavation, or other disturbance without a permit from the responsible heritage resources authority (NHRA, section 35(4)). The PIA will identify any specific rock types underlying the study area which are known to contain fossilised remains or trace of plants or animals and which could be negatively impacted by the proposed coal mining activities.

Archaeology

An examination of the literature has indicated that archaeological sites and material (structures and man-made features older than 100 years) are very common in the general area. The findings provide the basis for the recommendation of field confirmation through an archaeological walk down covering the whole of the study area. The aim of this will be to compile a comprehensive database of archaeological sites and material in the study area, with the aim of developing a mitigation or management plan for inclusion in the EMP as derived from the EIA.

Historical Sites and structures

Evaluation of topographical maps and satellite imagery has indicated the presence of numerous farmsteads, ruins and farm workers housing. As the age cannot be determined at this stage, field survey and evaluation of each structure and its locality, with regards to the proposed mining activity, will be required to determine the possible impacts on them and suggest appropriate mitigation measures during a detailed EIA Phase.

The data on the different types of heritage resources identified from the field work will be compiled in a final HIA report. This report will utilise the Plan of Study for the EIA/HIA (***Section 6***) as well as the significance rating (***ANNEXURES A and B***) to identify and rank the impacts on the heritage resources into the final detailed EIA investigation.

Potential impacts to be identified and evaluated during the EIA include:

- Disturbance/destruction of archaeological sites or material – Archaeological survey of the impacted area
- Disturbance/destruction of palaeontological material – Desktop study to be included in HIA report

- Destruction/damage/removal of unidentified cemeteries and graves - Archaeological survey of the impacted area
- Destruction/damage of historical structures – Physical survey of the impacted area
- Destruction/alteration of cultural landscape – Visual Impact Assessment to address this issue

The desktop evaluation of the study area and surrounds has shown that the possibility exists of finding various heritage resources in the proposed study area. This includes archaeological sites or material, historical structures and graves or cemeteries. This desktop evaluation does not, however, exclude the need for physical ground thruthing during the EIA phase of the project.

9. REFERENCES

COLLETT, D.P. 1982. *Excavations of Stone-Walled Ruin Types in the Badfontein Valley, Eastern Transvaal, South Africa*. The South African Archaeological Bulletin Vol. 37, No. 135 (Jun., 1982), pp. 34-43 Published by: South African Archaeological Society. Article Stable URL: http://www.jstor.org/stable/3888578

DELIUS, Peter (ed). 2007. *Mpumalanga: History and Heritage*. University of Kwa-Zulu Natal Press.

DELIUS, P AND HAY, M. 2009. *Mpumalanga: An Illustrated History*. The Highveld Press

ESTERHUYSEN, A and SMITH, J. 2007. *Stories in Stone*. Chapter 2 in Mpumalanga: History and Heritage.

EVERS, T.M. 1975. *Recent Iron Age Research In The Eastern Transvaal, South Africa.* In The South African Archaeological Bulletin, Vol. 30, No. 119/120 (Dec., 1975), pp. 71-83. South African Archaeological Society Stable URL: http://www.jstor.org/stable/3888096 Accessed: 03/05/2012 08:54

FOURIE, WOUTER. 2008a. *Archaeological Impact Assessment: Northern Coal Portion 15 and 16 of the farm Weltevreden 381 JT, Belfast, Mpumalanga*. PGS.

FOURIE, WOUTER. 2008b. *Archaeological Impact Assessments within South African Legislation*. South African Archaeological Bulletin 63 (187): 77–85, 2008

JOOSTE, C.P. 2002. *Anglo-Boer War Battles: The Battle Of Bergendal - The Last Pitched Battle Of The Anglo-Boer War.* Military History Journal Vol 12 No 4 - December

JOOSTE, C.P. 2008. *Machadodorp tot en met dorpstigting in 1904* (Afrikaans), MA dissertation, University of Pretoria, Pretoria, viewed 120501 http://upetd.up.ac.za/thesis/available/etd-11132008-124230

MASON, R.J. 1968. *Transvaal and Natal Iron Age settlement revealed by aerial photography and excavation*. African Studies 27: 167-179.

MAGGS, TIM. 1995. *Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa* Reviewed work(s): Source: The South African Archaeological Bulletin, Vol. 50, No. 162 (Dec.), pp. 132-142 Published by: South African Archaeological Society Stable URL: http://www.jstor.org/stable/3889062. Accessed: 01/05/2012 01:40

MORRIS, DAVID. 2008. Archaeological and Heritage Impact Assessment on Remainder of Carter Block 458, near Lime Acres, Northern Cape. McGregor Museum.

PAKENHAM, THOMAS. 1979. The Boer War. Jonathan Ball Paperbacks. Johannesburg

Internet Sources

UCT database of British Concentration Camps of the South African War 1900-1902; http://www2.lib.uct.ac.za/mss/bccd/)

ANNEXURES A

HERITAGE ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage and Grave Relocation Consultants (PGS) for the proposed Paardeplaats Project will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the National Heritage Resources Act (NHRA) (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002). The HIA process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site.

- Step II – Physical Survey: A physical survey will be conducted on foot through the proposed project area by qualified archaeologists', aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

- Step III – The final step involves the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites is 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 - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **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

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, will be used for the purpose of this report.

Table 7: 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)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	-	Low Significance	Destruction

ANNEXURES B

THE SIGNIFICANCE RATING SCALES FOR THE EIA

Method of Assessing Impacts

The impact assessment methodology is guided by the requirements of the NEMA EIA Regulations (2010). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

Determination of Environmental Risk:

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R)}{4} \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 8:

Table 8: Criteria for determination of impact consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or

	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

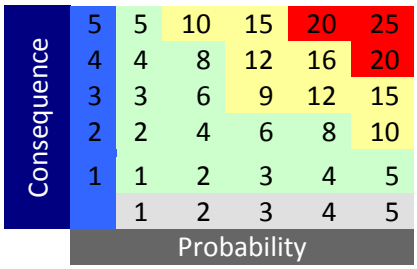
Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P (refer to **Error! Reference source not found.**). Probability is rated/scored as per Table 9.

Table 9: Probability scoring.

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

ER= C x P



The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 10.

Table 10: Significance classes.

Environmental Risk Score	
Value	**Description**
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk),
≥9; <17	Medium (i.e. where the impact could have a significant environmental risk),
≥ 17	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/ mitigated.

Impact Prioritisation

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in Section 0 it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority / significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/ mitigation impacts are implemented.

Table 11: Criteria for the determination of prioritisation.

Public response (PR)	Low (1)	Not raised as a concern by the I&AP's
	Medium (2)	Issue/ impact raised by the I&AP's
	High (3)	Significant and meaningful response from the I&AP's
Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.

	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 11. The impact priority is therefore determined as follows:

Priority = PR + CI + LR

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (refer to Table 12).

Table 12: Determination of prioritisation factor.

Priority	Ranking	Prioritisation Factor
= 3	Low	1
3 > 9	Medium	1.5
= 9	High	2

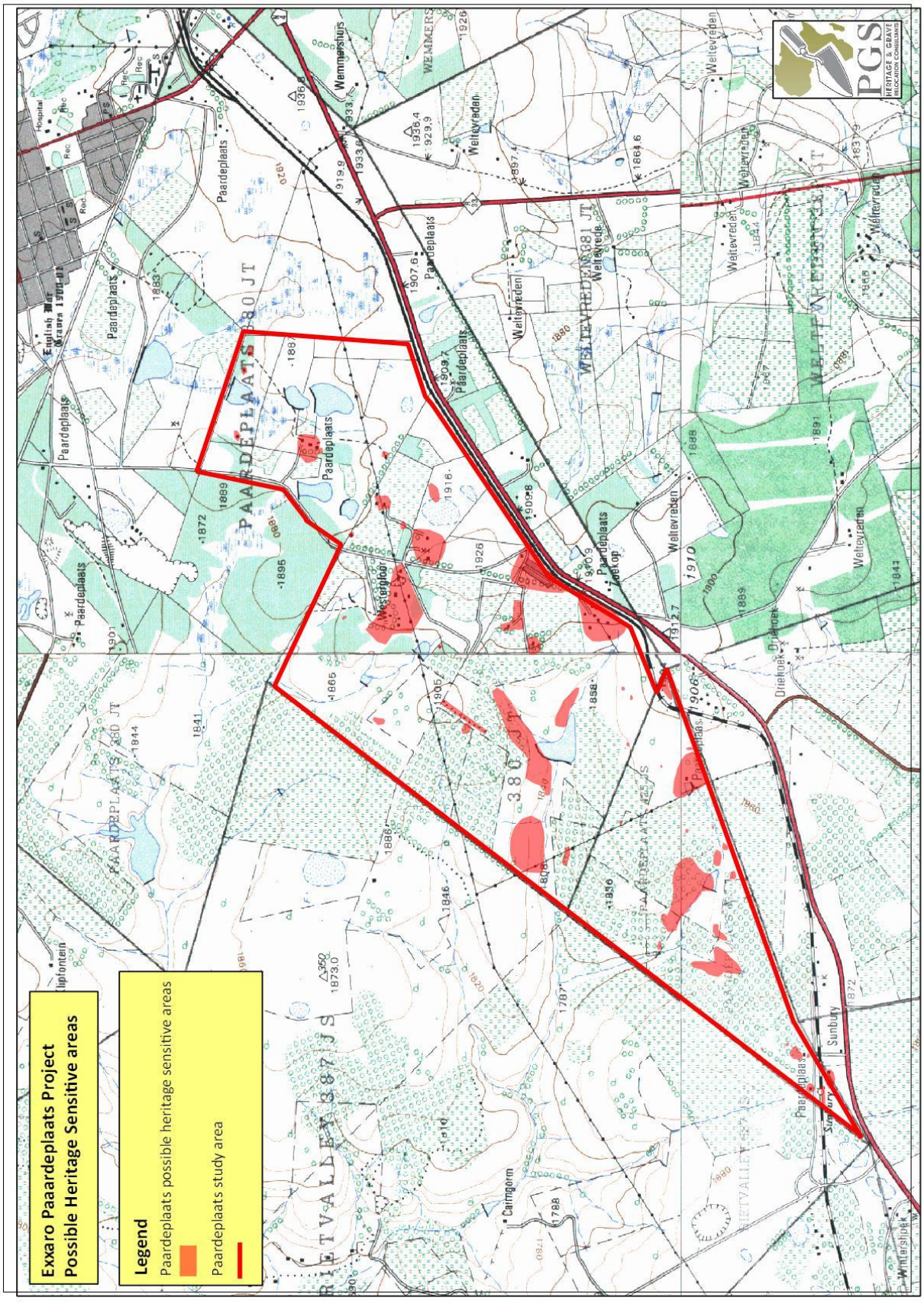
In order to determine the final impact significance the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

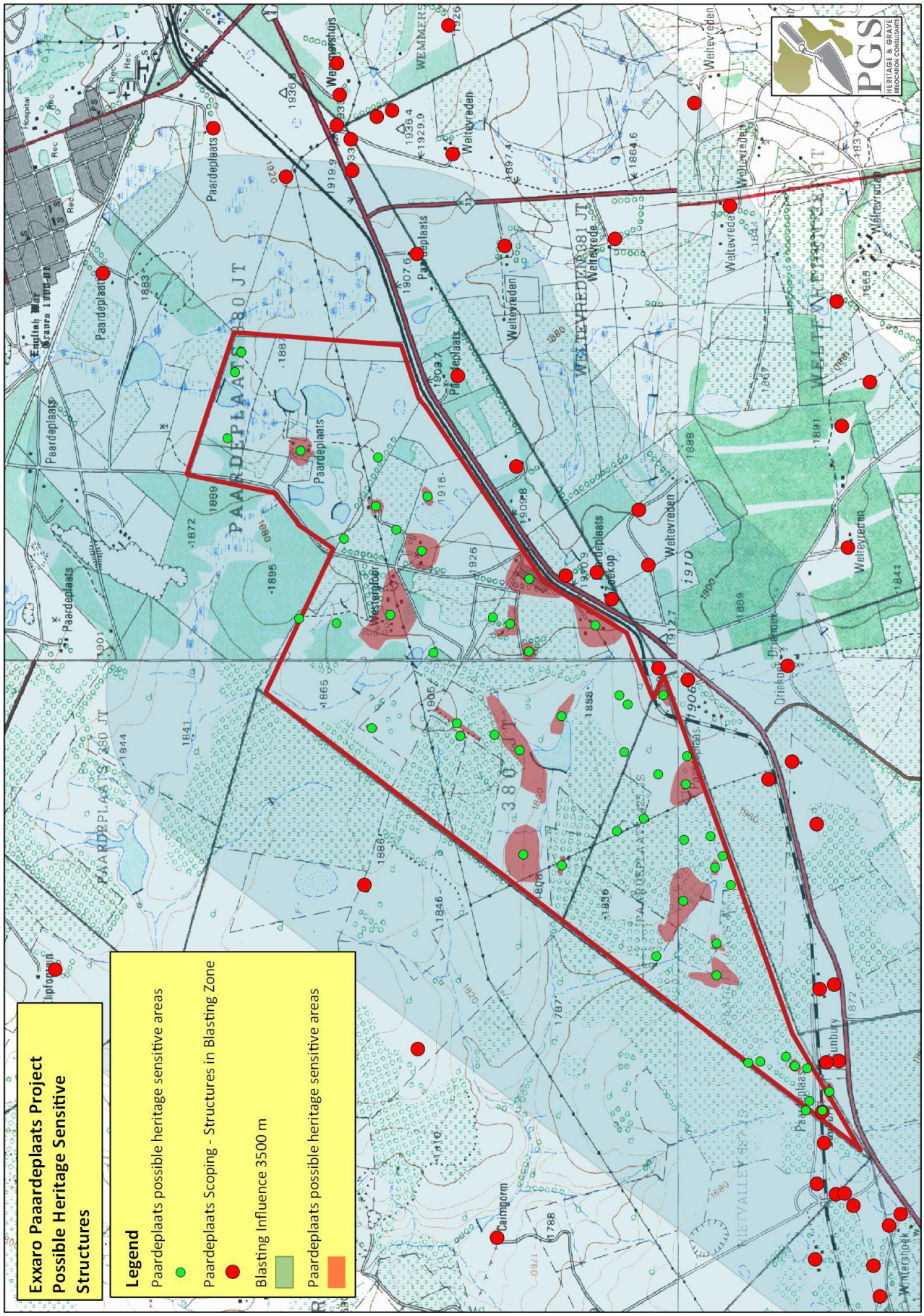
Environmental Significance Rating	
Value	**Description**
< 9	Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
≥9; <17	Medium (i.e. where the impact could influence the decision to develop in the area),
≥ 17	High (i.e. where the impact must have an influence on the decision process to develop in the area).

For ease of use a template impact assessment form has been drafted which will need to be completed by each specialist for each relevant impact, and where necessary for each alternative. The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

ANNEXURES C

POSSIBLE HERITAGE SENSITVE AREAS




Exxaro Paaardeplaats Project
Possible Heritage Sensitive Structures
Legend
Paardeplaats possible heritage sensitive areas
Paardeplaats Scoping - Structures in Blasting Zone
Blasting Influence 3500 m
Paardeplaats possible heritage sensitive areas
PGS
HERITAGE & GRAVE RELOCATION CONSULTANTS