PROPOSED EXPANSION OF EXISTING MINING AREA INTO PORTION RE OF THE FARM ROETZ 210 IS, JAGTLUST COLLIERY, NEAR CAROLINA, ALBERT LUTHULI LOCAL MUNICIPALITY, GERT SIBANDE DSITRICT MUNICIPALITY, MPUMALANGA PROVINCE

Phase 1 – Heritage Impact Assessment

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Declaration of Independence

The report has been compiled by PGS Heritage, an appointed Heritage Specialist for Alegna Environmental Management (Pty) 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

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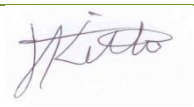
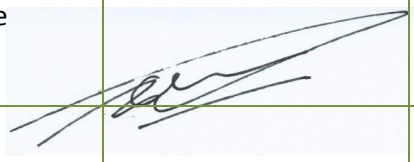
Authors	J Kitto		Heritage Specialist
Reviewed	W. Fourie		Archaeologist / Heritage Specialist
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EXECUTIVE SUMMARY

PGS Heritage (PGS) was appointed by Alegna Environmental Management (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Management Plan (EMP) Amendment for the proposed development of an extension to the existing mining area into Portion RE of the Farm Roetz 210 IS, Jagtlust Colliery, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province.

An archival and historical desktop study was undertaken which was used to compile a historical layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history. However, the desktop study did not reveal any historic or heritage sites from within the study area.

The desktop study work was followed by fieldwork which comprised a field survey of the study area. One heritage site was identified within the project footprint and two possible stone packed graves, comprising a second site, were identified outside the study area boundary. The following mitigation recommendations for the odentified sites must be adhered to:

Historic Structure (Roetz 3)

A historic/recent homestead and stone walled kraal was identified at site Roetz 3. The following mitigation measures are recommended for the identified structure:

- The structure is most probably older than 60 years and has heritage significance and/or value and is also protected under the Heritage Act (Act 25 of 1999).
- It must also be noted that the possibility of infant and stillborn burials does exist in and around the homesteads of traditional communities and therefore such burials can be expected at this site.
- It is recommended that a consultation process with local communities be done to determine if any knowledge around still-born burials at this site is known. If it is found that still-born burials are present, a grave relocation process must be implemented.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

Possible Graves (Roetz 1 and 2)

Two possible single grave sites were identified located just outside (200m from) the study area boundary. The recommendations are the same for each of these two sites:

The possible graves fall just outside the proposed area of the development and could possibly be affected by the proposed development. The developer should take note of the location of these possible graves and also of the recommendations as outlined in this report regarding them.

Graves older than 60 years (or presumed older) and/or not in a municipal graveyard are protected in terms of the National Heritage Act (No. 25 of 1999). Human remains (graves) younger than 60 years may only be handled by a registered undertaker or institution declared under the Human Tissues Act.

The developer is required to follow the process described in the legislation (section 36 of Act No. 25 and its associated regulations) if he wants to develop in or near an area where there are graves present.

It is therefore recommended that the areas with the possible graves should be avoided or, if this is not possible, then test excavations should be undertaken to determine if there are graves.

Palaeontology

A desktop Palaeontological Impact Assessment study found that the Roetz 210 IS Study Area is mainly underlain by Permian aged rocks of the Vryheid Formation, Ecca Group, Karoo Supergroup.

The very high fossiliferous potential of the Vryheid Formation, Ecca Group strata warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of the Vryheid Formation. As open cast mining is planned in this region, all the areas of mining are allocated a Very High Palaeontological Sensitivity as mining of coal is, by definition, mining of plant fossils.

Recommendations:

1. The EAP as well as the ECO for this project must be made aware of the fact that sediments of the Vryheid Formation, Ecca Group contain significant fossil remains, albeit mostly trace fossil and plant fossil assemblages. Several types of fossils have been recorded from this Group in the Karoo Basin of South Africa, with special mention of the Vryheid Formation.
2. A Very High Palaeontological sensitivity is allocated to the mining area and following a formal protocol for Palaeontological finds, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure and mining developments, with

special emphasis on areas where significant fossils are recorded during the mining operations, (Phase 1 PIA).

3. These recommendations should form part of the EMP of the project.

Further to these recommendations the general Heritage Management Guidelines in **Section 8** need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

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1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Alegna Environmental Management (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Management Plan (EMP) Amendment for the proposed extension of the mining area of the existing Jagtlust Colliery, into Portion RE of the Farm Roetz 210 IS, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, 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 proposed development area. The HIA aims to inform the EMP Amendment in the development of a comprehensive EMP 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 HIA was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 70 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.

Jennifer Kitto, Heritage Specialist for this project, has 16 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well-versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

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 development area. Various factors account for this, including the subterranean nature of some archaeological sites. In addition, an area in the middle section of the study area was covered by spoil heaps from the existing mining activities; therefore, the area under the spoil heaps was inaccessible. 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 below.

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:

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

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)

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 NEMA (Act No 107 of 1998) states that an integrated EMP should, (23:2 (b)) "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive legally compatible AIA report is compiled.

1.5 Terminology and Abbreviations

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 a 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

Earlier Stone Age

The archaeology of the Stone Age, between 400 000 and 2500 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.

Later Stone Age

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

Late Iron Age (Early Farming Communities)

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

Middle Stone Age

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

Palaeontology

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

Table 1: Abbreviations

Abbreviations	***Description***
AIA	**Archaeological Impact Assessment**
ASAPA	**Association of Southern African Professional Archaeologists**
CRM	**Cultural Resource Management**
DEA	**Department of Environmental Affairs**
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**
ROD	**Record of Decision**
SAHRA	**South African Heritage Resources Agency**

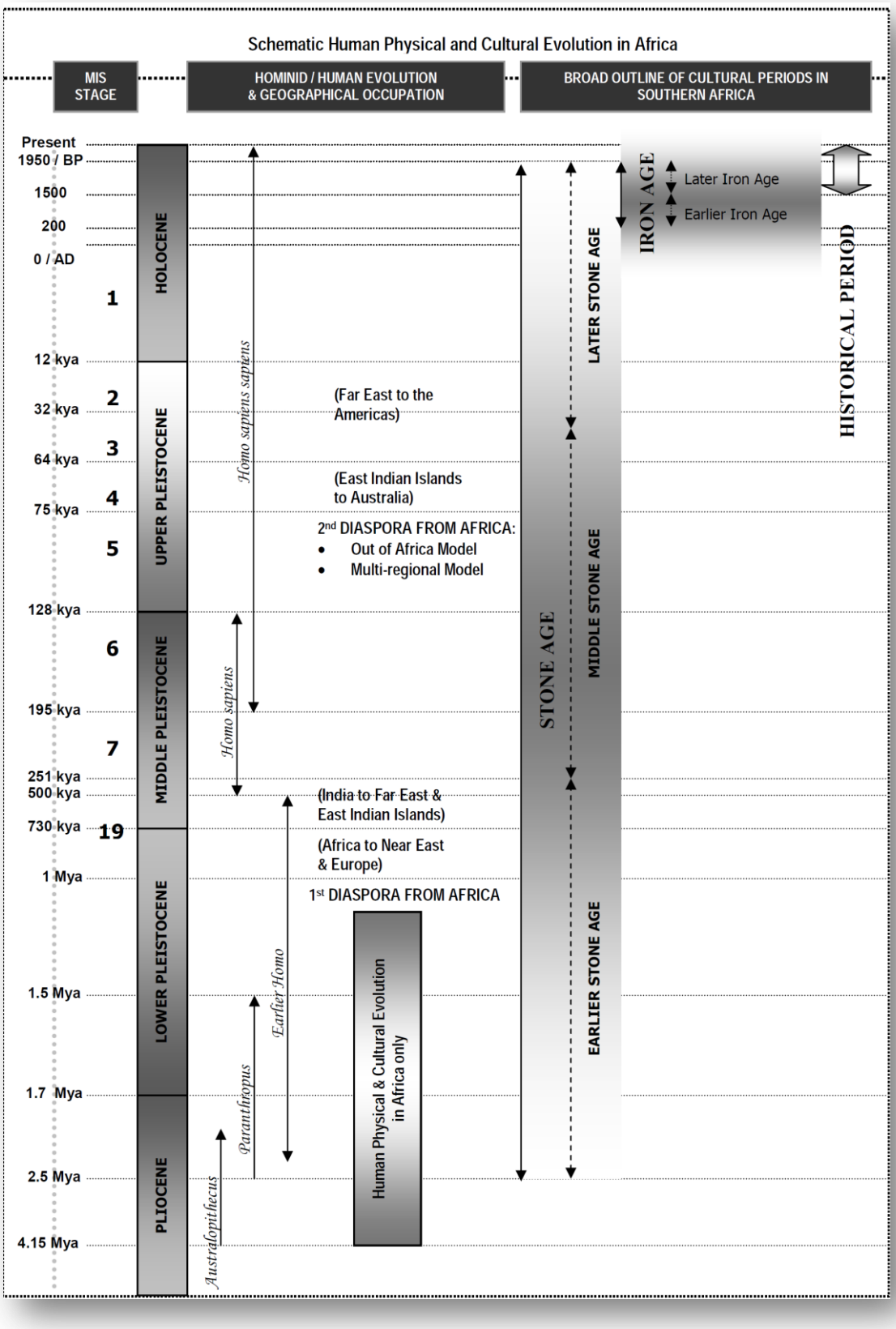

Figure 1 - Human and Cultural Time line in Africa (Morris, 2009)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location

The Albert Luthuli Local Municipality is part of the Gert Sibande District Municipality, which is situated in the eastern part of the Mpumalanga Province, and is bordered by Swaziland on the east, Nkangala District Municipality to the north, the Gauteng Province in the west and Kwa Zulu Natal province in the south. The Gert Sibande District Municipality consists of seven local municipalities.

Within the Gert Sibande District Municipality, the study area is located in the Albert Luthuli Local Municipality, approximately 15km to the south-west of the town of Carolina. The project involves the proposed development of a an extension of the mining area of the existing Jagtlust Colliery, into Portion RE of the farm Roetz 210, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province (**Figure 2** and **Figure 3**).

Coordinates	**North-east corner:** **S26° 7'58.89"; E30° 0'31.23"** **South-west corner:** **S26° 9'28.96"; E29°58'35.23"E**	**Western most corner:** **S26°8'40.59"; E29°59'15.21"**
Property	The entire extent of the farm Roetz 210 IS, within the Jagtlust Colliery property.	
Location	The study area is located 15km to the south-west of the town of Carolina in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province.	
Extent	The extent of the study area is roughly 92 hectares in size, of which the development foot print will be the entire area.	
Land Description	The area consists of relatively flat topography, containing a mixture of grasslands and old agricultural fields. The grasslands contain scattered sandstone outcrops. There are also scattered stands of trees. Since the study area borders on and is an extension of an existing mining area (Jagtlust Colliery), there are also areas of opencast mining activity adjacent to the study area.	

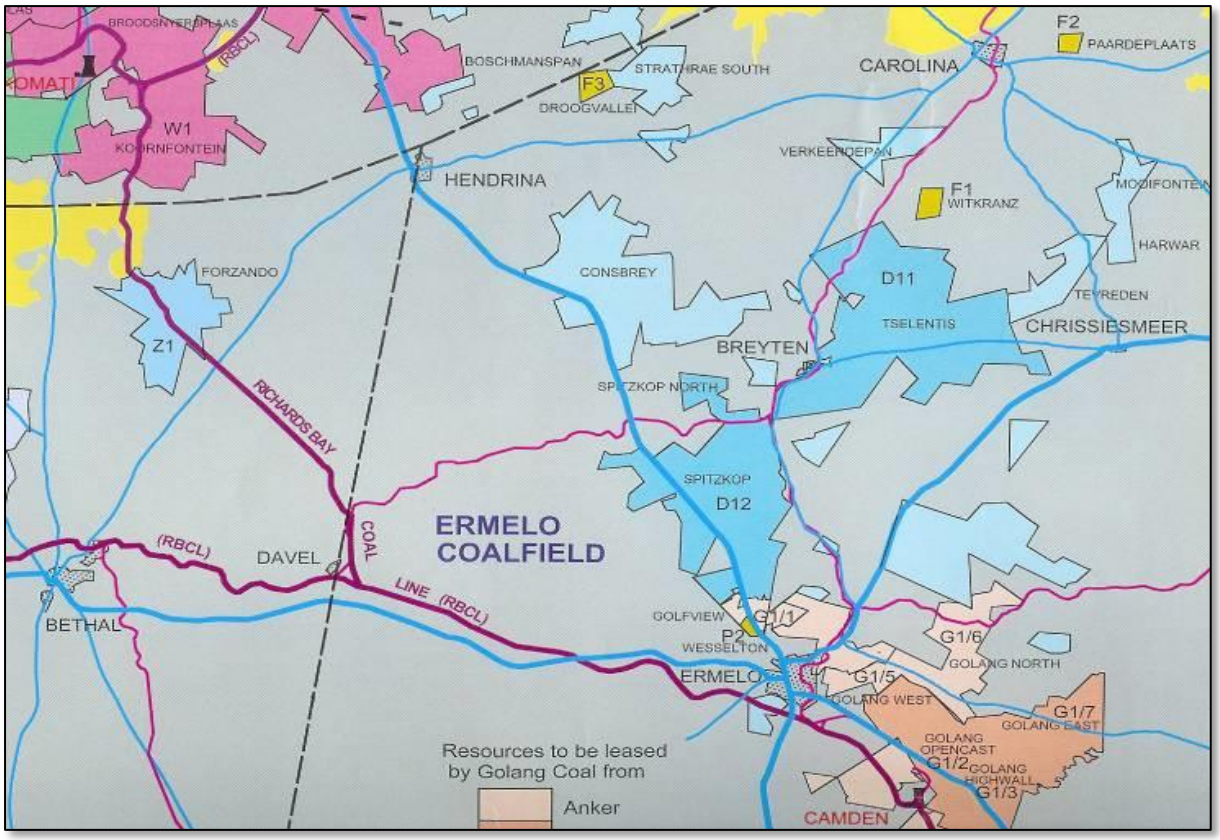

Figure 2 - Study Area Regional Locality (from Alegna Environmental Management)

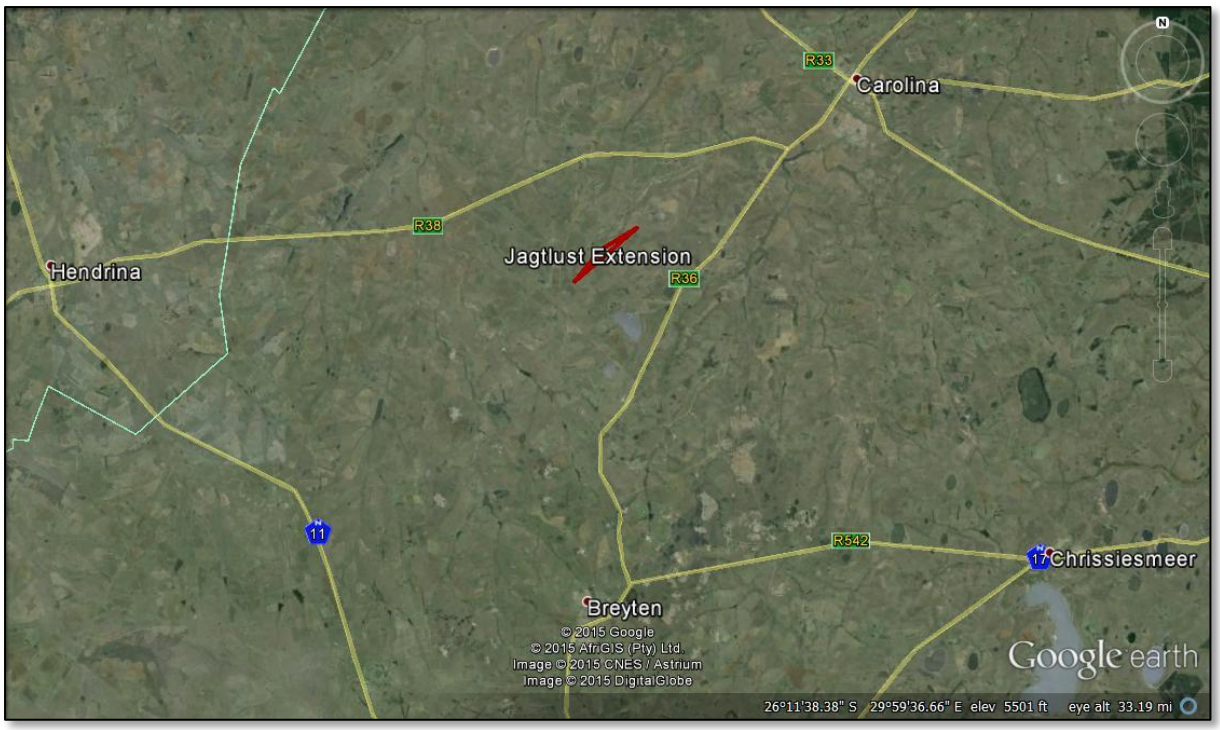

Figure 3 – Study Area Locality (Google earth image)

2.2 Site Description

The area consists of relatively flat topography, containing a mixture of grasslands and old agricultural fields (**Figure 4** and ***Figure 5*)**. The grasslands contain scattered sandstone outcrops. Since the study area borders on and is an extension of an existing mining area (Jagtlust operation), there are also areas of opencast mining activity from this operation adjacent to the study area (**Figure 6** and **Figure 7**).

Figure 4 – General view showing old fields

Figure 5 – General view of grassland with stone outcrops

Figure 6 – View showing mining activity in study area (spoil heaps)

Figure 7 – Another view showing existing mining area

2.3 Project Description

Northern Coal (Pty) Ltd (Northern Coal) has an approved mining right in terms of the Minerals and Petroleum Resource Development Act (MPRDA, Act 28 of 2002) for portion 1 and the remaining extent (RE) of the farm Jagtlust 47 IT. The farm is situated on the south-western boundary of the town of Carolina, Mpumalanga Province, South Africa. The project extracts coal from the E seam via opencast mining methods utilising three mining pits. Infrastructure on site consists of the mining

pits, access road, haul roads, a run of mine stockpile, pollution control dams, workshop, bunded portable diesel tanks and chemical toilets.

This EMP Amendment incorporates the contiguous section on Farm Roetz 210 IS portion RE, which Northern Coal is hereby applying to mine. This EMP forms part of the section 102 application, as required by the MPRDA.

A public participation process was undertaken to gather the issues and concerns of interested and affected parties (IAPs) and Authorities. The process consisted of contacting IAPs previously identified, having a public meeting with the stakeholders, and informing and engaging with them on the proposed project. The issues and concerns raised were incorporated in the EIA/EMP where relevant and the outcomes of the issues are recorded in the issues and response report.

Mining at the Roetz farm will entail access via an already existing highwall on the current opencast pit being mined at the Jagtlust operation. Opencast methods will be employed at the Roetz operation. The Life of Mine (LoM) is approximately three (3) years.

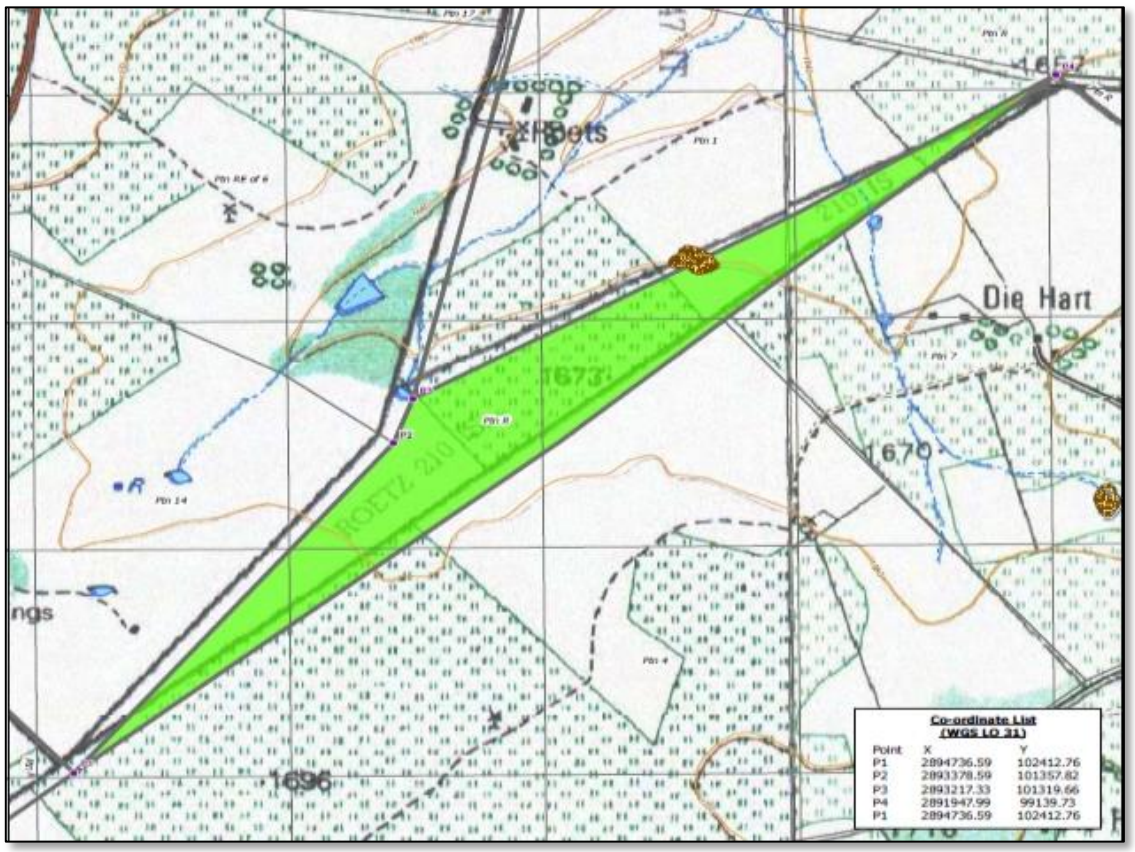

Figure 8 - Proposed site layout, study area is the green triangle (from Alegna Environmental)

3 ASSESSMENT METHODOLOGY

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

3.1 Methodology for Assessing Heritage Site Significance

This HIA report was compiled by PGS for the proposed development of an extension to the existing Jagtlust Colliery, near Carolina, Albert Luthuli Local Municipality, Gert Sibande district Municipality, Mpumalanga Province. The applicable maps, tables and figures are included, as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

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

Step II – Physical Survey: A physical survey was conducted by vehicle and foot through the proposed project area by a qualified heritage specialist and field technician, which aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

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

The significance of identified heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
    - Low - <10/50m2
    - Medium - 10-50/50m2
    - High - >50/50m2
- Uniqueness; and
- Potential to answer present research questions.

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

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development activity position;

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site.

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

Site Significance

Site significance classification standards prescribed by the SAHRA (2006) and approved by the 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

3.2 Methodology for Impact Assessment

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

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

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summarised explanation of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in Error! Reference source not found..

A combined quantitative and qualitative methodology was used to describe impacts for each of the afore mentioned assessment criteria. A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 3**.

Table 3 - Quantitative rating and equivalent descriptors for the impact assessment criteria

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

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

*3.2.1 **Significance Assessment***

The significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these, since their importance in the rating scale is very relative. For example, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the impact will be considered to be HIGH to VERY HIGH.

A more detailed description of the impact significance rating scale is given in **Table 4** below.

Table 4 - Description of the significance rating scale

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

3.2.2 **Spatial Scale**

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 5** below.

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Table 5 - Description of the spatial significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site / corridor.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the boundary of the study area.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

3.2.3 ***Temporal/Duration Scale***

In order to accurately describe the impact, it is necessary to understand the duration and persistence of an impact in the environment.

The temporal or duration scale is rated according to criteria set out in **Table 6**.

Table 6 - Description of the temporal rating scale

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

3.2.4 **Degree of Probability**

The probability or likelihood of an impact occurring is outlined in **Table 7** below.

Table 7 - Description of the degree of probability of an impact occurring

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

3.2.5 **Degree of Certainty**

As with all studies, it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used, as discussed in **Table 8**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making.

Table 8 - Description of the degree of certainty rating scale

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

3.2.6 **Quantitative Description of Impacts**

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

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

An example of how this rating scale is applied is shown below:

Table 9 - Example of Rating Scale

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Local	Medium Term	Could Happen	**Low**
Impact on heritage structures	2	3	3	3	**1.6**

Note: The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the table below.

Table 10 - Impact Risk Classes

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

Therefore, with reference to the example used for heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a Low impact.

4 CURRENT STATUS QUO

4.1 Description of Study Area

Within the Gert Sibande District Municipality, the study area is located in the Albert Luthuli Local Municipality, approximately 15km to the south-west of the town of Carolina. The project involves the proposed development of a an extension of the mining area of the existing Jagtlust Colliery, into Portion RE of the farm Roetz 210 IS, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province

The study area is topographically reasonably flat and comprises a mixture of low grasslands and old agricultural fields. Vegetation is sparse; however, there are a few patches of wattle trees scattered throughout the area. A number of sandstone rock outcrops were observed within and in proximity to the study area.

Since the study area borders on and is an extension of an existing coal mining area (Jagtlust Colliery), there are also areas of opencast mining activity adjacent to the study area. However, in the middle section of the study area, it was noted that mining activity is taking place and a large portion of the middle section is covered by spoil heaps from the mining activity.

5 ARCHIVAL AND DESKTOP RESEARCH FINDINGS

The aim of the archival and desktop background research is to identify possible heritage resources that could be encountered during the field work. The archival and desktop research focused on available information sources, which were used to compile a background history of the study area and surrounds, as summarised in **Table 11**. This data then informed the possible heritage resources to be expected during field surveying.

No archival maps showing the study area were located at the Archives.

Table 11: Summary of Archaeological & Historical Sequence of the Study Area and its Surroundings

DATE	DESCRIPTION
2.5 million to 250 000 years ago	**Earlier Stone Age:** The Earlier Stone Age (ESA) dates between 2.5 million to 250 000 years BP, and refers to the earliest occurrences of stone tool manufacturing associated with Homo Sapiens' predecessors. Technological industries associated with the ESA are the Oldowan (2.0-1.7 mya), characterised by large stone tools with minimal retouch, large flakes and hammer stones, followed by the Acheulean (1.5mya-250 000 mya), characterised by large cutting tools such as hand axes and cleavers (Mitchell, 2002). The Acheulian dates back to approximately 1.5 million years ago and was named after the French site, Saint Acheul, where these tools were first discovered. It should however be noted that the spread of Acheulian tools from Africa to Europe occurred only 500,000 years ago (Delius, 2007). ESA tools are rarely found in the primary context, they are usually washed away by rivers; some of these were found at Maleoskop on the Farm Rietkloof in Mpumalanga (Boshoff, 2005).
250 000 to 20 000 years ago	**Middle Stone Age:** The Middle Stone Age (MSA) dates between 250 000 to 20 000 years BP. The MSA dates from around 250 000 BP originate from sites such as Leopards Kopje in Zambia,

	while the late Pleistocene (125 000 BP) yields a number of important dated sites associated with modern humans (Deacon & Deacon, 1999). The MSA is characterised by flakes and blade industries, the first use of grindstones, wood and bone artefacts, personal ornaments, use of red ochre, circular hearths and a hunting and gathering lifestyle. The MSA tools were much smaller than the ESA tools and were used to create bone or wood spears (Delius, 2007) This phase is furthermore associated with modern humans and complex cognition; they moved into caves next to water sources and art, decoration and symbolism emerged (Wadley, 2013). The Bushman Rock Shelter is a well-known site for MSA tools; it is located in the Orighstad District and has been excavated twice since the 1960's (Plug, 1981).
40 000 years ago - to the historic past	**Later Stone Age:** The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small stone tools known as microliths. This period lasted up until contact with Iron Age inhabitants or European colonists and is associated with Homo Sapiens Sapiens. Various innovations occurred and included the bow and link-shaft arrow, bone needles, tortoiseshell bowls, fishing equipment, ostrich eggshell beads and other works of art and ornaments (Delius, 2007). Two LSA sites were found on the Honingklip farm near Badplaas in the Carolina district, in association with rock art and many tools which were used to prepare animal skins (Korsman, 1994).
Rock Art	There are nearly 400 known rock art sites in Mpumalanga, of which 10 of these can be found in the Carolina district, around the towns of Badplaas, Chrissiesmeer and Carolina. These can be attributed to either the San, Khoekhoen, Iron age farmers, Sotho-Tswana speakers or Nguni speakers (Bergh, 1999; Delius, 2007).
AD 900 - AD 1300 – 1800s	**Iron Age:** The Iron Age people constructed stone-walling throughout Southern Africa, with different patterns in different areas based the central cattle pattern, the Iron age people lived in fairly permanent agricultural villages and practiced metalworking (Delius, 2007). Because these people relied on agriculture they therefore settled near rivers and where conditions were favourable for farming. They also substituted their activities to include some hunting, gathering and collecting shellfish, if they resided

	close to the coast (Van Schalkwyk, 2008). Welgelegen Shelter, on the banks of the Vaal River near Ermelo, shows evidence of the interaction between the hunter-gather and farming communities during this period and that they coexisted in this area (Schoonraad and Beaumont, 1971).
1400 – 1800 **Tribes and chiefdoms of Mpumalanga**	**Tribes:** The San people, a hunter-gatherer group, were the very first inhabitants of Mpumalanga, evidence of their shelters has been found in Ermelo and Barberton. They continued to interact with the farming communities which started to move into the area and coexisted for an extended period of time (Voigt, 1981). Bakone (Koni) groups have a common ancestor known as Mabula, some of these Koni groups moved south and westwards and settled in the Lydenburg district (Delius, 2007). From the 17th century, the eastern Sotho expanded into the eastern areas of the Carolina District. This group existed of the Pai, Pulana and Kutshwe, each with their own history and with time they divided into their own self-governing groupings (Delius, 2007). The Pulana is responsible for the stone-walled settlements found in the Carolina District and were called Shakwaneng. These groups were displaced from Swaziland, where they originated, by expansionist policies (Ziervogel, 1954). **Chiefdoms:** During the 18th and 19th century the peaceful occupation of the above mentioned tribes was disrupted by the expansion of the Zulu Kingdom and subsequent displaced of the population, which became known as the Difaqane/Mfecane (Makhura, 2007). In the north-east, the Pedi under their leader, King Thulane, became the dominant power, only to be defeated by the Ndebele under their military leader, Mzilikazi, which in turn lead to a void being left by the Sotho tribes who moved out of the area.
1845 – 1883 **The South-Eastern Frontier**	**Historical Period:** The void was in turn filled by Swazi groups under the reign of their king, Sobhuza, who established various small chiefdoms in the Mpumalanga area (Bonner, 1983; Makhura, 2007). With the further expansion of the Swazi Kingdom under Mswati II (son of Sobhuza), the San/Bushmen who lived in shelters and caves near water sources were forced to assimilate into the farming communities (Bonner, 1983). These San groups had resided since about 1847 near the Pongola River under the rule of the Zulu King Mpande (Orpen, 1964). The intruding Swazi continued to raid and

	murder the San/Bushmen in the area and even sold the children to Boer farmers as serfs. The area around Breyten was particularly affected by these Swazi raids (Schoonraad & Schoonraad, 1972).The earliest traveller who came to the area was Robert Scoon in 1836; the white farmers only started settling in this area at the beginning of 1880 (Bergh, 1999). With all the Boer farmers starting to settle in the area Mswati II ceded the southern Transvaal to the colonial system (Bonne,r 1983). While some of the San/Bushmen in the area were sold to farmers by the Swazi, according to oral traditions other Boer farmers offered protection and aid to them in return for cheap labour (Prins, 1999).
1899-1902	**The South African War:** The Anglo Boer war, also known as the South African War, was a conflict in which the British wanted to secure their hegemony and the Boer republics wanted to preserve their independence. The War pitted 500,000 imperial troops against 87,000 republican Boers, Cape "rebels" and foreign volunteers (Van Schalkwyk, 2008). Although the Boer commandos had the advantage of knowing the landscape, the British adopted a scorched land policy in which they destroyed the farms, blockaded the countryside and placed civilians in concentration camps (Van Schalkwyk, 2008). The war lasted for only two and half years but three different stages can be identified: stage 1 - the Boer offense, stage 2 - the British response and stage 3 -Guerrilla warfare (http://www.angloboerwar.com/boer-war). The war came to Carolina in 15 August 1900 with a few skirmishes taking place on 7 November 1900 at Witkloof, 13 December 1901 at Witkrans and one at Witbank on 11 January 1902 (Bergh, 1999). The Battle of Lake Chrissiesmeer in 1901 is the most notable event during the South African War in this area. The Boer forces under General Louis Botha used the help of the local San/Bushmen to launch a surprise attack on General Smith-Doriens whose forces were camped around Lake Chrissiesmeer. The battle ended when the Boers were forced to retreat because of bad weather conditions, leaving 75 British lives taken against 80 Boer lives (Jones, 1999; Prins, 1999). The Boers were aided by the San/Bushmen during the war, especially after Lord Kitchener implemented the "scorched-earth" policy. They assisted the Boers in hiding their livestock and even moved families into Swaziland (Prins, 1999).

Figure 9 - A memorial to those who died during the Battle of Lake Chrissiesmeer.

The Carolina Commando was formed in 1895 after forming part of the Lydenburg Commando. David Johannes Joubert was appointed commander and their first action was in the Jameson Raid of 1896 in Krugersdorp, but upon their arrival found that the skirmish was over. The Carolina Commando was a very small commando with only four hundred Boers able to fight; when the war started they were under the command of HF Prinsloo and mostly fought with the Lydenburg Commando (http://www.angloboerwar.com/unit-information/boer-units/1954-commando-carolina).

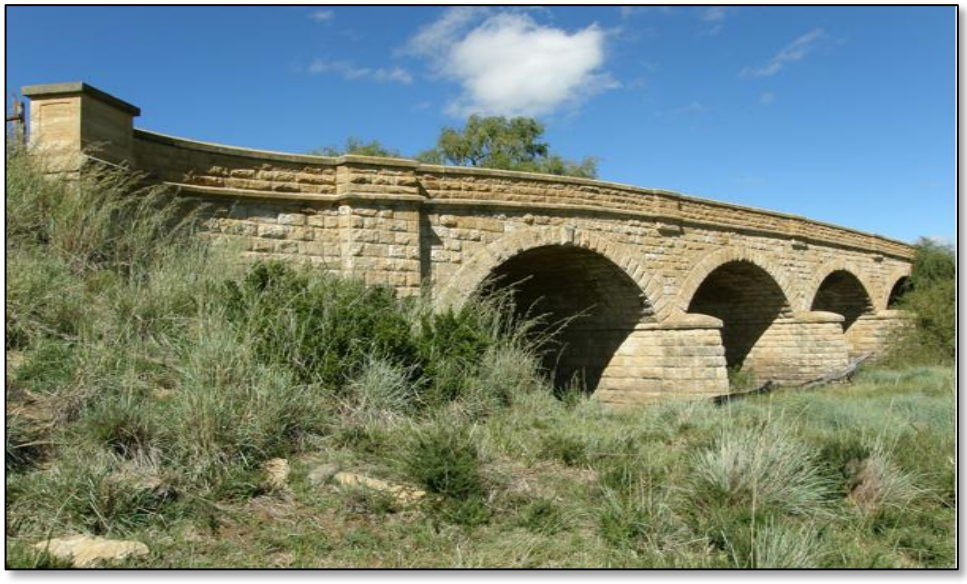
The Boer War ended on 31 May 1902 when the Boers signed the terms of surrender in Pretoria and the Boer Republics became a part of the British Empire (Shearing, 2004). Six month after the peace agreement, Carolina was bordering on famine with the last of the cattle being stolen by the black farming communities which had been uprooted from their land during the war (Warwick, 2004).

20th Century

1913 Land Act

Agricultural and Industrial Development

The implementation of the Land Act of 1913 resulted in most of the land in the Carolina area belonging to white Boer farmers (Schirmer, 2007). Agriculture has been the basis of economic sustainability in the area since 1918 and therefore the main heritage sites located throughout the area are homesteads and cemeteries. The black farmers found themselves in poor working conditions that led to political struggles and the formation of farm worker's associations (Holden & Mathabatha, 2007). The Apartheid era led to many people being forcibly removed from their homes; from

	1958 to 1968 people were uprooted and moved from Ermelo to the KwaZanele Township near Breyten (Christopher, 1991).
1883 **Carolina**	Carolina is a situated on route to Swaziland in the Mpumalanga province. According to the Transvaal Government Gazette, Carolina was laid out on the Farms Groenvlei ("green marsh") and Goede Hoop ("good hope"). Another source states that Cornelis Johannes Coetzee gave a part of his farm Steynsdraai ("Steyn's bend") for the establishment of a farm, provided that it was named after his wife Magdalena Carolina Smit (Erasmus, 2014). The town was first settled in 1883, when the gold reef was discovered in Barberton, and it was formally proclaimed on 15 June 1886. The town had to be rebuilt after it was destroyed during the South African War (Erasmus, 2014). The Sandstone Grobler Bridge, which crosses the Komati River, was officially opened in 1897 and named after Johannes Lodewikus Grobler. The Dutch Reformed Church's cornerstone was laid by Piet Joubert in 1888; the church was however used as a stable for the British during the South African War (Bornman, 1986). The Ermelo-Carolina-Machadodorp railway was completed in 1907, which opened up a trade route with Swaziland (Oberholster, 1972).  *Figure 10 - Grobler's Sandstone Bridge (Photographer: Roger Fisher)*
1906 **Breyten**	This town has geographical significance in that it lies at the foot of Klipstapel, a rock pile of approximately 1829m high. The town was first founded when the farm Bothasrus was given to Lukas Potgieter in 1888 after he lost his leg in the battle of Skuinshoogte during the Transvaal Republic's first war against Britain (Erasmus, 2014). He later sold a piece of his farm to Nicolaas Breytenbach and, in 1906 a new village

	named Breytenbach was established. Stone settlements belonging to the Leghoya Sotho community have been found throughout the surrounding area (Erasmus, 2014).
1914 **Hendrina**	Hendrina is located close to two of Eskom's large power stations, Arnot and Hendrina. It was established in 1914 when Gert Beukes purchased the farm Garsfontein ("barley spring") and named the town after his wife (Erasmus, 2014). The area surrounding Hendrina is used for coal mining and mixed farming.

5.1 SAHRIS Database – Previous Heritage Impact Assessment Reports

A search of the South African Heritage Resources Information System database (SAHRIS – (http://www.sahra.org.za/sahris), identified several previous HIA's undertaken within the wider area. A selection of previous studies for the area is listed in descending chronological order below:

- Du Piesanie, J. & Higgit, N. 2013. Heritage Impact Assessment for the Consbrey Colliery Project, 2629BB and 2629BD, Mpumalanga Province. Digby Wells Environmental.

  The study area for this survey included the farms Bankfontein, Boomplaats, Bosmanskrans and Dwarstrek. At least forty-one heritage sites, from rock art sites to historical settlements, were identified during this survey, although only ten of these sites were located within or adjacent to the proposed development area. Among these sites were four grave sites, two historic settlements/homesteads (with graveyards), one site with historic mine buildings and a historic sandstone bridge. Six Rock Art sites were also identified, two of them located on the Bosmanskrans farm.

- Du Piesanie, J. & Higgitt, N. 2013. Heritage Impact Assessment for the Harwar Colliery, 2630AA and 2630AC, Mpumalanga Province. Digby Wells Environmental.

The study area for this survey included the farms Mooifontein and Tevreden. During the survey two archaeological sites, two historical farm building/homestead sites and three informal cemeteries were identified as heritage resources. Two of the cemeteries were located inside the area where the proposed mining is to take place.

- Küsel, U. D. 2013. Cultural Heritage Resource Impact Assessment for the Upgrade of Drinking Water Works at Carolina, Mpumalanga Province. African Heritage Consultants CC.

The aim of the project was to upgrade the water purification plant as well as the outlet and to build a new water reservoir in town. The area had been disturbed previously by construction activities and therefore no heritage sites were identified.

- Pelser, A. 2013. A report on a Heritage Assessment for the Proposed Vaalbult Mining Project on Portions of the Farm Vaalbult 3IT, Gert Sibande District Municipality, West of Carolina, Mpumalanga Province. A Pelser Archaeological Consulting.

The study area is located on the farm Vaalbult 3IT and three heritage sites were identified: an historic sandstone farmstead and associated grave, and a small informal cemetery.

- Van Vollenhoven, A. 2012. A Report on a Heritage Impact Assessment (HIA) for the proposed Motshaotshele Colliery Project, Close to Hendrina, Mpumalanga District. Archaetnos Culture & Cultural Resource Consultants. Case ID: 2083.

Three Areas were investigated; Area 1 on the farm Kromkrans 208, Area 2 on the farm Krogshoop 213 and Area 3 on the farms Kromkrans 208 and Witbank 209. The area is mostly covered by agricultural fields but eight sites of cultural significance were identified, which were all informal graveyards of varying sizes.

- Fourie, W. 2008. Archaeological Impact Assessment: Northern Coal Portion 15 and 16 of the farm Weltevreden 381 JT, Belfast, Mpumalanga Province. PGS Heritage.

During the survey on the farm Weltevreden no heritage sites of significance were identified.

- Fourie, W. 2007. Nucoal Mining Archaeological Impact Assessment: Proposed coal mining on portions of the farm Op Goedenhoop 205 IS, Hendrina, Mpumalanga Province. Matakoma – ARM Heritage Contracts Unit.

During the survey only two sites of heritage significance were found within that study area: an informal graveyard with two graves and a historic/recent farmstead.

- Digby Wells & Associates. 2007. Synoptic Archaeological and Heritage Assessment for the Proposed Jagtlust (47 IT) Mini-Pit Project. For Northern Coal (Pty) Ltd.

This report evaluated the results of a previous HIA report by Matakoma (2005) for the Naudesbank mining project, which is located adjacent to the farm Jagtlust 47 IT, and which included the farm Jagtlust 47 IT. This evaluation noted that six sites of significance identified in the Matakoma study are located in the proposed Northern Coal Jagtlust (47 IT) mini-pit area. These include five grave sites and one historical structure.

- Fourie, W. 2005. Heritage Impact Assessment Proposed Naudesbank Mining Project, Mpumalanga Province. Matakoma Consultants.

This survey assessed the farm Naudesbank, located adjacent and to the west of the farms Jagtlust 47 IT and Roetz 210 IS. During the survey eighty-one sites of importance were found along the proposed development areas. These included eight archaeological sites (3 Stone Age and 5 Iron Age), forty-seven cemeteries and twenty-six historic farmsteads.

5.2 Palaeontology of the area

The palaeontological Desktop Assessment completed for this study (**Appendix B**) has shown that the study area is underlain by Permian aged sandstone and shale, with coal beds of the Vryheid Formation, Ecca Group. The Vryheid Formation is a dominantly sandstone and shale formation with coal beds (Figure 11).

Figure 11 - The entire study area is underlain by the Vryheid Formation, Ecca Group

Palaeontological Sensitivity

The Permian aged Vryheid Formation is mainly interpreted as a sandy shore deposit and fossils are mainly associated with event beds, and the most common fossils being sparse to locally concentrated assemblages of trace fossils and abundant plant fossils (Johnson et al, 2006). Body fossils are very rarely recorded.

The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. 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.

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). 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.

The Permian aged Vryheid Formations underlies the entire study area and monitoring of the fossil heritage must be planned for this development. Areas underlain by Vryheid Formation sediments are normally also overlain by deep soils and a preliminary Phase 1 Palaeontological Impact Assessment (PIA) is not recommended in this case. The Vryheid Formation sediments are however Highly sensitive for Palaeontological Heritage and these rocks must be monitored and subjected to Phase 1 PIA assessments during mining operations. Mining of coal is by definition, mining of fossil plant material.

Figure 12 - Palaeosensitivity for the entire area is rated as Very High

6 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 one day by vehicle and on foot by an archaeologist and field technician from PGS Heritage. The field work was conducted on 27 July 2015.

The survey focussed directly on the study area for the proposed extension of the existing Jagtlust Mine. The general area was documented by means of various photographs (**Figure 4** to **Figure 7**) 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 situated approximately 15km to the south-west of the town of Carolina in the Albert Luthuli Local Municipality. Vegetation is sparse and consists mostly of low grassland and old agricultural fields. The grasslands contain scattered sandstone outcrops. There are also scattered stands of trees. Overall visibility is good. However, in the middle section of the study area, it was noted that mining activity is taking place and a large portion of the middle section is covered by spoil heaps from the mining activity (**Figure 6** to **Figure 7, Figure 14**)

During the survey a total of two heritage sites were identified, of which one consisted of two possible graves (**Roetz 1** and **Roetz 2**) located just outside the study area, with a single historic/recent homestead (**Roetz 3**) being the only heritage feature found within the proposed study area. Each identified heritage site will be discussed below.

The identified heritage sites and the track logs (in white) for the survey are indicated on the map below (**Figure 13**).

Figure 13 – Map of the study area with identified heritage sites and track logs indicated (in white).

Figure 14 - Zoomed in view of the study area, showing approximate location of mining activity (lilac polygon)

6.1 Heritage Sites Identified within the Study Area

Only one heritage site was identified within the study area. This is the site named **Roetz 3**. A second possible site was identified outside the boundary of the study area (**Figure 15**).

Figure 15 – Showing position of Roetz 3

6.1.1 Site Roetz 3:

GPS: S26 08'42.8"; E239 59'16.7"

The foundation remains of a historic structure were identified at this location. The remains consisted of the foundation walls of a rectangular structure, divided into separate 'rooms'. The wall foundations were constructed from roughly dressed sandstone blocks. A small square 'room' was located on the east side of the structure. This may be the remains of a homestead or a kraal or farm structure.

The site is situated inside the study area, approximately 65m to the east of the north-west boundary of the study area (**Figure 15**).

Figure 16 – View of Roets 3, showing rectangular outline of structure (red polygon)

Figure 17 – Roets 3, another view showing the stone foundations (red lines)

The site is of low heritage significance and graded as provisionally Grade 3C due to the possibility of infant and stillborn burials may exist in and around the foundation or walls of the building (Cocks, et al, 2006). Therefore the site should be mitigated and recorded before it can be destroyed.

6.2 Heritage Sites Identified in Proximity to the Study Area

Two sites of possible single graves were identified approximately 200m outside the boundary of the study area: sites **Roetz 1** and **Roetz 2**.

6.2.1 Site Roetz 1:

GPS: S26 08'33.0"; E29 59'16.9"

One possible grave was identified at this location (**Figure 18**). The site comprises a discrete concentration of stones which could be a possible grave, or the result of past stone-clearing activities. There was no obvious headstone.

The site is situated approximately 200m to the north of the north-eastern boundary of the study area and is located outside the study area.

Figure 18 – View of Roetz 1, showing possible grave

The site is graded as Grade 4A with possible high heritage significance and may require to be mitigated before it can be destroyed.

6.2.2 Site Roetz 2:

GPS: S26 08’33.9”; E29 59’17.0”

One possible grave was identified at this location (**Figure 19**). The site comprises a discrete concentration of stones which could be a possible grave, or the result of past stone-clearing activities. There was no obvious headstone.

The site is situated approximately 200m to the north of the north-eastern boundary of the study area, about 10 meters away from Site **Roetz 1** and is located outside the study area.

Figure 19 - View of Roetz 2, showing possible grave

The site is graded as Grade 4A with possible high heritage significance and may require to be mitigated before it can be destroyed.

7 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES

In this section the impact of the proposed development on the study area will be calculated.

7.1 Impact on Heritage Sites Identified within the Study Area

7.1.1 Risk Calculation for the Impact of the Proposed Development on Site Roetz 3

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Local	Permanent	Will Happen	**Moderate**
Impact on historical structure	3	3	5	4	**2.93**

Impacts on the historical structure during construction will **definitely** be of a MEDIUM significance. The impact *is very likely to happen*. The impact risk class is 3 and **Moderate**. As a result, some mitigation may be required. Refer to **Section 8** of this document.

7.2 Impact on Heritage Sites Identified in Proximity to the Study Area

7.2.1 Risk Calculation for the Impact of the Proposed Development on Site Roetz 1 and Roetz 2

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Isolated Sites / proposed site	Permanent	Unlikely	**Low**
Impact on possible graves	3	1	5	2	**1.33**

Impacts on the possible graves during construction will definitely be of a LOW significance. The impact *could happen*. The impact risk class is 2 and thus **Low**. Therefore, mitigation will not be required unless the proposed mining expansion includes this location.

7.3 Impact on Palaeontology

The very high fossiliferous potential of the Vryheid Formation, Ecca Group strata warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of the Vryheid Formation. As open cast mining is planned in this region, all the areas of mining are allocated a Very High Palaeontological Sensitivity as mining of coal is, by definition, mining of plant fossils.

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	VERY HIGH	Study Area	Permanent	Will Happen	**High**
Impact palaeontology during construction and operations	5	2	5	5	**4**

The impact on palaeontological resources will **definitely** be of a VERY HIGH significance, on *the entire study area.* The impact *will happen* and will be permanent. The impact risk class is 4 and thus **High**. As a result mitigation would be required. Refer to **Section 8** of this document.

8 MITIGATION MEASURES AND GENERAL RECOMMENDATIONS

8.1 Heritage Sites Identified within the Study Area

The risk calculation above has shown that the impact of the proposed development on heritage resources in the study area falls in Impact Class 3, representing a Moderate impact.

8.1.1 Site Roetz 3 – Historic Structure

Mitigation:

- The structure is most probably older than 60 years and has heritage significance and/or value and is also protected under the Heritage Act (Act 25 of 1999).
- It must also be noted that the possibility of infant and stillborn burials does exist in and around the homesteads of traditional communities and therefore such burials can be expected at this site.
- It is recommended that a consultation process with local communities be done to determine if any knowledge around still-born burials at this site is known. If it is found that still-born burials are present, a grave relocation process must be implemented.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

8.2 Heritage Sites Identified in Proximity to the Study Area

The risk calculation above has shown that the impact of the proposed development on heritage resources located outside the study area falls in Impact Class 2, representing a Low impact.

8.2.1 Sites Roetz 1 and Roetz 2 – possible single graves

Mitigation:
The possible graves fall just outside the proposed area of the development and could possibly be affected by the proposed development. The developer should take note of the location of these possible graves and also of the recommendations as outlined in this report regarding them.

Graves older than 60 years (or presumed older) and/or not in a municipal graveyard are protected in terms of the National Heritage Act (No. 25 of 1999). Human remains (graves) younger than 60 years may only be handled by a registered undertaker or institution declared under the Human Tissues Act.

The developer is required to follow the process described in the legislation (section 36 of Act No. 25 and its associated regulations) if he wants to develop in or near an area where there are graves present.

It is therefore recommended that the areas with the possible graves should be avoided or if this is not possible then test excavations should be undertaken to determine if the sites are graves.

8.3 Palaeontology

The risk calculation above has shown that the impact of the proposed development on the palaeontology of the study area falls in Impact Class 4, representing a High impact. Therefore, the following mitigation measures will be required:

- following a formal protocol for Palaeontological finds, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure and mining developments, with special emphasis on areas where significant fossils are recorded during the mining operations, (Phase 1 PIA).

8.4 Project Impact (Unmitigated)

During the development of the expansion of the mining area impacts could occur to the identified heritage resources. These impacts could occur as a result of construction activities such as topsoil

stripping, vegetation clearing and excavations. The most notable impacts will definitely be on the palaeontologically sensitive substrata that occur throughout the study area.

The combined weighted project impact to the palaeontological resources (prior to mitigation) will definitely be of a HIGH negative significance, affecting the entire study area. The impact will be permanent and is going to happen. The impact risk class is thus **High**.

8.5 Cumulative Impact

The baseline impacts are considered to be Low, and additional project impacts (if no mitigation measures are implemented) will increase the significance of the existing baseline impacts. The cumulative unmitigated impact will definitely be of a HIGH negative significance, isolated sites to the entire study area in extent. The impact is going to happen and will be permanent. The impact risk class is thus High.

However with the implementation of the recommended management and mitigation measures this risk class can be minimized to a rating of Low.

9 CONCLUSIONS AND RECOMMENDATIONS

PGS Heritage (PGS) was appointed by Alegna Environmental Management (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Management Plan (EMP) Amendment for the proposed development of an extension of the mining area of the existing Jagtlust Colliery, into Farm Roetz, near Carolina, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province.

An archival and historical desktop study was undertaken which was used to compile a historical layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history. However, the desktop study did not reveal any historic or heritage sites from within the study area.

The desktop study work was followed by fieldwork which comprised a field survey of the study area. One heritage site was identified within the project footprint and two possible stone packed graves, comprising a second site, were identified outside the study area boundary.

Impact risk calculations were undertaken on the expected impact of the proposed development on the study area. The following mitigation recommendations for the identified sites must be adhered to:

9.1 Historic Structure (Roetz 3)

A historic/recent homestead and stone walled kraal was identified at site Roetz 3. The following mitigation measures are recommended for the identified structure:

- The structure is most probably older than 60 years and has heritage significance and/or value and is also protected under the Heritage Act (Act 25 of 1999).
- It must also be noted that the possibility of infant and stillborn burials does exist in and around the homesteads of traditional communities and therefore such burials can be expected at this site.
- It is recommended that a consultation process with local communities be done to determine if any knowledge around still-born burials at this site is known. If it is found that still-born burials are present, a grave relocation process must be implemented.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

9.2 Possible Graves (Roetz 1 and 2)

Two possible single grave sites were identified located just outside (200m from) the study area boundary. The recommendations are the same for each of these two sites:

The possible graves fall just outside the proposed area of the development and could possibly be affected by the proposed development. The developer should take note of the location of these possible graves and also of the recommendations as outlined in this report regarding them.

Graves older than 60 years (or presumed older) and/or not in a municipal graveyard are protected in terms of the National Heritage Act (No. 25 of 1999). Human remains (graves) younger than 60 years may only be handled by a registered undertaker or institution declared under the Human Tissues Act.

The developer is required to follow the process described in the legislation (section 36 of Act No. 25 and its associated regulations) if he wants to develop in or near an area where there are graves present.

It is therefore recommended that the areas with the possible graves should be avoided or if this is not possible then test excavations should be undertaken to determine if the sites are graves.

9.3 Palaeontology

The desktop palaeontological impact assessment has shown that the Roetz 210 IS study area is mainly underlain by Permian aged rocks of the Vryheid Formation, Ecca Group, Karoo Supergroup.

The very high fossiliferous potential of the Vryheid Formation, Ecca Group strata warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of the Vryheid Formation. As open cast mining is planned in this region, all the areas of mining are allocated a Very High Palaeontological Sensitivity as mining of coal is, by definition, mining of plant fossils.

Recommendations:

1. The EAP as well as the ECO for this project must be made aware of the fact that sediments of the Vryheid Formation, Ecca Group contain significant fossil remains, albeit mostly trace fossil and plant fossil assemblages. Several types of fossils have been recorded from this Group in the Karoo Basin of South Africa, with special mention of the Vryheid Formation.
2. A Very High Palaeontological sensitivity is allocated to the mining area and following a formal protocol for Palaeontological finds, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure and mining developments, with special emphasis on areas where significant fossils are recorded during the mining operations, (Phase 1 PIA).
3. These recommendations should form part of the EMP of the project.

Further to these recommendations, the general Heritage Management Guidelines in **Section 8** need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

10 PREPARERS

Jennifer Kitto – Heritage Specialist
Wouter Fourie – Review

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APPENDIX A

HERITAGE SITES MAP & TRACKLOG

Zoomed in view of Study Area showing heritage sites and area with spoil heap (lilac)

Appendix B

PALAEONTOLOGICAL IMPACT ASSESSMENT

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED MINING OF THE FARM ROETZ 210 IS IN THE ALBERT LUTHULI LOCAL MUNICIPALITY, GERT SIBANDE DISTRICT MUNICIPALITY, MPUMALANGA PROVINCE.

For:

HIA CONSULTANTS

DATE: 12 August 2015

By

Gideon Groenewald
078 713 6377

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by PGS Heritage and to undertake a desktop survey, assessing the potential palaeontological impact of the proposed mining activities on the farm Roetz 210IR, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. The mining application is for the extension of mining activities on the farm Jagtlust 47 IT, of Northern Coal (Pty) Ltd.

This report forms part of the Basic 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 Roetz 210 IS Study Area is mainly underlain by Permian aged rocks of the Vryheid Formation, Ecca Group, Karoo Supergroup.

The very high fossiliferous potential of the Vryheid Formation, Ecca Group strata warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of the Vryheid Formation. As open cast mining is planned in this region, all the areas of mining are allocated a Very High Palaeontological Sensitivity as mining of coal is, by definition, mining of plant fossils.

Recommendations:

1. The EAP as well as the ECO for this project must be made aware of the fact that sediments of the Vryheid Formation, Ecca Group contain significant fossil remains, albeit mostly trace fossil and plant fossil assemblages. Several types of fossils have been recorded from this Group in the Karoo Basin of South Africa, with special mention of the Vryheid Formation.
2. A Very High Palaeontological sensitivity is allocated to the mining area and, following a formal protocol for Palaeontological finds, a qualified palaeontologist must be appointed to assess and record fossils at specific footprints of infrastructure and mining developments, with special emphasis on areas where significant fossils are recorded during the mining operations, (Phase 1 PIA).
3. These recommendations should form part of the EMP of the project.

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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 mining activities on the farm Roetz 210IR, Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. The mining application is for the extension of mining activities on the farm Jagtlust 47 IT, of Northern Coal (Pty) Ltd.

This report forms part of the Basic 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 (2628 East Rand and 2630 Mbabane). 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 12 ***Palaeontological Sensitivity Analysis Outcome Classification***

PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS	
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond et al (2008) and Groenewald et al., (2014)	
RED	Very High Palaeontological sensitivity/vulnerability. Development will most likely have a very significant impact on the Palaeontological Heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
ORANGE	High Palaeontological sensitivity/vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and phase I Palaeontological Impact Assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
GREEN	Moderate Palaeontological sensitivity/vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the Palaeontological Heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and phase I PIA (ground proofing of desktop survey) recommended.
BLUE	Low Palaeontological sensitivity/vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of Life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of Life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. Collection of a representative sample of potential fossiliferous material recommended.

GREY	Very Low Palaeontological sensitivity/vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during implacement of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits.

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 weathering, or are buried beneath a thick mantle of unfossiliferous "drift" (soil, alluvium etc.).

2. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The study area is located on the farm Roetz 210 IR, south of Carolina (Figure 2.1).

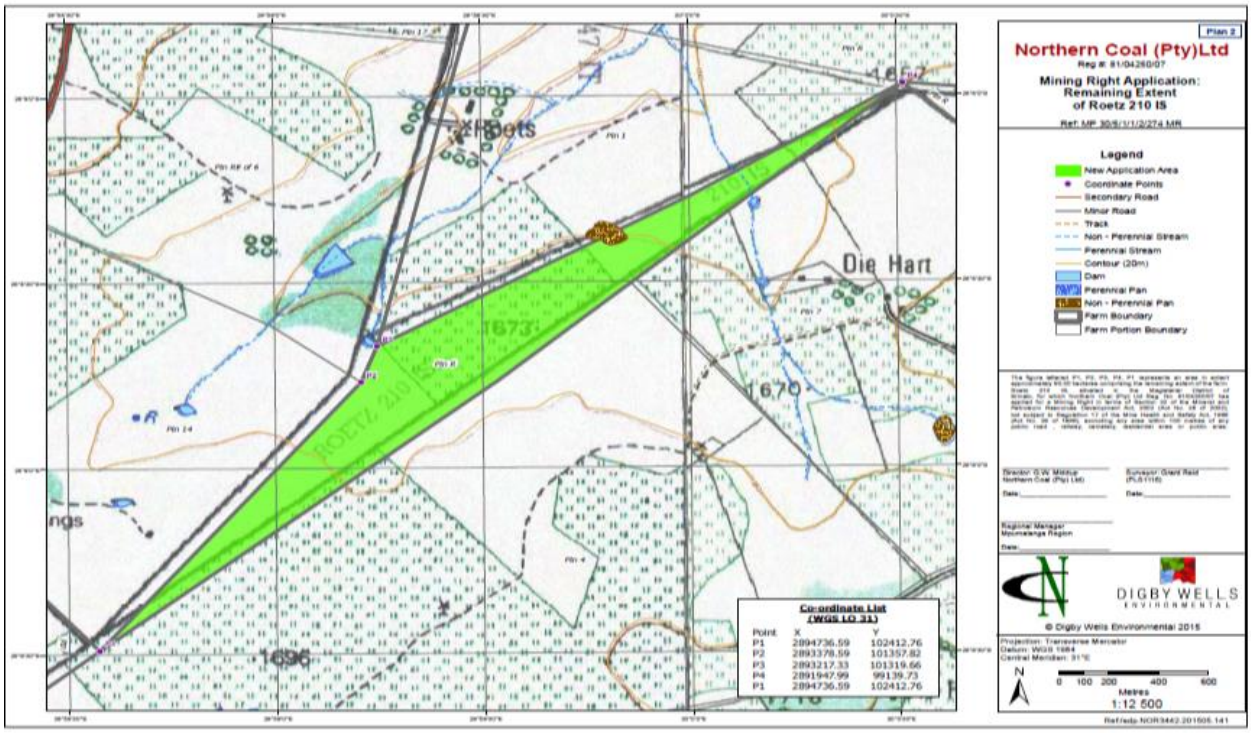

Figure 2.1 Locality of the study area on Roetz 210 IR

The proposed development is the extension of the mining activities of Northern Coal (Pty) Ltd on the farm Jagtlust 47 IT south of Carolina in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province

3. GEOLOGY

The study area is underlain by Permian aged sandstone and shale, with coal beds of the Vryheid Formation, Ecca Group (Figure 3.1).

Figure 3.1 The entire study area is underlain by the Vryheid Formation, Ecca Group

3.1. Vryheid Formation (Pt)

The Vryheid Formation is a dominantly sandstone and shale formation with coal beds. (Johnson et al, 2009)

4. PALAEONTOLOGY OF THE AREA

4.1. Vryheid Formation

The Permian aged Vryheid Formation is mainly interpreted as a sandy shore deposit and fossils are mainly associated with event beds, and the most common fossils being sparse to locally concentrated assemblages of trace fossils and abundant plant fossils (Johnson et al 2006). Body fossils are very rarely recorded.

The Vryheid Formation is well-known for the occurrence of 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.

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). 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.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation of Natal. The Karoo sediments are 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. In KwaZulu-Natal a shallow basin margin accommodated 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 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 (Figure 5.1). The different sensitivity classes used are explained in Table 1 above.

Figure 5.1 Palaeosensitivity for the entire area is rated as Very High

The Permian aged Vryheid Formations underlies the entire study area and monitoring of the fossil heritage must be planned for this development. Areas underlain by Vryheid Formation sediments are normally also overlain by deep soils and a preliminary Phase 1 Palaeontological Impact Assessment (PIA) is not recommended in this case. The Vryheid Formation sediments are however Highly sensitive for Palaeontological Heritage and these rocks must be monitored and subjected to Phase 1 PIA assessments during mining operations. Mining of coal is by definition, mining of fossil plant material

6. CONCLUSION AND RECOMMENDATIONS

The Roetz 210 Study Area is mainly underlain by Permian aged rocks of the Vryheid Formation, Ecca Group, Karoo Supergroup.

The very high fossiliferous potential of the Vryheid Formation, Ecca Group strata, warrants an allocation of a Very High palaeontological sensitivity to the areas underlain by the rocks of the Vryheid Formation. As open cast mining is planned in this region, all the areas of mining are allocated a Very High Palaeontological Sensitivity as mining of coal is, by definition, mining of plant fossils.

Recommendations:

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3. These recommendations should form part of the EMP of the project.

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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 by the Palaeontological Society of Southern Africa (society member for 25 years).
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