



***BOSCHMANSPOORT COLLIERY - MINING RIGHT APPLICATION ON
THE FARM BOSCHMANSPOORT STEVE TSHWETE MUNICIPALITY,
HENDRINA, MPUMALANGA PROVINCE***

Phase 1 – Heritage Impact Assessment

Issue Date: 30 January 2014

Revision No.: 1

Project No.:


Declaration of Independence

The report has been compiled by PGS Heritage, an appointed Heritage Specialist for GEM-Science. 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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Date:	30 January 2014		
Document Title:	Boschmanspoort Colliery - Mining Right Application on the farm Boschmanspoort, Steve Tshwete Municipality, Hendrina, Mpumalanga Province		
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EXECUTIVE SUMMARY

PGS Heritage (PGS) was appointed by GEM-Science to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Report (EIR) for the proposed development of a new colliery on Portions 24 and 31 of the farm Boschmanspoort 159 IS, Steve Tshwete Municipality, Hendrina, Mpumalanga Province.

During the heritage study a total of 5 heritage sites were identified to be close or within the proposed alignment of the proposed mining area. One of these identified sites is a historic/recent homestead (**BP001**) and two grave or burial site (**BP002 and BP005**) and one possible grave (**BP004**) were found within the study area. A ruined farm workers homestead was also noted at **BP003**.

The following recommendations are made with regards to the finds:

1.1 Graves

Two cemetery sites (**BP002 and BP005**) and one possible grave (**BP004**) were found within the study area and the following is recommended:

The identified grave fall within or nearby 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 graves and also of the recommendations as outlined in this report regarding it.

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 grave should be avoided.

If the developer decides to plan the development around the identified grave and leave it undisturbed, adequate arrangements should be made to protect the graves from the impact of the development. These should include the following:

- It is important to understand that the identified graves could have significant heritage value to the relevant families (if identified) and should therefore be preserved.
- The relevant families should be identified (if possible) and should be informed about the proposed activities which could possibly affect their grave.
- It is recommended that the identified graves should be clearly marked with danger tape during the entire duration of the project and especially during earth-moving/bush clearing activities and a 10m buffer zone must be allowed around the grave.
- A watching brief performed by a suitable qualified person is recommended during the bush clearing and construction phases of the project. This person should see to it that the grave are safe and protected during these phases.
- It is advisable to fence the grave to prevent future mistakes. A buffer zone of at least 10m around the grave is recommended.
- The proposed earth-moving/bush clearing activities should be altered and should be planned around the grave in order to protect it from any damage or other negative impacts.
- Bush clearing crews should be made aware of the grave in order that the grave will not be accidentally damaged during the earth-moving activities.
- The planning team should **ensure that access to the grave is not limited in any way**. A small management plan should be set up to ensure the future safety, access and maintenance of the graves next to the proposed development.

If the above recommendations can't be adhered to, further steps and measures should be taken to move the graves and relocate them to an official graveyard in the area. This should only be done as last resort if no other options deem to be possible. The following process is then required:

- A process of consultation with the affected families and communities, if identified, should then be initiated to start the relocation of the grave.
- Various applications to various Departments should be put into motion to obtain the necessary permissions and permits to perform the relocation of the grave. These applications and permits are required by law.

Only after all the required permissions and permits have been obtained, can the relocation of the grave continue as performed by professionals.

1.2 Historic Farmstead

- The structures are 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).
- An application for the total destruction of these structures should be filed at the South African Heritage Resources Agency (SAHRA).
- SAHRA will dictate the extent and the standard of recording of the structures. This could include the appointment of a qualified/approved historical architect to document the structures.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

1.3 Farmworkers homestead

- No further mitigation is required, however:
- 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.
- SAHRA will dictate the extent and the standard of recording of the structures. This could include the appointment of a qualified/approved historical architect to document the structures.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

1.4 Palaeontology

- The developer and the ECO of the mining project be made aware of the fact that coal mining is by definition the mining of fossil plant material.
- The developer appoints a qualified palaeontologist who must, on behalf of Boschmanspoort Colliery (Pty) Ltd apply for a collection and destruction permit from SAHRA, for plant and other fossils encountered during the construction of infrastructure as well as the mining operation.

- The developer must appoint a qualified palaeontologist to compile a strategic protocol for the chance find of fossils for the life-time of the mine. The palaeontologist must look out for exceptionally well preserved fossils and collect representative samples of these fossils for further study at an appropriate institute such as the Evolution Studies Institute at WITS University.

1.5 General

Further to these recommendations, the general Heritage Management Guidelines in Section 7 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 (PGS) was appointed by GEM-Science to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Report (EIR) for the proposed development of a new colliery on Portions 24 and 31 of the farm Boschmanspoort 159 IS, Steve Tshwete Municipality, Hendrina, 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 Heritage Impact Assessment aims to inform the Environmental Impact Assessment Report (EIR) 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

PGS Heritage (PGS) compiled this Heritage Impact Assessment (HIA).

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.

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

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern

parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

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. 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 HIA 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

Early 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.

Late Stone Age

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

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 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.

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
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

Refer to **Appendix A** for further discussions on heritage management and legislative frameworks.

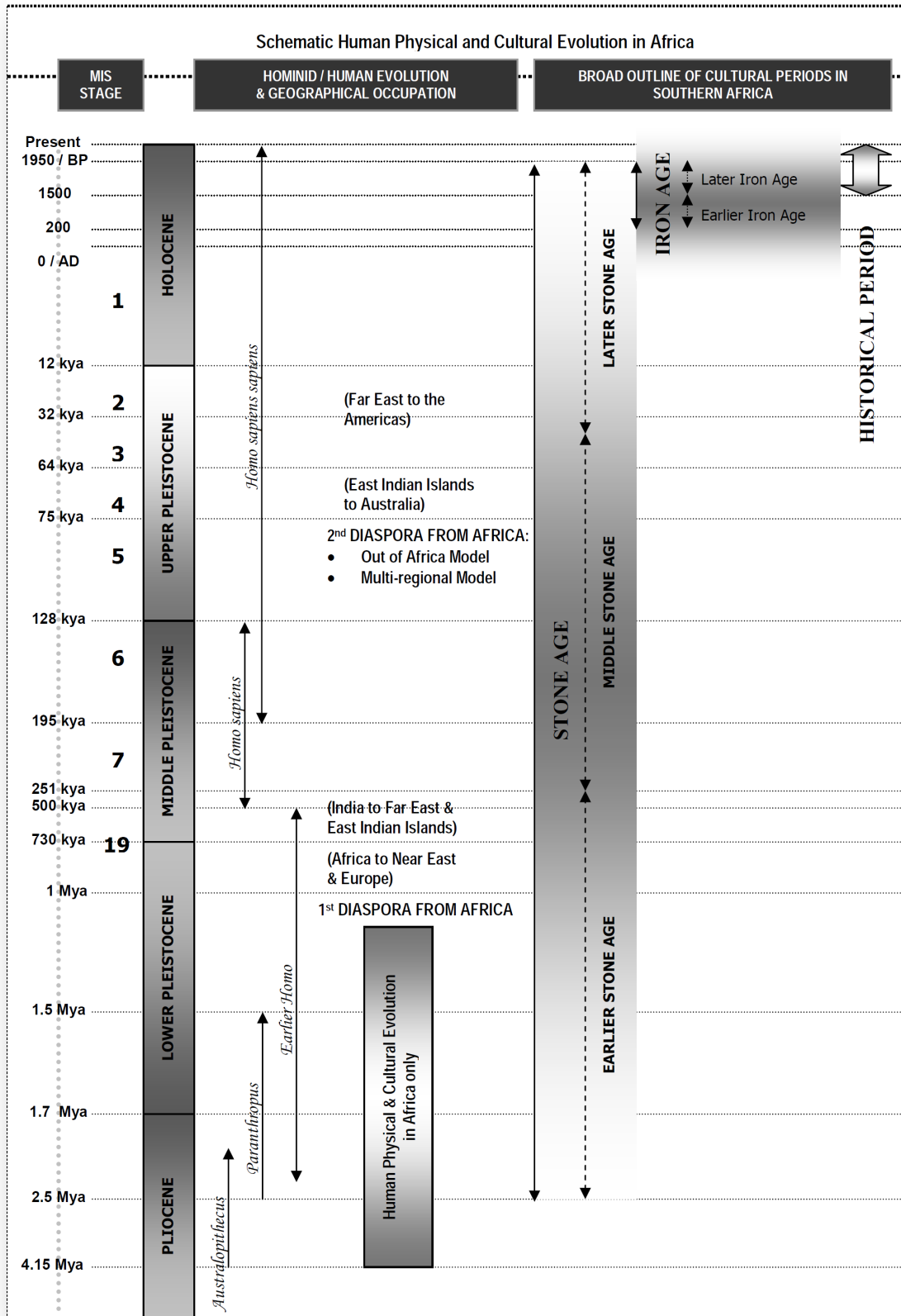


Figure 1 - Human and Cultural Time line in Africa (Morris, 2009).

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location

The site, portions 24 and 31 of the farm Boschmanspoort 159 IS, is approximately 12km north of the town of Hendrina (along the N11), 41km southeast of Middelburg (along the N11) and 55km west of Carolina (along the R38) (**Figure 2**).

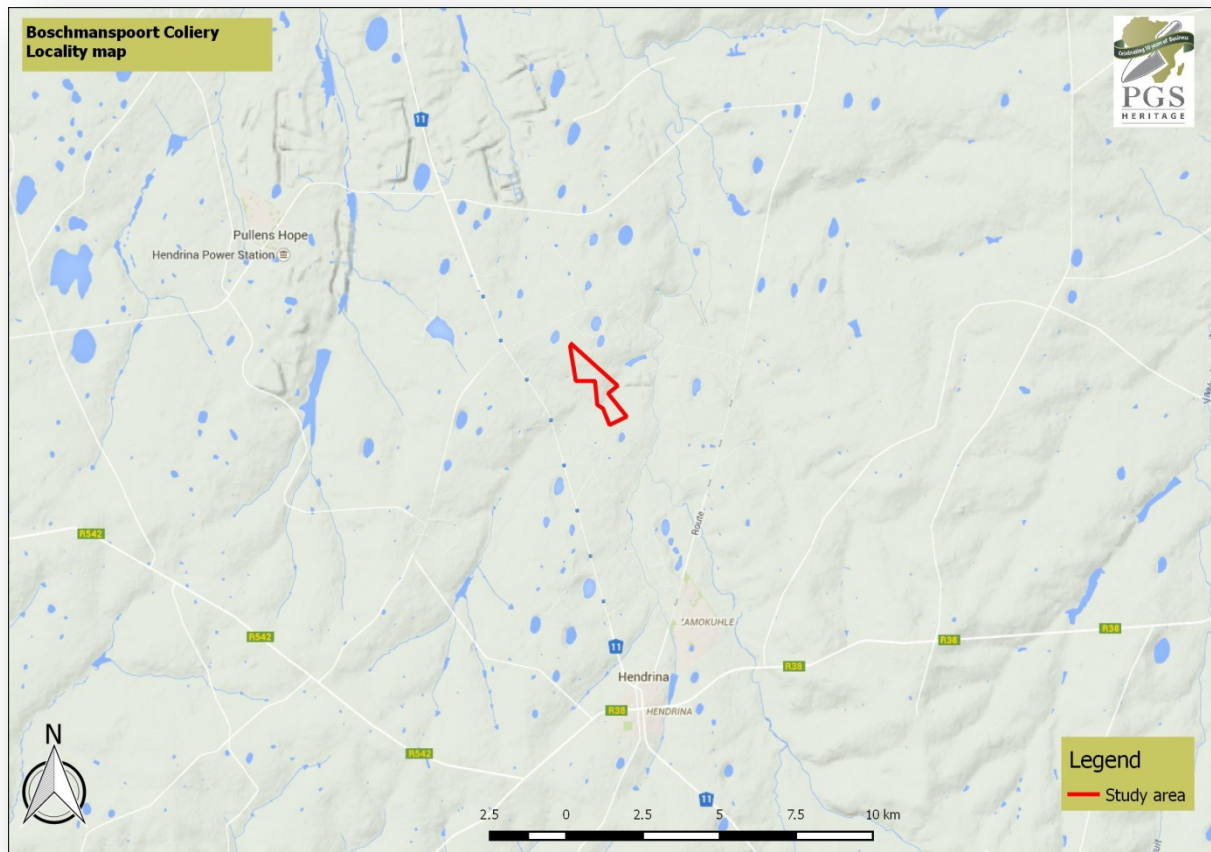


Figure 2 – Regional locality

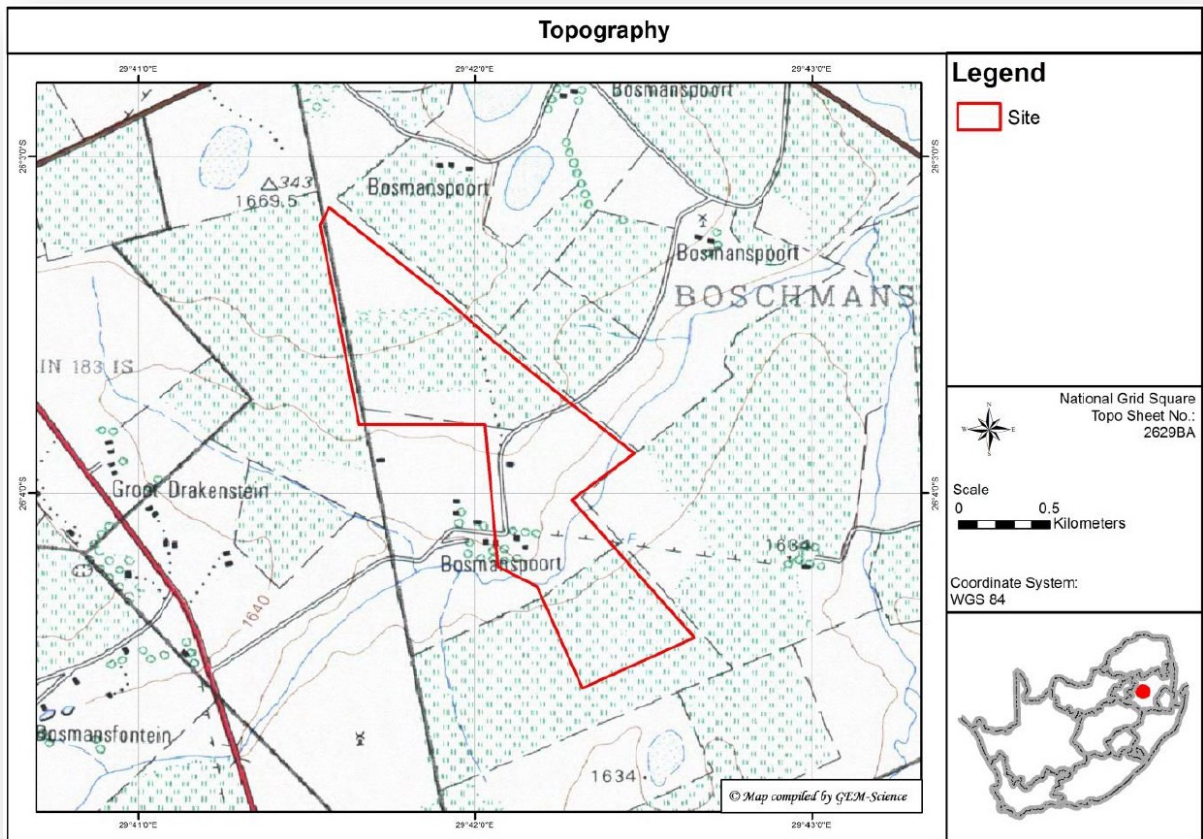


Figure 3 – Study area locality (provided by Gem Science)

2.2 Site Description

The site slopes from north-west and south-east to wards the wetland and small stream that dissects the study area into two portions. The northern section of the study area is characterised by plough maize fields (Figure 4 and Figure 6) while most of the eastern (Figure 5) and southern sections of the study area is utilised for grazing.



Figure 4 – View of northern section of study area



Figure 5 – View of eastern section of study area



Figure 6 – Panoramic view of northern section of study area

2.3 Project Description

The section in 2.3 has been provided by GEM Science.

2.3.1 Project overview

Mineral deposits:	Bituminous coal found in the coal seams of the Witbank Coal Field The following coal seams were considered economically mineable: No. 2 Coal Seam
Extent:	Site – 146.477ha Resource area – 50.01ha To be fenced off – 15.50ha
Reserves:	3.23MT (extractable tonnes in situ)
Mining method:	Shallow underground mining (between 15 and 70 metres below surface) – access can be gained via incline shaft Bord-and-pillar mining with continuous miners
Production rate:	240 000 tonnes of Run of Mine (ROM) coal per annum
Planned life of mine:	15 years (2 years)

The operational period has been subdivided into a construction phase and a production phase (Figure 7).

2.3.2 Construction phase

The construction phase will commence immediately upon granting of a mining right and will include the following items and expected timeframes after contractors have been appointment:

- Construction of access roads to (3 Weeks)
- Office and incline shaft area preparation (2 Weeks)
 - Removal of topsoil and leveling of area
- Incline Shaft Development (18 Weeks)
 - Establish incline shaft entry points
 - Installation of conveyor belt system
 - Installation of ventilation fans
- Construction of offices (6 Weeks)
- Construction ablution facilities (3 Weeks)

- Construction of workshops (6 Weeks)
- Construction of trenches and pollution control facilities (6 Weeks)
- Clearing and construction of topsoil, subsoil and hardrock stockpiles (2 Weeks)
- Clearing and construction of ROM stockpile area (2 Weeks)
- Installation of Weighbridge (2 Weeks)

2.3.3 *Operational phase*

During the production phase, the actual mining takes place. The underground mining will be done by means of the bord and pillar method.

The scheduled life of the mine is 10 years (production) during which time it is planned to produce 2.0 million tonnes of ROM raw coal from the No.2 Coal Seam Reserve. A pre-production phase lasting 24 weeks has been provided for the establishment of the underground shaft.

The operational phase will commence after the completion of the shaft and main development, known as steady-state mining. The mining of the underground reserves will be undertaken by suitably experienced underground mining contractors.

2.3.4 *Rehabilitation/closure period*

Rehabilitation will commence once underground mining has been completed and includes the re-instatement of roads. Rehabilitation will occur progressively from Year 13 as the underground workings are depleted and a total allowed period for completion of this exercise is three years. It is envisaged that the surface re-instatement will be completed well within this period; however this timeframe has been conservatively planned for.

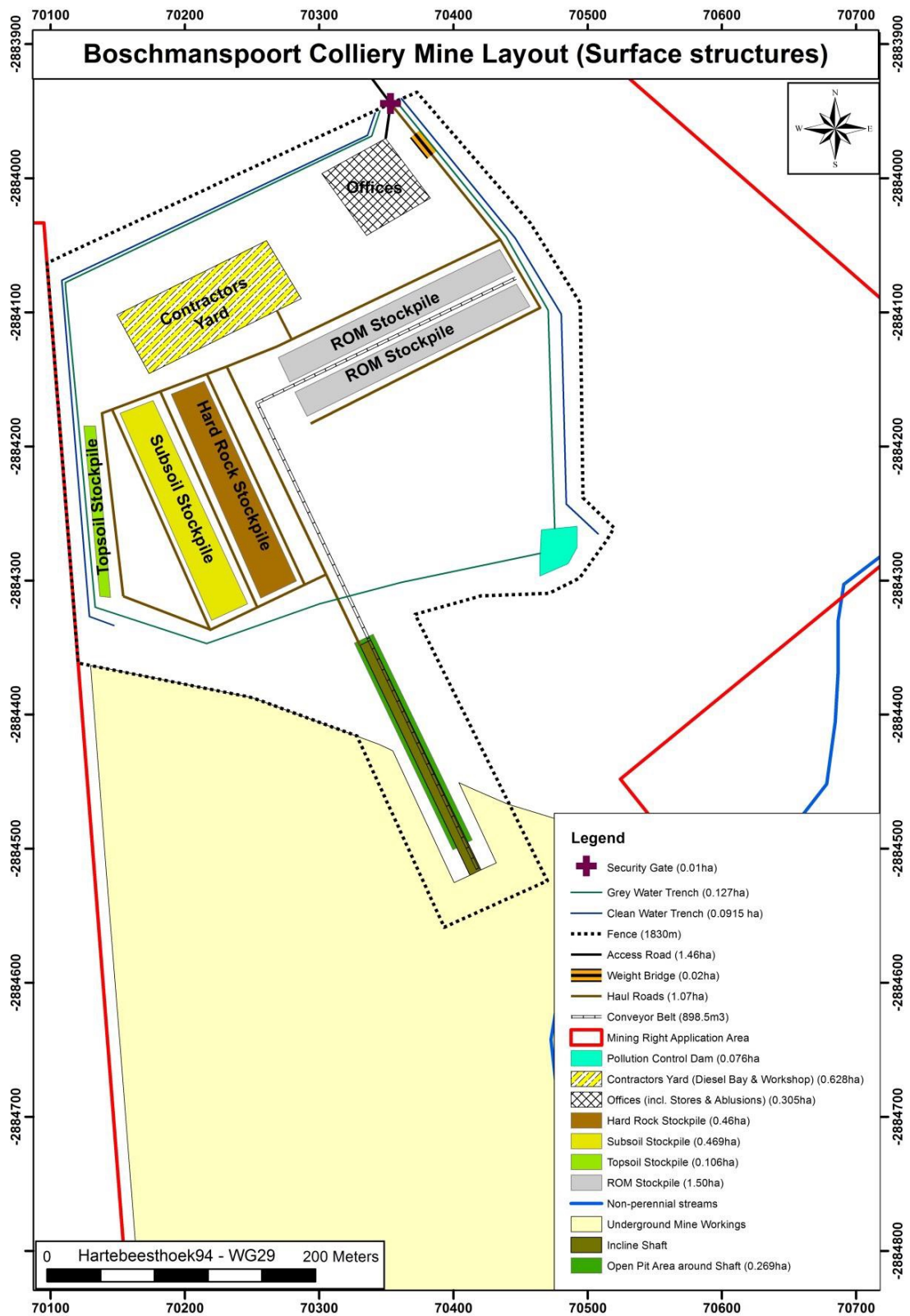


Figure 7 – Proposed site layout (from GEM Sciences)

3 ASSESSMENT METHODOLOGY

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

3.1 Methodology for Assessing Heritage Site Significance

This Heritage Impact Assessment (HIA) report was compiled by PGS Heritage (PGS) for the proposed establishment of the proposed Boschmanspoort Colliery. 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 on foot through the proposed project area by a qualified archaeologist, 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 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:

3.1.1 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 1: 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

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 Table 2.

Table 2: Quantitative rating and equivalent descriptors for the impact assessment criteria

Rating	Significance	Extent Scale	Temporal Scale
1	VERY LOW	<i>Isolated sites / proposed route</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

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

3.1.2 Significance Assessment

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1 000 km²) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 3 below.

Table 3: Description of the significance rating scale

Rating	Description
5	Very high Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	High Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is

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

3.1.3 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 4.

Table 4: Description of the spatial scale

Rating	Description
5	Global/National The maximum extent of any impact.
4	Regional/Provincial The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level).
3	Local The impact will affect an area up to 10 km from the proposed route.
2	Study Area The impact will affect an area not exceeding the Eskom servitude.
1	Isolated Sites / proposed route The impact will affect an area no bigger than the power line pylon footing..

3.1.4 Duration Scale

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in Table 5.

Table 5: 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 facility.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

3.1.5 Degree of Probability

Probability or likelihood of an impact occurring will be described as shown in Table 6 below.

Table 6: 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

3.1.6 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 7. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 7: Description of the degree of certainty rating scale

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

3.1.7 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:

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

An example of how this rating scale is applied is shown in Table 8 below.

Table 8: Example of Rating Scale

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

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

The impact risk is classified according to five classes as described in the Table 9 below.

Table 9: 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 air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

4 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 10**. This data then informed the possible heritage resources to be expected during field surveying.

Table 10: Summary of History of Matatiele Town and Surrounding Area

DATE	DESCRIPTION
2.5 million to 250 000 years ago	Early Stone Age: The Early 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).
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.

40 000 years Late Stone Age:

ago – to the historic past No direct reference to Later Stone Age finds could be found during the research.

AD 900 – AD Iron Age:

1300 – 1800s

No direct reference to Later Stone Age finds could be found during the research.

1899-1902 The South African War:

The area between Witbank and Ermelo major military activity during the later part of the South African War. The occupation of Pretoria on 5 June 1900, saw the retreat of Boer forces towards the eastern Transvaal (Mpumalanga) and the intensification of the guerrilla warfare activities. Seeking to bring an end to the conflict the British started an advance of the Boer forces from the west (Pretoria) and the south (Ermelo). In April 1901, one of the British Columns under Major-General F.W. Kitchener started with a push from Lydenburg towards the south over the Delagoa-Pretoria rail line in an attempt to capture the Boer forces under the command of General Ben Viljoen (

Between April and August of 1900 numerous skirmishes and engagements took place between British forces (predominantly associated with the Western Australian 5th and 6th Contingents) and retreating Boer commandos. The movement of the British Column can be tracked through the following dates and places:

- Middelburg to Rondebosch on 12 May 1901;
- Boshmansspruit – British Charge Boers on 14 May 1901; (16km north of study area)

- Battle of Brakpan – 16 May 1901; (1km east of study area)
- Wilmansrust engagement – 12 June 1901 (20 km south west of study area)
- Middelkraal British field hospital – (25km south west of study area)

<http://www.thefreelibrary.com/The+action+at+Brakpan.-a0123162112>

4.1 SAHRIS Database – Previous Heritage Impact Assessment Reports

A search of the South African Heritage Resources Information System

(<http://www.sahra.org.za/sahris>) database identified previous HIA's undertaken within the wider area:

- De Jong, R.C. 2006. Archaeological and Heritage Assessment Report Version 3: Optimum Mine EMP Amendment, North of Hendrina, Mpumalanga. Cultmatix cc, for Jones and Wagener.

Although this report covers the general area under discussion for the current Boschmanspoort report, none of the structures identified for this HIA was mentioned in the de Jong report.

- Van Schalkwyk, J.A. 2007. Heritage Impact Scoping Report for the Planned Hendrina-Marathon Powerline, Mpumalanga Province for Strategic Environmental Focus.

This report was conducted on a large scale and although it does cover the study area for the current HIA, not heritage features were identified.

- Pistorius, J.C.C. 2005. A Heritage Impact Assessment (HIA) Study For The Proposed New Optimum Colliery On The Farm Schoonoord 164is In The Mpumalanga Province Of South Africa. For African EPA.

This report was conducted on the farm Schoonoordt some 10 km to the east of the current study area.

4.2 Palaeontology of the area

4.2.1 Geological setting

The geology of the proposed project area is underlain by sedimentary rocks of the Permian aged Vryheid Formation (PV), Ecca Group, Karoo Supergroup (**Figure 8**) (Groenewald, 2014).



Figure 8 - The larger part of the study area is underlain by sedimentary rocks of the Vryheid Formation (Grey) and a small area is underlain by alluvium (Groenewald, 2014)

4.2.2 Palaeontology of the area

Groenewald (2014) indicates 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 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.*

5 FIELD WORK FINDINGS

Due to the nature of cultural remains, with the majority of artefacts occurring below the surface, a controlled-exclusive surface survey was conducted over a period of a day by vehicle and on foot by

an archaeologist and field technician from PGS. The field work was conducted in the week of 29 September 2014.

The survey focussed directly on the proposed pipeline routes and reservoir sites for the establishment of the new water supply scheme. The general area was documented by means of various photographs (**Figure 5** to Error! Reference source not found.) 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 north of the town of Hendrina. Vegetation is sparse and consists mostly of low grassland. Overall visibility is good.

During the survey a total of 5 heritage sites were identified of which 2 are historic/recent structures and buildings and 2 cemeteries (**BP002** and **BPP005**) and one possible grave (**BP004**). Each identified heritage site will be discussed below.

The identified heritage sites and the track logs (in black) for the survey are indicated on the map below (**Figure 9**).

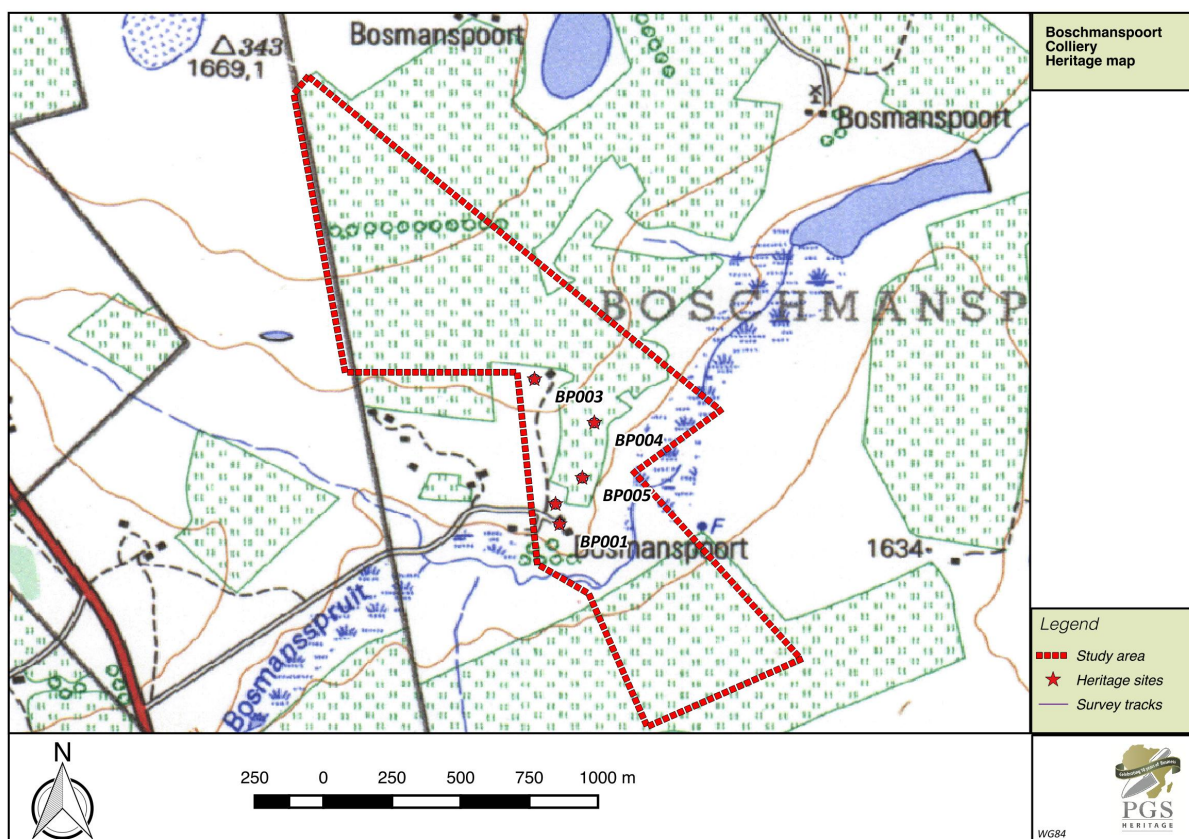


Figure 9 – Map of the study area with identified heritage sites and track logs indicated.

5.1 Heritage Findings

5.1.1 Site BP001

GPS: S26° 04' 08.0" E29° 42' 07.3"

The remains of one of the farmstead situated on the farm Boschmanspoort was found at BP001 (Figure 10). The site consists of a main dwelling partly constructed with sand stone blocks (original building) and addition build with red clay fired bricks (Figure 12). The building has been abandoned a few decades ago as can be seen from the trees growing inside the ruin (Figure 11). The only additional structure on the werf is a set of outbuilding to the north of the main building. Numerous large trees are still present on the werf as well as a lane of eucalyptus trees contemporary with the original dwelling.



Figure 10 – Panoramic view of BP001



Figure 12 – The addition of the red clay brick walls are visible

Figure 11 – Trees growing in side the ruined dwelling

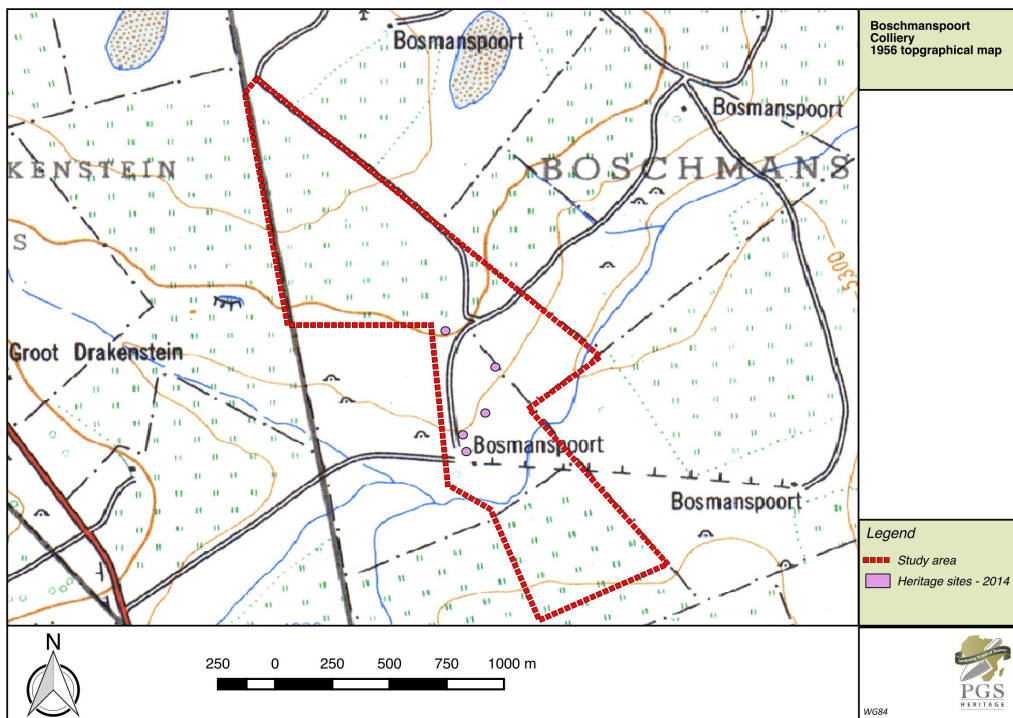


Figure 13 – 1956 topographical map indicating that the farmstead documented / BP001, is older than 60 years

The site is definitely older than 60 years (Figure 13) and is of medium heritage significance and graded as Grade 4A, and protected under Sections 34 of the NHRA.

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Site	Permanent	Could happen	Low
Impact on historic buildings	3	1	5	3	1.80

Mitigation:

- Demarcate the site as a no-go area;
- The monitoring of the structures must be included in the HMP of the proposed project, and
- If at any stage the site is disturbed, a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.
- Destruction of the site will require a permit issued under Section 34 of the NHRA and will only be issued with the backing of research documentation.

5.1.2 Site BP002

GPS: S26° 04' 05.3" E29° 42' 06.8"

Site **BP002** is a farm cemetery consisting of 11 graves (Figure 14). There is a distinctive age divide in the cemetery as is evident from the material utilised for the headstones and dressing of the respective graves. The younger set of graves, all have granite headstones and dressing (Figure 15), while the older set of graves have headstone and dressings manufactured from sand stone (Figure 14). Families associated with this cemetery are the De Wet and Van Aswegen's.



Figure 14 – View of BP002 from the east



Figure 15 – Granite headstone and dressing at BP002

The site is of medium heritage significance and graded as Grade 3B and protected under Section 36 of the NHRA.

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Site	Permanent	Could happen	Low
Impact on cemetery	3	1	5	3	1.80

Mitigation:

- The cemetery must be preserved;
- Demarcate the site as a no-go area during the construction phase;

- The monitoring of the structures must be included in the HMP of the proposed project, and
-

5.1.3 Site BP003:

GPS: S26° 03' 49.0" E29° 42' 04.0"

Site **BP003** is the ruin of a farm workers homestead (Figure 16) that was recently demolished. The main structure was constructed from mud bricks and wooden frame. The paved garden path is another main feature of the remains (Figure 17).

The site is of low to medium heritage significance and graded as Grade 4B. 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 (Cocks; Bangay; Wiersum & Dold, 2006).



Figure 16 – General view of site BP003



Figure 17 – View of the paved garden path at site BP003

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	LOW	Isolated Sites	Permanent	Could happen	
Impact on structure	2	1	5	3	1,60

Mitigation:

- Demarcate the site as a no-go area during the construction phase;
- The monitoring of the structures must be included in the HMP of the proposed project, and
- If at any stage the site is disturbed, and it is found that human remains were present, a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.

5.1.4 Site BP004:

GPS: S26° 03' 54.7" E29° 42' 11.9"

Site **BP004** is characterised by an oval shaped, rock lined mound (Figure 18). The mound is east west aligned. The shape and alignment of the structure indicates the possibility of it being a grave.



Figure 18 – View of possible grave

The site is of provisionally given medium heritage significance and graded as Grade 3C, and protected under Section 36 of the NHRA.

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Site	Permanent	Could happen	Low
Impact on possible grave	3	1	5	3	1.80

Mitigation:

- Demarcate the site as a no-go area during the construction phase;

- The monitoring of the structures must be included in the HMP of the proposed project, and
- If at any stage the site is disturbed, and it is found that human remains were present, a qualified archaeologist must be contracted to evaluate the damage and make recommendations on the appropriate mitigation measures.

5.1.5 Site BP005

GPS: S26° 04' 01.9" E29° 42' 10.3"

Site BP005 is a large farm worker cemetery containing approximately 40 graves. The oldest grave dates from 1938 with associated families the Magagula family.



Figure 19 – View of cemetery BP005 from the north

Figure 20 – The only granite headstone in the cemetery



Figure 21 – Hand carved headstone at BP005

The site is of medium heritage significance and graded as Grade 3B and protected under Section 36 of the NHRA.

Impact rating

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Site	Permanent	Could happen	Low
Impact on cemetery	3	1	5	3	1.80

Mitigation:

- Demarcate the site as a no-go area during the construction phase.;
- The monitoring of the structures must be included in the HMP of the proposed project, and

5.2 Palaeontology

Groenewald (2014) states that *“The sedimentary rocks of the Vryheid Formation will contain fossils and the mining of coal is, by definition, the mining of fossilised plant material. Although these rock sequences will have a high palaeontological sensitivity, the chances of finding fossils before actual construction phase as well as when the mining of the rocks take place, is relatively low. This is evident from photographic evidence of the outcrops in the study area.”*



Figure 22 – Outcrops on site

The following colour coding method is used to classify a development area’s palaeontological impact, as illustrated in **Figure 23**:

- **Red colouration** indicates a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops on the site/route and the chances of finding fossils during the construction phase are very high.
- **Orange colouration** indicates a possibility of finding fossils of a specific assemblage zone either in outcrops or in bedrock on the site/route. Fossils will probably be present on the site/route and the chances of finding fossils during the excavation phase are high.
- **Green colouration** indicates that there is no possibility of finding fossils in that section of the site/route development.

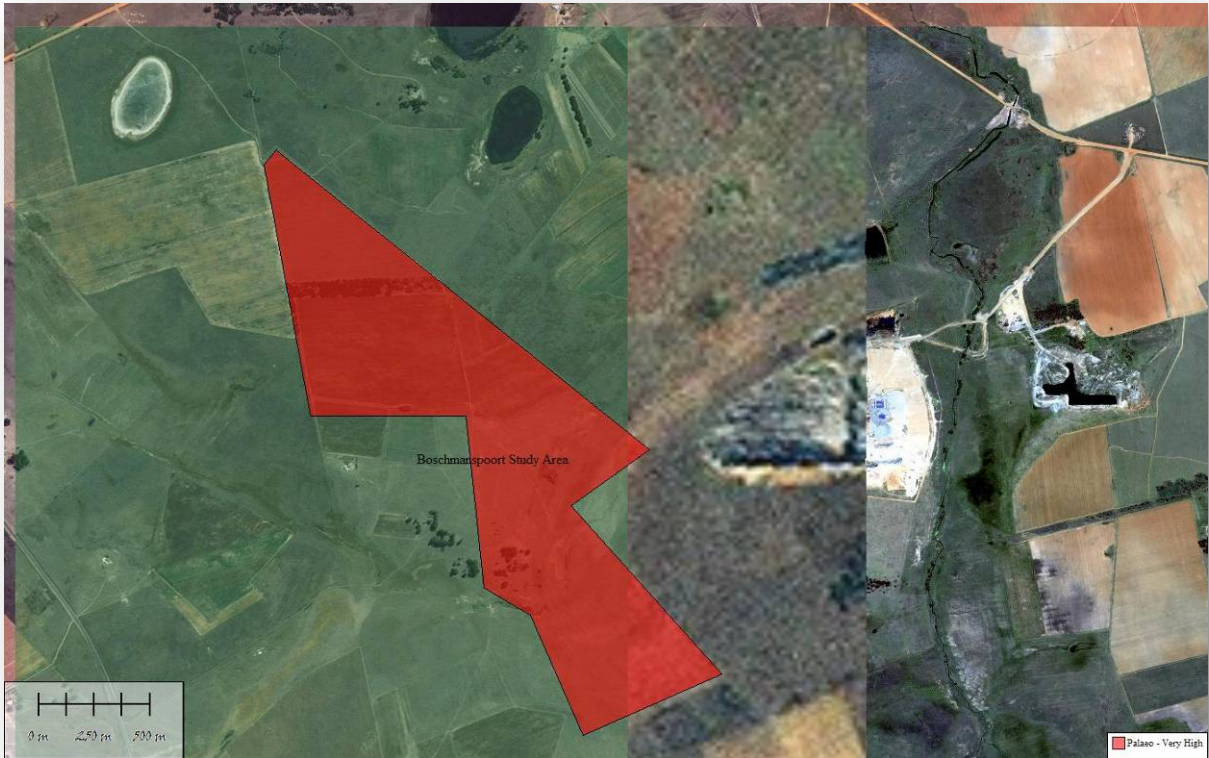


Figure 23 – Palaeontological Sensitivity Map, of the proposed project

The palaeontological significance and rating is summarised in **Table 11**.

Impact rating:

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	HIGH	Study Area	Permanent	Very Likely	
Impact on cemetery	4	2	5	4	2,93

Mitigation:

- The developer and the ECO of the mining project be made aware of the fact that coal mining is by definition the mining of fossil plant material.
- The developer appoints a qualified palaeontologist who must, on behalf of Boschmanspoort Colliery (Pty) Ltd apply for a collection and destruction permit from

SAHRA, for plant and other fossils encountered during the construction of infrastructure as well as the mining operation.

- The developer must appoint a qualified palaeontologist to compile a strategic protocol for the chance find of fossils for the life-time of the mine. The palaeontologist must look out for exceptionally well preserved fossils and collect representative samples of these fossils for further study at an appropriate institute such as the Evolution Studies Institute at WITS University.

6 CONCLUSIONS AND RECOMMENDATIONS

During the heritage study a total of 5 heritage sites were identified to be close or within the proposed alignment of the proposed mining area. One of these identified sites is a historic/recent homestead (**BP001**) and two grave or burial site (**BP002 and BP005**) and one possible grave (**BP004**) were found within the study area. A ruined farm workers homestead was also noted at **BP003**.

The following recommendations are made with regards to the finds:

6.1 Graves

Two grave or burial site (**BP002 and BP005**) and one possible grave (**BP004**) were found within the study area and the following is recommended:

The identified grave fall within or nearby 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 graves and also of the recommendations as outlined in this report regarding it.

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 grave should be avoided.

If the developer decides to plan the development around the identified grave and leave it undisturbed, adequate arrangements should be made to protect the graves from the impact of the development. These should include the following:

- It is important to understand that the identified graves could have significant heritage value to the relevant families (if identified) and should therefore be preserved.
- The relevant families should be identified (if possible) and should be informed about the proposed activities which could possibly affect their grave.
- It is recommended that the identified graves should be clearly marked with danger tape during the entire duration of the project and especially during earth-moving/bush clearing activities and a 10m buffer zone must be allowed around the grave.
- A watching brief performed by a suitable qualified person is recommended during the bush clearing and construction phases of the project. This person should see to it that the grave are safe and protected during these phases.
- It is advisable to fence the grave to prevent future mistakes. A buffer zone of at least 10m around the grave is recommended.
- The proposed earth-moving/bush clearing activities should be altered and should be planned around the grave in order to protect it from any damage or other negative impacts.
- Bush clearing crews should be made aware of the grave in order that the grave will not be accidentally damaged during the earth-moving activities.
- The planning team should **ensure that access to the grave is not limited in any way**. A small management plan should be set up to ensure the future safety, access and maintenance of the graves next to the proposed development.

If the above recommendations can't be adhered to, further steps and measures should be taken to move the graves and relocate them to an official graveyard in the area. This should only be done as last resort if no other options deem to be possible. The following process is then required:

- A process of consultation with the affected families and communities, if identified, should then be initiated to start the relocation of the grave.
- Various applications to various Departments should be put into motion to obtain the necessary permissions and permits to perform the relocation of the grave. These applications and permits are required by law.

Only after all the required permissions and permits have been obtained, can the relocation of the grave continue as performed by professionals.

6.2 Historic Farmstead

- The structures are 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).
- An application for the total destruction of these structures should be filed at the South African Heritage Resources Agency (SAHRA).
- SAHRA will dictate the extent and the standard of recording of the structures. This could include the appointment of a qualified/approved historical architect to document the structures.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

6.3 Farmworkers homestead

- No further mitigation is required, however:
- 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.
- SAHRA will dictate the extent and the standard of recording of the structures. This could include the appointment of a qualified/approved historical architect to document the structures.
- Only after the requirements of SAHRA have been fulfilled can the destruction of the structures continue.

6.4 Palaeontology

- The developer and the ECO of the mining project be made aware of the fact that coal mining is by definition the mining of fossil plant material.
- The developer appoints a qualified palaeontologist who must, on behalf of Boschmanspoort Colliery (Pty) Ltd apply for a collection and destruction permit from SAHRA, for plant and other fossils encountered during the construction of infrastructure as well as the mining operation.
- The developer must appoint a qualified palaeontologist to compile a strategic protocol for the chance find of fossils for the life-time of the mine. The palaeontologist must look out for exceptionally well preserved fossils and collect representative samples of these fossils for further study at an appropriate institute such as the Evolution Studies Institute at WITS University.

6.5 General

Further to these recommendations, the general Heritage Management Guidelines in Section 7 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.

7 HERITAGE MANAGEMENT GUIDELINES

7.1 General Management Guidelines

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-
 - (a) the construction of a road, wall, transmission line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
 - (b) the construction of a bridge or similar structure exceeding 50m in length;
 - (c) any development or other activity which will change the character of a site-
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or

- (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

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

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

This survey and evaluation must include:

- (a) The identification and mapping of all heritage resources in the area affected;
 - (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Heritage Resources Act;
 - (c) An assessment of the impact of the development on such heritage resources;
 - (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
 - (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
 - (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
 - (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.
3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:

- a. Heritage;
- b. Graves;
- c. Archaeological finds; and
- d. Historical Structures.

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

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

The purpose of an archaeological/palaeontological monitoring programme¹ is:

- To allow, within the resources available, the preservation by recording of archaeological/palaeontological deposits, the presence and nature of which could not be

¹ The definition of an archaeological/palaeontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, in the inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

established (or established with sufficient accuracy) in advance of development or other potentially disruptive works

- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/palaeontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring programme is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring programme is to establish and make available information about the archaeological resource existing on a site.

PGS can be contacted on the way forward in this regard.

Table 11: Roles and responsibilities of archaeological and heritage management

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should attend all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology support team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology support team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into the employee induction course).	The client	Environmental Consultancy and the Archaeologist,

If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

7.2 All phases of the project

Based on the findings of the HIA, all stakeholders and key personnel should undergo an heritage induction course during this phase. Induction courses generally form part of the employees' overall training and the heritage component can easily be integrated into these training sessions. Two courses should be organised – one aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This needs to be supervised by a qualified archaeologist. This course should be reinforced by posters reminding operators of the possibility of finding archaeological/palaeontological sites.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small scale infrastructure development associated with the project/operations.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to during the subsequent history of the project. In general these are low impact

developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction/operational phase, it is important to recognise any significant material being unearthed, and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to attend relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development on a recurrent basis, with more frequent visits to the actual workforce and operational areas.

In addition, feedback reports can be submitted by the archaeologist to the client and SAHRA to ensure effective monitoring. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/palaeontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/palaeontological monitoring programme.

7.2.1 *Graves*

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

- Upon the accidental discovery of graves, a buffer of at least 20 meters should be implemented.
- If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a permit must be applied for from SAHRA and other relevant authorities. The local South African Police Services must immediately be notified of the find.
- Where it is recommended that the graves be relocated, a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

- i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
- ii. Site notices indicating the intent of the relocation;
- iii. Newspaper notices indicating the intent of the relocation;
- iv. A permit from the local authority;
- v. A permit from the Provincial Department of Health;
- vi. A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
- vii. An exhumation process that keeps the dignity of the remains intact;
- viii. The whole process must be done by a reputable company that is well versed in relocations;
- ix. The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

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LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA**1 General principles**

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

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

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

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

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;

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

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

2 Graves and cemeteries

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

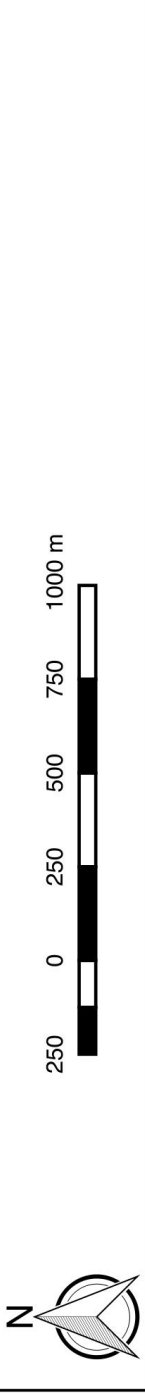
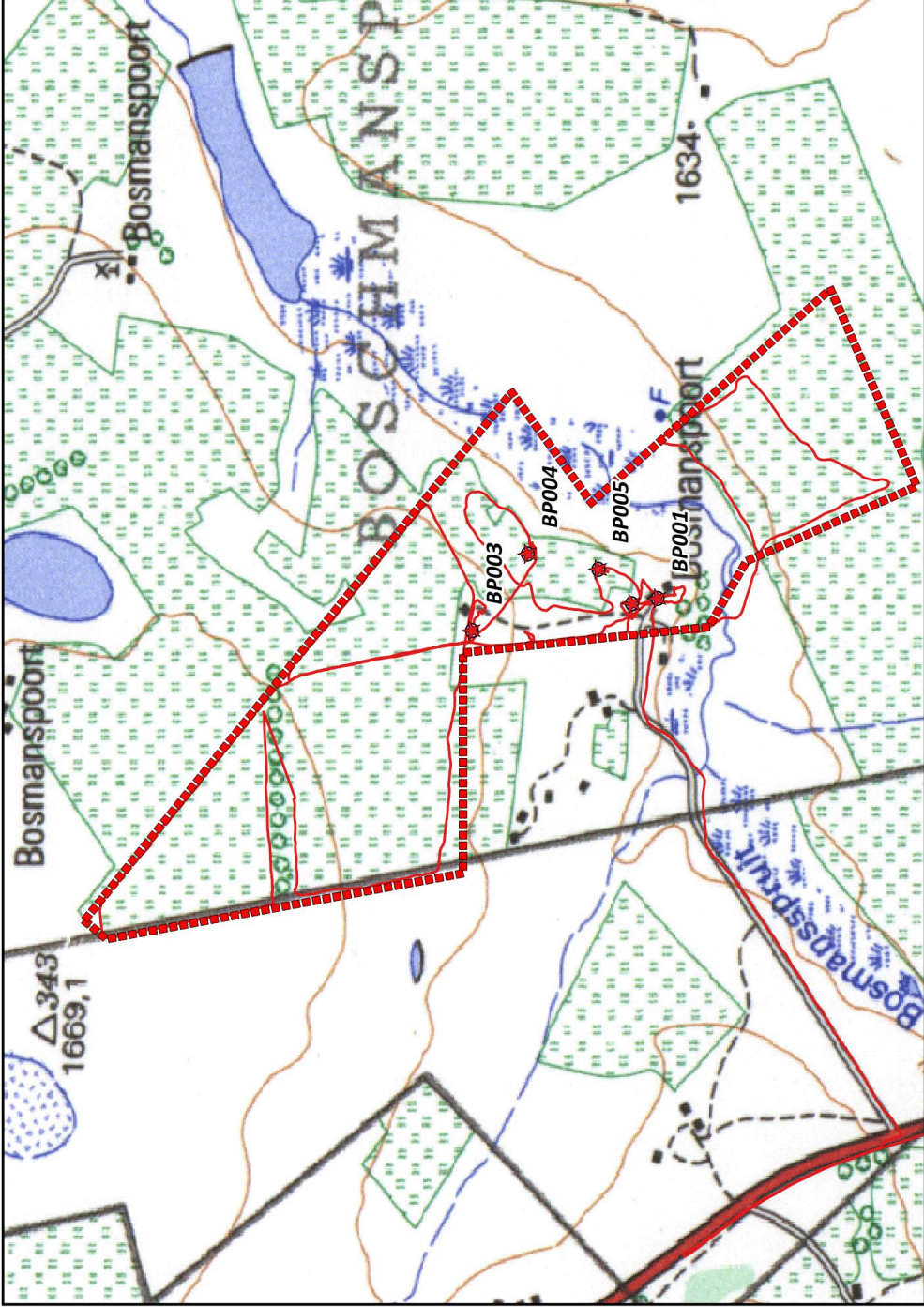
Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding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

authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

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

Appendix B

HERITAGE MAP



Appendix B

Palaeontological desktop

**PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE
BOSCHMANSPOORT COLLIERY NEAR THE TOWN OF
HENDRINA IN MPUMALANGA PROVINCE**

For:

HIA CONSULTANTS



DATE: 26 November 2014

By

GIDEON GROENEWALD

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by PSG Heritage and Grave Relocation Consultants to undertake a desktop survey, assessing the potential palaeontological impact of the Boschmanspoort Colliery, situated on the farm Boschmanspoort 159 IS (portions 24 and 31) within the Steve Tshwete Local Municipality of the Nkangala District Municipality in Mpumalanga.

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

The site falls on portions 24 and 31 of the farm Boschmanspoort 159 IS, is approximately 12km north of Hendrina (along the N11), 41km southeast of Middelburg (along the N11) and 55km west of Carolina (along the R38).

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation (PV), Ecca Group, Karoo Supergroup. The Vryheid Formation consists predominantly of grey sandstone with interbedded prominent coal beds and lenses of shale and grit. The sediments are interpreted as having been deposited on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that form the core business of this project.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant.

The study area is almost entirely underlain by Permian aged sedimentary rocks of the Vryheid Formation, Ecca Group of the Karoo Supergroup. The Vryheid Formation is known for containing an abundant assemblage of plant fossils and the mining of coal is by definition the mining of fossil plant material.

Due to the fact that the Vryheid Formation sediments and coal beds will only be exposed during the mining operations and associated infrastructure development, it is unlikely that fossils will be observed before the construction activity and mining takes place. For this reason a High Palaeontological sensitivity is allocated to the study area and significant fossil finds must be recorded during the life-span of the mine.

It is recommended that:

1. The developer and the ECO of the mining project be made aware of the fact that coal mining is by definition the mining of fossil plant material.
2. The developer appoints a qualified palaeontologist who must, on behalf of Boschmanspoort Colliery (Pty) Ltd apply for a collection and destruction permit from SAHRA, for plant and other fossils encountered during the construction of infrastructure as well as the mining operation.

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3. The developer must appoint a qualified palaeontologist to compile a strategic protocol for the chance find of fossils for the life-time of the mine. The palaeontologist must look out for exceptionally well preserved fossils and collect representative samples of these fossils for further study at an appropriate institute such as the Evolution Studies Institute at WITS University.

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1. INTRODUCTION

1.1. Background

Gideon Groenewald was appointed by PSG Heritage and Grave Relocation Consultants to undertake a desktop survey, assessing the potential palaeontological impact of the Boschmanspoort Colliery, situated on the farm Boschmanspoort 159 IS (portions 24 and 31) within the Steve Tshwete Local Municipality of the Nkangala District Municipality in Mpumalanga.

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

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

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

1.1. Aims and Methodology

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

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

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

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

Table 1.1 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.	
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 larger alluvium deposits. Collection of a representative sample of potential fossiliferous material is recommended.

GREY	<p>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 emplacement 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.</p>
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1.2. 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

2.1. Locality

The site falls on portions 24 and 31 of the farm Boschmanspoort 159 IS, is approximately 12km north of Hendrina (along the N11), 41km southeast of Middelburg (along the N11) and 55km west of Carolina (along the R38) (Figure 2.1 and 2.2).

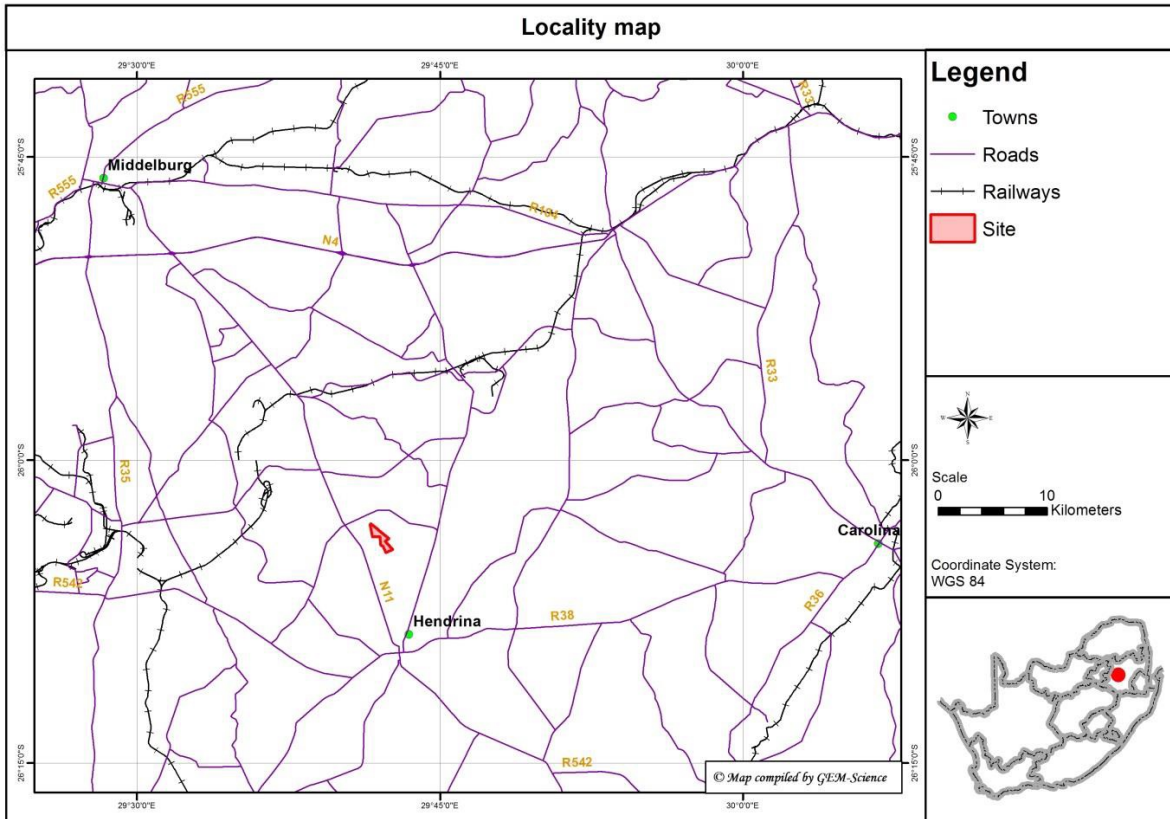


Figure 2.1 Locality of the proposed mining area

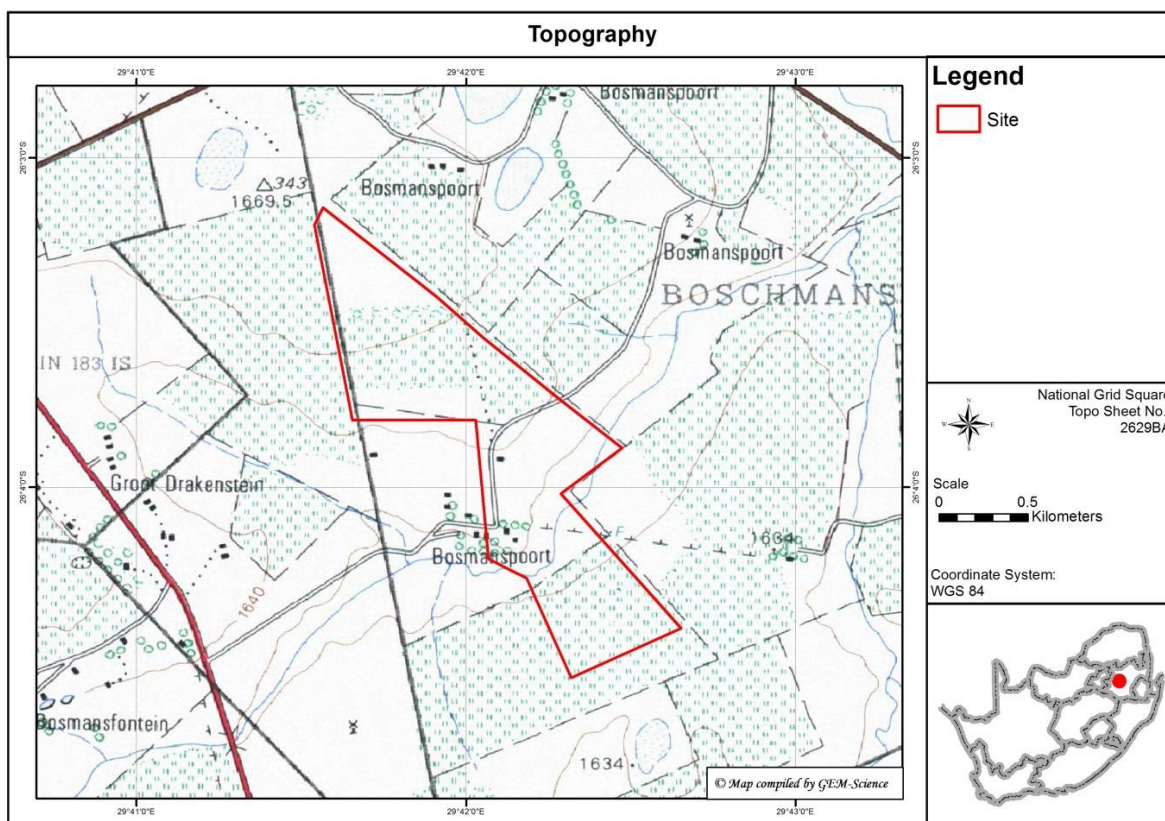


Figure 2.2 Site specific information on the locality of the Boshmanspoort Mine development.

2.2. Project Overview

The mining activity will be strictly shallow underground mining and the main components of the project are as follows.

Mineral deposits:	Bituminous coal found in the coal seams of the Witbank Coal Field The following coal seams were considered economically mineable: No. 2 Coal Seam
Extent:	Site – 146.477ha Resource area – 50.01ha To be fenced off – 15.50ha
Reserves:	3.23MT (extractable tonnes in situ)
Mining method:	Shallow underground mining (between 15 and 70 metres below surface) – access can be gained via incline shaft Bord-and-pillar mining with continuous miners
Production rate:	240 000 tonnes of Run of Mine (ROM) coal per annum
Planned life of mine:	15 years (2 years pre-production, 10 years production and 3 years rehabilitation)

The layout of the project is summarised in Figure 2.3.

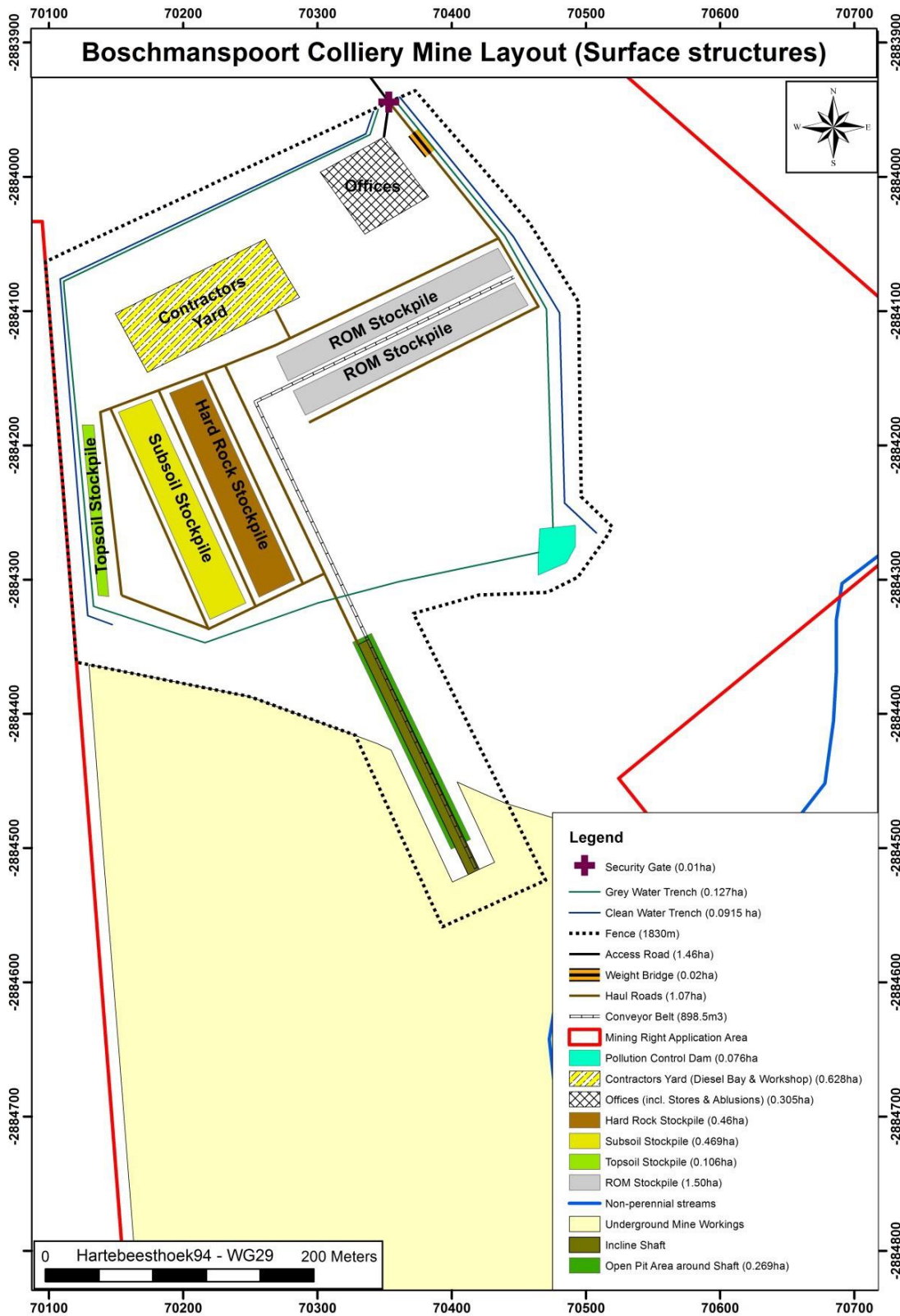


Figure 2.3 Layout of the proposed Boschmanspoort Colliery Mine, indicating surface developments as well as underground mining area.

3. GEOLOGY

The study area is underlain by sedimentary rocks of the Permian aged Vryheid Formation (PV), Ecca Group, Karoo Supergroup (Figure 3.1). The Vryheid Formation consists predominantly of grey sandstone with interbedded prominent coal beds and lenses of shale and grit. The sediments are interpreted as having been deposited on a sandy shoreline, beyond which lay vast swamplands. The plant material that accumulated within these swamps formed the coal deposits that form the core business of this project (Johnson et al, 2009).

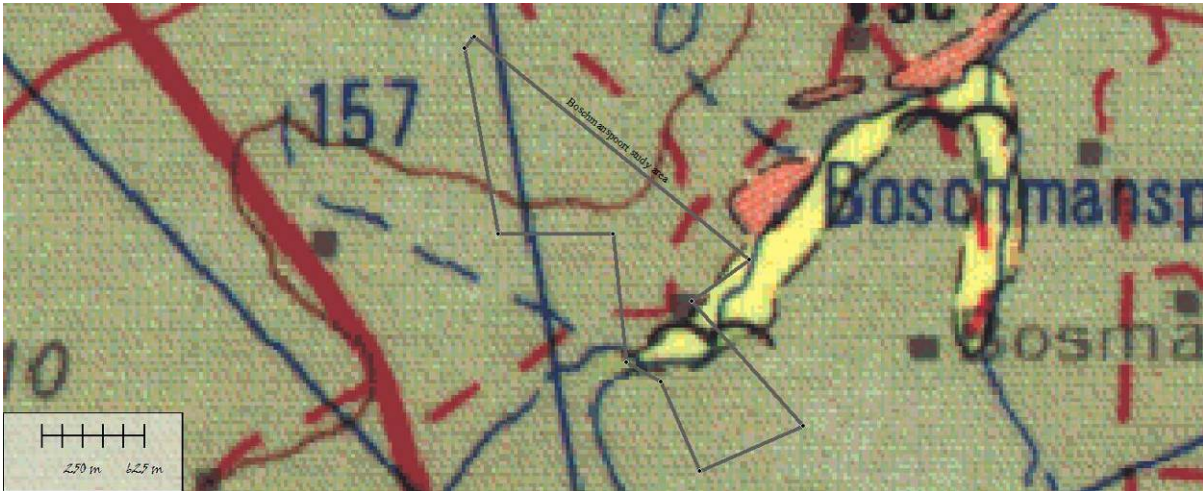


Figure 3.1 The larger part of the study area is underlain by sedimentary rocks of the Vryheid Formation (Grey) and a small area is underlain by alluvium.

4. PALAEOONTOLOGY OF THE STUDY AREA

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation. 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).

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.*, *Lidgettonia 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.

Significant fossils have been described from alluvial deposits in the Free State Province and the recording of fossils from these deposits will be significant.

5. PALAEOLOGICAL SENSITIVITY

The sedimentary rocks of the Vryheid Formation will contain fossils and the mining of coal is, by definition, the mining of fossilised plant material. Although these rock sequences will have a high palaeontological sensitivity, the chances of finding fossils before actual construction phase as well as when the mining of the rocks take place, is relatively low. This is evident from photographic evidence of the outcrops in the study area. A High Palaeontological sensitivity is allocated to the areas underlain by the Vryheid Formation as well as the small area underlain by alluvium (Figure 5.1). The mining of coal will by definition be the mining of fossil plant material, although the best specimens are expected in the layers of rock between the coal seams. It is recommended that the developer apply for a collection and destruction permit for all fossil material encountered during the construction of infrastructure and mining operations. If well preserved examples of plant, vertebrate, invertebrate or ichno fossils are recorded it would be of significant scientific value and these examples must be recorded by a palaeontologist and representative samples provided to a registered institution such as the Evolution Studies Institute at WITS University, for further studies.

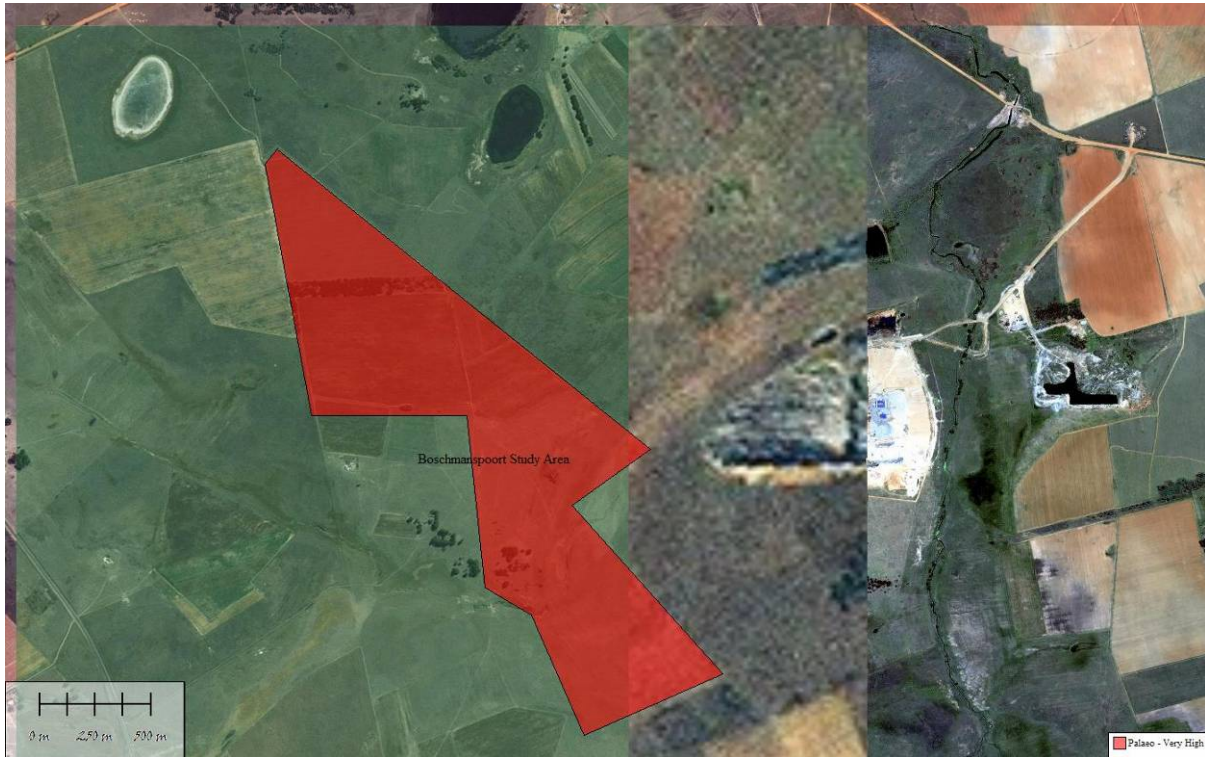


Figure 5.1 Palaeontological Sensitivity of the proposed mining site at Boschmanspoort Colliery. For explanation of red colour see Table 1.1 above.

6. CONCLUSION AND RECOMMENDATIONS

The study area is almost entirely underlain by Permian aged sedimentary rocks of the Vryheid Formation, Ecca Group of the Karoo Supergroup. The Vryheid Formation is known for containing an abundant assemblage of plant fossils and the mining of coal is by definition the mining of fossil plant material.

Due to the fact that the Vryheid Formation sediments and coal beds will only be exposed during the mining operations and associated infrastructure development, it is unlikely that fossils will be observed before the construction activity and mining takes place. For this reason a High Palaeontological sensitivity is allocated to the study area and significant fossil finds must be recorded during the life-span of the mine.

It is recommended that:

1. The developer and the ECO of the mining project be made aware of the fact that coal mining is by definition the mining of fossil plant material.
2. The developer appoints a qualified palaeontologist who must, on behalf of Boschmanspoort Colliery (Pty) Ltd apply for a collection and destruction permit from SAHRA, for plant and other fossils encountered during the construction of infrastructure as well as the mining operation.
3. The developer must appoint a qualified palaeontologist to compile a strategic protocol for the chance find of fossils for the life-time of the mine. The palaeontologist must look out for exceptionally well preserved fossils and collect representative samples of these fossils for

further study at an appropriate institute such as the Evolution Studies Institute at WITS University.

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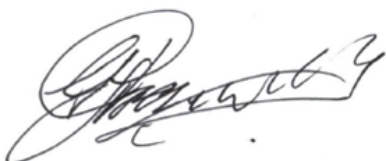
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8. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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 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.

A handwritten signature in black ink, appearing to read 'G. Groenewald', written in a cursive style.

Dr Gideon Groenewald
Geologist