AREA 8 PIT EXTENSION, SOMKHELE MINE NEAR MTUBATUBA, KWAZULU-NATAL

Phase 1 Heritage Impact Assessment

December 2018
Updated January 2019

FOR: **GCS Water and Environmental (Pty) Ltd**
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EXECUTIVE SUMMARY

Somkhele Anthracite Mine has been a fully operational anthracite mine since 2007 and is operated and owned by Tendele Coal Mining (Pty) Ltd. Somkhele Anthracite Mine intends to extend its existing Luhlanga opencast pit (Area 8) by approximately 18 ha. The proposed extension includes an increase in the footprint of the waste rock dump to 50 Ha.

The site of the proposed Area 8 opencast pit is 68 Ha (680000 m²) in size hence it triggers section 38 (1) (c)(i) of the National Heritage Resources Act (NHRA), 1999 (Act No 25 of 1999), which refers to (c) any development or other activity which will change the character of a site — (i) exceeding 5 000 m² in extent. The Phase I HIA was undertaken to assess whether any heritage resources will be impacted by the proposed Area 8 pit extension.

The mine falls within Reserve No. 3 (Somkhele 15822) of the Mtubatuba administrative district. The approximate midpoint of the proposed pit extension is at S28º19'14.43"; E32º04' 42.63".

An inspection of the project site was undertaken on 14 November 2018. The area of the pit extension is heavily overgrown with vegetation making areas inaccessible and the identification of low-lying heritage resources such as archaeological remains very difficult. However, people and animals have created paths through the bush which allowed some access to the site.

The area on which the pit extension is proposed was previously inhabited. In 2016, the mine engaged with the people living on the land and negotiated that all those in the area of the proposed extension be relocated. This included graves that were found on the project site. All the graves (apart from three graves) have been disinterred from the project area. The removal of the three graves has been approved by the affected family and it is the understanding of the specialist that the disinterment will take place shortly. The graves found on the project area were either moved to private locations or were moved to a cemetery which is situated to the northern boundary of the proposed pit extension.

The specialist was taken to one of the three graves left on site which is made from packed rock. Close to the grave, the remains of dwellings / structures of previous residents was still visible. Close to the southern boundary of the pit extension, the remains of a number of structures were found that appear to either be part of a large homestead or separate dwellings. A deep open trench is situated just north of these remains.

According to the South African fossil sensitivity map, the proposed Area 8 pit extension falls within an area of very high fossil sensitivity with an overlap into an area of high sensitivity. An area of

very high fossil sensitivity warrants a field assessment to determine the extent of the impact of the proposed extension on sensitive / significant fossils. It is recommended that, at a minimum, a desktop palaeontological assessment is undertaken to determine the extent of impact of the extension on fossils and whether a field assessment is required. This study must be undertaken prior to work starting on the proposed extension.

The desktop palaeontological impact assessment revealed that the Somkhele Mine is situated in the Vryheid Formation, Ecca Group, early to middle Permian in age and has reserves of coal and anthracite. Fossil plants of the Glossopteris flora have been recorded from road and rail cuttings and boreholes. Recent research on the nearby Emakwazini Formation has highlighted the unusual nature of this fossil deposit and so it is of interest to palaeontologists. Any fossil material will be visible and accessible once mining operations commence so it is recommended that a monitoring programme and Fossil Chance Find Protocol are instituted in the EMPr. The mine's responsible person must check shales and mudstones regularly, save a sample of any fossils found and call a palaeontologist to collect and rescue a representative sample.

The heritage resources that could be impacted by the proposed development are:

- Damage to graves and a cemetery;
- Destruction of fossils, and
- Damage or destruction of archaeological sites.

The outcome of the impact assessment was that all the impacts were assessed as having a medium impact and that with the implementation of mitigation measures most of the impacts were reduced to a low impact apart from the impact on fossils. The post-mitigation score for the potential impact on fossils (30) sits on the border between a low impact and medium impact hence it is very close to having a low impact. Similar scores apply to the assessment of cumulative impacts on the heritage resources listed above.

<u>The following is recommended</u>:

- The three graves must be disinterred from the area of the proposed pit extension prior to any work taking place on the project site. If, for some reason, the removal of the graves is delayed, a buffer of 100 m must be placed around the graves in which no activity may take place.
- The proximity of the cemetery to the pit extension is a concern. It is recommended that a buffer of 100 m is maintained between the fencing of the cemetery and the boundary of the pit extension to prevent damage through mining activities. In addition, no blasting may take place within 500 m of the cemetery unless authorised by the relevant government departments.

- Due to the thick vegetation cover, low lying heritage resources such as archaeological sites could not be identified during the site investigation. It is recommended that when the vegetation is cleared from the project footprint, a qualified archaeologist is on site to identify archaeological sites (if any) and implement mitigation measures where necessary.
- The Chance Find Protocol recommended by the palaeontologist must be added to the EMPr and the mining geologist, environmental officer and other designated personnel must regularly check the shales and mudstones for fossils, rescue them and call a palaeobotanist to collect a sample (with an AMAFA permit) and house them in a recognised local institution for further study. This monitoring process must continue for the life of the mine.

Once the above recommendations and mitigation measures are undertaken, then the extension of the Area 8 pit may proceed from a heritage perspective.

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I, **Jean Lois Beater**, act as an independent specialist for this project and I do not have any vested interest either business, financial, personal or other, in the proposed activity other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.

SPECIALIST DETAILS

Name	Qualification	Professional Registration
Jean Beater	MA (Heritage Studies) MSc (Environmental Management)	Member of Association of South African Professional Archaeologists (No. 349) Member of IAIAsa (No. 1538)

1. INTRODUCTION

Somkhele Anthracite Mine has been a fully operational anthracite mine since 2007 and is operated and owned by Tendele Coal Mining (Pty) Ltd. Somkhele Anthracite Mine intends to extend its existing Luhlanga (also referred to as Area 8) opencast pit by approximately 18 ha. The proposed extension includes an increase in the footprint of the waste rock dump to 50 Ha.

This report serves as the Phase 1 Heritage Impact Assessment (HIA) for the proposed Area 8 pit extension.

2. LEGISLATIVE BACKGROUND

The site of the proposed Area 8 opencast pit is 68 Ha (680000 m²) in size hence it triggers section 38 (1) (c)(i) of the National Heritage Resources Act (NHRA), 1999 (Act No 25 of 1999), which refers to (c) any development or other activity which will change the character of a site — (i) exceeding 5 000 m² in extent. Section 38 of the NHRA list those developments or activities which may require an HIA.

In addition, the proposed pit extension may impact on graves, structures, archaeological and palaeontological resources that are protected in terms of sections 33, 34, 35, and 36 of the KwaZulu-Natal Heritage Act (KZNHA) (No. 4 of 2008) as well as sections 34, 35, and 36 of the National Heritage Resources Act (NHRA).

In terms of section 3 of the NHRA, heritage resources are:

(a) places, buildings, structures and equipment of cultural significance;
(b) places to which oral traditions are attached or which are associated with living heritage;
(c) historical settlements and townscapes;
(d) landscapes and natural features of cultural significance;
(e) geological sites of scientific or cultural importance;
(f) archaeological and paleontological sites;
(g) graves and burial grounds, including—
    (i) ancestral graves;
    (ii) royal graves and graves of traditional leaders;
    (iii) graves of victims of conflict;
    (iv) graves of individuals designated by the Minister by notice in the *Gazette*;
    (v) historical graves and cemeteries; and

(vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

(h) of significance relating to the history of slavery in South Africa;

(i) movable objects, including:

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

(ii) objects to which oral traditions are attached or which are associated with living heritage;

(iii) ethnographic art and objects;

(iv) military objects;

(v) objects of decorative or fine art;

(vi) objects of scientific or technological interest; and

(vii) books, records, documents, photographic positives and negatives, graphic, film or video material 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).

The Phase I HIA was undertaken to assess whether any heritage resources will be impacted by the proposed Area 8 pit extension at Somkhele Mine.

3. LOCATION

Somkhele Anthracite Mine is located approximately 16 km west of Mtubatuba in KwaZulu-Natal and approximately 10 km south-east of the Hluhluwe Imfolozi Game Reserve. The mine falls within Reserve No. 3 (Somkhele 15822) of the Mtubatuba administrative district. The approximate midpoint of the proposed pit extension is at S28º19'14.43"; E32º04' 42.63" (see **Figures 1** and **2** below). **Figure 3** shows the layout of the pit extension.

Figure 1: View of location of Somkhele Mine

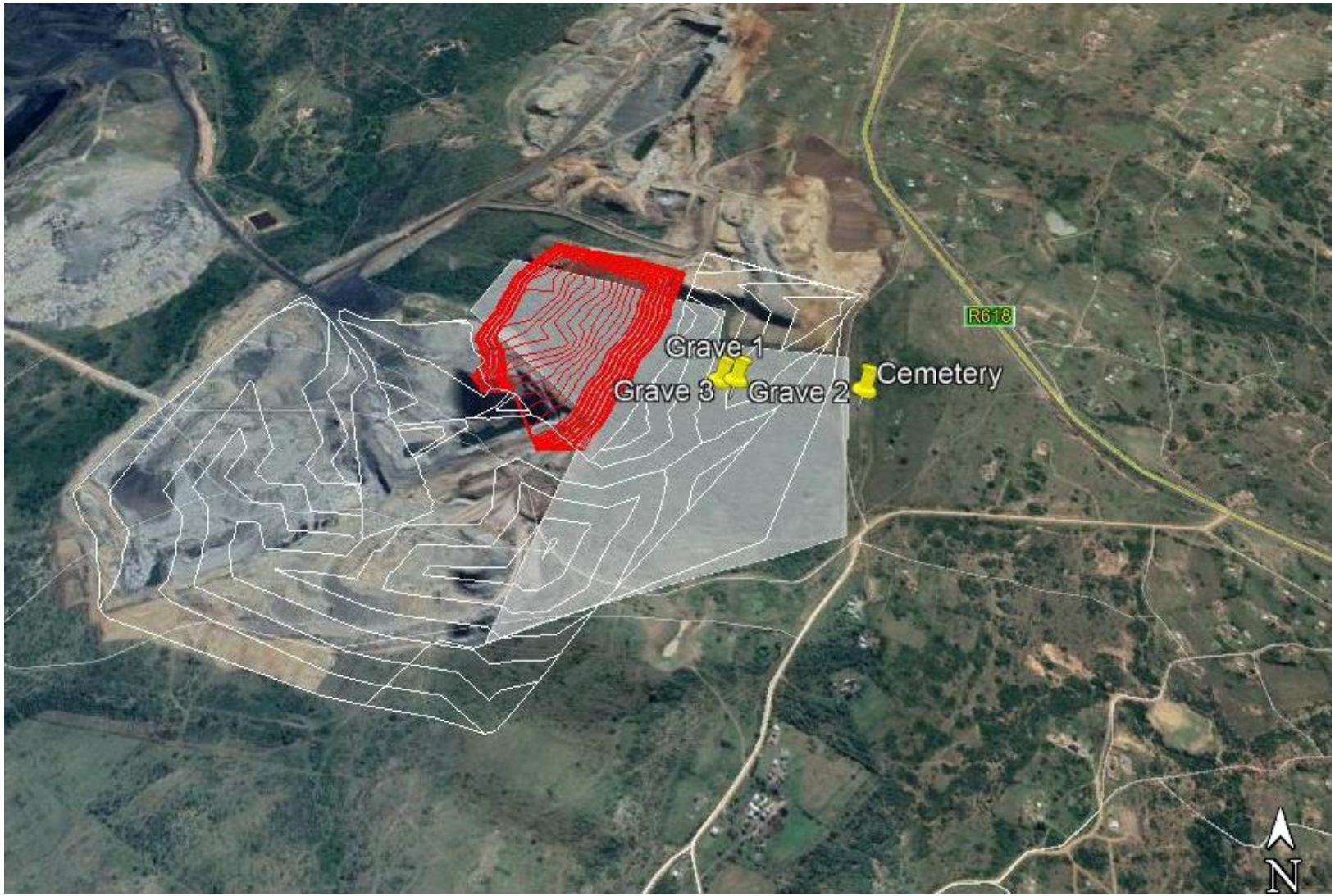


Figure 2: View of Area 8 pit extension shaded in grey with red lines indicating existing pit and white lines the waste rock dump

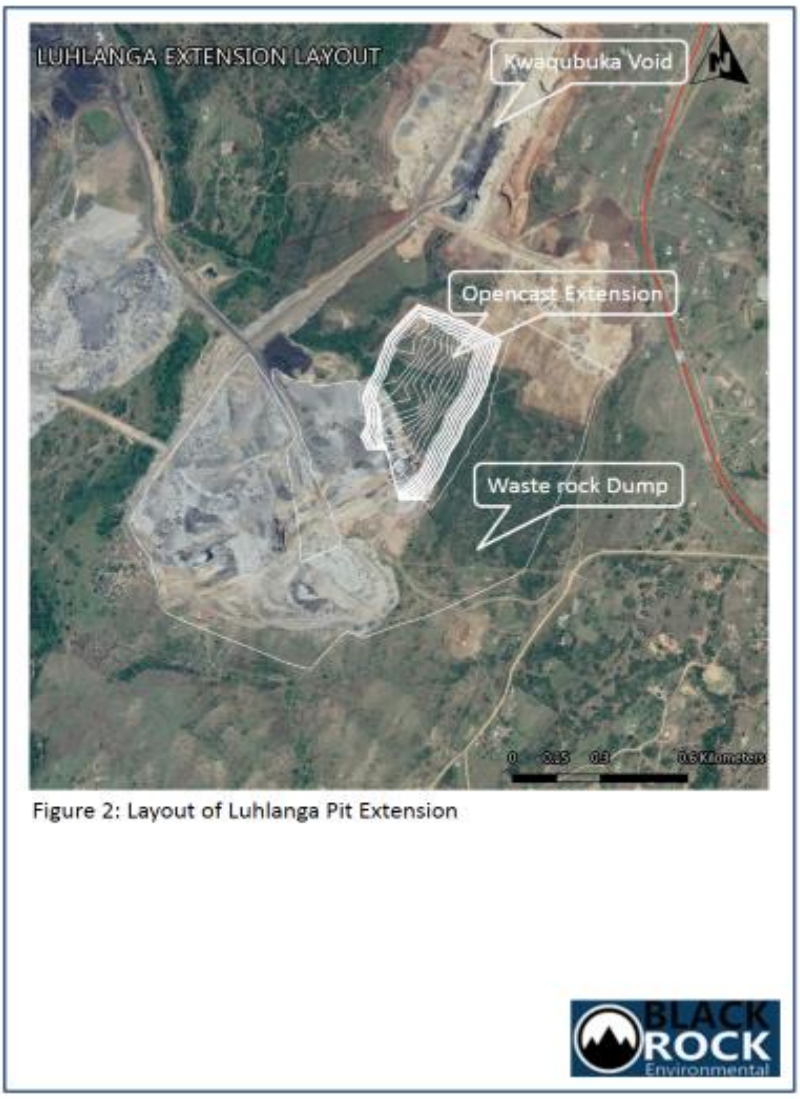


Figure 2: Layout of Luhlanga Pit Extension

Figure 3: Layout of pit extension

4. TERMS OF REFERENCE

Undertake a Phase 1 Heritage Impact Assessment in order to determine the possible existence of heritage resources, as listed above, that could be impacted by the proposed extension. Assess potential impacts and provide mitigation measures to limit or avoid the impact of the proposed project on heritage resources (if any).

Submit the HIA report to the provincial heritage resources authority, Amafa aKwaZulu-Natali (Amafa), for their statutory assessment and comment.

5. METHODOLOGY AND CONSTRAINTS

A survey of literature, including other heritage impact assessment reports completed for the larger area, was undertaken in order to ascertain the history of the area and what type of heritage resources have or may be found in the area of development.

An inspection of the project site was undertaken on 14 November 2018. The specialist was accompanied to site by the Tendele Coal Mining's environmental officer and the EAP. The area of the pit extension is heavily overgrown with vegetation making areas inaccessible and the identification of low-lying heritage resources such as archaeological remains very difficult. However, people and animals have created paths through the bush which allowed some access to the site.

As required by the EAP, the following methodology was used when assessing identified impacts in terms of heritage resources:

5.1 Impact Assessment Methodology

Each impact identified was assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value was linked to each rating scale.

The following criteria was applied:

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?); and
- Duration of occurrence (how long the impact may last).

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?).

The following ranking scales were used:

Probability:=P

5 – Definite/don't know; 4 – Highly probable; 3 – Medium probability 2 – Low probability; 1 – Improbable; 0 – None

Scale:=S

5 – International; 4 – National; 3 – Regional; ;2 – Local; 1 – Site only 0 – None

Status of Impact

+: Positive

-: Negative N: Neutral

Duration:=D

5 – Permanent; 4 - Long-term (ceases with the operational life); 3 - Medium-term (5-15 years); 2 - Short-term (0-5 years); 1 – Immediate

Magnitude:=M

10 - Very high/don't know; 8 – High; 6 – Moderate; 4 – Low; 2 – Minor

The following formula was applied to calculate the impact significance after the factors were ranked for each impact: SP = (magnitude + duration + scale) x probability. In addition, the status of the impact is positive, negative or neutral (no impact).

Table 1:Impact Significance Ratings

SIGNIFICANCE	ENVIRONMENTAL SIGNIFICANCE	COLOUR CODE
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60 (max = 100)	H

6. HISTORICAL BACKGROUND OF PROJECT AND SURROUNDING AREA

The larger surrounding area has been sporadically surveyed for archaeological sites with the most systematic surveys having occurred in the Hluhluwe Imfolozi Game Reserve which is situated close to the proposed development. Fifty nine Middle Stone Age (MSA) sites have been recorded in the nature reserve. MSA sites are associated with anatomically modern people and date back to approximately 40 000 to 200 000 years ago. The vast majority of MSA sites in the game reserve

are open-air sites and do not occur in archaeological context and have limited excavation value. Thirty Five Later Stone Age (LSA) sites occur in various localities in the game reserve. The Later Stone Age is usually associated with San hunter-gatherers or their immediate predecessors and dates back to between 200 years and 30 000 years ago. The game reserve also contains some Zululand rock art sites (Prins 2014:2-3).

The earliest agricultural sites in KwaZulu-Natal date to between AD 400 and 550. All are situated close to sources of iron ore, and within 15 km of the coast. Current evidence suggests it may have been too dry further inland at this time for successful cultivation. From 650 onwards, however, climatic conditions improved and agriculturists expanded into the valleys of KwaZulu-Natal, where they settled close to rivers in savanna or bushveld environments. Several iron age furnaces occur in the Hluhluwe Imfolozi Game Reserve (Mitchell 2002:356).

This way of life came to an end around AD 1000 when preferred village locations of the last four centuries were abandoned in favour of sites along the coastal littoral. In general, sites dating to between 1050 and 1250 were found to be smaller than most earlier agriculturist settlements. It seems likely that this new pattern of settlement was in some way influenced by a changing climate, for there is evidence of increasing aridity from about AD 900. This new pattern of economic inter-dependence continued into the colonial period nearly 500 years later (eThembeni Cultural Heritage 2014:20)

In 1887, Zululand became a British colony but the British style of administration, according to Laband and Thompson (1989:216-218) was viewed by many uSuthu as an attack on their traditional customs which eventually erupted into open revolt in 1888. Various conflicts took place between the British and the supporters of King Dinizulu including one where, in the Lower Umfolozi District, Chief Somkhele kaMalanda of the Mphukonyoni launched an attack on the magistrate's fort which was repulsed.

According to Bulpin (1986:446), in 1903 the North Coast railway line from Durban was opened to the coal mine known as Somkhele after the local chief. A siding on the line, just north of the Mfolozi River was named Mtubatuba, after Somkhele's son and heir. Mtubatuba is now a town on the KZN north coast.

7. RESULT OF SITE INSPECTION

The area on which the pit extension is proposed was previously inhabited. In 2016, Somkhele Mine engaged with people living on the land and negotiated that all those in the area of proposed extension be relocated. This included graves that were found on the project site. According to the environmental officer of Tendele Coal Mining, all the graves (apart from three graves) have been disinterred from the project area. The removal of the three graves has been approved by the affected family and it is the understanding of the specialist that the disinterment will take place in the near future.

The specialist was taken to one of the three graves left on site. The grave is made from packed rock (see **Figure 4** below) and is situated at S28º19'10.38"; E32º04' 43.80". The other two graves are situated in close proximity to the first grave at S28º19'10.41"; E32º04' 44.99" and S28º19'10.30"; E32º04' 44.95" respectively.

Figure 4: Grave made from packed rock

The graves found on the project area were either moved to private locations or were moved to a cemetery which is situated very close to the northern boundary of the proposed pit extension with

the centre of the cemetery at S28º19'12.19"; E32º04' 54.28". There could be close to a 100 graves in this cemetery (see **Figure 5** below).

Figure 5: Fenced cemetery with some of the graves

The remains of a number of structures that had been demolished by the mine after the relocation of residents were found about 40 m north east of the aforementioned graves (see **Figures 6** and **7** below).

Figure 6: Remains of traditional circular structure

Figure 7: Remains of structures

Close to the southern boundary of the pit extension, the remains of a number of structures were found that appear to be part of a large homestead. Information regarding these remains was requested from the Mine. The information relayed to the specialist from the Mine was that there were two graves at the homestead in question, which were relocated to the cemetery in Area 8 i.e. Luhlanga cemetery. A deep trench is situated just north of these remains. It is unclear for what reason the trench was dug. The trench is clearly visible on **Figure 12** which shows the heritage resources in the project area as well as those in close proximity to the project area.

Figure 8: Remains of cement structure

Figure 9: Remains of circular structure

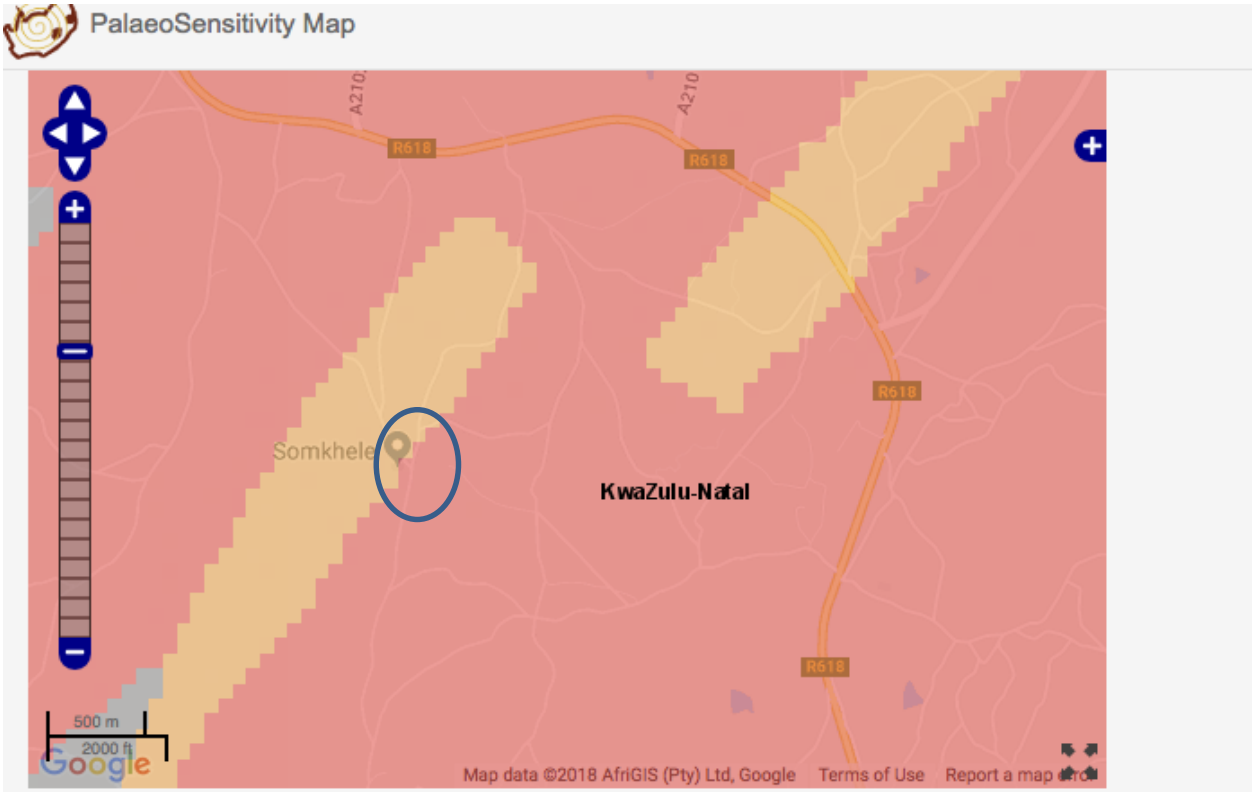
Figure 10: Remains of a structure

Figure 11: Heritage sites

No further heritage sites were found during the site inspection. As stated previously, soil surface visibility was not good due to the thick vegetation and heritage resources, such as archaeological sites, may be present below the surface or in areas of dense vegetation. The vegetation cover, which included sickle bush, was dense through-out most of the project area as can be seen in **Figure 13** below.

Figure 12: Dense vegetation on site

According to the South African fossil sensitivity map, the proposed Area 8 pit extension falls within an area of very high fossil sensitivity as indicated by the red colour in **Figure 14** below with an overlap into an area of high sensitivity (orange colour in the figure below). As indicated in the Legend of **Figure 14**, a very high fossil sensitivity warrants a field assessment to determine the extent of the impact of the proposed extension on sensitive / significant fossils. It is recommended that, at a minimum, a desktop palaeontological impact assessment (PIA) is undertaken to determine the extent of impact and whether a field assessment is required. This study must be undertaken prior to work starting on the proposed extension.



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

Figure 13: Fossil sensitivity with mine outlined in blue

The desktop PIA revealed that the Somkhele Mine is situated in the Vryheid Formation, Ecca Group, early to middle Permian in age and has reserves of coal and anthracite. Fossil plants of the Glossopteris flora have been recorded from road and rail cuttings and boreholes. Recent research on the nearby Emakwazini Formation has highlighted the unusual nature of this fossil

deposit and so it is of interest to palaeontologists. Any fossil material will be visible and accessible once mining operations commence so it is recommended that a monitoring programme and Fossil Chance Find Protocol are instituted in the EMPr. The mine's responsible person must check shales and mudstones (usually designated for a dump) regularly, save a sample of any fossils found and call a palaeontologist to collect and rescue a representative sample.

8. ASSESSMENT OF IMPACTS

The potential impacts of the proposed pit extension on heritage resources was assessed as per the methodology as described in Chapter 5 of this report. The heritage resources that could be impacted by the proposed development are:

- Damage to graves and a cemetery;
- Destruction of fossils and fossil material, and
- Damage or destruction of archaeological sites.

The impact assessment matrix spreadsheet is attached to this report as **Appendix 1**. The outcome of the assessment was that all the impacts were assessed as having a medium impact that with the implementation of mitigation measures most of the impacts were reduced to a low impact apart from the impact on fossils. The post-mitigation score for the potential impact on fossils (30) sits on the border between a low impact and medium impact hence close to having a low impact. Similar scores apply to the assessment of cumulative impacts on the heritage resources listed above.

9. RECOMMENDATIONS

The three graves should be disinterred from the area of the proposed pit extension prior to any work taking place on the project site. If, for some reason, the removal of the graves is delayed, a buffer of 100 m must be placed around the graves in which no activity may take place. This buffer must be highly visible to workers and vehicles so that the graves are not damaged in way.

The proximity of the cemetery (to which some of the graves from the project site were moved) to the site of the pit extension is a concern. It is recommended that a buffer of 100 m is kept between the fencing of the cemetery and the boundary of the pit extension to prevent any damage to the graves through mining operations. In addition, no blasting activities may take place within 500 m of the cemetery unless permission has been granted to the Mine for this to take place by the relevant government departments.

Due to the thick vegetation cover, low lying heritage resources such as archaeological sites could not be identified during the site investigation. Therefore, it is recommended that when the vegetation is cleared from the project footprint, a qualified archaeologist is on site to identify archaeological sites (if any) and implement mitigation measures where necessary. These implementation measures could include securing sites to prevent damage to them, applying to Amafa for the necessary permits for the recording and preservation of the sites or the recording and destruction of sites depending on the significance of the finds. Archaeological sites are protected by section 36 (1) of the KZNHA which states that no person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without prior written approval of the Amafa Council having been obtained on application to the Council.

The impact on palaeontology during construction will, post-mitigation, be a medium impact as it appears from the fossil sensitivity map, that significant fossils finds could be impacted by the pit extension. The assessment undertaken in the PIA indicated that there was a moderate to high chance that fossils from the Vryheid Formation may be disturbed by the proposed development hence the inclusion of a Fossil Chance Find Protocol in the PIA report.

10. CONCLUSION

The proposed pit extension may impact on archaeological sites hence the recommendation that an archaeologist is on site when the area is cleared of vegetation which is currently inhibiting the identification of such sites. In addition, due to the very high fossil sensitivity of the development area, the project may proceed only once the desktop palaeontological assessment has been undertaken and the recommendations from the desktop study implemented.

Once the above recommendations and mitigation measures are undertaken, then the extension of the Area 8 pit may proceed from a heritage perspective.

11. ADDITIONAL MITIGATION MEASURES

- Construction and operational workers should be made aware of the types of heritage resources, such as archaeological sites, that could be found during the development of the pit. The process in terms of chance finds as mentioned in the second bullet point below must then be followed.

- For any chance heritage finds (graves, archaeological sites, etc.), all work must cease in the area affected and the Contractor must immediately inform the Project Manager. A registered heritage specialist must be called to site to inspect the finding/s. The relevant heritage resource agency (Amafa) must be informed about the finding/s.
- The environmental officer and all other persons responsible for site management should be aware that indicators of sub-surface sites could include:
    - Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate);
    - Bone concentrations, either animal or human;
    - Ceramic fragments, including potsherds; and
    - Stone concentrations that appear to be formally arranged (may indicate the presence of an underlying burial, or represent building/structural remains).
- The heritage specialist will assess the significance of the resource and provide guidance on the way forward.
- Permits must be obtained from Amafa if heritage resources are to be removed, destroyed or altered.
- Under no circumstances may any heritage material be destroyed or removed from site unless under direction of a heritage specialist.
- Should any recent remains be found on site that could potentially be human remains, the South African Police Service as well as Amafa must be contacted. No SAPS official may remove remains (recent or not) until the correct permit/s have been obtained.
- The Chance Find Protocol recommended by the palaeontologist must be added to the EMPr and the mining geologist, environmental officer and other designated personnel must regularly check the shales and mudstones for fossils, rescue them and call a palaeobotanist to collect a sample (with an AMAFA permit) and house them in a recognised local institution for further study. This monitoring process must continue for the life of the mine.

12. REFERENCES

Bulpin, T.V. 1986. *Discovering Southern Africa*. Muizenberg: Treasury of Travel

Laband, J. and Thompson, P. 1989. In Duminy, A and Guest, B. (Eds). *Natal and Zululand from earliest times to 1910. A new history*. Pietermaritzburg: University of Natal Press and Shuter & Shooter

eThembeni Cultural Heritage. 2013. *Phase 1 Heritage Impact Assessment Report for the Proposed Somkhele Anthracite Mine Northern Expansion, Mtubatuba Local Municipality, Umkhanyakude District, KwaZulu-Natal*. Unpublished report

Mitchell, P. 2002. *The archaeology of Southern Africa*. Cambridge: Cambridge University Press

PGS Heritage (Pty) Ltd. 2017. *Heritage Management Plan – for the Somkhele Colliery Operations of Tendele Coal Mining (Pty) Ltd, around Somkhele, Umkhanyakude District, KwaZulu-Natal*. Unpublished report

Prins, F. 2014. *Heritage Impact Assessment of the proposed Ward 15 Phenyane to Obazweni gravel road, Nongoma Municipality, Northern KwaZulu-Natal*. Unpublished report

APPENDIX 1

IMPACT ASSESSMENT MATRIX

Status of Impact	
+: Positive (A benefit to the receiving environment)	
N: Neutral (No cost or benefit to the receiving environment)	
-: Negative (A cost to the receiving environment)	
Magnitude:=M	***Duration:=D***
10: Very high/don't know	5: Permanent
8: High	4: Long-term (ceases with the operational life)
6: Moderate	3: Medium-term (5-15 years)
4: Low	2: Short-term (0-5 years)
2: Minor	1: Immediate
0: Not applicable/none/negligible	0: Not applicable/none/negligible
Scale:=S	***Probability:=P***
5: International	5: Definite/don't know
4: National	4: Highly probable
3: Regional	3: Medium probability
2: Local	2: Low probability
1: Site only	1: Improbable
0: Not applicable/none/negligible	0: Not applicable/none/negligible

The maximum value that can be achieved is 100 Significance Points (SP).
Environmental effects were rated as follows:

Significance	***Environmental Significance Points***	***Colour Code***
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

POTENTIAL ENVIRONMENTAL IMPACT	APPLICABLE AREA	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	PHASE	PERSON	ANNUAL MANAGEMENT COST
			M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
IMPLEMENTATION PHASE																					
Damage, alteration or destruction of graves within project area and cemetery on boundary of project area	Area 8 pit extension	**Footprint clearance, topsoil stripping, establishment of infrastructure**	8	4	3	4	60	-	M	Demarcate footprint area clearly; Minimise site clearance to the footprint area only; Ensure that 3 graves within project area have been disinterred prior to any work taking place on project area; A buffer of 30 m must be established between the cemetery and the footprint of the pit extension; Adhere to all recommendations made by Amafa aKwaZulu-Natali as well as mitigation measures provided in Phase 1 HIA report	6	4	2	2	24	-	L	Adhere to Mining Work Programme Adhere to Construction Plan	Construction	Environmental Officer	Included in construction costs
Damage, alteration or destruction of fossils	Area 8 pit extension	**Footprint clearance, topsoil stripping, establishment of infrastructure**	8	5	2	3	45	-	M	Undertake a desktop palaeontological study to determine the extent of impact of the extension on fossils; Implement all recommendations and mitigation measures provided by the study	6	2	2	3	30	-	M	Adhere to Mining Work Programme Adhere to Construction Plan	Construction	Environmental Officer	
Damage, alteration or destruction of archaeological sites	Area 8 pit extension	**Footprint clearance, topsoil stripping, establishment of infrastructure**	8	2	2	5	60	-	M	A suitably qualified archaeologist / heritage practitioner must be present at the time of footprint / vegetation clearance of the site to identify archaeological sites and implement mitigation measures	4	2	2	3	24	-	L	Adhere to Mining Work Programme Adhere to Construction Plan			
							0	-	L							-	L				
							0	-	L							-	L				
							0	-	L						0	-	L				
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POTENTIAL ENVIRONMENTAL IMPACT	APPLICABLE AREA	ACTIVITY	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION							RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							ACTION PLAN	PHASE	PERSON	ANNUAL MANAGEMENT COST
			M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
IMPLEMENTATION PHASE																					
Damage, alteration or destruction of graves within project area and cemetery on boundary of project area	Area 8 pit extension	**Local mining**	6	4	2	3	36	-	M	Minimise the stripping footprint as far as possible. Ensure that on-site graves exhumed prior to construction work Respect recommended buffer between cemetery and pit extension	4	4	2	2	20	-	L	Adhere to recommended mitigation measures	All Phases	N/A	N/A
Damage, alteration or destruction of fossils	Area 8 pit extension	**Local mining**	6	5	2	3	39	-	M	Implement recommendations and mitigation measures provided by desktop palaeontological assessment	4	5	2	3	33	-	M	Adhere to recommended mitigation measures	All Phases	N/A	N/A
Damage, alteration or destruction of archaeological sites	Area 8 pit extension	**Local mining**	6	5	2	3	39	-	M	Implementation of mitigation measures recommended by archaeologist / heritage practitioner	4	5	2	2	22	-	L	Adhere to recommended mitigation measures	All Phases	N/A	N/A
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POST CLOSURE																					
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