PROGRESS REPORT	
Project Name:	Heritage Resources Management Process for the Exxaro Matla Coal Mining Right Area
Project Number:	EXX4731
Date:	August 2017

1 Introduction

Exxaro Coal Mpumalanga (Pty) Ltd (hereinafter Exxaro) appointed Digby Wells Environmental (hereinafter Digby Wells) to develop a Heritage Site Management Plan (HSMP) for the identified grave of Helena Booyens within Matla Mine 2 operational area ("*the heritage site*"). The objective of the HSMP was to define management and mitigation measures for the *in situ* conservation of the heritage site. Subsequently, Exxaro required Digby Wells to complete a Watching Brief (i.e. heritage monitoring) of rehabilitation activities in proximity to the heritage site.

This report serves as an addendum to the required progress reporting as encapsulated in the Exxaro Matla Coal: Grave Management Plan for Matla Mine 2 to report on the outcomes of the Watching Brief.

1.1 Project background

The heritage site is situated on the farm Rietvlei 62 IS Portion 3 within the Emalahleni Local Municipality (ELM), Mpumalanga Province. It is underlain by coal seam 2 and 4, within proximity to the Panel 20 undermining area. Refer to Figure 1-1 for graphical representation of the location of the heritage site in relation to the Panel 20 undermining area.

Subsequent to the development and implementation of the HSMP, Exxaro undertook short wall mining activities at Panel 20 that resulted in the total extraction of coal seam 2 and consequently subsidence at surface levels within proximity to the heritage site. To this effect, a site inspection by heritage specialist Justin du Piesanie and representatives of the South African Heritage Resources Agency (SAHRA) Burial Grounds and Graves (BGG) Unit was undertaken on 30 May and 1 June 2017 respectively.

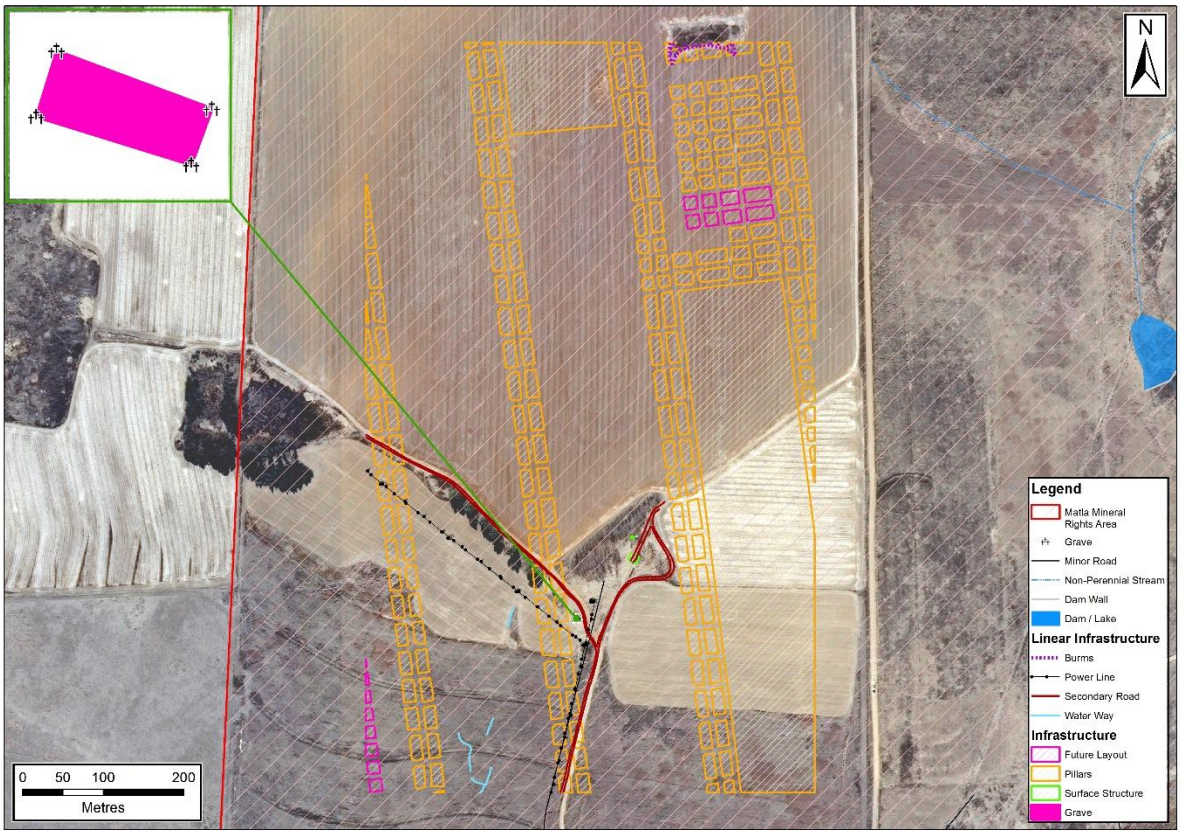

Figure 1-1: Heritage site location in relation to Panel 20 undermining area

1.2 Project description

Subsidence is defined as a shallow enclosed depression occurring over a span of time (Kleinhans & Van Rooy, 2016). With respect to mining, subsidence occurs as undermining advances where the back areas collapses, material fills the voids created. The collapse commonly continues until the resistance to compaction of the collapse material equals the weight of the overlying material. This may take up to six weeks for 90% of the total subsidence to occur. In cases where double seam mining has been undertaken, such as at Panel 20, the collapse is approximately 80% of the mining height, i.e. for every one meter (m) in height, there is a 0.8 m subsidence (Tanner, 2007).

One of the surface impacts from subsidence is the development of surface cracking at zones of expansion and contraction. This potential surface impact was highlighted within the developed HSMP, and monitoring objectives and requirements to manage surface cracking were defined. These included the following:

Table 1-1: Heritage site monitoring

Environmental aspect	Area / process / activity	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Heritage – Heritage Site	Coal Seam 2 Panel 20 Short Wall mining activities	Environmental Rehabilitation Superintendent / Chief Surveyor	Weekly	Proactively	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.
		Archaeologist	Monthly during mining activities		• Visually assess the status quo; • Review monitoring results against baseline conditions.
Heritage – Heritage Site	Coal Seam 2 Panel 20 Short Wall mining activities	Environmental Rehabilitation Superintendent	Weekly	Reactively	• If risks are manifested: 1. Cease all works immediately; 2. Report incident to the SHE Manager; 3. Contact an archaeologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the NHRA, NHRA Regulations and SAHRA Minimum Standards. • Only recommence operations once impacts have been mitigated.

Subsidence occurred along Panel 20 resulting in the manifestation of surface cracking in proximity to the heritage site. As a result, reactive management measures as detailed in Table 1-1 were employed. Commensurate to the conditions of the HSMP and recommendations made by the heritage specialist, the SAHRA BGG Unit required Exxaro to mitigate the resultant cracks to promote the *in situ* conservation of the heritage site. As a result, Exxaro appointed a qualified and accredited archaeologist to complete a Watching Brief during rehabilitation activities.

1.3 Expertise of the specialist

The expertise of the heritage specialists are summarised in the table below:

Table 1-2: Expertise of the specialists

Team Member	Bio Sketch
Justin du Piesanie ASAPA Member 270 AMAFA Registered ICOMOS Member 14274 Years' Experience: 11	**Justin du Piesanie completed the on-site Watching Brief and compiled the progress report**. Justin is the HRM Manager at Digby Wells. Justin joined the company in August 2011 as an archaeologist and was subsequently made the HRM manager in the Social and Heritage Services Department. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. He has over 10 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, and NHRA Section 34 application processes. Justin has gained further generalist experience since his appointment at Digby Wells in Botswana, Burkina Faso, the Democratic Republic of Congo, Liberia and Mali on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, Justin has acted as a technical expert reviewer of HRM projects undertaken in Cameroon and Senegal. Justin's current focus at Digby Wells is to develop the HRM process as an integrated discipline following international HRM principles and standards. This approach aims to provide clients with comprehensive, project-specific solutions that promote ethical heritage management and assist in achieving strategic objectives.

1.4 Works cited

Kleinhans, I., & Van Rooy, J. L. (2016). *Guidelines for Sinkholes and Subsidence based on Generic Geological Models of a Dolomite Environment on the East Rand, South Africa.* University of Pretoria: Unpublished Report.

Tanner, P. (2007). *Guidelines for the Rehabilitation of Mined Land.* Chamber of Mines South Africa: Unpublished Report.

2 Methodology

Remediation of surface cracking can comprise the following techniques:

- Landform re-creation (*soils shaping*);
- Agricultural deep ripping of small, shallow cracks;
- Ripping of soils by dozer or backacter; and
- Infilling of large cracks with inert material that is permeable to prevent the formation of sinkholes.

In this instance, rehabilitation comprised a combination of the aforementioned techniques under the supervision of a qualified and accredited archaeologist and the Environmental Rehabilitation Superintendent on 8 and 11 August 2017.

Landform re-creation was undertaken to approximately 30 m distance from the heritage site. Remediation of surface cracking within proximity to the heritage sites included:

- Soil ripping with the use of a Caterpillar DZR-15 Crawler Dozer outside a 5 m buffer of the heritage site;
- Soil ripping with the use of a Caterpillar Backhoe Loader (TLB) within a 5 m buffer of the heritage site; and
- Agricultural deep ripping of small, shallow cracks directly adjacent to the heritage site.

The area subjected to soil ripping via the Dozer underwent a final process of soils shaping to create the “desired” topography that would reinforce and support the elevated heritage site, and reduce the likelihood of erosion over time. The smaller, shallower cracks subject to remediation via the TLB and manual labour was infilled with a combination of soils and concrete pebbles to promote stabilisation of the soil and reduce further collapse over time. Once sufficiently infilled, the rehabilitated cracks were compacted as far as possible.

3 Observations

Rehabilitation activities avoided any physical damage to the surface dressing of the heritage site. No mortal remains were exposed through the exposure of the sub-surface during remediation of the surface cracks. The heritage site was conserved *in situ*.

Photographic evidence of the remediation activities associated with the rehabilitation of the surface cracking associated with the subsidence of the undermined area is presented below.

Pre-remediation

Dozer

TLB

Manual

Figure 3-1: Photographs of various remediation activities

4 Conclusion and Recommendations

Exxaro enlisted the services of Digby Wells to complete a Watching Brief during rehabilitation of surface crack in proximity to the identified heritage site. The Watching Brief was completed to comply with:

- The national legislative framework with specific consideration of the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- The directive of the SAHRA BGG Unit received on 1 June 2017;
- The management and mitigation measures encapsulated within the HSMP; and
- Best practice standards.

As recorded, no direct impacts to the heritage site manifested from subsidence of Panel 20 and the resultant surface cracking, or the rehabilitation remediation employed on 8 and 11 August 2017.

Monitoring of the heritage site in accordance with Section 5 of the HSMP must be completed. This will comprise the following:

Table 4-1: Heritage site monitoring for post mining

Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Environmental Rehabilitation Superintendent / Chief Surveyor	Monthly – first year Yearly thereafter	Proactively	• Measure levels of subsidence and compare with recorded baseline conditions; • Status quo will be recorded through photographs; • Results will be maintained; and • Results will be reported in the progress reporting.
Archaeologist	Quarterly – first year Yearly thereafter	Proactively	• Visually assess the status quo; • Review monitoring results against baseline conditions.
Environmental Rehabilitation Superintendent	Monthly	Reactively	• If risks are manifested: 1. Report incident to the Sustainability Manager; 2. Contact an archaeologist to inspect the site; 3. Report incident to the competent authority; and 4. Employ reasonable mitigation measures in accordance with the requirements of the NHRA, NHRA Regulations and SAHRA Minimum Standards.

It is recommended that the additional monitoring after the first rains be undertaken in addition to the defined monitoring measures. The additional monitoring is required to gauge the effectiveness of the rehabilitation measures, and where necessary mitigate under the advisement of a qualified and accredited archaeologist to ensure expansion of cracks or erosion is impeded.

Kind Regards,

Justin du Piesanie

Manager: HRM