

**Report on the assessment of potential graves by means of Ground Penetrating Radar (GPR) and archaeological test excavation at the Dwarsrivier Mine, Limpopo Province**

**Type of development:**

Mining

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Project Reference:

Project number 23076

Report date:

July 2023

## APPROVAL PAGE

<b>Project Name</b>	Dwarsrivier Mine: Potential Grave Investigation
<b>Report Title</b>	Report on the assessment of potential graves by means of Ground Penetrating Radar (GPR) and archaeological test excavation at the Dwarsrivier Mine, Limpopo Province
<b>Authority Reference Number</b>	SAHRA PERMIT NUMBER 3966
<b>Report Status</b>	Draft Report
<b>Applicant Name</b>	Dwarsrivier Mine

<b>Responsibility</b>	<b>Name</b>	<b>Qualifications and Certifications</b>	<b>Date</b>
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**DOCUMENT PROGRESS****Distribution List**

Date	Report Reference Number	Document Distribution	Number of Copies
27 July 2023	23076	Envirologistics (Pty) Ltd	Electronic Copy

**Amendments on Document**

Date	Report Reference Number	Description of Amendment

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## Executive Summary

During the Heritage Impact Assessment for the Khulu TSF Facility at the Dwarsrivier Mine (Van der Walt 2021), two features (Feature 1 & Feature 6) were recorded that required further investigation if impacted on. Feature 1 is described as a “*Stone cairn next to a survey beacon, the purpose of the feature is unknown, but the feature is located in a sandy area where stones do not occur naturally and was carried in.*” Feature 6 was described as: “*Square stone packed foundations of a structure measuring approximately 4x4 meters, possibly farm labourer dwelling.*”

The features cannot be preserved *in-situ* within the mine and in line with the recommendations made in the HIA (Van der Walt 2021) and the subsequent comments issued by SAHRA (SAHRA case ID 16879), Beyond Heritage was appointed to investigate Feature 1 to determine whether the stone packed feature represents a grave and to investigate Feature 6 to confirm the lack of subsurface features and potential stillborn burials within the foundations. The features were investigated through a combination of Ground Penetrating Radar (GPR) scans and test excavations conducted under SAHRA permit number 3966.

This document represents a final report on the results of the investigation of both Features. The GPR grid scans that were performed show no anomalies consistent with the presence of graves, and it also does not show any clear indication that an object is buried underground at either site. The test excavations conducted also did not expose a burial pit or indication of a coffin or human remains at Feature 1 or any stratigraphy and cultural material at Feature 6. These areas were not indicated as significant during stakeholder consultation and have historically been disturbed by mining and cultivation activities and is considered of no heritage significance. The investigation was completed successfully, and the project can proceed without further preconstruction activities at these locations based on adherence to the following recommendations.

## Recommendations:

- Implementation of a chance find procedure for the project as outlined in the 2021 HIA.

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## 1 INTRODUCTION

Beyond Heritage was appointed to undertake a Heritage Impact Assessment (Van der Walt 2021) for the Khulu TSF Project located at the Dwarsrivier Mine, Limpopo Province. The report was submitted to SAHRA (Case number 16879) and SAHRA provided final comments on the assessment.

The assessment recorded two features that could potentially be associated with burials (described in the report as Feature 1 and 6) that will be directly impacted on. The following is a short description of the features as per the HIA: Feature 1 is described as a *“Stone cairn next to survey beacon, the purpose of the feature is unknown, but the feature is located in a sandy area where stones do not occur naturally and were carried in and Feature 6 as “Square stone packed foundations of a structure measuring approximately 4x4 meters, possibly farm labourer dwelling.”*

Beyond Heritage was appointed to investigate Feature 1 and 6 (Located respectively at 30°06'29.0132" E; 24°54' 47.7510" S and 30°06' 42.7789" E; 24°54' 56.1167") at Dwarsrivier mine (Figure 1 & 2) to determine whether the stone packed features are associated with burial sites. A GPR Scan and test excavations were conducted on the features during the week of the 29<sup>th</sup> of May 2023. No indication of a grave at Feature 1 or Feature 6 was recorded during the scans and test excavation.

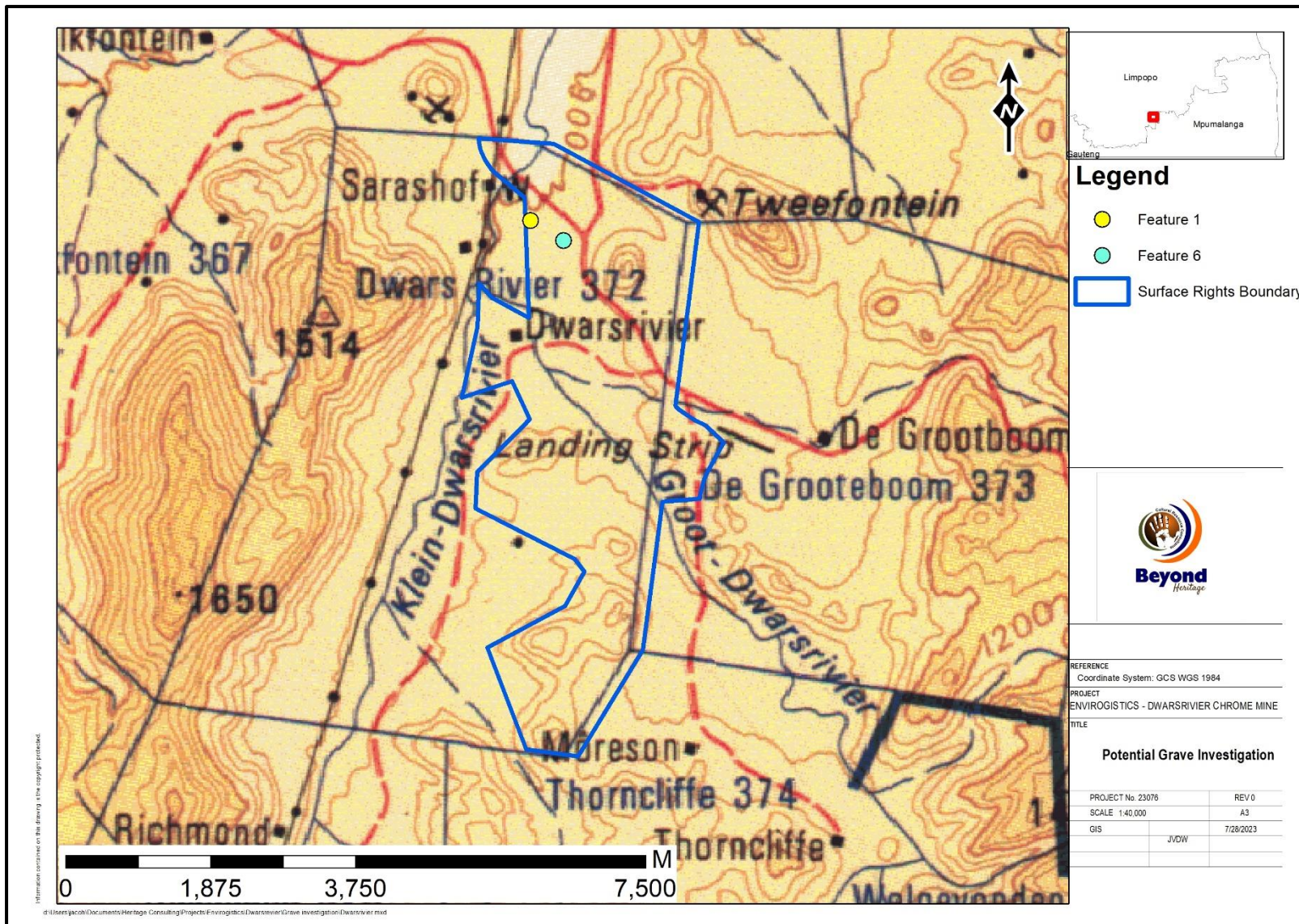


Figure 1.1. Regional setting of the project (1:50 topographical map).



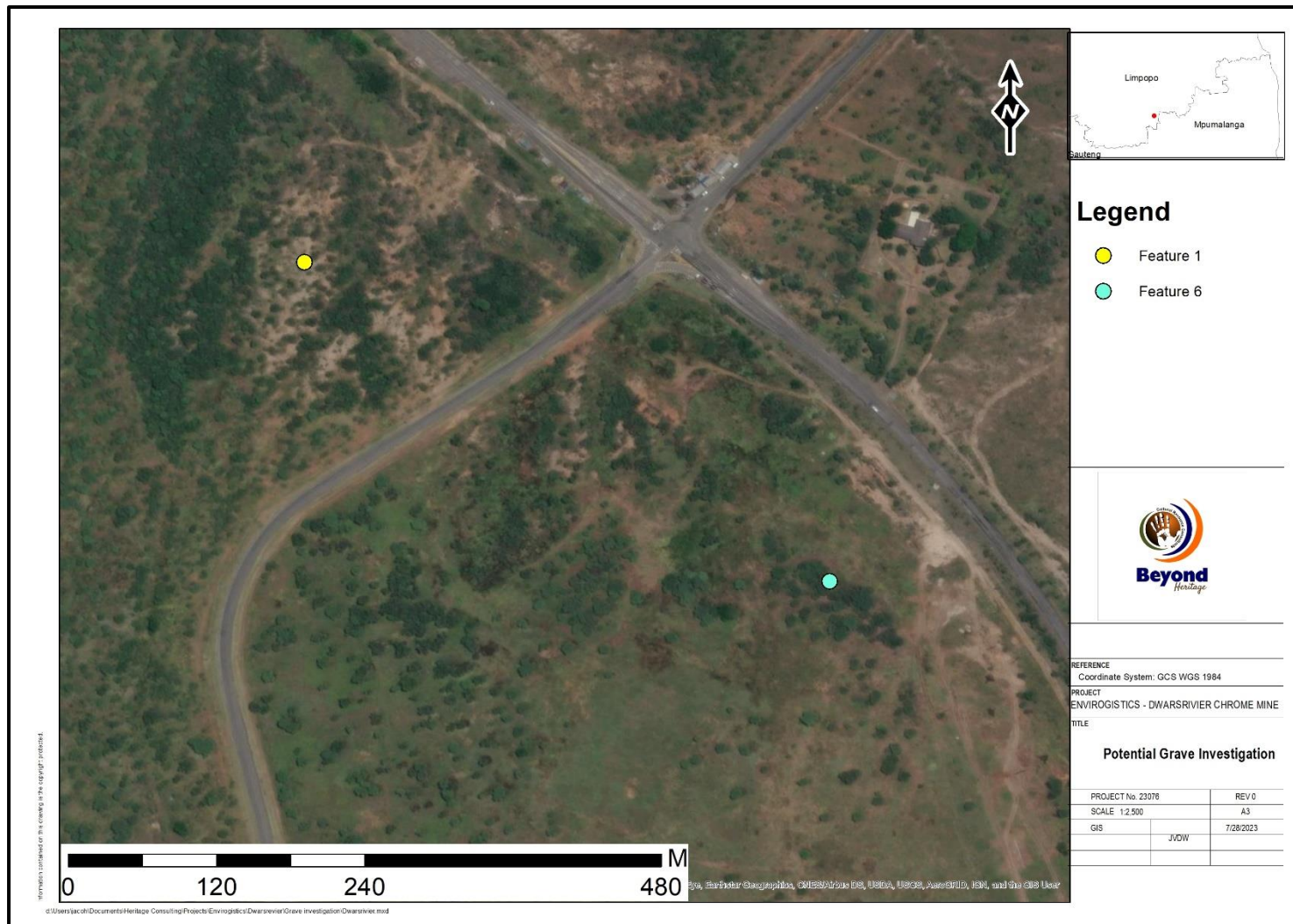


Figure 1.2: Aerial image of the areas investigated.

## 2 METHODOLOGY

The following methodology was employed:

- Documentation of surface features;
- Bush clearing to expose the extent of the features;
- Removal of surface stones to enable GPR machine access;
- GPR scan of the features;
- Test excavations to confirm the results of the GPR scan.

### 2.1 GPR scans

A 2D scan is done by moving the GPR scanner across the surface and scanning the whole area under investigation and doing the analysis of data on site. Once this is done a 3D grid scan is done. The data for the 3D scan is saved and analysed at the office. For this site, two areas of 5m x 5m were scanned. This is done by scanning a grid with each line scanned spaced 500mm apart. This equates to 10 scans in each direction and a total of 20 lines per 3D scan. The scanner uses 2 antennas with the 800mHz antenna scanning 1m deep and the 300mHz antenna scanning 3m deep. The GSSI Radan7 Software is then used to interpolate between each scan and form a 3D image of the scanned area.

Both features were mapped on scale plans of the site and surface features were photographed and recorded. The stones were then removed to enable the GPR scan of potential subsurface disturbances. The results are included in Annexure A (Le Roux 2023).

### 2.2 Test Excavations

Test excavations were conducted by hand with trowels and spades adhering to archaeological excavation and recording techniques as outlined by applicable SAHRA guidelines and standards. The aim of the test excavations at Feature 1 was to remove the topsoil and to verify whether there is a change in the soil matrix that could indicate a burial pit without disturbing possible human remains. Several test excavations were conducted at Feature 6 to determine the presence of subsurface anthropogenic deposit that could be associated with stillborn burials. The surface at both features was cleared of stones and bushes and photographed. All observations regarding construction, materials and characteristics of the surface features were documented. Test pits were marked out, and excavated in arbitrary layers of 5cm.

A burial pit would be demarcated by changes in the soil matrix. This would include a change in soil colour and or texture due to prior disturbance if a pit or other alteration in the stratigraphy occurred. Layers of 10cm were continually removed until sterile soil was reached at a satisfactory depth below the surface level at.

## 3 Results

Extensive mining activities take place within the area and together with previous cultivation have led to large scale disturbance of the areas investigated. Both areas are marked by dense vegetation after the rainy season and have been fallow for a number of years. Feature 1 is situated within an area marked by large scale erosion and is located on a crest between two erosion gullies. Feature 6 is within a dense thicket of trees and overgrown close to an existing powerline and on the border of areas that have been cultivated in the past.

Prior to the grave investigation a stakeholder process was facilitated by Beyond Heritage and a site visit was undertaken by Ms Annlin Matabane (Reach Archaeology) where identified stakeholders were provided the opportunity to indicate burial sites and also other sites of heritage significance during the week of 4 April 2022. No features were indicated at Feature 1 nor at Feature 6.

### 3.1 Archival Maps

Historical topographic maps were consulted to contextualise the study area and based on the 1963 and 1976 maps the areas where Features 1 and 6 are located were historically excavated and later cultivated as recently as 2002 (Figure 3.1, 3.2 and 3.3). It is therefore assumed that it is unlikely that burials would have taken place in these areas that is marked by disruptive activities. This was confirmed by the GPR scans and test excavations and is briefly described in the following sections.

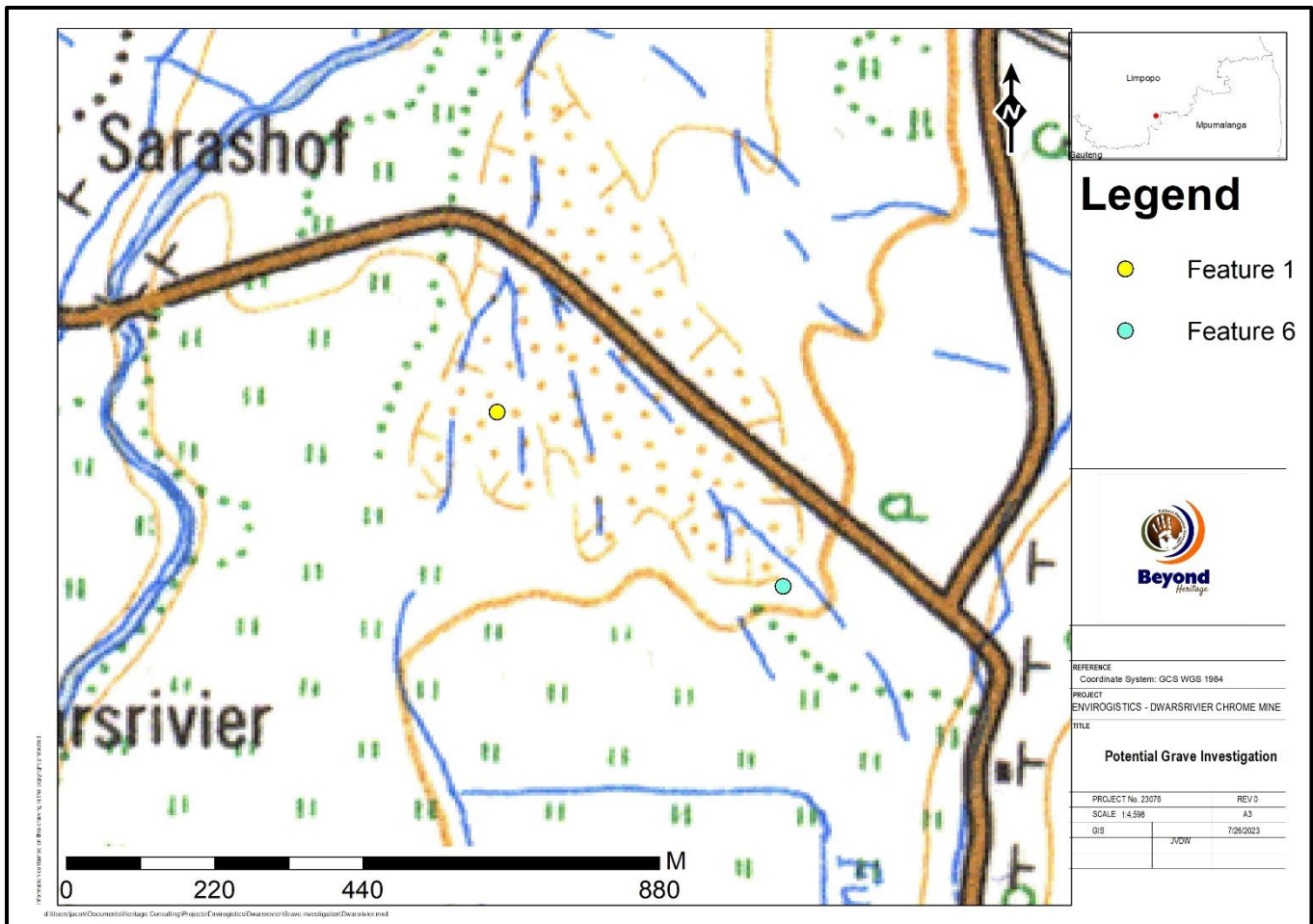


Figure 3.1. Extract of the 1963 1: 50 000 Topographic map of the area indicating excavations and drainage lines in the area where both Features 1 and 6 are located.



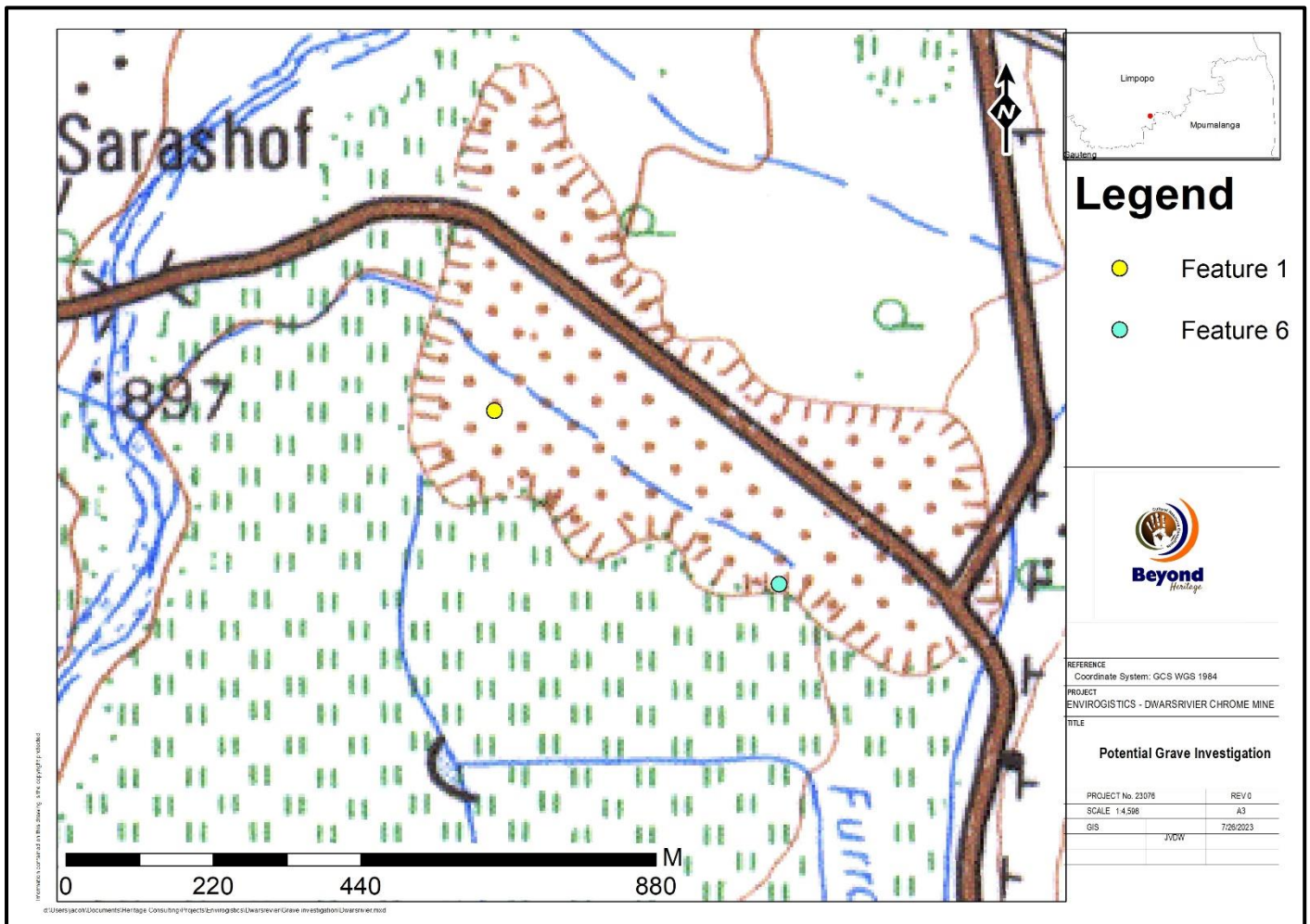


Figure 3.2. Extract of the 1976 1: 50 000 Topographic map of the area indicating extensive excavations in the area where Features 1 and 6 are located and cultivation in the surrounding area.

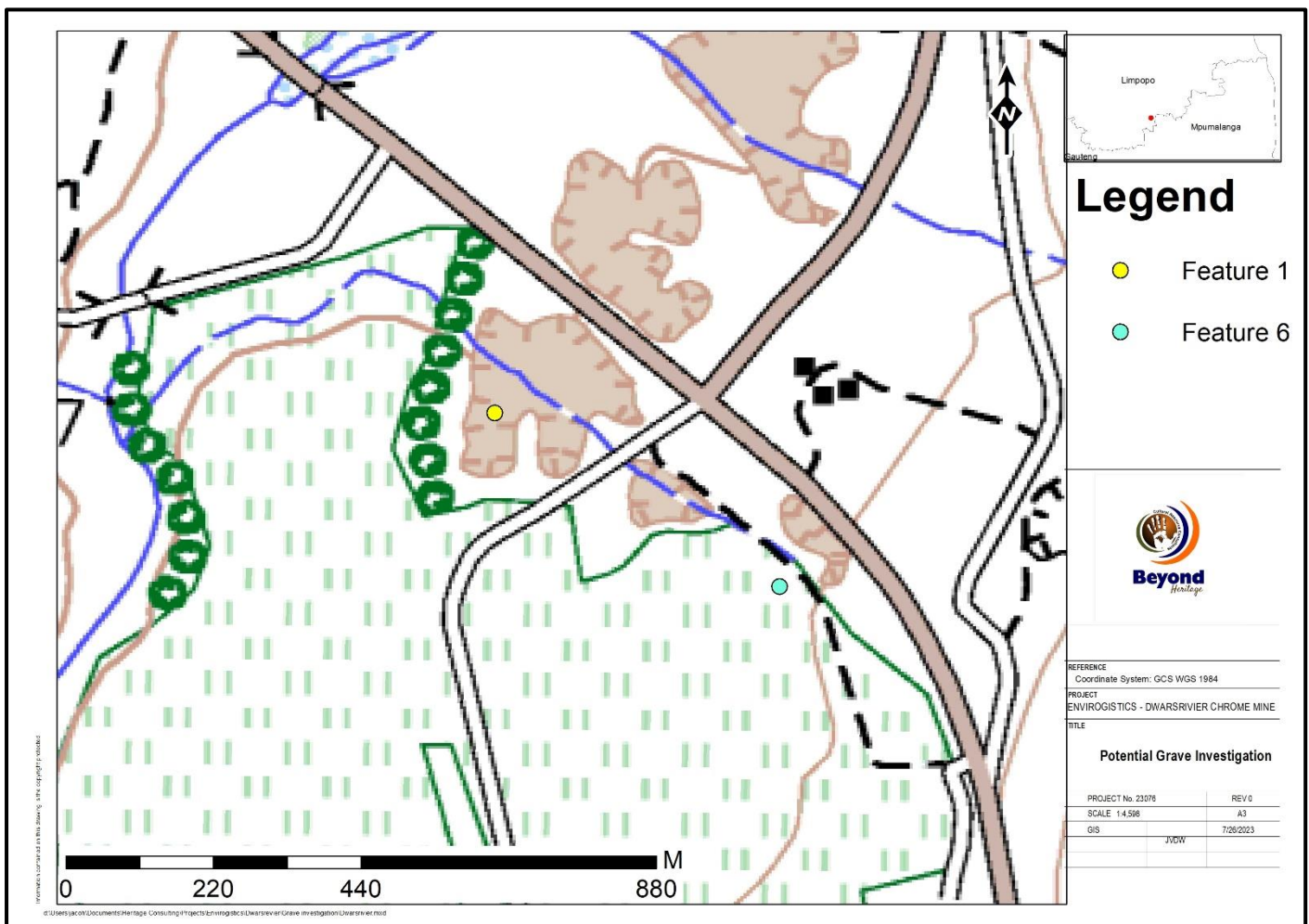


Figure 3.3. Extract of the 2002 1: 50 000 Topographic map indicating Feature 1 in an excavated area and Feature 6 in a cultivated area.

### 3.2 Feature 1

Feature 1 consists of a small cairn of packed stones next to a surveyor beacon marked by a rounded cement marker situated on top of the crest of an erosion gully. The feature was investigated due to a concern that the cairn may possibly be a grave. After the surface features were recorded and the rocks removed there were clear evidence of white paint and or lime on the rocks suggesting that this was part of a marker before the more permanent cement beacon was constructed (e.g., Figure 3.11).

The GPR scan of the feature, described as Scan 2 in the attached GPR report showed no anomalies consistent with a burial (Le Roux 2023) and was confirmed by the test excavation that is described in section 3.2.1.





Figure 3.4. General site conditions surrounding Feature 1- Image showing the small cairn situated on top of an erosion gully with overgrown vegetation surrounding the site.



Figure 3.5. Image showing the Cairn with the small cement marker right next to it. The marker reads TPA 156.





Figure 3.6. Image showing the cement marker.



Figure 3.7. Image showing Feature 1 after the surrounding vegetation had been cleared. The white paint on some of the rocks within the cairn can be seen on this image.





Figure 3.8. General view of Feature 1 without the small stone cairn.



Figure 3.9. Image showing the removed stones with some evidence of white paint.



Figure 3.10. Images showing the scanning process.



### 3.2.1 Feature 1 Test Excavation

A small 1x1m test trench was set up over feature 1 to establish whether there may be a burial or any indication of a burial pit. No Evidence of a burial pit was identified during the excavation and sterile soil consisting of compacted gravel were encountered ~6 cm from the present surface level and the excavation was terminated in this undisturbed sterile layer (Figure 3.13 to 3.19).



Figure 3.11. Start of excavation/Surface layer.





Figure 3.12. Excavation process.



Figure 3.13. End of excavation – Image showing sterile soil at the bottom of the test trench at feature 1.



Figure 3.14. South facing profile



Figure 3.15. West facing profile





Figure 3.16. East facing profile



Figure 3.17. North facing profile

Table 3-1. Excavated depth at the corners of the excavation at Feature 1.

Corner	Excavated Depth
SW	70 mm
NW	18 mm
NE	24 mm
SE	22 mm

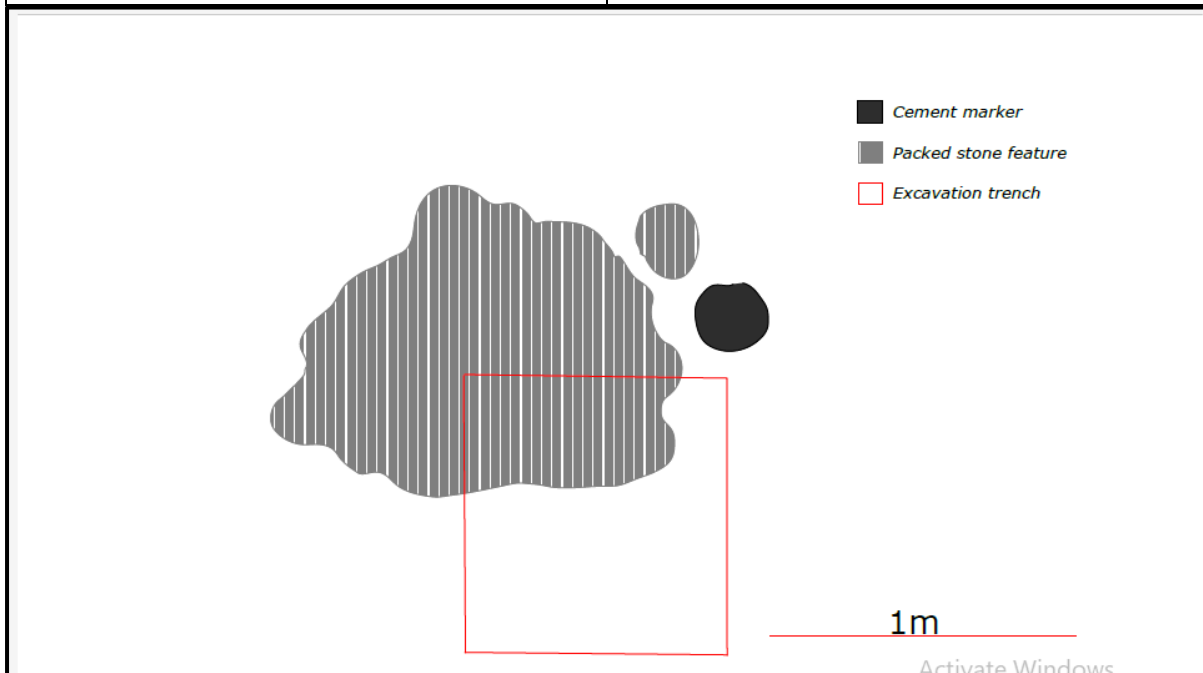


Figure 3.18. Site plan of Feature 1.

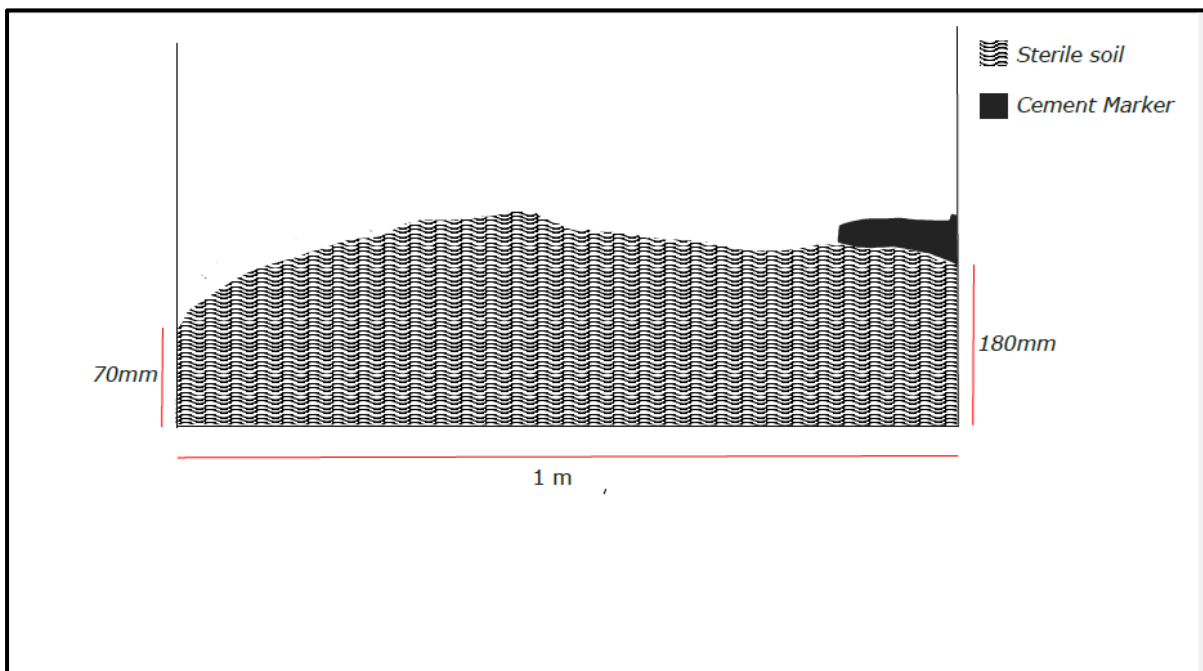


Figure 3.19. East facing profile of Feature 1.

### 3.3 Feature 6

Feature 6 consists of a few linear looking sections of possible stone packed foundations, and it was initially thought this could be the remains of a homestead. The site was GPR scanned, and test excavated to establish whether there is any evidence of burials associated with these features. During the investigation of the site, it became clear that if this was indeed a homestead it is degraded to the point that there is very little left. It is more likely that these linear lines of rocks could be the result of clearing of the historic cultivated fields in which the feature is located of rocks that was then dumped here.

The GPR scan of the feature, described as Scan 1 in the attached GPR report confirmed that no subsurface disturbances are present, and no section appears to show human remains (Le Roux 2023). This was confirmed by 7 test excavations (Figure 3.20) that recorded no cultural material or any anthropogenic deposit or features that could indicate burials. The excavations are briefly described in Section 3.4.1 to 3.4.6.

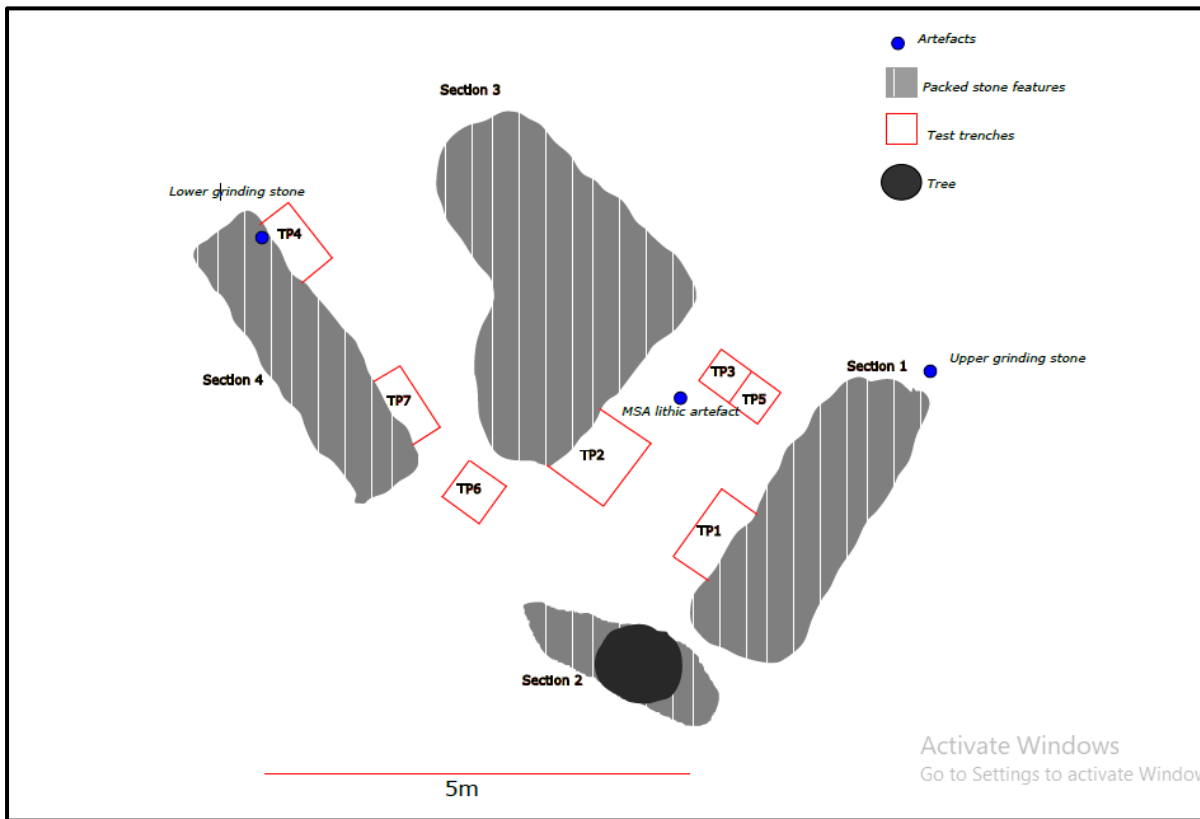


Figure 3.20. Site plan Feature 6.



Figure 3.21. General view of the environment surrounding Feature 6.





Figure 3.22. Image showing the surface clearing process.

4 main sections of packed stone features were identified during the clearing of the surface vegetation.





Figure 3.23. Section 1 – Image facing southeast



Figure 3.24. Section 2 – Image facing southeast



Figure 3.25. Section 3 – Image facing Northeast



Figure 3.26. Section 4 – Image facing Southeast

Feature 6 was scanned with a GPR machine across a 5 x 5 m grid that covered most of the site.





Figure 3.27. Sections 1 and 3 after surface clearing for the scanning process.



Figure 3.28. Image showing the GPR scanning process.

### 3.4 Feature 6 Test excavations

Seven Test pit (TP) excavations were conducted at Feature 6. The depth of the excavations is detailed in Table 3-2. General site conditions and descriptions of each TP is included below.

Table 3-2. Depth of excavation and volume of soil at TP 1 – 5.

TP 1	
Corner	Depth
SW	130mm
SE	140mm
NE	90mm
NW	40mm
Excavated Volume	50l
TP 2	
Corner	Depth
SW	150mm
SE	140mm
NE	120mm
NW	110mm
Excavated Volume	130 l
TP 3	

Corner	Depth
SW	150mm
SE	150mm
NE	120mm
NW	120mm
Excavated Volume	275 l
TP 4	
Corner	Depth
SW	100mm
SE	80mm
NE	100mm
NW	110mm
Excavated Volume	125 l
TP 5	
Corner	Depth
SW	120mm
SE	170mm
NE	160mm
NW	120mm
Excavated Volume	75 l

**3.4.1 TP1**

TP1 was set up on the western edge of section 1 to establish if the stones were packed or dumped at this location. It seems that the rocks were dumped here as no evidence consistent with stone wall foundations were recorded and no anthropogenic deposit noted. TP1 consists of a 1m x 0,5m Test Pit set up right over the edge of the packed stone feature (Figure 3.29).

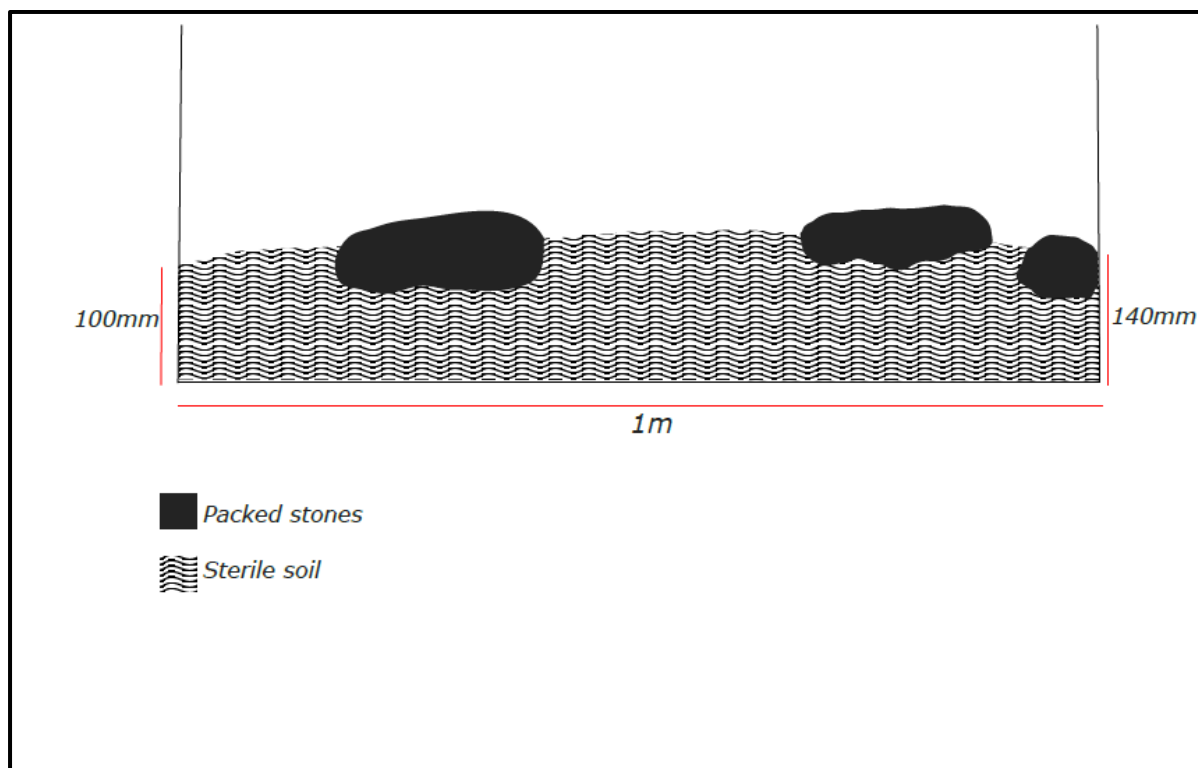


Figure 3.29. Feature 6 TP 1 – West facing profile.





Figure 3.30. Image showing the southeast facing profile. The packed stones sit on the surface of the feature. The stones were located about 60mm from the surface. This resembles a packed stone foundation or section of walling.



### 3.4.2 TP2

TP2 was set up to establish the depth of the packed stone feature at section 3. The grid was set up as a 1mx 1m square.



Figure 3.31. TP2 after excavation ending on sterile soil.



### 3.4.3 TP3

TP3 was set up as a 50cm x 50cm test pit situated in the open area between section 1 and 3 where there were no packed stone features. TP3 was set up in an effort to investigate the sub-surface layers in the open areas between the various packed stone feature.



Figure 3.32. Image showing TP3 post excavation.

TP3 showed no difference in the soil layers from the other excavated pits. TP3 ended on sterile soil.



### 3.4.4 TP4

TP4 was set up as a 1m x 0,5m square on the edge of the packed stone feature in an effort to establish if the stones were packed or dumped at this location. It seems that the rocks were dumped here as no evidence consistent with stone wall foundations were recorded and no anthropogenic deposit noted. The stones are on the surface with the stones only sitting 60mm below the surface (Figure 3.33).

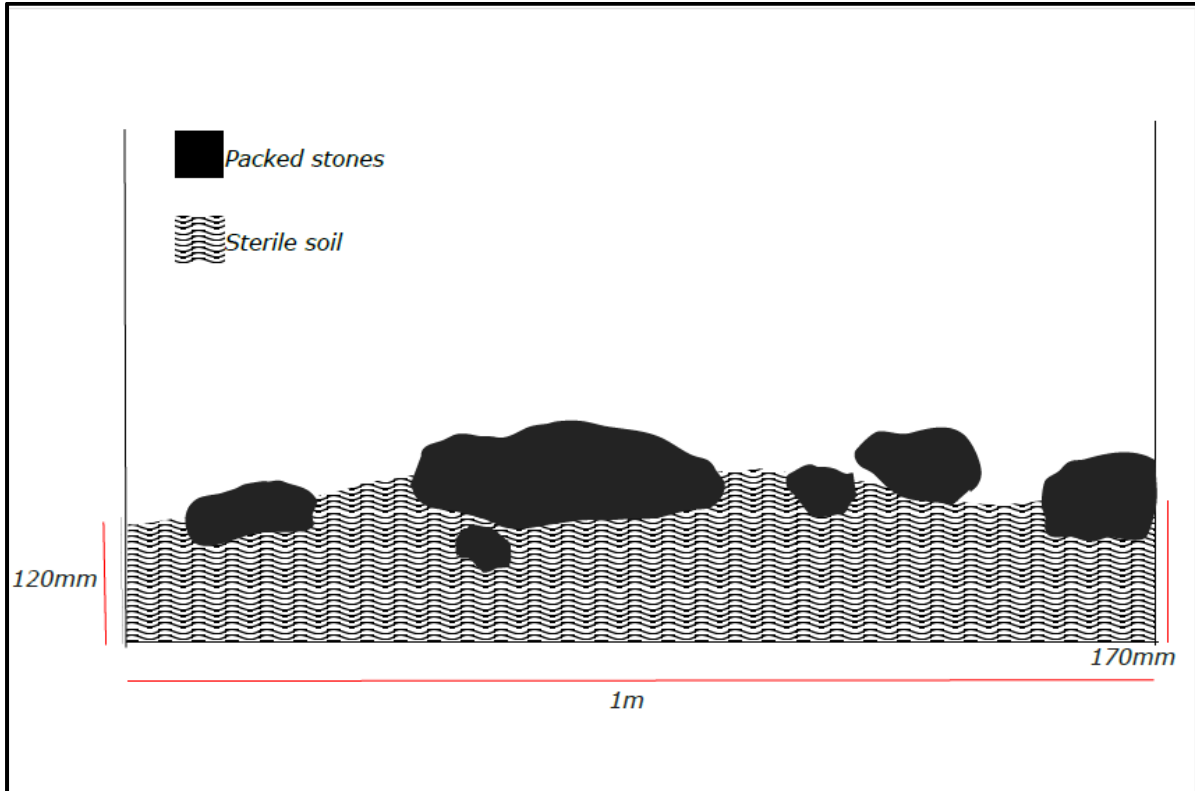


Figure 3.33. Feature 6 TP 4 – Northeast facing profile.



Figure 22 – A shovel test pit was set up on the north facing edge of section 4 in an effort to establish the depth and relationship of the packed stone feature.

#### 3.4.5 TP5

TP5 was excavated as an extension of TP3. TP3 was extended towards the east. TP5 was set up as a 0,5m x 0,5m square right next to TP3 on its eastern edge to further investigate the site within the open areas between sections 1 and 3. No cultural material or anthropogenic deposit were noted, and the excavation was terminated in sterile soil.

#### 3.4.6 TP6 and TP7

Two more Shovel test pits were excavated to further investigate the site. Both these pits also showed the same pattern from the other excavations with the packed stone features sitting at the surface on top of sterile soil. No cultural material or anthropogenic deposit were noted, and the excavation was terminated in sterile soil.

### 4 Conclusion and Recommendation

The use of GPR to assess subsurface anomalies at the site was able to conclusively indicate the absence of subsurface anomalies at Feature 1 and Feature 6 (Le Roux 2023). This was confirmed through additional ground truthing and archaeological test excavations that established that both features are located on sterile soil and no cultural material, anthropogenic deposit, burial pits, or features associated with burials were recorded. Historical topographic maps were also consulted to contextualize both Features in the relation to surrounding activities and based on the 1963 and 1976 maps the areas where Features 1 and 6 are located were historically excavated and later cultivated as recently as 2002.

Feature 1 is characterized by a small cairn of packed stones next to a surveyor beacon marked by a rounded cement marker situated on top of the crest of an erosion gully. After the surface features were recorded and the rocks removed there were clear evidence of white paint and or lime on the rocks suggesting that this was part of a marker before the more permanent cement beacon was constructed.

Feature 6 consists of a few linear looking sections of possible stone packed foundations, and it was initially thought this could be the remains of a homestead. During the investigation of the site, it became clear that if this was indeed a homestead it is degraded to the point that there is very little left. It is more likely that these linear lines of rocks could



be the result of clearing of the historic cultivated fields in which the feature is located of rocks that was then dumped here.

During a site visit by the heritage team as part of stakeholder engagement (Matabane 2022), no sites of significance were indicated at Feature 1 or 6. It is therefore recommended that construction can proceed at both locations based on the approval of SAHRA. It is recommended that a chance find procedure should be implemented for the project as outlined below:

#### **4.1 Chance Find procedure.**

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as human remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any skeletal material, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

## 5 References

- Le Roux, H. 2023. GPR Grave Detection Report. Heritage Consultants. Dwarsrivier Mine, Limpopo. Unpublished report.
- Matabane, A. 2022. Dwarsrivier Heritage Input Grave Identification and Verification Report. Unpublished report.
- Van der Walt, J. 2022. Heritage Impact Assessment for the proposed new Khulu Tailings Storage facility and associated infrastructure project, Limpopo Province. Unpublished report.

**Annexure A –**

**GPR Grave Detection Report. Heritage Consultants. Dwarsrivier Mine, Limpopo.**