



GPR Grave Detection Report

– Heritage Consultants

– Dwarsrivier Mine, Limpopo.

Scanning Report

Prepared for

Heritage Consultants

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1 INTRODUCTION

To whom it may concern,

Heritage Consultants (the Client) approached Subscan (Pty) Ltd to perform 2 x GPR (Ground Penetrating Radar) Scan on a site on Dwarsrivier Mine, Limpopo. The purpose of the scan is to determine the presence of any human remains at two possible graves in the area.

Scanning was done on 30 May 2023.

Analysis and reporting were done on 7 – 8 June 2023.

This report shows Subscan's findings.



2 GROUND PENETRATING RADAR EXPLAINED

Ground Penetrating Radar (GPR) sends an electromagnetic pulse into the ground and then calculates the strength and the time required for the return of any reflected signal. A scan is series of pulses sent over a single area. The signal is reflected wherever the electrical conductivity of the material being tested has changed.



By using GPR a sub-surface image can be produced. The size of the object cannot be determined since a small but highly conductive material (like steel) could appear the same way as a larger but less conductive material (like PVC conduit).

The depth of penetration depends on the electrical conductivity of the material, the frequency of the electromagnetic pulse and the radiated power. Essentially in dry materials depth penetration is deeper than in moist or clay-laden soils. A high frequency pulse would give a better resolution feedback but will not penetrate as far as a lower frequency pulse.

The depth of an object is calculated by the Machine software using the time it takes to send and receive a pulse.





3 EQUIPMENT USED

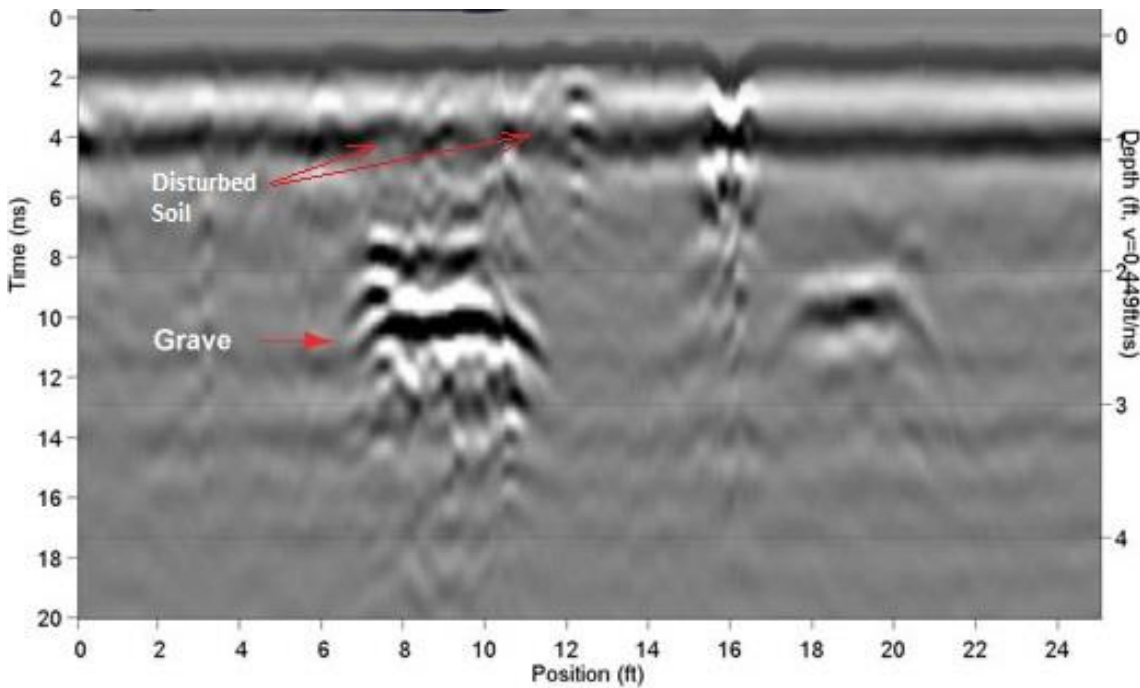
Utility detection: *GSSI Utility Scan DF*
Software: *RADAN7*

4 METHODOLOGY

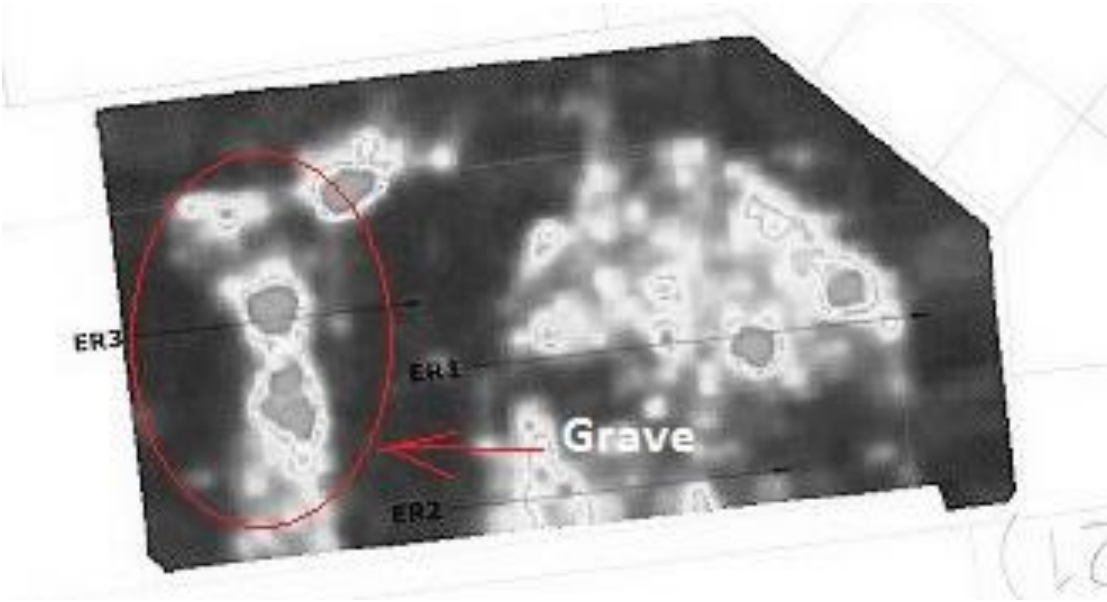
A 2D scan is done by moving the GPR scanner across the surface and scanning the whole area under investigation and doing the analysis of data on site. Once this is done a 3D grid scan is done. The data for the 3D scan is saved and analysed at the office. For this site, two areas of 5m x 5m were scanned. 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.

When a grave is detected the image that would be returned from the software would look similar to the following image.

On this image a cross section of a grave is seen. Note that it shows both the disturbance in the ground all the way from the surface and the human remains 2.5 feet deep.



When the 3D scan with a grave present (as in the image below) the image that is returned will show a disturbance of the soil at various levels – usually from the surface to at least 1,5m deep.

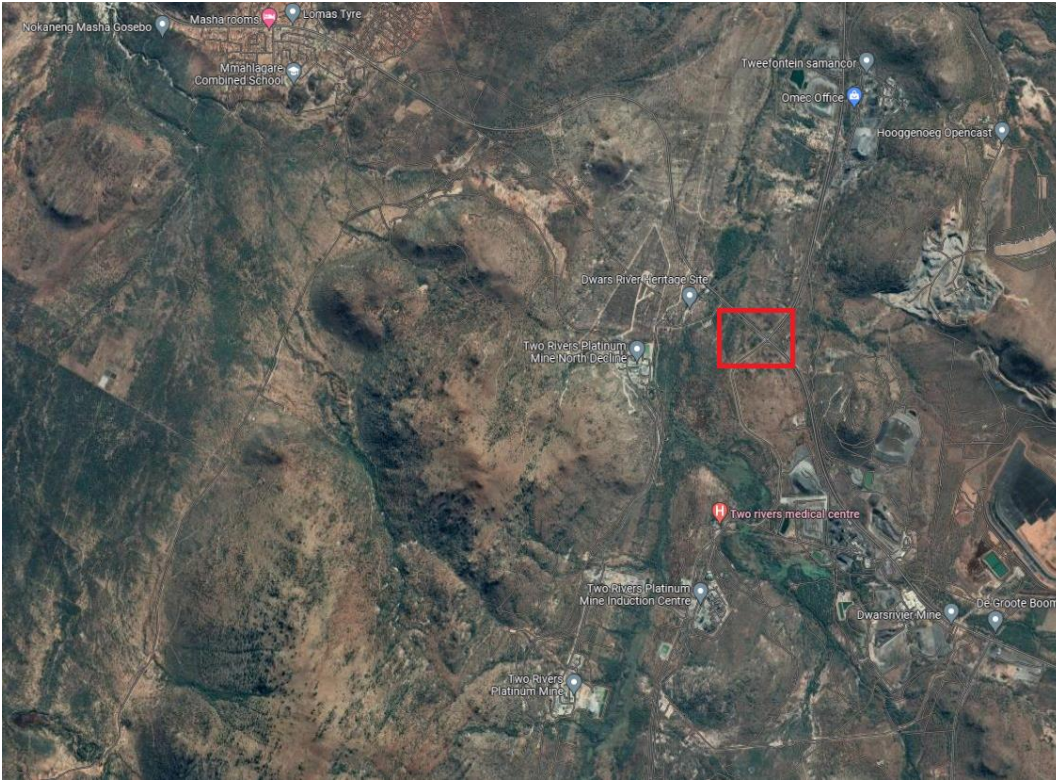


When a grave is present this image will repeat itself at various levels going down.



5 FINDINGS

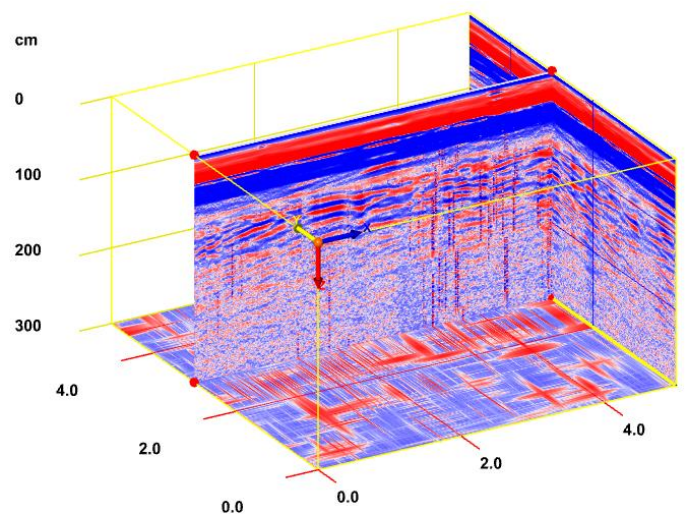
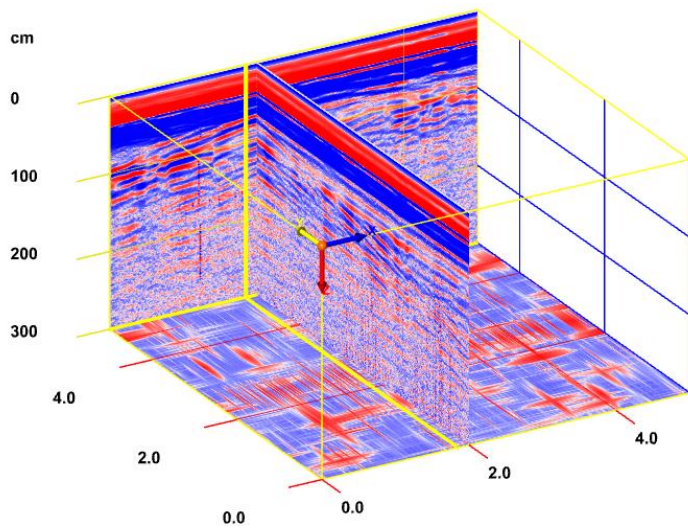
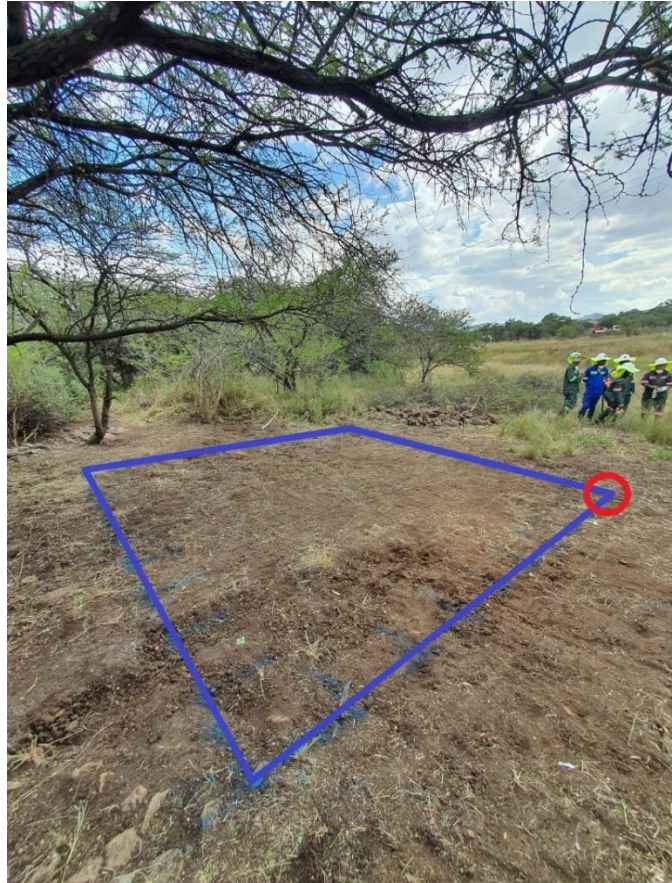
The position's where the scanning was done is marked by the yellow pins in the image below.



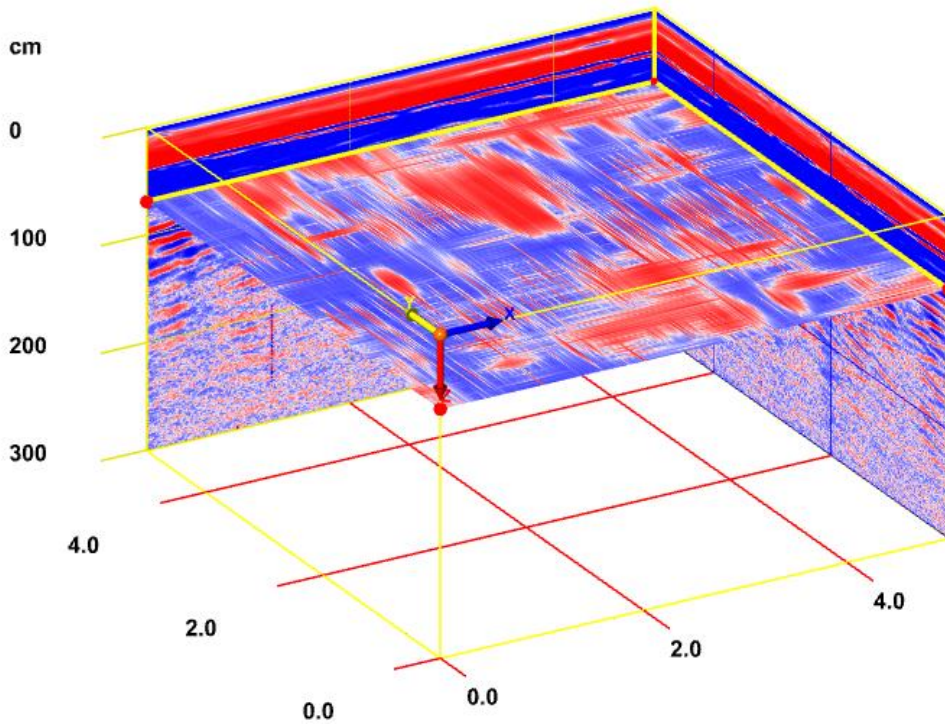


5.1 SCAN 1

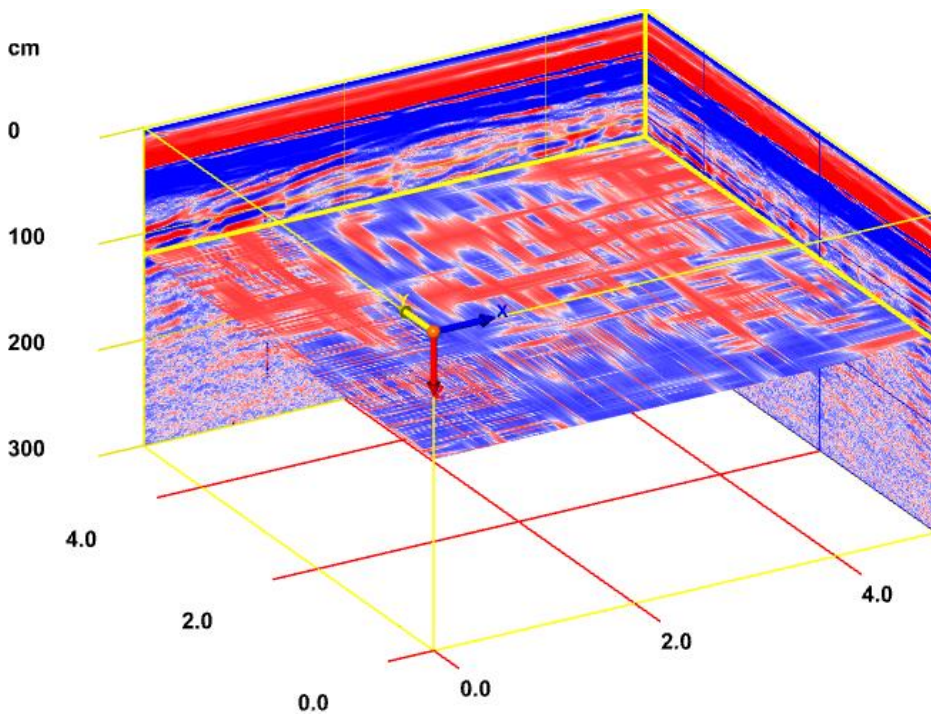
Scan 1 position:



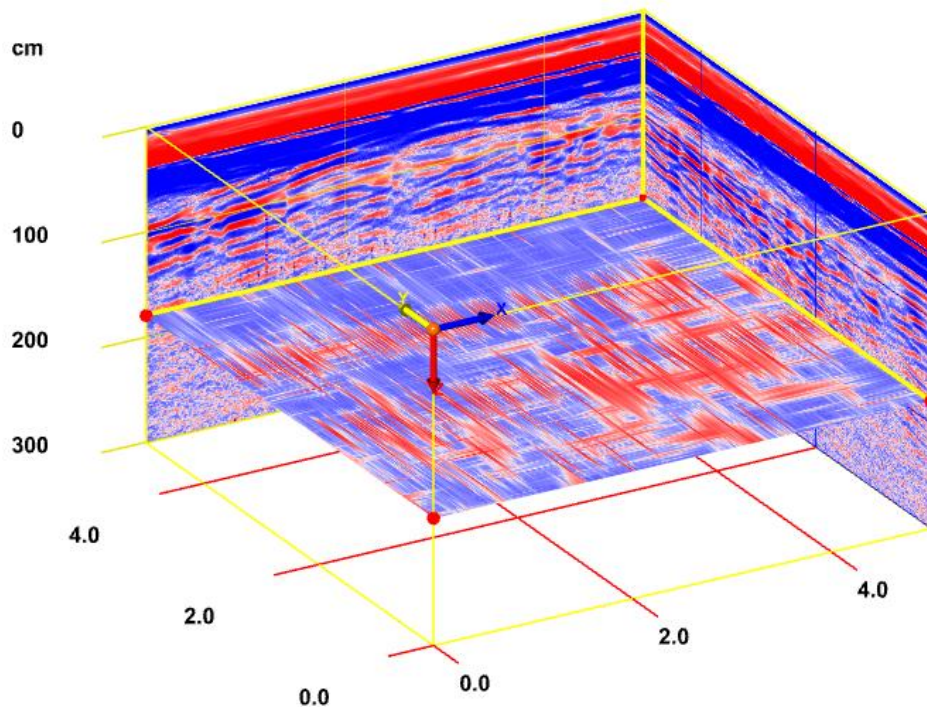
No repeated disturbance of the ground could be detected.



This image shows a 300mm thick slice at 700mm deep. No section appears to show human remains.



This image shows a 300mm thick slice at 1.2m deep. No section appears to show human remains.



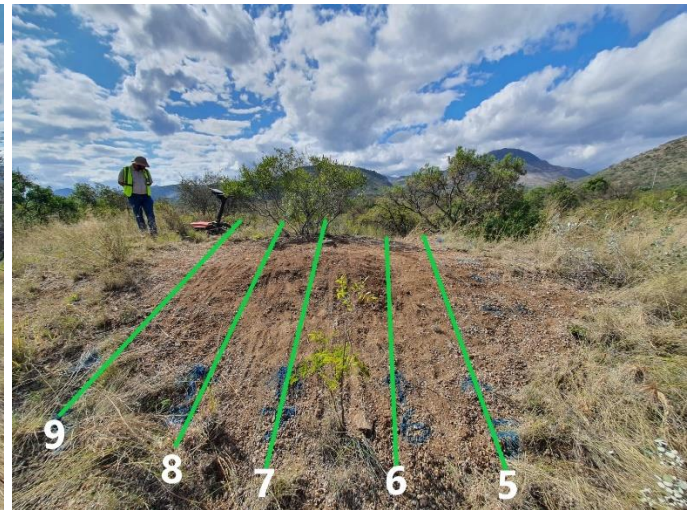
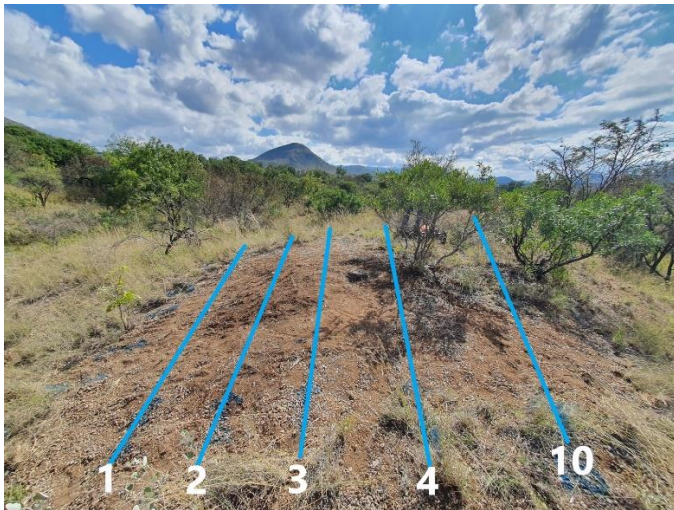
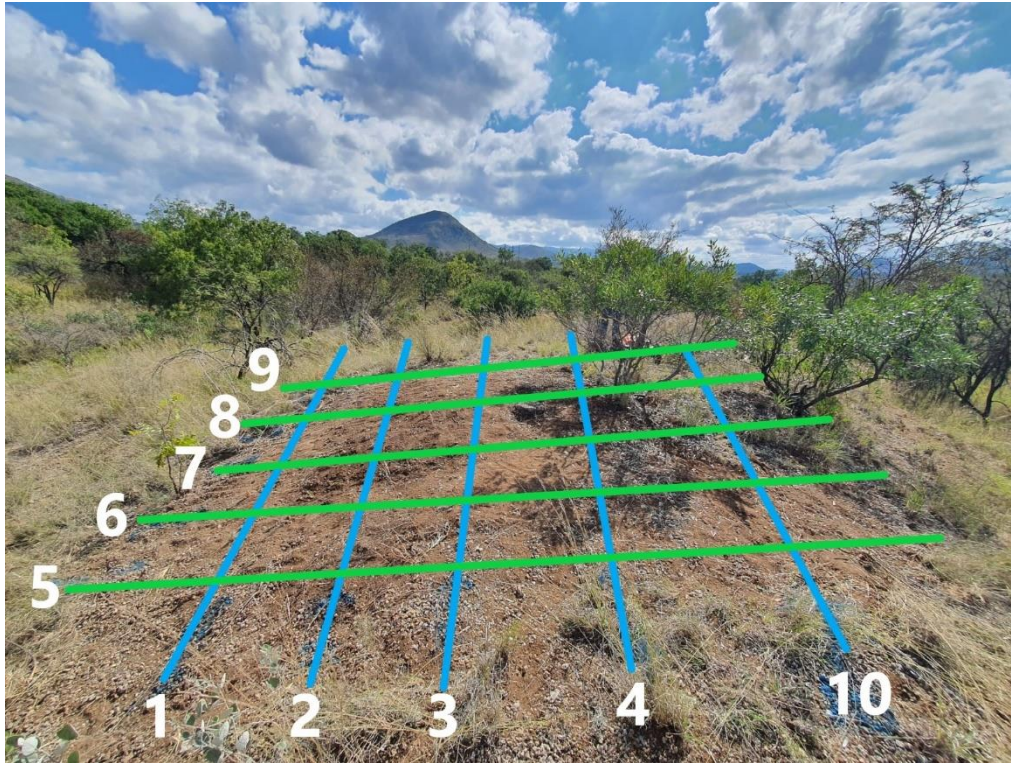
This image shows a 300mm thick slice at 1.8m deep. No section appears to show human remains.

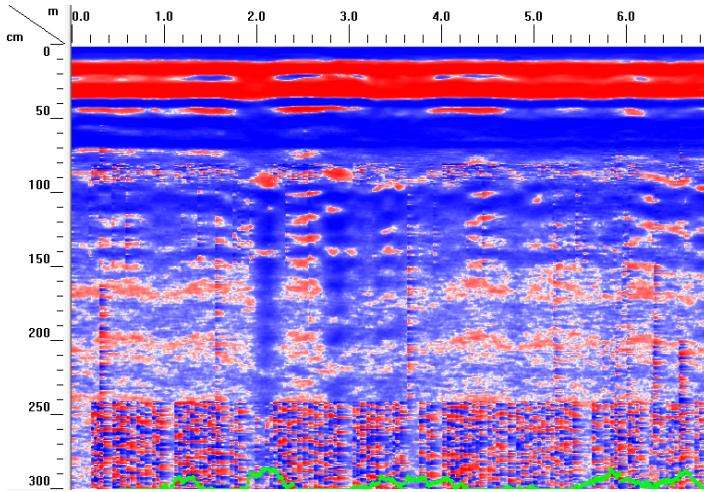


5.2 SCAN 2

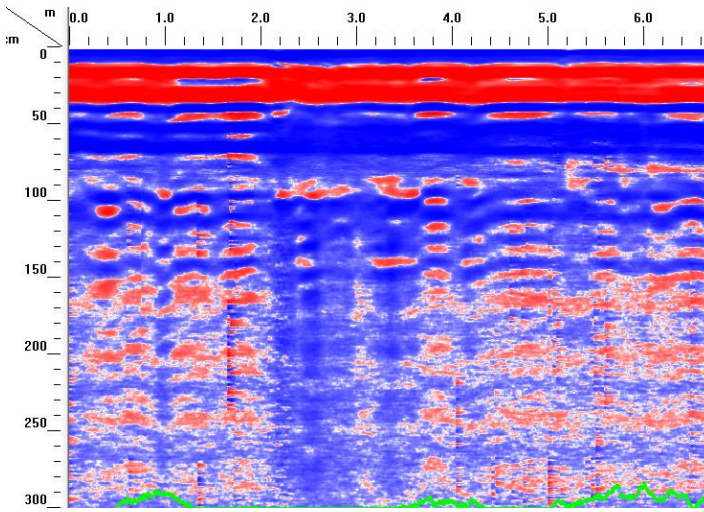
Scan 2 position:

The area where scan 2 was done has a tree on a pitched section of the ground which makes a grid scan impossible. Therefore 10 individual lines were scanned.

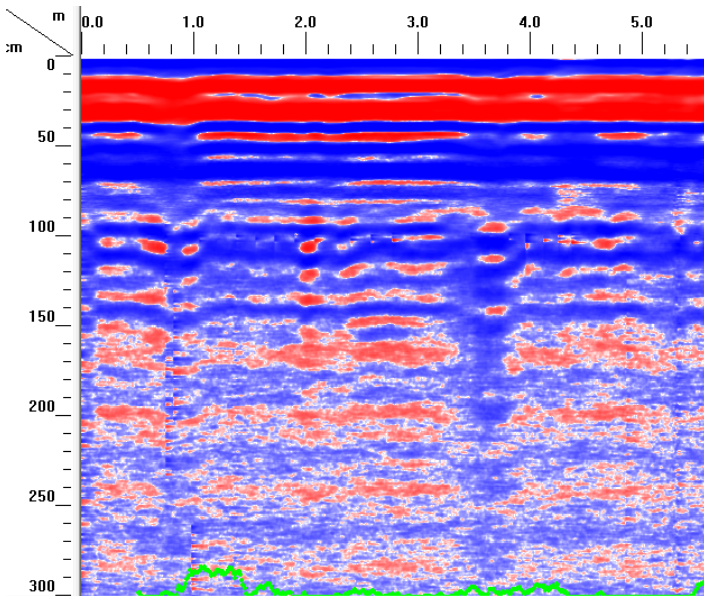




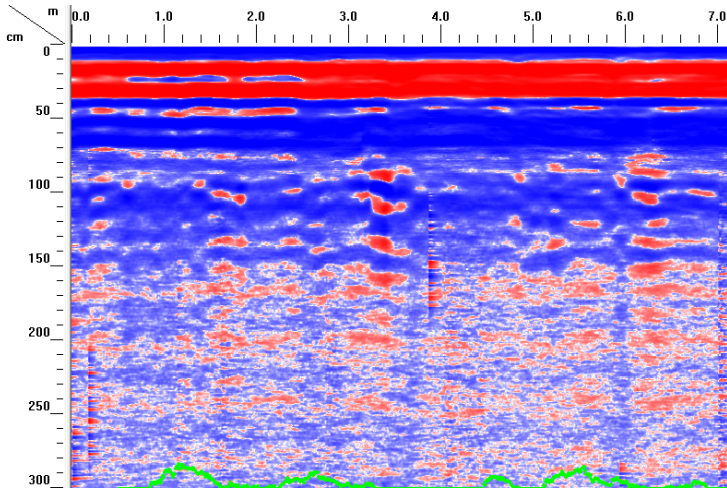
Line 1



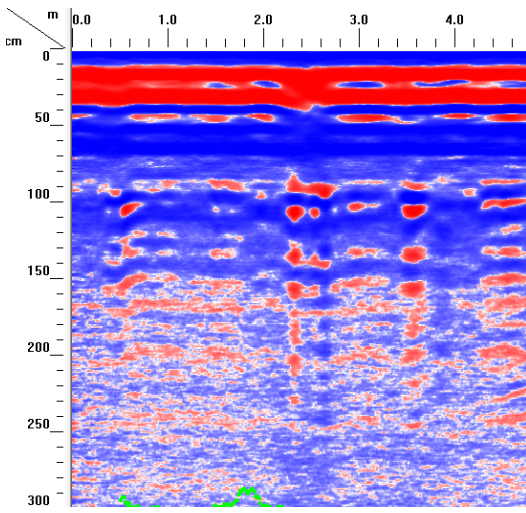
Line 2



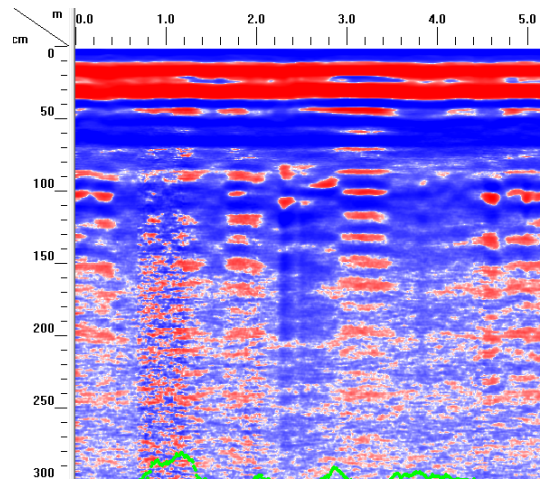
Line 3



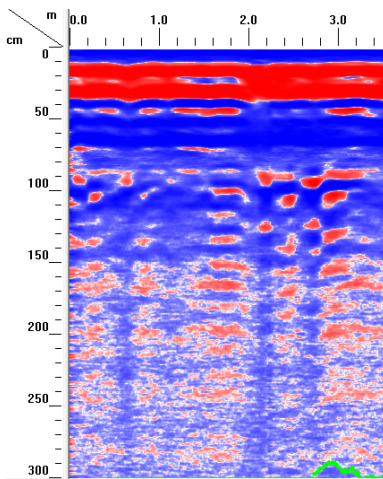
Line 4



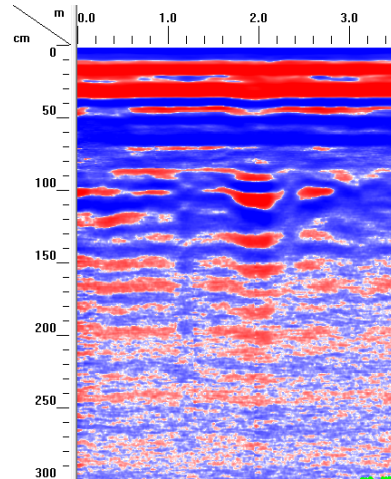
Line 5



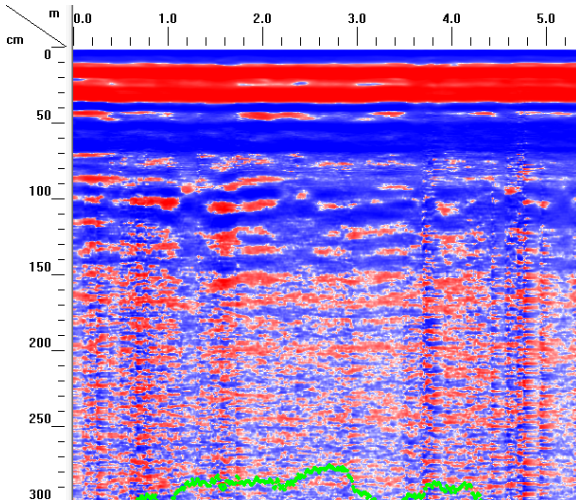
Line 6



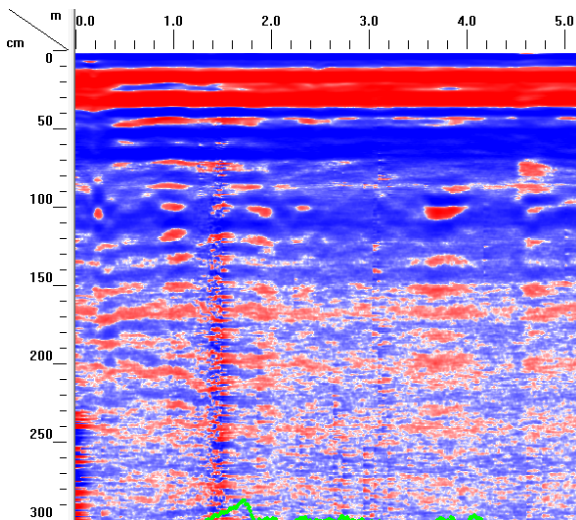
Line 7



Line 8



Line 9



Line 10

None of the 10 scans show a disturbance that appears to be human remains.

6 CONCLUSION

The 3D scan that is presented in this report did not detect any human remains at any depth within the first 3 meters.

The GSSI Utilityscan DF is a Dual Frequency GPR machine at the forefront of global underground detection technology and the method used for this scan is international best practice for detecting graves.