

# Consolidated report on the Assessment of reported grave localities at Platreef by means of Ground Penetrating Radar (GPR) and archaeological test excavation during 2015

Ivanhoe Mines: Platreef Project  
FARM Turfspruit 241 KR, Mokopane, Limpopo

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**Client:** Ivanplats (Pty) Ltd

**SAHRA PERMIT NUMBER: 2104; Case ID: 8319 & 2099; Case ID: 8274**

This report is to be read in conjunction with:

Van Der Walt and Hutten, 2015. REPORT ON TEST EXCAVATIONS OF TWO GRAVES  
POSSIBLE GRAVES Ivanhoe Mines: Platreef Project, FARM Turfspruit 241 KR,  
Mokopane, Limpopo.

Nienaber, 2015. Assessment of reported grave localities at Platreef by means of Ground  
Penetrating Radar (GPR).

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**ACKNOWLEDGEMENT OF RECEIPT**

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## Executive summary

Site (Field allocation)	Position	GPR Assessment	Recommendation
PLR9	S24.09086 E28.96138	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLR228	S24.08558 E28.96043	No anomalies consistent with the presence of graves	No action required
PLR77	S24.08714 E28.96667	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLR74	S24.08068 E28.96664	No anomalies consistent with the presence of graves	No action required
PLR73-1	S24.07296 E28.95798	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLR70	S24.08113 E28.96637	Anomalies present but not consistent with graves	No action required
PLR7	S24.08978 E28.96139	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLR68	S24.08973 E28.96236	No anomalies consistent with the presence of graves	No action required
PLR63	S24.09150 E28.95795	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLR5A01	S24.09001 E28.96302	No anomalies consistent with the presence of graves	No action required
PLR23-1	S24.07956 E28.96562	No anomalies consistent with the presence of graves	No action required
PLR227	S24.08363 E28.95671	No anomalies consistent with the presence of graves	No action required
PLR226	S24.08252 E28.95668	No anomalies consistent with the presence of graves	No action required
PLR225	S24.08116 E28.95806	No anomalies consistent with the presence of graves	No action required
PLR224	S24.08117 E28.96040	Test excavation confirm no graves in indicated area	No action required
PLR223	S24.08211 E28.96047	Test excavation confirm no graves in indicated area	No action required
PLR222	S24.08235 E28.96032	No anomalies consistent with the presence of graves	No action required
PLR221	S24.08348 E28.96047	No anomalies consistent with the presence of graves	No action required
PLAT7OP	S24.08979 E28.96168	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLAT7DAT	S24.08974 E28.96177		
PLAT7AOP	S24.08987 E28.96129	No anomalies consistent with the presence of graves	No action required
PLAT7ADAT	S24.08978 E28.96136		
PLAT12AOP	S24.08285 E28.96517	Anomalies that might represent graves present	Include in Grave Relocation Schedule
PLAT12ADAT	S24.08280 E28.96534		
PLAT11AOP	S24.08296 E28.96897	No anomalies consistent with the presence of graves	No action required
PLAT11ADAT	S24.08306 E28.96879		
20150704 SITE1 same as PLR 5A01	S24.08940 E28.96308	No anomalies consistent with the presence of graves	No action required

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## **1. Introduction**

Ground penetrating radar (GPR) has become an established technique in the field of forensic geoscience. In recent years, several studies, focusing on the application of GPR for detecting graves, have emerged; for example Doolittle and Bellantoni (2010), Fiedler et al. (2009), Hansen et al. (2014), Molina et al. (2015), Novo et al. (2011), Pringle et al. (2008), Schultz (2008) and Schultz and Martin (2012). These studies generally fall into one of two categories, those aimed at detecting and/or monitoring unmarked cemetery graves and those aimed at detecting and/or monitoring clandestine graves.

In this instance members of the local community indicated locations said to contain graves. Some of which were reportedly indicated by the presence of various surface features, such as rocks or low mounds, while others were reportedly obliterated by the activities on the site. Each of these localities were surveyed and individually assessed for sub surface radar anomalies that could indicate the possible presence of graves.

Where the GPR results were inconclusive or where other obstacles to the geophysical assessment existed, ground truthing by means of archaeological test excavation was conducted.

## **2. Legal compliance**

SAHRA permits were obtained for both the geophysical survey (SAHRA PermitID 2099) and the test excavations (SAHRA PermitID 2104). Since both the survey and the excavation were not conducted at sites where there were any heritage resources present the permits were not a legal requirement to continue with the investigation. The assessment was designed and conducted to confirm or disprove claims that graves were present in specific localities. Until such time as the presence of a heritage resource is not proven or confirmed the locality does not comprise a heritage site and is not subject to the requirements of the NHRA (Act 25 of 1999). Due to the social sensitivities relating to claims, spurious and otherwise, of the presence of graves at the mine the permits were obtained to prove due diligence.

### **1. Survey methods – Sites PLAT 7, 7A, 11A, 12A, 22/8, 22/1, 22/2, 22/3, 22/4, 22/5, 22/6, 22/7, PLR 20150705**

#### **Site 1**

A GSSI SIR 3000 GPR system (by Geophysical Survey Systems, Inc.), with a Compact Survey Cart and 400 MHz shielded antenna, was employed in the study. The operating frequency was selected on the basis that it provided a good balance between range (depth of investigation), resolution, and survey productivity. GPR profiles were acquired in one direction. A profile spacing of 50 cm was used and the depth range was set to approximately 2 m, based on an assumed bulk ground velocity of 0.1 m/ns. In-line positioning accuracy was

achieved by using the Cart encoder wheel odometer system.

Together with the 400 MHz antenna a T Rate of 100 KHz in Time Mode was used. Scans were sampled at 1024 at a Bit rate of 16 with a Range (nS) of 95 and a dielectric setting of 8.00 at a Rate of 64 with 50 scans/unit at a Gain setting of 0 dB. Gain setting, throughout, was on Auto at 4 Points and with a GP1 of -20, GP2 55, GP3 66 and GP3 73. Position settings were at Auto with an Offset of 1.60 and a Surface % of 10. Filter settings were as follows: LP\_IIR 800, HP\_IIR 100, LP\_FIR 0, HP\_FIR 0 with Stacking at 5 and BGR\_RWVL 0.

## 2. Survey methods – Sites PLR7 grave 6,7,8 & 9, PLR9, 5A01, 23-1, 73-1, 70, 68, 74, 77, 63

A GSSI Utility Scan DF unit with the following specifications was used:

Controller															
System	Panasonic Toughpad ® FZ-G1														
Data Storage Internal Memory	128 GB SSD														
Display	Enhanced 10.1" WUXGA 1920x1200 with LED backlighting														
Processor	Intel® Core i5-2557M vPro														
Ports	USB 3.0, Ethernet and Serial														
Batteries	Li-Ion battery pack (10.8 V typical 9300 mAh)														
Operating Temperature	-28°C to 60°C (-20°F to 140°F)														
Weight	2.7 kg (6 lbs)														
Environmental	IP65														
Drop Spec	MIL-STD-810G														
GSSI System Software															
Scan Rate	150 scans/sec at 512 samples/scan														
Scan Intervals	50 or 100 scans/meter (15 or 30 scans/foot)														
Output Data Resolution	32-bit														
Operating Mode	Survey Wheel														
Depth Ranges	<table border="1"> <thead> <tr> <th colspan="2">Metric</th> </tr> <tr> <th>High Frequency</th> <th>Low Frequency</th> </tr> </thead> <tbody> <tr> <td>0.50 m</td> <td>1 m</td> </tr> <tr> <td>0.75 m</td> <td>2 m</td> </tr> <tr> <td>1 m</td> <td>3 m</td> </tr> <tr> <td>2 m</td> <td>4 m</td> </tr> <tr> <td>3 m</td> <td>5 m</td> </tr> </tbody> </table>	Metric		High Frequency	Low Frequency	0.50 m	1 m	0.75 m	2 m	1 m	3 m	2 m	4 m	3 m	5 m
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	High Frequency	Low Frequency													
	12 in	3 ft													
	18 in	6 ft													
	3 ft	9 ft													
6 ft	12 ft														
9 ft	15 ft														

System Speed	up to 600 kHz, 200 kHz in North America
Data Collection Speed	up to 10 km/h (6.25 mph)
Gain	Manual or automatic, 1-8 gain points (-42 to + 126 dB)
Real-time Filters	Stacking, Background Removal
Advanced Real-time Filter	Signal floor tracking
Display Mode	<b>Linescan Mode:</b> high frequency data only or low frequency data only displayed <b>Dual Mode:</b> high and low frequency data displayed in split screen view <b>Blend Mode:</b> high and low frequency data combined in single view
Data Format	RADAN® (.dzt)
Diagnostic	GPS status and battery
<b>Digital Dual Frequency Smart Antenna</b>	
Number of Hardware Channels	2 (two)
Frequencies	300 and 800 MHz
Typical Range	4 m / 12 ft
Maximum Range	7 m / 21 ft
Connectors	Digital control, power, survey wheel, marker, serial RS232, accessory connector
GPS	Data stored internally
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Weight	5 kg (12 lbs)
Dimensions	33.5 x 31 x 15 cm (13.2 x 12.2 x 5.9 in)
Environmental	IP65
<b>Cart</b>	
Model 655	4-wheel, compact survey cart Internal, integrated survey wheel encoder Removable, 12-inch wheels Compact, weather resistant design Antenna centerline to front of cart: 38.2 cm (15 in) Dimensions: 61.7 x 100 x 102.4 cm (24.3 x 39.4 x 40.3 inches) <b>Total System Weight:</b> 29 kg (66 lbs)

<http://www.geophysical.com/utilityscandf.htm> (Accessed 2015/11/02)

GPR profiles were acquired in one direction as described for each surveyed grid at 2D line assessment. A profile spacing of 50 cm was used. In-line positioning accuracy was achieved by using the Cart encoder wheel odometer system. Where feasible different settings were employed for the different site characteristics observed at the different locations. These are given along with the grid information for each locality where applicable.

### 3. Ground Truthing – Excavation methods

On 23 October 2015 the PGS team including Marko Hutten, Stephany van der Walt, Thomas Mulaudzi and Edward Khorombi conducted the test excavations under the supervision of the mine safety staff. The methods employed during the test excavation are aimed to remove enough top soil until a clear display of the soil stratigraphy is understood. To begin, with each case, the surface was cleared of all debris and photographed. All observations regarding construction, materials and characteristics of the surface features were documented. A 1.5m square grid was set in the center of the area concerned. The top soil was then carefully removed in layers of 30cm at a time between observations. A burial pit

would be demarcated by ascertaining differences in the soil matrix. This would include a change in soil color and or texture due to prior disturbance if a pit or other alteration in the stratigraphy occurred. It is this very change in the matrix, a change in soil density, that the GPR measures and records as an anomaly. Layers of 30cm were continually removed until sterile soil was reached at a satisfactory depth bellow the top soil. Both test trenches were 1.5m square and were dug to a depth of 0.5m.

With other scenarios, after the indication of the presence of the burial pit is documented, the in-fill is excavated to expose the human remains and associated cultural materials. It was decided prior to the test excavations, should a burial pit be discovered, that further excavations would cease and the full social consultations would continue with the affected family in order to obtain all the necessary permits.

## 4. Data processing and visualization

For the purposes of data interpretation 2D and 3D analyses were performed on the various GPR data sets. For the initial 2D analyses the REFLEXW software (by Sandmeier Scientific Software) was used. Time-zero corrections were applied to the data, followed by additional standard processing steps, including dewow filtering and automatic gain control (AGC).

In the case of the Utility Scan DF data some processing was done during data collection where suitable and desirable. In these cases the processing steps are given as part of the information for each survey locality below.

The visualizations presented in this report are with GSSI SIR 3000 firmware, by means of screen capture, or alternatively by means of the GSSI Utility Scan DF firmware.

## 5. Assessed localities

**Table 1. Locality positions.**

PLR9	S24.09086 E28.96138	PLR225	S24.08116 E28.95806
PLR822	S24.08558 E28.96043	PLR224	S24.08117 E28.96040
PLR77	S24.08714 E28.96667	PLR223	S24.08211 E28.96047
PLR74	S24.08068 E28.96664	PLR222	S24.08235 E28.96032
PLR73-1	S24.07296 E28.95798	PLR221	S24.08348 E28.96047
PLR70	S24.08113 E28.96637	PLAT7OP	S24.08979 E28.96168
PLR7	S24.08978 E28.96139	PLAT7DAT	S24.08974 E28.96177
PLR68	S24.08973 E28.96236	PLAT7AOP	S24.08987 E28.96129
PLR63	S24.09150 E28.95795	PLAT7ADAT	S24.08978 E28.96136
PLR5A01	S24.09001 E28.96302	PLAT12AOP	S24.08285 E28.96517
PLR23-1	S24.07956 E28.96562	PLAT12ADAT	S24.08280 E28.96534
PLR227	S24.08363 E28.95671	PLAT11AOP	S24.08296 E28.96897
PLR226	S24.08252 E28.95668	PLAT11ADAT	S24.08306 E28.96879
20150704SITE1	S24.08940 E28.96308		









Figure 1. Locality maps

## 5.1. Site PLAT 7

### Reported grave locality

A 10 m by 5 m grid directly east of the existing graves at this locality was set in the road to assess the reports that graves were damaged or destroyed by the grading of the road.

### Location<sup>1</sup>

Grid datum - Plat7Dat  
Grid Orientation Point - Plat7OP

### Survey results

3D imaging of the data shows the graded berms of the gravel road east of the graves with indications of compaction differences in the track road which was at the location before it was graded. In addition there is clear indication of a termite nest of large extent between the road and the graves. No subsurface anomalies consistent with graves were observed in the road at this location (Fig. 2).

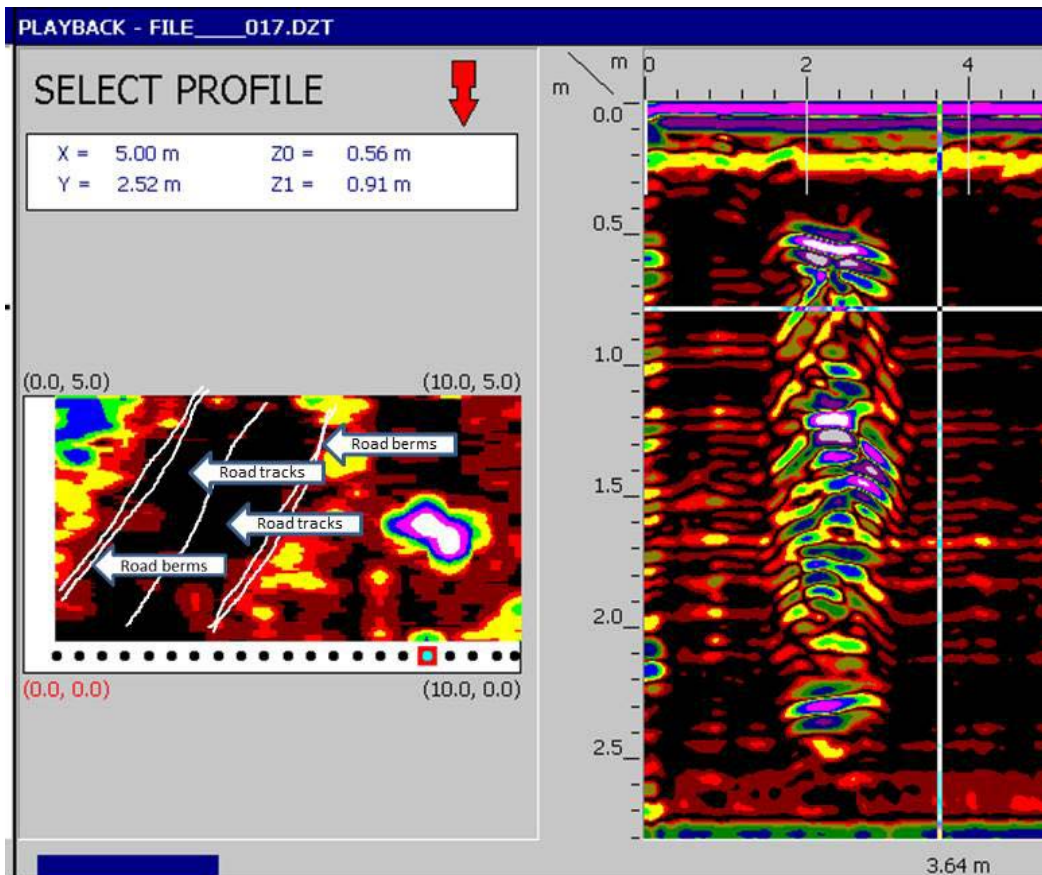


Figure 2. Site PLAT7 GPR anomaly visualization.

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

<sup>1</sup> Refer Figure 1 for locality map and Table 1 for corresponding position information for each site

## 5.2. Site PLAT 7A

### Reported grave locality

A 10 m by 10 m grid directly over the indicated area was surveyed.

### Location

Grid datum - Plat7ADat  
Grid Orientation Point - Plat7AOP

### Survey results

Several sub-surface radar anomalies, some of which corresponds with packed rocks on the surface is evident. Surface and GPR observations can be interpreted as possible indications of the presence of an old homestead at the site where graves may be present (Fig. 3).

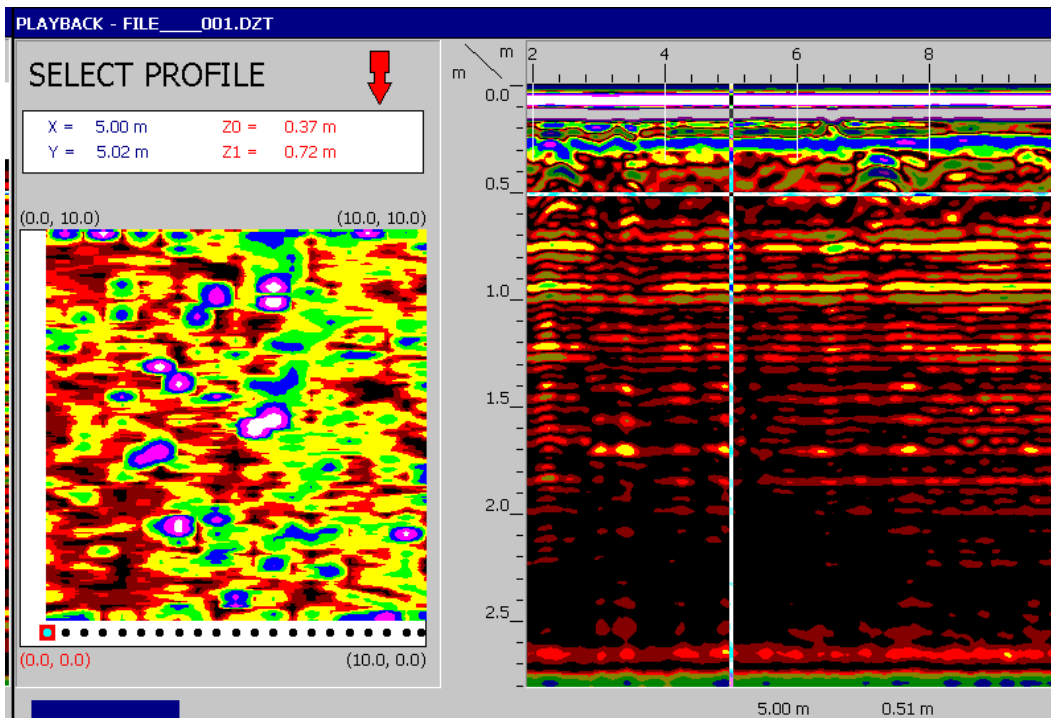


Figure 3. Site PLAT7A GPR anomaly visualization.

### Recommendations

The presence of graves cannot be confirmed by means of GPR alone. Ground truthing and test excavation is required.

## 5.3. Site PLAT 11A

### Reported grave locality

A 20 m by 20 m grid directly over the indicated area in a mealie field was surveyed.

## Location

Grid datum - Plat11ADat  
Grid Orientation Point - Plat11AOP

## Survey results

The upper 30 cm disturbed area consistent with the plough zone could be clearly visualized. No other sub-surface anomalies could be observed over the area other than termite nests which were also visible on the surface.

The underlying soil structure visible on the radargram profile is consistent with the geology of the area as indicated by Ivanplats; EH\_IVPGT\_011\_20150522\_Geotechnical\_Investigation\_Pit\_Latrines, A Geotechnical Investigation to Confirm the Presence of Soil Conditions in the Mogongoa and GaKgobudi Project Areas. (Fig. 4).

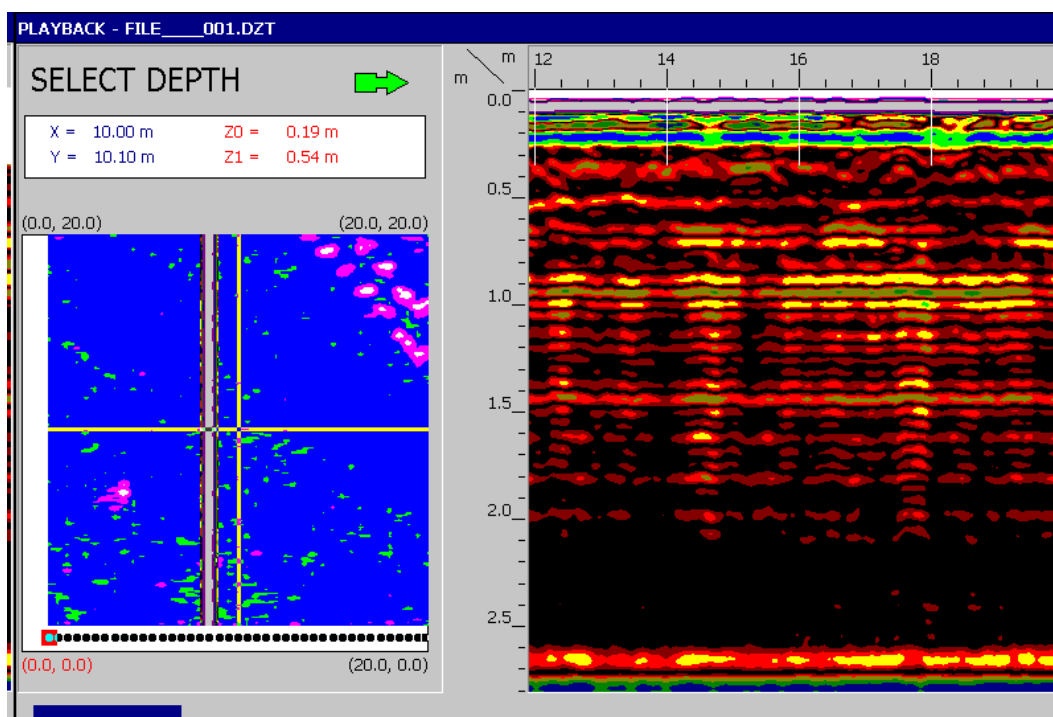


Figure 4. Site PLAT11A GPR anomaly visualization.

## Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

## 5.4. Site PLAT 12A

### Reported grave locality

A 10 m by 10 m grid directly over the area indicated as the possible location of graves by the Moatsi family.

## Location

Grid datum - Plat12ADat



Grid Orientation Point - Plat12AOP

### Survey results

Two anomalies which might be consistent with graves are present in the south-eastern corner of the grid. Other possible anomalies were also observed but could not be specifically visualized (Fig. 5).

### Recommendations

The presence of graves cannot be confirmed by means of GPR alone. Ground truthing and test excavation is required.

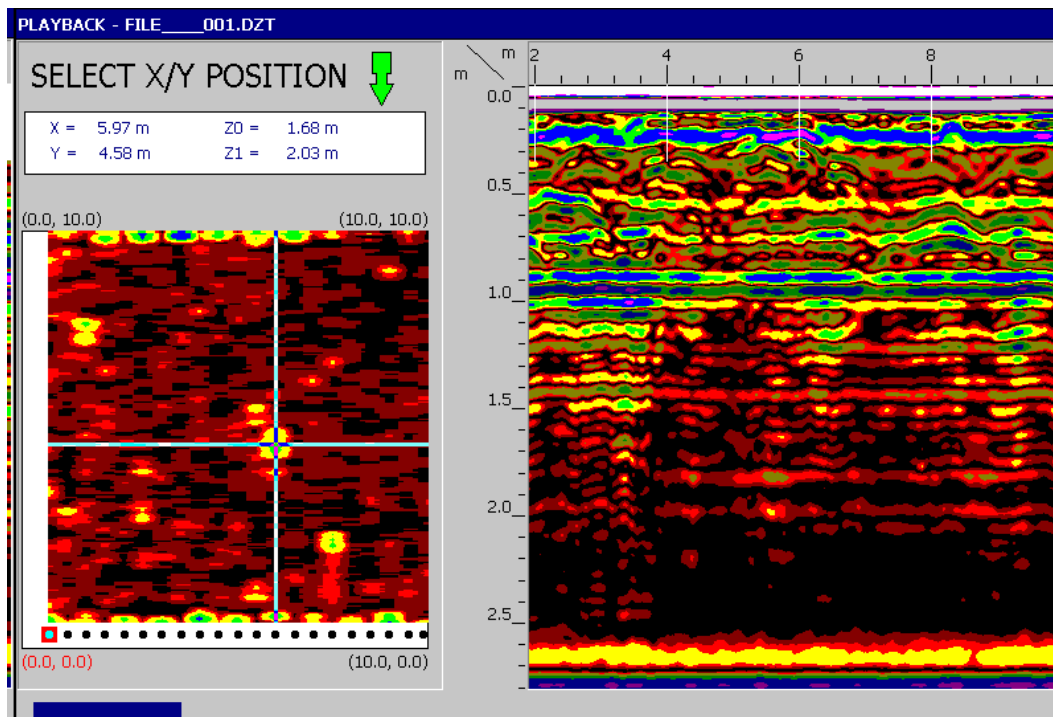


Figure 5. Site PLAT12A GPR anomaly visualization.

## 5.5. Site PLR 22/8

### Reported grave locality

A 5 m by 5 m grid in a north-south direction from the datum along the wall at the main gate with the last grid line 50 cm away from the wall.

### Location

Grid datum - PLR 822 at south western corner of grid

### Survey results

The surface gravel layer that forms the walkway is clearly visible as well as a deeper homogeneous layer (geological) consistent with the Ivanplats; EH\_IVPGT\_011\_20150522\_Geotechnical\_Investigation\_Pit\_Latrines, A Geotechnical Investigation to Confirm the Presence of Soil Conditions in the

Mogongoa and GaKgobudi Project Areas. There are no sub-surface disturbances visible below 50 cm (Fig. 6).

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

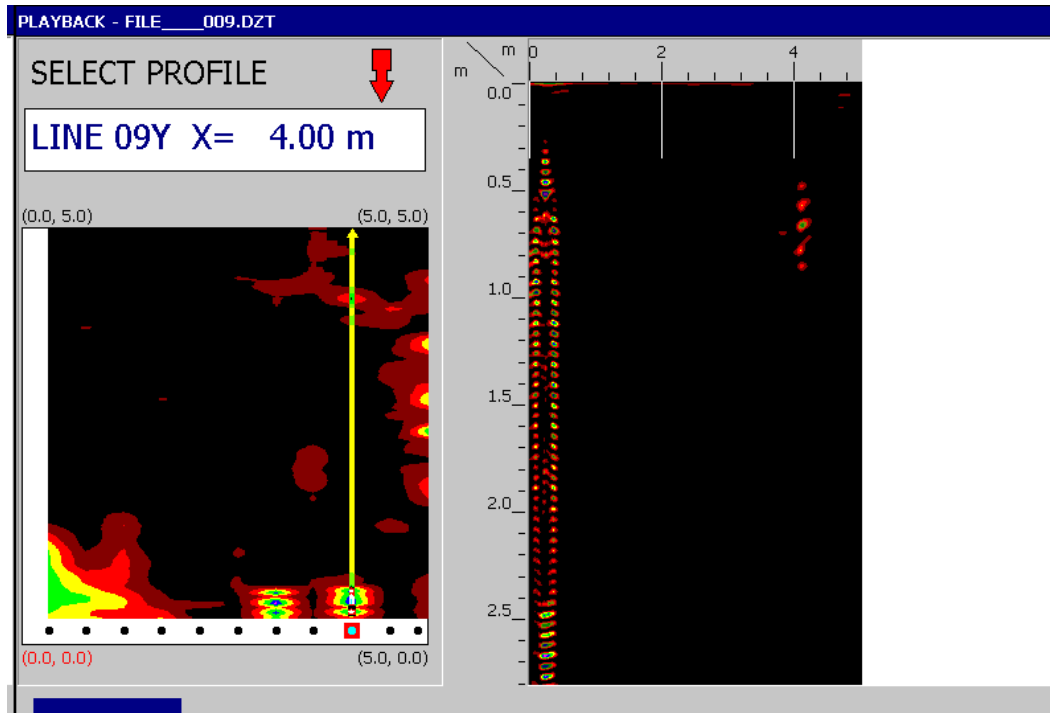


Figure 6. Site PLR22/8 GPR anomaly visualization.

## 5.6. Site PLR 22/1

### Reported grave locality

A 4 m by 8 m grid in a north-south direction from the datum along the wall at the main gate with the last grid line 50 cm away from the wall.

### Location

Grid datum - PLR 221 at south western corner of grid

### Survey results

The survey represented a level previously disturbed surface area with demarcation stakes penetrating the surface. Sub-surface features only show the natural geological stratigraphy. Metal stakes and termite mounds were observed (Fig. 7).

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

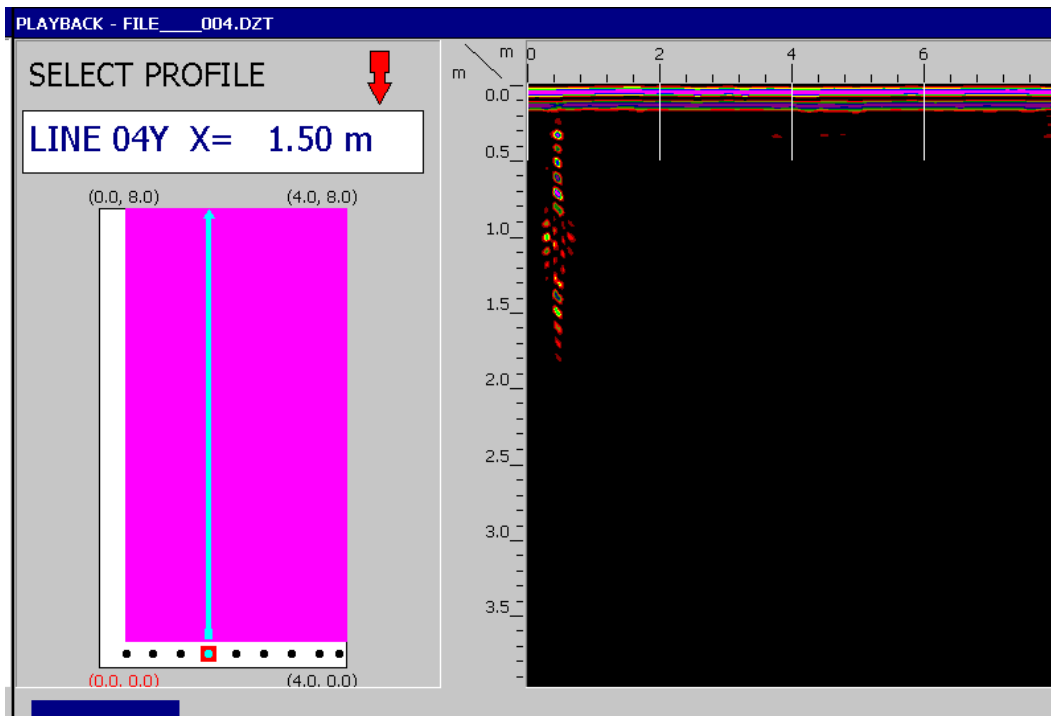


Figure 7. Site PLR22/1 GPR anomaly visualization.

## 5.7. Site PLR 22/2

### Reported grave locality

A 10 m by 10 m grid over the indicated area was surveyed.

### Location

Grid datum - PLR 222 at south western corner of grid

### Survey results

Similar natural sub-surface structures as at the other sites were observed in addition to tree roots and termite nests (Fig. 8).

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.



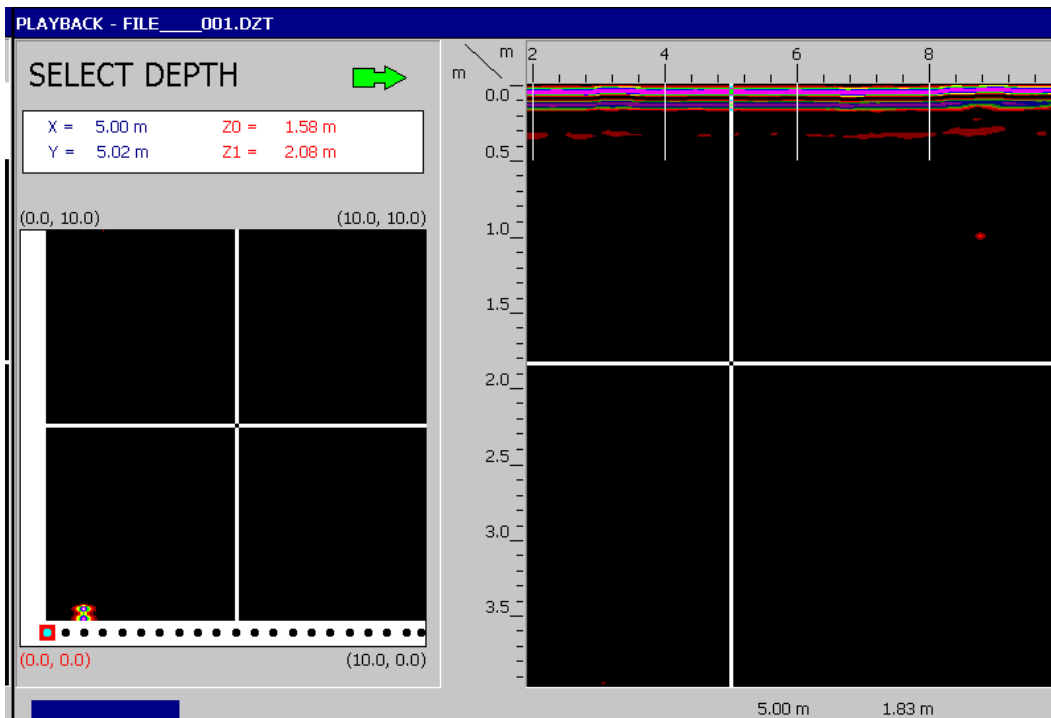


Figure 8. Site PLR22/2 GPR anomaly visualization.

## 5.8. Site PLR 22/3

### Reported grave locality

A 3 m by 10 m grid, 1 m away from and parallel to the wall over the indicated area was surveyed.

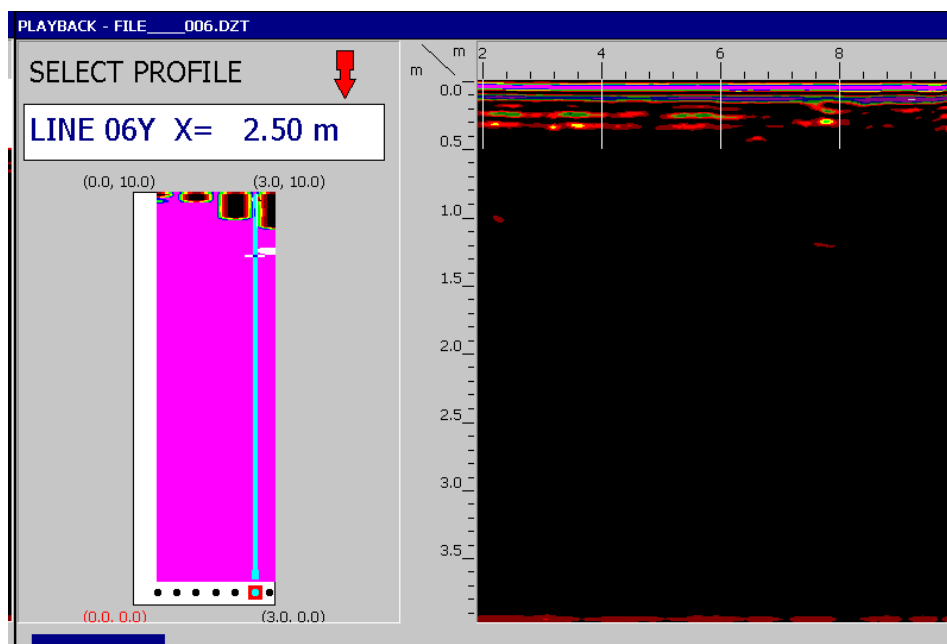


Figure 9. Site PLR22/3 GPR anomaly visualization.

## Location

Grid datum - PLR 223 at south western corner of grid

## Survey results

The surface in this locality was heavily disturbed by a mechanical excavator. Anomalies were observed but cannot be assessed due to the disturbance (Fig. 9).

## Recommendations

This survey is inconclusive due to the disturbance of the area. Archaeological test excavation in conjunctions with additional high frequency, high resolution GPR is recommended to further investigate the locality.

## Ground truthing and test excavation

This site was of particular interest as it was the first possible grave location to be pointed out by the community members on 26 May 2015. It was then pointed out for a second time by the same individual (the grandson of the relatives of the alleged deceased).



**Figure 10: IVN\_PGS\_22\_03 with the barricade partially removed on arrival before excavation work began**

The site was barricaded with danger tape to prevent any disturbance to the area, which was removed on arrival by PGS (Figure 10). The TLB was then supervised while carefully removing the top soil from the site (Figure 11). By removing the top soil, no changes in the soil matrix were noted that indicated the presence of a burial pit. Further, a test trench of 1.5m square was excavated within an area where the soil seemed less compacted. After systematically removing 30cm of the soil in the test trench it was concluded that no evidence of a grave was present (Figure 12).



**Figure 11: PGS staff supervising the TLB during the removal of the over burden and top soil.**



**Figure 12: IVN\_PGS\_22\_03 Test trench revealing no evidence of a burial pit**

## 5.9. Site PLR 22/4

### Reported grave locality

An 11 m by 3 m grid, 50 cm away from and parallel to the wall in a western direction over the indicated area was surveyed.

### Location

Grid datum - PLR 224 at north eastern corner of grid

## Survey results

Apart from the natural soil structures, as previously described for the general area, a single anomaly that could possibly represent a grave was observed (Fig. 13).

## Recommendations

The observed anomaly needs to be investigated by ground truthing and archaeological test excavation to determine if it is a grave.

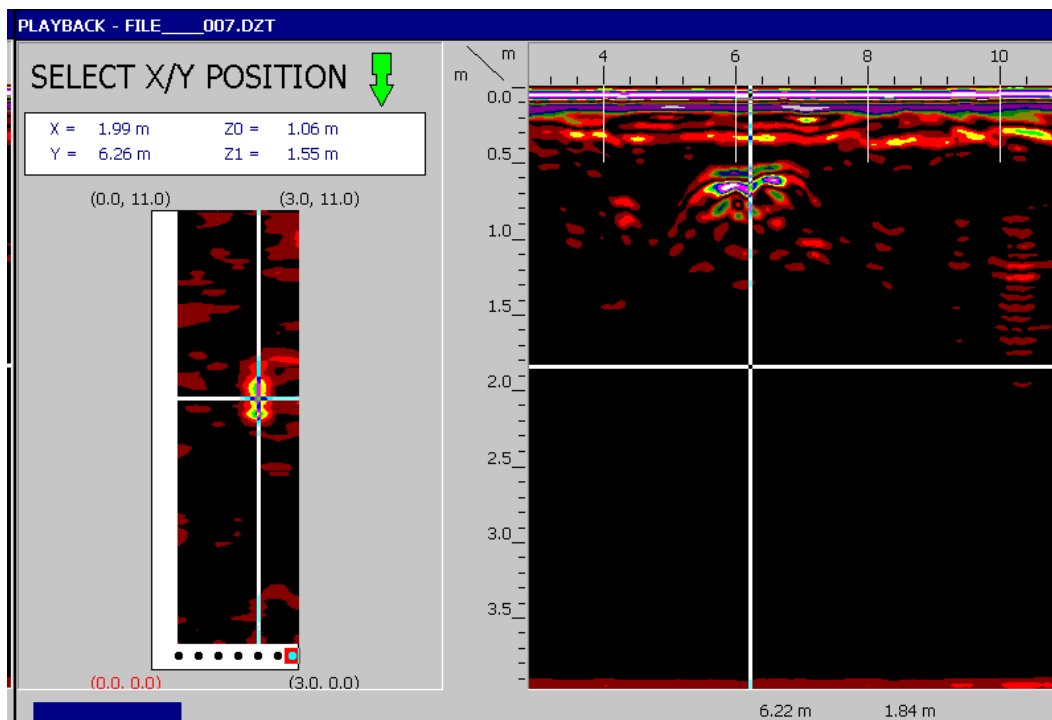


Figure 13. Site PLR22/4 GPR anomaly visualization.

## Ground truthing and test excavation

This site was pointed out by the grandson only during the second visit when an additional 7 sites were pointed out inside the box cut, walled area on 10 June 2015. The area had been barricaded with danger tape since the initial identification until 23 October 2015 (Figure 14). A test trench of 1.5m square was excavated. By removing the top soil, no changes in the soil matrix were noted that indicated the presence of a burial pit. After systematically removing 30cm of the soil in the test trench it was concluded that no evidence of a grave was present (Figure 15).





**Figure 14: IVN\_PGS\_22\_04 with the barricade partially removed on arrival before excavation work began**



**Figure 15: IVN\_PGS\_22\_04 Test trench revealing no evidence of a burial pit**

## 5.10. Site PLR 22/5

### Reported grave locality

A 2 m by 5 m grid, 50 cm away from and parallel to the wall in a western direction over the indicated area was surveyed.

### Location

Grid datum - PLR 225 at south eastern corner of grid

### Survey results

The surface at the site was previously disturbed and leveled and an electrical lamppost occurred in the middle of the area. Apart from the natural soil structures, as previously described for the general area, no other sub-surface features were observed (Fig. 16).

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

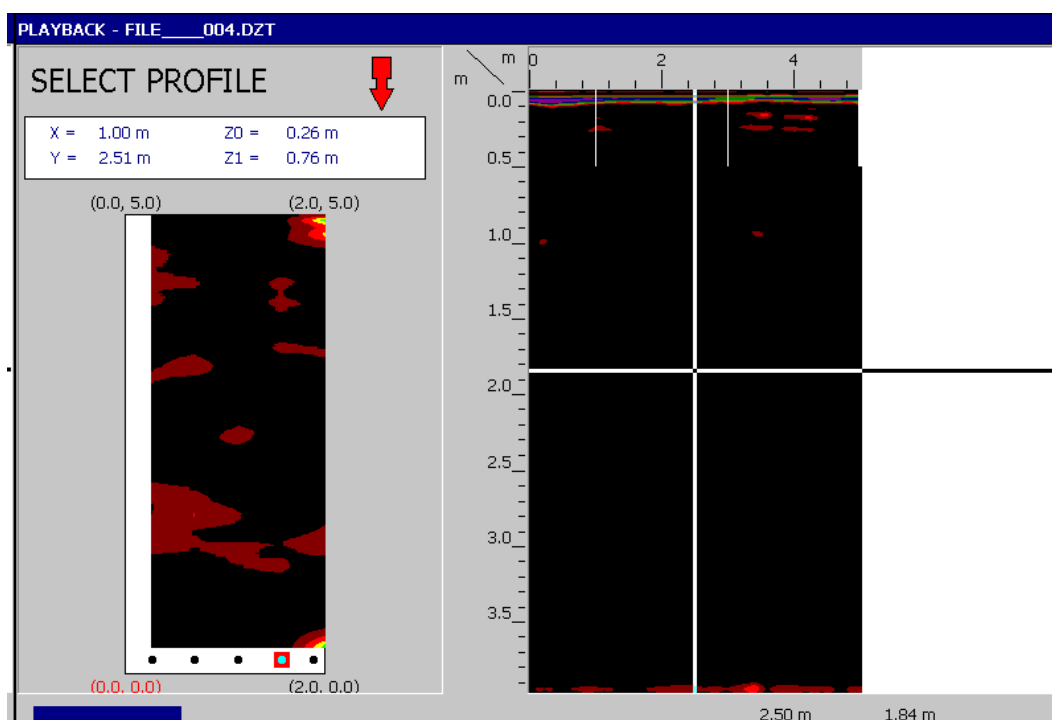


Figure 16. Site PLR22/5 GPR anomaly visualization.

## 5.11. Site PLR 22/6

### Reported grave locality

A 5 m by 5 m grid over the indicated area was surveyed.

### Location

Grid datum - PLR 226 at south eastern corner of grid

## Survey results

The surface at the site was previously disturbed and leveled with indications that concrete was mixed at the location. Apart from the natural soil structures, as previously described for the general area, no other sub-surface features were observed apart from anomalies that might indicate metal (Fig. 17).

## Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

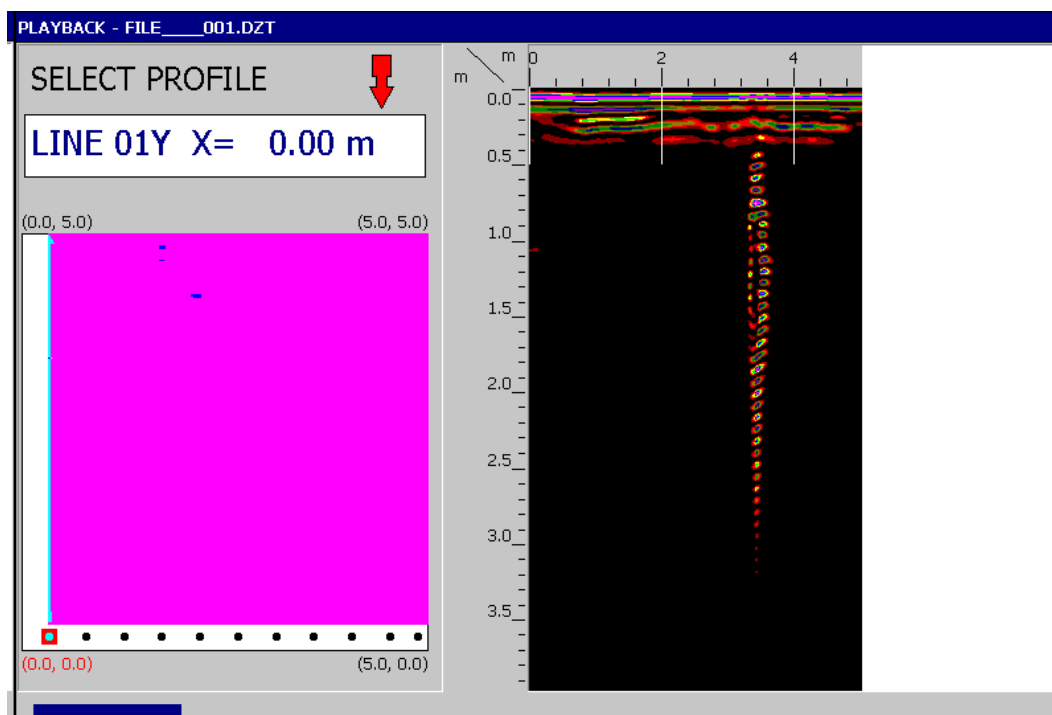


Figure 17. Site PLR22/6 GPR anomaly visualization.

## 5.12. Site PLR 22/7

### Reported grave locality

Due to the presence of metal stakes at the site no grid could be surveyed. Three parallel lines of data covering the indicated locality were surveyed.

### Location

Grid datum - PLR 227 indicates middle of area

### Survey results

Apart from the natural soil structures, as previously described for the general area, no other sub-surface features were observed.

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.



### 5.13. Site PLR 20150705 Site 1 (Included in subsequent survey as PLR 05B01)

#### Reported grave locality

A 4 m by 8 m grid over the indicated area was surveyed where members of the community alleged that two graves were present as represented by low mounds of earth and rocks at the site. To protect the surface features from damage during the survey the eastern structure was covered with a tarpaulin during the survey (Fig. 18).



Figure 18. PLR 20150705 Site 1 surface features.

#### Location

Grid datum - PLR 20150705SITE1 at south western corner of grid

#### Survey results

Apart from the natural soil structures, as previously described for the general area, no other sub-surface features were observed (Fig. 19).

#### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.



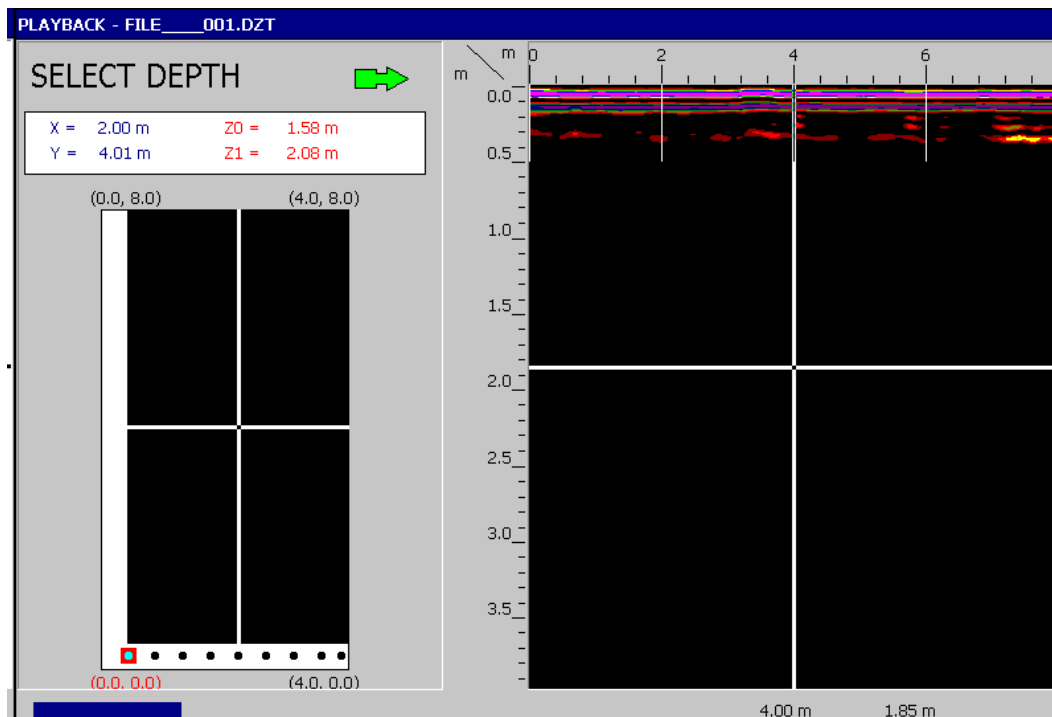


Figure 19. Site PLR 20150705 Site 1 GPR anomaly visualization.

## 5.14. Site PLR 7 Grave no 6,7,8 & 9

### Reported grave locality

The Monyamane and Malautsi families claimed the graves of four stillborn children at this locality. Two of which were buried in the main rondawel of the homestead that used to be here according to them and another two children in the kitchen. Surface features visible on the surface are consistent with their claims for the existence of an old homestead. A GPR survey was conducted in a 15 m by 20 m grid, oriented due north, at 1 m intervals in two directions (in zigzag fashion)

### Location

The location waypoint was taken at south-western corner of the grid (refer Table 1).

### Survey results

Sub-surface anomalies observed at this site are consistent with the claims for an old homestead consisting of several structures previously existing at the location (Fig. 20). The methodology employed did not allow for high resolution reconstruction in order to identify specific possible still born graves. It is also doubtful that these would be sufficiently different to be detectable by radar.

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 2.

## Recommendations

It is recommended that the location be included as a grave site and then be investigated archaeologically in the presence of the family to find and recover the graves reported to be here.

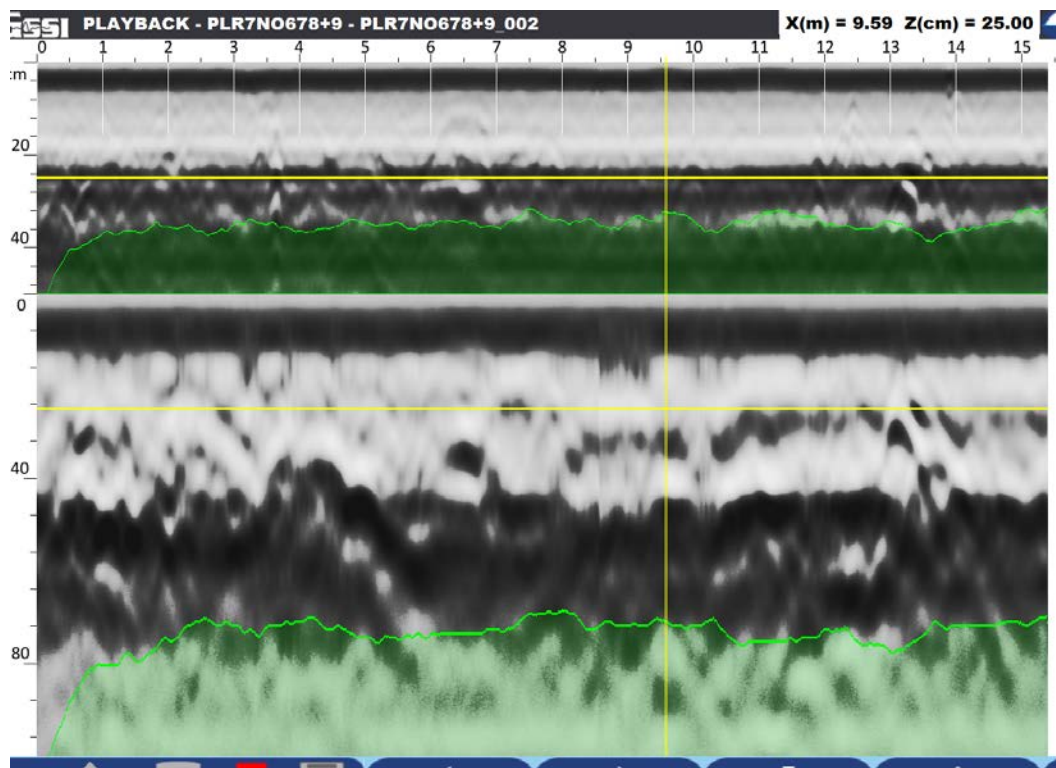


Figure 20. Site PLR 7 GPR anomaly visualization.

PLAYBACK FILE INFO		
FILE NAME FILE 001		
COMMENTS		
<b>RADAR PARAMETERS</b>	<b>POSITIONING</b>	<b>PROCESSING HISTORY</b>
Created 9/30/2015 11:52 AM	Scan Step 100 scans/m	HF Range Gain (dB)
Samples/Scan 512		-7 47 58 62
Scan Rate 150 Hz		62
Dielectric 20.0		Vert IIR High Pass 200 MHz
Antenna HF-800MHz		Vert IIR Low Pass 1500 MHz
Time Range 33.13 nS		Signal Floor Detection ON
Position Offset -11.09 nS		Horz IIR Stacking TC = 3
Antenna LF-300MHz		LF Range Gain (dB)
Time Range 66.25 nS		1 58 63 63
Position Offset -9.17 nS		66
		Vert IIR High Pass 100 MHz
		Vert IIR Low Pass 800 MHz
		Signal Floor Detection ON
		Horz IIR Stacking TC = 3

Table 2. Site PLR 7 field data processing and equipment settings.

## 5.15. Site PLR 9

### Reported grave locality

A GPR survey was conducted in a 17 m by 7 m grid, inside the fence erected at the graves and oriented accordingly, at 1 m intervals in two directions (in zigzag fashion). The pre-settings for 3D grids in the GSSI firmware were used to set up the telemetry.

### Survey results

Interference with the radar was experienced from the fence and complicated interpretation of the observed anomalies (Fig. 21).

Sub-surface anomalies were present but are complex (Fig. 22).

Basic field processing was done to enable the visualization of the GPR results. Processing steps were the same as indicated for PLR 7 (refer Table 2).

### Recommendations

It is recommended that the location be included as a grave site and then be investigated archaeologically in the presence of the family to find and recover the graves reported to be here.

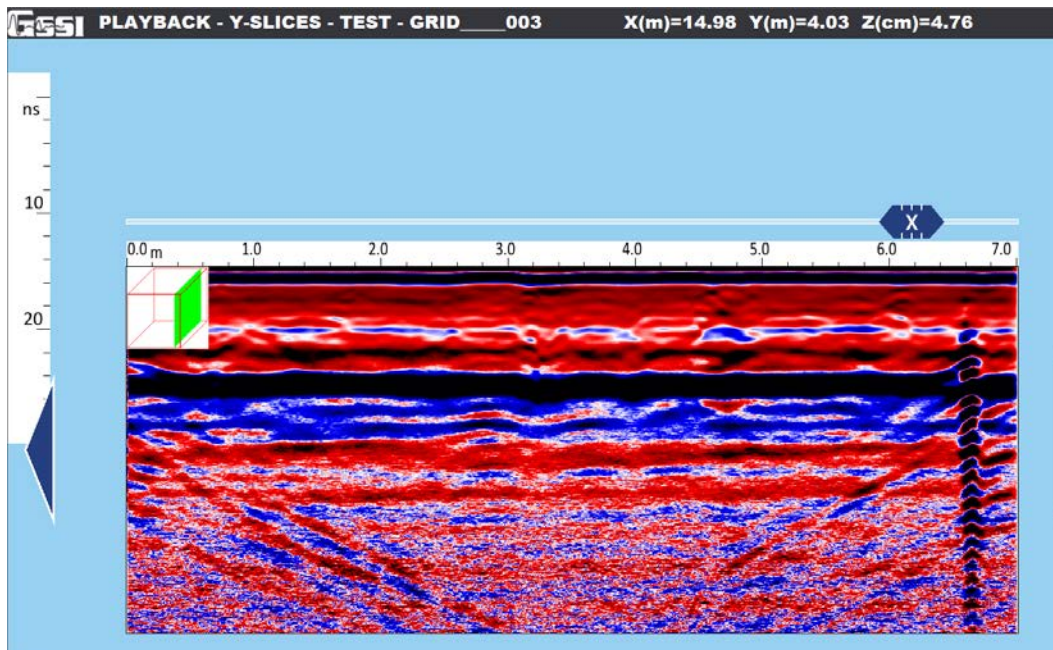


Figure 21. Site PLR 9 GPR anomaly visualization in 3D. Interference from the fence is evident.

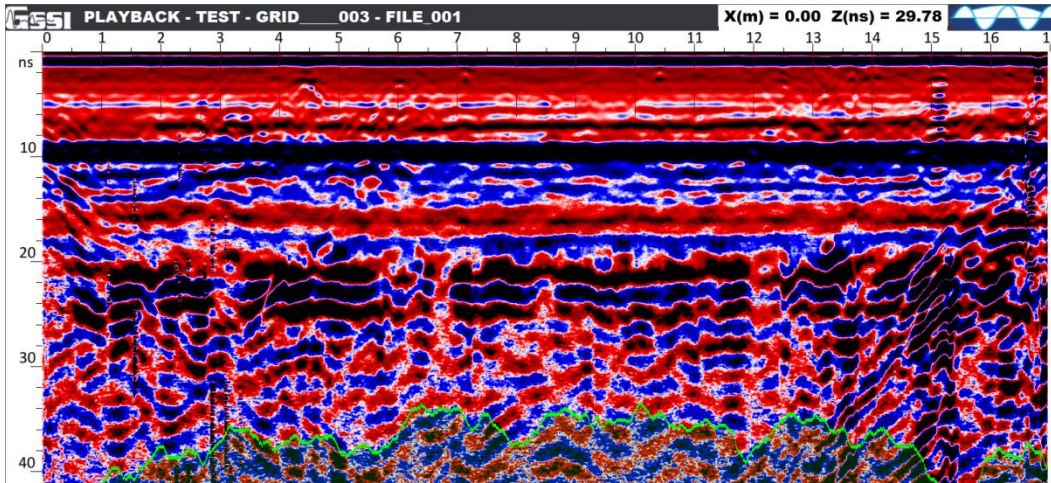


Figure 22. Site PLR 9 GPR anomaly visualization.

## 5.16. Site PLR 5A01

### Reported grave locality

A single line 2D survey was conducted parallel to the visible structure on the surface and inside the fence surrounding it.

### Survey results

Interference with the radar was experienced from the fence and complicated interpretation of the observed anomalies.

No anomalies consistent with the possible presence of a grave were observed (Fig. 23).

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 3.

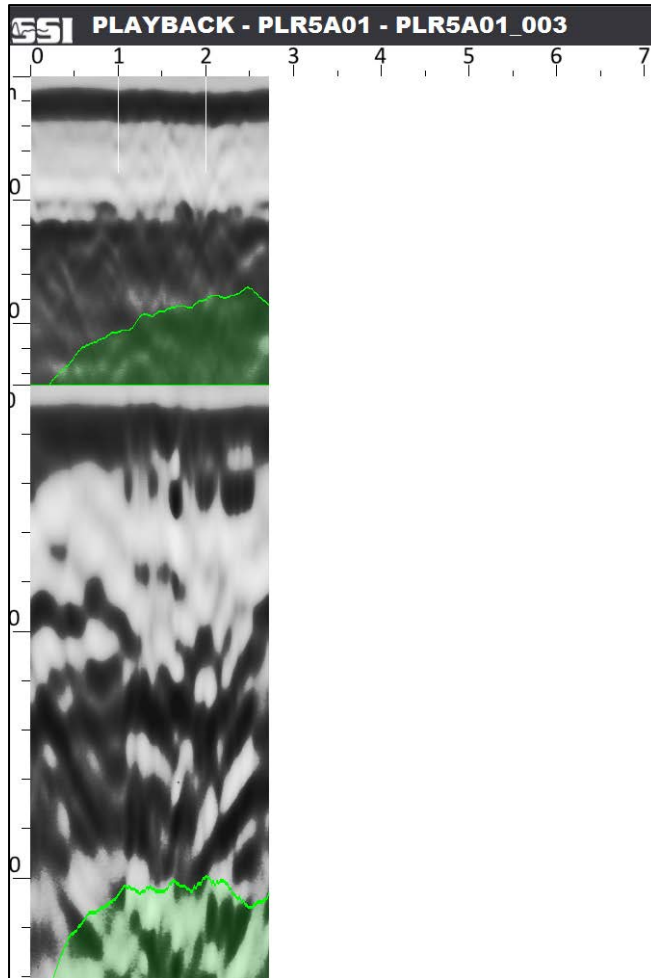
### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

PLAYBACK FILE INFO		
FILE NAME PLR5A01 001		
COMMENTS		
RADAR PARAMETERS	POSITIONING	PROCESSING HISTORY
Created 9/30/2015 2:50 PM	Scan Step 100 scans/m	HF Range Gain (dB) -13 31 36 36
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 9.0		Signal Floor Detection ON
Antenna HF-800MHz		LF Range Gain (dB) -2 35 47 47
Time Range 11.11 nS		Vert IIR High Pass 100 MHz
Position Offset -13.29 nS		Vert IIR Low Pass 800 MHz
Antenna LF-300MHz		Signal Floor Detection ON
Time Range 22.22 nS		
Position Offset -13.58 nS		

Table 3. Site PLR 5A01 field data processing and equipment settings.





**Figure 23. Site PLR 5A01 GPR anomaly visualization.**

## **5.17. Site PLR 23-1**

### **Reported grave locality**

A single rock on the surface was indicated as a possible grave.

A GPR survey consisting of two 2D lines in respectively east-west and north-south directions were surveyed and intersected at the rock.

### **Survey results**

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 4.

No anomalies consistent with the possible presence of a grave were observed (Fig. 24).

### **Recommendations**

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

PLAYBACK FILE INFO		
FILE NAME PLR23 1 001		
COMMENTS		
RADAR PARAMETERS	POSITIONING	PROCESSING HISTORY
Created 10/1/2015 8:32 AM	Scan Step 100 scans/m	HF Range Gain (dB) -7 26 41 45
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 9.0		Signal Floor Detection ON
Antenna HF-800MHz		LF Range Gain (dB) 0 23 46 46
Time Range 11.11 nS		Vert IIR High Pass 100 MHz
Position Offset -13.29 nS		Vert IIR Low Pass 800 MHz
Antenna LF-300MHz		Signal Floor Detection ON
Time Range 22.22 nS		
Position Offset -13.58 nS		

Table 4. Site PLR 23-1 field data processing and equipment settings.

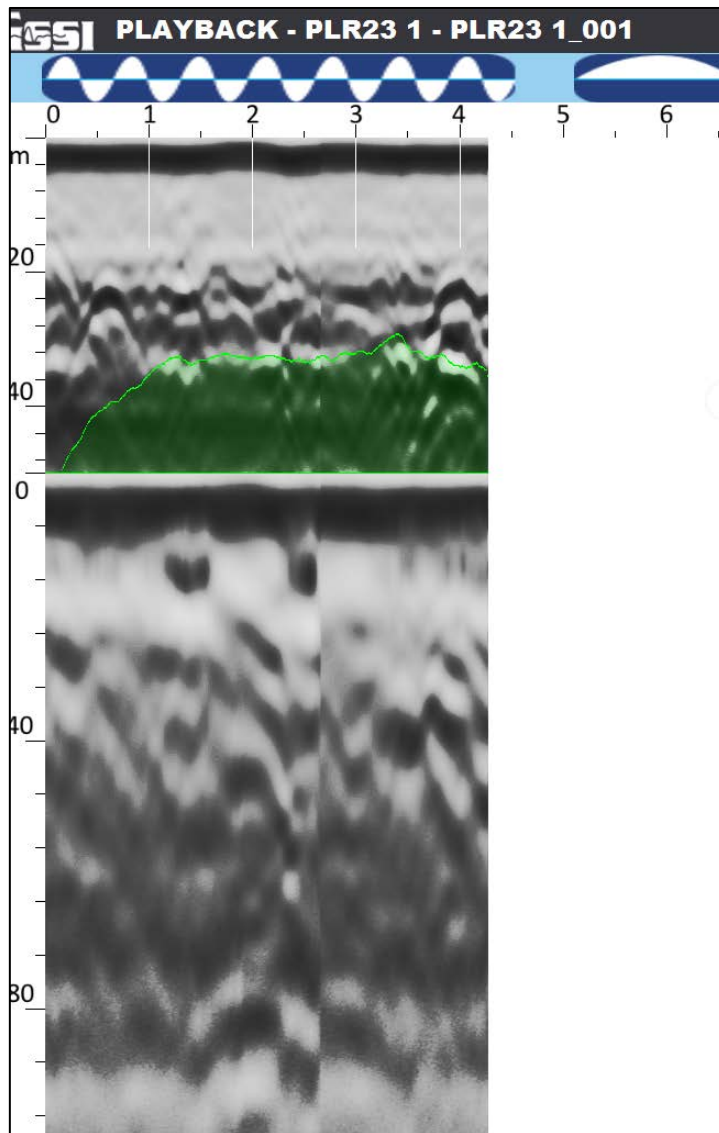


Figure 24. Site PLR 23-1 GPR anomaly visualization.

## 5.18. Site PLR 73-1

### Reported grave locality

Reported location of a grave in the general area.

A GPR survey was conducted in a 15 m by 30 m grid, oriented due north, and at 1 m intervals in two directions (in zigzag fashion) as per the 3D setup indicated in the GSSI firmware.

The grid was expanded to the south and east of the datum and an additional 10 m by 27 m was surveyed in the same way.

### Location

The location waypoint was taken at south-western corner of the original grid (refer Table 1).

### Survey results

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 5.

Sub-surface anomalies observed at this site are consistent with the claims for an old homestead consisting of several structures previously existing at the location (Fig. 25). The methodology employed did not allow for high resolution reconstruction in order to identify specific possible still born graves. It is also doubtful that these would be sufficiently different to be detectable by radar.

### Recommendations

It is recommended that the location be included as a grave site and then be investigated archaeologically in the presence of the family to find and recover the graves reported to be here.

PLAYBACK FILE INFO		
FILE NAME	FILE	001
COMMENTS		
RADAR PARAMETERS	POSITIONING	PROCESSING HISTORY
Created 10/1/2015 2:39 PM	Scan Step 100 scans/m	HF Range Gain (dB) -10 49 57 60
Samples/Scan 512		60
Scan Rate 150 Hz		Vert IIR High Pass 200 MHz
Dielectric 20.0		Vert IIR Low Pass 1500 MHz
		Signal Floor Detection ON
		Horz IIR Stacking TC = 3
Antenna HF-800MHz	GRID PARAMETERS	
Time Range 33.13 nS	X Y	
Position Offset -11.09 nS	Start 0 0	LF Range Gain (dB) -1 60 62 62
	End 10 10	65
Antenna LF-300MHz	Space 1 1	Vert IIR High Pass 100 MHz
Time Range 66.25 nS		Vert IIR Low Pass 800 MHz
Position Offset -9.17 nS		Signal Floor Detection ON
		Horz IIR Stacking TC = 3

Table 5. Site PLR 73-1 field data processing and equipment settings.

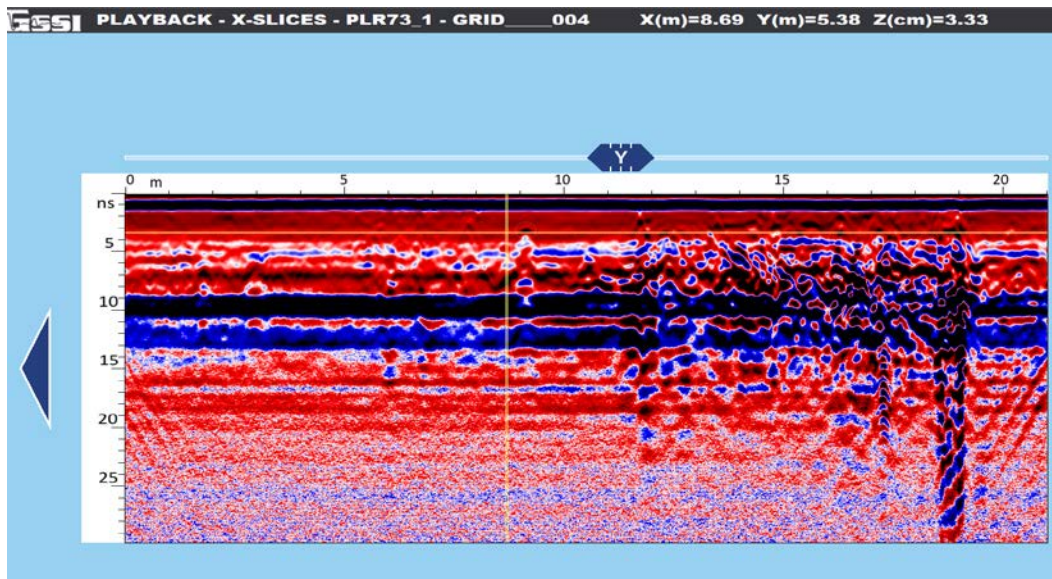


Figure 25. Site PLR 23-1 GPR anomaly visualization.

## 5.19. Site PLR 70

### Reported grave locality

A GPR survey was conducted inside the fence around the structure. It consisted of a 10 m by 21 m grid oriented along the fence, at 1 m intervals in two directions (in zigzag fashion) as per the GSSI firmware setup.

The baseline orientation was 228° east of north

### Location

The location waypoint was taken at south-western corner of the grid (refer Table 1).

### Survey results

Interference with the radar was experienced from the fence and complicated interpretation of the observed anomalies.

No anomalies consistent with the possible presence of a grave were observed (Fig. 26 and 27). A single large anomaly approximately 3 m by 7 m big does occur at the location and possibly represents a pit structure.

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 6.

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.



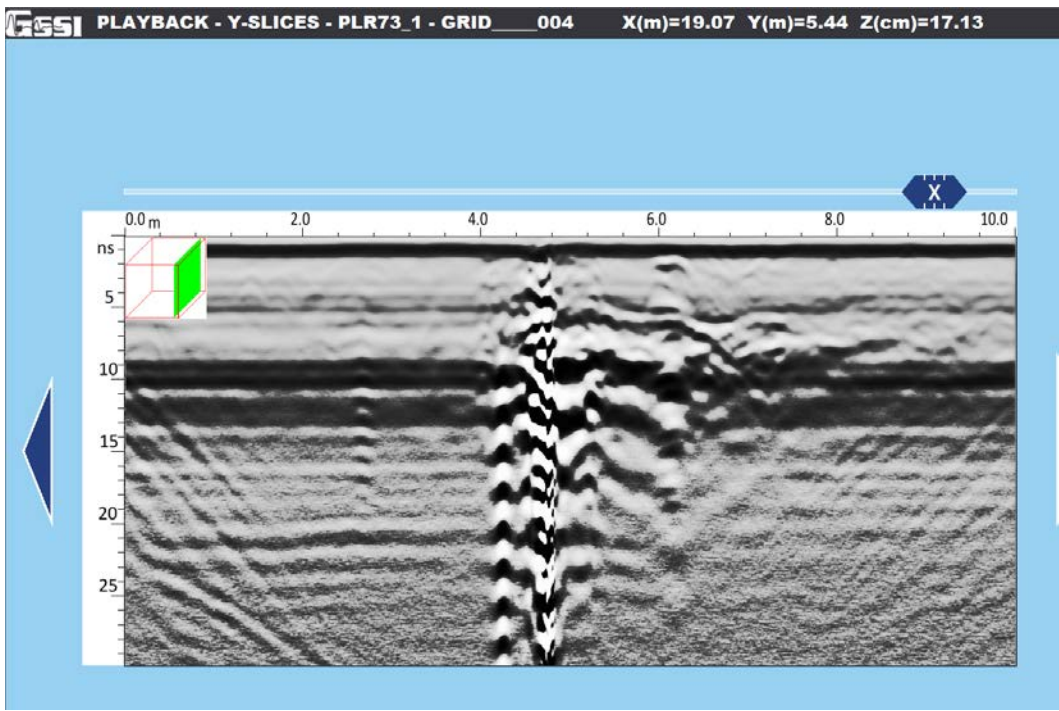
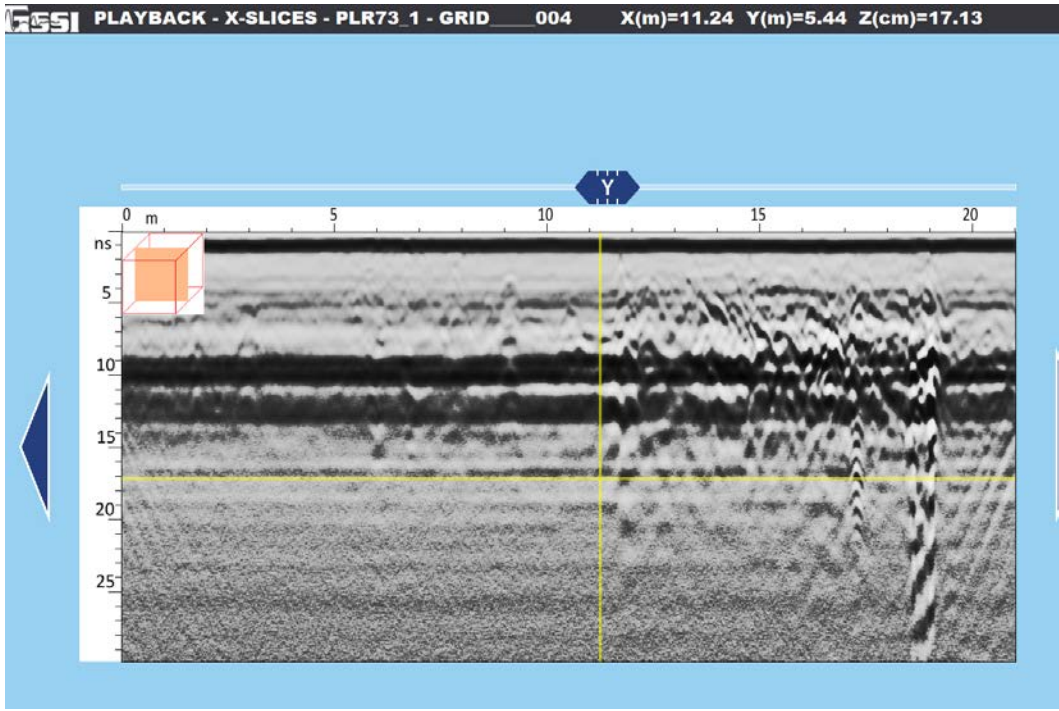


Figure 26. Site PLR 70 GPR anomaly visualization.

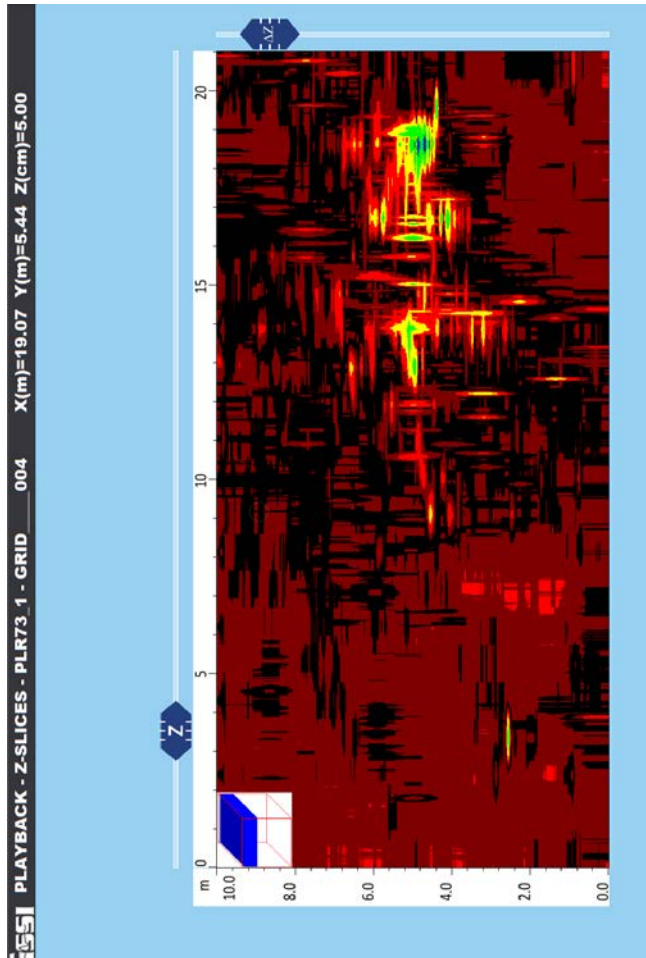


Figure 27. Site PLR 70 GPR anomaly 3D visualization.

PLAYBACK FILE INFO		
FILE NAME	FILE 001	
COMMENTS		
RADAR PARAMETERS	POSITIONING	PROCESSING HISTORY
Created 10/1/2015 12:14 PM	Scan Step 100 scans/m	HF Range Gain (dB) -9 46 55 57 59
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 20.0		Signal Floor Detection ON
		Horz IIR Stacking TC = 3
Antenna HF-800MHz	GRID PARAMETERS	LF Range Gain (dB) -2 52 64 64 65
Time Range 33.13 nS	X Y	Vert IIR High Pass 100 MHz
Position Offset -11.09 nS	Start 0 0	Vert IIR Low Pass 800 MHz
	End 21 10	Signal Floor Detection ON
Antenna LF-300MHz	Space 1 1	Horz IIR Stacking TC = 3
Time Range 66.25 nS		
Position Offset -9.17 nS		

Table 6. Site PLR 70 field data processing and equipment settings.

## 5.20. Site PLR 68

### Reported grave locality

This location contained surface rocks indicated in the Digby-Wells survey as a possible grave.

Two single line surveys (2D) were conducted separately in a north-south and east-west direction and intersected at the prominent rocks on the surface.

### Survey results

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 7.

No anomalies consistent with the possible presence of a grave were observed (Fig. 28).

### Recommendations

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

PLAYBACK FILE INFO		
FILE NAME	PLR68_002	
COMMENTS		
RADAR PARAMETERS	POSITIONING	PROCESSING HISTORY
Created 10/1/2015 1:18 PM	Scan Step 100 scans/m	HF Range Gain (dB) -14 31 36 36
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 9.0		Signal Floor Detection ON
Antenna HF-800MHz		LF Range Gain (dB) 1 28 46 52
Time Range 11.11 nS		Vert IIR High Pass 100 MHz
Position Offset -13.29 nS		Vert IIR Low Pass 800 MHz
Antenna LF-300MHz		Signal Floor Detection ON
Time Range 22.22 nS		
Position Offset -13.58 nS		

Table 7. Site PLR 68 field data processing and equipment settings.

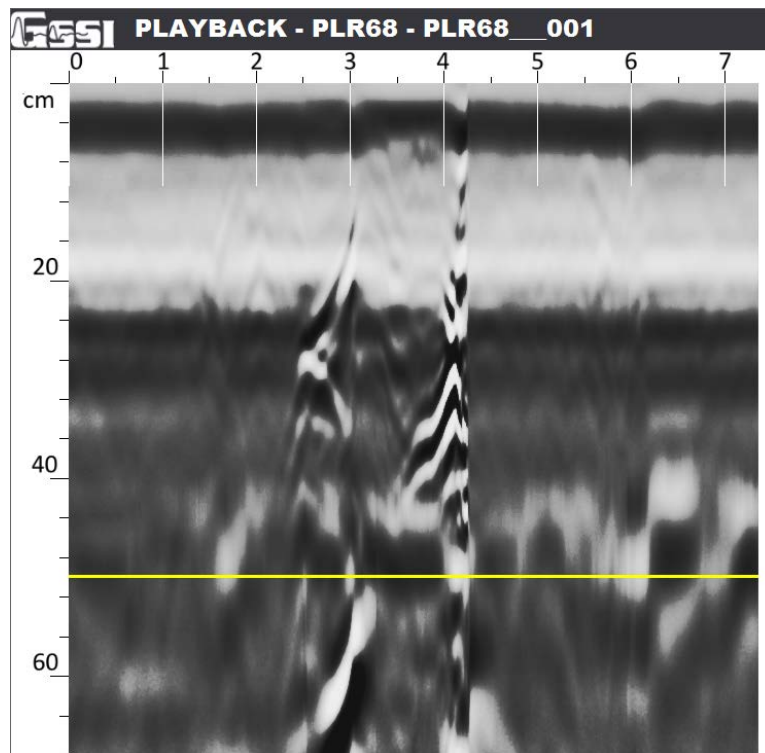


Figure 28. Site PLR 68 GPR anomaly visualization.

## **5.21. Site PLR 74**

### **Reported grave locality**

A single rock on the surface reportedly marking a grave was investigated.

Two single line surveys (2D) were conducted separately in a north-south and east-west direction and intersected at the prominent rocks on the surface.

### **Survey results**

No anomalies consistent with the possible presence of a grave were observed.

### **Recommendations**

No anomalies consistent with the presence of graves were observed at this locality, no further actions are required.

## **5.22. Site PLR 77**

### **Reported grave locality**

Three stillborn children are claimed to be buried at this locality. Surface features visible on the surface are consistent with their claims for the existence of an old homestead. A GPR survey was conducted in a 10 m by 10 m grid, oriented due north, at 1 m intervals in two directions (in zigzag fashion)

### **Location**

The location waypoint was taken at south-western corner of the grid (refer Table 1).

### **Survey results**

Sub-surface anomalies observed at this site are consistent with the claims for an old homestead consisting of several structures previously existing at the location (Fig. 29 and 30). The methodology employed did not allow for high resolution reconstruction in order to identify specific possible still born graves. It is also doubtful that these would be sufficiently different to be detectable by radar.

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 8.

### **Recommendations**

It is recommended that the location be included as a grave site and then be investigated archaeologically in the presence of the family to find and recover the graves reported to be here.



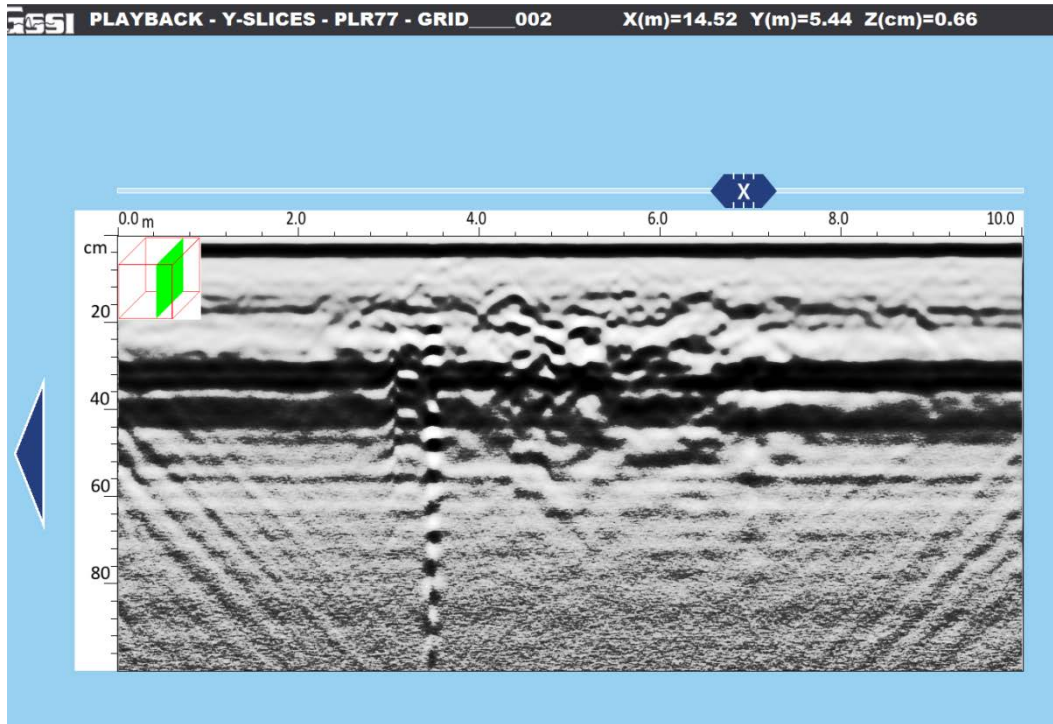


Figure 29. Site PLR 77 GPR anomaly visualization.

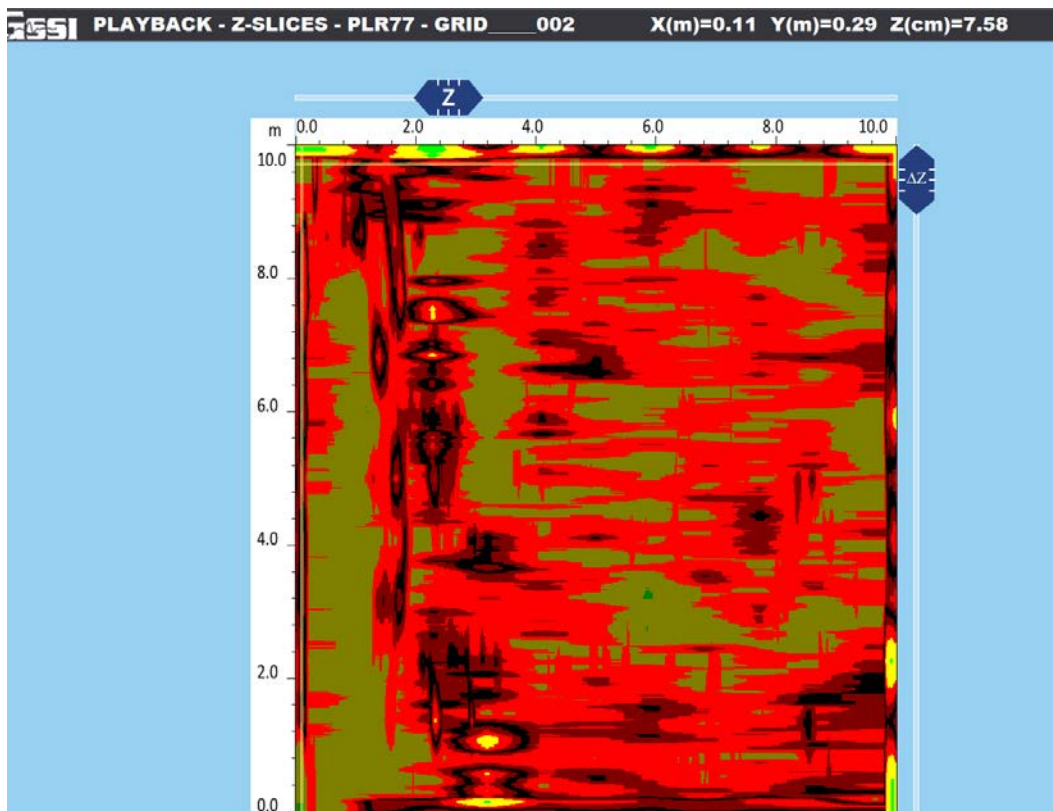


Figure 30. Site PLR 77 GPR anomaly 3D visualization.

PLAYBACK FILE INFO		
FILE NAME	FILE 001	
COMMENTS		
<b>RADAR PARAMETERS</b>	<b>POSITIONING</b>	<b>PROCESSING HISTORY</b>
Created 10/1/2015 2:39 PM	Scan Step 100 scans/m	HF Range Gain (dB) -10 49 57 60 60
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 20.0		Signal Floor Detection ON
		Horz IIR Stacking TC = 3
Antenna HF-800MHz	<b>GRID PARAMETERS</b>	
Time Range 33.13 nS	X Y	LF Range Gain (dB) -1 60 62 62 65
Position Offset -11.09 nS	Start 0 0	Vert IIR High Pass 100 MHz
	End 21 10	Vert IIR Low Pass 800 MHz
Antenna LF-300MHz	Space 1 1	Signal Floor Detection ON
Time Range 66.25 nS		Horz IIR Stacking TC = 3
Position Offset -9.17 nS		

**Table 8. Site PLR 77 field data processing and equipment settings.**

## 5.23. Site PLR 63

### Reported grave locality

The reported grave of a 9 month old child at an old homestead was investigated.

Two single line surveys (2D) were conducted separately in a north-south and east-west direction and intersected at the marked structure rocks on the surface.

### Survey results

Sub-surface anomalies observed at this site are consistent with the claims for an old homestead consisting of several structures previously existing at the location (Fig. 31). The methodology employed did not allow for high resolution reconstruction in order to identify specific possible child graves. It is also doubtful that these would be sufficiently different to be detectable by radar.

The terrain was also not suitable for this type of assessment.

Basic field processing was done to enable the visualization of the GPR results. Processing steps are indicated in Table 9.

### Recommendations

It is recommended that the location be included as a grave site and then be investigated archaeologically in the presence of the family to find and recover the graves reported to be here.

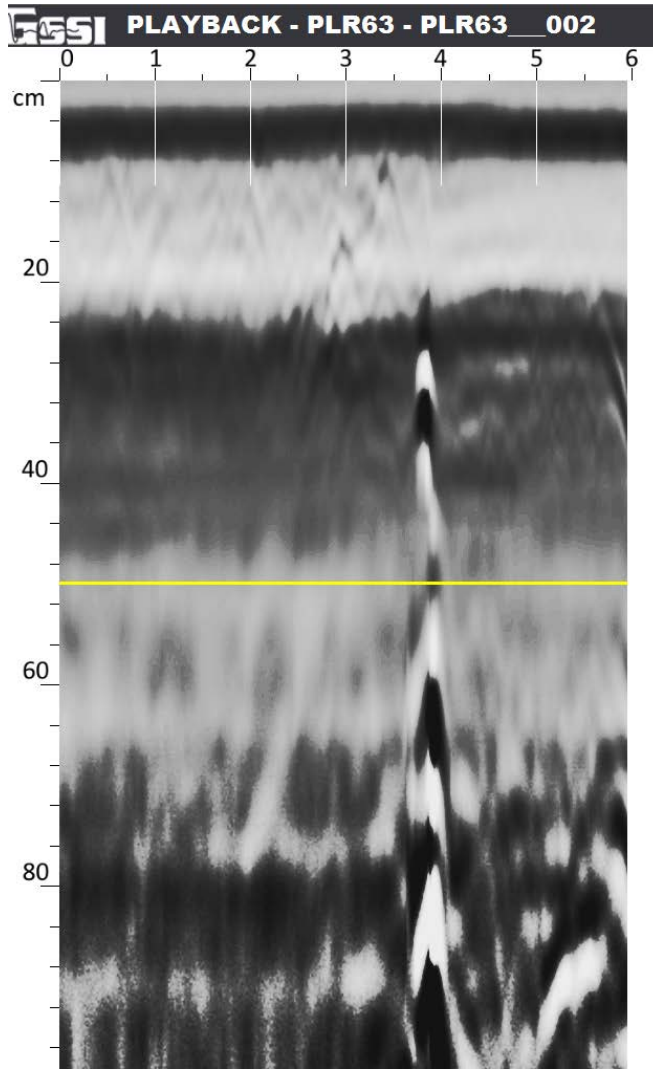


Figure 31. Site PLR 63 GPR anomaly visualization.

PLAYBACK FILE INFO		
FILE NAME	PLR63_002	
COMMENTS		
<b>RADAR PARAMETERS</b>	<b>POSITIONING</b>	<b>PROCESSING HISTORY</b>
Created 10/1/2015 3:44 PM	Scan Step 100 scans/m	HF Range Gain (dB) -14 29 35 35
Samples/Scan 512		Vert IIR High Pass 200 MHz
Scan Rate 150 Hz		Vert IIR Low Pass 1500 MHz
Dielectric 9.0		Signal Floor Detection ON
Antenna HF-800MHz		LF Range Gain (dB) 5 5 53 58
Time Range 11.11 nS		Vert IIR High Pass 100 MHz
Position Offset -13.29 nS		Vert IIR Low Pass 800 MHz
Antenna LF-300MHz		Signal Floor Detection ON
Time Range 22.22 nS		
Position Offset -13.58 nS		

Table 9. Site PLR 63 field data processing and equipment settings.

## 6. Conclusions

Several areas were surveyed and good results were achieved. The use of GPR to assess sub-surface anomalies at this site was able to conclusively indicate the absence of sub-surface anomalies due to the well-established and known soil geology in the general area. It was therefore possible to conclusively state at which of the above localities no graves were present. It was, however not possible to distinguish between graves and other general anomalies that are similar in size and extent. Where these are present additional ground truthing and archaeological test excavation was conducted to confirm whether the observed anomalies represent graves.

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