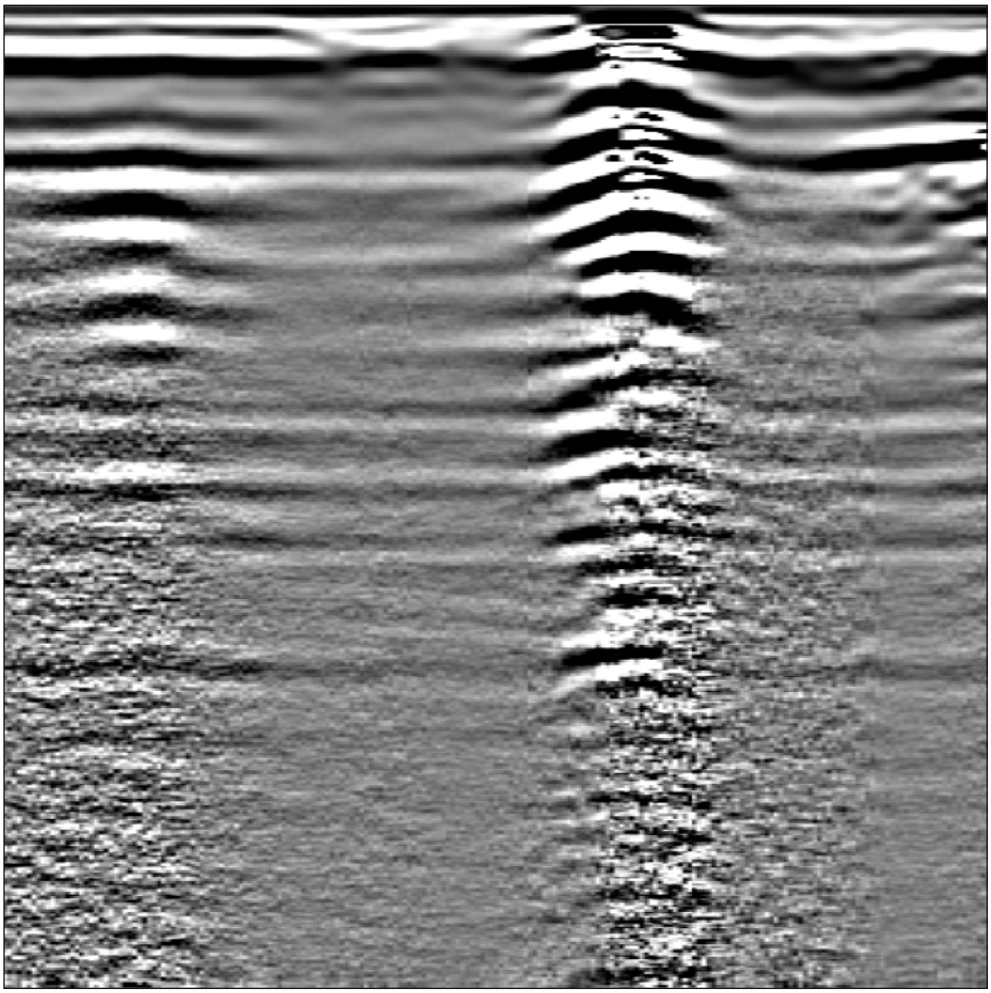
making sense of heritage

St Thomas The Martyr
Bristol, Somerset

Ground Penetrating Radar Survey Report



Ref: 111220.01
November 2015

geoservices

St Thomas The Martyr, Bristol, Somerset

Ground Penetrating Radar Survey Report

Prepared for:
The Churches Conservation Trust,
Society Building
8 All Saints Street
London,
N1 9RL

Prepared by:
Wessex Archaeology
Portway House
Old Sarum Park
SALISBURY
Wiltshire
SP4 6EB

www.wessexarch.co.uk

November 2015

WA Ref. 111220.01

Quality Assurance

Project Code	111220	**Accession Code**		**Client Ref.**	
Planning Application Ref.		**Ordnance Survey (OS) national grid reference (NGR)**	359120,172765		

Version	Status*	Prepared by	Checked and Approved By	Approver's Signature	Date
v01	I	*ECR*	*GJD*		
File:	X:\PROJECTS\111220_Reports\111220_StThomas_Draft_ECR.docx				
	E	*ECR*	*PAB*		04/12/15
File:	X:\PROJECTS\111220_Reports\111220_StThomas.docx				
File:					
File:					
File:					

* I= Internal Draft; E= External Draft; F= Final

St Thomas The Martyr, Bristol, Somerset

Ground Penetrating Radar Survey Report

Contents

Figures

Tables

St Thomas The Martyr, Bristol, Somerset

Ground Penetrating Radar Survey Report

Summary

Ground Penetrating Radar survey was conducted inside the church of St Thomas the Martyr, Bristol, Somerset with Ground Penetrating Radar (centred on NGR 359120,172765). The project was commissioned by the Churches Conservation Trust (CCT) with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features in particular features relating to the previous church and any associated crypts.

The site comprises the interior of St Thomas the Martyr Church, Bristol, with survey covering all accessible areas of the church with a total of 130 sq m surveyed with each radar antennae. The geophysical survey was undertaken during the 19-20th October 2015.

The ground penetrating radar survey has demonstrated the presence of a number of responses of potential archaeological interest. The responses identified are primarily linear features associated with the church heating system, a potential grave in the central aisles and possible structural elements near the altar. Further high amplitude responses may relate to rubble/disturbance relating to the rebuilding and remodelling of the church in the 17h century.

St Thomas The Martyr, Bristol, Somerset

Ground Penetrating Radar Survey Report

Acknowledgements

Wessex Archaeology would like to thank the Churches Conservation Trust for commissioning the geophysical survey. The assistance of Neil Rushton is gratefully acknowledged in this regard.

The fieldwork was undertaken by Lizzie Richley and Alistair Salisbury. Lizzie Richley processed the data and Jennifer Smith and Lizzie Richley interpreted the geophysical data and Lizzie Richley wrote the report. The geophysical work was quality controlled by Garreth Davey, Paul Baggaley and Lucy Learmonth. Illustrations were prepared by Lizzie Richley. The project was managed on behalf of Wessex Archaeology by Paul Baggaley.

St Thomas The Martyr, Bristol, Somerset

Ground Penetrating Radar Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by the Churches Conservation Trust to carry out geophysical survey at the church of St Thomas the Martyr, Bristol, Somerset (hereafter "the Site", centred on NGR 359120,172765). Ground Penetrating Radar (GPR) was undertaken over all accessible parts of the Site (**Figure 1**).

1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area. In particular the GPR survey was sought to ascertain the status of a potential crypt belonging to the preceding church structure.

1.1.3 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

1.2 Site location and topography

1.2.1 The Site of the church is located within the urban centre of Bristol, 110m from the river Severn and bordered on the north east and south by roads and on the west by a further building. In all directions around the Site are further buildings.

1.2.2 The Site is on a lower-lying flat area of land approximately 22m above Ordnance Datum (aOD). The Site comprises the tiled, open areas within the Church and as such was delimited by the presence of church furnishings such as pews and lecterns.

1.3 Soils and geology

1.3.1 The solid geology at the Site is sandstone of the Redcliffe Sandstone Member, a sedimentary bedrock formed approximately 200-251 million years ago with superficial tidal flat deposits of clay and silt formed up to 2 million years ago (BGS 2015).

1.3.2 The soils underlying the Site are unsurveyed due to urban and industrial setting of the (SSEW SE Sheet 5 1983).

1.4 Archaeological background

1.4.1 The following information is summarised from the Heritage Gateway website (www.heritagegateway.org.uk). A search was performed for all heritage assets within a mile radius of the Site in order to ascertain the archaeological potential of the Site.

Previous investigations

1.4.2 The heritage gateway contains no information regarding previous archaeological investigation in the vicinity of the Site.

Designated heritage assets

1.4.3 Several scheduled monuments are located within a mile radius of the Site. Within the immediate environs of the site (within *c.* 500m) is Buchanans Wharf (Historic England list entry 1202484) a grade II listed post medieval mill and granary, the Seven Stars Public House (Historic England list entry 1202634) which is a grade II listed post medieval Public house and 25-31 Victoria Street (Historic England list entry 1291692) which are Grade II.

1.4.4 A former wool hall dating to 1830 is located within 100m of the Site (past scape monument number ST58 SE 564).

Archaeological and historical context

1.4.5 The Heritage Gateway website contains no information regarding prehistoric, medieval and post-medieval monuments and find spots a within a mile radius of the Site.

1.4.6 The site is located within central Bristol and is surrounded by several listed monuments and historical buildings dating from the medieval to present day.

1.4.7 The church of St Thomas the Martyr is known to have been built before the beginning of the 13th century, although no remains of this original building are now visible. The church was repeatedly extended and rebuilt until the 15th century. During the late 18th century the building was demolished, all but the tower, and rebuilt. In the late 19th Century the building was completely reordered before being made redundant in 1982.

1.4.8 Online historic OS mapping sources were consulted, which indicate that the Site of the Church of St Thomas the Martyr has not altered in use since the late 18th century to present (OS County Series 1888-90).

2 METHODOLOGY

2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on the 19th and 20th October 2015. The survey area was completely sheltered, having been undertaken within the church building itself. Personal communication with staff of the Churches Conservation Trust at the Site informed the WA team that the area is prone to flooding with known crypt areas often filled with stagnant water (*pers.comms.* 2015). An area of 130 sq m was surveyed with the individual radar antennae.

2.1.2 Due to insufficient satellite and cell coverage within the Site, a Leica Viva RKT GNSS instrument was used to survey a number of positions outside of the church that were then be used to established a Leica Total Station Theodolite. This was then used to establish survey grid nodes within the Site. This mode of survey is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (2008).

2.1.3 The ground penetrating radar survey at the church of St Thomas the Martyr, was undertaken in accordance with the English Heritage guidelines (2008) for each technique employed. The data were collected in zigzag method.

2.2 Ground Penetrating Radar Survey

2.2.1 Ground penetrating radar survey was conducted within the church St Thomas the Martyr (Figure 1 & 2). Within the church several obstacles reduced the survey area, these were the Victorian benches and choir stalls that are permanent fixtures with the church.

2.2.2 The ground penetrating radar survey was conducted using a GSSI SIR 3000 with 400 MHz antenna and separately with a 900MHz. Both antennas were mounted on a sledge with survey wheel to record horizontal distances to attain maximum coverage within the Site. Data were collected at 60scans per unit (1 unit = 1 meter) along traverses spaced 0.25m apart with an effective time window of 100ns for the 400MHz survey and 20ns for the 900MHz survey. The GPR survey was undertaken in accordance with English Heritage guidelines (2008) and data were collected in the zigzag method.

2.2.3 Data from the survey were subjected to common radar correction processes. These comprised amplitude and wobble correction of the radar profile to correct for variance in temperature and soil moisture content, background and band pass filtering to remove noise in the data from the surrounding area and XYZ mean line to correct for mosaic effects from variance in the day to day conditions during survey. These steps were applied on both datasets collected at the Site.

2.2.4 The approximate depth conversion for the 400 MHz antenna is shown in Table 1 assuming the GPR pulse through the ground is 0.106m/ns and in Table 2 for the 900MHz antenna with the assumed GPR Pulsed through the ground transmitting at 0.153m/ns. It is possible to determine more precisely the average velocity of the GPR pulse through the ground if excavated features at a known depth can be identified in the data. Radargrams were analysed for suitable hyperbolic reflections, which can be used to determine the velocity of the GPR pulse through the subsurface deposits.

2.2.5 The Relative Dielectric Permittivity (RDP) of the bulk structure can be calculated using $K = \left(\frac{V_c}{V_r}\right)^2$ where K is the RDP, Vc speed of light in a vacuum and Vr the GPR pulse velocity.

Table 1 - Relative velocity to depth conversion based on a dielectric constant of 8.01 for the 400 MHz Antenna

Time Slice	Time (ns)	Depth (cm)
1	0-5.47	0-29
2	4.47-9.94	24-53
3	8.95-14.41	47-76
4	13.42-18.89	71-100
5	17.89-23.36	95-124
6	22.36-27.83	119-148
7	26.84-32.3	142-171
8	31.31-36.78	166-195
9	35.78-41.25	190-219
10	40.25-45.72	213-242
11	44.73-50.20	237-266
12	49.20-54.67	261-290
13	53.67-59.14	284-313
14	58.14-63.61	308-337
15	6.62-68.09	332-361
16	67.09-72.56	356-385
17	71.56-77.03	379-408
18	76.04-81.50	403-432
19	80.51-85.98	427-456
20	84.98-89.45	450-474

Table 2 - Relative velocity to depth conversion based on a dielectric constant of 3.84 for the 900 MHz Antenna

Time Slice	Time (ns)	Depth (cm)
1	0-1.09	0-8
2	0.89-1.99	7-15
3	1.79-2.88	14-22
4	2.68-3.78	21-29
5	3.58-4.67	27-36
6	4.47-5.57	34-43
7	5.37-6.46	41-49
8	6.26-7.36	48-56
9	7.16-8.25	55-63
10	8.05-9.14	62-70
11	8.95-10.04	68-77
12	9.84-10.93	75-84
13	10.73-11.83	82-90
14	11.63-12.72	89-97
15	12.52-13.62	96-104
16	13.42-14.51	403-111
17	14.31-15.41	109-118
18	15.21-16.30	116-125
19	16.1-17.2	123-132
20	17.0-17.89	130-137

2.2.6 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

3.1.1 The ground penetrating radar survey has identified several point reflectors and linear responses across the Site along with anomalous areas of high and low amplitude reflections. Results are presented as a series of greyscale timeslices, archaeological interpretations at a scale of 1:250 and radargrams (**Figures 3** to **5**) with black representing high amplitude responses and white relating to low amplitude responses.

3.1.2 The interpretation of the ground penetrating radar data highlights the presence of potential archaeological features, possible archaeological features and high amplitude responses alongside a series of linear trends (**Figure 4**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.

3.1.3 It should be noted that small features and water logged features may produce responses that are below the detection threshold of the GPR antenna. Excess disturbance in the form of excavation and demolition can also impede the ability of geophysical techniques to detect archaeology. It may therefore be the case that more archaeological features may be present than have been identified through geophysical survey.

3.1.4 A series of metal grills over heating pipes were encountered during the survey; metal reflects nearly all of the radar EM wave and as such produces strong reflective responses in the data. As such, linear anomalies that are related to these metal grills have not been discussed.

3.2 Ground Penetrating Radar 400 MHz results and interpretation

3.2.1 The 400MHz antenna shows a number of responses of potential archaeological interest (**Figures 3**-**5**). This antenna has the potential of detecting features to a depth of 4m in good conditions. Selected timeslices have been presented and interpreted (**Figures 3** and **4**) with the relative depths presented in **Table 1**.

3.2.2 Timeslice 1 displays the responses from the ground surface to a depth of approximately 29cm and reveals a range of responses of potential archaeological interest. At **4000**, a high amplitude response is present towards the south of westernmost aisle of the church. This anomaly is *c.* 2m by 2m. This is likely to extend beyond the survey extents and may present a grave or variations in the flooring such as different tiles. North of this response are a series of small high amplitude anomalies **4001**. These are too small to be individual graves with their sizes varying between 0.5cm and 0.7cm diameter. As such, these are likely to be related to the flooring. Following the aisles clockwise, **4002** and **4003**, indicate two strong high amplitude responses these are related to the pillars in the church and are likely to relate to the substantial foundations that these pillars would sit on. A response of some significance is **4004**, this represents a linear high amplitude response that lies within the central aisle of the church on and matches the alignment of the aisle. This response is some 3 m in length and approximately 1 m wide suggestive of a tomb. The radargram over this feature (radargram 89 **Figure 5**) show a disturbance in the data between 3 and 6 m, a clear hyperbole is not visible due to the orientation of the radar to the feature.

3.2.3 At end the eastern end of the chancel **4005**, shows a high amplitude linear response that extends west from the steps to the altar. This feature is some 1m in width by 2m in length, similar dimensions to **4004**. It is possible that this represents a similar feature; a potential grave.

3.2.4 The east end of the church contains several high amplitude responses, at **4006**, a series of small high amplitude reflections are located centrally of the southern extent of the eastern aisle. Similarly to those seen at **4001**, these are sub 1m in diameter suggesting they are related to the flooring as opposed to tombs or graves. The proximity to the surface dispels theories of these responses being related to any rubble, infill, or cavity associated with the historically referenced crypt.

3.2.5 At **4007**, a low amplitude response can be seen next to the southern choir stalls. It is unclear what this feature is but it may represent a cavity.

3.2.6 Responses in time slice 3 (47-75cm depth), show continuations of features revealed in timeslice 1. In particular at **4008**, the high amplitude response in the central aisle continues to be present and is revealed to be a much wider feature at this depth (*c.* 0.8 m). This is of potential archaeological interest. Further features that persist to this depth those at **4009**, which were identified in timeslice 1 at **4005**. This response is more clearly rectangular at this level and is mirrored by a similar response at **4010**. Initially this was considered to be a potential grave due to its similarity with **4007** in time slice 1, however with the appearance of **4010**, it is possible that these two are in fact related and represent structural features of the church and perhaps relate to the earlier crypt.

3.2.7 In close vicinity to the pulpit are **4011** and **4012**, small high amplitude responses. These have no clear shape and form and are perhaps related to the rubble and/or disturbance during the redesign of the church. Similar responses are seen at **4013** and **4014**, where the shape and form of the responses provide no clear context and as such are difficult to interpret.

3.2.8 Time slice 6 shows responses from a depth of between approximately 119 -148cm, and again, a number high amplitude responses have been revealed in the 400 MHz radar data. **4015** shows a continuation of the high amplitude responses seen in the chancel area in time slices 1 and 3. These features, alongside those seen at **4016** (linear response in the central aisle) have been in evidence in the results from the very first time slice and signify features of considerable size with a potential depth extent of 1.5m. It is highly probable that these are structural features and graves. In the north aisle a series of high amplitude responses can be seen at **4017.** These have no clear orientation or shape but are potentially related to the earlier church structure. At **4018**, a linear high amplitude response crosses the western aisle on an east to west alignment. This feature is approximately 0.5 m in width.

3.2.9 Timeslices 9 and 15 showing responses from 190-219cm and 332-361cm respectively show few responses in the aisles but show a number of potential archaeological responses in the east end of the church. **4019**, shows further continuation of the feature discussed in earlier timeslices giving credence to its interpretation as a structural feature due to its size. However in timeslice 15 it has lost its rectangular form and appears as small (*c.* 0.8 m diameter) high amplitude response. **4020** indicates a number of amplitude responses in the western extent of the chancel area of the church. These are spaced quite far apart and are unlikely to be related to one another and are likely to be caused by inconsistences in the ground surface perhaps as a result of rubble, compaction subsurface or geomorphological factors. **4021** shows a high amplitude response in close proximately to known metal pipework and may be related. Again, **4022**, shows the same feature as at **4019**, and **4023**, shows continuation of the disparate responses indicated at **4020**. The persistence of these features would suggest large scale disturbance in this area such as rubble or compaction.

3.2.10 Timeslice 19, the last depth to be discussed from the 400 MHz data shows very little change in the readings from aisles again but reveals a large high amplitude response in on the north side of the chancel in close proximity to the north choir stalls. This feature is present at an estimated depth of 4m and may be related to geology or foundations of the church.

3.3 Ground Penetrating Radar 900 MHz results and interpretation

3.3.1 The 900MHz antenna shows a number of responses of potential archaeological interest (**Figures 6**-**8**). This antenna has the potential of detecting features to a depth of 1.3 m in good conditions. Selected timeslices have been presented and interpreted (**Figures 6** and **4**) with the relative depths presented in **Table 2**.

3.3.2 The 900 MHz radar survey has revealed a number of responses of potential archaeological interest through the timeslices. Timeslice 1, showing responses to a depth of approximately 8cm, exposes few notable responses displaying a largely homogenous unit of ground pertaining to the current flooring. A high amplitude response at **5000** is attributed to the heating pipes for the church whilst **5001** is consistent with the high amplitude responses that were picked up in the 400 MHz survey of this area.

3.3.3 Timeslice 3 (c.14-22cm) at **5002** reveals some of the finer detail of the large scale high amplitude response that was identified in the 400 MHz data set (**Figure 4**; **4000**). Within the 900 MHz data set is possible to see a rectangular response that crosses the western aisle on an east to west alignment with several small sub 0.5cm diameter responses to the south. It is possible that these represent aspects of the flooring such as reinforcements, foundations or rubble beneath the tiles. **5003** shows a strong high amplitude response that is the continuation of **5001**. At **5004** a high amplitude response has been detected in close vicinity to the pulpit. This is similar to responses in the 400MHZ data and relates to the same feature.

3.3.4 In timeslice 6 (*c.* 34-43cm) it is possible to discern the high amplitude response in the central aisle that has been identified in the 400 MHz data however it is not as strongly present in this dataset (**5005).** A weak high amplitude response can be seen at **5006** in close proximity to the pulpit. This is similar to what was seen in the 400 MHz data timeslice 3 (**Figures 3** & **4**). **5007** shows continuation of the high amplitude responses detected near to the pulpit however they are much diminished in size.

3.3.5 A series of trends are particularly apparent in the next timeslice to be discussed; Timeslice 9 of the 900 MHz dataset. These are “artefacts” in the data that can sometimes arise through the process of data collection and are not related to archaeological features, These have been ignored in previous and later time slices from both datasets due to their origin as part of the data collection practise. At **5008**, a high amplitude anomaly can be see that is likely related to the responses detected in earlier timeslices (**5002**). **5009** shows further detail of the high amplitude responses in the chancel that extend west from the altar steps. This this depth it the shape of the feature is rectangular with a segment that runs southeast to northwest and a segment that extends west from the steps. High amplitude responses continue to be present near to the pulpit, **5010** but they are small scale and as such are difficult to give a firm interpretation to.

3.3.6 In timeslice 15 approximately 96-104cm depth, shows the continuation of the high amplitude responses in the central aisle; **5011**, and those in the chancel area near to the alter steps; **5012**. Timeslice 19 reveals no new notable responses.

4 CONCLUSION

4.1.1 The ground penetrating radar survey has been successful in detecting anomalies of archaeological interest. The radar survey has revealed a number of high amplitude anomalies of potential archaeological interest, however none of which can conclusively be interpreted as belonging to a crypt type structure.

4.1.2 The main aim of this survey was to ascertain the presence and the state of the crypt purported in historic documents to be beneath the current church. Work done at the church, such as the insertion of a toilet in the north transept, revealed a tomb associated with the earlier crypt and a medieval arch in the southwest of the church also alludes to the presence of the earlier crypt. However, little is known about the state of the crypt beneath the main body of the church. Known documentation reveals conflicting information about the state of the crypt with potential theories that the extent of the crypt matches the footprint of the current church (*pers.comms. 2015).* If the crypt had a smaller footprint we would see variation in the results from the inner and outer areas of the crypt however as the crypt is thought to have the same footprint, these contrast cannot be seen. This means that it is difficult to say for certain whether the results show a crypt or not.

4.1.3 What has been revealed however is a high amplitude response in the central aisle from the 400 MHz antenna that represents a potential grave alongside two high amplitude responses extending west from the altar that resemble structural features that may be related to the crypt or foundations of the current church. The 900 MHz radar revealed increased detail of the high amplitude responses seen in southern part of the west aisle and corroborated the features identified in the central aisle and the chancel area by the 400 MHz antenna.

4.1.4 The survey has revealed several potential structural and funeral features of varying sizes and form. No further clear crypt features have been identified, however the lack of substantial evidence from the radar survey may not exclude the potential presence of crypts particularly considering the limitations on survey extent due to the church furniture.

5 REFERENCES

5.1 Bibliography

English Heritage, 2008.*Geophysical Survey in Archaeological Field Evaluation*. Research and Professional Service Guideline No 1, 2nd edition.

5.2 Cartographic and documentary sources

1888-90 OS County Series: Gloucestershire / 1:10,560

Soil Survey of England and Wales, 1983. *Sheet 5, Soils of Midland and Western England*. Ordnance Survey: Southampton.

5.3 Online resources

UK Soil Observatory, http://www.ukso.org [accessed November 2015]

British Geological Survey, http://www.bgs.ac.uk [accessed November 2015]

Heritage Gateway, http://www.heritagegateway.org.uk [access November 2015]

APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey Methods and Equipment – Ground Penetrating Radar

The ground penetrating radar (GPR) data were collected using a cart-based shielded antennae with central frequencies suitable for the types of target being investigated. Lower frequency antennae are able to acquire data from deeper below the surface, whereas higher frequencies allow high resolution imaging of near-surface targets at the expense of deep penetration. The exact make and model of equipment varies.

The depth of penetration of GPR systems is determined by the central frequency of the antenna and the relative dielectric permittivity (RDP) of the material through which the GPR signal passes. In general, soils in floodplain settings may have a wide range of RDPs, although around 8 may be considered average, resulting in a maximum depth of penetration c. 2.5m with the GPR signal having a velocity of approximately 0.1m/ns.

The GPR beam is conical in shape, however, and whilst most of the energy is concentrated in the centre of the cone, the GPR signal illuminates a horizontal footprint which becomes wider with increasing depth. At the maximum depth of the antenna, it becomes impossible to resolve any feature smaller than the horizontal footprint for the corresponding depth. The size of the footprint is dependent upon central frequency, and its size increases as the central frequency decreases.

The vertical resolution is similarly dependent upon the central frequency; for the 300MHz antenna, features of the order of 0.05m may be resolved vertically. Antennae with lower frequencies can therefore penetrate more deeply but are less resolute in both horizontal and vertical directions. Choice of antenna frequency is guided largely by the anticipated depth to the target and the required resolution.

GPR data for detailed surveys are collected along traverses of varying length separated by 0.5m with cross lines collected running perpendicular to these traverses at wider separations. The data sampling resolution is governed by the data logger and a minimum separation of 0.05m between traces is collected for all surveys.

Post-Processing

The radar data collected during the detail survey are downloaded from the GPR system for processing and analysis using commercial software (GPR Slice). This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

Typical data and image processing steps may include:

- Gain – Amplifies GPR data based upon its position in the profile, which boosts the contrast between anomalies and background. A wobble correction is also applied during this step;
- Background Filter - is used to remove banding noises that are seen across the radargrams
- Bandpass – Removes GPR data lying outside a specified range, which removes high- and low-frequency noise.

Typical displays of the data used during processing and analysis:

- Timeslice – Presents the data as a series of successive plan views of the variation of reflector energy from the surface to the deepest recorded response. The variation in amplitude is represented using a colour scale with red indicating high amplitude and blue indicating low amplitude responses.

- Radargram – Presents each radar profile in a vertical view with distance along the profile expressed along the x axis and depth along the y axis. The amplitude variation is expressed using a greyscale.

APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into four main categories: archaeological, modern, agricultural and uncertain origin/geological.

The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

The modern category is used for anomalies that are presumed to be relatively modern in date:

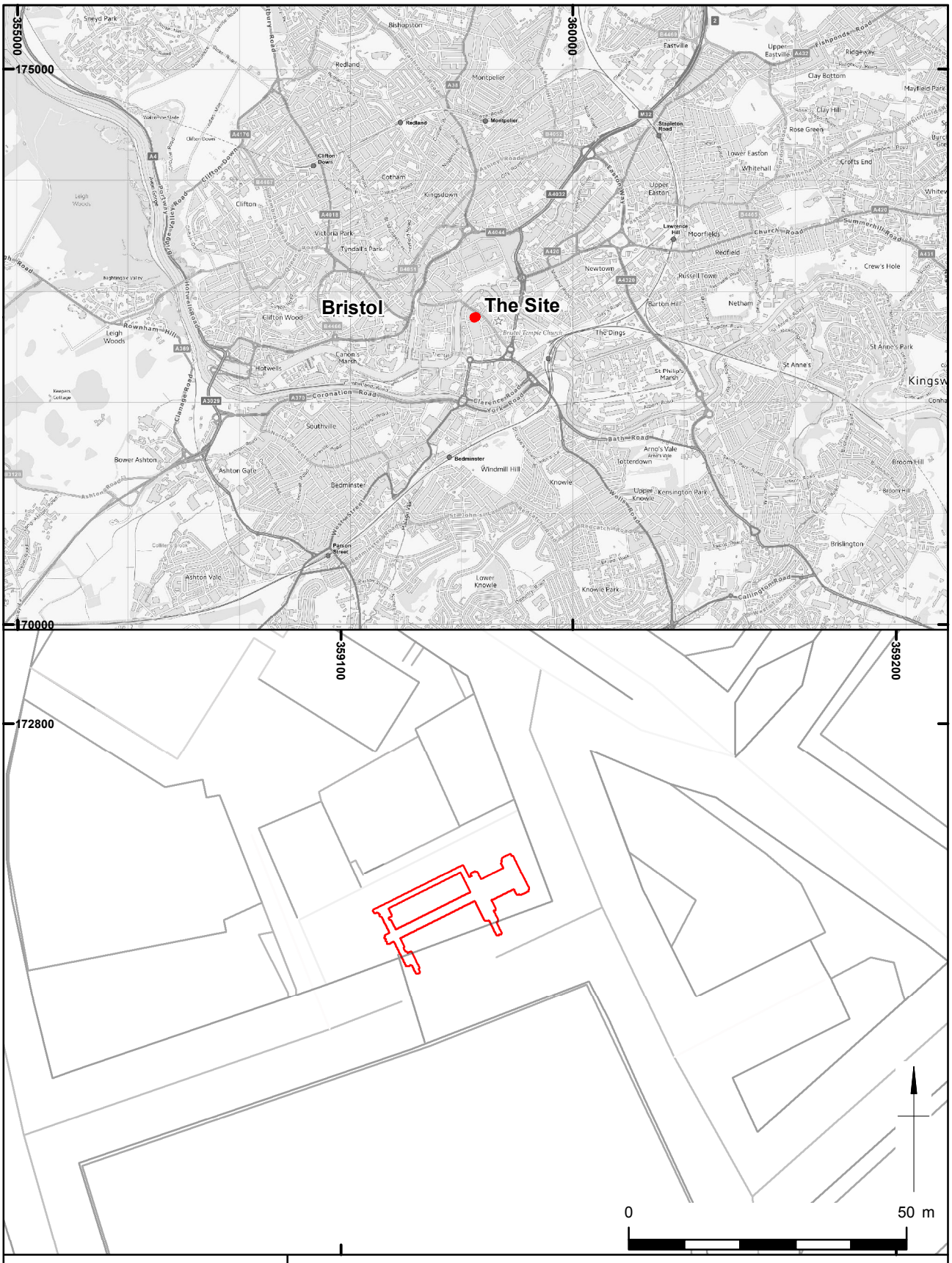
- High Ampitude Response – used for responses caused by buried material. These anomalies are of unknown modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Agricultural ditches – used for ditch sections that are aligned parallel to existing boundaries and former field boundaries that are not considered to be of archaeological significance.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Trend – used for low amplitude or indistinct linear anomalies.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.

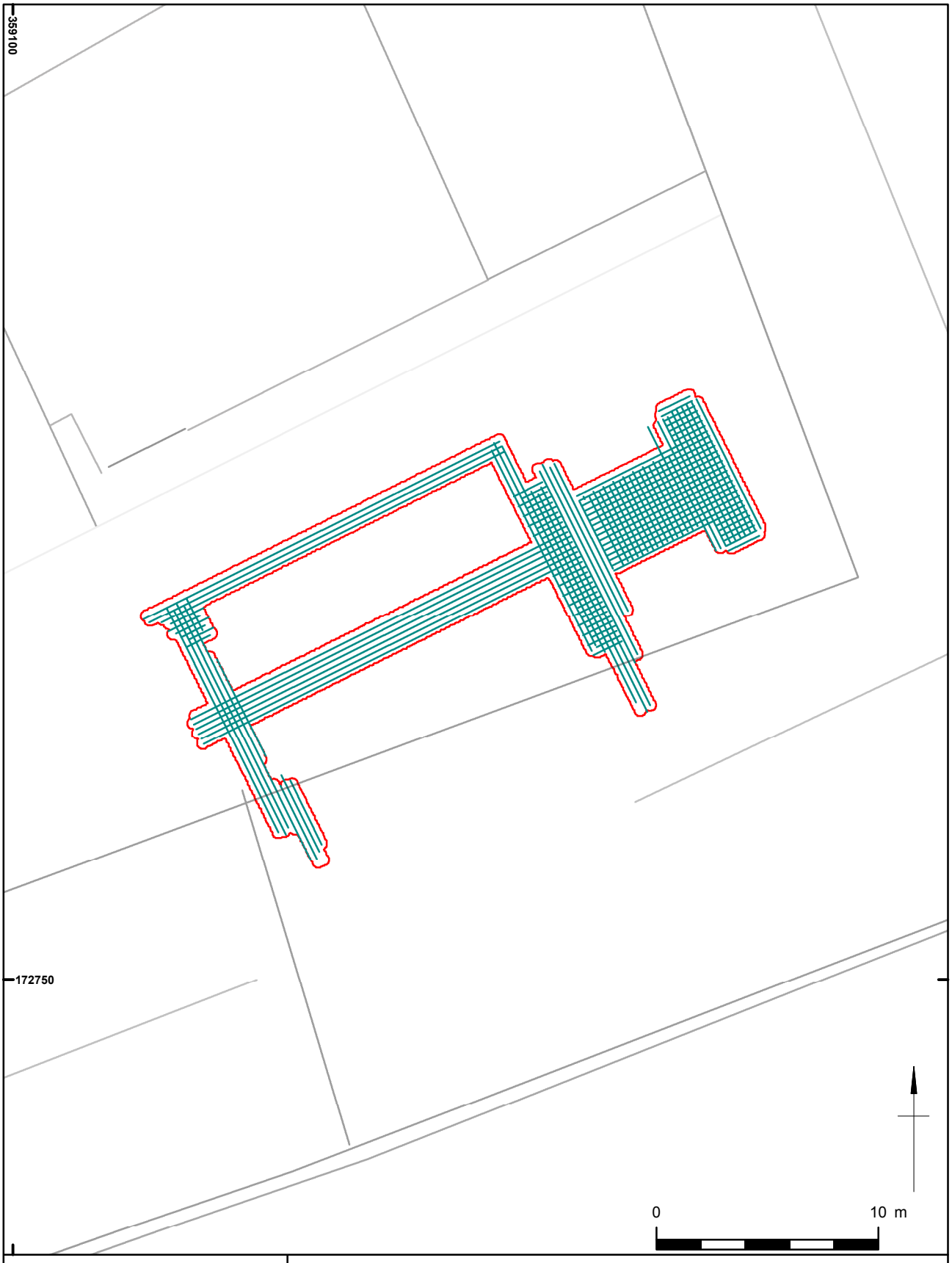


Detailed Survey Extents

Date:	10/11/2015	Revision Number:	0
Scale:	1:50000 and 1:1000 at A4	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

Site Location and GPR survey Extent

Figure 1



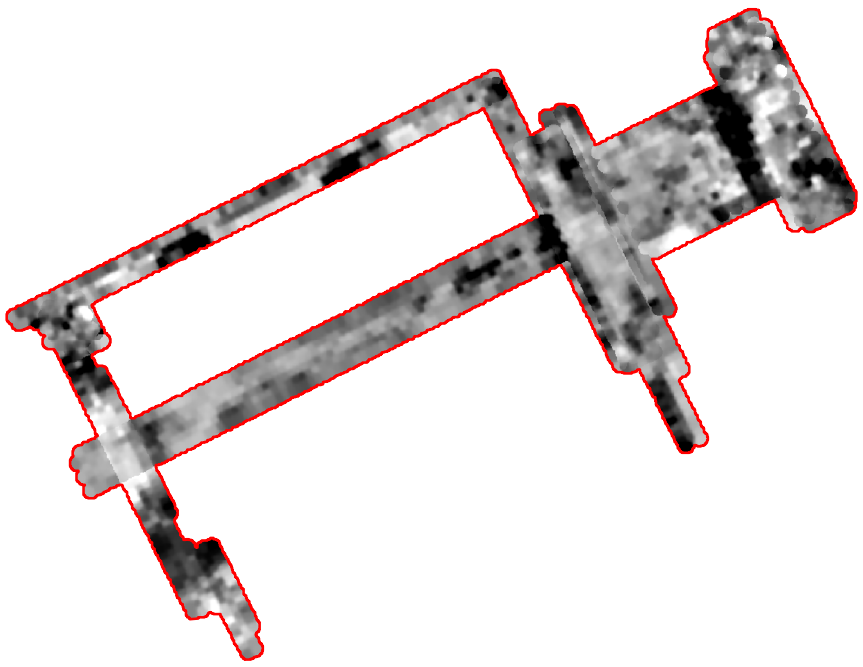
GPR Transects

Detailed Survey Extents

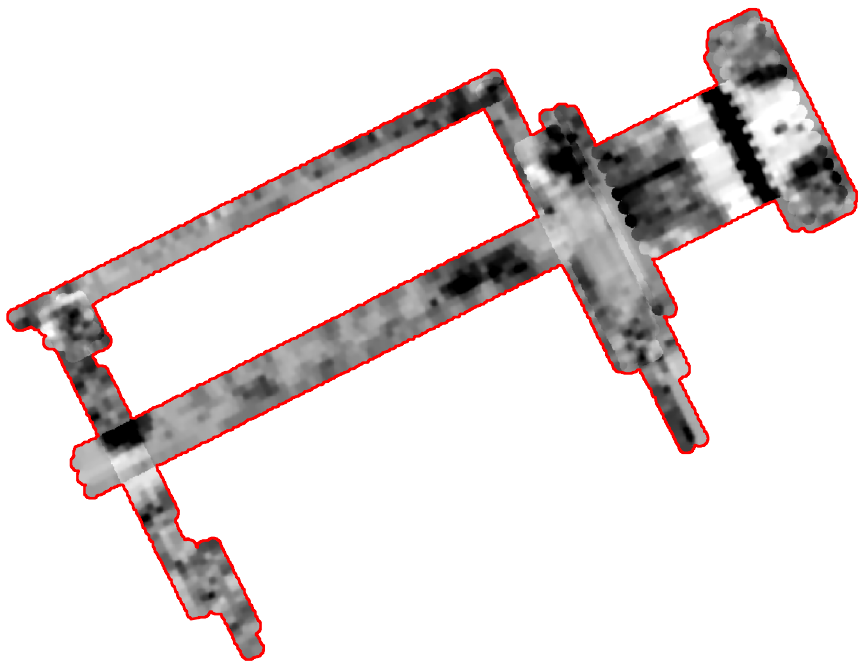
Date:	10/11/2015	Revision Number:	0
Scale:	1:250 at A4	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

GPR Transects

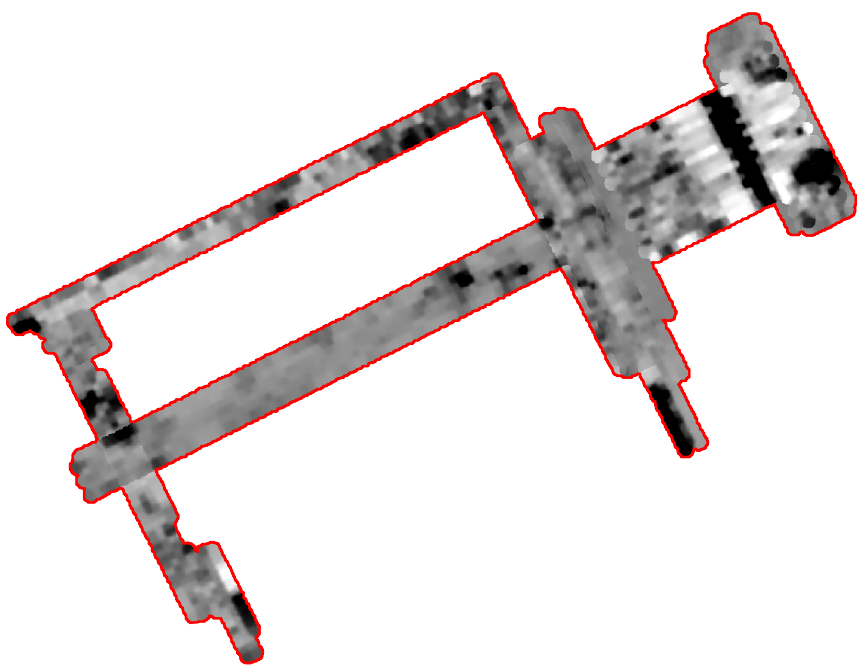
Figure 2



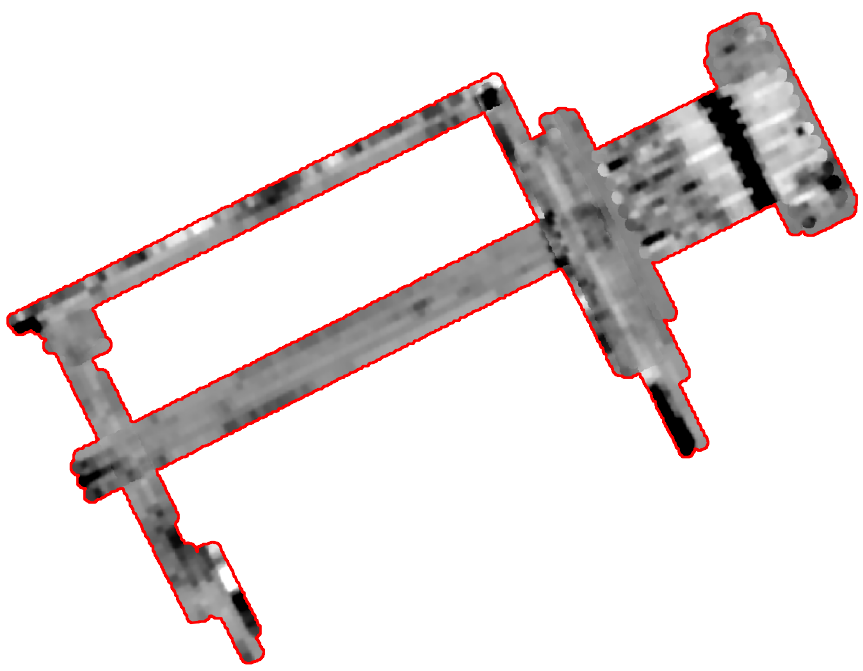
Timeslice 1



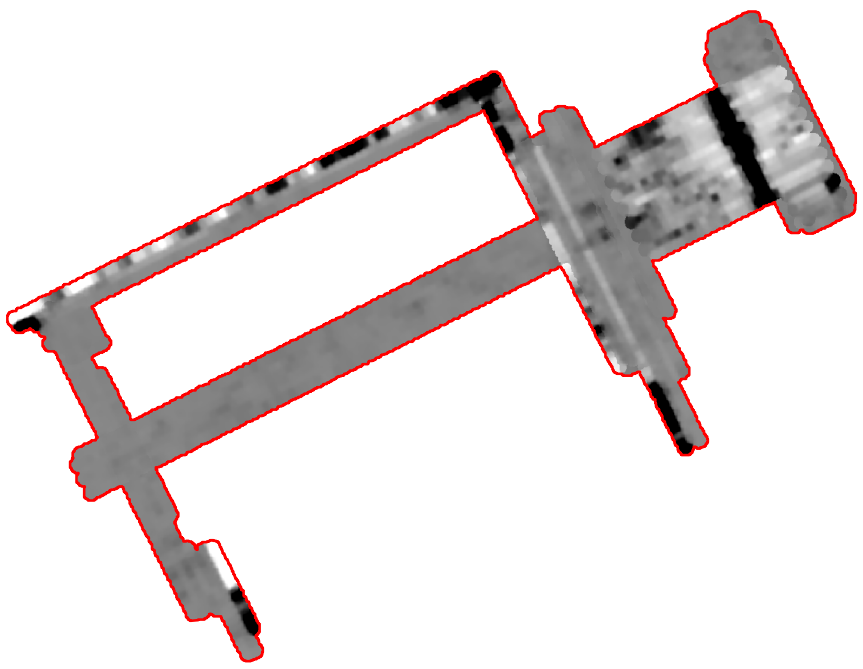
Timeslice 3



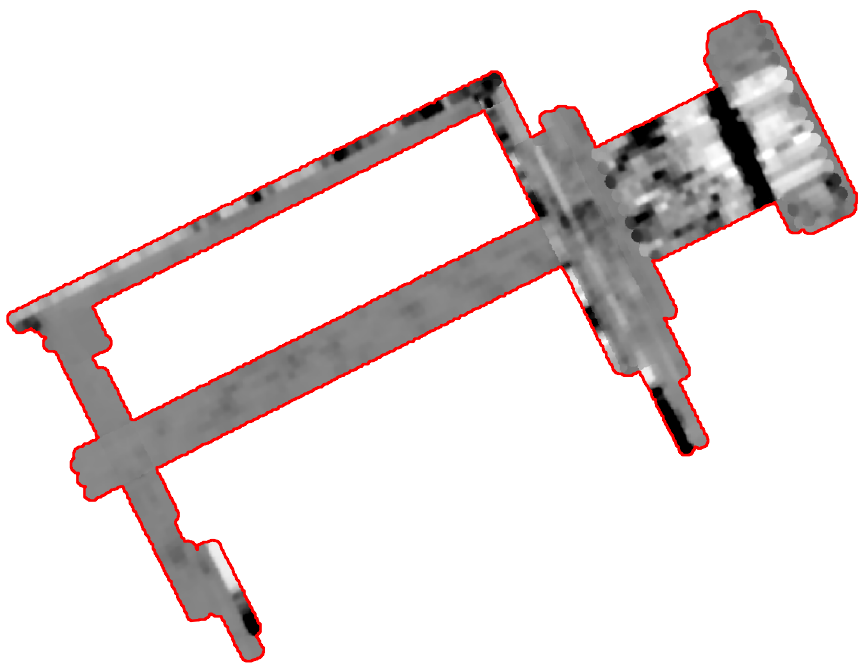
Timeslice 6



Timeslice 9



Timeslice 15



Timeslice 19

High Amplitude

Low Amplitude

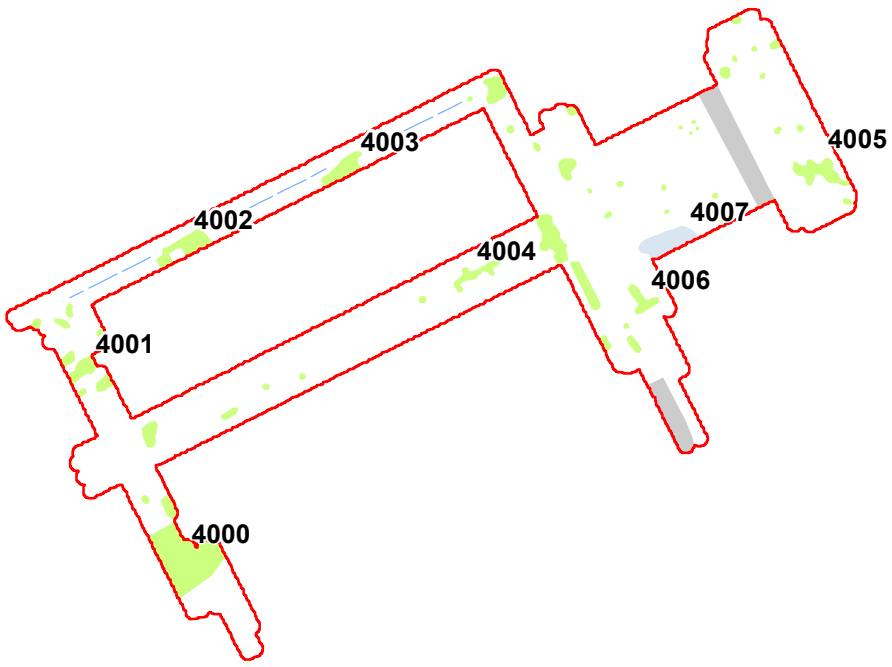
Detailed Survey Extents

0 25 m

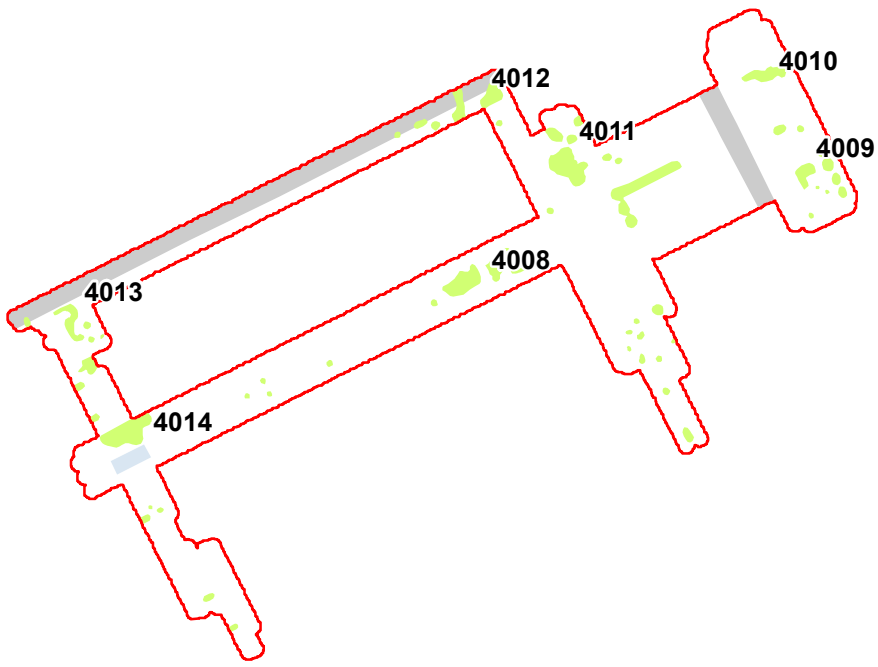
Date:	10/11/2015	Revision Number:	0
Scale:	1:250	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

400 MHz Results

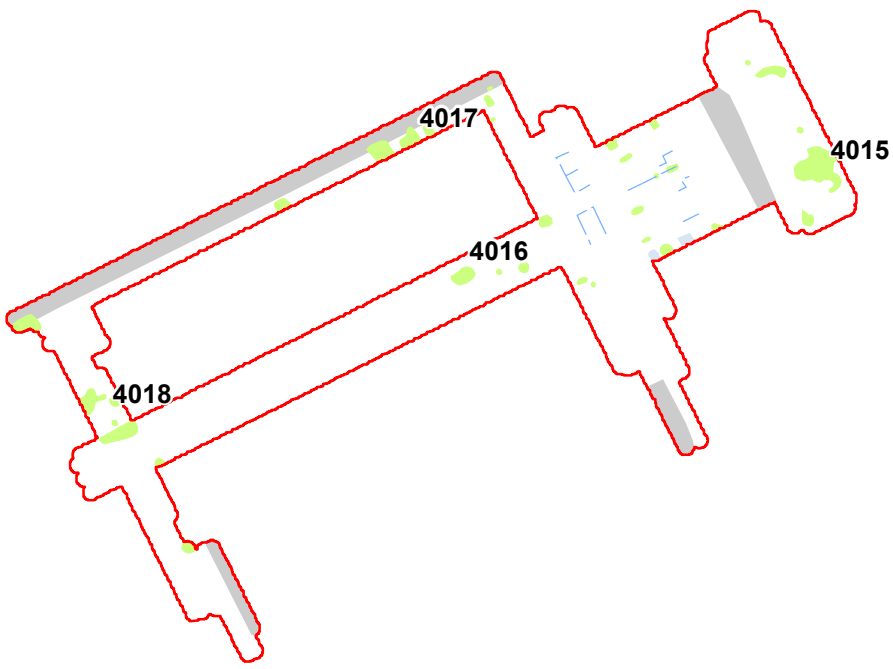
Figure 3



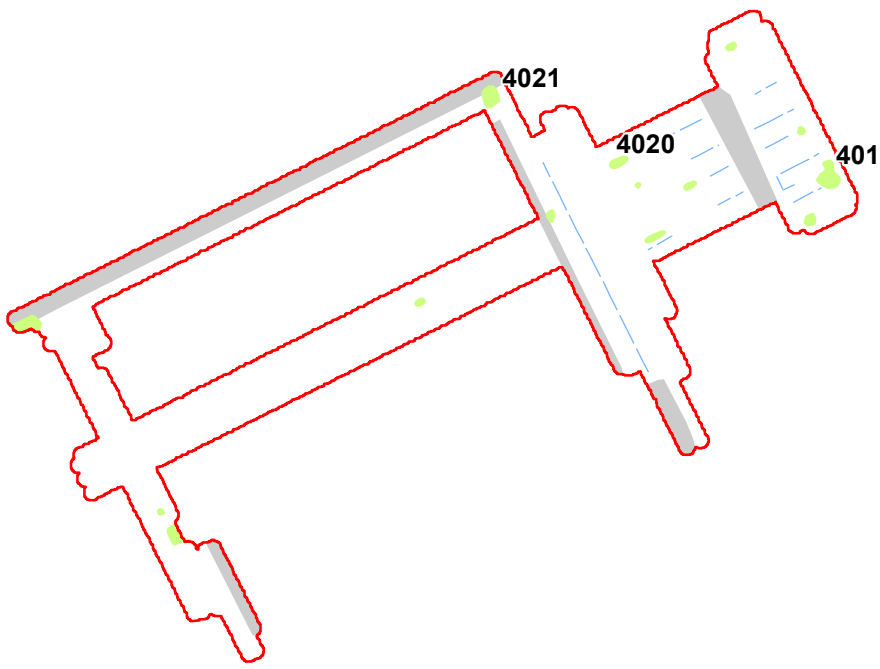
Timeslice 1



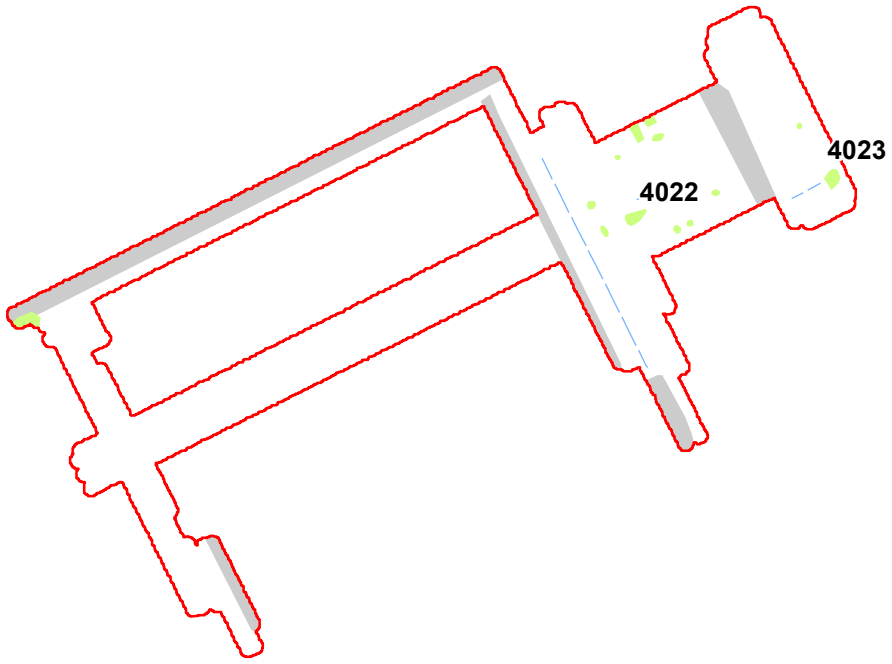
Timeslice 3



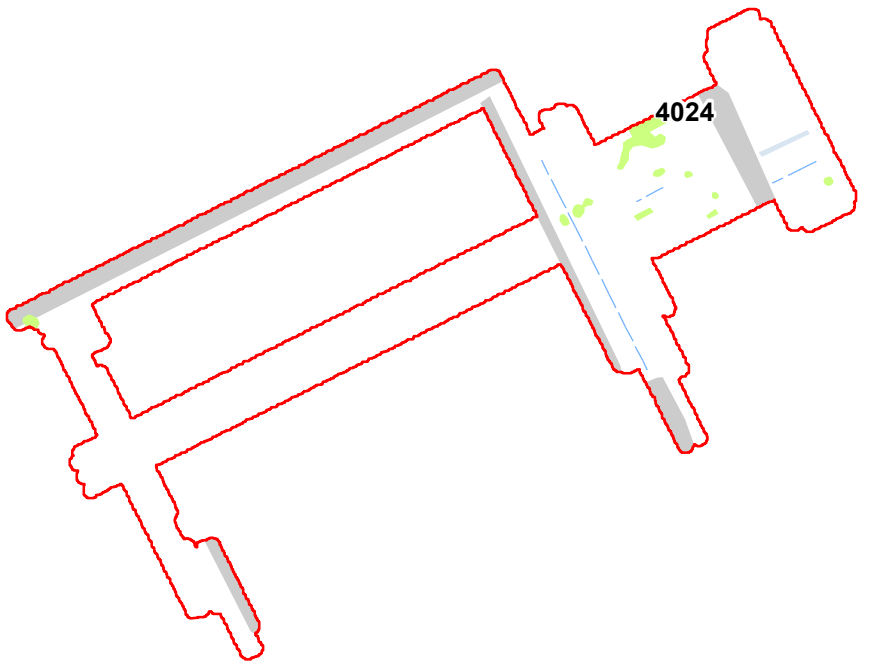
Timeslice 6



Timeslice 9



Timeslice 15



Timeslice 19

GPR Survey Extent 400MHz
Trend
Possible Archaeology
High Amplitude
Low Amplitude

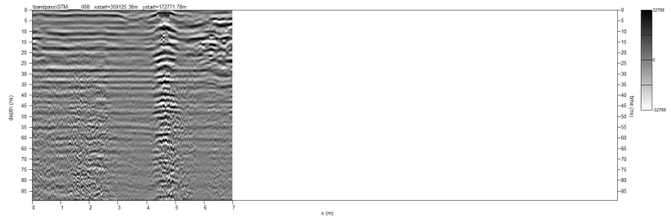
0 25 m

Date:	17/11/2015	Revision Number:	0
Scale:	1:250	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

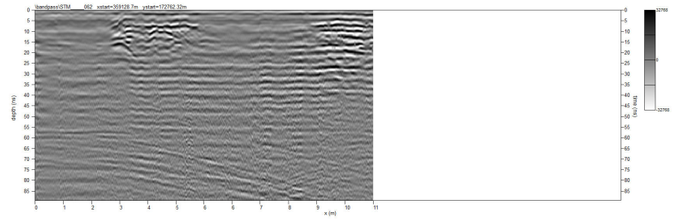
400 MHz Interpretation

Figure 4

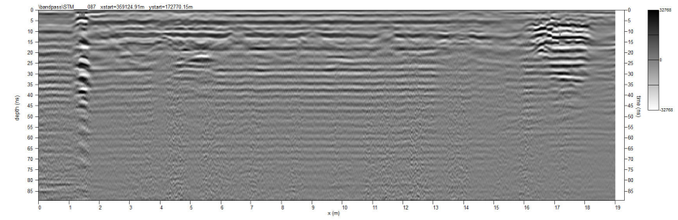
Transect 8



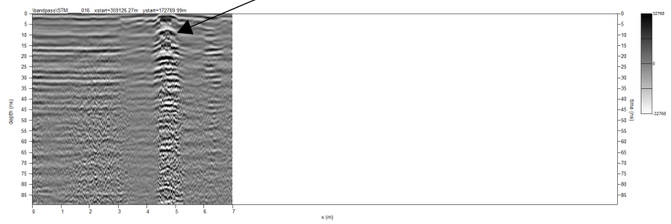
Transect 62



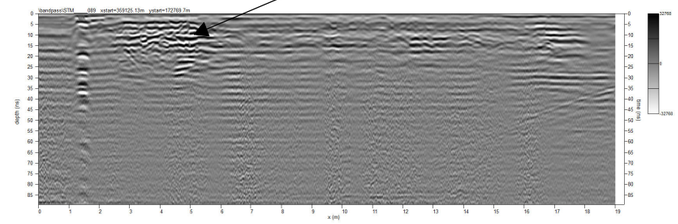
Transect 87



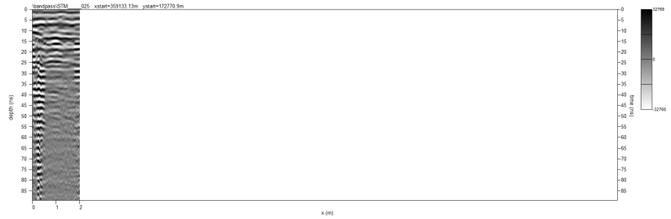
Transect 16



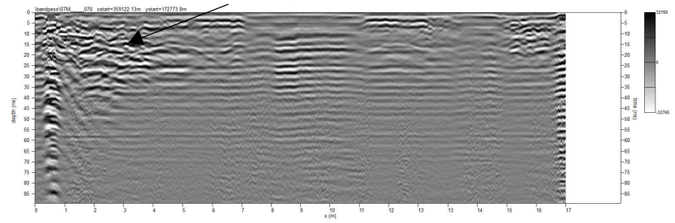
Transect 89



Transect 25



Transect 70



Transect 100

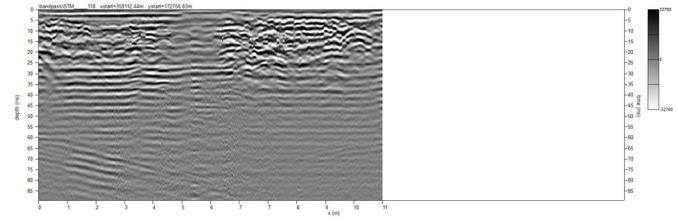
Transect 40

Transect 110

Transect 57

Transect 79

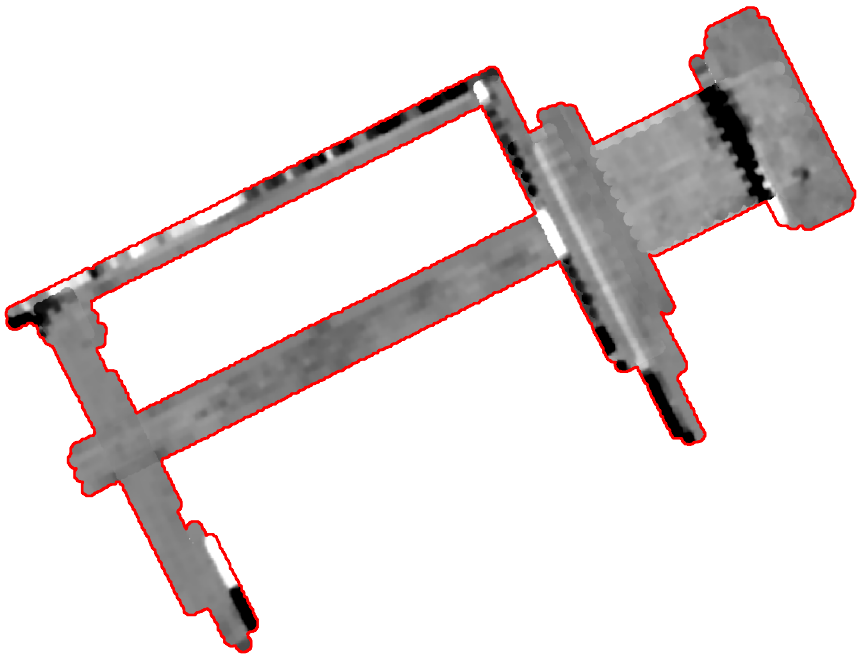
Transect 118



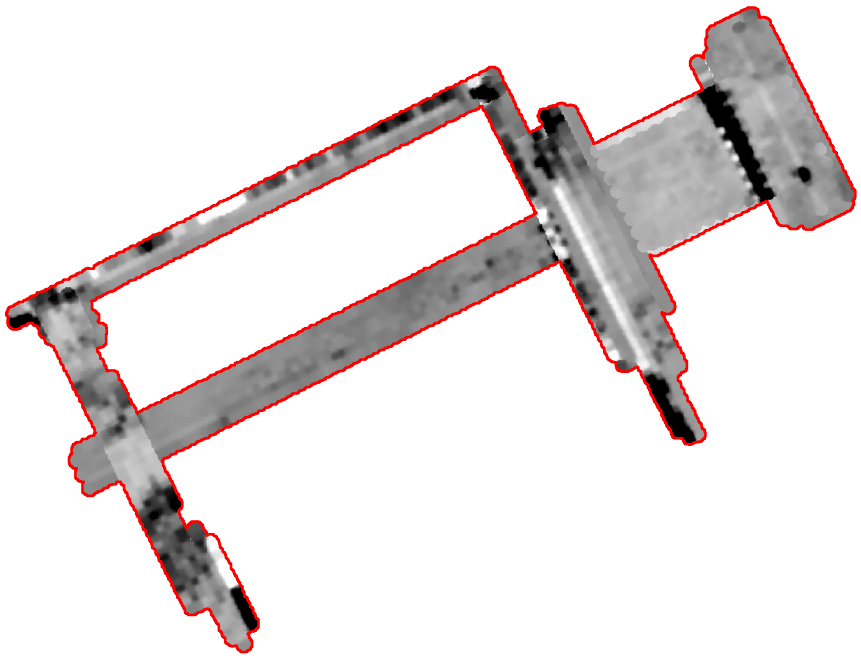
Date:	18/11/2015	Revision Number:	0
Scale:	n/a	Illustrator:	ECR
Path:	X://PROJECTS/111220/GIS/FIGSMXD		

400 MHz Selected radargrams

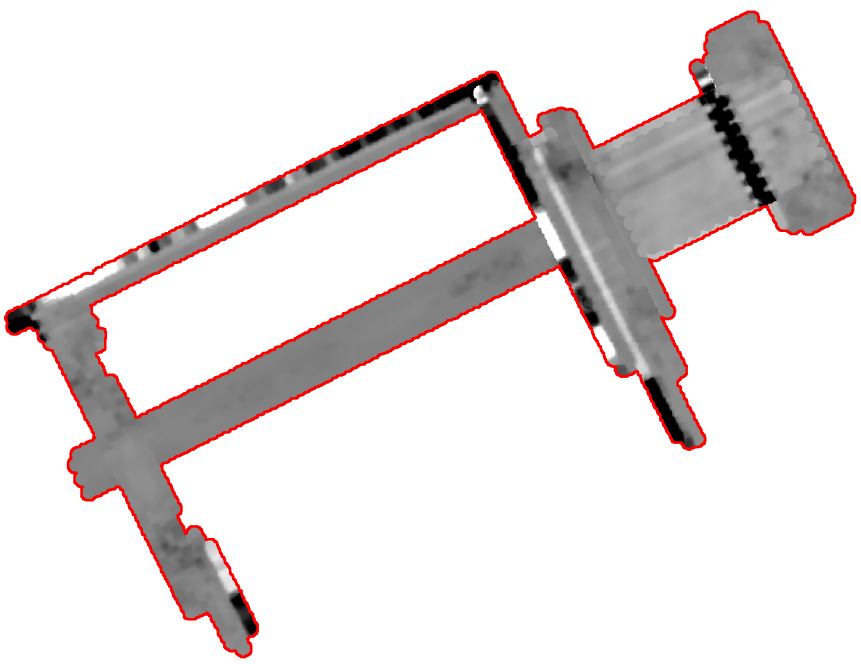
Figure 5



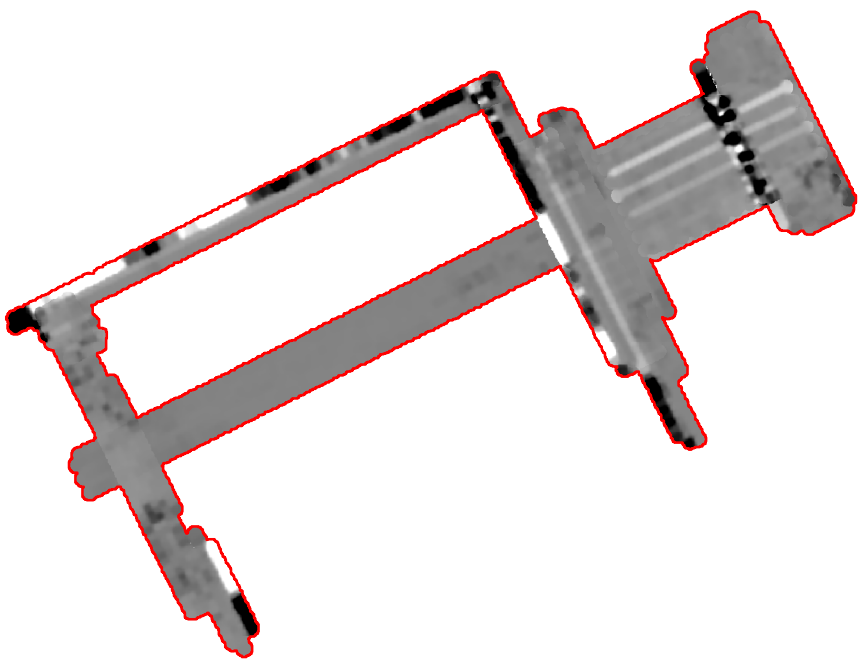
Timeslice 1



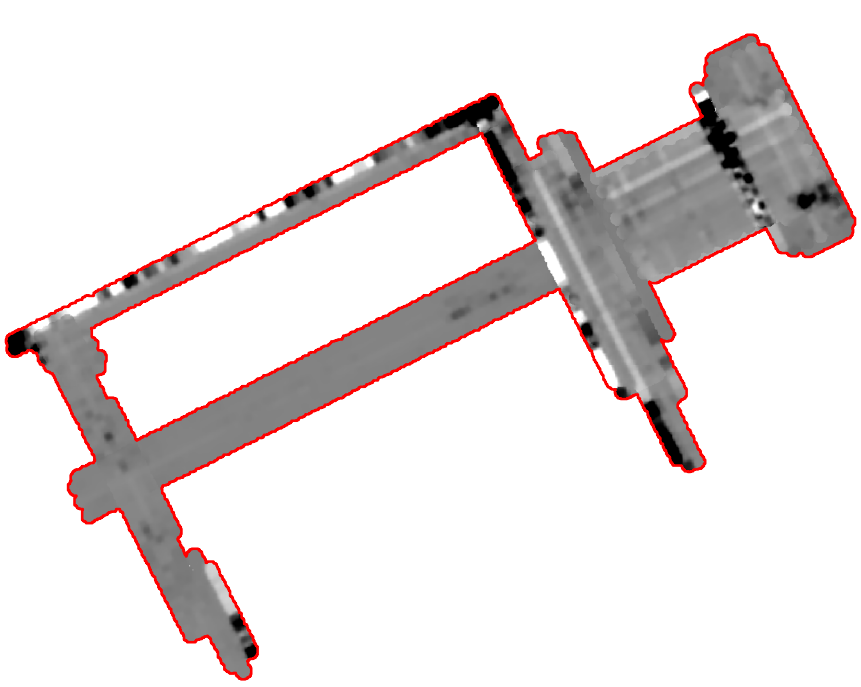
Timeslice 3



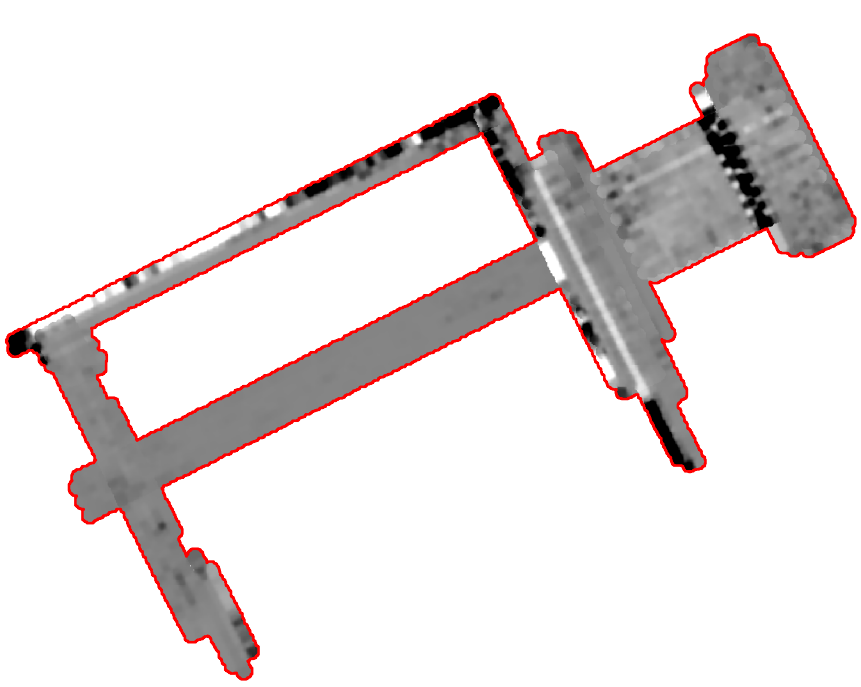
Timeslice 6



Timeslice 9



Timeslice 15



Timeslice 19

High Amplitude

Low Amplitude

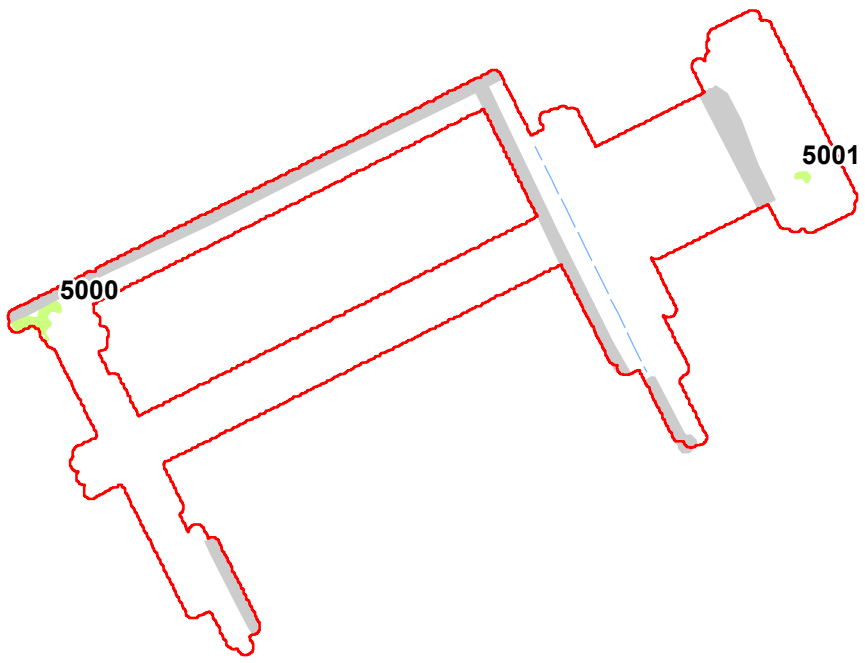
GPR Survey Extent 900MHz

0 25 m

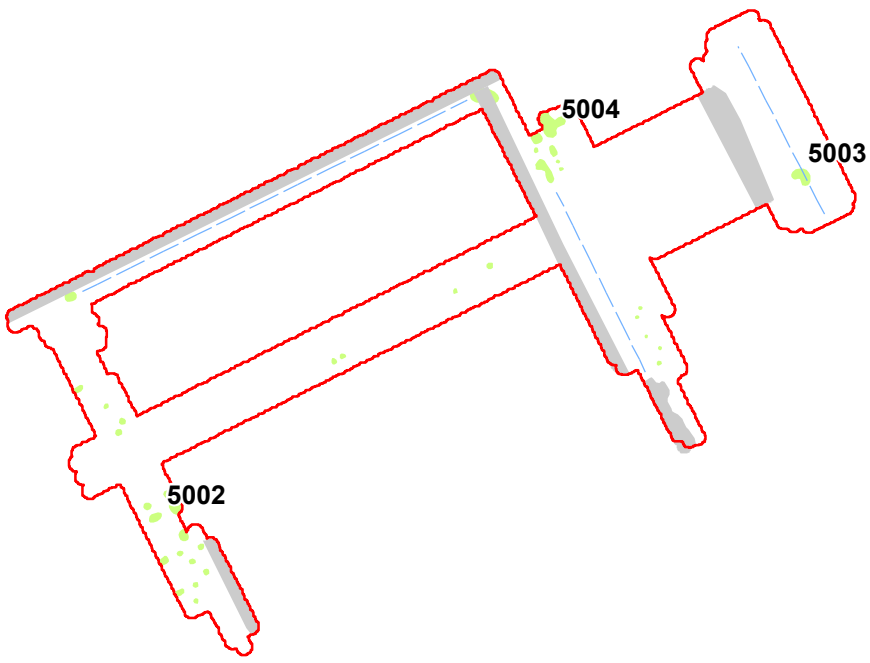
Date:	17/11/2015	Revision Number:	0
Scale:	1:250	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

900 MHz Results

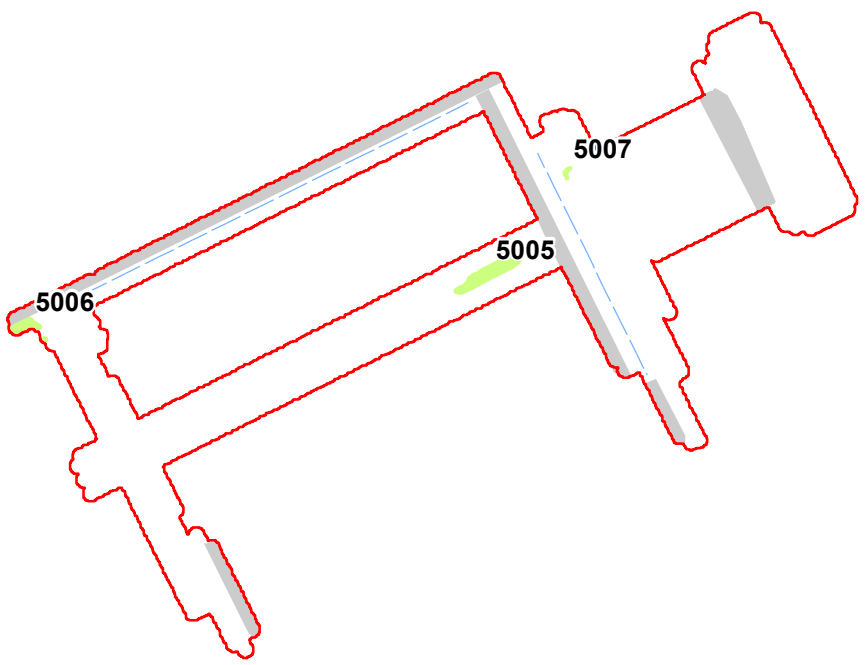
Figure 6



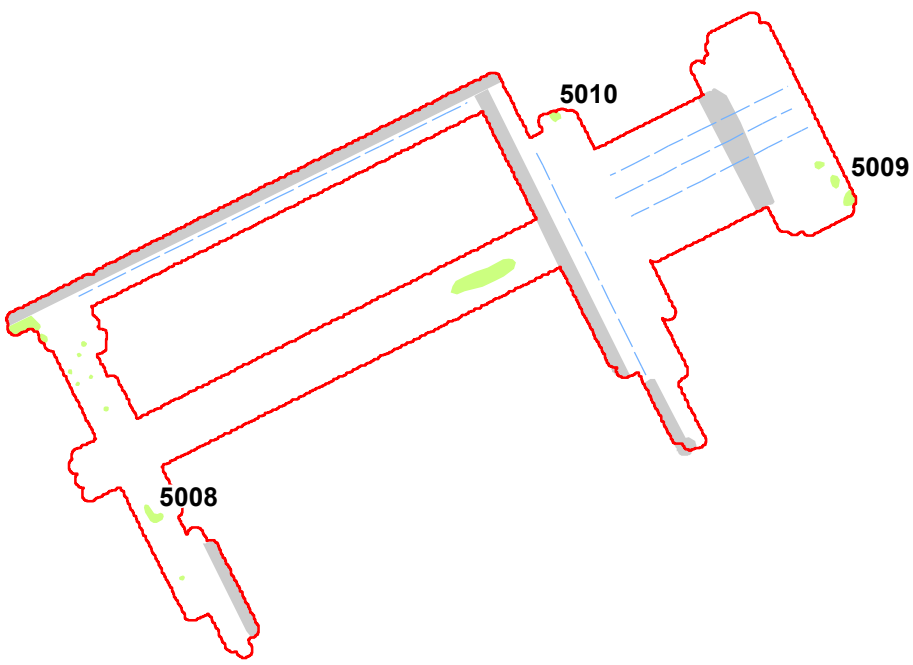
Timeslice 1



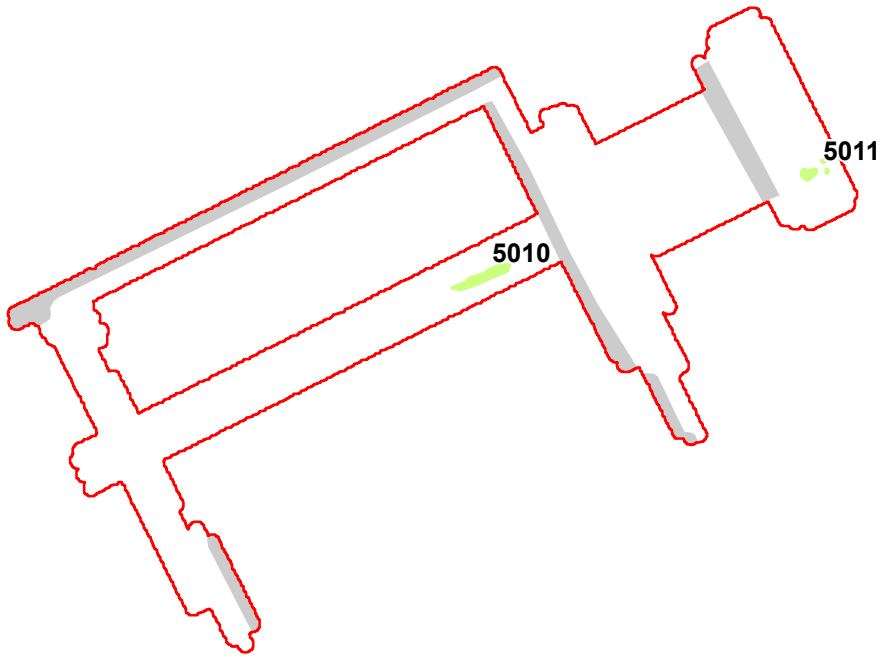
Timeslice 3



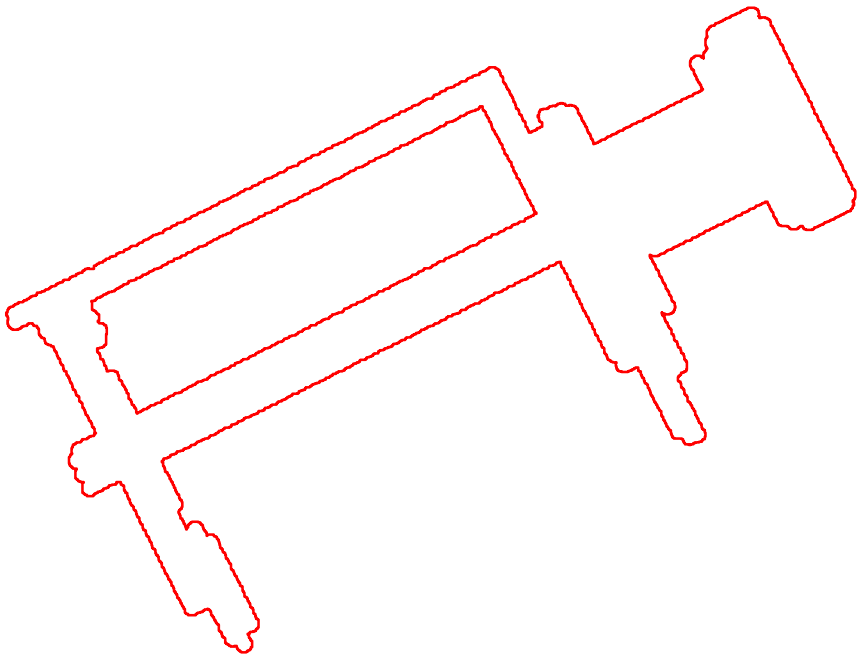
Timeslice 6



Timeslice 9



Timeslice 15



Timeslice 19

GPR Survey Extent 900MHz

Trend

High Amplitude Response

Possible Archaeology

0 25 m

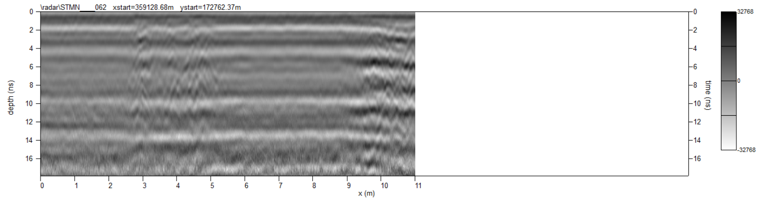
Date:	17/11/2015	Revision Number:	0
Scale:	1:250	Illustrator:	ECR
Path:	X:\PROJECTS\111220\GIS\FigsMXD		

900 MHz Interpretation

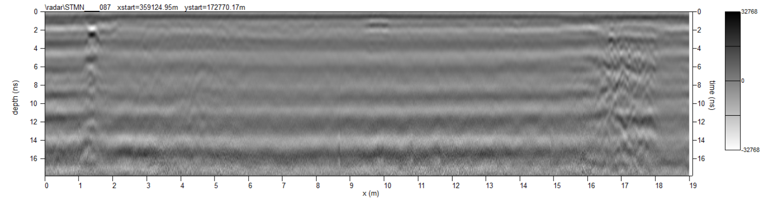
Figure 7

Transect 8

Transect 62

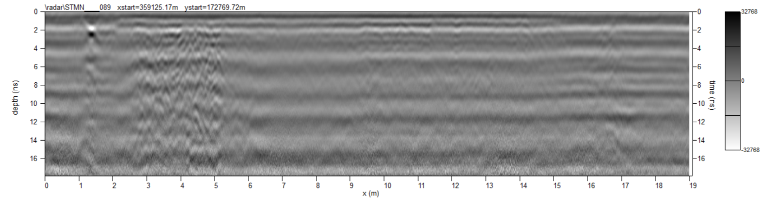


Transect 87



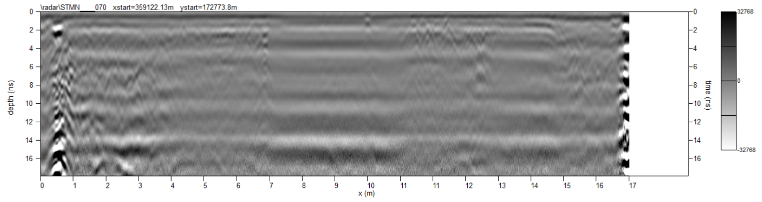
Transect 16

Transect 89



Transect 25

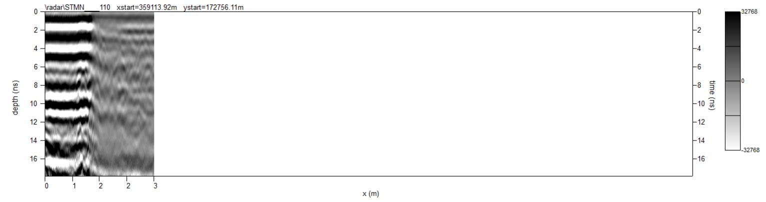
Transect 70



Transect 100

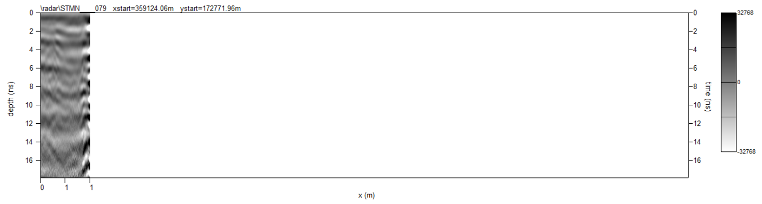
Transect 40

Transect 110

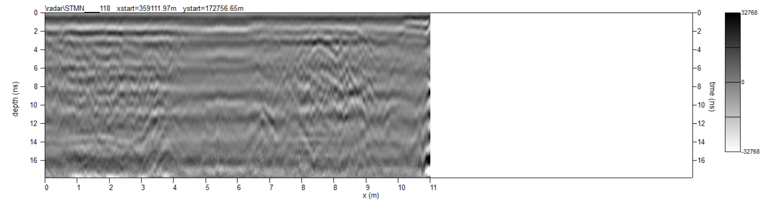


Transect 57

Transect 79



Transect 118



Date:	18/11/2015	Revision Number:	0
Scale:	n/a	Illustrator:	ECR
Path:	X://PROJECTS/111220/GIS/FIGSMXD		

900 MHz Selected radargrams

Figure 8

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www.wessexarch.co.uk