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1952 Boxley Abbey
Drainage Investigation Report

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Included in this pack	Drainage Investigation Report
Associated Survey Plan	1952 Boxley Abbey Investigation Plan.DWG



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Authorisation Sheet	
Client:	Society for the Protection of Ancient Buildings
Project Title:	1952 Boxley Abbey Drainage Investigation
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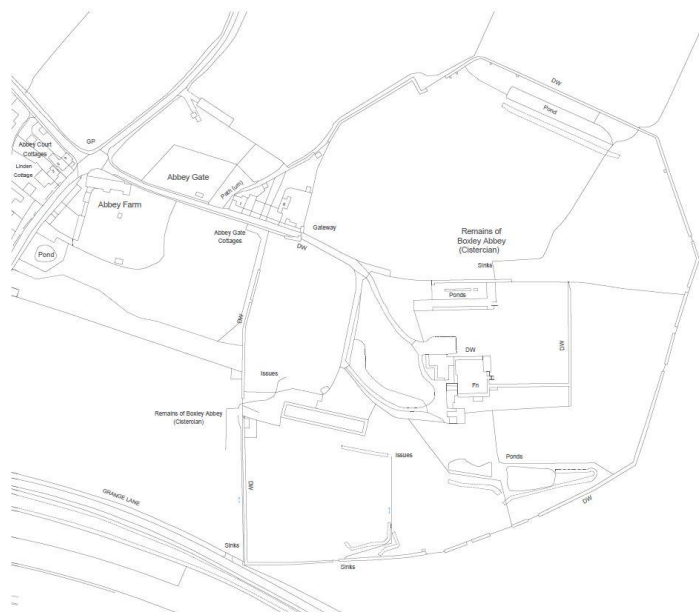
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1. Introduction

This drainage investigation survey has been undertaken on behalf of The Society for the Protection of Ancient Buildings (SPAB). This report should be read in conjunction with drawing **1952 Boxley Abbey Investigation Plan.DWG.**



The aerial image above shows the layout of the site. The Ordnance survey map below gives a more detailed view.



The aim of the survey investigations was to try and establish as much information as possible on the route of the drainage/watercourses around the site. The survey was undertaken over three working days commencing on the 13th July and finishing on the 15th July 2020. The survey team worked closely with the Kent Underground Research Group (KURG) throughout the three days. Based on previous site evidence gathered by KURG/SPAB tried to work from located access points around site shown in the site investigation drawing.

2. Survey Equipment and Methods

The survey was undertaken using two main techniques the first was a drain reel with 33khz sonde inserted into drains at access points numbered on the associated drawing. The sonde was located using a Vivax Metro-tech Locator the technique is known is Electro-Magnetic Locating. The second technique was using a Mala Ground Penetrating Radar on a mid-range frequency of 450mhz, on the surface in targeted areas discussed with KURG and SPAB members.



Image above shows reel and sonde. Image below shows Mala GPR.





3 Scope of Works

Based on the initial discussions and site walkthrough there seemed to be three main watercourse routes that required investigation. The first flowed down an open stream from the north pond and went underground near the driveway of the property. It was blocked and flooding the driveway when the survey team first arrived. It then flows through the woodland area and into the field to the north of the Hospitium. The second watercourse that needed investigating was where the water from the former nave area flowed. The third watercourse was in the woodland area to the south east of the main site.

In addition to the watercourses it was hoped that some further information could be obtained around the Reredorter using GPR. The survey investigation hoped to find the sub-surface routes possible drains used to flow into and the reredorter and then how the waste flowed out into the southern pond areas.

Finally, it was also discussed that the GPR would be used by Terra Measurement in the 'Chapel' room at the South of the Old House. This investigation hoped to gather more information on what is below the floor of this room and if there are any cavities.

4 Electro-Magnetic Sonde Locating Results

Sonde Access Point 1: From this access point the drain was located approximately 50m upstream. This allowed the KURG team to follow the route of the drain and find a previously unknown access point a gully plate **GY01** on the edge of the track down to the hospitium labelled as sonde access point 2.

Sonde Access Point 2: From this access point the drain was located approximately 26m upstream, the drain bends inside the woodland and it was believed the sonde could be pushed no further due to probable tree roots in the drain. The drain was also checked downstream to confirm the positions marked out from access point 1.

Sonde Access Point 3: It was not possible to trace the route of the drain from this point for more than a few metres upstream due to a potential blockage noted on the drawing. Downstream could not be traced as the sonde could not be inserted into the drain at this point.

Sonde Access Point 4: The drain was traced approximately 15m downstream to a potential blockage. The area was flooded around this point and the sonde could not be inserted into the upstream drain.

Sonde Access Point 5: It was not possible to trace the drain from this point as the Sonde would not go more than 1m into the downstream drain. Upstream was open watercourse.



Sonde Access Point 6: This is the point where the open watercourse is split off and piped into the former nave area. The drain was located approximately 10.5m downstream from the access point flowing into the nave area.

Sonde Access Point 7: This point is on the outside of the former nave area and was traced for approximately 8m downstream before hitting an obstruction.

Sonde Access Point 8: This point was the only place we could insert the sonde on the drain which is believed to flow from the former nave area and is a separate drain from the one which takes the natural water course. The drain was located approximately 23m upstream and the downstream flow into the open stream which flows through the field to the south of the Hospitium.

Sonde Access Point 9: From this point the third watercourse located in the south east woodland was traced upstream for approximately 30m until it hit an obstruction. This drain is in dense woodland.

5. Targeted Ground Penetrating Radar Findings

GPR Grids 01 & 02: Based on discussions with the team members of KURG some areas were identified and high intensity transactional grid scanning was undertaken at 1m intervals. This data was collected and processed through the onsite Mala Post Processing software. Unfortunately, no conclusive linear features, shapes or anomalies were located.

GPR of Watercourse 02: was used to try and locate the location of the second water course which flowed from the former Knave area down to the open watercourse in the field to the south of the hospitium. A linear feature was identified which matched up well with the previously sonde located drain. The survey team spoke with James Best-Shaw to discuss other potential utilities in the location, after those discussions a general utility sweep was undertaken to eliminate the potential electric and gas services in the vicinity of the located linear feature. It is our opinion that the linear feature is indeed a drain which allows the water to flow from the Knave through the gardens into the southern open watercourse.

GPR of Watercourse 03: In the north-east corner of the site there is a clearing which was used for access to the car park for the SPAB team. This clearing was scanned, and a distinct linear feature was located, this feature lined up well with the previously sonde located third watercourse on the woodlands, this is likely to be the same drain. Due to the dense woodland a large section of where the drain is suspected to flow could not be scanned with GPR.



6 General Sweep Ground Penetrating Radar Findings

General sweeps using GPR were undertaken around the reredorter, on the top of the grass bank which runs from the Knave down to the steps into the rose garden and in the camping and barbeque pit areas. The grass bank was scanned after discussions with KURG but no conclusive feature was located. KURG suspected due to the history of the site that the bank may be on top of lots of former site rubble from previous construction/demolition projects. This would concur with the GPR results as lots of anomalies in the data were noted but no pattern could be interpreted.

In the north-east area of the barbeque pit and the east side of the camping zone some GPR anomalies did seem to suggest further investigation may be worthwhile. There were also some interesting responses outside of the ground wall in the cleared area used for access. There was one small area around the reredorter inside the woodland which gave a strong GPR response at 0.77m depth but without further investigation it is not possible to say what this could indicate.

7 Post-Processed Ground Penetrating Radar Grid Findings

Post processed grid scanning at 2m intervals were used in two locations to try and locate anomalies in large open areas.

Area 1 was the north-west corner of the field to the north of the hospitium where the geophysical survey was undertaken. This was undertaken to supplement the geophysical survey of the field see if the GPR could help confirm any of the geophysical survey findings.

Area 2 was the area where cars were parked to the north-east of the site, this was undertaken with the intention of trying to identify a connection between the open watercourse from the northern ponds and the reredorter. Only one potential linear feature was located in this grid.

8 Old House Ground Penetrating Radar Grid Findings

A general sweep scan was used in the back room of the old house. See image 1 below which shows a sketch indicating the position of the GPR scans in the back room. Image 2 shows three distinct layers when scanning the floor. The top layer is assumed to be the flooring and is between 0.35/0.40 deep in places. The second layer ranges from 0.40 to 1.10/1.30 depth. The third layer is from the 1.30 depth and below. Image 3 shows the change in profile marked on the scan plan image.



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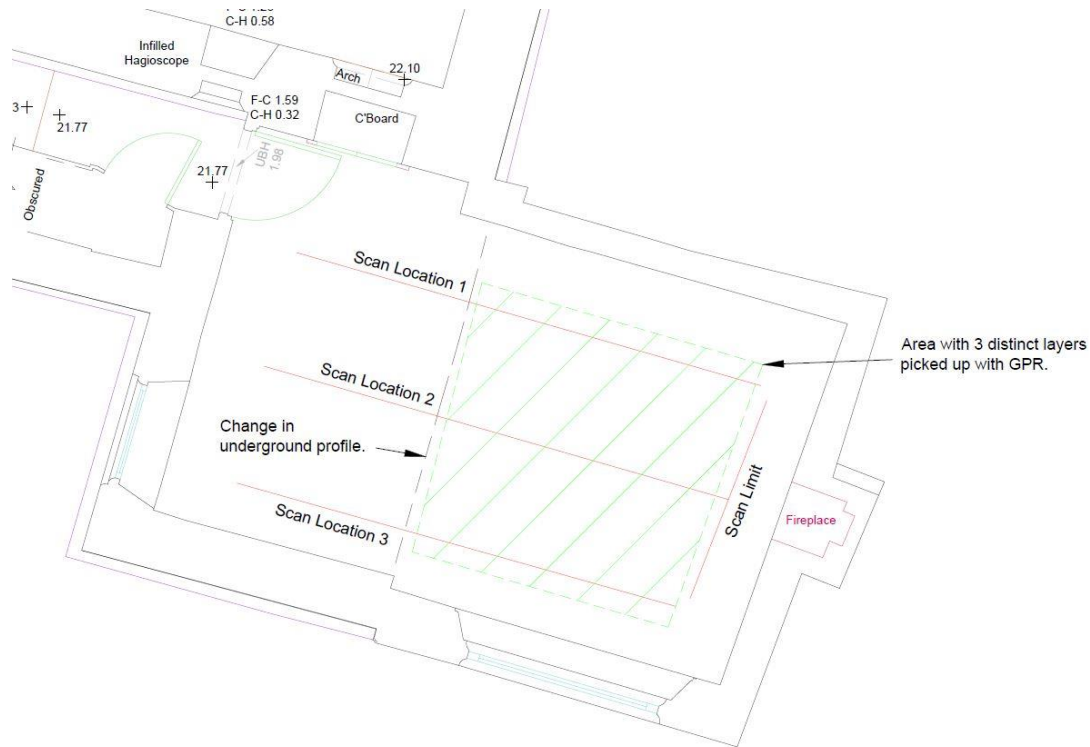


Image 1

3 distinct layers in scan profile.

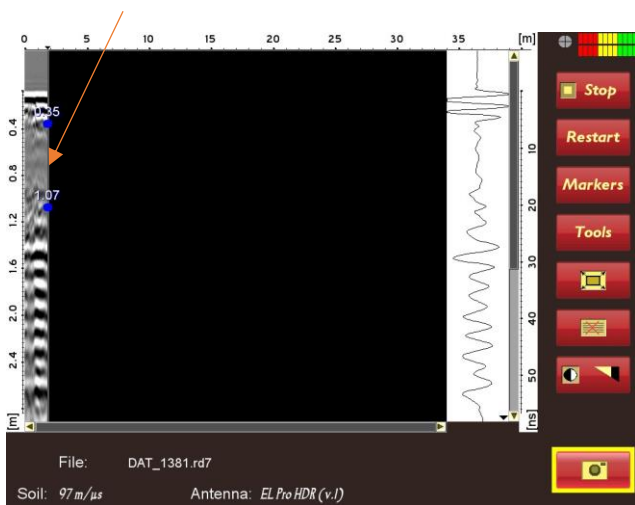


Image 2

Change in profile through scan.

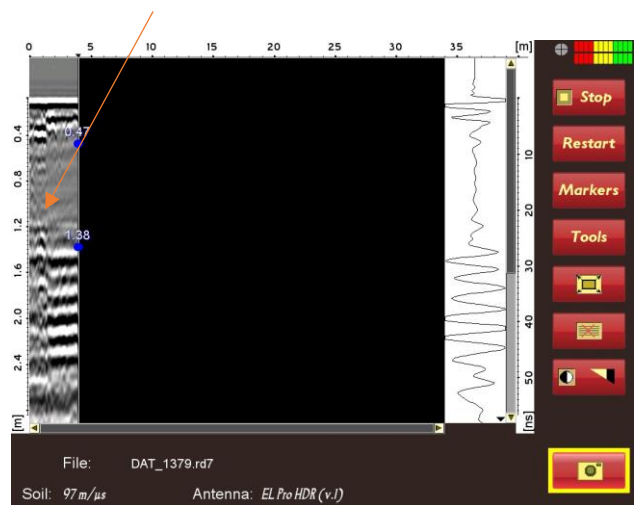


Image 3



9 Conclusions and Recommendations

There are limitations to both techniques used on the working party at Boxley Abbey. The sonde could not be pushed passed obstructions in drains and therefore the survey was ended at these points.

A possible future activity which may help uncover further information on the drainage around Boxley Abbey would be a CCTV survey for the drainage. This is the process of inserting cameras in the drains and getting a visual check on the condition of the drainage, this can help get past certain blockages, jetting the drains may clear obstructions to allow the CCTV survey to complete as much as possible. It will also give a clear picture of the condition of the drains.

The GPR was mid-range frequency of 450mhz this is designed for utility locating. Other models with lower frequencies designed for archaeological feature location and deeper ground penetration may have more optimal results around the reredorter.