KURG at Boxley Abbey: 13-15 July 2020

Introduction

Kent Underground Research Group ("KURG") was invited by the Society for the Protection of Ancient Buildings ("SPAB") to participate at their working party at Boxley Abbey on 13-15 July 2020.

The working party consisted of around ten separate teams undertaking projects either at Boxley Abbey itself, or the SPAB Old House Project ("OHP"), the former St Andrews Chapel near the western entrance to the Abbey complex. Most of the teams were involved in restoring brick or stone walls at Boxley Abbey, or work on the roof at the OHP. Some of this involved the production of lime mortar using local materials, including lime produced in a kiln built in the grounds of the OHP using chalk quarried near Oxted. Hastings Area Archaeological Research Group ("HAARG") were also carrying out geophysical surveys of parts of the site.

KURG's specified role was relatively open-ended and could be summarised as:

- Enjoying ourselves in mud, water and holes in the ground.
- Assisting and working with a team from Terra Measurement Ltd, based in Derbyshire. Terra Measurement were doing 3-D scans of the structures and features and carrying out surveying work of various kinds, including with ground penetrating radar ("GPR").
- Finding out what we could about the past and present drainage systems around the Boxley Abbey site.

The whole of the Boxley Abbey site forms a scheduled ancient monument. Consequently, formal permission is required from Historic England to carry out almost any form of work in the area. Permissions had been received to carry out the geophysical survey and the various wall repair work. There was also permission for repairs to drainage – and this proved relevant to some work carried out by KURG described below. However, it did rather limit some investigations that might have been carried out that would involve the judicious use of spades.

People

Whereas it is not usual KURG practice for an event such as this, the current COVID-19 situation makes it appropriate to maintain a record of attendees for each day.

	Monday 13/7/2020	Tuesday 14/7/2020	Wednesday 15/7/2020
Peter Burgess	**X**		
Pete Burton	**X**	**X**	**X**
Mike Clinch	**X**		
Robert Hall	**X**	**X**	**X**
Nick Hill	**X**	**X**	**X**
Clive Penfold	**X**	**X**	**X**
Emma Scheck	**X**	**X**	
Che Tsang	**X**	**X**	**X**

Equipment

Clive Penfold came with a full carload of toys, of which the most useful were:

- Drain rods, complete with auger and rubber disc attachments to unblock pipes

- Radio transmitting sonde and detector, with the sonde able to be attached to drain rods
- Metal detector
- Traceable flexible plastic pipe (an electric current in a cable threaded through the pipe can be detected)
- Generator and submersible pump

A combined KURG and Terra Measurement team also used a radio transmitting sonde and detector, where the sonde was on a flexible fibreglass reel. This was considerably longer than the total length of drain rods available to KURG and this was useful in some cases.

The usual array of spades, mattocks, torches, laser measuring devices, etc were deployed. Vertical access equipment was carried, but not used on this occasion.

Some of Clive Penfold's toys

Investigations

For the purposes of this note, the results of our investigations have been set out in the following sections:

- Reredorter
- South east pond
- North pond and northern drainage channel
- Eastern drainage channel
- Western drainage channel
- Remedial work on western drainage channel
- Conclusions and possible next steps

Reference is made to two specific documents:

- A paper by PJ Tester FSA: “Excavations at Boxley Abbey”, published in Archaeologia Cantiana LXXXVIII in 1973.
- A “Plan of Boxley Abbey” dated April 1801 and surveyed by “John Smith, House and Land Surveyor, Maidstone”.

Various diagrams have been produced of the drainage channels based on an OS 25 inches to 1 mile map published in 1946. These have not been annotated in a manner that is intended to be precisely to scale. This is because KURG did not attempt to do any measured surveying above ground on the basis that Terra Measurement were much better equipped to do this. However, the qualitative description is intended to clarify the drainage channel flows as they currently exist.

The Reredorter

Estate agents are universally admired for their commitment to factual accuracy and profligacy (as opposed to economy) with the truth.

"*In the Abbey Wall, on the north side of this [Kitchen] Garden, are Two Entrances to Underground Passages, which are said to lead to Boxley Church on the east, and to Allington Castle on the south west.*"

Such are the statements contained within the particulars for the Boxley Abbey Estate distributed in advance of it being auctioned in the late 19th century at the time it was purchased by the Best-Shaw family. The particulars are surprisingly silent on the subject that the subterranean passage in question is in fact a reredorter, or communal toilet, for the monks of the Cistercian monastery.

The current owner of Allington Castle – Sir Bob Worcester of Ipsos-MORI fame – might be startled to learn that his home was at the wrong end of an implied 2.6 km pipeline of ecclesiastical excrement from Boxley Abbey and Boxley Church. It would be an impressive engineering feat - especially, the section under the River Medway to reach the castle.

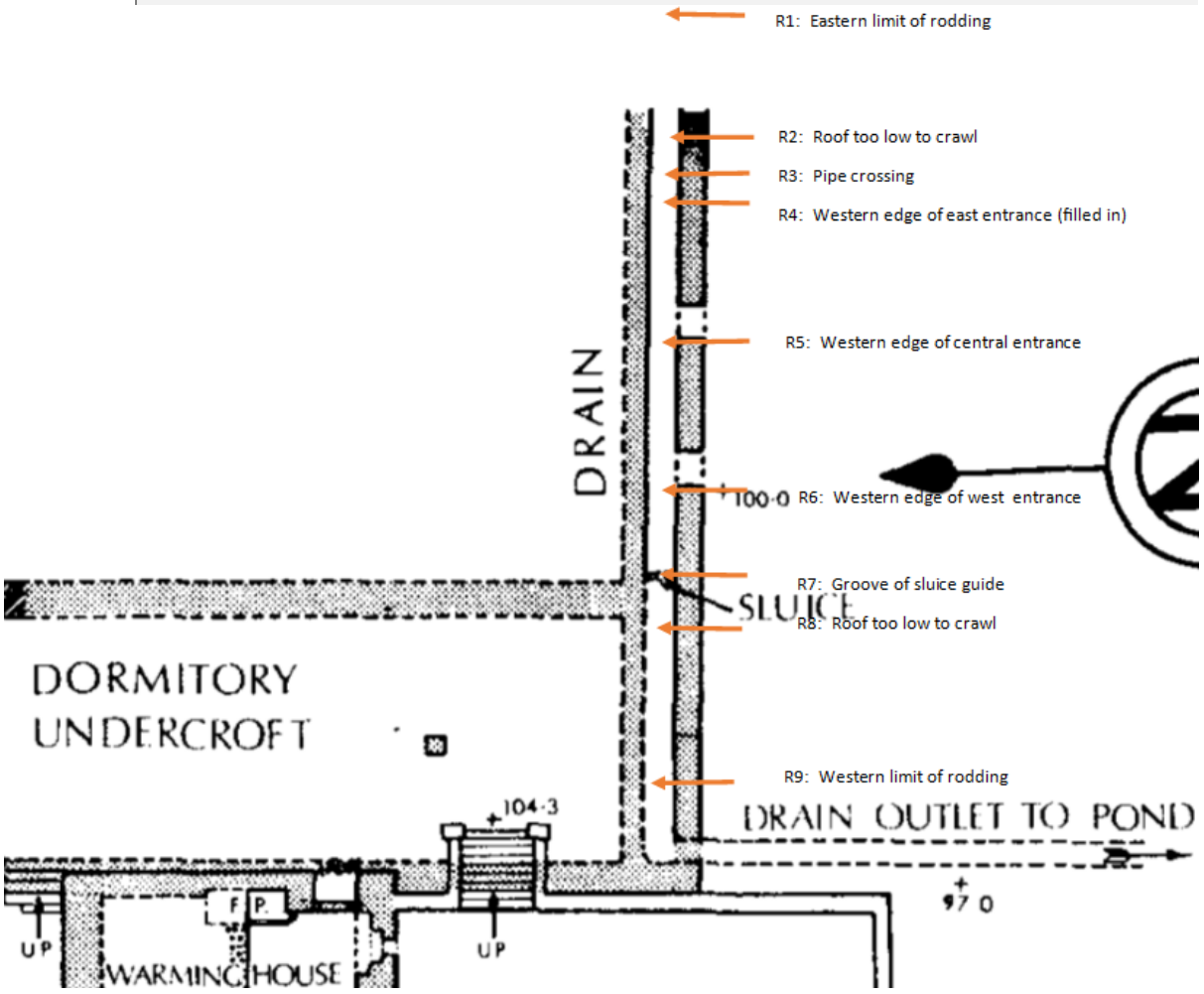
The KURG team is all too familiar with such tall stories of lengthy tunnels constructed without apparent thought for geology, ventilation, drainage, or indeed purpose, and thus approached the reredorter with instruments of measurement appropriate for mere metres, rather than kilometres.

Measurement

Terra Measurement were undertaking a 3-D scan of the reredorter and it therefore seemed superfluous to carry out a detailed survey. However, it seemed unlikely that the laser scanner could penetrate the furthest extents of the reredorter where the roof is low above the floor deposits. It therefore seemed appropriate to try to determine the distance that could be reached by the use of a radio locating sonde on the end of drain rods.

The various measurements made are summarised in the table below. The points defined for the measurements are explained further in the accompanying photographs and diagram. It should be noted that the measurement made by use of a sonde on drain rods is necessarily less accurate and the measurements of the two extremities reached could be out by perhaps 50cm. In neither the western nor eastern extremities reached by the drain rods, was it obvious that they were really terminal points – and could simply be where the floor deposits reached the roof or another obstacle was reached. Given the potential archaeological sensitivity of the floor deposits, no attempt was made to force the issue by use of an augur or similar device that might disturb the deposits, although there was evidence that rodents had carried out excavations without apparently seeking and obtaining the required Scheduled Ancient Monument permission.

Point	Description	Distance from point R7 (metres)
R1	Eastern limit of rodding	21.2
R2	Roof becomes too low to crawl (east)	17.0
R3	Pipe crossing reredorter	15.0
R4	Western edge of east entrance (now filled in)	14.6
R5	Western edge of central entrance	8.2
R6	Western edge of west entrance	3.1
R7	Groove of sluice guide	0.0
R8	Roof becomes too low to crawl (west)	1.0
R9	Western limit of rodding	7.4



Locations of measuring points shown on an extract of the plan in the paper by Tester in Archaeologia Cantiana LXXXVIII. The walls of the reredorter continue further east (to the top of the plan) than is shown. The positions of R1-9 shown are only approximately to scale.

Photographs

Exterior of reredorter looking east. The rectangular west entrance (R6) is in the centre of the picture and the arched central entrance (R5) is clearly visible to its right. The filled in arch of the east entrance is not clearly visible in this picture. The extreme eastern limit of rodding (R1) is between the two blue plastic barrels at the extreme right of the picture.

The large horizontal stone at the centre of the picture is position R2. A small part of the top of the horizontal pipe (R3) is visible in the bottom left corner.

The pipe across the reredorter (R3) on top of a half-height wall is visible in the centre of the picture. The pipe is a Victorian (?) clay pipe. The lower edge of the arching on the right (south) projects over the wall – giving almost an "eave" effect at the lower level of the arching. The position R3 on the inside roughly matches the position of the filled in east entrance (R4) most visible from the exterior. At all entrances, there is a hole in the roof up to the pavement along the wall line in the garden above. This hole is bridged by corroding steel beams and stone slabs.

A view of the hole in the roof by the filled in east entrance.

A more distant view of R3. The projecting lower edge of the arching on the right (south) can be seen running the full length of the wall.

The central entrance (R5) is on the right. Again, the projecting lower arching on the right continues. It is also noticeable that the stonework on the right (south) wall is of poorer quality than the left (north) side. The gap in the arching by the entrance is also apparent.

The constriction between the two grooved pillars of the sluice (R7). Behind is the lower arch at the end of the sluice chamber, followed by a lower arch (R8). The right (north) wall here shows considerable calcification of the stones above the level of the lower of the two stones forming the (north) grooved pillar, but little calcification below that level. This is indicative of there being historically a normal level of standing water at that point – probably caused by water leaking around the sluice gate above the joint in the northern grooved pillar. This also tends to confirm that water flowed from east to west. The stone forming the lower arch (R8) also has calcification markings similar to those seen in limestone caves around fossil streamways.

View of the broadly square cross-section shaft above the sluice through which the mechanism to lift the sluice gate would have operated.

Location of the "drop zone"

A question arises of: where did the monks apply their rears to the reredorter? – or more indelicately, where was the "drop zone"?

The description of the reredorter in Tester's paper in Archaeologia Cantiana LXXXVIII of 1973 is reproduced below for ease of reference and should be read in conjunction with the diagram above. This description implies that the water in the reredorter runs from east to west and that the sluice gate is immediately upstream of the "drop zone" by the dormitory range.

The direction of flow in the reredorter being east to west corresponds with our observations of calcification on the stones (mentioned above in one of the captions to the photographs) and also seems likely based on the general slope of the ground (albeit we would really need to observe the presumed stone floor of the reredorter to be certain). However, two other observations seem inconsistent with the description given by Tester of the location of the "drop zone":

- As shown in the diagram above, the three openings (or "entrances") in the reredorter wall are all upstream of the sluice gate. If these openings in the wall are "to provide access for the purpose of removing accumulated silt", as stated, then surely they should be either at, or downstream of, the "drop zone" rather than upstream of it? An exception might be made for an opening near the sluice gate for the purposes of maintaining that mechanism, but it does not explain the other two openings. The wall of the reredorter also does not seem to betray any subsequently filled in openings downstream of the sluice gate where Tester implies the "drop zone" is situated.
- There are openings in the vaulted roof of the reredorter above each of the openings. It is accepted that these could be the result of changes subsequent to the use of the reredorter, but they are perhaps most easily explicable as being the actual historic "drop zones" of the reredorter.

Given these observations, we can postulate a different form of the reredorter to that suggested in the paper by Tester. Rather than the latrines being situated at the end of the east range of the dormitory, they are instead in a building projecting at right-angles to the end of the dormitory – the precise reverse of the suggestion in that paper. There are three holes in the roof of the reredorter and three openings (albeit one now filled in) to remove accumulated silt. The sluice gate is at the downstream end of the reredorter. Hence, in a form a little like a communal form of a modern WC, latrine waste falls into a channel that is normally full of water. At intervals, the sluice gate is lifted and the backed-up water in the reredorter channel surges downstream taking the accumulated debris with it.

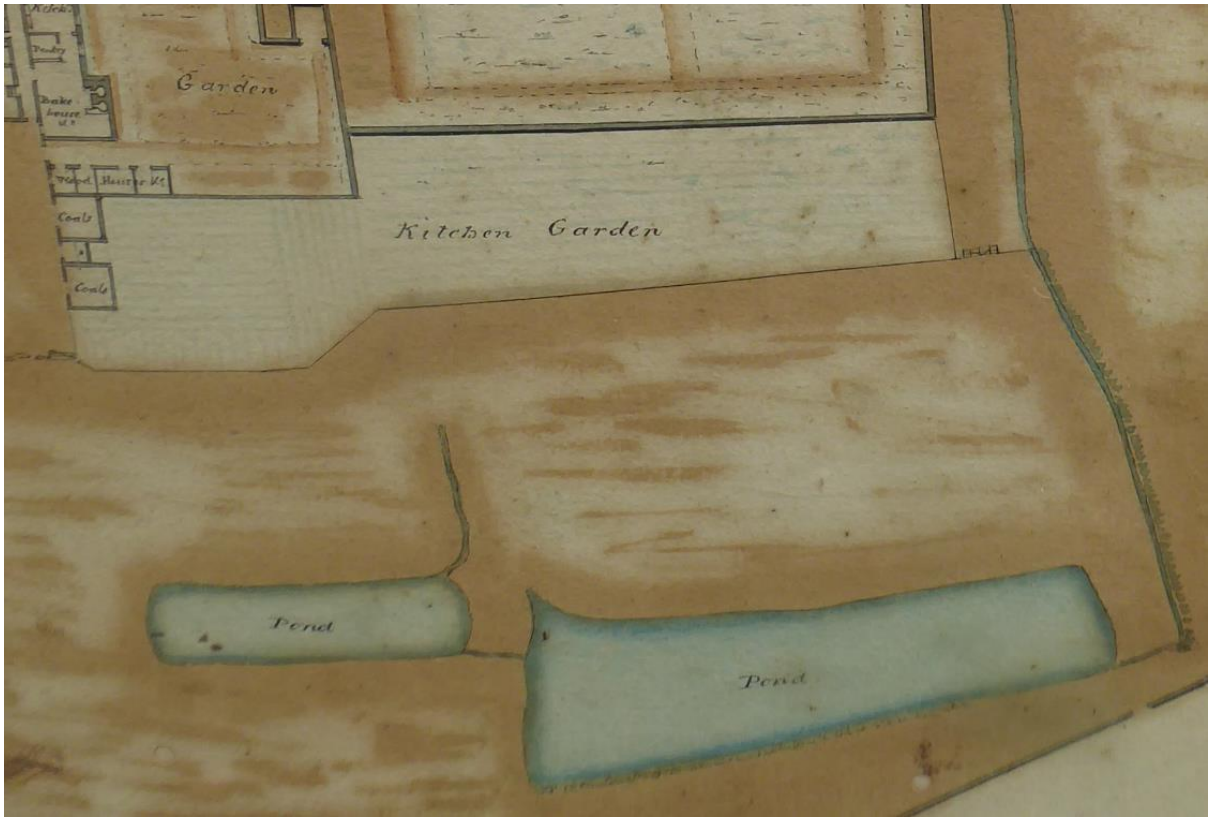
One way of identifying which better represents the historic form of the reredorter would be to send an endoscope along the reredorter passage downstream of the sluice gate to identify whether the roof of the reredorter along that length has any openings upwards, or is simply capped by stones. Such an investigation need not do any damage to the accumulated deposits in the passage, as there is a gap between the deposits and the roof sufficient for a modern compact camera and light, even before smaller endoscopes or drain cameras are considered.

THE REREDORTER AND DRAIN

The sanitary arrangements at Boxley seem to have been similar to those at Kirkstall and Valle Crucis where instead of the latrines being housed as usual in a building projecting at right-angles to the end of the dormitory, they were situated in the end of the east range itself with a drain passing beneath.[12] At Boxley the drain is well preserved, its course continuing some distance to the east where it is covered by a pointed barrel vault. Water was conducted from a source to the north, where rivulets still run in the fields, and made to flow westward through the vaulted drain. Immediately on the line of the east face of the dormitory range there is a constriction in the drain with vertical grooves on each side where a wooden sluice-gate held back the water before it passed beneath the latrines (Fig. 2). When the gate was raised from above, the water flowed with sudden force to scour the area under the privies, apparently escaping into a ditch running southward for about sixty yards into an existing pond. Surface indications of this ditch remain in the field between the pond and the Abbey. In the wall forming the south side of the drain are openings to provide access for the purpose of removing accumulated silt.

Location and form of the reredorter drain

The paper by Tester proposes that the reredorter drain takes a right-angled turn and heading south to the south west pond. The stated evidence for this is the (then) perceived ditch heading to the pond. The 1801 survey shows such an open ditch heading to the pond (just left of centre in the picture below).



The line of the ditch currently seems less evident, although a line of trees is suggestive of its possible line. We understand that Terra Measurement did not get any immediately obvious responses from a GPR survey, but this may change after further processing of data. However, the area covered by

the GPR is probably a little to the east of the line of the ditch and proposed line of the reredorter drain which runs along ground with various obstacles to easy use of a GPR.

One difficulty with the proposed line of the reredorter drain is that it takes a right-angled turn in a location where there would be heightened risks of blockages from debris. To overcome this risk, one or more of the following could apply:

- There is a sharp drop in the height of the drain at the point of the right-angled turn – even to the extent of a waterfall at the corner. The resulting turbulence and increased water speed would reduce the risk of blockages.
- The reredorter drain has some form of access at the corner to remove any blockages.
- A junction with another drain that runs from north to south, whose flow would then assist in keeping the reredorter drain clear. Such a drain might be linked with the need to clear rainwater from the roofs of buildings, or from water taken from the northern drainage system on a similar line to that now taken in order to be directed through the former nave of the abbey.
- The reredorter drain does not in fact have such a right-angled corner at that location, but instead continues in a westerly direction for some distance. It may be noted that the modern septic tank outflow reaches the same south west pond at a more western location than the ditch shown in the 1801 survey.

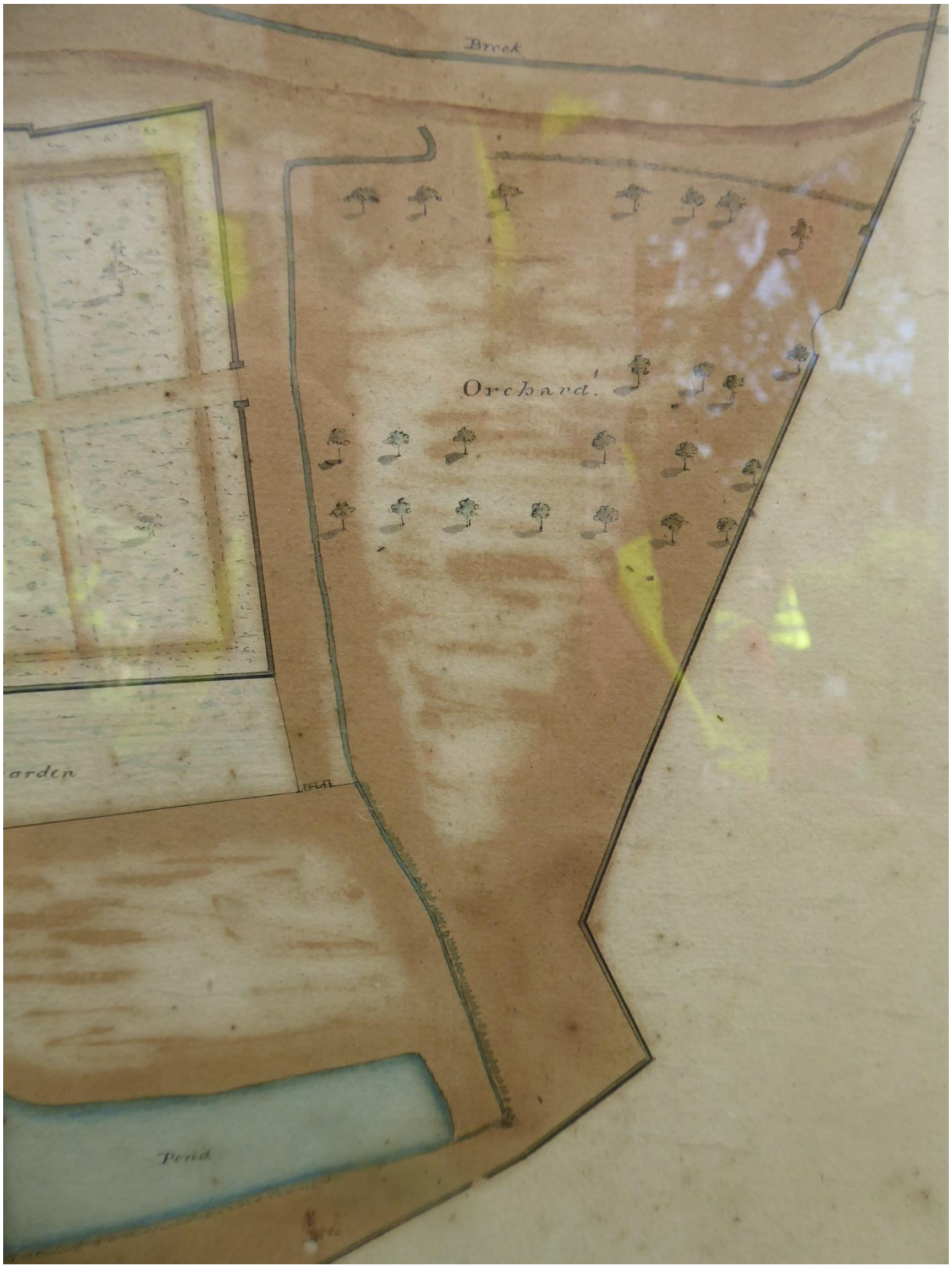
Limited investigations have been made by us to investigate these possibilities. We understand that a brief GPR investigation by Terra Measurement near the top of the steps up from the current Rose Garden gave complex signals with no obvious line of such a drain. In the Rose Garden itself near the foot of the steps is a small drain that leads downwards and slightly to the south. Various attempts with sondes on drainrods and fibreglass reel did not lead to progress of more than a metre, although its location is suggestive of a linkage to the reredorter.

Dale Rose of Terra Measurement investigating the small drain in the current Rose Garden.

More information on the line of the reredorter drain might be found from the endoscope exercise referred to above, although it will be the floor of the reredorter rather than its roof that will be of more relevance. Further investigations could be attempted on the possible line of the drain to the south west pond.

The South East Pond

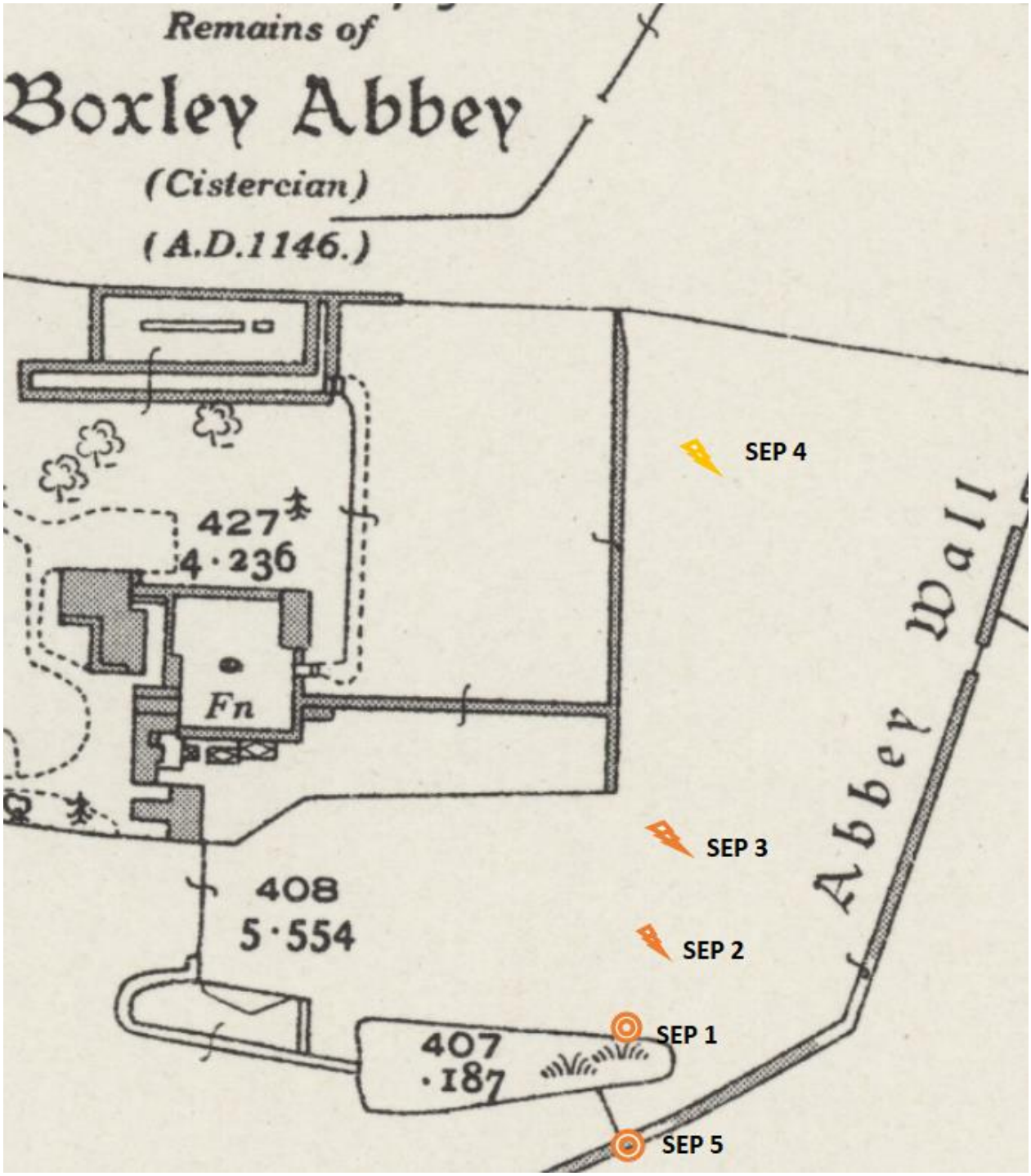
The 1801 survey shows a single drain going into the south east pond (see below).



Towards the eastern end of the south east pond, there was a small flow of water into the pond. On clearing some debris, it could be seen that this was emanating from a ceramic field drain (SEP 1 on map below).

Close-up of SEP 1: Ceramic field drain at top, with water dripping through tree roots below.

Broken pieces of ceramic field drain associated with SEP 1, with GPS case for scale (13 cm long).



Locations superimposed on a 25 inches to 1 mile map revised 1936/7 and published 1946 (not reproduced to scale here).

With a sonde on drain rods threaded into the drain, the position of SEP 2 was located approximately 20-25 metres away, with the limiting factor for progress being the number of drain rods rather than any blockage. A sonde on fibreglass reel reached to SEP 3 before some form of blockage prevented the sonde being threaded further. The depth of the sonde was measured as around 1 metre. It is understood that Terra Measurement managed to find further signals with the use of GPR up to SEP 4. It should be noted in this context that the area inside the abbey wall north and east of SEP 1 is heavily wooded and GPR is only feasible along a length of grassy path that runs north-south just

outside of the inner wall. The 1801 survey shows the drain turning to the east at a point near to SEP 4, but due to the undergrowth and woodland, this could not be verified.

Taken together, this tends to support the 1801 survey, with the open drain being replaced by a buried ceramic land drain and with a more direct line in the approach to the south east pond.

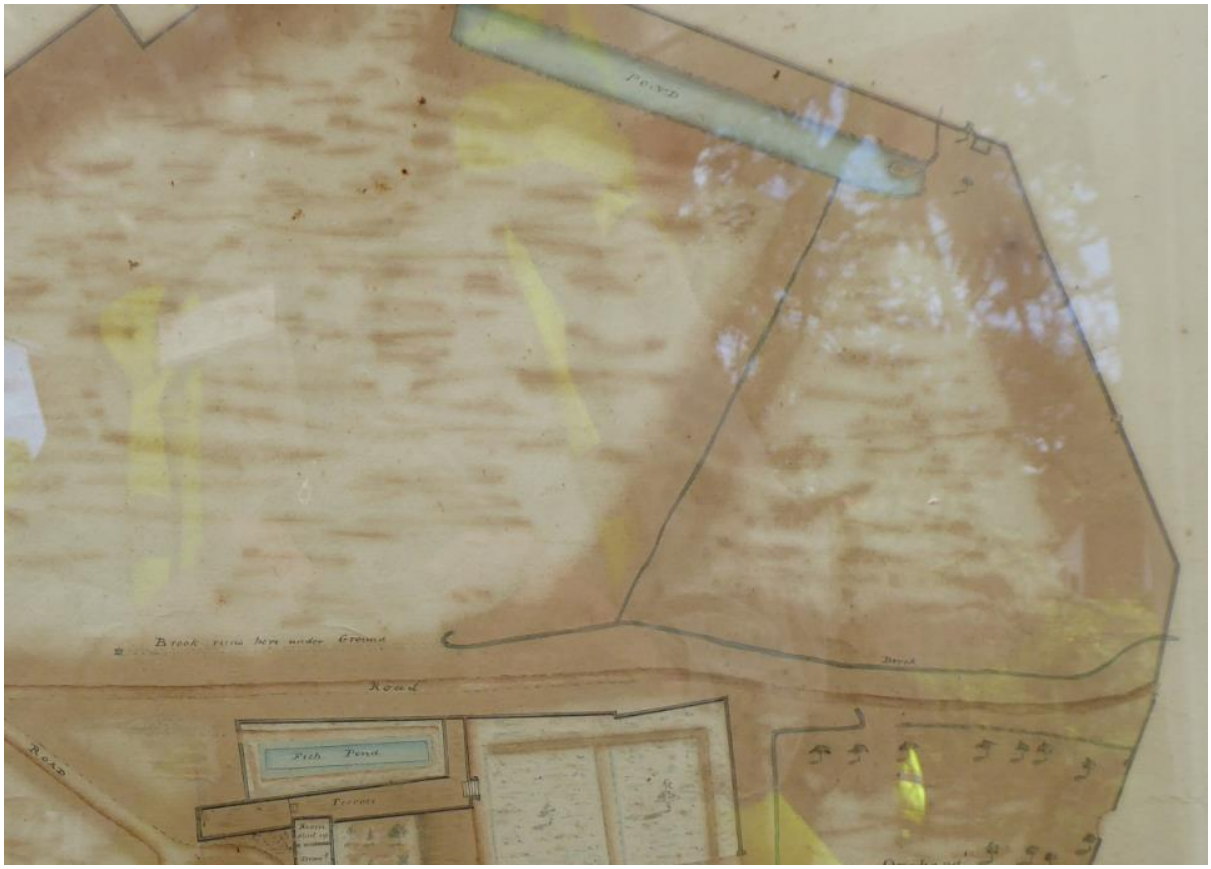
A line of Terra Measurement's white flag markers running along the path beyond the portable toilets.

On the south side of the south east pond is a drainage ditch running into the pond from under the abbey wall (SEP 5 below). It appears that this has been modified in the relatively recent past. Broken pieces of ceramic field drain lie on the surface nearby. The map published in 1946 shows this drainage channel, but earlier editions do not – and neither does the 1801 survey.

Drainage channel at SEP 5 that appears to let water in from the fields outside the wall of the abbey complex.

North Pond and Northern Drainage Channel

The 1801 survey shows a single inlet into the north pond through the abbey wall at its north eastern end (below). There is a single outlet from the pond that heads south west. This joins another "brook" as it is labelled on the map, that comes from the east and then after a while the label is that the combined "brook runs here underground" in a westerly direction.

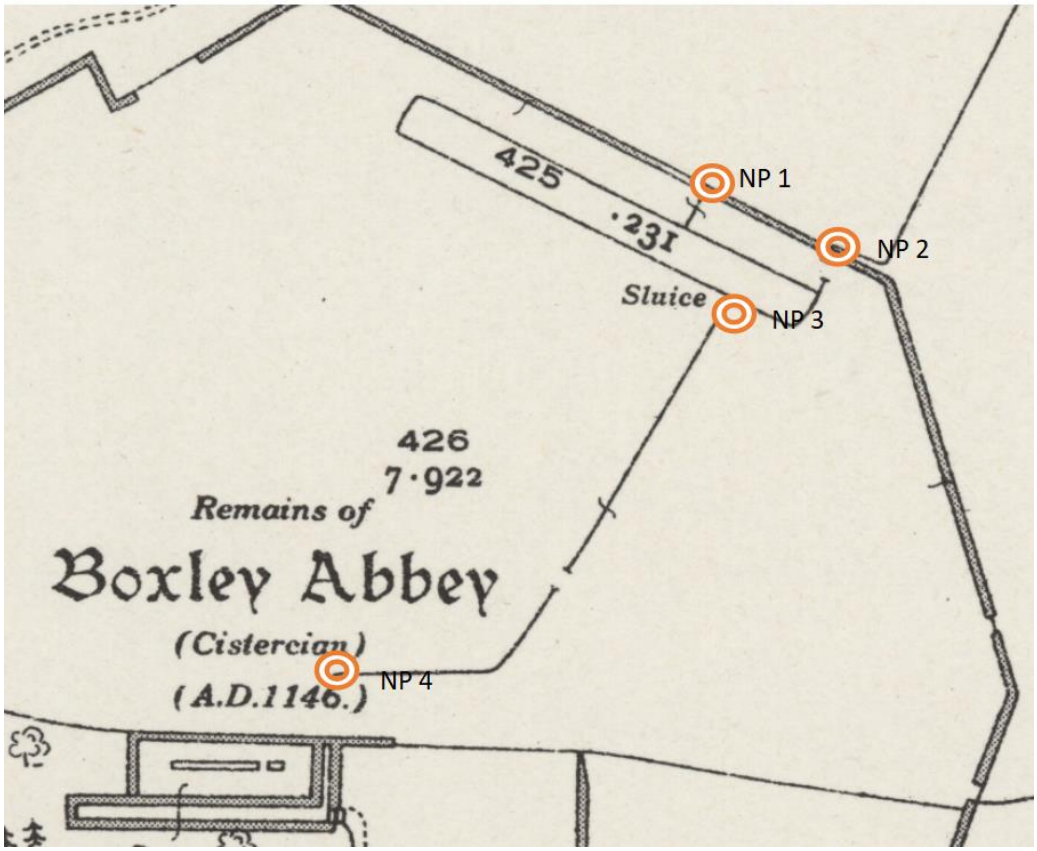


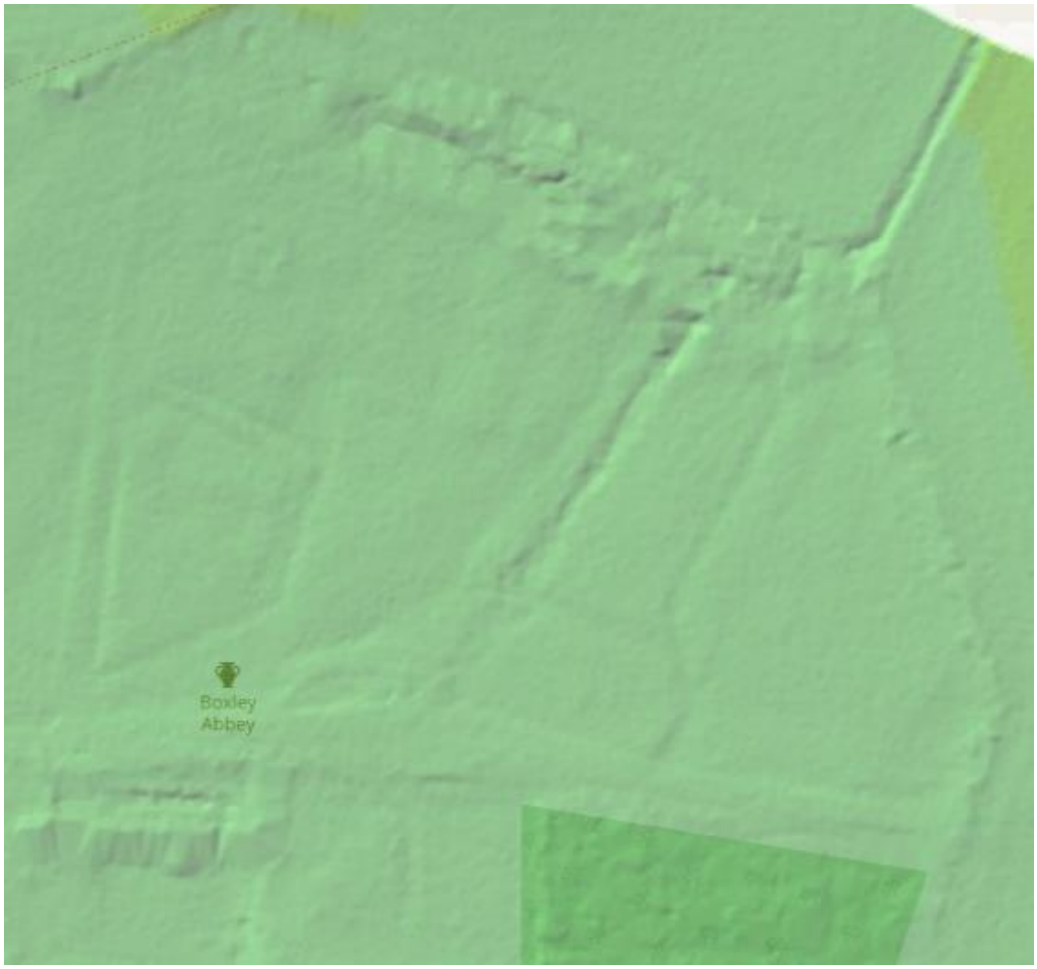
An extract of the 25 inches to 1 mile map (revised 1936/7 and published 1946) is shown below with key locations (NP 1-4) marked.

The north pond was found to have two inlets running under the abbey wall. These are both shown on the 1946 map, but the western inlet seems to be omitted from earlier maps. Both inlets are currently active, although in July 2020, it was the western inlet at NP 1 that had the larger flow. The eastern inlet at NP 2 seems to be consistent with both the 1801 survey and the 1946 map. Interestingly, the 1801 survey appears to show an islet that may have been caused by sediment from the eastern inlet and in practice in July 2020 the eastern end of the pond is largely silted up, whereas the western end has open water.

In July 2020, the sluice and dam at NP 3 was heavily overgrown, however, visible brickwork in the dam included bricks that seem likely to date from after 1801, even though the shape of the pond appears similar in both the 1801 and 1946 maps. It therefore seems likely that the newer bricks represent maintenance rather than a major change in the structure.

The drain running from the east in the 1801 survey no longer exists on the ground in 2020. It is possible that there is an underground land drain, but the vegetation growth and the cars parked over the area made it difficult to investigate.


425
·231
Sluice
426
7·922
Remains of
Boxley Abbey
(Cistercian)
(A.D.1146.)
NP 1
NP 2
NP 3
NP 4


Boxley
Abbey

It has been proposed that the Cistercian complex originally included a watercourse running from this northern watercourse down along the eastern side to join the line of the drain at SEP 4 and ultimately feed the reredorter and the south east pond. It seems unlikely that any such watercourse existed in 1801, as it would have needed to have crossed the east-west "brook" that is shown on the survey. Indeed, it seems plausible that the feed to any such Cistercian watercourse running north – south could easily have come from the east rather than from the north. Nevertheless, it would be a point to investigate: the lidar results (above) do show a feature running roughly parallel to the existing watercourse. The presence of parked cars impeded any such investigation on this occasion. It would be interesting to see geophysics results in this area – and possibly also at times of lower vegetation growth.

The inlet running under the abbey walls at NP 1.

View of NP 4 (under the wooden covering in the centre of the picture) from the east. NP 4 is at the start of where the 1801 survey indicated that the "brook here runs underground". It is now a penstock, where water is dammed up to drive much of the flow along the "eastern drainage channel" (as it is known in this report) which starts by running underground to the left of this picture to then flow down the former abbey nave. The residual flow continues (now mostly above ground) to form the "western drainage channel" (as it is known in this report).

Eastern Drainage Channel

The track of the eastern drainage channel is shown on the annotated version of the 1946 25 inches to the mile map extract below.

The channel starts at the penstock at NP 4 mentioned in the previous section, where water is dammed up to send a flow in an underground channel southwards under the track and abbey wall to emerge at the eastern end of the former nave (which has been converted into a water garden) at EDC 2. A sluice at the western end of the nave forms a pond, where the water goes into a channel and then into a short tunnel at EDC 3 to go under the western wall and emerge at EDC 4.

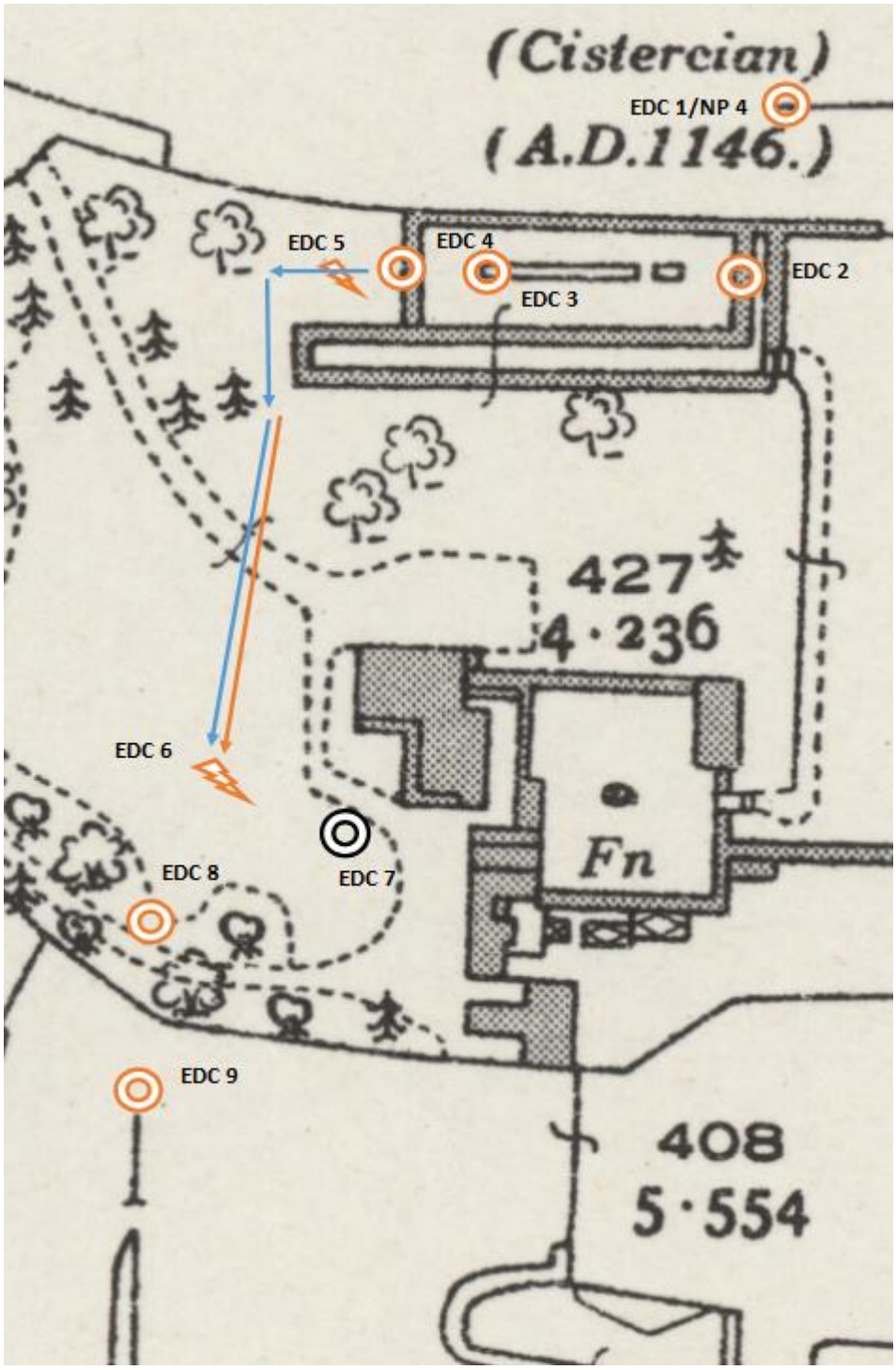
An attempt was made to prove the link from EDC 1 to EDC 2 with drain rods and sonde. In part this was done in case it might also find a conceivable continuation to the south heading towards the reredorter. In practice, there is some form of partial blockage in the length from EDC 1 to EDC 2 and no further information was found.

The entrance at EDC 4 was investigated using a sonde on the end of both drain rods and glass fibre pipe. In both cases, no progress was made beyond EDC 5. This may be caused by dislocations in the pipe or a sharp corner in the channel. Coming from the other direction, the access point at EDC 8 was investigated using a sonde on the end of a glass fibre pipe to reach EDC 6 (at a depth of around 0.8 metres), but could not progress further. To try to find the line of the flow from EDC 5 to EDC 6 two methods were used:

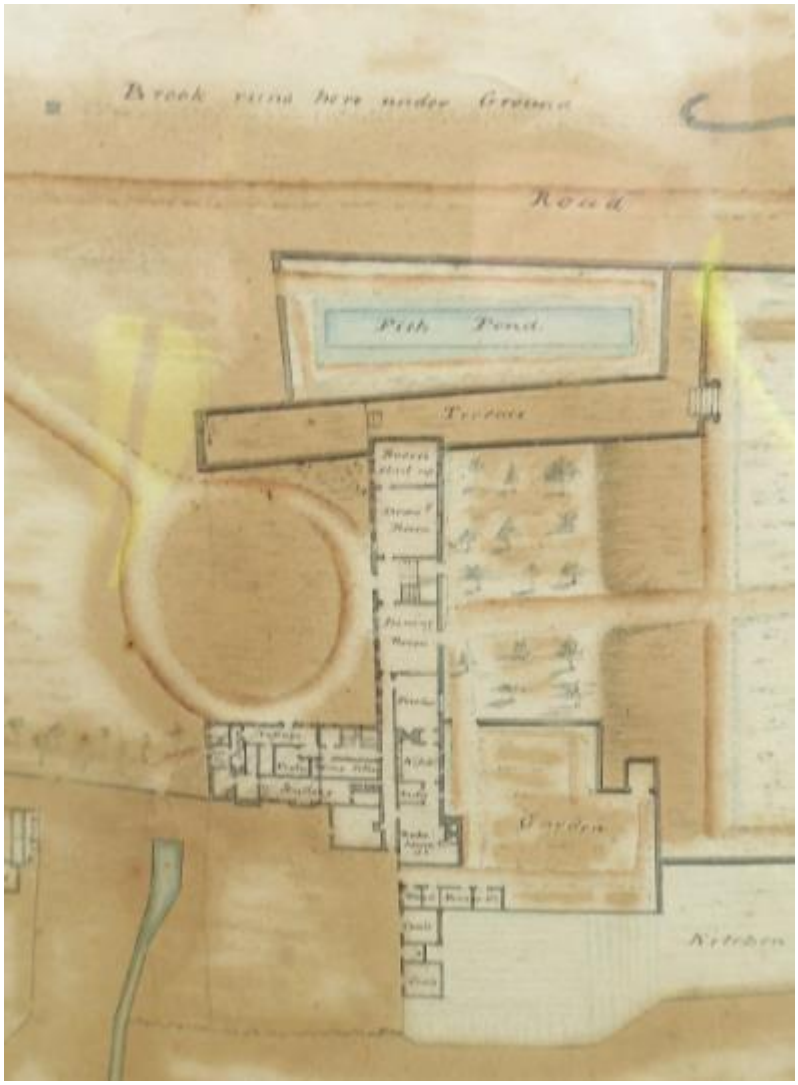
- Firstly using GPR, a length of channel across the drive and under the trees beyond was found. This is shown as the orange line in the map below. Closer to the stone walls of the terrace at the EDC 5 end, the readings were not conclusive.
- Secondly using a metal detector. Rather strangely, this proved to pick up the line intermittently all the way from EDC 5 to EDC 6, showing that the channel went around the stone walls of the terrace at the EDC 5 end, rather than underneath them (the blue lines in the map below). It is not clear to us why a metal detector was working in this instance. It is not a confusion with electricity or telephone cables, as these service lines were found separately. It is possible that the channel is in ceramic pipe with a metallic glaze, or with large amounts of iron oxide in its construction or deposited by water flow and this is sufficient to cause an induced magnetism. However, the signals were clear on the known run from EDC 4 to EDC 5 and for some of EDC 6 to EDC 8. One feature to note is that on the western end of the structure on the approach to EDC 5 at the end of the terrace walls, the metal detector tended to show two separate lines around a metre apart.

The drain cover at EDC 7 was lifted and investigated to see if it linked with the eastern drainage channel. It was dry at the time and no link was proved.

In a final test, the dam in the penstock at EDC 1/NP 4 was breached (by removing a small green football that blocks an overflow pipe), sending all of the water through the western drainage channel. This eventually caused the flow through EDC 2, EDC 3, EDC 4 and EDC 8 to dry up. We can assume, therefore that the eastern and western drainage channels are separate in normal conditions.



A comparison with the 1801 survey (below), indicates that the general layout then was probably similar – although the survey only shows the elements that are above ground. One notable difference is that it appears that there was then probably some form of decorative pool around EDC 6 to EDC 8. Beyond EDC 8, the path of the channel is evident, with the flow running under a track to emerge at EDC 9 and then flowing above ground (although with enough worked stones in the ditch to imply past existence of a stone built culvert) to eventually flow into a pond near the southern boundary at Grange Lane. The southern part of the channel is likely to have been affected in the recent past by the construction of the M20.


Brook runs here under Ground
Road
Fish Pond
Terrace
Garden
Kitchen

EDC 6 in the foreground. The line back up to EDC 5 is being found (surprisingly effectively) by a metal detector. It broadly heads under, but to the right of the trunk of, the copper beech in the distance and then to the left of the end wall of the terrace.

The access point at EDC 8.

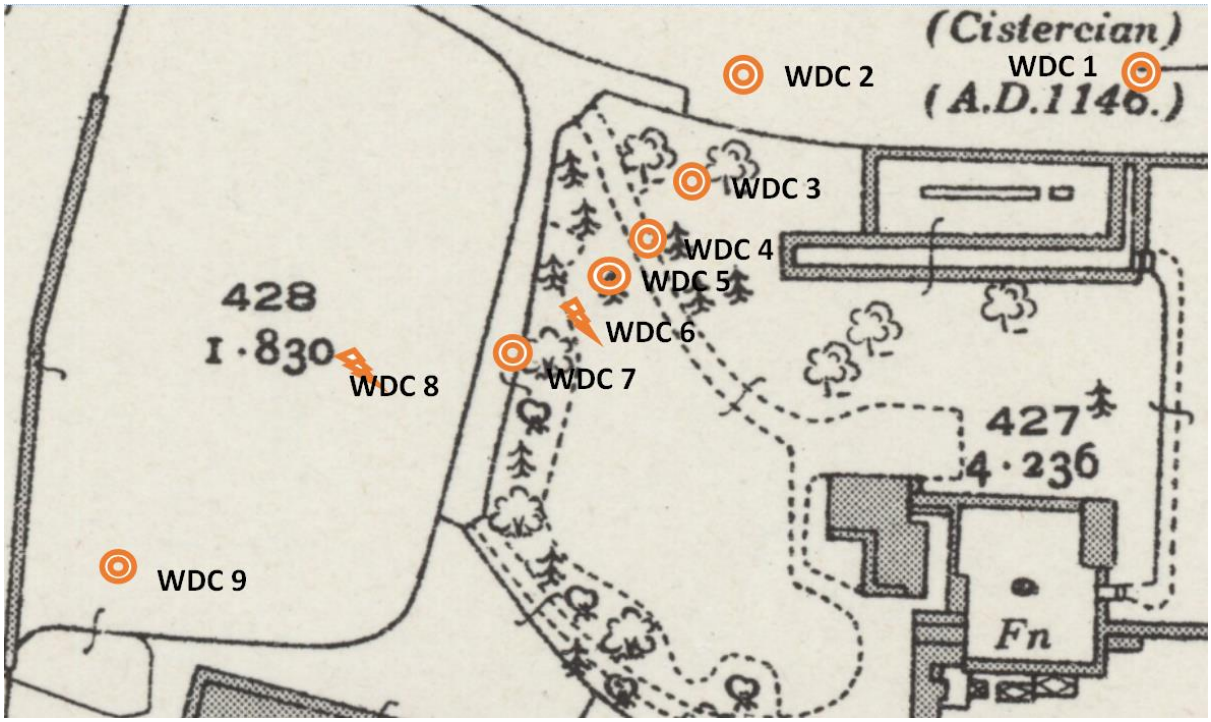
Western Drainage Channel

The track of the western drainage channel is shown on the annotated version of the 1946 25 inches to the mile map extract below.

The channel starts at the same penstock as NP 4/EDC 1 (and labelled as WDC 1 below). The flow runs along a ditch to WDC 2, where it enters a culvert to emerge at an access point at WDC 3, where it then goes into a modern black corrugated plastic pipe. This flows directly to the access point at WDC 5 (this was found by drain rodding). In practice, due to a blockage in the plastic pipe, much of the water ran along the surface to an ordinary road drain at WDC 4 where it eventually joined somewhere between WDC 5 and WDC 7 (this is discussed in the next section below).

Using a sonde on drain rods (from WDC 5) and on glassfibre reel (from WDC 7) the route of the flow via WDC 6 was able to be proved (the tracks from WDC 5 and WDC 7 overlapped).

Similarly, a sonde on glass fibre reel from each of WDC 7 and WDC 9 overlapped the track through WDC 8. It may be noted that the line of the sonde from WDC 8 to WDC 9 shows up very clearly on the geophysical analysis that we have seen. WDC 8 is in an obvious depression in the field.



An extract of the 1801 survey is shown below. The access point at WDC 2 appears to be shown and the line from WDC 8 to WDC 9 appears to be shown as an open ditch. However, little clue is given of the line of flow from WDC 2 to WDC 8.


ROAD
ROAD
Cow Shed
Barn

Entrance to culvert at WDC 2

The drain in the drive forming WDC 4. WDC 5 is covered by a log just visible under the trees a few metres beyond the tarmac. The orange markings on the tarmac mark the position of a blockage (now removed) in the black plastic pipe running from WDC 3 to WDC 5. The two lines of tarmac patches over the lines of underground pipes can be seen clearly (these are referred to in the section on remedial work on the western drainage channel below).

The access point at WDC 7 is under the hedge on the left of the track roughly opposite the fence post seen here on the right.

WDC 7 access point

The upwelling at WDC 9 before flowing into the pond to the west of the Hospitium.

The flow from WDC 9 is above ground and into a pond to the west side of the Hospitium. In July 2020, this pond was largely dried out and overgrown, although it had held significant water in February 2020. No work was done to track the flow from the pond down to the southern end of the site, but it seems likely that towards the southern end it will have been affected by the construction of the M20.

Remedial Work on Western Drainage Channel

As noted in the previous section, a blockage in the black plastic pipe between WDC 3 and WDC 5 caused water to be forced up from WDC 3 and run over the surface to the road drain at WDC 4. This was damaging the ground and the road surface. During a visit in the very wet February of 2020, water was also then running over the ground beyond the drive and down the track through to the Hospitium.

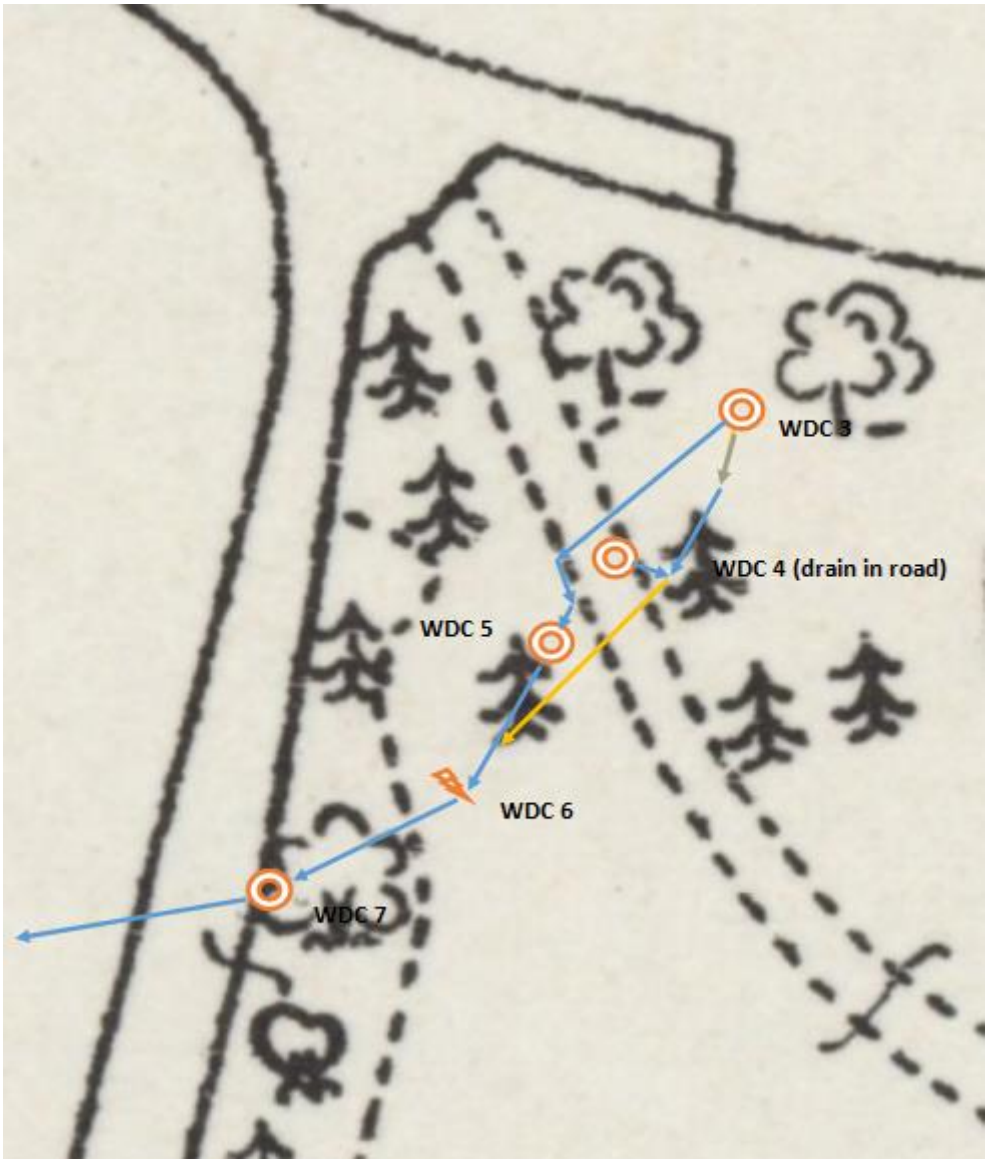
We therefore tried to understand the flows of water in this area.

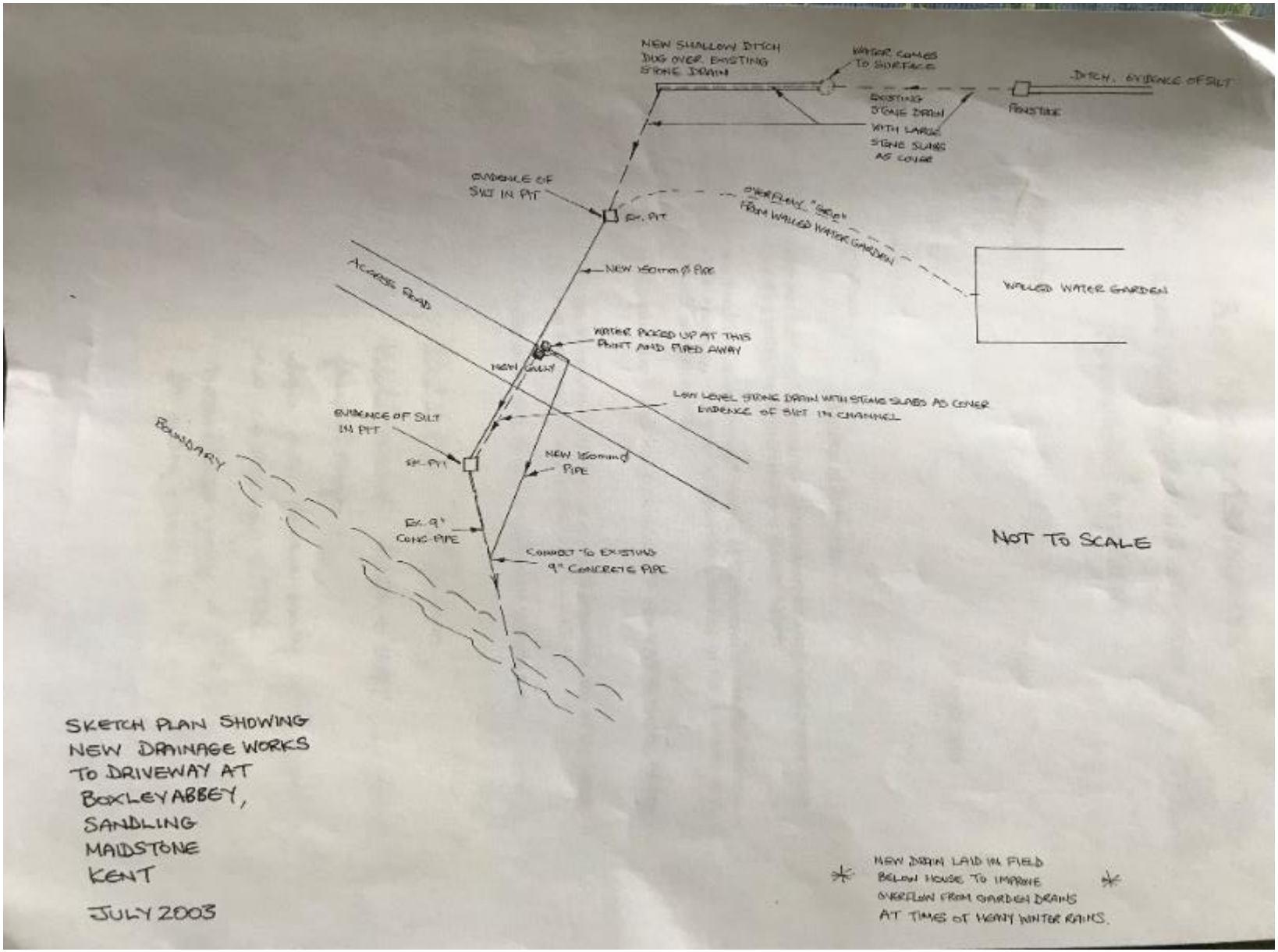
We found that we were able (through much use of drain rods) to clear the black plastic pipe between WDC 3 and WDC 5. The blockage was caused primarily by a brick (apparently Georgian era) that had been brought into the pipe – presumably by water flow. On clearing the blockage, water no longer flows across the surface. However, the rather tight "S" bend of the black plastic pipe, relatively low incline, together with its corrugated nature and relatively small diameter relative to flow will mean that it is likely to be prone to blockage in future.

We investigated WDC 4. The main part of it is simply a silt/gravel trap that needs periodic emptying (we partially did so). However, it has a junction near the surface that leads to a pipe that flows roughly south easterly initially. Pushing a traceable cable down through this pipe led to the cable being detected around 3 or 4 metres short of WDC 3. We therefore believe that there used to be some form of linkage to WDC 3 that is no longer in place. However, it is also apparent, that the flow of water from WDC 4 must head down a different direction under the drive and out through to a pipe junction somewhere between WDC 5 and WDC 7. It is possible that this is in fact at WDC 6 near a large tree, where the sonde could not progress when pushed in from WDC 7.

In the diagram below, blue lines show the line of proved pipe. Yellow lines show assumed lines of actual flow and grey shows assumed lines where flow probably once occurred. The places where the two lines cross the drive (albeit – assumed in the case of water from WDC 4) are clearly visible as patches on the tarmac surface.

We were provided with a July 2003 plan by Mr James Best-Shaw that has some additional data – albeit we doubt that we would have understood quite how the flow was actually working in practice from this plan alone. This plan has also been reproduced below.


WDC 3
WDC 4 (drain in road)
WDC 5
WDC 6
WDC 7


NEW SHALLOW DITCH DUG OVER EXISTING STONE DRAIN
WATER COMES TO SURFACE
DITCH, EVIDENCE OF SILT
EXISTING STONE DRAIN WITH LARGE STONE SLABS AS COVER
RINGSTEAD
EVIDENCE OF SILT IN PIT
EX. PIT
OVERFLOW "SPRING" FROM WALLED WATER GARDEN
WALLED WATER GARDEN
NEW 150mm ø PIPE
ACCESS ROAD
WATER PICKED UP AT THIS POINT AND PIPED AWAY
NEW GULLY
LOW LEVEL STONE DRAIN WITH STONE SLABS AS COVER EVIDENCE OF SILT IN CHANNEL
EVIDENCE OF SILT IN PIT
BOUNDARY
EX. PIT
NEW 150mm ø PIPE
EX. 9" CONC PIPE
CONNECT TO EXISTING 9" CONCRETE PIPE
NOT TO SCALE
SKETCH PLAN SHOWING NEW DRAINAGE WORKS TO DRIVEWAY AT BOXLEY ABBEY, SANDLING MAIDSTONE KENT
JULY 2003
NEW DRAIN LAID IN FIELD BELOW HOUSE TO IMPROVE OVERFLOW FROM GARDEN DRAINS AT TIMES OF HEAVY WINTER RAINS.

There is a question of how to keep the water from running on the surface in future wet conditions. Clearly the two basic points of maintenance are to:

- Keep the black pipe from WDC 3 to WDC 5 running clear.
- Keep the silt/gravel trap in WDC 4 clear.

However, it seems likely that the rate limiting step for water flow is the section from WDC 3 to WDC 5 (or WDC 6), where the pipe seems to be laid at less of an incline than around WDC 7 (say). It would be interesting to see whether a link could be made easily from WDC 3 to WDC 4 at below ground level to give an additional relieving line of flow – as there is some evidence that such a line may exist in part and this may involve less work than a more comprehensive solution.

We would note that it seems quite possible that the flow of water into the Boxley Abbey site may well have changed over the last few decades, as it seems that the water extraction plant for Maidstone to the north of HS1 has moved location. We have not covered this further in this report.

Conclusions and Next Steps

One of the consistent features of our investigations has been that the 1801 survey appears to be reliable as far as it goes in terms of the drainage channels shown. It therefore seems likely to be relatively reliable for other matters as well.

We understand that further geophysical survey work is to be carried out on the north field and this is likely to be helpful in identifying possible historic watercourses in that area.

We were surprised to find that a metal detector appeared to pick up the lines of buried drains on the eastern drainage channel quite effectively. There would seem merit in using this technique elsewhere on the site (including the north field and in the area north of the south east pond) to see if any further information can be gleaned. It is non-invasive and quick to use.

We believe that an endoscope (or similar equipment) could give more information on the reredorter – and that this should be straightforward. Ultimately, it would be interesting to carry out some excavation in it, but this would presumably involve Scheduled Ancient Monument permission.

More information may be found in times of lower plant growth.

It will be interesting to see how the western drainage channel copes with higher water flow this autumn and winter after the work done to clear drains. We suspect that further work may be required to avoid surface water damage to the Hospitium.

KURG August 2020