

NEW PERSPECTIVES ON ABBEY CWM HIR: A Photogrammetric Survey.

Julian Ravest

The standing walls that currently define Abbey Cwm Hir represent only the large nave and part of the transept of what was planned as an impressive Cistercian Abbey. The ambition of its builders is reflected in the scale of this nave, which, at 242 ft (74m), is the longest in Wales. However, the extension of the Abbey beyond the visible ruins and the existence of any other buildings on the site has been a matter of conjecture as nothing else now remains above ground level and there have only been limited archaeological excavations. Documentary evidence for the site is similarly limited.

Against this background of a dearth of knowledge, a photogrammetric survey of the Abbey site and adjoining areas in the Abbey Cwm Hir valley by drone was undertaken. By its very nature, a survey based on photographs can only encompass the visible topography of the site. However, sub-surface features may also affect the shape of the visible surface and hence be derived from a set of aerial photographs.

The rapid development in recent years of aerial photography using drones and the general availability of software enabling analysis and visualisation of images has opened up powerful techniques for the mapping and 3-D modelling of ground surfaces. This survey has been undertaken using such techniques at the invitation of the Abbeycwmhir Heritage Trust in order to answer, as far as possible, some of the outstanding questions related to the Abbey. It has benefitted from encouragement and advice from archaeologists of the Clwyd Powys Archaeological Trust (CPAT), both in terms of the use of drones for photogrammetric surveys and the analysis of the imagery. A starting point for our survey was two CPAT Reports^{1,2} on the Abbey which provided an initial interpretive framework and authoritative view of the archaeological understanding of the Abbey site in 2005.³

This current paper has benefitted from comments and suggestions from Professor David Austin and Lt General Jonathon Riley (see accompanying paper in this volume of *Transactions*⁴). In particular, as a result of these inputs, the photogrammetry has opened up a new layer of interpretation of the site in terms of the English Civil War.

The Abbey Cwm Hir site has been much worked over since the Abbey was founded some 850 years ago and it is to be expected that the present surface bears the marks of this long period. It is currently part of a working farm. Consequently, the interpretation of the findings of this survey is subject to varying degrees of uncertainty. However, at the very least, the imagery provides a detailed record of the present state of the site which may guide future investigations.

Ideally, the survey should be accompanied by, or inform, other types of archaeological investigations. Small scale excavations of part of the site were undertaken by Stephen Williams in 1894;⁵ we are aware of only two other archaeological investigations since that time:

- a geophysical survey of part of the site undertaken in 1998 by GeoQuest Associates for Clwyd Powys Archaeological Trust;⁶
- currently CPAT are leading an excavation of the area immediately to the west of the farm where aerial photography has suggested a possible cemetery.

HISTORICAL AND INTERPRETIVE CONTEXT

While this is not an historical study of the Abbey, it is necessary to outline the main events and sources of information relevant to the interpretation of its present state.

The Foundation of the Abbey: The Abbey was established on a previously unoccupied, isolated site. This isolation is typical of Cistercian foundations and was designed to protect the monks and lay brothers from distractions. Even the much later tithe map (c.1840) shows the existence of only a small village consisting of little more than a farm, a church, a mill and a cottage.

Records exist dating the foundation of the Abbey to 1143 (quoted, for example, in ^{8 et al}). What was actually initiated in terms of buildings at that time is not known. As this was a politically troubled period, little more than the appointment of some monks in a temporary building is possible. To date, no physical evidence of any building associated with this first establishment has been found.

The Abbey was re-founded in 1176, with no apparent continuity with the earlier foundation, as a daughter house to the Abbey of Whitland, 1140, itself a daughter house to Clairvaux Abbey, 1115. The Whitland monks also founded Strata Florida Abbey, 1164, and Strata Marcella Abbey, 1170. In 1198 some monks from Abbey Cwm Hir founded its own daughter house at Cymmer near Dolgellau.

Radford⁷ contended that Llywelyn Fawr (Llywelyn ap Iorwerth), Prince of North Wales, started the construction of the church as an impressive symbol of the unification of Wales. This places the extant ruins as probably dating from 1220s. However, more recently, Stephenson⁸, has argued strongly against this attribution and date. He considers that the more likely driving force behind the building was Roger Mortimer during an earlier period of approximately 1195 to 1210, or possibly to 1215. The Abbey was designed for 60 monks and lay brothers but there is no evidence that it ever achieved anything like that number. The construction was never completed with possibly only the nave finished. This may have been because, after its grandiose establishment, for most of its existence the Abbey was relatively poor and never attracted significant and lasting patronage. In 1231 it also suffered the huge fine of three hundred marks and the destruction of a grange by Henry III as

punishment for a monk effectively leading the King's men into an ambush. This was not a good start and may have brought any idea of continuing building on the original scale to a halt.

The possible existence of a church earlier than that defined by the present ruins, related to the 1143 foundation or the 1176 re-foundation, on the present site is discussed below.

Major destructive events

The Abbey has suffered four major events, outlined below, which have contributed to its present ruinous state.

Owain Glyndwr, 1401/2: During his campaigns, Owain Glyndwr reputedly despoiled the Abbey⁹. No record exists identifying what happened before or after this act but it appears the Abbey, though continuing as a religious establishment, never fully recovered.

Dissolution, 1537: The Abbey is referred to infrequently in the historical record until its dissolution in 1537 when it housed just three monks and the Abbot. In his Itinerary John Leland, living at the time of the dissolution, comments on the length of the church and writes:

*No church in Wales is seen of such length, as the foundation of walls there begun doth show, but the third part of the worke was never finished. All the howse was spoiled, and defaced by Owen Glendour.*⁹

This quotation suggests that some foundations may still exist, and be found, upon which no building was ever constructed.

Immediately following the dissolution, parts of the Abbey were used in the restoration and enlargement of Llanidloes Church. This included five arches from one of the arcades separating the nave and aisle at the Abbey. This implies that any existing roof was removed during this period, if not before.

Civil War, 1644: During the English Civil War the Abbey was the site of a battle during which the Parliamentarians assaulted the Royalist held Abbey. A transcription of a contemporary letter,¹⁰ described how, under the leadership of Sir Thomas Myddelton, the defending garrison was first asked to surrender. On this being declined the Abbey was immediately stormed, apparently taking the Royalists by surprise since attacking casualties were light while some three hundred and twenty men, including cavalry, were captured. The letter states:

... that the enemy had made them a garrison at Abbey Cwm-hir, a very strong house, and built with stone of a great thickness, and the walls and outworks all very strong the house having been in former times an Abbey of its papists ...

It further states: *This garrison of theirs is Master Fowlers house.* In the first quotation, house could, as in Leland above, refer to the remains of the church. In the second it could refer to Fowler's household as he may have financed the Royalist troop and was the owner of the Abbey Cwm Hir estate though he was not present at the battle. There is, however, the possibility that an actual dwelling had been constructed on the site either within the nave ruins, or separate from them.

The mention of *outworks* is notable in the context of our findings. Holding a garrison at Abbey Cwm Hir was strategically important to the Royalists, with costs on a par with those of New Radnor and Stapleton Castles.¹¹ Consequently, its physical defences would have been significant.

After the short assault the parliamentarians ... *having thrown down the enemy's works, and made the garrison unserviceable for the future ... marched on to Flintshire.* The physical impact of this act of destruction has been largely ignored by subsequent writers. Whereas Owain Glyndwr's actions appear to have been more akin to iconoclastic vandalism from which the monks were able to recover, at least to some extent, the Parliamentary action was aimed at deliberately and permanently wrecking any existing buildings.

Clearance, 1820s: Between 1821 and 1837 the Abbey was owned by Thomas Wilson. Work on the clearance of the Abbey was undertaken during this period. On acquiring the estate Wilson commissioned a report on its state from the land surveyor Layton Cooke. The report deals with the various properties of the estate and how they may be improved. Its account of the Abbey is what concerns us here.

This report, the manuscript of which is held in the archives of the Radnorshire Society, includes what appears to be later annotations by Wilson. We will refer to this as the Cooke/Wilson Report. A transcribed version of the report was published in the *Transactions of the Radnorshire Society*.¹² The report is the most comprehensive description to that date of an intervention to the Abbey site.

Within what is assumed to be Wilson's hand, is reference to the ruins and the surrounding area. He states that, in 1824-5 he contracted to have the interior of the ruins cleared to the floor.

Vast quantities of ornamental and other Free stone were dug up and preserved. And the bases and other portions of pillars discovered.

Following a brief description of finds, it continues:

I afterwards had the exterior of the ruins and the whole field in which they stand dug up and found the abbot's apartments ... and the slaughter house, also a large separate Free stone oven ...

Hundreds of tons of stone were taken away and used in the construction roads but *of the ruined building itself I have not disturbed a stone.*

Wilson formed the river into a lake below the Abbey ... *which much adds to its beauty*. Wilson also built a house close to the Abbey site which he finished in 1833, using stone in part taken from the Abbey site. This house was later enlarged to form the present Hall.

LATER ACCOUNTS OF THE ABBEY SITE

Rev WJ Rees's description of the ruins, 1849: In his account of Abbey Cwm Hir, written some twenty years after the Cooke/Wilson report, the Rev Rees is the first to describe the documentary records of the Abbey's history and its subsequent ownership, and to provide a detailed description of the ruins. He quotes the Cooke/Wilson report as a basis of his description but adds further details to which we must attach some credence in view of his proximity in date to the clearances and apparently direct observation. He adds to the Cooke/Wilson account by saying that a refectory and monks' dormitories were also found in addition to the Abbot's house and the slaughter house reported by Cooke/Wilson. He states that these were located ... *on the south-east of the church and extended to the Clewedock brook*.

Rev Rees also noted:

- A strong dyke and entrenchment bounding the precinct to the east and west at nearly equal distances from the church enclosing about ten acres.
- At the south western corner of the precinct enclosure was the great oven of the monastery. It was removed in 1831. When complete it would have been twelve feet in diameter, three feet in depth and three feet high.
- The church consisted of a nave with side aisles and a transept *portion also of the western side wall, and of the northern and southern end walls of the transept, were rendered more visible; but not even traces of its eastern side wall, nor of any of the chancel or choir, were brought to light*.
- The cemetery was thought to have been on the south west of the field in which the ruins stood, but no evidence was found.
- An apparently temporary wall partitioned off the east end of the nave so that it could be used as the choir. Rees describes it as being thinner and of inferior materials to the permanent external walls of the nave. It used clay and not lime mortar.
- A similar wall closed off the eastern end of the nave. This would presumably have been intended to be removed when the transept was completed. Rees reasonably concluded that, since it had not been demolished, the transept was never completed.

- Rees suggests that the two doorways found in the southern nave wall were entrances to the nave and to the temporary choir.
- He also notes that in removing the rubbish in the nave to the original floor level, the workmen turned up a great number of human bones. Since these were above the Abbey floor level these could be hastily buried bodies of Royalist soldiers.
- Rees reports information received ... *several years ago, a considerable time before the removal of rubbish by Mr. Wilson...*, of the remains of two apartments at the western end of the nave. One was in the south west corner measuring ten by twelve feet with two doors, one to a vestibule, the other into the nave. The second, beyond the vestibule and extending to the north side of the nave measured thirteen feet long by fourteen feet wide and contained an oven. This oven may have been for baking wafers for the mass or for consecrated bread. *Of this apartment part of the wall was entire, the interior of which was lined with upward slabs of stones. On one whereof were sculptures in bas-relief, executed with much art and labour representing figures of human beings and brute animals.*

Rees made careful measurements of the extant ruins and his account includes a plan of the up-standing ruins of the nave but no plan of the external grounds. He reports that the clearance was done in 1827 but decries the fact that in the following years much ornamental and other stonework was removed for reuse or display elsewhere.

Stephen W Williams's account and excavation of the Abbey, 1894: The next significant account of the Abbey was provided by Stephen W Williams.⁵ His account of the ruins rests in part on the description of Rev Rees with significant additions from his own excavations.

Notably he mentions that a recent drain had been cut East -West through the supposed location of the cloister. This unearthed some traces of foundations and two lines of lead pipes which ...*had provided the conventional buildings with water...* It also uncovered a piece of in situ paving stone which he assumed formed part of the south walk of the cloister. He is the first to argue that there was an earlier church on this site. Williams takes the foundation date of the Abbey as 1143, with a date for the extant ruins as early thirteenth century. He argues that the Abbey must have had a church during this span of almost a century. More recently Stephenson has argued that the time span for the construction of an earlier church/abbey may have been as little as twenty years, sandwiched between the re-foundation of the Abbey in 1176 and the construction date for the extant ruins within his own dating assumptions. Williams undertook *some trifling excavations* to determine:

- if any portion of the church east of the nave had been completed,
- if there were any trace of the earlier church,
- the position of the cloister and conventional buildings.

The excavations are not described in detail but, most importantly, his paper does include the first plan of the nave and immediate area showing lines of walls or foundations that had been found together with his proposed layout of a cloister and buildings belonging to an earlier, smaller Abbey. The plan does not appear to differentiate between walls or trenches found by his excavation from those inferred from the upstanding ruins or from those revealed by the earlier digging of the drain. However, he describes the results of his excavations:

The North Wall of the Transept[s] ends abruptly and there is not a trace of foundation further than is shown on the plan.

The South Wall does not appear to have been built much further than on the north side, but there are traces of foundations extending eastwards and also southwards.

Parallel to the West Wall of the South Transept, I found a line of foundation which I think is the east side of the Sacristy, Chapter House, Day room and Slype. The position that this wall occupies, with regard to the church, points to the possibility that there was an earlier church that preceded the present structure.

In ascribing functions to the alleged buildings, he relies on the ‘standard’ Cistercian template for a monastery but this goes well beyond any of the physical evidence that he adduces.

It would appear that his trifling excavations may not have been particularly deep and followed the then prevalent excavation pattern of chasing existing or found wall lines. This is confirmed by his encouraging suggestion that excavation to some two to three feet could reveal the plan of the buildings surrounding the cloister.

The interpretation of the exterior areas south of the nave based on the findings described is highly speculative. In particular, the western edge of the cloister on which much of his plan of the cloister rests, appears to be based solely on the unearthing of approximately twelve feet of a North-South wall or foundation when the drain was dug. Consequently, the scale of the cloister and the location of the conventional buildings owe more to Williams’s presupposition of an earlier, smaller church on the same site than to any physical evidence provided by his excavations.

CA Raleigh Radford, 1982: Radford accepts Williams’s interpretative plan of the area south of the nave as conclusive evidence of a smaller, earlier church on the site though he takes such church as dating from the period of re-foundation in 1176 rather than from 1143 as assumed by Williams. He reinforces Williams’s contention that there was an earlier church on the site which the monks pulled down to rebuild it on a larger scale. For this he draws on more recent knowledge of plans of other Cistercian abbeys of the period.

Radford provides a *Restored plan of the twelfth century* monastery based on Williams's plan and using Tintern Abbey as a model. He places the Abbey in the context of other Cistercian Abbeys and describes how a transformation from an earlier church to the current one may have actually taken place. However, it adds nothing new by way of evidence furthering site interpretation.

Geophysical Survey, 1998: GeoQuest Associates undertook a geophysical survey of the transept and cloister on behalf of Clwyd Powys Archaeological Trust. The conclusions of this survey were generally tentative. However, it did identify an area east of the nave up to the tree/hedge line which it interpreted as ...

good evidence that a set of wall footings for part of the choir survive here in the subsoil.

The survey did not cover the strip directly alongside the current tree/hedge line but did identify the field bank and the ridge and furrow cultivation further east. It did not provide unambiguous evidence for wall footing related to a transept or south of it. The survey showed some magnetic anomalies south of the nave but was unable to resolve any partitions within the claustral range. One linear anomaly found in the claustral area can now be identified as the 1890 drain.

PRESENT PHOTOGRAMMETRY SURVEY

Most photography is characterised by the creation of a two-dimensional image of a three-dimensional object, person, landscape, etc. Photogrammetry, on the other hand, is characterised by extracting the lost third-dimension by combining the results of two or more overlapping photographs. In its simplest form the process is based on binocular vision: the brain combines the images from each eye to recreate the third-dimension. In the present study, computers are used to enable hundreds of overlapping vertical photographs to be combined to produce a georeferenced 3-D digital model. This model may be manipulated to provide a range of informative visualisations of the site.

All survey work reported here was undertaken with a DJI Phantom 4 drone taking twelve Mega-pixel images. The ground resolution of the original photographs was approximately one inch per pixel or better. The main Abbey precinct was surveyed in a single flight during which one hundred and eighty eight vertical photographs were taken. Areas of special interest were subject to further, lower altitude, surveys to obtain higher resolution imagery. Other areas to the east and west along the valley were also surveyed but nothing of note was found with the exception of features which may represent an outer precinct boundary and a building platform of a possible barn to the east of the present mill.

To aid in the interpretation of the images the farmer provided a sketch of the lines of drainage pipes of which he was aware. Images one to four show the photogrammetry of the main precinct area. Image one, shows the results of combining the one hundred and eighty eight photographs into a single image covering some fifty acres, (twenty hectares).



Image 1. This Simple Local Relief Model (SLRM), analyses the digital model to show more clearly the complex surface undulations within the precinct resulting from some eight hundred and fifty years of occupation of the site.



Image 2. An image of the digital model of the site which reveals the ground form of the precinct area

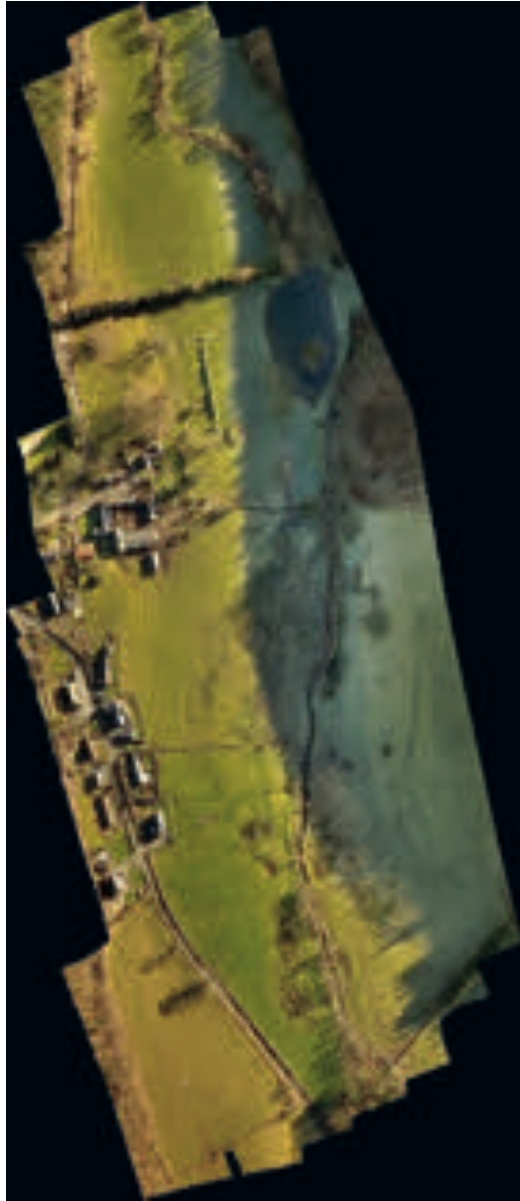


Image 3. Main Precinct area which covers most of the areas of archaeological interest. An early morning survey with long shadows of the hill and trees to the south covering areas where frost persisted.

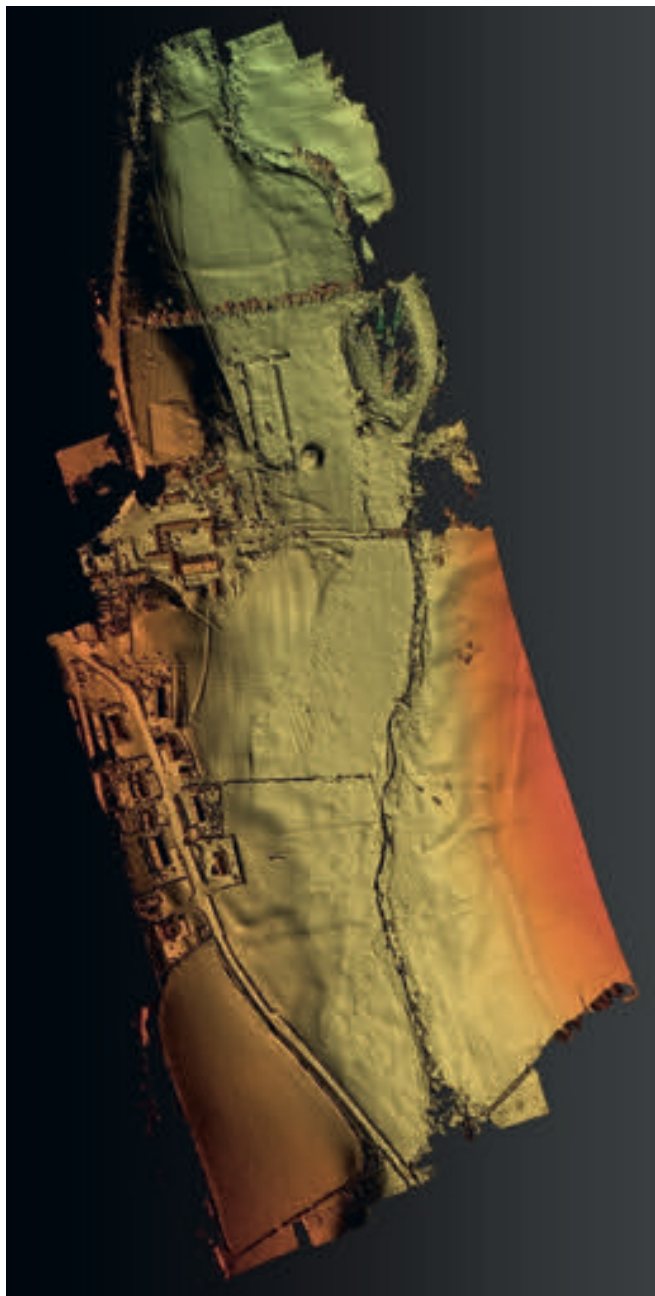
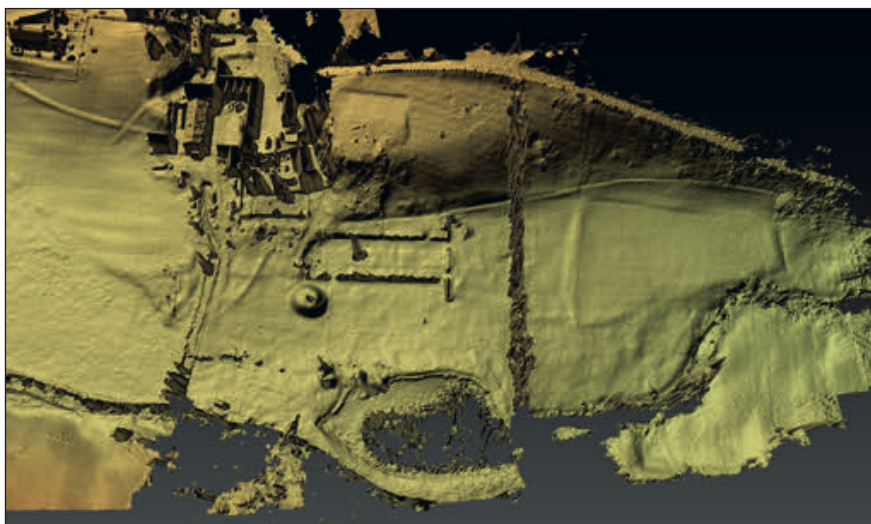


Image 4. The Abbey precinct in the valley with colour to show elevation. Heights of features within this range have been exaggerated to show subtle changes in the ground levels.

Central Abbey Area.

The central area of the precinct is the most studied area and understandably has been the focus of most attention.

Image 5. The central area of the precinct consists of the ruins of the Abbey nave and its immediate areas to the south, including the lake formed by Wilson in the 1920s, and east, encompassing the Transept area and earthworks beyond the hedge of trees. This analysis distorts vertical objects such as trees and buildings.



Nave: Within the nave the two lines where pillars were dug out is visible in Image 6 overleaf as is the excavation line dug out to reveal the location of the temporary partition dividing the nave. No convincing evidence is visible of the two enclosures, (vestibule and oven), at the west end mentioned by Rees. It may be that the partitions here, of undetermined date, were superficial so left no mark after the 1820s clearance. However, the recorded clearance of an oven in one of the rooms at the west end of the nave may have left sub-surface features.

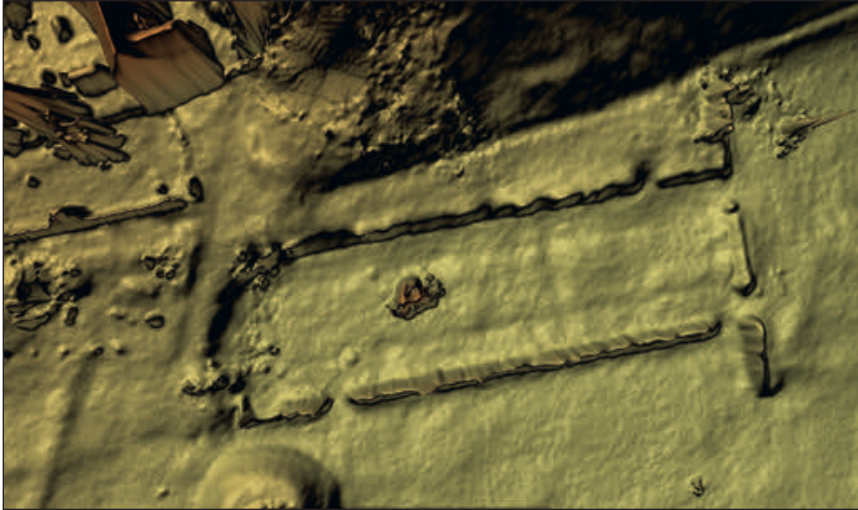


Image 6. The only upstanding walls are those of the nave and east wall of the Transept.



Image 7. The cloister area with heights and features exaggerated.

The image above shows the surface features of the area south of the nave. It is in this area that, on the traditional Cistercian plan, there would have been a cloister.

Cloister Area

Image 8 shows the surface features of the area south of the nave. It is in this area that, on the traditional Cistercian abbey plan, there would have been a cloister.

There is no evidence in the photogrammetry of any cloister south of the nave. There are two prominent lines, one E-W the other N-S visible. The E-W line, not exactly parallel to the nave walls, is the drain referred to by Williams and extends through the site and continues to the river. The N-S line coming from the west doorway of the nave is a path possibly, we understand, with a drain underlying it at least as far as the E-W drain. A diagonal line from the same doorway is a drain from the farm house to the main, 1890s, E-W drain. Another drain line from the south meets the main E-W drain at roughly the same point.

As discussed above, the detailed plan of the cloister drawn by Williams rests on slight evidence and our photogrammetry provides no further evidence to confirm or reject his conclusions. However, absence of evidence is not necessarily evidence of absence. Further archaeological investigation using other techniques is needed. The mound is a garden feature dating from the 1820s clearances and beautification of the site. The mound appears to sit on top of an area of ridge and furrow. That this cultivation pattern does not now extend further east suggests that the mound may have been placed at the edge of the area cleared by Wilson.

We follow other commentators in considering that the mound is generally the great oven that Rees records as being in the south-western corner of the Abbey enclosure can now be most likely attributed to the Civil War period when a significant Royalist garrison was stationed at the Abbey. Its scale is beyond that required during the ecclesiastical use of the site. As it is not clear what 'enclosure' Rees was referring to, the location of this oven is unclear.

Tithe maps show the lake as extending further to the west and consequently it is unlikely that anything of archaeological value exists in that area.

The Transept Area

Images 8, 9 and 10 show visualisations of the Transept area. There is no indication of any north or south walls of the Transept. However, the imagery of this complex area shows a rectangular feature which appears to be the remains of a building extending beneath the current N-S tree line. This building feature coincides broadly with anomalies recorded in the 1998 geophysical survey (Ref. 6), but the present photogrammetry is at higher resolution and shows, for the first time, continuity across the tree line.

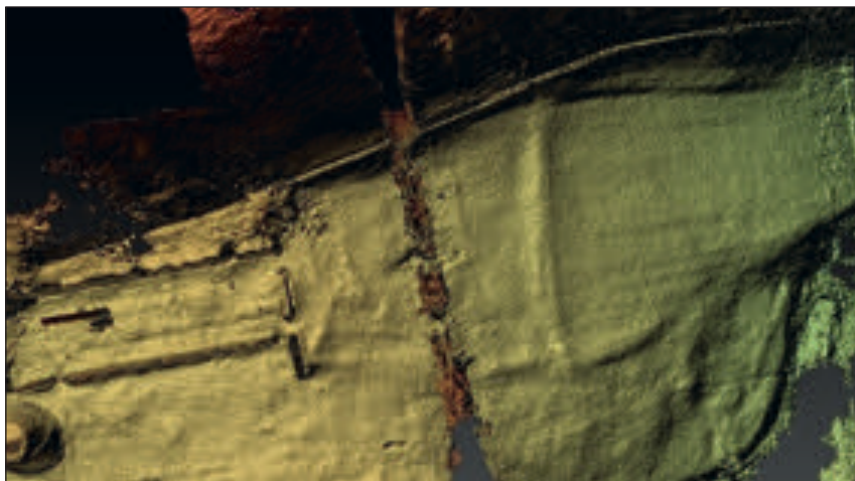


Image 8. Transept area showing relationship with the nave adjacent earthworks, heights exaggerated.

It is possible that the building in the transept area was the so-called Abbot's house identified in the Cooke/Wilson report. If this attribution is correct it would have to have been constructed at a time when it was obvious that the transept would not be completed. However, it is also possible that it is Fowler's house, referred to rather ambiguously in the account of the Civil War battle and as having been destroyed at that time. This does not preclude Fowler's house having been rebuilt on the site of an earlier building.

However without any dating evidence it could also be some other abbey related building, or even a post-dissolution agricultural building.

To the immediate east of this house feature is a field defined by earth banks and showing marks of ploughing. The southern bank of this field continues south of the Transept area and meets the southern end of the west Transept wall. The more prominent western bank of the field overlaps this southern bank indicating a probable later construction. This bank has been incorrectly identified, as a precinct boundary.¹³



Image 9. Transept area using exaggerated analysis.

If the western field boundary is indeed a later feature, the field and the Transept area must once have formed a single entity. This could have been a garden associated with a house within the transept area. The prominent N-S earthwork would have divided this garden and may have been constructed as a line of defence protecting the Royalist strong-hold of the house and Abbey ruins during the Civil War. This explanation is due to, and has been developed by, Jonathon Riley.⁴ It should also be noted that the field tapers towards its eastern end where it is defined by an eroded bank and external ditch. This could also be a relic of the Civil War constituting part of a system of defence in depth.

Claustral area

On the typical Cistercian abbey plan, the area south of the Transept would have contained the claustral buildings. There is no clear definitive evidence in the photogrammetry to indicate that any such buildings were ever built at Abbey Cwm Hir. However, despite the area having been extensively worked over, there are possible hints of an underlying pattern (Image 12). Immediately to the south of the southern part of these remains may still exist under the spread of debris which was taken from the lake and visible along its northern bank. Anything further south towards the river would have been destroyed by the digging of the lake.



Image 10. Claustral area south of Transept to lake.

Western precinct boundary/earthworks

Image 3 shows the western Precinct boundary crossing the valley from the present road and climbing the hillside to the south before turning east. Analysis of LiDAR images enables the progress of the southern precinct boundary to be traced following the contours beneath the present tree canopy and eventually descending to the brook and on to the present mill. The eastern precinct boundary would then cross the valley, coinciding with the current road as it crosses the river and returning along the line of the road.

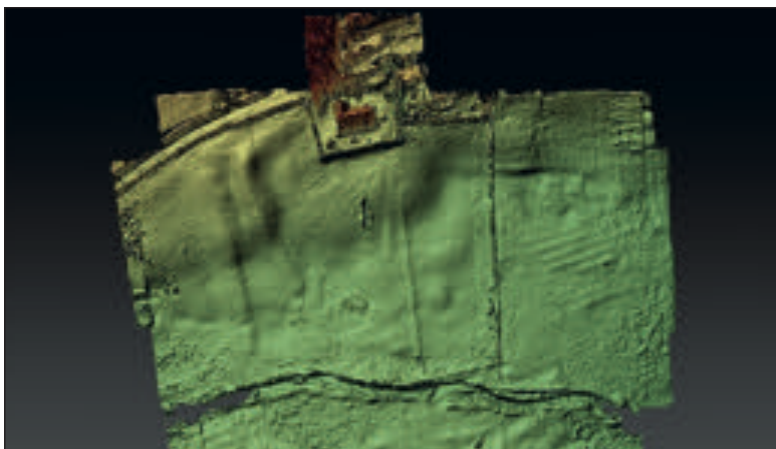


Image 11.

The earthwork within the north-west corner of the precinct has largely escaped the attention of previous commentaries. Images 12 and 13 although partially obscured by modern buildings it appears to consist of a natural elevated area in its eastern and northern edges by a ditch and bank. This ditch and bank extend in a curved corner around to the north edge parallel to the road where it is obscured by the houses. The bank, clearly overlays the earlier precinct boundary. LiDAR images made prior to the construction of the buildings show the northern bank extending further alongside the present road under the new houses. Its southern and eastern aspects hint at the bank being completed but that ploughing has apparently eroded it. A bank is shown in Image 3 extending from this feature, across the brook to meet the southern Precinct boundary.

The puzzle of this feature is that its western bank, long known, appears to duplicate, at a slight angle, the precinct boundary bank. This fuller picture revealed by the photogrammetry is more suggestive of a military defensive position. In our view this is consistent with it coinciding with the 1644 engagement during the Civil War, a period touched on only briefly or ignored in most of the commentaries. The western bank appears to continue across the river and up the other side of the valley. It would constitute a strong strategic outpost defending the eastern approach along the road to the garrisoned Abbey such as that mentioned in the contemporary letter quoted earlier describing the battle.¹⁰ It is positioned to take advantage of the pre-existing precinct boundary and the local topography. It commands the road and its loss to any attacking forces with cannon would critically expose the central Abbey defences. This interpretation is developed in.⁴ There is an indication in the imagery of a building platform within the elevated area.



Image 12. North-West precinct boundary and earthworks. Exaggerated heights.

Cross valley bank and ditch east of Precinct

Some eighty metres east of the current road bridge, which is assumed very close to the precinct boundary, are the remains of a cross valley ditch and bank Image 13. The section north of the present road in the lower ground to the river is more eroded than that which extends up the southern hillside. It is judged to be too far from the centre of the Royalist garrison some two hundred and fifty metres away to be an effective defensive embankment of the Civil War, and it is not apparently connected to the Precinct boundary. Its date and purpose remain obscure.



Image 13. Cross valley ditch and bank east of precinct.

CONCLUSIONS

Ultimately aerial photogrammetry relies on an analysis of the visual appearance of the surface layer. It is, however, a very powerful tool for the examination of the surface as detail can be extracted from the photographic data that is not readily, if at all, visible from ground level or from the lower resolution aerial photography from aeroplanes. As such it can reveal features that can be interpreted within an historical/ archaeological context and which may act as a guide for future work that will reveal structures below the surface. At the very least the photogrammetry records the present state of the site.

In addition to providing insight into the early history of the site, the impact of the fortification of the site by the Royalists, and its destruction by the Parliamentarians during the Civil War has been made visible for the first time.

This present survey suggests four areas that deserve deeper examination using other techniques:

- the transept area where clear indications of a building are revealed,
- south of the transept area where there is a hint that possible sub-surface evidence of buildings may still exist,
- the area south of the nave, in particular the areas where Williams claimed evidence for the extent of a cloister revealed by the cutting of the East/West drain,
- the hitherto unrecognised possibility of a Civil War defensive position at the north west corner of the precinct and in eroded earthworks east of the precinct.

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