

GGAT 131: Building Survey and Analysis at Neath Abbey: interim report

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A report for Cadw
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Summary

A survey was carried out at Neath Abbey with volunteers from the Neath Antiquarian Society and students from Swansea and Cardiff Universities. A wall-by-wall record of the church, cloister and west (laybrothers') range was made using written and hand-drawn records and EDM survey. Rectified photographs taken in the 1990s were digitised with a view to creating a virtual 3D model. In order to fit with Swansea University's timetable this model, and the final analysis of the structures, will be completed by the end of the current academic year, when the full report will be produced. This interim report presents a detailed account of the fieldwork stage of the project, together with the results of the EDM survey. We also provide an analysis of the benefits gained, and the problems encountered, in carrying out the work, and provides an evaluation of the use of people with no previous experience to carry out work involving architectural survey.

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On-site supervision was carried out by Edith Evans (GGAT), Rowena Hart (GGAT) and Eddie Owens (Swansea University). Jan Bailey (GGAT) provided the schools programme. The EDM results were processed by Rowena Hart and Charley James-Martin (GGAT). This report was produced by Edith Evans and Rowena Hart.

1. Introduction

Neath Abbey (00585w; SAM GM006) was a Savigniac foundation, planted in 1129 by Richard de Granville, which became Cistercian on the merger of the two orders in 1147. By 1291 it had become one of the wealthiest abbeys in Wales, permitting the monks to engage in extensive campaigns of rebuilding in the 13th and 14th centuries. After the Dissolution, the site was purchased by Sir Richard Cromwell, who began the conversion of the southeastern corner of the cloistral buildings into a mansion. This went out use as a gentry residence in the 18th century, and it was taken over by the metalworkers who had already established themselves elsewhere in the ruins in 17th century. Signs of their activities are today mainly visible in the west (laybrothers') range. An initiative by the newly formed Neath Antiquarian Society saw the site cleared of later accretions in the second quarter of 20th century, after which the site was laid out for display. It is currently in the guardianship of Cadw, which currently aims to increase interest and awareness in this important monument.



Plate 1: The northern end of the western façade of Neath Abbey, showing the church (left) and laybrothers' range (right).

The site is one of the major monuments in care in South Wales, but has had low visibility both in terms of academic research and its visitor profile. Over recent years, however, steps have been taken in order to begin to address both issues. A research group (Neath Abbey Interpretation Project) has been formed under the leadership of Swansea University including Cadw, the Trust, the Neath Antiquarian Society and representatives of the local authority, to

promote both objectives; the university itself has been successful in attracting research funding. Within Cadw a working group has been set up to improve the condition of the site and the visitor experience through conservation of the fabric, improvements to the setting, and updated visitor information that includes the results of the new research. It is against this background that the Glamorgan-Gwent Archaeological Trust proposed to lead a community project that would involve young people in the study of the abbey remains. Our initial suggestion was a study of the architectural fragments no longer *in situ* that have been collected in two areas of the site, one along the eastern perimeter, where loose carved stones uncovered during Neath Antiquarian Society's clearance work before the Second World War have been stockpiled, and the other adjacent to the northern side of the Tudor mansion in a heap of masonry fragments, not all of which are derived from the abbey itself. However, this proposal did not fit well with Cadw's timetable for work on the remains, and it was therefore decided that the project would be centred on making use of the rectified photographic images of the church, cloister and laybrothers' range that Cadw had commissioned in the 1990s.

Cadw's principal objective was that these images should be used to create a virtual 3D image of those parts of the abbey that had been photographed. However, the Trust felt that this provided limited opportunities to introduce archaeological fieldwork techniques to a wider audience. We therefore submitted a proposal that included, alongside the digitisation and manipulation of the photographs, a detailed wall-by-wall written record should be made, and that the written and photographic record should be used to generate an analysis of the fabric. This part of the project was to involve three weeks' fieldwork.

Project partners

Two partners were identified, Neath Antiquarian Society and Swansea University. Neath Antiquarian Society was formed in 1923 by a group of local enthusiasts who had come together to excavate the remains of the abbey, and had been responsible for the clearance of centuries of accumulated rubble down to the latest floor surfaces. The society holds the photographic record that was made during and after the clearance activities, although there does not appear to be any extant written record of this work. Members of the society are involved in the Interpretation Project group, and expressed interest in taking part in the survey project.

Staff of the School of Classic, History and Egyptology at Swansea University had already carried out a number of historical studies of the abbey and its estates, under the aegis of Professor Dan Power. In addition, the Trust and the university have previously collaborated elsewhere on two excavations projects, in which a significant proportion of the fieldwork had been carried out by students of this body co-ordinated by Dr Eddie Owens. These opportunities had proved extremely popular with the students as well as contributing to their development; some of them had used the experience to further both research and career aims.

Shortly before the project was due to start, the Trust was asked to provide work experience for a number of archaeology students from Cardiff University, to include two weeks' fieldwork. Four of these students were able to participate in the Neath Abbey fieldwork, and

two of them in the subsequent work of ordering and digitising the archive. The other two took part in the ‘Hands on Heritage’ event, for which they produced display material in the form of an account of their experience (reproduced as Appendix 1).¹



Plate 2: Students recording walls in the abbey church (foreground) and learning how to use the Total Station (background).

Project design

The purpose of the proposed project was to carry out an EDM survey of the range, collate the individual photogrammetric images to produce a composite image of each wall and, using these data, to examine and analyse the fabric of the laybrothers’ range to provide a definitive account of the architectural development and the evidence for industrial use after the Dissolution. A similar process was to be carried out on the church. Although this was believed to have less scope for a new interpretation, having already been the subject of study, it would still provide an excellent training opportunity and it was thought possible that new information might emerge, both through the survey and through examination of historic photographs. The composite photogrammetry images would then be further combined to produce a 3D model of the building. The Tudor mansion and the medieval structures upon which it was based were specifically excluded. This was partly a question of time, and partly because it appeared likely that Cadw would in the future wish to document this part of the site through modern digital photogrammetric techniques, which will generate revolvable 3D images directly from the data captured.

¹ Includes an error in respect of the project purpose.

In 2012 the Trust had carried out a three-week condition survey of Margam Abbey using a combination of photographs, written records and EDM survey, involving the Friends of Margam Park and other local volunteers, none of whom had previously had any experience of building survey (Pamment 2013). This had been a drop-in community project, with training provided as people joined in. Our experience with this project showed that, whilst the volunteers' level of observation was very good, they had never previously been called up on to translate observations into a written text and they consequently struggled with the production of a clearly-ordered sequence of information. Our conclusion therefore was that a three-week period was too short to expect volunteers with no previous experience to be able to develop the skills necessary to produce written records that did not require extensive editing before they could be used in a report. An essential part of the skill-set involved in the production of an ordered record includes the ability to analyse, and the records made by Margam volunteers showed that they had difficulty in distinguishing architectural observations from those on condition, a basic analytical task. It therefore seemed unlikely that people with little or no previous experience would be able to cope with the analytical part of the programme either.

One of the objects of involving university students in creating the wall-by-wall record at Neath was an expectation that they would already have started to acquire the necessary reporting and analytical skills as part of their academic training for a degree. We also felt that in order for the participants to be able to carry out the analysis successfully, they would have to have been immersed in the recording: it was not something that could be done a drop-in basis. Generally speaking, the members of Neath Antiquarian Society did not feel that they could provide that level of commitment to the project. It was felt that for volunteers who wanted to participate on a drop-in basis, work on the EDM survey would be the most suitable.

Wider dissemination in the local community was planned as three strands: work with local schools; a presence at Cadw's 'Hands on Heritage' event on 6th July including presentation of interim results and introduction to the methods used; a talk at a suitable venue.

The work programme was set out in the project proposal as follows:

Set-up and introduction

- ❑ Recruit volunteers
- ❑ Arrange on-site facilities
- ❑ Scan sample of individual photogrammetry shots onto easily portable devices, or print out as hard copy, for initial training session in field
- ❑ All students, and as many of community volunteers as are able, visit abbey with photogrammetry shots available to hand, and are introduced to (a) History and architectural development of Neath Abbey; (b) principles of photogrammetry and EDM survey; (c) what we intend to get out of the project.

At this point students divide into two groups: (1) archaeological technique, incorporating architectural analysis; and (2) 3D IT model.

Archaeology

- ❑ Divide the architectural analysis participants into teams, each to be responsible for specific areas of the range. Teams to make a preliminary examination of their area on site.
- ❑ Digitisation of remaining photographs, with each team digitising its own area to maintain interest and ensure that conceptual links are properly maintained between the fabric and the photos.
- ❑ EDM survey, lay out grid
- ❑ EDM survey of plan and elevations of laybrothers' wing
- ❑ EDM survey of plan and elevations of church.
- ❑ EDM survey of remaining elements of east and south ranges (excluding Tudor mansion).
- ❑ Stitch together the photos to form elevations of complete walls.
- ❑ Examine archive photographs to identify and record any industrial features swept away during previous restoration programmes.
- ❑ Using these elevations and direct observations on the ground, each team works on its own area, making decisions as to how it developed, what architectural elements are visible in each phase and, in the laybrothers' wing, how these relate to its changing functions, with reference also to historic copper smelting techniques. Teams will be mentored by member of Trust staff and university lecturer with appropriate experience.
- ❑ Teams each present in turn the results of their own areas to the rest of the fieldwork participants, for evaluation and identification of any conflicts in interpretation; resolve any conflicts.
- ❑ Any necessary revisions take place, and teams each write up a report on its own area.
- ❑ Prepare grey literature report, incorporating reports produced by teams.

3D model

- ❑ IT-based students join in with digitisation programme
- ❑ IT group works on preparing 3D model, visiting site from time to time to compare their results with what can be seen on the ground.

2. The project in practice

Digitisation of rectified photographs and photomosaic

The photographs, which were provided in the form of small black-and-white prints, have now been digitised and returned to Cadw. The intention had been to carry out the digitisation at the university as one of the initial tasks, this turned out to be impossible as, after initially expressing interest in the project, the Department of Computer Science withdrew from the project. Restrictions on the use of scanners by other students meant that Dr Owens had to carry out the digitisation himself towards the end of fieldwork, when there was less need to supervise the students recording on site. Consequently, no photomosaic was completed during the fieldwork stage.

The first attempt to scan them was as very high resolution (c300,000 KB) TIF images, but this process was so slow, and the prospects of being able to manipulate them easily seemed so remote, that it was abandoned after the first three images and the remainder were scanned as JPEGs of average size 700KB.

The EDM survey

A measured building survey of the upstanding remains of Neath Abbey (with the exception of the Tudor mansion and those monastic remains that were incorporated within it) was conducted using a Leica Total Station (TC 702). A local grid was established, and local stations were used to traverse around the abbey remains. A method of reflector-less survey was used which enabled the rapid survey of the elevations. An infra-red beam was enabled to inform the whole survey team of location of the data points being collected. Where necessary the survey method switched to engage the reflector technique. The use of the reflectorless technique was particularly suited to site conditions, as it meant that for the most part those taking part in the work could stay outside the safety barriers that have been erected to control access to those parts of the buildings where conservation work is needed.

Data was stored on the internal memory of the Total Station during the day and then downloaded at the end of each day and backed up to an external hard drive. Data was imported into AutoDesk Map 3D and checked for accuracy and quality on a daily basis.

Once imported into AutoDesk the data were joined to form the elevations, outline model and floor plan of the abbey remains. The majority of the detailed post-processing of the data was completed after the final dataset was added to the outline model. Final elevation figures in this report were created using Corel Draw 12.

For the purposes of drawing up the project proposal, the time required to carry out the survey in the field was estimated from air and satellite photography available through the Next Perspective layer in the Trust's GIS system and through Google Earth. It was based on the assumption that the participants would have no previous experience, but would pick up the

techniques required sufficiently quickly that there would be no necessity to resurvey any part of the site.

The quality of the survey data varied on a daily basis due to the inexperience of the student and volunteer surveyors but was generally good. It was not deemed possible to re-survey all of the lower-quality data as time would not allow for this. Where small areas had to be re-surveyed it meant that the whole abbey was not completed within the timescale. The complete plan was surveyed, although elevations 1, 3, 4, 6, 7, 9, 10, 15, 13, 12, and only the external elevations of 2, 61, 62, 63, 8, 11, 19, 23 and 24 were surveyed. Where walls survived to less than 1.5m in height they have not been shown as a separate elevation drawing as they contained insufficient detail.

With the benefit of hindsight, a site visit at the project planning stage would have provided a more accurate estimate of time required, as it would have enabled a more accurate assessment of the complexity of the elevations. However, we consider that there is probably enough information to provide an adequate framework on which to hang the 3D model, which was the main purpose of carrying out the survey.



Plate 3: A volunteer using the reflector to plot poorly preserved walls.

Whilst we appreciate that Cadw wishes to utilise fully the resources it already has (in this case the existing sets of rectified photographs), technology has overtaken the type of approach adopted here. Laser scanning techniques can now produce virtual 3D rotatable models directly from the data captured on site through electronic manipulation. We consider that for future surveys involving such detailed and fairly complex architecture, a laser scan survey would be more appropriate. We realise that hire of the equipment is currently more expensive and that there might conceivably be a reduced involvement for members of the local community and/or students; however training in this technique would be groundbreaking and also very appealing for all groups. It is by far the most rapid technique with instant results on the screen of the scanner so an immediate display of the capture can be

presented. An alternative technique where there has recently been considerable advances is photogrammetry, which can now be carried out at a basic level using ordinary digital cameras and relatively inexpensive software. This could be a more suitable technique for community groups wishing to produce virtual 3D rotatable models of the exteriors of building.

The written and hand-drawn record

Only one member of Neath Antiquarian Society was able to provide the level of commitment necessary for taking part in the recording, so this part of the work was almost entirely carried out by undergraduates. In the absence of hard copy of the rectified photographs or photomosaics, all recording was carried out on site. Records were made on a standardised form (see Appendix 2), one record per wall face, with space for a hand-drawn sketch so that the recorder could clarify salient features. A initial training session was carried out on the first wall. For the record of the first face, the method was described and demonstrated. The implications of the observations for analysis of the building were discussed, and the participants were encouraged to contribute their own ideas. For the second face, the participants were encouraged to identify the points of interest themselves and discuss them.

The participants were then split into two teams, one for the west range and the other for the church. Initially, a pair of recorders were allocated to each wall face to allow for mutual support and discussion. However, as the recorders grew in confidence, they each tended to take responsibility for a single wall face, although discussions on points of interest continued with their partners. They also took digital photographs for their own interest and to assist them in making fair copies of their records. The supervisors moved between the recorders, helping them with observations, answering questions and discussing points of interest. As they finished the record of each wall, participants moved on to the next. A photocopy of the plan in the Cadw guidebook had been made and each wall numbered to produce a master plan for the recording. Further copies were made of this, which were distributed to the teams so they were able to label their records as they moved on from wall to wall.

Each recorder was then responsible for transcribing a fair copy of his or her record digitally at home (with the help of their digital photographs) and returning both the original hand-written record and the digital version (via email) to the supervisors. A few of the students were also able to scan their sketches at this point and insert them into the appropriate place in the digital forms. Due to participant illness, a number of records went astray at this point and had to be recreated by other members of the teams. Following the completion of the fieldwork stage of the project, the digital records were checked against the originals; a few had to be digitised at this point as no electronic copy had been sent in. The original records were also scanned as JPEGs, and the remaining sketches were abstracted and inserted into the appropriate space of the forms.

The quality of the records is highly variable, reflecting the variable extent to which individual students had mastered the art of selecting salient information and expressing it clearly and logically. Two other faults were noted. The first was becoming carried away with the analytical side and forgetting to make a sufficiently detailed record of the underlying raw

data. The others was becoming overwhelmed with the detail of tiny difference that could be noted on certain walls and consequently being unable to sort out what was significant in interpretive terms. The best participants reached the level of expertise we had expected when planning the project. However, in terms of observation many of the students performed less well than the previous year's volunteers at Margam Abbey. In respect of a producing a coherent description, records will again need a fairly heavy edit. Swansea University is currently recruiting postgraduates for work experience in the Trust in April, and we have earmarked one of these places for a postgraduate to carry out the editing under Trust supervision.



Plate 4: Students recording one of the walls in the laybrothers' range.

During the course of the project a decision was made to extend the recording process by producing measured drawings of as many architectural details as possible. There were three reasons for this. One was the recognition that far more mouldings survived, and in better condition, than had previously been realised. The second was that some volunteers could only put in limited time on site and did not feel that it would particularly benefit them to spend it all on the Total Station survey, and some of the Cardiff students were not able to start their placements until all or most of the wall recording had been completed: drawing therefore provided an alternative activity. The third was the realisation that this would also produce a more rounded record of the architecture and insight for the participants into the process of recording medieval buildings, as well as potentially feeding into the interpretation process. Measured drawings have consequently been produced of most of the better-preserved mouldings in those areas of the abbey that were not behind the safety fences.



Plate 5: A student and a volunteer measuring and drawing an architectural moulding.

Archive photography

The photographic archive held by the Neath Antiquarian Society of the site clearance in the first half of the 20th century was examined for images that might throw more light on the development of the site, in particular its use for industry after the Dissolution. Images from the ‘Britain from above’ project were also supplied by RCAHMW.

Six images (all with reference NAS/Ph/23a/3/ Box no.23a) were located that show information that is no longer apparent on site. However, the results from this part of the project were disappointing because comparatively few photographs showed detail of the abbey while work was being carried out – the majority were taken after most of the rubble had been cleared. In particular the main emphasis had been on the church, followed by the Tudor mansion area. There were no photographs of the laybrothers’ range with an industrial plant *in situ*.

The analysis

This part of the process did not go according to plan. Recruitment of students to this project proved to be much more difficult than to previous excavation projects, probably because survey is seen as less glamorous and exciting. Most of the students had already arranged to leave Swansea before the end of the project and were not sufficiently engaged to want to change their plans. Consequently, there were only two students from the recording teams left at the point at which the detailed records were completed and analysis was due to begin. One was from the church team and the other from the laybrothers’ range team. They decided to work together and produced an interpretation which they gave as a verbal presentation to the supervisors. They were intending to produce this as a written report before the holiday, but

this did not materialise. However, the technical report will include analysis, and it is hoped that the student contribution can be produced and incorporated within it.

3D virtual model

Because of the withdrawal of the Department of Computer Science from the process in the summer, this has not yet been started. However, one of our postgraduate work experience places in April is for an IT student to produce this from the rectified photographs and Total Station survey.

Schools programme

The schools programme also proved to be something of a disappointment, although since it was all planned as part of the CBA Community Archaeology Training Placement it did not affect the project budget. The Trust's Community Archaeology Training Placement holder contacted all the primary schools in Neath abbey area, as well as the secondary schools in Neath, but none of them were prepared to engage with us. However, Coedffranc Primary School (which is outside the area where we tried to make contacts) had already decided to bring a group of children to visit the abbey, and this trip took place during the period of the survey. The school already had a work programme for the site visit, but was able to welcome the CATP holder on a follow-up visit to the classroom during which she was able to round out their experiences by telling them more about medieval archaeology. The material for this follow-up work included a handling collection containing the type of roof tile that would have been used on the abbey buildings.

Other public presentation

Four students (two from Swansea and two from Cardiff) who were involved in the fieldwork also took part in the 'Hands on Heritage' event arranged by Cadw on 6th July. Based at the Trust's stand, they talked to visitors about the project and showed them some of the findings. The two Cardiff students had also prepared a display based on accounts of their experience on the project, as part of their portfolio of placement work. The Trust's Geomatics Officer was also present with the Total Station to talk to visitors about her part of the project and to explain how the instrument works.

We anticipate providing a public lecture on the whole project, when completed, through the Neath Antiquarian Society. A lecture on the fieldwork stage of the project was given to the Port Talbot Historical Society in November 2013.

3. Conclusions

The survey at Neath Abbey was the second in which the Trust has been experimenting with ways of involving volunteers in preparing a detailed survey of complex building remains. The experience of this project, along with that of the Margam abbey project in the previous summer, have provided us with valuable information not only about both the potential gains from such a project, but also a the problems involved in running it.

As professional archaeologists, used to the rapid assimilation of new working techniques, we have consistently underestimated the barriers to this that are experienced by people with little or no experience in the general skills and disciplines of producing an ordered account in which description and analysis are derived from observation, and these three elements are correctly integrated. We are confident that, given time, most of our volunteers would eventually reach the standard required for level of reporting that is required of the projects that Cadw funds the Welsh Archaeological trusts to undertake, but it is unrealistic to expect this to take place in three weeks. We should probably be thinking in terms of regular training over at least a year. This problem was initially identified during the Margam survey, where the volunteers' high levels of observation were conspicuously not matched by their levels of written recording. The records from Margam required extensive editing before they could be included in the report, which added considerably to the time that had been estimated for the project. We had also failed to allow sufficient time for digitisation of the Margam record sheets. Fortunately at Margam we benefitted from the fact that the project was led by the holder of the CBA's Community Archaeology Training Placement, so that a considerable part of this work could be carried out at no further cost either to Cadw or to the Trust.

The design of the Neath project took these factors into account, and was based around the premise that these skills should be already developed, at least to some extent, by students during a degree course. We therefore proposed that the detailed description of the walls should be done primarily by students, although in order not to introduce an element of possibly unwarranted discrimination, we also opened the opportunity to members of Neath Antiquarian Society who were able and prepared to commit enough time to the project to give them a reasonable chance of being able to develop the necessary skills. In the event, only one society member decided to take this up. The reliance placed on students' existing skills turned out to be misplaced. The Trust staff involved in designing this aspect of the project and submitting it for Cadw's approval were products of the education system of the 1960s and 1970s and failed to appreciate that essay writing skills are no longer so central to undergraduate level work in the humanities disciplines. The levels achieved by individual recorders varied very widely. The best achieved the expected standard, although there were unfortunately very few of those; the worst did not perform as well as the Margam volunteers had in the previous year. For any future project considerably more contact time would need to be allocated to students or volunteers in order to allow for training.

As a result of our experience of having to transcribe records after the end of the fieldwork phase at Margam, for Neath we built digital transcription into the recorders' task list. This worked reasonably well, although some problems were encountered as a result of illness of one of the participants, and the fact that some students had already arranged to leave Swansea before the end of the fieldwork. The voluntary status of the Swansea students was a possible factor in their completing transcription in their own time: an assessed module might be more successful in producing 100% returns. Further editing is required that was not allowed for in the project design, but we have now built this in as a postgraduate placement which will be undertaken in April by one of the most able of the students, now studying for an MA. In any future project, direct digital recording in the field to digital tablets might be a better option.

In the total station component of the survey, there was again a very wide variation of individual achievement. The best picked up the techniques quickly and produced excellent work, whereas the poorer students struggled to understand what they were doing and why, and in the worst cases failed to show any improvement at all. The measured drawing was generally of a higher standard. Students and volunteers worked in three teams of two. One person in each of two of the teams already was proficient in this skill, one from a fair amount of excavation experience and the other from background in engineering. The members of the other team had little previous experience of measured drawing but during the week they were on site showed considerable promise.

Greater thought also needs to be put into how partnership with a university is planned in detail, given the different year to which the academic sector works. The placements which have been arranged in order to complete the report were not available before April, which in the timetable used by Cadw and the Trusts is in a different financial year. We also need to ensure that all departments that should be involved have made a firm commitment to the project.

One other aspect of the project requires comment, the fact that the total station survey was not entirely completed. The assessment of total station survey time was made from air and satellite photographs which, while they provided accurate information about the number of walls to be surveyed, failed to reveal the complexity of detail of the elevations that needed to be recorded. We consider that a preliminary site visit would be necessary for any future similar project. If it should be considered desirable to complete the remaining elevations with the Total Station (always excluding the Tudor mansion), this would take 3 days in the field, 2 days of data processing and 2 days of illustration preparation.

A table detailing problems, remedial action, and actions for avoiding them in future can be found in Appendix 3.

Reference

Pamment, S, 2013 Monastic Margam community survey project (GGAT report 2013/0120)

Appendix 1: Student experience

Neath Abbey Survey July 2013



The survey at Neath Abbey in July 2013 was undertaken by Glamorgan-Gwent Archaeological Trust in conjunction with Swansea University and Neath Antiquarian Society. This survey was commissioned by Cadw to ascertain the state of the Abbey, create accurate and updated records and to confirm how much remedial and conservative work is needed to preserve the Abbey for posterity.

With this in mind a few different types of survey were decided upon. The first was using a total station also called an EDM machine (Electronic Distance Measurement machine). This was set up using a base line, which was measured from the EDM set up on one point to a reflector set up on another. These points were created by hammering posts into the ground in a hope that they could be used for the duration of the survey. Once this baseline was set up and the instrument zeroed

a survey of the walls could begin. The EDM was used to plan the elevations of the Abbey. Each wall was planned by recording points on the wall, where the corners, buttresses, windows and doorways were as well as the heights. These points recorded how far away the wall was from the EDM machine, the height of the point and the angle from the baseline. This gave the point a 3D position. When plotted the points could be joined to those next to it to create a plan of the elevations of the Abbey that could also be related to other elevations via the measurements. This is what I did on my first day helping to survey Neath Abbey. Although recording the points is time consuming it is well worth the result and gives very accurate measurements and therefore records of the walls. This is important so



that if a later survey is carried out it can be compared and the rate of degradation of the Abbey can be shown and more can be done to preserve the building.



Cadw holds two photogrammetric surveys of the site, one undated and one from 1992. By digitising and 'stitching' these photographs together and attaching them to the EDM survey results a composite record of the elevations can be created. This will go along with

updated photographs to create an up to date record.

A more specific survey was carried out mostly by History and Classics students from Swansea University. This was an in-depth survey of the architectural development of the Abbey. This was to identify areas of repair, change or addition to the Abbey when it was still in use, whether by the monks or after the dissolution. This was more specifically

directed towards the laybrothers side of the Abbey as it is known that this area was overtaken by metalworkers in the 18th century. However the exact changes they made to the buildings and the effect this may have had on the deterioration of this side of the range is unclear. This survey, it is hoped, will clarify these changes and possibly identify new areas for further research into the building and development of Neath Abbey. The students examined the walls and described the brickwork and types of stone used (Sutton stone or sandstone) and where. Where it appeared that the Abbey had been altered was also recorded. A sketch of each wall accompanies each description.



This survey was backed up with technical drawings of the more elaborate mouldings, which were carved from the Sutton stone around doorways, windows and as pillars. This stone was also used to dress the buttresses. A plan and profile example of as many of these more elaborate carvings as possible in the project timeframe was made. This not only records the remaining stone but can also be used to help identify the master masons involved at Neath Abbey and hopefully more accurately date some of

the remodelling and additions to the Abbey. I drew a few of these doorways, shown in the pictures; the processional doorway into the Abbey Church; the doorway into the bookstore next to the chapter house and a doorway into the laybrothers side of the cloister.



I enjoyed working on the survey of Neath Abbey as it is unlike anything I have done before and I feel as if I have learnt a lot not only about the processes involved in the survey but also about Neath

Abbey's history. This has also increased my knowledge of Cistercian abbeys in general. I particularly enjoyed doing the technical drawings as I found it quite challenging but when finished I was happy with my work and could see how I improved on consequent drawings. Working with Neath Antiquarian Society, especially Gloria, was a highlight as they were happy to share their knowledge about the Abbey and the surrounding area. This was especially rewarding when we got to see the photographs taken of the excavations in the 1920's which are kept in the Neath Antiquarian Society's archives as they have photographs of decorated stonework that is no longer visible on site. It was also interesting to see the difference in the photographs between the archaeology and archaeologists then and now.

Cadw organised an open day for the 6th of July which I attended with GGAT along with many other stalls. There were various activities, tile-making, printing, soapstone-carving and calligraphy which were equally enjoyable for adults and children as well as demonstration stalls. These gave the visitors an idea as to how the monks would have lived and how the Abbey would have been built with masons, blacksmiths and The History Chef stall handing out tasters of monastic style food, which was surprisingly delicious! Neath Antiquarian Society had a stall with information on their involvement in the Abbey as well as on Alfred Russell Wallace, the less well-known discoverer of natural selection who lived in Neath. A large number of people attended and this may have been due to the beautiful weather as well as the enticing stalls and we were busy from opening at 10am until close at 4pm. A wonderful fun and educational day!

Marie Wall
Cardiff University Student

Appendix 2: Wall recording form

Neath Abbey Survey and Building Analysis Wall Recording Form		
Wall No.	Photo No(s).	
LOCATION OF WALL		
<p>DESCRIPTION Indicate materials, architectural features, modifications, and any other features of interest</p>		
FIELDWORK INFORMATION		
Photograph taken by	Form recorded by	Survey date

**Neath Abbey Survey and Building Analysis
Wall Recording Form**

SKETCH ELEVATION: (A drawing showing the wall with any features of interest marked, with measurements where appropriate)

Sketch by:

Appendix 3: Summary of project issues

<i>Problem</i>	<i>Action taken</i>	<i>How can this be avoided in future?</i>
Digitisation of photographs could not be carried out according to planned timetable.	Fitted in later in programme. Did not in the event cause disruption to the recording programme, as visibility was good enough for recording to be carried out on site. However, participants also photographed their own walls to assist with the writing-up at home.	Ensure arrangements are finalised at project planning stage. Own photography a useful supplement.
Insufficient time to complete survey of all elevations.	Intensive working, but failed to compensate adequately. However, this is not likely to have a knock-on effect on the virtual 3D model.	Visit site during project planning stage to obtain a more accurate assessment of time.
Inadequate quality of some of the data.	Some survey data recaptured on site. Some of records rewritten on site. Edit due to take place	Projects of this type require working with students/volunteers over a much longer period to develop skills to adequate level. Laser scanning or photogrammetry might be a more appropriate method
Recorders failed to return all hard copy and digitised forms.	Forms missing completely were redone by other members of team. Any further digitisation necessary carried out at post-fieldwork stage.	Place even more stress on importance of records to recorders.
Not enough suitable tasks in initial plan for all participants.	Measured drawings of moulding added to task list.	

Most students left before the end of the fieldwork.	Analysis phase of the project adapted to fit remaining numbers. Project reconfigured to utilise April placements to complete necessary work.	Project type possibly more suitable for students on formal, assessed, placement for specified number of days.
Absence of IT students from main part of project.	Project reconfigured to utilise April placements to carry out this part of programme.	Obtain firmer commitment from all potential partners before submitting grant request.
Project as designed (within a single financial year) not a good fit with university year.	Produced interim report at end of financial year; extended completion into new financial year / final term of academic year to utilise postgraduate work experience placements.	More awareness of differing requirements of project partners.
Local schools not interested in engaging with project.	Took opportunity of school involvement where it was found	Canvas schools for interest at project planning stage.

Neath Abbey Community Survey Project

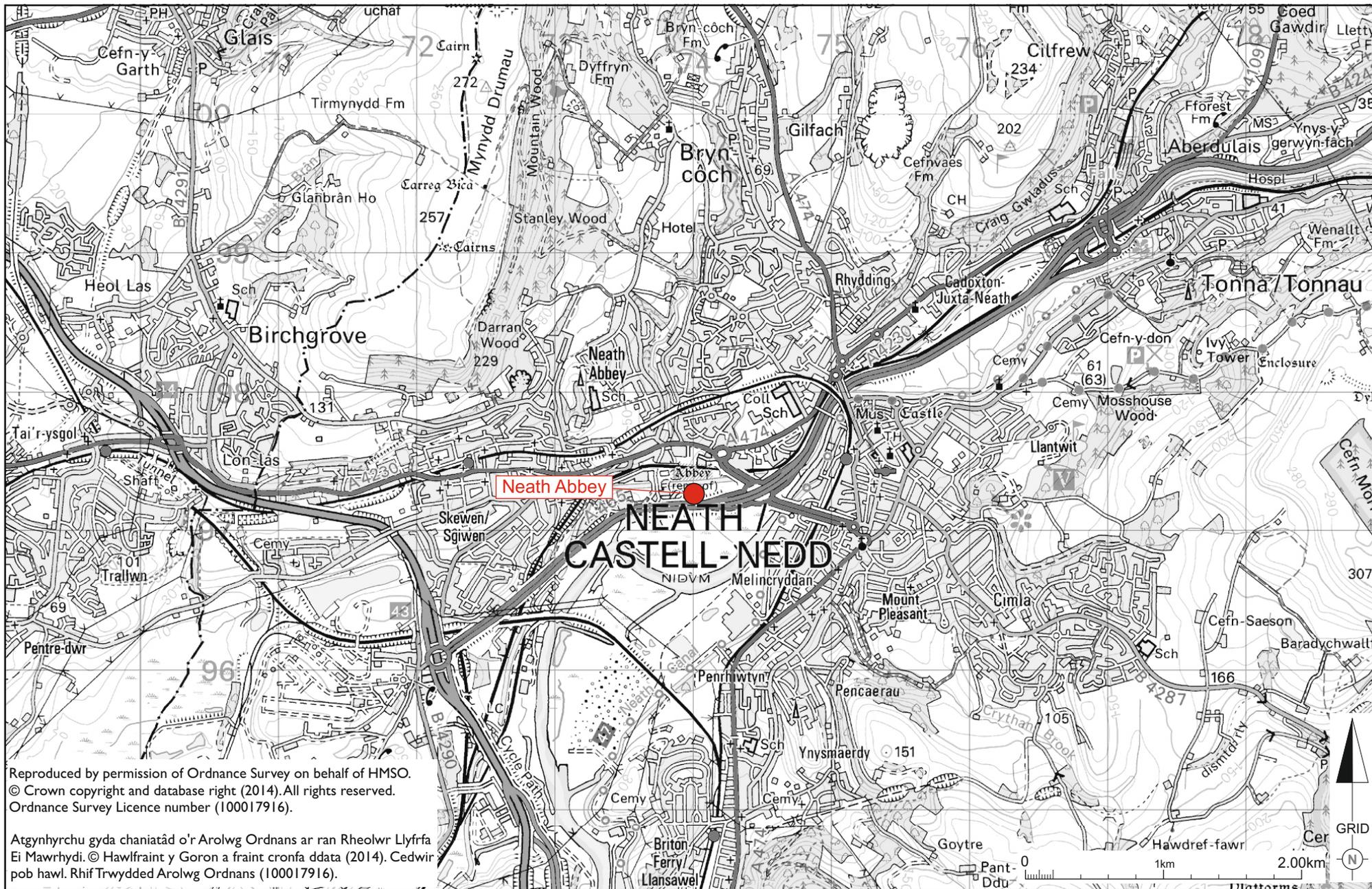


Figure 1. The location of Neath Abbey

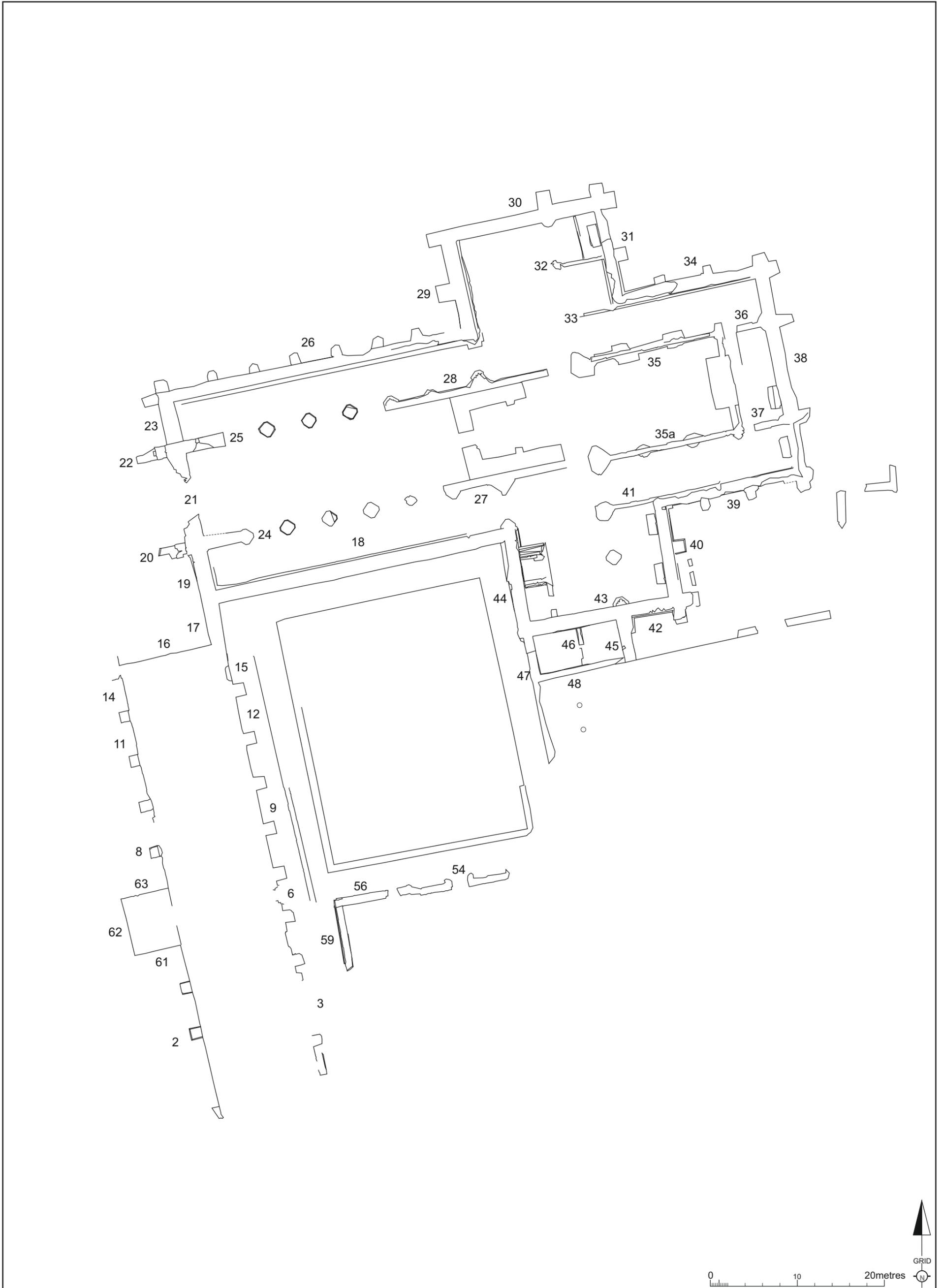


Figure 2. Plan of surveyed area

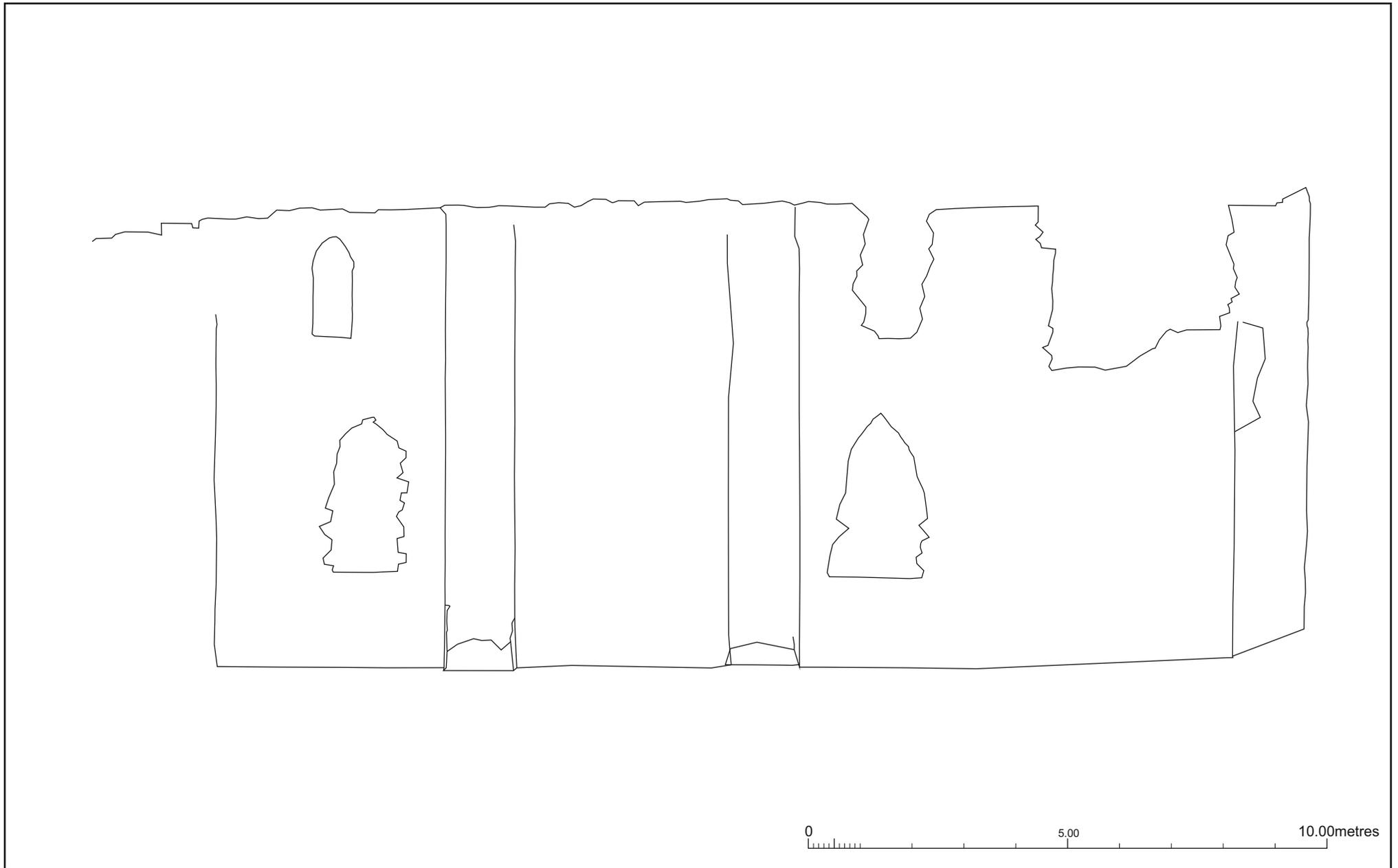


Figure 3. West facing elevation of wall 2

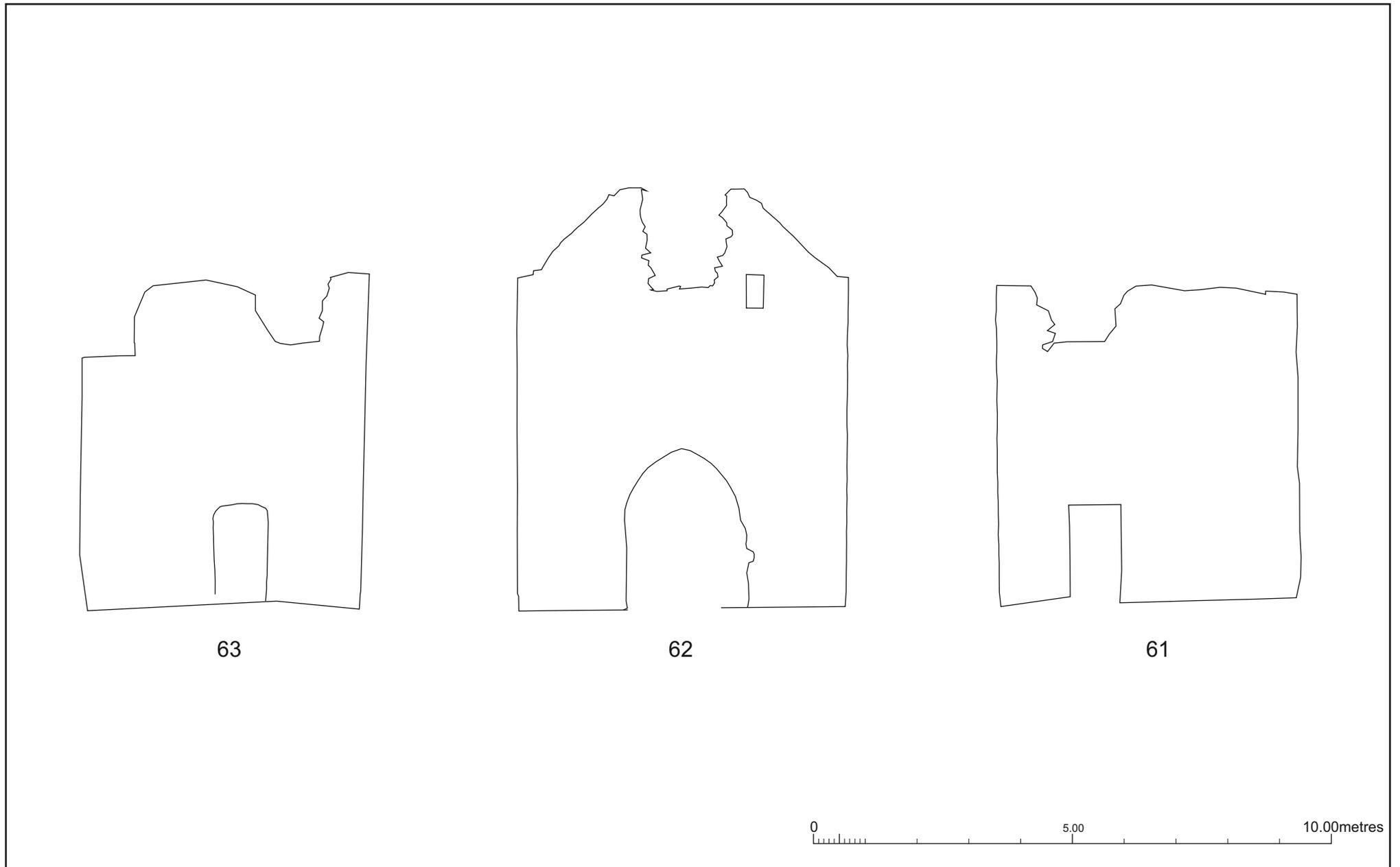


Figure 4. North facing elevation of wall 63, west facing elevation of wall 62 and south facing elevation of wall 61



Figure 5. West facing elevation of walls 8, 11 and 14

Neath Abbey Community Survey Project

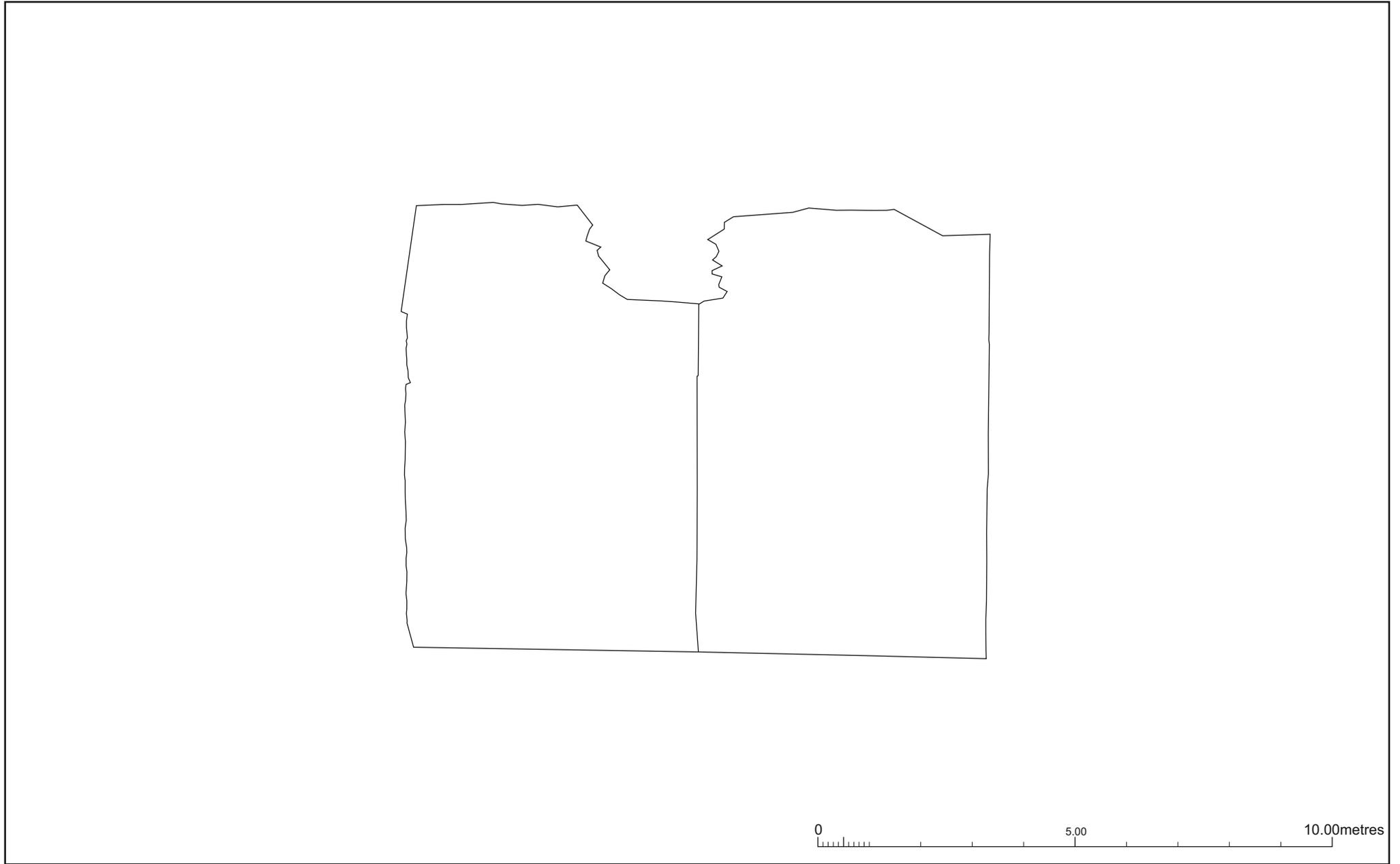


Figure 6. North facing elevation of wall 16

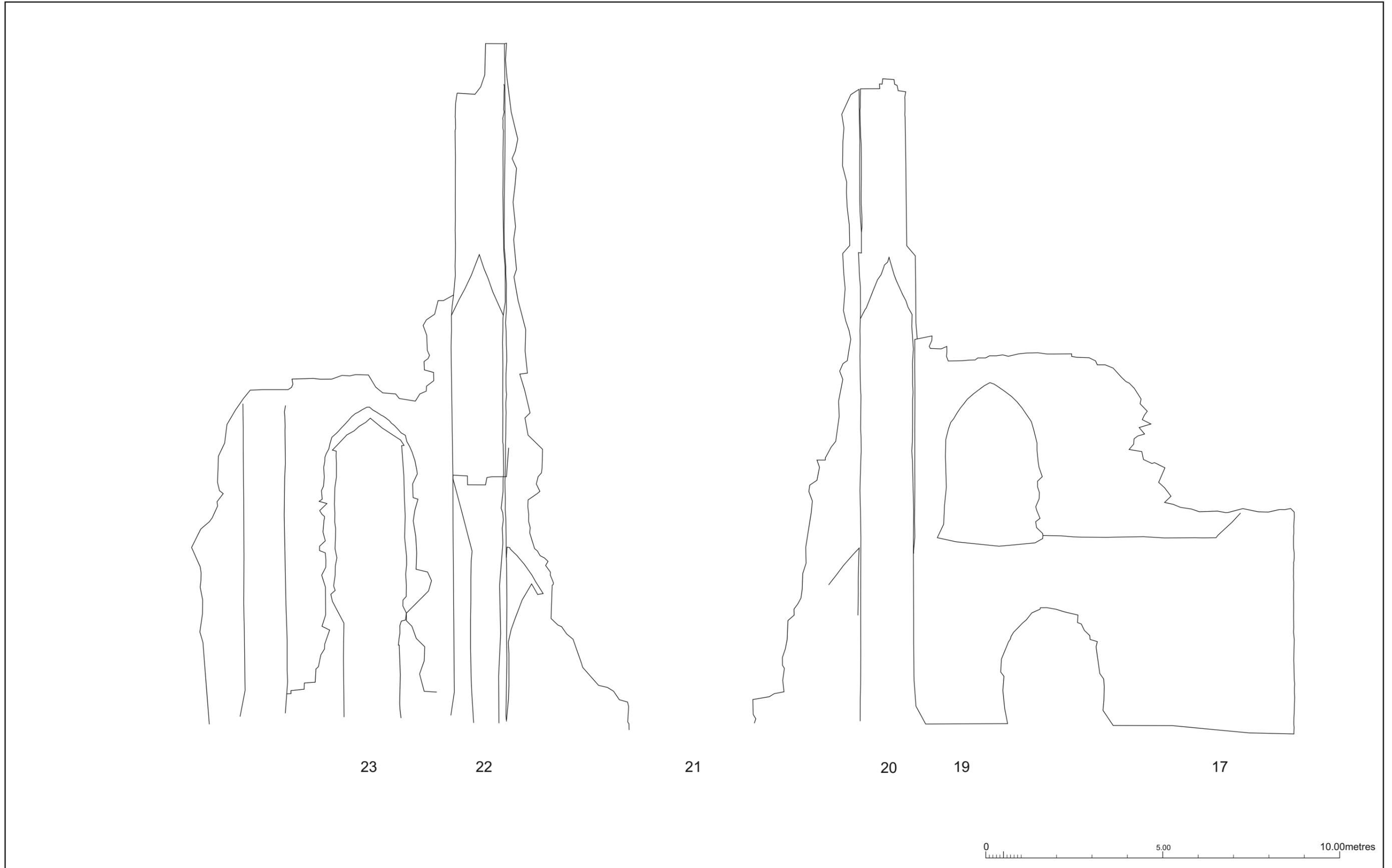


Figure 7. West facing elevation of walls 17, 19, 20, 21, 22 and 23

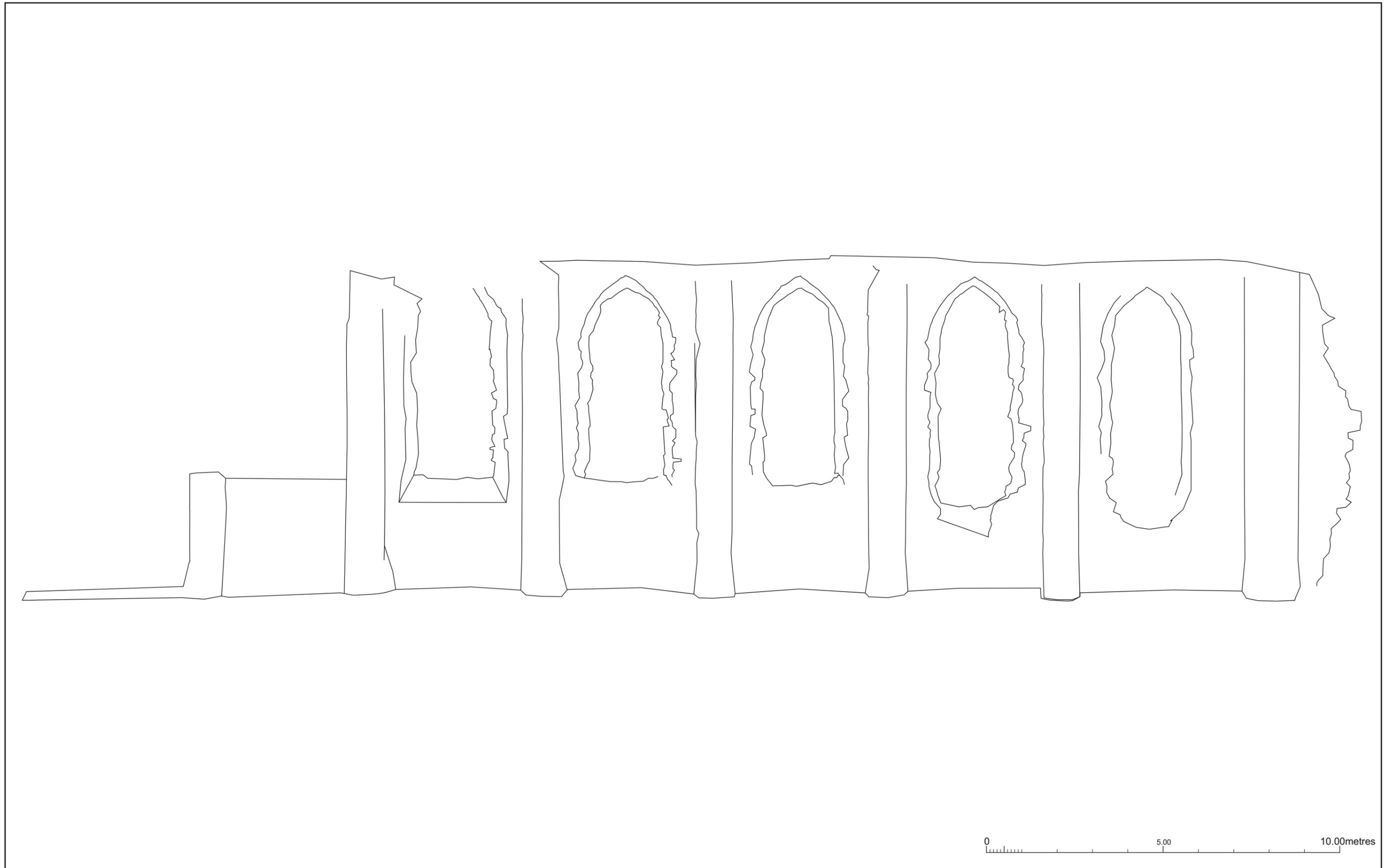


Figure 8. North facing elevation of wall 26

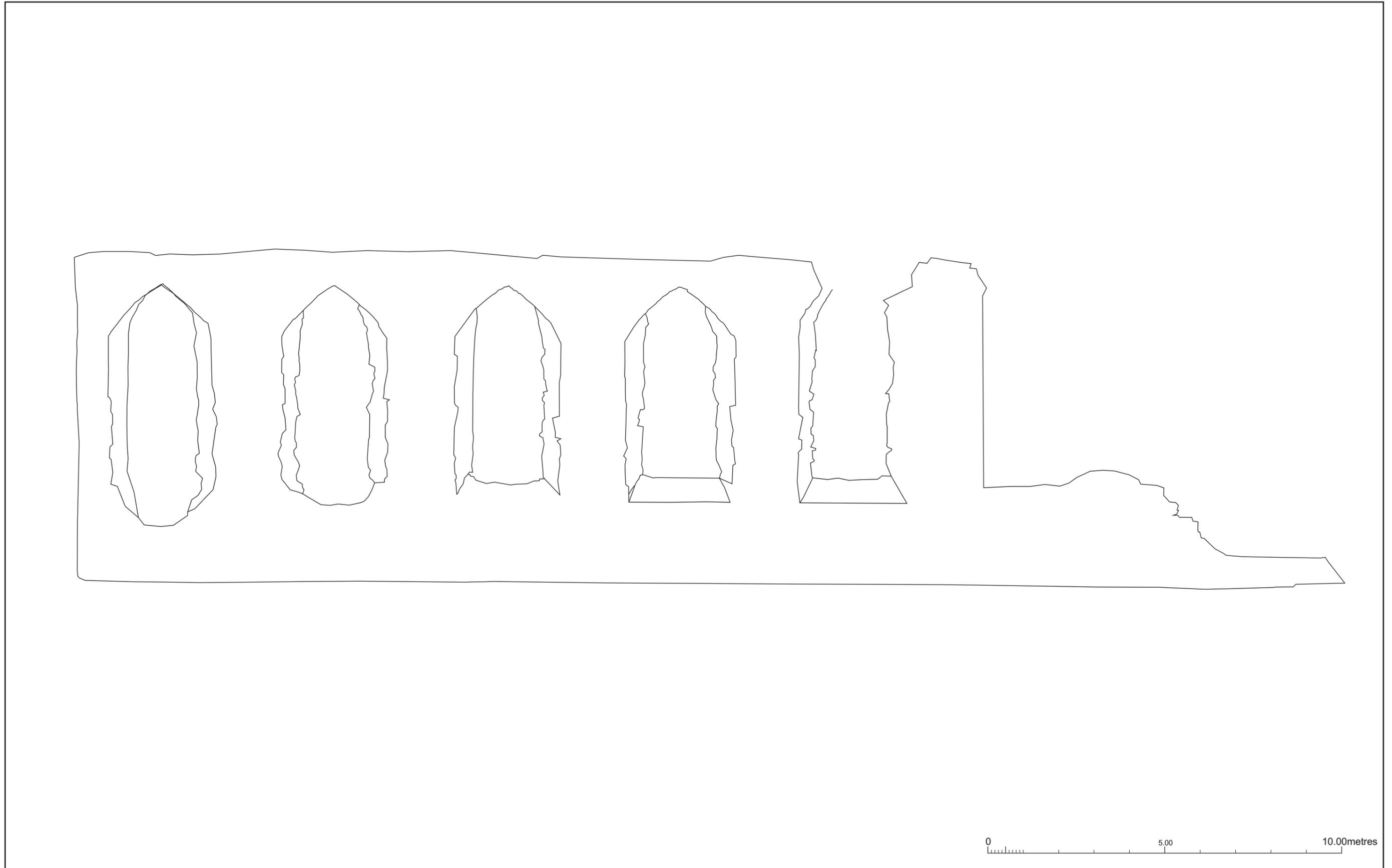
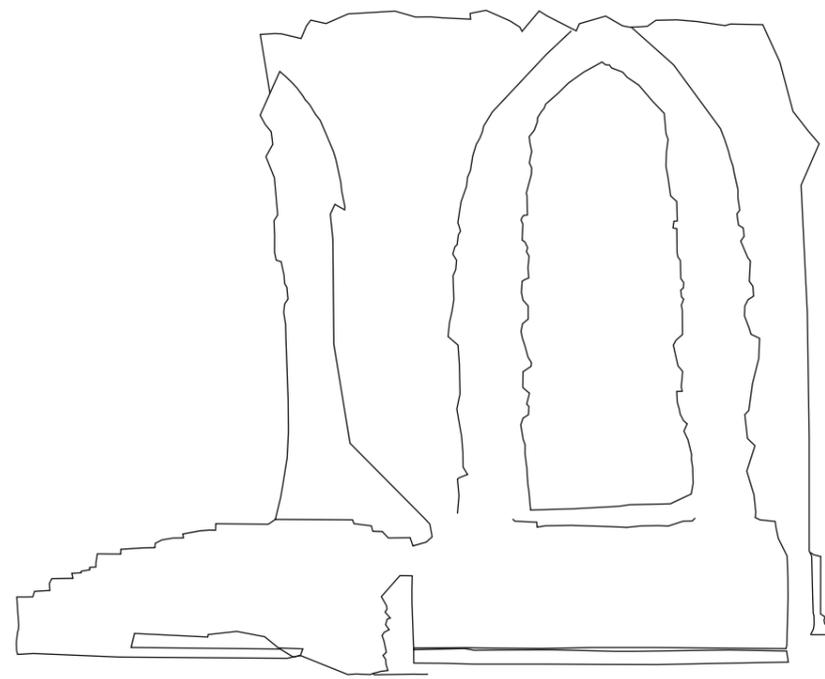
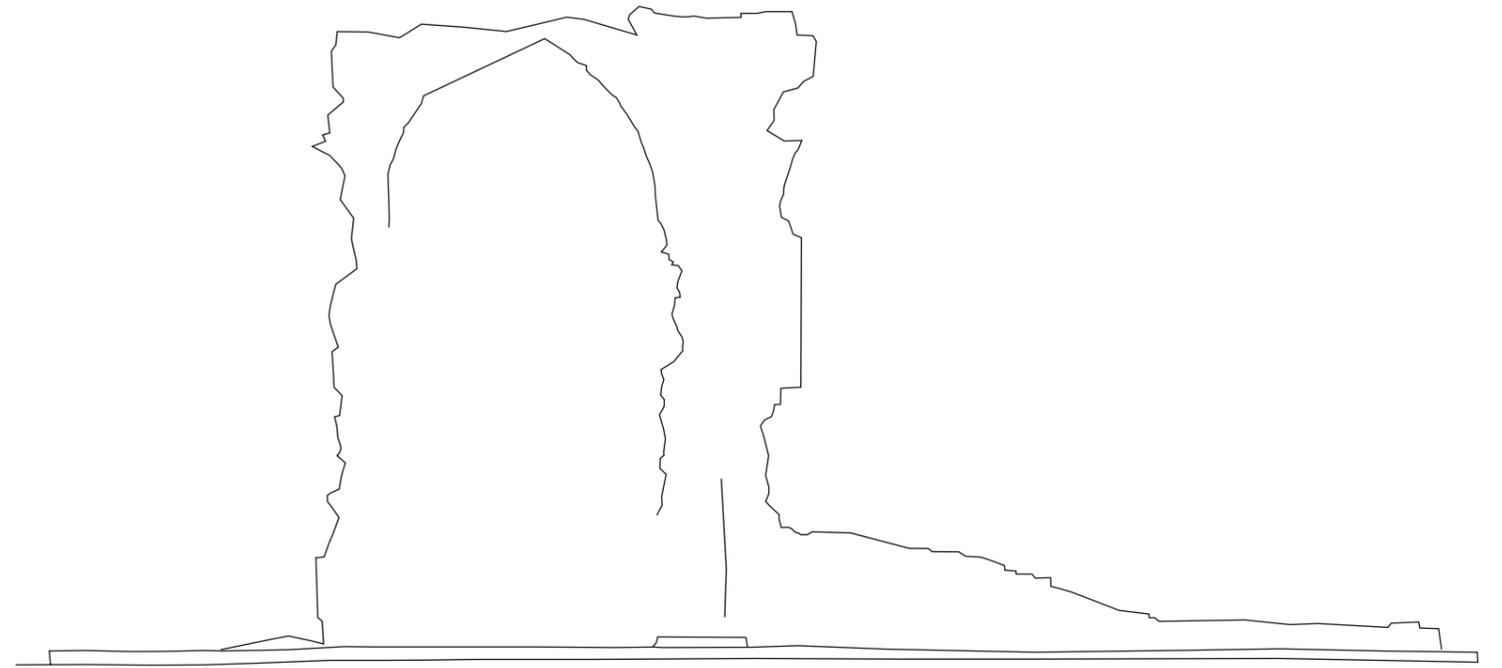


Figure 9. South facing elevation of wall 26



31



33

34



Figure 10. West facing elevation of wall 31 and south facing elevation of walls 34 and 33



Figure 11 .East facing elevation of wall 31 and north facing elevation of wall 34

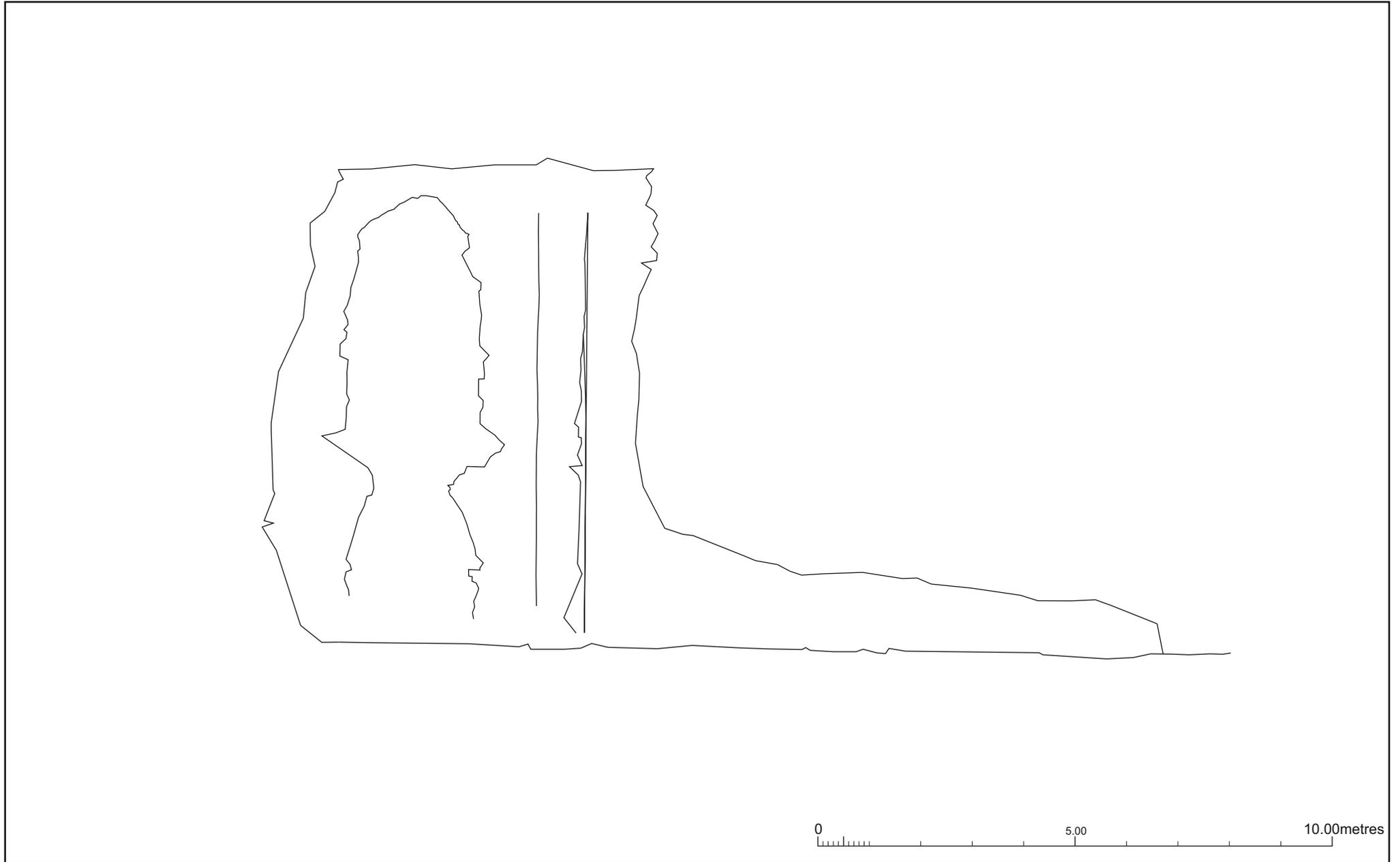


Figure 12. South facing elevation of wall 39

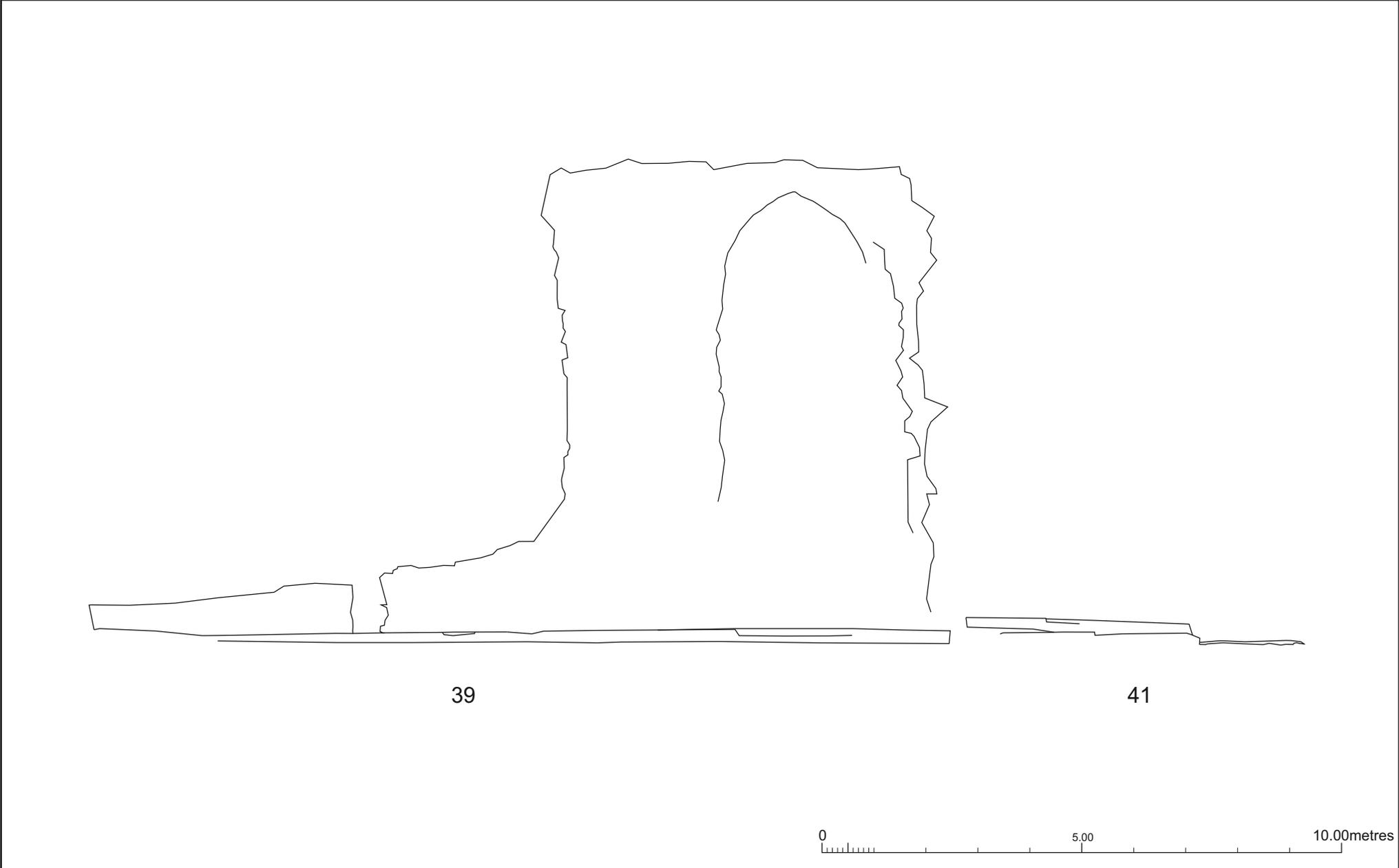


Figure 13. North facing elevation of walls 39 and 41

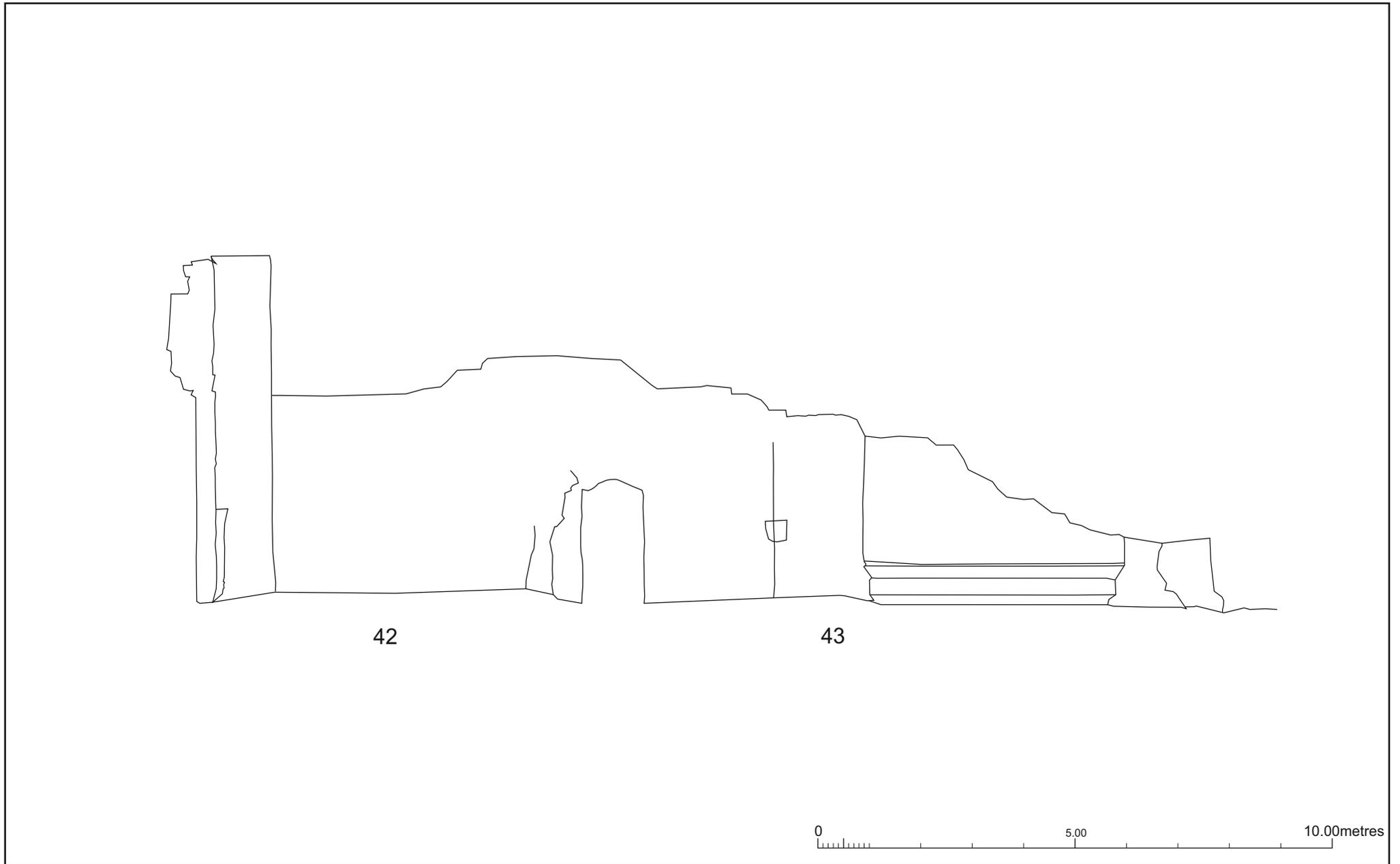


Figure 14. South facing elevation of walls 42 and 43

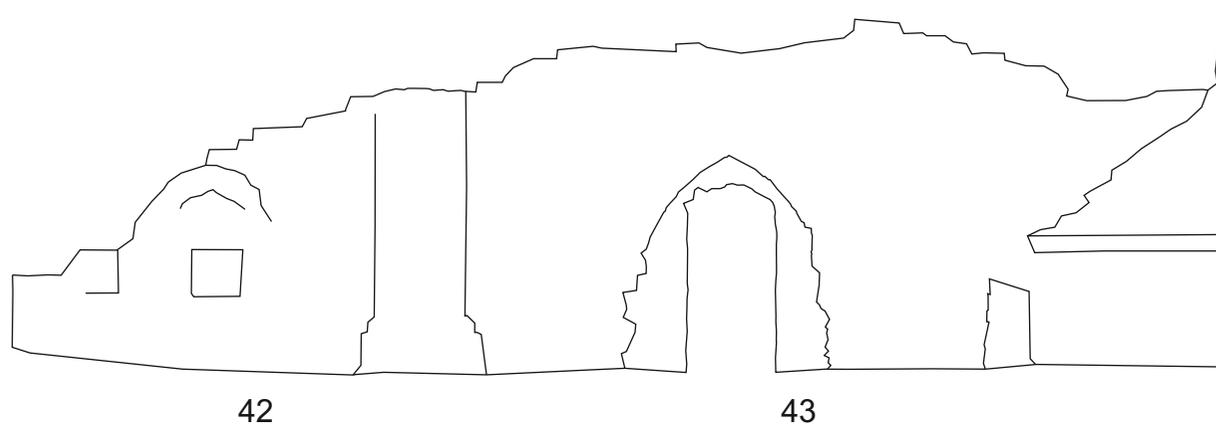
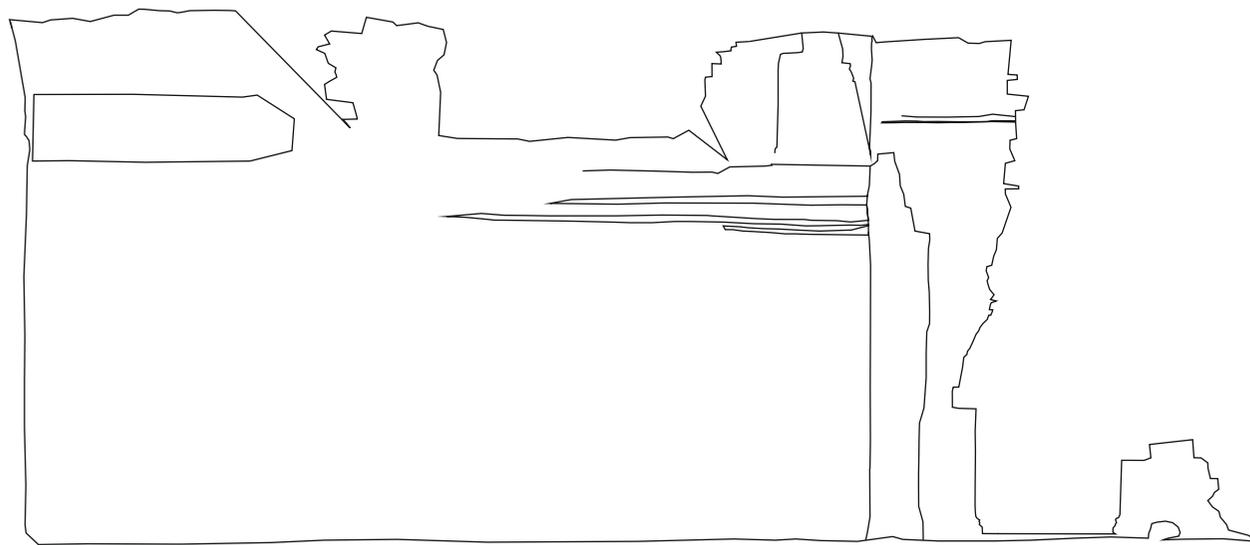


Figure 15. North facing elevation of walls 42 and 43



44

47



Figure 16. West facing elevation of walls 44 and 47



Figure 17. East facing elevation of walls 44 and 47

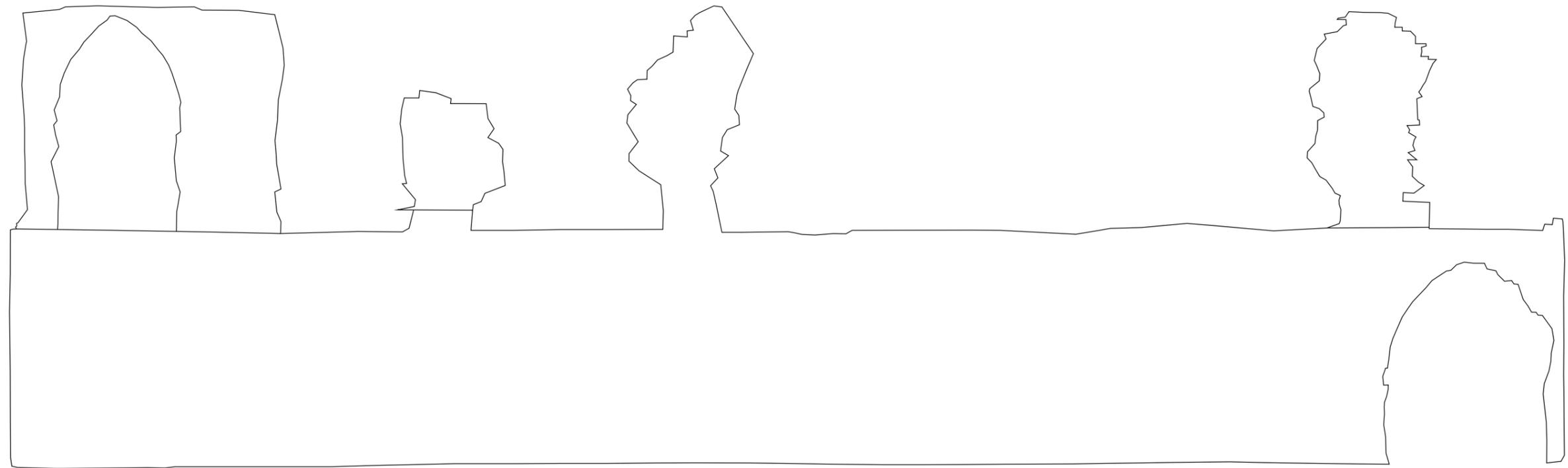


Figure 18. South facing elevation of wall 18

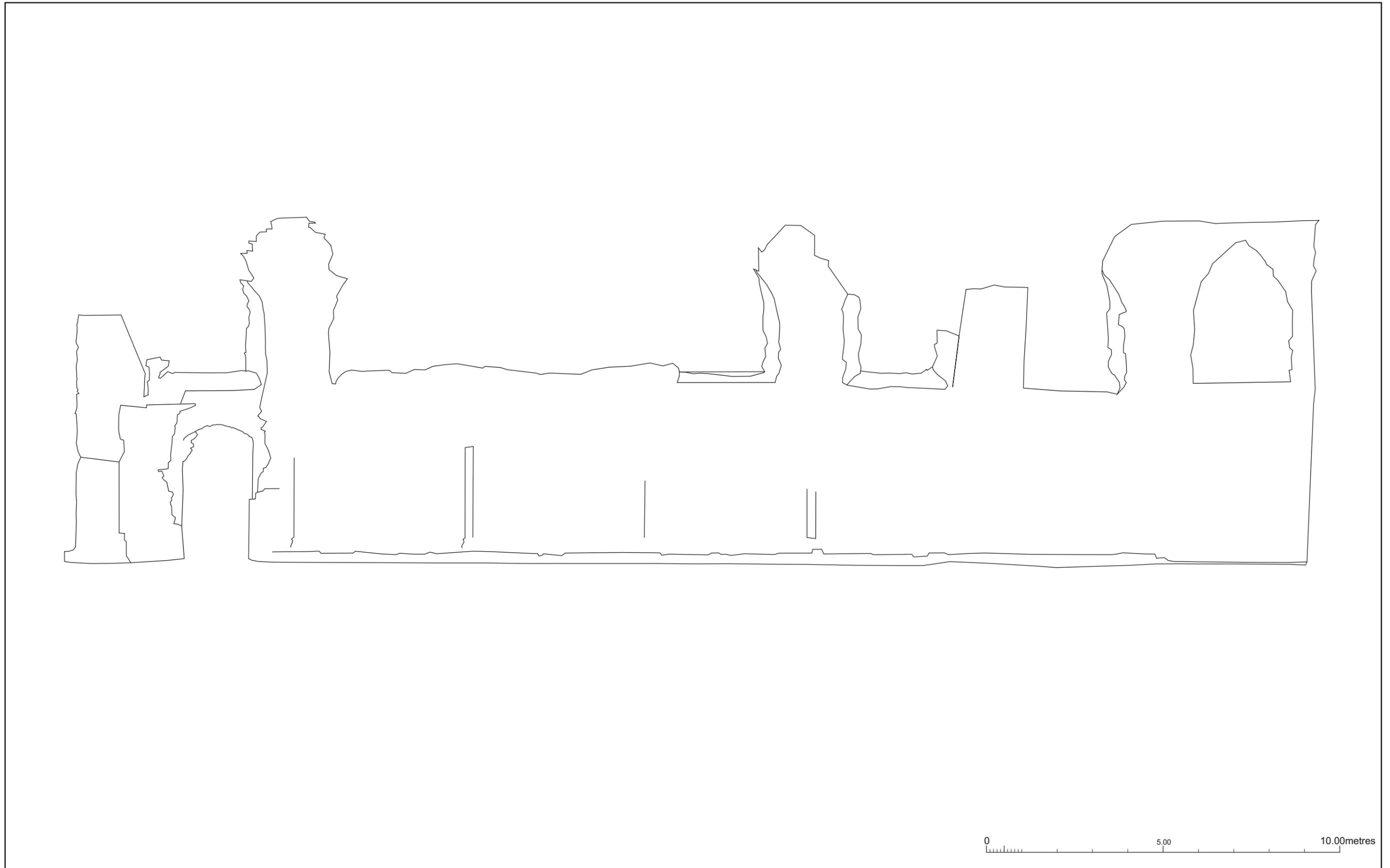


Figure 19. North facing elevation of wall 18

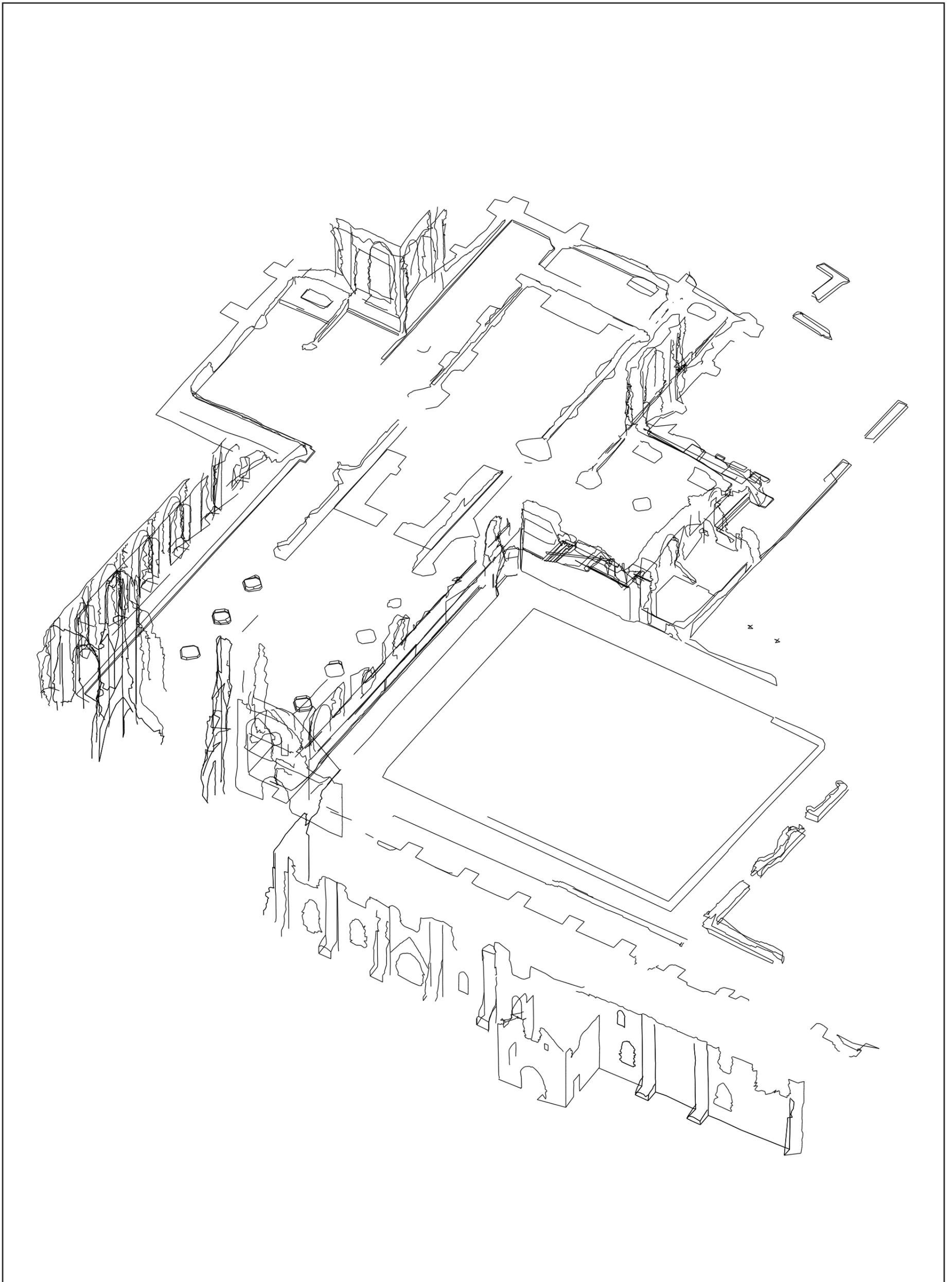


Figure 20. An isometric view from the south west



**Glamorgan-Gwent
Archaeological Trust Ltd
(Projects Division)**



QUALITY CONTROL

Report Title: GGAT 131: Building survey and analysis at Neath abbey: Interim report

Report Date: March 2014

Report Number: 2014/026

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Date: 31/03/14

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Position: Assistant Project Officer

Date: 27/03/14

Illustrations checked and authorised by: Paul Jones

Position: Senior Illustrator

Date: 11/04/14

Report checked and authorised by: Edith Evans

Position: Heritage and Outreach Manager

Date: 31/04/14

As part of our desire to provide a quality service we would welcome any comments you may wish to make on the content or presentation of this report.