



WINDERMERE REFLECTIONS

**FULLING MILLS IN
EASEDALE,
GRASMERE,
ELTERWATER,
GREAT LANGDALE
AND GRAYTHWAITE**

**Community Archaeology
Survey Report**



Oxford Archaeology North

September 2012



THE NATIONAL TRUST

Issue No: 2012-13/1307

OAN Job No: L10453

NGR: NY 3195 0870

NY 3436 0591

NY 3370 0503

NY 2942 0650 and

SD 3711 9330 (centred)

Document Title: WINDERMERE REFLECTIONS: FULLING MILLS IN
EASEDALE, GRASMERE, ELTERWATER, GREAT LANGDALE
AND GRAYTHWAITE

Document Type: Community Archaeology Survey Report

Client Name: The National Trust

Issue Number: 2012-13/1307

OA Job Number: L10453

National Grid Reference: NY 3195 0870, NY 3436 0591, NY 3371 0503 NY 2942 0650 and SD
3711 9330 (Centred)

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SUMMARY

Oxford Archaeology North (OA North) was invited by the National Trust and the Lake District National Park Authority to provide supervision and support to facilitate and enable a community archaeology project examining a number of possible, former fulling mills located within the Windermere lake catchment. The project was financed by the Heritage Lottery Fund and was one of three community surveys being undertaken as part of Reflections on History, one of nineteen projects taking place under the umbrella of Windermere Reflections. Windermere Reflections is part of a wider range of conservation and heritage themed projects in the Windermere Catchment Restoration Programme. The project was intended to undertake a series of detailed topographic surveys and desk-based analyses of former fulling mills, while providing support and training for volunteers in areas such as archaeological survey and archive research.

Topographic survey was undertaken to identify, record, and describe any extant structures and features associated with five possible, former fulling mills within the Windermere lake catchment. The surveys were undertaken between the 9th April and 5th May 2012. Desk-top historical survey of information pertinent to each site, including historical maps, and records held in the Armit Library and Kendal Record Office took place on the 9th and 10th May 2012.

Fulling describes the process of cleaning and de-greasing woollen cloth, either with potash, dung and urine or fuller's earth, and the pounding of the cloth to compact the fibres of the fabric. The pounding of the roughly woven woollen cloth was undertaken using large wooden hammers (known as stocks) which were lifted by cams on an axle turned by a water wheel. The stocks would act upon the cloth within a large fulling trough which also contained water and fuller's earth. After fulling, the cloth would be washed, stretched and dried.

The recent survey examined five possible fulling mills within the Windermere lake catchment. Four of the five sites are located within the northern part of the catchment, near the villages of Grasmere and Langdale, an area documented as important for fulling and weaving. The condition of the mills was variable, with one at Sourmilk Gill being an exceptional survival and representing an archetypal medieval fulling mill, whereas at Loughrigg Terrace, for example, there is reasonable survival of the water system but the mill remains are open to interpretation. Two of the mills, that at Sourmilk Gill and Stickle Ghyll, were originally stone founded structures, associated with well-defined water supply systems, comprising head race, wheel pit and tail race, and, at Sourmilk Gill, a launder platform also. Both mill structures were potentially reused and their operational life is uncertain.

At Loughrigg Terrace, the putative mill platform is only 4.5m by 2.6m in size and it is possible to conjecture that the stocks and trough would not have been contained within a building, although a simple timber structure could have been erected over the working components. There would, in any case, have only been room for a single stock hammer and trough.

The head and tail races were the most diagnostic features of all the mills, and often provided the most definitive evidence for a mill, notably at Loughrigg Terrace. The relatively limited water supply for many of these water wheels indicates that the supply

would have been taken over the top of an overshot wheel (as opposed to an undershot wheel which required a large flow of water) using a wooden launder. These rarely survive; but a large stone platform for a launder survives at Sourmilk Gill.

At three of the mill sites (Sourmilk Gill, Low Wood and Little Ore Gate) a series of ponds survived, which drew water from a divert channel, although their function as part of the fulling process were potentially varied.

The process of fulling was bound into a broadly agricultural economy of mixed farming, including the rearing of sheep and shearing, as well as weaving and potash manufacture. Spatially associated with a number of the mills were stock pounds, arable farming remains and potash kilns, which reinforce the historical evidence that indicates that fulling was undertaken on a part-time basis alongside a large range of agricultural activities and was seasonal following on from the annual wool shear typically in mid-summer.

ACKNOWLEDGEMENTS

Oxford Archaeology North would like to thank the National Trust and the Lake District National Park Authority for commissioning the project, and the Heritage Lottery Fund for providing the funding. In particular, thanks must go to Jamie Lund, of the National Trust, for his considerable involvement and support. We would also like to thank Miles Sandys for giving permission to access the putative former mill site at Little Ore Gate on the Greythwaite Estate and for providing information regarding woodland management. The project would also like to thank Robert and Jane Powell for allowing staff and volunteers to park at Brimmerhead Farm which facilitated easy access to the site alongside Sourmilk Gill. We are also grateful to the staff of the National Trust Sites and Monuments Record (NTSMR) and the Lake District National Park Historic Environment Record (LDNPHR), the Armit Library and Museum, Ambleside; Barrow Library and Local Studies Centre; Cumbria Archives Centre, Kendal and Lancashire Archives, Preston, for their assistance during supervised volunteer visits. In particular we would like to thank Peter Eyre, Senior Archivist at the Cumbria Archives Centre, Kendal, and Deborah Walsh at the Armit Library, Ambleside, for providing documentary training for the group.

Fieldwork, including site clearance and survey, was primarily undertaken by volunteers whom we must thank for their boundless enthusiasm and energy throughout the project (Plate 1):



Barbara Blatchford, Jose Brock, Joyce Clarkson, Dave Clarkson, Bob Abram, Helen Pugh, Robin Smalley, Anne Catterson, Joan Ferrero, Charles Rowntree, Barbara Stevens, Amanda Hames, Helen Eastham, Linda Peel, Alison Ewin, Peter Mattiessen, Roger Baker, Sandra Shaw, Robert Bell, Mark Simpson, Rae Cross, Kathy Cross, Jane Worthington, Tony Edwards, Judith Edwards, Jenny Kelly, Roger Kingston, Liz Kingston, Anita Payne, Vince Warwick, Annie Warwick, Clare McEntegart, Ian Harford, Hedda Moore, Judith Horsley, Hilary Corton, Piers Waterston and Chris Sherin.

Plate 1: Volunteers surveying at the fulling mill sites

In addition, Bob Abram, Jane Abram, Judith Edwards, Liz Kingston, Roger Kingston, Anita Payne, Helen Pugh and Robin Smalley contributed considerably to the documentary study.

The volunteers were aided in primary documentary research by Helen Quartermaine and topographic survey by Peter Schofield, Alastair Vannan, Jamie Lund, John Hodgson, David Maron, Jamie Quartermaine, Holly Beavitt-Pike and Eleanor Kingston. The report was written by Peter Schofield, Helen Quartermaine and Alastair Vannan, and the illustrations were produced by Anne Stewardson. The report was edited by Jamie Quartermaine, who also managed the project.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 Oxford Archaeology North (OA North) was invited by the National Trust and the Lake District National Park Authority to provide supervision and support to facilitate and enable a community archaeology project examining a number of possible, former fulling mills located within the Windermere lake catchment. The project was financed by the Heritage Lottery Fund and was one of three community surveys being undertaken as part of Reflections on History, one of nineteen projects taking place under the umbrella of Windermere Reflections. Windermere Reflections is part of a wider range of conservation and heritage themed projects in the Windermere Catchment Restoration Programme. The aim of the wider project is to improve water quality and to bring environmental and economic benefits to the area.
- 1.1.2 The first step towards planning the Reflections on History project was taken in 2010, with the commissioning of a GIS based study examining the woodland, water and mineral-based heritage of the Windermere lake catchment (OA North 2010). This study and report made recommendations for a series of community projects based around each of the three themes of woodland, water and minerals/mining. The first thematic survey project, examining woodland industries on the Greythwaite Estate located in the south-western part of the Windermere lake catchment, took place during March and April 2012. This was followed soon after by a second thematic survey project which aimed to examine the use of water power for a number of former fulling mills within the Windermere lake catchment.
- 1.1.3 The project undertook a detailed topographic survey and desk-based analysis of four former fulling mills in the northern and north-western parts of the Windermere lake catchment (locations shown on Figure 1):
- Sourmilk Gill at Brimmer Head Farm, Easedale (NY 3193 0868)
 - Loughrigg Terrace, near to the outflow of Grasmere Tarn (NY 3431 0589)
 - Low Wood, Elterwater (NY 3370 0503)
 - Stickle Ghyll, Great Langdale (NY 2941 0649)
- 1.1.4 A project design was issued by OA North (*Appendix 1*) in response to a written brief from The National Trust (*Appendix 2*) which targeted investigation on these four sites. A further potential fulling mill site was identified at Little Ore Gate, near Graythwaite (SD 3711 9330) during the survey of woodlands on the Graythwaite Estate undertaken as part of the Reflections of History (OA North *forthcoming*). Given the interest in this site amongst the project participants, it was undertaken as part of the program of survey and the results are incorporated into this report.

1.2 AIMS

- 1.2.1 The principle aim of the project was to involve people from the local community with an interest in archaeology and their own local historic environment in archaeological investigation and survey that would provide new information on the wealth of archaeological remains in the Windermere lake catchment. The aim was to provide training for volunteers in surveying and documentary research that they would be able to continue to use beyond the life of the project. The range of techniques taught to the volunteer team were such that these would allow recording without the need for expensive or specialist equipment and provided a legacy of skills within the community. As well as educational it was important that the participants were provided with an experience that was both meaningful, in terms of learning, but was also social and enjoyable.
- 1.2.2 This training entailed providing a general introduction to the techniques of archaeological survey, supplemented by a guided tour of the sites under investigation. This general introduction took place at High Close Youth Hostel on the 31st March 2012 in advance of the start of fieldwork.
- 1.2.3 The objectives of the recording programme, undertaken by the volunteers with professional supervision, were to undertake outline documentary research into the fulling mills and fulling activity in the Windermere catchment. To undertake detailed surveys of four fulling mills, and their local environs to provide an appropriate context for the individual mills. Ultimately the information gathered through this process was to be disseminated in reports, and updated records for the Lake District Historic Environment Record and the National Trust Sites and Monuments Record. The information collated will in due course be used for interpretation purposes by the various partners involved in Windermere Reflections to inform local communities and visitors to the catchment of the areas special qualities.

2. METHODOLOGY

2.1 INTRODUCTION AND PROJECT DESIGN

- 2.1.1 **Project Design:** a project design, submitted by OA North (*Appendix 1*) in response to a project brief by Jamie Lund, National Trust (*Appendix 2*), was used as the basis for this investigation. It was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists, and generally accepted best practice.
- 2.1.2 The work programme was divided into three elements: desk-based research; detailed field survey and reporting. The survey areas were centred upon each of the documented fulling mills defined and was adjusted so as to ensure that the maximum possible area could be examined by the volunteers over the course of a week. In all instances this ensured that the main areas of fulling mill and associated water systems were recorded. The areas of final survey are as shown on Figures 2-20 and 29-34.

2.2 DOCUMENTARY STUDY

- 2.2.1 The documentary study was undertaken to provide training for volunteers, and to allow them to get involved in the historical side of the project. It entailed two training days, led by the archivists at the Cumbria Record Office (Kendal) and Armitt Library (Ambleside). Further study was undertaken at the Barrow Record Office, but not as part of the training programme.
- 2.2.2 The documentary study sought archaeological information pertinent to each study area, such as earlier investigations of the site or aerial photography that may provided a valuable insight into the character of the respective areas. This element of study obtained pertinent background information, and drew upon historical mapping and database sources. These included an appraisal of the information held in the Lake District National Park Historic Environment Record (HER) and the National Trust Sites and Monuments Record (SMR), as well as appropriate sections of county histories, early maps, primary documentation, such as tithe and estate plans, and published documentary sources. The work accessed the following repositories: Lake District National Park HER; National Trust SMR Cumbria Record Office (Kendal and Barrow); Lancaster University Library; Armitt Library (Ambleside); the OA North library and on-line sources.
- 2.2.3 The core repository in terms of the collation of information for the desk-based assessment was the Cumbria Record Office (Kendal), which held the primary sources for the areas. However, an extremely valuable source of secondary information was provided at the Armitt Library, which included the important research of Mary Armitt into fulling mills. As the desk-based research comprised a key element of the volunteer involvement within the community project, in addition to research undertaken by OA North, two day-long tutored sessions were held at the Cumbria Record Office (Kendal) and Armitt Library (Ambleside) in order to provide training for volunteers in the use of the resources of the record office and the specific use of historical documents in the context of archaeological research. The tutored sessions were held during early part of May

2012, with instruction by Helen Quartermaine and Jamie Quartermaine from OA North, Peter Eyre, Senior Archivist at the Kendal Record Office, and Deborah Walsh, Curator at the Armit Museum and Library.

- 2.2.4 The relevant documents held by the record office were collated into broad themes and the volunteers were encouraged to engage in independent research which formed the basis of a research archive. Numerous types of records were consulted during the research, with a particular emphasis on the inspection of historic mapping and secondary sources.
- 2.2.5 **LiDAR plotting:** 1m resolution LiDAR mapping was available for selected study areas, notably at the Sourmilk Gill study area. This is very detailed terrain modelling data produced by laser scanning the ground from an aircraft. The data was initially provided as Raster images, but following discussion with staff from the Lake District National Park Authority it was agreed to obtain the LiDAR data in ASCII format which allows considerable manipulation of the model, including exaggeration of the vertical axis to enhance the earthwork remains. The LiDAR provided a basis for the interpretation and recording of the landscape and provided contour information for Sourmilk Gill area.
- 2.2.6 **Aerial Photographic Modelling:** three of the sites (Sourmilk Gill, Loughrigg Terrace and Stickle Ghyll) were modelled by photogrammetry using aerial photographs and corrected photographic texture photographic images for the areas. New aerial photographs were taken using a UAV, a small remote controlled helicopter. Survey control was introduced to the photographs by the placement of survey control targets across the site and were located by means of survey grade GPS.
- 2.2.7 Photogrammetric processing was undertaken using Agisoft software which provided detailed modelling using an overlap of up to 130 photographs, and created a very detailed DTM (Digital Terrain Model) across the site. The photographs were then digitally draped over the model to create an accurate three-dimensional representation of the ground surface. The primary output, however, was an accurate two-dimensional image which was used to provide additional plan information (Figs 7, 12, and 20).
- 2.2.8 The Low Wood and Little Ore Gate sites were within woodland, preventing aerial photography, and the method could not practically be applied.

2.3 DETAILED SURVEY

- 2.3.1 Detailed topographic survey was undertaken at all five sites (Fig 1) using the methodology equating to the level of survey detail defined as English Heritage Level 3 (Ainsworth *et al.* 2007). It was intended for this survey to serve primarily as a training exercise for the volunteers, so the survey techniques were devised to be easy to understand, to allow for plotting in the field, and to use equipment that can be acquired at low cost by the volunteers for follow on work. Initially the following survey techniques were demonstrated to the volunteers as part of an introductory survey day:

- **Plane Table:** the technique produces drawings in the field and typically uses stadia tacheometry on the alidade to measure distances. However, the project alidade was modified to use a Disto, mounted onto the telescope,

to measure distances of up to 120m. The Disto also measured vertical angle and output corrected horizontal distances.

- **Theodolite and Disto:** the project used a theodolite with a Disto distance measurement device mounted on top. The range of the Disto is 120m and was suitable for detailed recording. The survey data was plotted onto draughting film using a large protractor, allowing for the production of survey drawings in the field;
- **Total Station:** a modern total station was demonstrated, which provides digital output to a pen computer allowing views of the graphic output as they are produced. While the technique was efficient and effective, the equipment was too expensive for the volunteer groups and was not considered for the remaining survey;
- **High Accuracy GPS:** the use of a Leica 1200 differential GPS was used for the peripheral elements of the survey, such as field boundaries and other topographic detail. It can achieve accuracies to +/- 0.02m and provides graphic output of the survey results on its LCD screen. It allowed the volunteers to establish survey control at all five sites that could afterwards be used to locate and position the various hand drawn surveys produced in the field using other techniques, and to visualise the survey results in the field in a meaningful way.

2.3.2 **Survey Control:** survey control was introduced to the sites by means of a high-accuracy survey-type differential GPS, ensuring the internal accuracy of the survey and also its location with respect to the Ordnance Survey National Grid.

2.3.3 **Detail Survey:** the detail survey was primarily undertaken using the theodolite and Disto and also the plane table. The plotting of the theodolite data was graphical onto field survey drawings using a large A3-sized paper protractor. The topographic survey recorded all structural and earthwork components, which were drawn by hachure survey. Survey points were marked on the ground using spray paint and the survey drawing was manually drawn up with respect to them. On completion of the survey, the field drawings were digitised into a CAD system and combined with survey data obtained from the Leica 1200 GPS.

2.3.4 **Description:** the final stage was the production of a descriptive record of all features, incorporating a provisional interpretation of the function of the features where possible. A provisional interpretation of the site's chronology was also provided where possible. The digital gazetteer was collated and edited, output as an Access Report and input directly into a Microsoft Word format.

2.3.5 **Photographic Record:** a digital photographic archive was generated in the course of the field project using a digital SLR camera with 10 megapixel resolution. The photographic record comprises landscape and detailed photography; the detailed photographs of archaeological features incorporated a scale bar. All photography was recorded on *pro-forma* sheets showing the subject, orientation and date.

2.3.6 **Photogrammetric Recording of Wall Elevations:** at Stickle Ghyll there were the upstanding remains of a putative fulling mill which were recorded by means of photogrammetry. Survey control was established by means of taped offsets to selective detail on the walls. A series of photographs were taken from multiple locations of each elevations to provide the basis for photogrammetric analysis.

Photogrammetric processing was undertaken using Agisoft software which provided detailed modelling using the overlaps of the photographs, and created a detailed DTM (Digital Terrain Model) of each elevations. The photographs were then digitally draped over the model to create an accurate three-dimensional textured surface of each wall. The primary output, however, was an accurate two-dimensional elevation of each wall incorporated into Autocad (Figs 21-8).

2.4 REPORT AND GAZETTEER OF SITES

- 2.4.1 **Reporting:** the present report identifies areas of defined archaeology, and an assessment and statement of the actual and potential archaeological significance of the material within the broader context of regional and national archaeological priorities.
- 2.4.2 Information concerning the sites of archaeological interest within the study area has been collated into a gazetteer (*Section 5*). The gazetteer output from the Access 97 database is compatible with the National Trust Sites and Monuments Record, and was formatted within Word. Site locations are given as ten-figure National Grid References where possible. The *National Monuments Record Thesauri* (English Heritage 1999) was used as part of the site descriptions.

2.5 ARCHIVE

- 2.5.1 A full archive has been produced to a professional standard in accordance with English Heritage guidelines (1991) and the *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (UKIC 1990). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. The archive is provided in the English Heritage Centre for Archaeology format, both as a printed document and digitally. The archive will be provided to the National Trust for storage within both their regional and national archives.

3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

3.1 HISTORICAL BACKGROUND

- 3.1.1 **Introduction:** the following sections present a summary of the historical and archaeological background of fulling and cloth manufacture within the Windermere catchment. It examines the process and technology of fulling and examines the historical evidence for fulling and cloth manufacture at each of the five putative fulling sites. The historical background below examines the history of fulling from the earliest documentation in the medieval period through to the present and has been compiled in order to place the individual fulling mills within a wider chronological context.
- 3.1.2 **Twelfth - Thirteenth Century:** ‘Historical evidence from the twelfth century onwards indicates that the physical geography and climate of the Lake District areas enabled widespread sheep farming and the export of wool. By the fourteenth century it is apparent that there was a thriving market in the townships of Kendal and Ambleside in the Lake District for ready-woven cloth for export to other parts of England and abroad. To serve this industry a series of fulling mills had been constructed along the banks of the River Rothay and Easedale (and perhaps further to the west by Wray Gill) in the Grasmere townships and in areas south of Rydal Water. The fulling mills have been described as a revolutionary development changing the pattern of the agricultural economy, not only by the speedier processing of larger quantities of a more weather-proof cloth, but also by introducing urban manufacturing and economic concepts into the rural manors and monastic estates’, (Carus-Wilson 1941, 39-60).
- 3.1.3 During the twelfth and thirteenth centuries the great manufacturing centres of cloth were in large towns in the east of England close to the ports of Hull, Great Yarmouth and Ipswich. However, documentary, place-name and family name evidence demonstrate that the wool industry in Cumberland and Westmorland was also established in this period (Davies-Shiel 1992). The geography and climate of the land was more suited to sheep than to the rearing of cattle or arable farmlands and the monastic estates of Furness Abbey and Conishead Priory exploited this, holding extensive ‘parks’ for sheep farming and leasing land for sheep farming. By the end of the twelfth century, Furness Abbey held as many as 60,000 sheep, with most of the raw wool exported outside the region (Elliot 1961, 112-9). Wool production was in such large quantities that it necessitated the building of warehouses for storing wool and for the improvement of packhorse routes (Carnie 2002, 54-7). The monks gained a reputation for high-grade fleeces and wool (Davies-Shiel 1992) at a time when raw wool was a major export of England.
- 3.1.4 **Fourteenth - Sixteenth Century:** when Edward III gained the throne in 1327 and found that he needed to raise money for his foreign policies, he legislated to tax the wool-clip that was exported to the continent. The high taxes of the raw wool, as compared to the minimal taxes of woven cloth, enabled further development of the weaving industries in Kendal and Ambleside (Carus-Wilson 1941, 39-60; Davies-Shiel 1978, 27). This, combined with increasing confidence in the building and operation of fulling mills in this area, meant that both weavers and fullers were able to exploit the new commercial possibilities of cloth manufacture.

Many parts of the Lake District had an abundance of becks and streams suitable for turning waterwheels (unlike the flat areas of the Norfolk and East Anglia) and easy access to bracken which was used to manufacture potash which was essential to the fulling process. Even prior to the Black Death in 1348, there were potentially at least fifty fulling mills (Davies-Shiel 1992) in the two counties of Cumberland and Westmorland, although it can be difficult to quantify reliably on the basis of the sometimes erratic historical evidence available. Some of these were owned by Furness Abbey and Conishead Priory (Davies-Shiel 1978, 111; Z/100/1, 1318). In the late medieval period across the country, monastic houses invested heavily in fulling mills, and between a third and a half of all monastic houses built or managed at least one such mill (Lucas 2006, 181-2). The total number of mills in Cumberland and Westmorland equalled around one third of the number of fulling mills in England at this date (Carus-Wilson 1941, 41-61). The depopulation caused by the Black Death ensured that wage-based employment continued to create a profitable industry with a steadier market. Later, and during the fifteenth and sixteenth centuries, there was tight control of the wool trade by the Crown with many specific edicts being passed that detailed rules of production, the cloth types, the sale of cloth, and indeed who should wear which types of cloth, again enhancing the commercial prospects for the weavers of Kendal and Ambleside and for the fullers who washed and dressed their cloth.

- 3.1.5 A detailed study of medieval fulling mills and their owners in Grasmere and Rydal demonstrated that between the thirteenth to the sixteenth centuries fulling mills were erected along the banks of the River Rothay and in Easedale, and possibly further to the west by Wray Gill; while the areas south of Rydal and west of Ambleside were also regarded as important for fulling (Armitt 1908; Carnie 2002). Armitt describes how the earliest fulling mill referred to in the surviving documentation may be the manorial fulling mill of Grasmere mentioned in 1283 in the Inquisitions of William de Lindesey, perhaps serving the areas of Grasmere, Langdale and Loughrigg, and being held by the lord and situated at the manorial centre (Armitt 1916, 198). The wool industry and trade at that time seems also to have been controlled, and dues extracted from the transportation of cloth. Local tradition recorded in the nineteenth century describes how cloth from Langdale (probably via Long House and Pye Howe) was transported over Blea Rigg to be ‘dressed [fulled] in Grasmere and that they paid a small toll to their neighbour township, for keeping the road open to them’. This implies that, firstly, fulling mills had yet to be built in Langdale and, secondly, that probably ‘the original lord's mill in Grasmere was situated on one of the higher western tributaries of the Rothay’ which accords well with Sourmilk Gill. (Armitt 1908, 152).
- 3.1.6 In 1375, a William Bakester was working the Grasmere fulling mill, and by 1390 Rad de Grenerige was operating the mill (Farrer and Curwen 1924; Armitt 1908, 139). By 1390, there was a new mill within this parish situated in Loughrigg and worked by John Walker (Armitt 1916, 199-200). In 1453, a rental cites a new mill in Grasmere, a new mill in Ambleside and two mills in Langdale, making a total of six mills in the parish (Armitt 1908, 139-140).
- 3.1.7 Dues also had to be paid for each fulling mill, known as ‘walking silver’, a reference to the term walk-mill and the earliest methods of fulling by pounding with ‘walking’ feet (Plate 2). The Barony of Kendal records note a rental called ‘walkynsylver’ from the tenants of Loughrigg in 1390 and again in 1454. Thus the

building of a fulling mill was an investment, from which an income could be earned and taxes levied. Armitt notes that as time went on some fulling mills became exempt from the manorial tax of Loughrigg and Rydal, perhaps in recognition of the increasing numbers built and the ‘websters’ (weavers’) independence (Armitt 1916, 94).

- 3.1.8 The increase in the number of fulling mills can be ascribed not only to an increased demand for fullled cloth, but also to the entrepreneurial and commercial activities of newer manorial owners. A rental document of 1493, when Sir William Parr held the barony of Kendal, lists a total of ten mills, three in each of the parishes of Grasmere, Langdale and Ambleside and one in Loughrigg. It seems that three of these, one in each township, had been newly constructed during Sir William Parr’s tenure (Armitt 1908, 140). These mills were leased out: John Hawkrigge held the three mills in Grasmere, Robert Wylkynson and his ‘fellows’ held Langdale, but it is not recorded who held the mill in Loughrigg. By 1506 a further two mills had been built in Loughrigg but again it is not known who leased them (Armitt 1908, 140-1). In Langdale, a fourth fulling mill was built by the 1570s (*ibid*).
- 3.1.9 Armitt calculates that by the end of the sixteenth century there were as many as 18 fulling mills in the area of Grasmere, Troutbeck, Rydal, Loughrigg, Elterwater, and Langdale. Some fulling mills were jointly owned by two or more partners, suggesting that a fulling mill could be a costly operation needing business partnerships. For instance, the Bensons were owners of many of the fulling mills in the area, alongside John Hawkrigge, Robert Wilkinson and his partners, the Brathwaite family in Ambleside and Hawkshead, the Jacksons in Ambleside, and the Griggs in Langdale (Armitt 1916, 202). A court hearing and document of 1578 lists the seizure of ‘the 4th part of a fulling mill; the 8th part of another fulling mill; the 8th part of a corn mill; and the 4th part of a certain moor or pasture called ‘Whelpstrother’ in the lordship of Langdale before citing different holdings by the Bensons and Griggs in Langdale (Farrer and Curwen 1924).
- 3.1.10 The names of the Benson family seem to dominate the documentary and financial archive of the late fifteenth and sixteenth centuries of Grasmere; owning properties at Bainrigg (between Grasmere and Rydal), Easedale, and Langdale. The Bensons bought the manor of Baisbrown and its mills in 1546 after the dissolution of Conishead Priory (ALMS/103.2). According to the archive, these holdings included mills (although what type were not specified). A partnership of Michael, Edward and Bernard Benson in 1575 or 1576 purchased much of Loughrigg; in this document they were described as clothiers, although Armitt explains that they could equally well have been fullers and dyers, as well as weavers (Kendal WDRY/1/13/9 Box 68; Armitt 1908, 146-7). In 1593, the Grigg family still owned one walk-mill in Langdale but ‘several mills’ were owned by the Bensons (Armitt 1908, 143). The Benson family seem to have seized opportunities to hold land for both the operation of fulling mills as well as for the drying of the cloth, using poor upland areas that could be used as tenterfields (Carnie 2002, 101).
- 3.1.11 ‘During the fifteenth and sixteenth century the parishes and townships of Grasmere, Rydal, Langdale and Elterwater must have had considerable and well organised industrial drive. Each fulling mill may have been working in tandem with perhaps as many as twenty websters who used the wool processed by forty-

five sorters, carders, and spinsters with the fullers and websters also providing work for dyers and shearmen. Outside the trade there would have been work for packmen and men operating the potash kilns', (Davies-Shiel 1978, 22-4).

- 3.1.12 ***Late Sixteenth and Seventeenth Centuries:*** this was a period of decline for the wool and cloth trade in the Lake District and indeed in the whole of the North West. Transport tolls had detracted from the profits, the plagues of 1577 and 1597-8 had reduced the working population and contributed to loss of trade (Armitt 1908, 197), and the Dissolution had caused a temporary collapse of the local economic structure for a crucial few years. A raft of rules introduced by Edward VI in order to control the wool trade more profitably and to prevent the export of wool clip to the continent did not help to prevent the decline in the wool trade of the north-west regions. Staplers were given the monopoly of buying and selling wool and cloth. Furthermore, the better-quality and finer wool cloths sold in the southern markets were becoming more popular and, although thick and blanket-like cloths were still required to be worn by the artisan classes, the demand for such cloth would have been less profitable. Kendal had its own guild of staplers but its production remained low; four mills in Grasmere were reported as decayed in 1572 (Armitt 1908, 155). During the late sixteenth and early seventeenth centuries the Benson family, who had owned and operated many of the fulling mills in the area, had seemingly over-stretched their finances and their documentary record becomes a paper trail of mortgages and sales.
- 3.1.13 Other industries were proving to be much more profitable and these were taking up the reduced labour-force in areas such as the Furness Fells and on the south coast of the Lake District. The geography, woodlands and resources of the Furness Fells were more conducive to the iron-smelting industries, and the easy availability of sea transport and markets on the coast and abroad meant that the iron industry could expand and bloomforges at sites such as Cunsey Mill and Force Mills developed and became more profitable businesses. Only in 1618 and 1619 was the Edward VI legislation modified under James I to encourage the Lake District woollen industries to redevelop (Carnie 2002, 65), but by then many fulling mills had been turned into carding mills, bark mills, saw mills and bobbin mills (Armitt 1908, 198).

3.2 FULLING TECHNOLOGY AND ARCHAEOLOGY

- 3.2.1 ***The basic fulling process:*** the carding, spinning and weaving of wool was based in tenants' cottages, many of which would have had one or more handlooms. After the cloth was woven and sold on, it needed to be fulled. This involved the cleaning and de-greasing of the cloth either with potash, dung and urine or fuller's earth (a naturally occurring magnesium oxide rich clay), and then the pounding of the cloth. Prior to fulling mills, the cloth would have been pounded by the feet of people walking on the cloth. The development of water-powered fulling stocks or mills in England at the end of the twelfth century (Wilson 1973, 12) allowed the mechanisation of this process with huge oak hammers or stocks to pump out the dirt and grease, thicken the weave and to produce a felt-like texture. Cloth may have been fulled for up to three sessions, the first time in urine, a second time with fullers's earth (or potash) and a third time with hot soapy water (Coquetdale Community Project 2011, appendix 11; Davies-Shiel

1992; Flohr 2006, 193-200). The fulled cloth was then dried by stretching it on tenter-frames in large fields, presumably adjacent to the mill buildings where the fulling took place. 'The process of raising the pile was then performed by the flower head of the teasel (laid in a flat frame) which scratched up the surface of the cloth', (Brydson 1908, 96).

*'Cloth that commeth froe the weaving is not comely to wear,
Till it be fulled under fote or in a fullyng stocks;
Washen well with water, and with tasels cratched,
y-touked and y-teynted, and under talours hand '*

William Langland, c1362, from Piers Plowman.

Some versions have 'y- Walked' in the place of 'y-touked'; the author, often uses 'touker' for 'fuller.'

- 3.2.2 The Scottish 'luaghad' was similar to the fulling mill, where cloth was cleansed, shrunk and thickened by heat, moisture and pressure. Up to fourteen women, divided into two equal groups, would sit down either side of a long ribbed board. They would then place a cloth over it. Initially, the cloth was worked backwards and forwards by the women's hands and once they tired of this, they used their feet in the same manner (Plate 2).
- 3.2.3 Singing always accompanied both working at the quern and the luaghad. This process was known as 'waulking' and the songs as 'waulking songs'. The words often have no specific meaning but are simply syllables appropriate to the rhythm of the work

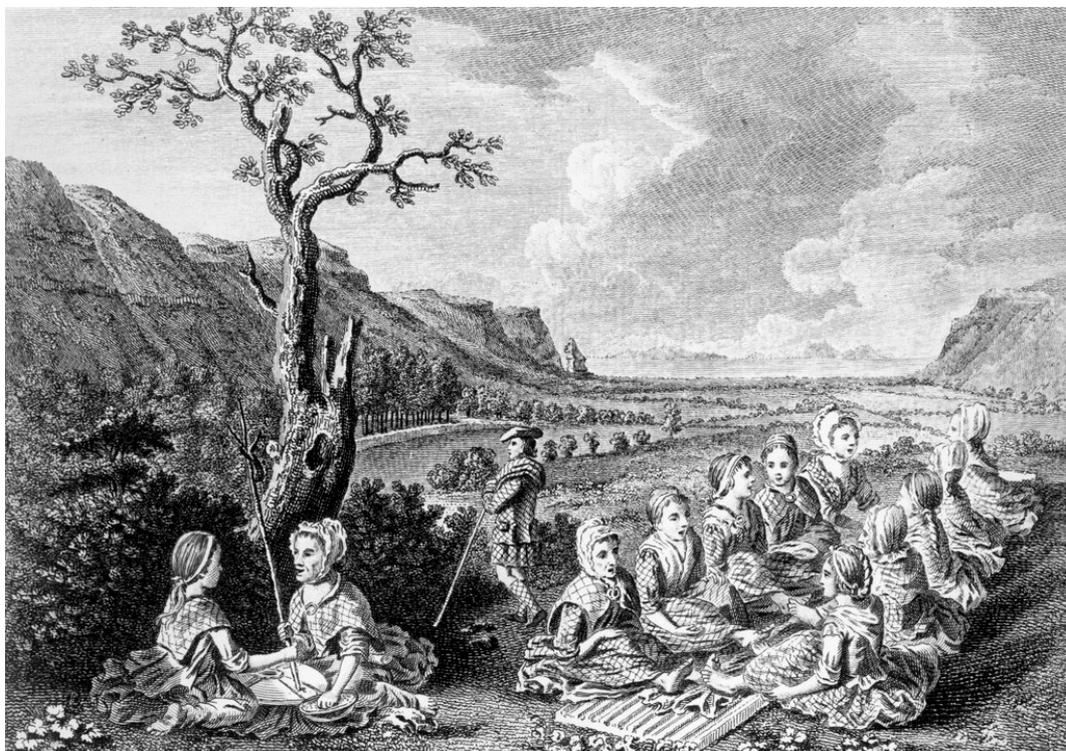


Plate 2: Eighteenth century (approximately 1760s) engraving of Scotswomen waulking (fulling) cloth on a luaghad and singing waulking songs (http://www.ambaile.org/en/item/item_illustration.jsp?item_id=11027)

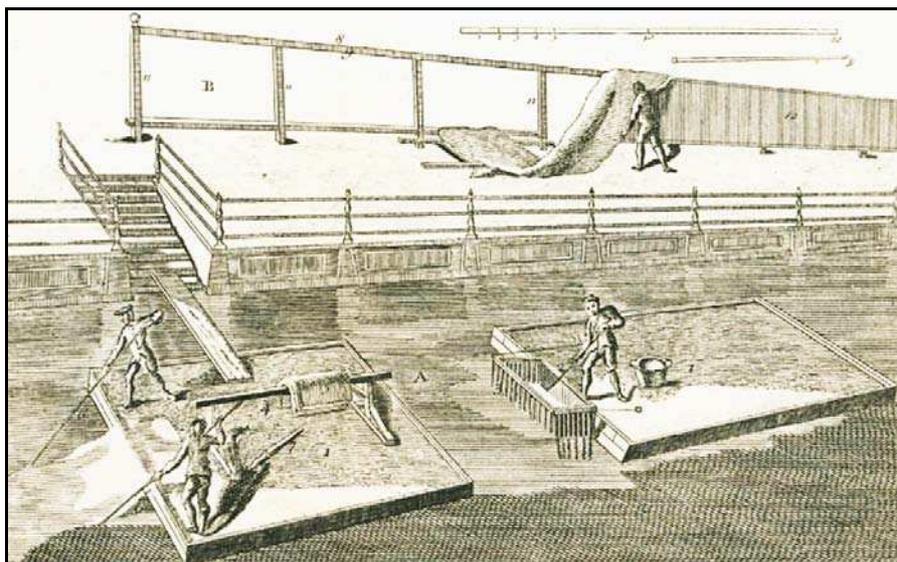


Plate 3: Engraving entitled ‘the washing of the wool and hanging up of woollen cloth’ (Pluche 1732)

- 3.2.4 The different processes of fulling meant that each mill needed to have a continuous water supply, running from the water source through a leat, both for washing and for driving a water-wheel. The mill needed to be close to a source of naturally-growing bracken, which was burnt in kilns to provide potash, which acted as a cleaning agent, and also adjacent to large areas of wind-swept hillside or poor grassland where the cloth could be dried on frames or tenterhooks (Plate 3). Davies-Shiel suggested that each mill might have been associated with ‘tenterfields’ or ‘tenterbanks’ upwind of the mill and one or more potash kilns in fields known as ‘brackenrigge’ [or ‘ashburner’] downwind of the mill (Davies-Shiel 1978, 21-23) thus place name evidence is of importance in identifying possible sites.
- 3.2.5 **Water supply:** the mill buildings themselves needed to be located where a fall of water could be exploited (or landscaped) from a stream or mill pond, along a head-race, with a launder constructed to take water from the head-race to an overshot, or possibly, a breast-shot water-wheel (Plate 4). The overshot and the breast-shot wheels relied upon the weight of the water for their propulsion. The overshot wheel utilised a greater fall of water than a breast shot wheel (where the water was introduced part way up the wheel) and as a consequence could get the same amount of propulsion from a smaller flow of water. The other type of wheel, the undershot wheel, relied entirely on the flow of water past the wheel and required a substantial stream or mill pond to provide comparable propulsion. Below the wheel would have been the tail-race to allow the flow to escape. Field evidence collated by Davies-Shiel suggests that a single ‘water wheel with a pair of stocks on each side of the water wheel would need the flow from a 10 foot wide stream saved into a millpond with a weir’ (1992). However, millponds were more a feature of post-medieval fulling mills, and the simpler medieval examples, as found during the present survey, were often without millponds (*Section 4*).
- 3.2.6 The miller could control the water flow by moving a lever to raise or lower a sluice gate or penstock fitted in the launder (Davies-Shiel 1992). The flow of

water and launder were constructed so as to work either with an overshot water-wheel, needing a 10 foot fall of water, or with a breast-shot wheel or with an undershot water wheel which relied on the kinetic energy from the flow of water (Davies-Shiel 1978, 29-32). The water-wheel was housed in a stone-lined wheel pit attached to the side of the mill building housing the fulling machines (Plate 5).



Plate 4: Launder and waterwheel on a small village mill at the Museum of Folk Architecture and Life, Uzhhorod, Ukraine

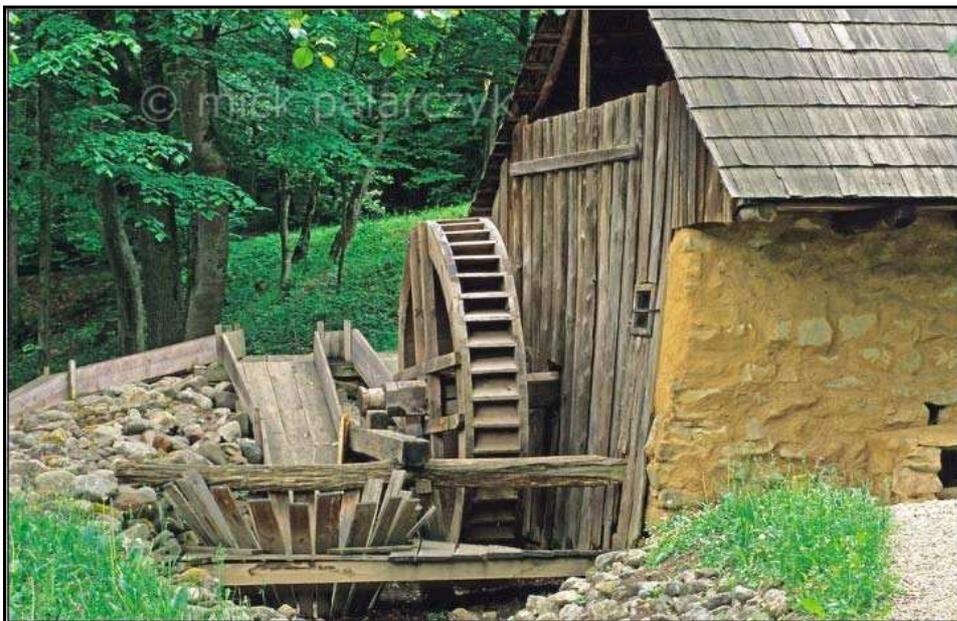


Plate 5: Fulling Mill with busnita (whirlpool washing device) at the ASTRA Museum of Traditional Folk Civilization, Sibiu, Romania (©Mick Palarczyk)

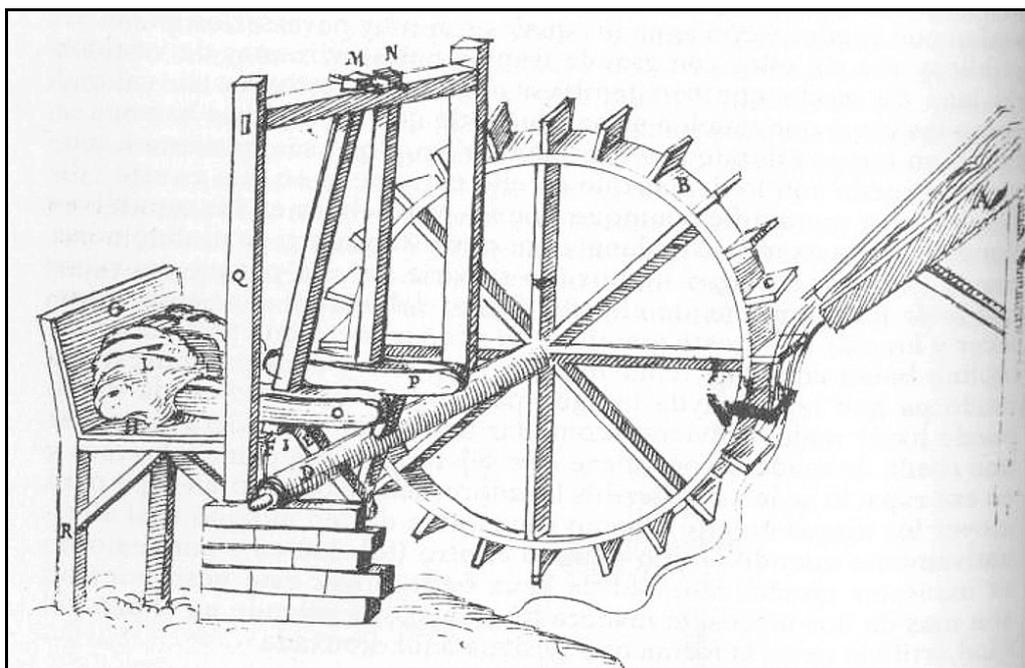


Plate 6: Diagram of a fulling mill by Juanelo Turriano c1595 within the manuscripts of the Biblioteca Nacional de Madrid (Turriano 1996)

- 3.2.7 **Surviving post-medieval mill buildings:** post-medieval fulling mills were often free-standing two storied structures and some were built into a bank to allow easier access to and from the second storey (Davies-Shiel 1978, 62). The majority of the mills being investigated by the present study, however, were of medieval date and were much more insubstantial and may not have been within a clearly defined superstructure at all. Such buildings were typically around 10 x 5m, needing only to house the water-wheel and its camshaft, the fulling stocks and the boxes where the cloth was immersed in liquid or pounded according to the process. Davies-Shiel also refers to small buildings of 10 feet square, perhaps housing just one pair of stocks on a water-wheel mounted on an exterior wall and thus needing a smaller water supply (Davies-Shiel 1992); these may refer to an earlier period of mill building. The Garston Mill, Merseyside, excavation report (Adams and Price 2007) quotes a late nineteenth century source describing the remains of the earlier (perhaps medieval) mill as being a small square structure built on the dam of the watercourse, of ‘old solid stonework’, ‘banked up in a narrow rocky gorge’; the archaeological evidence seems to indicate that the older mill was set into the terrace of the valley and powered by an overshot wheel (*ibid*). The archaeological report of the early thirteenth century medieval fulling mill at Barrowburn, Northumberland, indicates that the main mill building had an upper storey set into a terrace on the bank-side (Coquetdale Community Archaeology 2012, 19), but as yet there is no indication as to the size of the building. This mill was worked by a breast-shot wheel, within a c 0.52m wide wheel pit, and it was estimated that the wheel was c 3.4m in diameter on the basis of curved abrasions in the masonry.

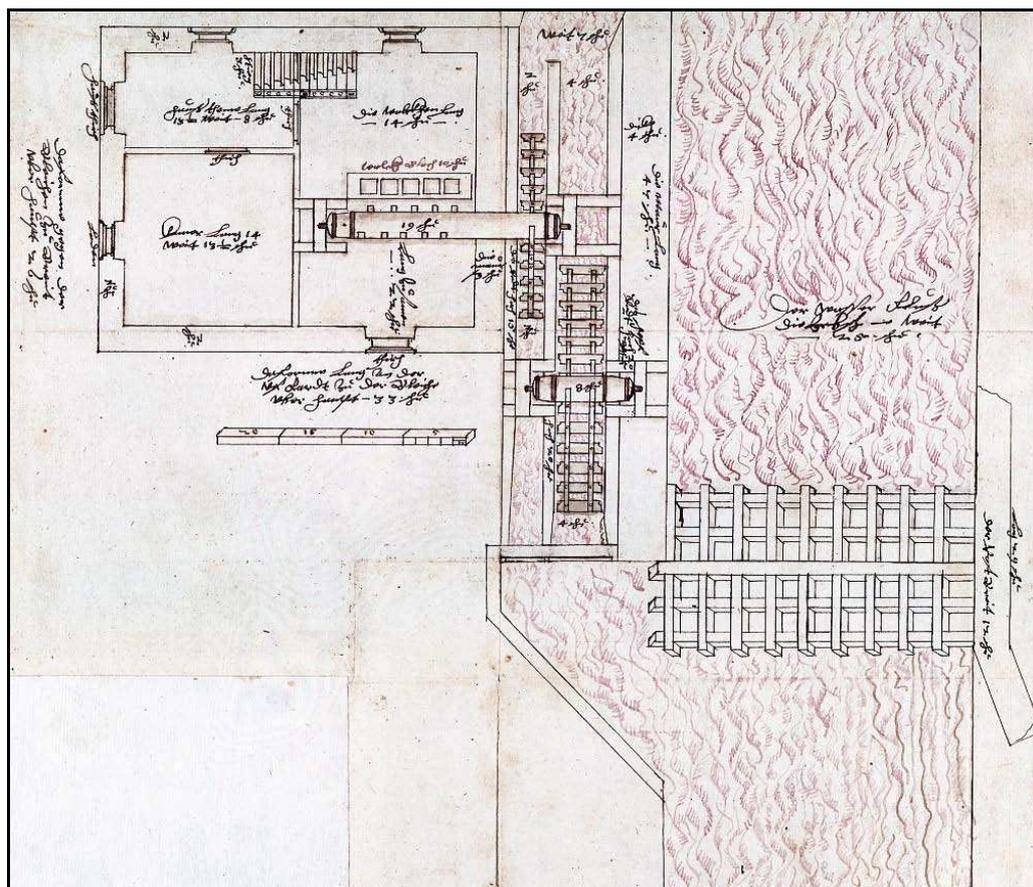


Plate 7: Plan of the fulling mill at Bad Urach by Heinrich Schickhardt, c1598, within the manuscripts of the Hauptstaatsarchiv Stuttgart

- 3.2.8 **Post-medieval fulling machine technology:** within the mill building would have been the fulling hammers or stocks activated by a cam shaft driven by the water wheel (Plates 6 and 7). Fulling was one of the earliest processes in the cloth trade to be mechanised because it was the simplest, needing only the camshaft or a wheel with tappets to lift the hammers (Pelham 1958, 4-5). Early fulling machines perhaps had cam shafts against which hammers or stocks were raised and fell vertically, and heavily, onto the cloth (Reynolds 2002, 82-85; Plates 8-10). Unfortunately, medieval fulling stocks have not survived well, although their mechanism may be extrapolated from diagrams and descriptions of the early post-medieval period. One such description is from Italy in the early seventeenth century (Zonca 1607; Plate 10); it is of a very old mill with an overshot waterwheel of just seven feet in diameter, driving a shaft with four tappets to lift the mallets. Zonca's diagram shows a mechanism of hammers swinging into a large box, which presumably held the cloth. Later in the seventeenth century, Böckler's schematic diagram of a fulling stock driven by a single cam shaft attached to single and small undershot waterwheel demonstrates the simplicity of an early machine (Plate 11; Böckler 1661; Scott 1931, 30-52). The stocks are on pivoted horizontal arms, pushed into action by the cam-shaft, pummeling and gathering the cloth into narrow folds at the far end of a wooden box. This diagram shows the whole machine as being workable by one man in a comparatively small space. It is depicted in an outdoor setting, but this is likely to reflect an artistic device of the period, rather than suggesting that the machines were worked in the open.

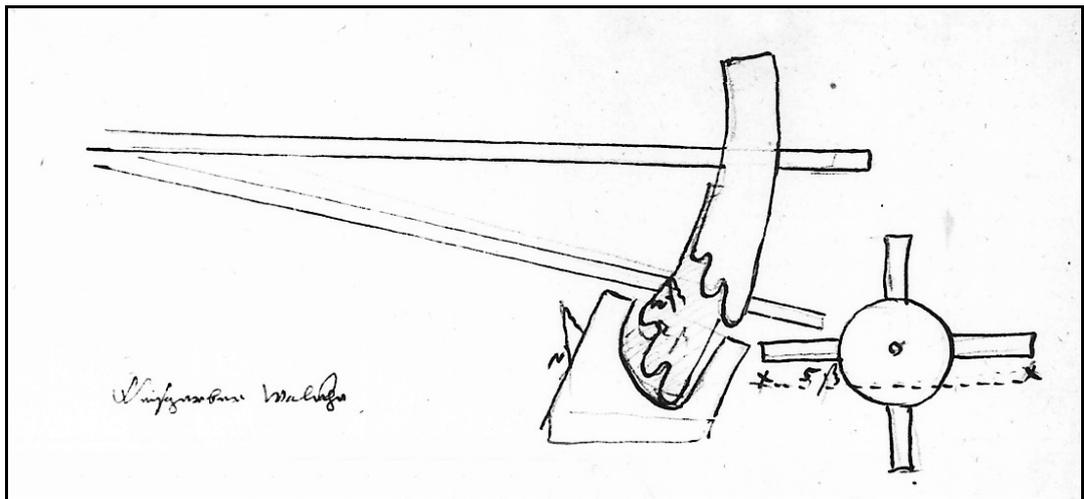


Plate 8: Diagram of fulling machinery by Heinrich Schickhardt, c1600, within the manuscripts of the Hauptstaatsarchiv Stuttgart

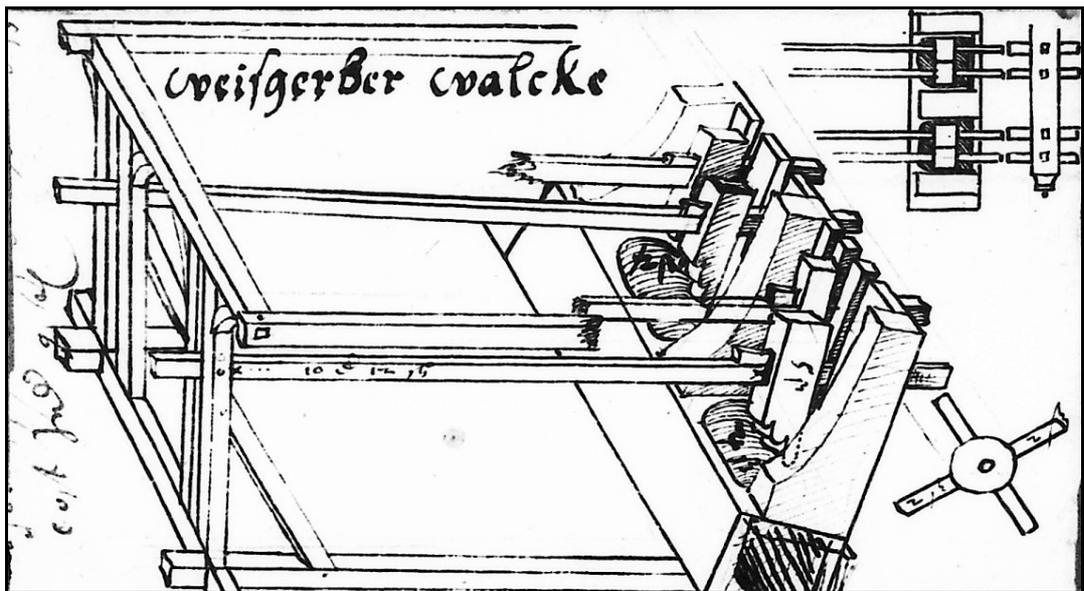


Plate 9: Diagram of fulling machinery in the fulling and polishing mill at Berg (Stuttgart) by Heinrich Schickhardt c1615 within the manuscripts of the Hauptstaatsarchiv Stuttgart

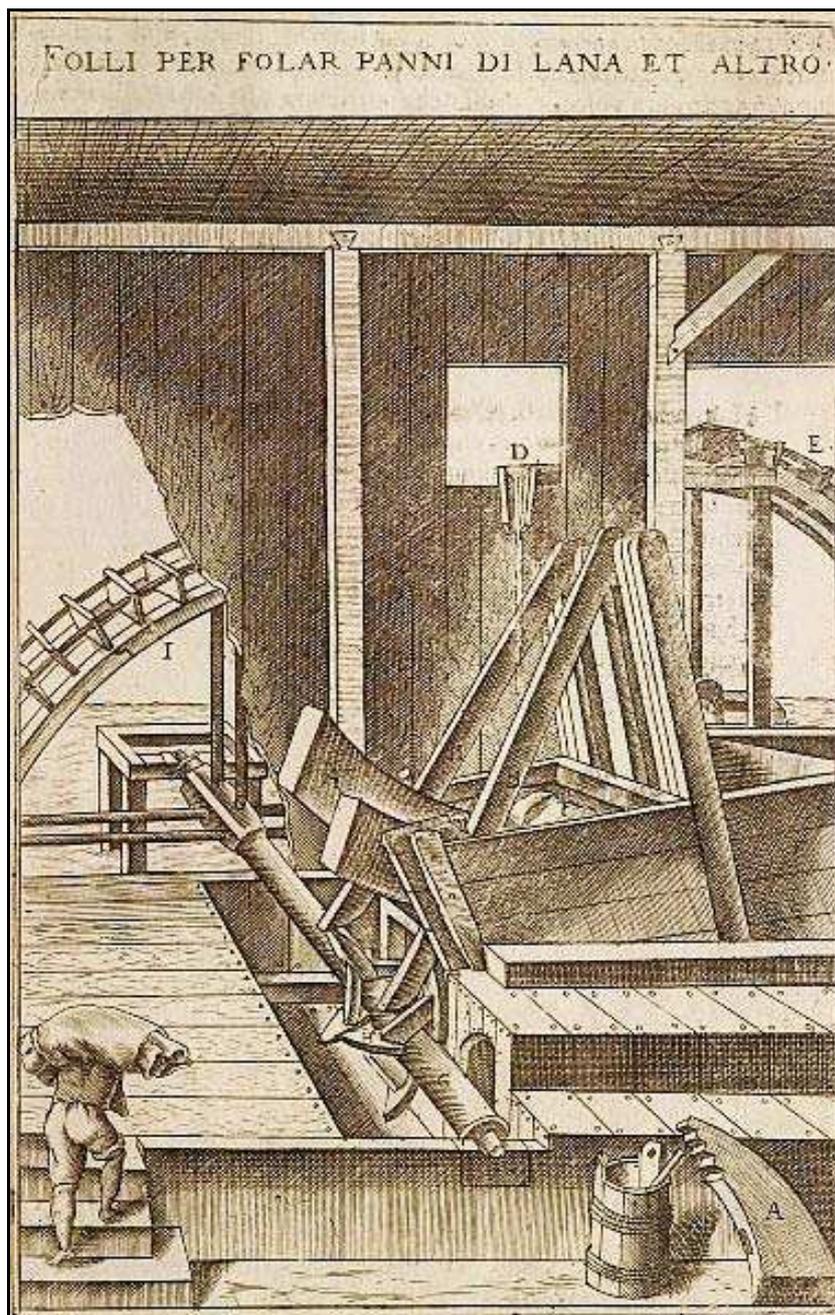


Plate 10: Seventeenth century engraving of fulling mill machinery from *Novo Teatro di Machine et Edificii* (Zonca 1607)

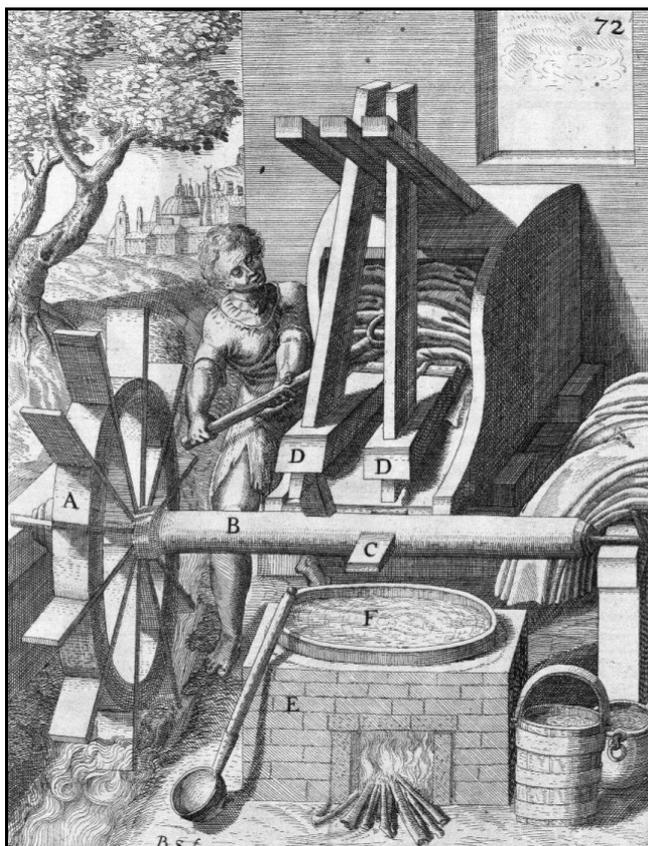


Plate 11: Seventeenth century engraving of fulling mill machinery from *Theatrum Machinarum Novum* (Böckler 1661)

- 3.2.9 The post-medieval fulling machine is typically described as being a shaft with a number of cams pushing back and raising up pairs of heavy wooden fulling stocks, which would then swing down, with gravity, in the arc of a pendulum onto the cloth (Plates 11-14). A detailed description can be found in a recent publication

‘the water-wheel used cams on its axle to convert rotary into reciprocal power: in order to operate two large, very heavy oaken trip-hammers. As the water-wheel revolved, these cams rotated a smaller drum with wooden cam-tappets protruding from each side; and as the wheel and its drum ascended, the cam-tappets raised the first trip hammer, as they came into contact with similar grooved-projections on the hammer. When the wheel began its descent, the cams passed by the trip-hammer’s projections, thereby releasing the hammer to fall with immense force into the fulling trough below; then the cams on the revolving drum made contact with the cams on the second trip hammer, to repeat this process, pounding the cloth up to forty times a minute’ (Munro 2002, 248).



Plate 12: Watercolour of open air fulling stocks near Fife (Sandby c1750)

- 3.2.10 The curved ends of the mallets swung into large boxes containing the cloth, both pounding it and gathering it forward so that the whole length of cloth would be worked. The trough was typically rounded at its end to encourage the bales of woollens to rotate during fulling and thereby producing an even finish. The cloth would be either broad cloth (usually 8 foot wide) or narrow cloth (usually 4.5 feet wide) and this would be shrunk to perhaps as much as half the width and length (Davies-Shiel 1992);



Plate 13: Model of fulling stocks (Anon nd, © Calderdale MBC)

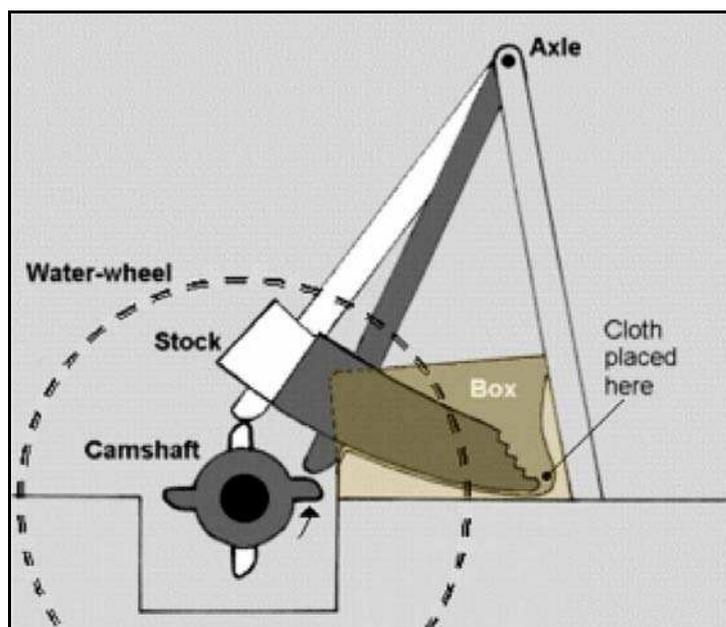


Plate 14: Simplified diagram of fulling mill machinery (© Isle of Wight Industrial Archaeology Society)

- 3.2.11 Other fulling mills known as ‘new draperies fulling mills’ were developed in the sixteenth century, when the cheaper and lighter worsted cloths became popular. These cloths were not fullled after being woven, thus they needed fulling earlier in the process as spun yarn, prior to it being woven. The yarn was more fragile and thus needed smaller water-wheels and machines within smaller buildings, and often did not need to be sited near running water or a collecting pond (Davies-Shiel 1992).
- 3.2.12 The remains of a post-medieval mill at Buck Mill in Somerset were excavated in 2010 by Wessex Archaeology (2011). This comprised a canalised stream leading from the water source, the mill buildings and a stone-lined and capped culvert aligned from the mill buildings towards the tail-race. The working areas of the mill building were accessed internally from the domestic rooms. An earlier wooden breast-shot wheel of 2.3m width had been replaced by a later narrower iron *c* 0.90m over-shot water-wheel. Both were housed in a stone-lined wheel pit, which formed the outer water of the mill building. In the later phase (eighteenth century), a flat area was landscaped into which was inserted a large water storage pool, and a curved buttress was erected to support a launder leading over the water wheel.
- 3.2.13 The fulling mill complex at Llystyn Mill, Nevern, on the River Clydach in North Pembrokeshire, was originally a timber-framed building, of unknown date, with a stone-lined wheel pit; a later nineteenth century fulling mill building was subsequently constructed in stone (Mytum forthcoming). The interior rooms are of interest: in the same room as the fulling stocks were the bases of structures used for heating, and there were chimneys built into the walls of the mill. An adjacent room had water piped in from the leat and the bases for structures to hold large vats for the washing and also for the dyeing of the cloth. Böckler’s illustration of a fulling mill (Plate 11) shows a small kiln for boiling water or other liquid in the foreground (and thus must be of significance) adjacent to the water-wheel and cam shaft. Hot water was necessary for both bleaching (Davies-

Shiel 1975) and for dyeing the cloth, processes which were sometimes undertaken in conjunction with the fulling (*Section 3.2.14*); hot water may potentially also have helped in the fulling process but this is not explicit from the documentary sources.

- 3.2.14 **Dyeing:** the dyeing of the cloth could be undertaken at any stage of the process (Walton 1991, 332), but most typically was undertaken after the fulling and either within the same facilities as the fulling mill or was treated as a separate process (McCutcheon 1980, 248). Potash may have helped to fix the yellow and blue dyes (Davies-Shiel 1975, 18) and perhaps dyeing was interspersed amongst the different fulling washes. Recent work by Adam Lucas, lists fourteenth century fulling mills in Wales and Shropshire that were adjacent to a dyehouse (Lucas 2006, 142)

3.3 DOCUMENTARY STUDY OF THE FIVE MILL SITES

- 3.3.1 Four of the potential mills sites recorded by the present survey are located in the area of Grasmere, Loughrigg and Great Langdale (Fig 1).

- 3.3.2 **Sourmilk Gill Mill, Easedale (NTSMR 23039, HER 35921):** the thirteenth and fourteenth century route from Langdale to Grasmere, travelled by those wishing to have their cloth fullled, lay along Blindtarn Gill (Armitt 1908, 152) and would have passed close to Sourmilk Gill, thus the eventual construction of a fulling mill at Sourmilk Gill may have been commercially viable. It has not been possible to ascertain who owned these lands in the earlier periods; however, the lands along Sourmilk Gill, Far Easedale, Blindtarn Gill and further south at Wray were held by the Benson family from the late sixteenth centuries and the early seventeenth century (Armitt 1908, 152). Armitt mentions how the sluice at Sourmilk was still evident when she was writing and that ‘tradition declares to have been used for a walk-mill’.

- 3.3.3 The tithe map of 1844 for Grasmere cites the names of Geo Partridge and John Hawkrigg. It does, though, not show a mill structure or any feature in the environs apart from a later sheep fold. The field system matches that shown on the later ordnance survey mapping (*Section 3.3.4*).

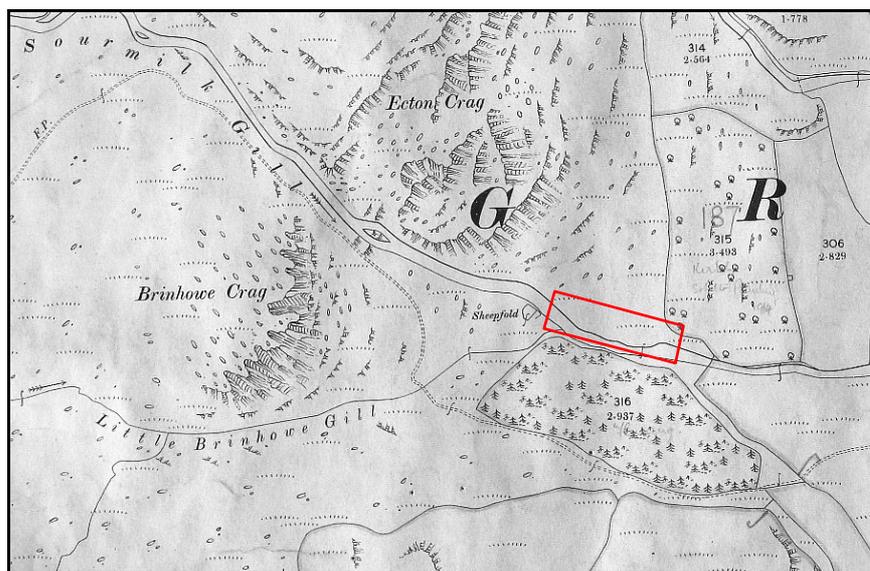


Plate 15: First Edition OS map (1861) showing Sourmilk Gill, Easedale

- 3.3.4 Both the Ordnance Survey First and Second Edition 25 inch mapping of 1861 and 1898 (Plate 15) show a sheep fold located on the south side of Sourmilk Gill, the surveyed mill is located on the opposite side of the river to this structure. The mill is located on common or wasteland outside the western edge of an irregular and probably early field system centred on Brimmerhead Farm. The probable ring garth was bounded to the south by Easedale Beck and to the north by a track extending through High Easedale Farm and Kelleray and thus to Brimmer Head. A small coppiced intake on the south side of Sourmilk Gill may have supplied wood and bracken for potash, and to the north of this was a narrow outgang bounded by enclosed land that leads to a probable ford crossing the beck, which possibly acted as a funnel leading sheep to the crossing.
- 3.3.5 Davies-Shiel's annotated maps of 1990 have marked the location of this surveyed mill with '1593 1675 site of a cloth mill'. He also identified to the east, at Brimmer Head (NY 3242 0857), the remains of a potash kiln and, at Lancrigg (NY 3287 0845), 'a 10 foot deep pond' which may be the remains of a potash kiln (Davies-Shiel 1990), although the locations of these features may be less than precise making them difficult to verify. Further downstream on Easedale Beck he marks the map again with 'John Benson Fuller 1574'.
- 3.3.6 **Loughrigg Terrace Mill, Grasmere (NTSMR 181816, HER 3079):** Armitt refers to a fulling mill at the foot of Loughrigg cited in a rental of 1493 as a Bainrigg mill (Armitt 1916, 206). This part of the Bainrigg estate (then owned by a John Hunter), had been sold on to a new owner, John Benson in 1480 (Armitt 1908, 142), although it is recorded that John Benson later sold on part of the estate in 1487, and perhaps kept back the fulling mill(s) as one of their own businesses.
- 3.3.7 Armitt locates the Bainrigg fulling mill as being on the shores of the Rothay between Grasmere and Rydal on the Bainrigg estate. The Bainrigg estate was traditionally located on the north side of the River Rothay. However, the mill cited by Armitt, now recorded as the Bainrigg fulling mill at NY 346 061, is on the south shore of the River Rothay. Armitt goes on to say that the Bainrigg mill was 'the only one on the left bank of the Rothay, though there were two then, or a little later, on the right bank'. If the left bank is the north side of the river, then there may be the remains of this one mill on the north side of the River Rothay. There are certainly two mills on the south side of the river recorded by Mike Davies-Shiel known as HER 30709. The mill lying to the west, close to the existing weir as it leaves Grasmere (HER 30709), is the surveyed mill. These fulling mills were both on unenclosed land, and were perhaps built during the period of expansion of the fulling mill industries late in the fifteenth century.
- 3.3.8 Armitt (1912, 30) adds more information. 'In former times a fulling mill stood on the left bank of the Rothay near to the ford and within the freehold property of Bainrigg. The mill was owned in the fifteenth century by the Benson family..... The woodman recently found a track leading from the site of the mill to a rocky height, which emerged on the present Wishing Gate Road'. The Wishing Gate Road, was engineered as a turnpike road only in about 1770-1780, and follows the line of the present A591 past Grasmere lake, before heading off to the right onto the low fellside towards Town End, past How Top and over White Moss Common before descending back into Grasmere via Dove Cottage (James Archer pers comm).

- 3.3.9 The survey area is depicted as blank open moorland on the OS First Edition 25 inch mapping of 1861 (Plate 16). The survey area is bounded to the south by an old track known as Loughrigg Terrace with no other buildings or structural features detailed adjacent to the shore and neither is the second mill to the east marked. The surveyed fulling mill is on unenclosed land with woodland easily accessible, as were the other fulling mills to the south of the Rothay. Above Loughrigg Terrace (to the south of the surveyed mill) are the remains of a potash kiln at NY 3407 0560 (Davies-Shiel 1990), and again its location may be less than precise making it difficult to verify.

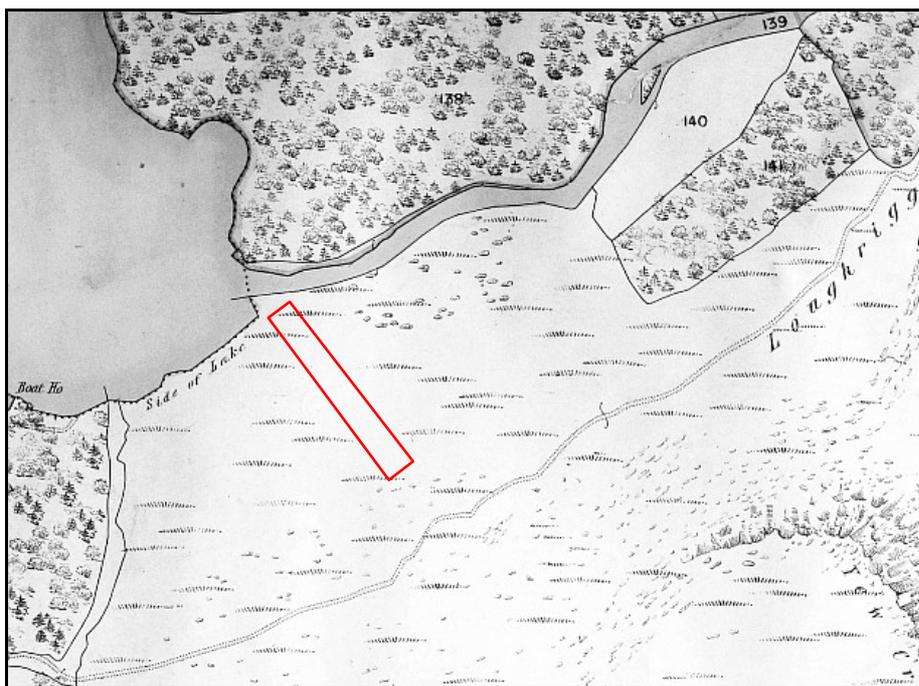


Plate 16: First Edition OS map (1861) showing Loughrigg Terrace, Grasmere

- 3.3.10 **Low Wood Mill, Elterwater (NTSMR 181817, no HER number):** a rental document of the late fourteenth century refers to a fulling mill which Armit্ত argues is likely to be the one to the east of Loughrigg Fell at Miller Bridge. Miller Bridge was one of the Benson family holdings eventually purchased in 1575 by three Bensons, Michael, Bernard and Edward, in a major transaction with William Fleming of Coniston and Rydal; Miller Bridge may have been a ‘customary holding’, perhaps for several generations (Armitt 1908, 145-7). It may be that in the same transaction Edward Benson, also a clothier, became owner of High Close and subsequent bonds of the early to late seventeenth century confirm the Benson ownership of High Close (Kendal 1605, WDAG/Box 59/3). This property is adjacent to the location of the third fulling mill surveyed at Low Wood. Armitt mentions that there is no documentary evidence for a mill here although: ‘Possibly one may have stood on the Mere Syke, near its source; for from a field there called Long Brow, a building is known to have disappeared’, (Armitt 1916, 206). The Bensons also held properties at the Fould close to Loughrigg Tarn.
- 3.3.11 During the sixteenth and seventeenth centuries many Benson farmholds and (probably) mills were known at the southern part of Loughrigg. There is much place-name evidence for mills (Mill Brow), stocks (Stock Field) and tenters fields

(by Mill Brow) and Tenters Pool (by Little Loughrigg) (Armitt 1916, 206). The OS First Edition 25 inch mapping of 1861 (Plate 17) shows irregular and seemingly unorganised woodland intakes with some access trackways, and are probably associated with the establishment of pleasure grounds associated with High Close. This later landscaping may potentially have impacted on the former fulling mill and resulted in the changing of the water system to accommodate recreational rather than functional needs.

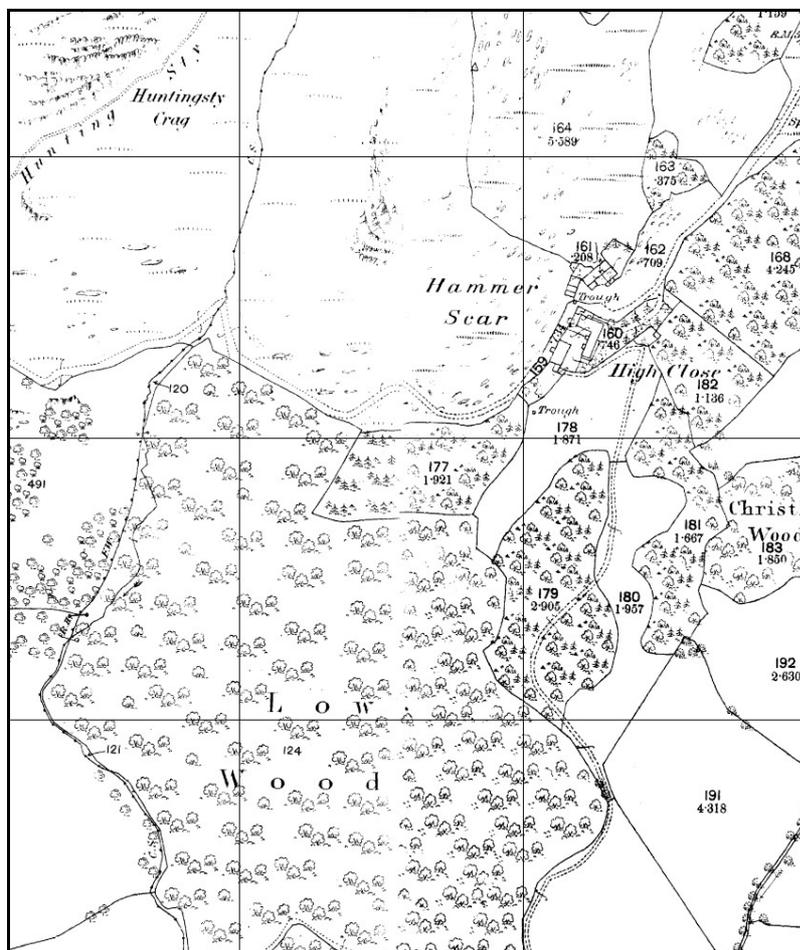


Plate 17: First Edition OS map (1860) showing Low Wood and High Close

- 3.3.12 The Second Edition 25 inch mapping of 1890 (Plate 18) depicted a formal carriage drive heading down through Low Wood from the landscaped gardens surrounding High Close. It also shows the stream running diagonally downslope through the centre of the wood, the site of the pond and, below it, the putative linear tail race as the eastern boundary of a small plantation or orchard compartment. The differences between the two editions of OS mapping may suggest that the archaeological features in the survey area are of late-nineteenth century date. Alternatively and more probably, as is often the case elsewhere, the Second Edition mapping may have recorded more detail of existing features within the woodland the extents of which were only cursorily inspected during the survey for the earlier edition of mapping. A reservoir was depicted to the north of site within woodland at Hammer Scar from this mapping onwards, it is possible that this feature is associated with water management for the house and a probable culverted stream running into Low Wood. It is a moot point whether the stream running through Low Wood is very late in date, and consequently not

associated with a fulling mill or whether the reservoir is a later addition to an already channelled watercourse running down past the house that had been remodelled.

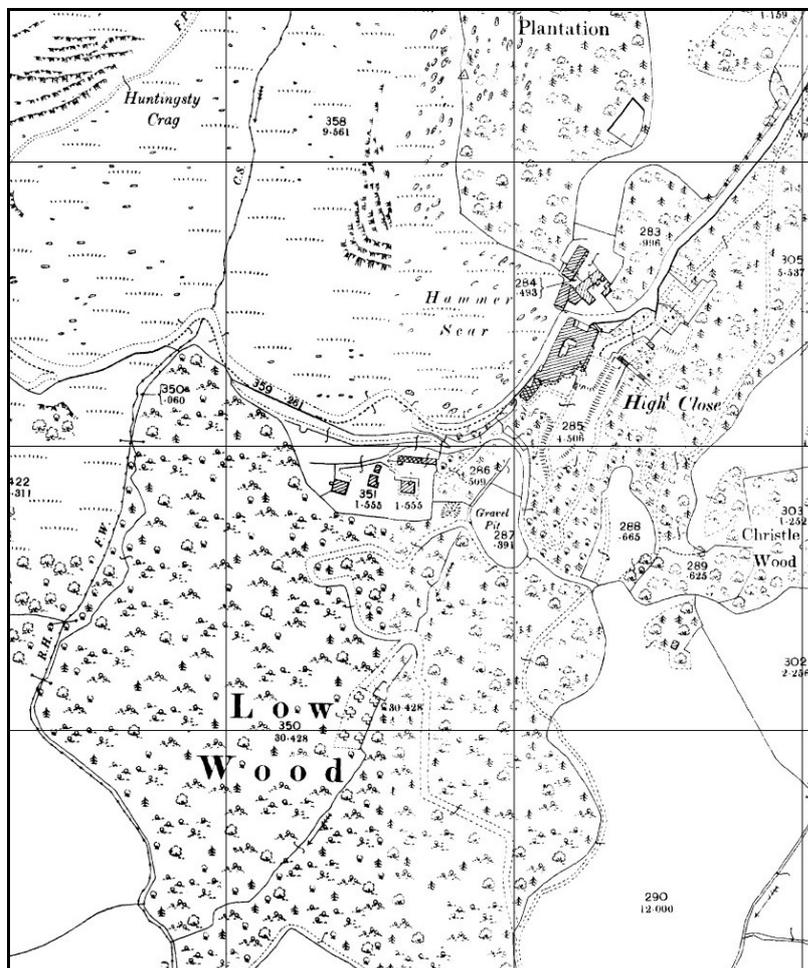


Plate 18: Second Edition OS map (1890) showing Low Wood and High Close, Elterwater

- 3.3.13 ***Stickle Ghyll Mill, Great Langdale (NTSMR 181818, HER 30571)***: the existence of a route from Langdale to Grasmere via Pye How and Blea Rigg implies that cloth was being woven in Langdale. While this route was being used, the construction of the fulling mill at Stickle Ghyll in Great Langdale (Armitt 1908, 152) would have been very advantageous. There were two fulling mills in Langdale in 1454 (online Records relating to the Barony of Kendale: Langdale and Baisbrowne), a third one had been built by 1493 (Armitt 1908, 141) and a fourth fulling mill had been constructed by the 1570s (*op cit*, 148). During the sixteenth century, the Benson family acquired many holdings in Langdale; in 1506-7 the Benson family rented land from a Thomas Grygge in the Langdale township (Armitt 1908, 143). By 1562, John Benson of Langdale or Mickle Langdale held a freehold property there and resided there (Armitt 1908, 161). A William Benson, Michael Benson and Robert Benson ‘of Langden’ are listed in parish registers of 1570s and 1580s and Armitt suggests that ‘one of them possibly had the mill on the stream that flows from Stickle Tarn, which gained for it and the adjacent home-stead the name of Millbeck’, (Armitt 1908, 148). In

1658, Edward Benson of High Close bought property at Millbeck. Acquisitions continued and by the beginning of the eighteenth century there may have been as many as three Benson holdings at Millbeck, including that of Low Millbeck Farm (National Trust files).

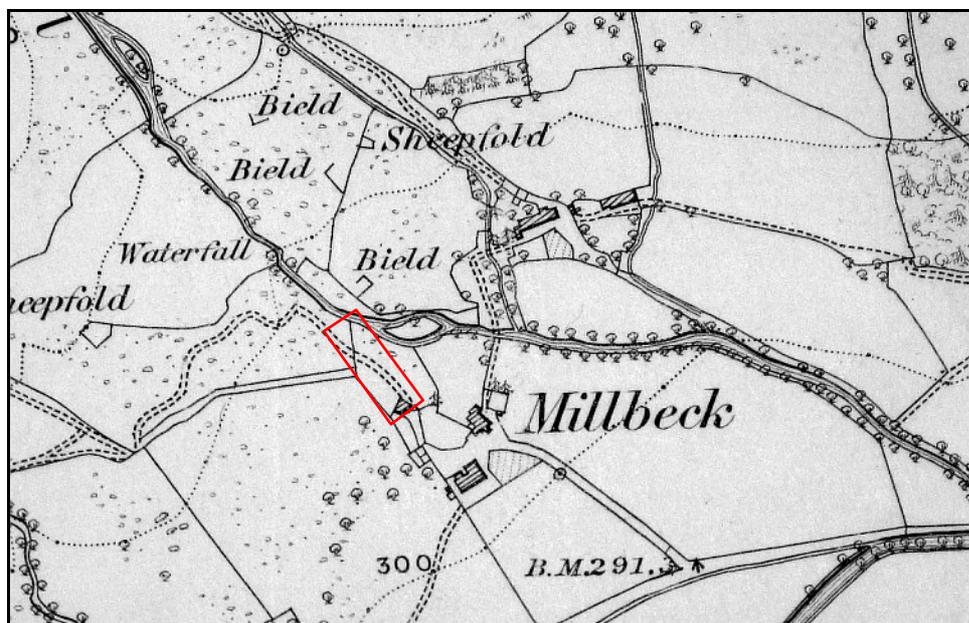


Plate 19: First Edition OS map (1861) showing Millbeck, Great Langdale

- 3.3.14 The tithe map of Langdale, dated 1844, shows that an Edward Benson was still the holder of property to the east of Dungeon Ghyll Beck, adjacent to, but not depicting the surveyed mill. The surveyed fulling mill was located on the edge of a complex of farm buildings on a farmstead within an enclosed field and not on outlying unenclosed land. The OS First Edition 25 inch map of 1861 (Plate 19) depicted five buildings at Millbeck. The present day Stickle Barn building is shown as the southernmost building of the complex. The surveyed mill is the most north-westerly of these buildings and it was still roofed at that date. The arrangement of buildings may be continuous from the described plan in a sale document of 1653 which described ‘all and singular five buildings, orchards, gardens, arable land, meadows of grounds, grazings, floodings, woods and underwoods ... turbario’ (WDRY/1/3/13/9). There was no further mention of a mill here, and probably had an alternative function as one of the five buildings.
- 3.3.15 By 1890, the OS Second Edition 25 inch map (Plate 20) showed that the New Dungeon Ghyll hotel had been constructed, and Stickle Cottage had been expanded with the addition of a building immediately to the west, and a long north/south orientated building, probably an out-building, was also constructed forming a semi-courtyard complex. To the south of this complex, the building now known as Stickle Barn, was largely unchanged from the OS first edition map. By this date the name of the complex was no longer Millbeck, which was instead reserved for the farm buildings to the north, and the only name applied to the complex of buildings was Dungeon Ghyll New Hotel.
- 3.3.16 The putative mill building in the north-west part of the complex (and now to the immediate west of the north/south outbuilding) was by this date unroofed, partially demolished, with the south-east wall elevation not shown. The present

day outgang track that passes the mill is presently enclosed in this location, but was probably unenclosed in the medieval period.

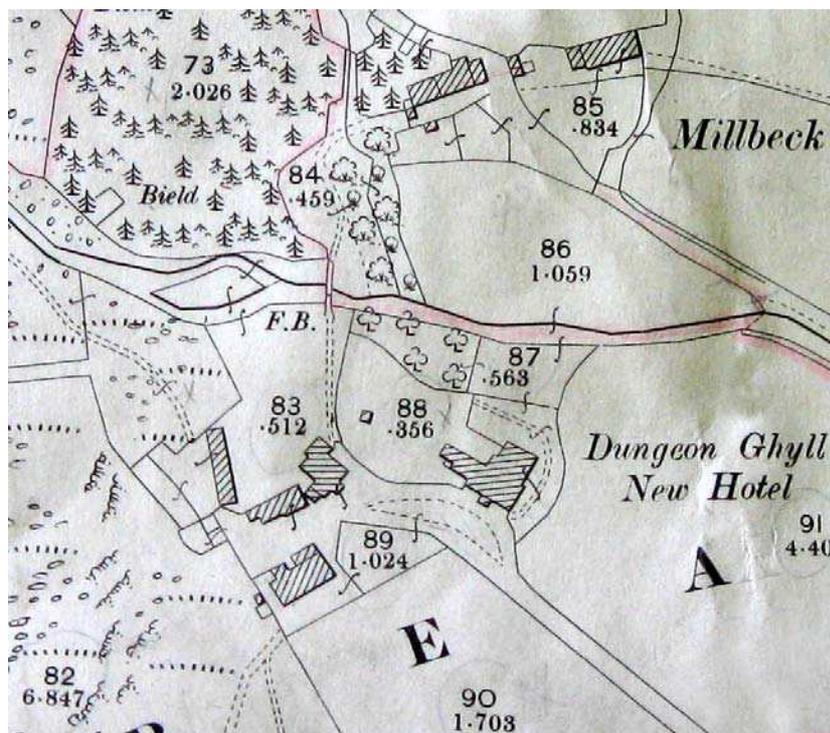


Plate 20: Second Edition OS map (1890) showing Dungeon Ghyll New Hotel, Great Langdale

- 3.3.17 ***Little Ore Gate Mill, Graythwaite (no HER number)***: the fifth possible fulling mill site lies within the Furness Fells and is located at the junction of Little Ore Gate and Great Ore Gate in woodlands in the Graythwaite Estate, in the parish of Hawkshead.
- 3.3.18 In the early medieval period, these fells were held by the monks of Furness Abbey, and there was possibly a chapel at Graythwaite, although it is not referred to at the time of the Dissolution. It was certainly in existence whilst the Rawlinsons lived there, but was in disuse by 1722 (Farrer and Brownbill 1914; online entry for Satterthwaite).
- 3.3.19 The Furness Fells were primarily utilised in the medieval period for their woodland and iron ore. Substantial areas were cleared of trees to make charcoal, and associated with the woodlands were charcoal burning pits and platforms, as well as bloomeries for smelting the iron. These cleared areas became known as Parks: for instance Waterside Park, Lawson Park, Parkamoor (Brydson 1908, 51-9) also Brotherylketh, Abbott Park and Oxen Park (Farrer and Bownbill 1914, online entry for Colton). These Parks were then used for the grazing of cattle and sheep whilst the wood was re-growing. Brydson quotes Collingwood, who in his *Book of Coniston* of 1906 says, 'On the east side of the lake [Coniston] there is a remarkable coincidence between the sites of the Furness Abbey Parks, or early clearings for sheep farms, and the bloomeries there. After the Dissolution of the monastic estates, the King's Commisioners' assessments listed both Parks and Granges, fisheries and 'herdwicks and shepecoats' (Cowper 1899, 94). It did not, however, list the known corn-mills (of which there were four), smithies and woodland industries, most notably wood turning, coopering and charcoalers

(Brydson 1908-9, 59-67), although perhaps these were not on offer to the Crown. Brydson also relates that the Parks that had bloomeries were let by the Commissioners in 1537 to William Sandes and John Sawrey, who ‘continued the iron business formerly carried on by monks’, (1908-9, 61). After the Dissolution, during the sixteenth and seventeenth centuries, parts of the Graythwaite estate were held by the Sandys family and then the Rawlinson family, who had also held parts of Grizedale.

- 3.3.20 It is interesting to note that neither the accessed secondary or documentary sources report on cloth production, weaving or fulling in these areas, although these were significant industries during the seventeenth and eighteenth centuries when Hawkshead was a renowned market centre for weaving (Baines 1824, 652). One document in Satterthwaite Church of 1668 relates that ‘the inhabitants of the district’ kept a number of sheep on the common land, combing and spinning the wool in their own homes and then taking it, as spun wool, to the market at Hawkshead (Tweddell 1870, 108). There is only one mention of a fulling mill in the sixteenth century, that of Sawrey Extra in 1537 in Cowper (1899, 269), where there is mention of a later fulling mill at Hawkshead which was operated until 1737.
- 3.3.21 The surveyed site at Little Ore Gate is less than a kilometre from Cunsey Mill. At Cunsey Mill there was originally an early seventeenth century bloomforge and later there seems to have been a corn mill, as may be evident from a letter stating the intention of converting the corn mill (belonging with close called Seed) into iron works and a mill forge (Z/24/1).

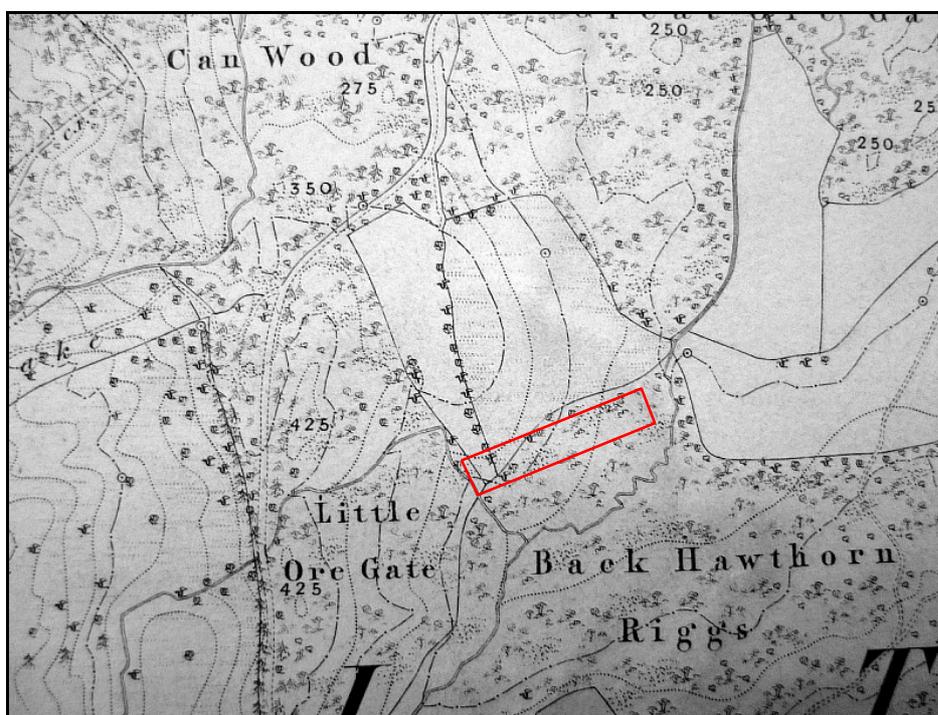


Plate 21: First Edition OS map (1851) showing Little Ore Gate, Graythwaite

- 3.3.22 Away from Cunsey Mill there seems to be little documentary evidence for mills, except for a reference, in 1643, for permission from William Rawlinson for a fulling mill and bloomsmithy to be erected by a William Tomlinson of Grizedale. There is no detail as to its location, and it was likely to have been on either

Grizedale Tarn or Beck (BDHJ/90/12/4). There is a further reference in 1736 to a fulling mill and lands at Force Forge (south of Satterthwaite), previously owned by William Rawlinson (BDHJ/89/1/7). Earlier fulling mills may have existed but were perhaps, as they were originally on monastic lands, not recorded or taxed in a different way to those, for instance, in the Kendal Barony. Alfred Fell referred to two fulling mills or walk mills which were given permission for conversion into a forge *c* 1624 by William Wright, an ironmaster of Easthead, late of Cunsey. These mills may have been on the site of the Cunsey Mill complex (Fell 1968, 196-7) or may have been elsewhere, but they do at least demonstrate the presence of fulling mills in this particular area and may be an indication that there were others.

- 3.3.23 The surveyed putative fulling mill was located to the west of Cunsey Mill within woodland adjacent to a large sub-square field intake. The OS First Edition 6 inch map of 1851 (Plate 21) depicted the survey area as being a compartment of woodland on the edge of both Low Ore Gate and Back Hawthorn Riggs, defined to the west, south and east by a sinuous but broadly curvilinear stream. No features associated with the mill and its water management were depicted. The Ordnance Survey First Edition 25 inch mapping of 1890 is identical apart from the addition of a pair of woodland access trackways located both south and west of the survey area. Within the wider region the woodlands contain irregular enclosures consistent with coppicing (OA North forthcoming) and the place names in this area are related to woodland and associated industries (or to eel catching along Cunsey Beck), and a chopwood kiln, 13 feet x 8 feet in size, has been identified at Great Ore Gate at SD 3727 9365 by Davies-Shiel (1990).

4. SURVEY RESULTS

4.1 INTRODUCTION

4.1.1 The recent Level 3 archaeological survey has identified and recorded a total of 59 built components or other archaeological features associated with the five potential fulling mill sites (Fig 1). There are sixteen features at Sourmilk Gill (Section 4.2; Figs 2-7); twelve at Loughrigg Terrace (Section 4.3; Figs 8-12); sixteen at Low Wood (Section 4.4; Figs 13-16); six at Stickle Ghyll (Section 4.5; Figs 17-28); and nine at Little Ore Gate (Section 4.6; Figs 29-34). The identified features within each individual fulling mill survey area are described by location, the evidence for the mill structure, the water-management system and other ancillary features. This description is followed by a discussion of surviving mill evidence, the potential reconstruction of the layout and operation of each mill.

4.2 SOURMILK GILL MILL, EASEDALE (FIGS 2-7)

4.2.1 **Location and Topography:** the fulling mill is located adjacent, and to the north, of the fast flowing Sourmilk Gill, which feeds into Easedale Beck; the site is within the Easedale valley to the west of Grasmere (NY 3193 0868). The mill site is just below a waterfall on an area of gentle sloping land just beyond the present day enclosed lands; there is no evidence that the land was ever within the enclosed intake and may have been deliberately sited on common land. The gill extends out from Easedale Tarn, which lies in a high altitude cwm formed by glacial action and, as such, the tarn ensures a constant and guaranteed water supply for the fulling mill. Around the mill are areas of gentle to moderate sloping land that face south-east and could have served as tenter lands, although none were positively identified during the recent survey. The site lies at c 120m (aOD), below the steep craggy hills of Grasmere Common.

4.2.2 **Introduction:** the Sourmilk Gill fulling mill is the best preserved of the five mills examined, and it has revealed the remains of the mill structure, the wheel pit and a complex water-supply system. The fulling mill sits within a wider context of ancillary agricultural features that are seemingly of a broad date range, some of which are just outside the study area to the east, and it is possible that the mill was operated alongside wider agricultural activities. The complex of remains is described below in terms of the evidence and character of the mill structure, the form and operation of the water feed and run-off system, and the ancillary agricultural features that are spatially associated with it.

4.2.3 **Mill Structure** (Fig 4): the mill comprises a single-celled sub-rectangular structure which is on an area of level ground immediately adjacent to a rocky outcrop that supported a launder. The mill structure comprises a large revetted stone-constructed platform (SMG11.1) upon which there are the stone dwarf wall remains (SMG11.2) of a rectangular structure (Plate 22). The platform has a series of large kerb stones at the edge to retain the platform, particularly at the northern corners, but little other stone structure. There is a flight of two steps built into the southern end of the eastern wall elevation providing an indication of the point of access for the platform. The southern wall of the platform coincides

with the southern wall of the overlying stone structure and also forms the northern side-wall of the wheel pit. It is an extremely thick wall and is relatively well built, reflecting the support it would have provided for the water-wheel axle.



Plate 22: Foundations of the fulling mill, wheel pit and tail race (Sites **SMG11** - **SMG13**)

- 4.2.4 The lower platform (**SMG11.1**) measured approximately 7m square and the surviving foundations of the overlying structure (**SMG11.2**) measured 6.2m by 5.5m. The internal space, that accommodated the stocks and drive shaft, was only 4.3m by 4.9m in size, and the long axis of the building was parallel to the line of the drive shaft extending from the wheel. The upper walled structure (**SMG11.2**) is partially collapsed but the fabric was observed in the north wall elevation and from examination of aerial photography was seemingly of drystone construction up to 0.9m wide, with large facing stones on either side.
- 4.2.5 It is evident that the platform (**SMG11.1**) and the stone structure (**SMG11.2**) were two very distinct elements, particularly as the platform is significantly larger than the stone dwarf-walled structure; it would appear to reflect two phases of construction with the platform being the mill or an earlier phase of mill. In the earliest phase, the mill was evidently a timber-framed structure set on top of the platform, as there is little evidence of stone material beyond the revetment kerbing. While there is the possibility that the second phase structure represents dwarf walls for a later phase of mill, there is perhaps a more likely alternative that it reflects a later re-use of the platform. It is interesting to note that the large launder platform (*Section 4.2.11*) has sustained substantial collapse on its northern side, and it is evident that there should be considerable collapsed material at the base of the crag. There is no evidence of this material. The assumption must be that the material has been reused in another structure; there is similar field stone in both the Phase 2 structure and also the Site **SMG03** stock enclosure. If the former, this would imply that the Phase 2 stone structure post-

dated the disuse of the fulling mill; it might, for example, have been a stock shelter wall or bield that reused stone from the platform, but there is no evidence for this.

- 4.2.6 **Wheel Pit (SMG12; Fig 4 and Plate 23):** at the south side of the mill structure is a sub-rectangular, stone-constructed wheel pit, which shares its northern side wall with the south wall of the mill building. Internally, the wheel pit measures approximately 4m x 0.75m and is 1.2m deep; however, the depth does not provide an indicator of wheel size, as its not known at what height the axle was mounted or to what extent the wheel pit has been infilled. The length of the pit provides some indication as to the size of the wheel and, assuming the line of the axle/drive shaft was down the centre of the mill building, there would have been sufficient space within the wheel pit to provide for a wheel of up to 2m radius (4m diameter).



Plate 23: The wheel pit with the launder platform upstream behind it (Sites **SMG12** and **SMG8**)

- 4.2.7 The wheel pit is aligned with a launder base to the west (Site **SMG08**) and the outflow from the wheel pit was into a tail race to the east (Site **SMG13**). The wheel pit is of double-thickness drystone construction and externally, including an additional shallow foundation course on the south of the pit, had an overall measurement of 6.5m x 3.2m. The southern wall of the wheel pit was very wide (up to 2m thick), sufficient to support the wheel axle.
- 4.2.8 **Water Supply - Overview:** the fulling mill was located so as to draw a water supply from a very fast flowing stream which has the potential to flood (Fig 2).

The biggest issue on the site may have been coping with, and preventing damage to the fulling mill in times of flood, rather than a shortage of water. There is a head race that extends from a side stream of the main flow which should have afforded a steady, but reduced flow of water down the head race. However, in the upland areas of the Lake District the flow through primary streams can build up very quickly in times of heavy rain and become a major torrent, and there is a need to allow for this increased flow. The head race diverts into three channels, seemingly controlled by a sluice, and comprises the launder and two divert channels. The two divert channels may have been intended to cope with high flows in the supply stream. A wooden launder would have extended over a dry-stone platform to provide a raised drop for an over-shot wheel.

- 4.2.9 The tail race from the wheel pit merged with the southern divert channel; this extended into Sourmilk Gill. The northern divert channel extended around the mill building and fed into three putative wash pools, before draining into Sourmilk Gill.



Plate 24: View downstream along the head race (Site **SMG06**)

- 4.2.10 *Head race* (Sites **SMG06, 10 and 14**; Figs 3 and 4): the head race extends away from a heavily degraded stone structure (Site **SMG10**), formed of large stones (1.37m wide) that edges Sourmilk Gill and shows up clearly on aerial photographs. The structure is very evident on the southern side of the head race, where it is only 2.3m long, but is hardly evident on the northern side. Given its location at the intake point from Sourmilk Gill it is possible to tentatively conjecture that this formed the southern side of a possible sluice or water capture point off the gill, and could also have served to restrict flow into the head-race in times of flood. The head race extends south-east from this structure and is approximately 21m x 0.8m wide and 0.3m deep (Plate 24). The head race (Site **SMG06**) is orientated roughly north-west/south-east and has been cut into a natural platform (**SMG14**) that fringes the north bank of Sourmilk Gill. The head race would have contained large flows of water during times of flood; however, towards the eastern end of the head race, the northern side of the natural mound flattened out. At the eastern end it is aligned with a stone-founded launder base

(Site **SMG08.1**) and excess water was controlled by a pair of divert channels (Sites **SMG07** and **SMG09**) that skirt either side of the launder and the mill. The two divert channels, and the low stone platform (Site **SMG08.2**) for the launder base, split away from each other at the same point, which corresponds with a square plan section in the present channel, and was putatively the location for a sluice, which must have existed at this point. The sluice is likely to have been of wood construction, and may not have left much in the way of physical remains.

- 4.2.11 *Launder* (Sites **SMG08.1** and **SMG 08.2**; Fig 4): the launder would have been of timber construction and would have been set on top of the dry stone launder support (Site **SMG08.1**; Plate 25) which is orientated roughly west-north-west/east-south-east towards the wheel pit (Site **SMG12**). The structure is a roughly horizontal, sub-rectangular drystone platform running over an area of natural outcrop that is constructed of surface-gathered stones measuring approximately 12m x 2.2m wide and 2.8m high. The launder platform extends up to the eastern edge of the rocky outcrop, and is at this point only 5.7m away from the western edge of the wheel pit, a sufficiently small distance for a wooden launder to jump the gap, albeit supported by wooden posts. Much of the stone from the northern side of the launder was missing and there were no accumulations of stone at the base of the crag, as would be expected if the structure had partially collapsed. It appears that this stone was removed from the structure for reuse and it is possible that a large accumulation of similar stones at the western side of the mill platform (Site **SMG11.2**) might have originated from the launder base. Alternatively, it could have been incorporated into the Site **SMG03** stock enclosure.



Plate 25: South wall elevation of the eastern end of the extant launder platform (Site **SMG08.1**)

- 4.2.12 *Divert Channels* (Figs 4 and 5): a curvilinear divert channel (Site **SMG07**) extends to the south of the launder passing down the face of the crag and then around the southern side of the wheel pit before merging with the tail race (Site **SMG13**). For the most part, the channel does not appear to be deliberately cut

into the rock where it extends over the crag, but has been cut into a channel at the base of the crag and at its eastern end; where it merges with the tail race it is up to 1m wide and 0.4m deep.

- 4.2.13 A sinuous divert channel extends around the north side of the mill for approximately 77m (Site **SMG09**), and again, where it extends over the crag, it has not been deliberately cut, and instead follows a natural course through the rocky outcrops. The channel carried water around the north side of the mill and flowed into a series of potential washing ponds (Site **SMG04**), before outflowing into Sourmilk Gill downstream of the mill. On levelled ground the divert channel has been cut into the ground surface and was up to 0.6m wide by 0.3m deep.
- 4.2.14 *Tail Race*: the tail race (Site **SMG13**; Figs 4 and 5) took the combined flow from the southern divert channel and the wheel pit, and appears as a curvilinear gully running roughly north-west/south-east from the wheel pit (Site **SMG12**). It is a well-defined slope-cut channel with some large stone material protruding from the northern bank (western end) though this was not necessarily structural. The tail race measures approximately 36m x 2.5m and is up to 1.5m deep in places. It outflows into the north side of Sourmilk Gill further downstream.
- 4.2.15 *Washing ponds*: the northern divert channel extends into a series of three small pools / ponds that were each approximately 2m square (Site **SMG04**; Fig 5), the southernmost of which is roughly stone lined on two sides (Plate 26). The water flow between the separate ponds would have had a cascading arrangement, with a channel extending from the southernmost pond into Sourmilk Gill. These were almost certainly washing ponds for cloth taken through the fulling process.



Plate 26: A series of interconnected washing pits (Site **SMG04**)

- 4.2.16 **Agricultural Features:** within the vicinity of the fulling mill are a number of agricultural features that potentially reflect farming activity over a broad period of time. These include a rectangular enclosure (Site **SMG03**; Fig 6), which is 13m x 13m in extent (Plate 28) and a small domestic gabled hut (Site **SMG02**; Fig 3) 3.5m x 4.2m and located on a narrow terrace just above Sourmilk Gill (Plate 27). The rectangular enclosure has extremely degraded stone banks, and utilises a large boulder at its north-eastern corner; it is 13m x 13m in size. It is likely to be of considerable antiquity, and is potentially of comparable age to the fulling mill. While there have been discussions as to the possibility that it related to the fulling mill, perhaps serving as a storage area for the mill, it is relatively large and there is little evidence of comparable large structures associated with other medieval fulling mills. Typically such structures are interpreted as stock pounds, but their dates are very uncertain.
- 4.2.17 The hut is likely to have functioned as either a small peat hut or ‘scale’ or, potentially, a shepherd’s hut, and could be of considerable antiquity to judge by its level of decay. On the opposite side of the gill is a two-celled stock enclosure (Site **SMG15**; Fig 3) that is in good condition and is believed to have been repaired by the National Trust within the past 30 years. It has an entrance facing straight into the Sourmilk Gill which would indicate that it had a function, either primary or secondary, as a sheep wash. At the lower end of Sourmilk Gill, just before it enters the enclosed lands, there is a shallow flat-floored section which could have served as a ford or bridging point. An outgang between two blocks of enclosed land, intended as a drove route, converges on this point reinforcing suggestions of a crossing point.



Plate 27: The possible peat hut or shepherds hut (Site **SMG02**)

- 4.2.18 Immediately to the east of the study area, in the enclosed lands belonging to Brimmerhead Farm, is an area of broad thickness consumption walls and banks, which would have been produced by stone brought up by the plough, indicating historic land improvement for either grazing of small scale cultivation. The alignments of the consumption walls are at odds with the present day field

boundaries and the implication is that these reflect the survival of a field system that pre-dates the present enclosure.



Plate 28: The rectangular stock enclosure (Site **SMG03**)

- 4.2.18 **Discussion:** the fulling mill at Sourmilk Gill was very carefully located to take advantage of a fast flowing stream that provided an abundant water supply, situated at the interface between the enclosed lands and the steep craggy spur of Ecton Crag. The mill, and its associated water-supply system, is in a remarkably good condition, and was evidently well built. The small, and essentially basic, form of the fulling mill, along with the use of field clearance stone in the construction of the launder support and mill building foundations, would suggest that it was more likely to be of medieval than post-medieval date. All of the ancillary elements associated with a fulling mill are evident, including putative washing ponds, and a nearby potash kiln located in a pasture field to the north-west of Brimmer Head Farm (*Section 3.3.5*).
- 4.2.19 Surrounding the mill are a number of agricultural structures which provide an indication that both arable and pastoral activities were practised in the environs. The consumption banks are typical features of medieval cultivation, and the stock enclosure (Site **SMG03**), which is a dry-stone structure in an advanced stage of decay, is likely to be of considerable antiquity and potentially medieval in date. The implication is that the fulling mill, and at least some of the agricultural features, were broadly contemporary. These monuments seem to reflect the deliberate placement of mills, folds and other communal structures owned by the Lord of the Manor, grouped around the outgang leading onto the common land, and reflects the manorial privilege to erect buildings on such lands in areas that were convenient for access for their tenants.
- 4.2.20 If it can be concluded that these varied monuments were broadly contemporary then this would accord with the documentary evidence that fulling was a seasonal activity, being undertaken after the sheep were shorn and the wool was processed. As such the process would allow for it to have been undertaken alongside

conventional farming activities, particularly those that generated wool in the first place.

4.3 LOUGHRIGG TERRACE MILL, GRASMERE (FIGS 8-12)

4.3.1 **Location and Topography:** the surveyed fulling mill at Loughrigg Terrace is close to the shore of Grasmere Lake at its outfall where it feeds into the River Rothay (NY 3431 0589; Plate 29). The mill is adjacent to the present day weir which maintains higher water levels in the lake than there would have been the past, and certainly during the anticipated period of usage of the mill. The mill is located on the lower southern slopes of Ewe Crag and is associated with an artificial platform set up above the shore of the lake (Plate 29). The mill was fed by a leat/channel diverted off an adjacent, small and unnamed beck. This small beck was itself fed from a very small tarn above Ewe Crag, which would have provided some degree of continuous water supply for the mill; however, it is not as reliable and strong a supply as that feeding the Sourmilk Gill mill. The mill is now, and would always have been, within unenclosed lands which form part of Loughrigg Common.

4.3.2 **Introduction:** the Loughrigg Terrace fulling mill corresponds with the approximate location of documented mills in this area (*Section 3.3.4*), and there is a fairly definite head race and water supply which, in itself, strongly suggests the existence of a mill. There is, however, less certainty about the precise form and location of the mill itself based on the physical evidence because the site has suffered erosion and there has been considerable landscaping around the shore of the lake which has clearly impacted on the mill site, removing a significant part of the large platform. The complex of remains is described below in terms of the evidence for the mill structure and the form and operation of the water-feed system.

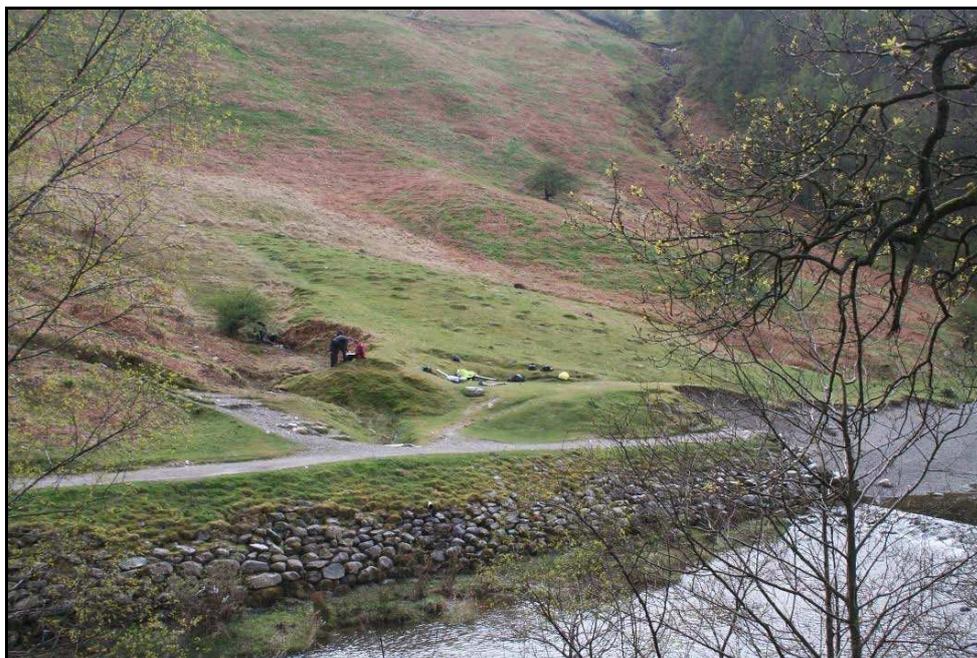


Plate 29: The potential location of the Loughrigg Terrace fulling mill adjacent to a large platform on the shore of Grasmere lake

- 4.3.3 **Mill Evidence:** set within a bend in a stream/leat gully is a small sub-rectangular grass-covered platform (Site **LT01**; Fig 9) set on the east side of the water channel just above the south shore of Grasmere Lake (Plate 30; Fig 8). The platform is potentially the location of a fulling mill, although its size (c 4.5m x 2.6m and 0.4m high) would preclude a substantial built structure surrounding the fulling frame and stocks. The adjacent stream/water channel diverts around the western side of the platform and, on the opposite (eastern) side, is a rectangular depression (c 2.5m x 0.6m and up to 0.15m deep) between the base of the gully bank and the platform which could represent the position of a water-wheel (Site **LT04.1**). If this was the water-wheel then there is a maximum width of only 1.8m between the edge of the putative wheel pit and western edge of the platform to accommodate the axle and cams for the mill. In this configuration, the stocks would have been located to the south of the drive shaft extending into an area that is now obscured by subsequent collapse. While this would seem to be an extremely small space to accommodate a mill structure, it should be born in mind that the divert channel to the west has probably cut back the western edge of the platform which would originally have been wider.
- 4.3.4 Another potential location for the water-wheel would be on the north end of the platform where the stream kinks around it (Site **LT04.2**), and here the platform has a well-defined straight cut edge. In this configuration, the axle would have been orientated north/south and the stocks would have been orientated east/west, leaving relatively little space to accommodate the stocks and fulling trough.



Plate 30: Putative mill platform, facing east (Site **LT01**)



Plate 31: downslope side end of the mill platform at the possible position of a water wheel (Site **LT01**)

- 4.3.5 Other potential mill evidence consists of a series of flat-topped stones (Site **LT03**; Fig 9) at the confluence of the head race (Site **LT 06**) (*Section 4.3.8*) and the north/south channel (Site **LT05**) which could have served as a foundation from which to launch a wooden launder taking water to an overshot water-wheel. There is a substantial fall between the channel at this point and the putative wheel pit, which would have been sufficient to drive a water-wheel. A launder launching from this position would favour a wheel in the Site **LT04.1** position, as the wheel would have been in line with the launder, a necessary requirement for driving the wheel. With the present lines of drainage this would work with a supply from the channel Site **LT05**, rather than the head race (Site **LT06**); however it is possible that in the past the head-race merged with channel Site **LT05** at a higher point, in which case this putative launch point for the launder could also have been supplied by the head race.
- 4.3.6 To the east of the putative mill, and set above the gully, is a line of stones extending for up to 3.5m. It is very tentatively suggested that these might be part of the weighted edge of a perishable roof projecting over the fulling frame and stocks.
- 4.3.7 The other possibility is that the mill is not in this location at all, and was instead on the shore of the lake, in which case it would have been landscaped and removed by the construction of the modern path there. This seems less likely because, even if a mill in this position had now gone, there should be some indications of the launder launching point at an adequate height above the shore to drive an overshot wheel. With the present arrangement of the water channel there are no indications of a launder launching point, nor would there be enough of a fall in the channel to provide a sufficient head of water for a wheel.
- 4.3.8 **Water Supply:** the head race (Site **LT06**; Figs 9-11) for the mill extends out from an existing and relatively fast-flowing stream gully at a point that is 116m away

from the fulling mill. There is presently no join with the head race as water erosion in the stream gully has cut the stream channel down below the level of head race, and because a dam (Site **LT 09**; Fig 11) has been constructed that presently blocks the start of the head race from the feeder stream channel (Plate 32). The dam is a small, slightly curvilinear section of drystone walling measuring c 3.8m x 1m wide and is up to 0.6m high; subsequent erosion in the stream gully has cut the stream channel down considerably and may potentially have removed a northerly extension of the putative dam structure. However, given the uncertainty as to its original form and the evident erosion in the stream gully there is some uncertainty as to how the structure facilitated the capture of water from the stream. One possibility is that the water was taken via a wooden launder that extended over the dam and deposited the water into the top of the head race, which meant that it was possible to control the amount of water entering the head race. The flow of water into the head race was potentially from a short launder set on a notched stone that survives in the side of the stream gully (Site **LT10**; Fig 11). The dam would have raised and reinforced the natural side of the stream bank and would have prevented excessive water flow into the head race during times of flood, which could have damaged the water wheel.



Plate 32: Linear blocking dam wall located at the take-off point at the beginning of the head race (Site **LT09**)

- 4.3.9 *Head Race*: the head race (Site **LT06**; Figs 9-11) consists of a long sinuous gully running roughly south-east/north-west downslope towards Grasmere Tarn. It measures approximately 110m x 6m and is up to 2m deep in places. The north-western end is denuded and there is a slight gap in a boggy area before the

putative launder step (Site **LT03**), which coincides with the confluence of the head race with another channel/leat (Site **LT05**). This small channel is orientated roughly north/south and is at least 10m long and 2m wide. While the channel may have in the past taken water off a stream gully running downslope to the south-west of the mill site there is no extant evidence of a link to this stream. Alternatively the channel may have captured the water from the nearby boggy ground to the south of the mill site and would have provided additional water for the launder but would have also kept the ground above the mill site dry. There is an area of blocking near the start of the head race (Site **LT11**; Fig 11) which probably reflects a deposit of more recent material rather than an aspect of the water management for the mill.

- 4.3.10 *Tail Race and Divert Channel:* below the launch point for the launder, the divert channel that collects water from both headrace (Site **LT06**; Fig 9) and channel (Site **LT05**; Fig 9) extends around to the west of the putative mill platform (Site **LT03**; Fig 9) before merging with the putative tail race below the wheel pit (Site **LT4.1**; Fig 9) and continuing as a short sinuous section of tailrace, flowing north towards Grasmere Tarn (Site **LT07**). The divert channel appears as a partially modified section of a natural stream gully approximately 26m long, 3m wide and up to 2m deep. At the northern end, it disappears into a culvert running beneath the modern footpath along the shore.
- 4.3.11 *Ancillary Features:* one of the most noticeable non-natural features in the environs of the fulling mill is a large sub-circular platform (Plate 33; Site **LT02**) which is set into the hillside and embanked downslope located just above the south shore of Grasmere Tarn. It is approximately 12m by 8m in size and up to 1.3m high. It is presently accessed from the west by a sloping ramp that is again cut and embanked into the hillside (Plate 34 and Fig. 9), and has a small drain running along its southern side; there is also a small footpath leading onto the platform from the east.



Plate 33: Large partially eroded platform area adjacent to the fulling mill viewed from above (Site **LT02**)



Plate 34: Ramp leading onto the platform area (Site **LT02**) looking east

- 4.3.12 The platform is separated from the putative fulling mill by a large curvilinear embankment that was constructed on top of the western bank of the stream gully running around the mill platform (Site **LT01**; Fig 9). The height of the embankment, separating the platform from the gully, would have precluded the construction of the fulling mill on this platform as the embankment would have prevented the transmission of water power from a wheel in the gully across to the platform. The function of the platform could have been as some sort of storage area adjacent to the mill site or it may have been utilised to perform some of the various tasks involved in the process of fulling, such as washing or even dyeing of the cloth. Unfortunately, the land to the north of the platform, on the shore of the lake, has been eroded and landscaped to accommodate the footpath making it difficult to gain a full understanding of the site.
- 4.3.13 On the opposite, eastern side of the tail race is a further putative platform (Site **LT08**), located adjacent to the modern footpath. It measures 5m x 4.5m and is up to 1.5m high, and has a D shape which has, in part, been created to allow for the footpath that extends along its northern edge (Fig 9). It is considerably less marked than the western platform and, indeed, is possibly entirely natural in origin. If it is man-made its function is uncertain and it is not evident in what capacity it would have served the mill.
- 4.3.14 **Discussion:** the remains at the Loughrigg Terrace fulling mill are very different to those documented at Sourmilk Gill. If the physical traces are confirmed as belonging to one of the fulling mills documented in this locality (*Section 3.3.6*), then it was evidently a very insubstantial feature. The size of the mill would have been constrained by the size of the gully within which it was set; there would have been relatively little room for working; with space for only a single trough and set of stocks. Very small mills have been recorded elsewhere which are located in similar confined spaces so we cannot discount the platform being a genuine mill site (Plate 35). The remains do not reveal any substantial structure and it is possible, indeed probable, that the mill workings were not entirely

housed within a building. The superstructure for the wheel, axle mounts and stock assembly would all have been constructed of wood, so would have left little in the way of physical remains. There was possible evidence for a setting of stones for anchoring a rudimentary roof structure (**Site LT12**; Fig 9) but again this could have been an open-sided building.

- 4.3.15 Without the evidence of the water supply, comprising the leats and dam, there would be little to confirm the existence of a fulling mill in this location, and it is indeed possible that the mill itself may have stood closer to the lake shore and have been eroded away, an interpretation supported by the possibility of the level platform having originally functioned as a header pond for a water supply, however the physical evidence examined on site makes this interpretation unlikely. An associated potash kiln was recorded nearby at NY 3407 0560, and is just inside a pasture field (*Section 3.3.9*).
- 4.3.16 This mill perhaps highlights the considerable differences between simple mills associated with medieval weaving and the much better documented post-medieval mills, which were located within large buildings and were fulling cloth on a much larger scale. This potentially reflects that the fulling mills of the period were operated on a seasonal basis by a part time miller and would have served the needs of only a limited number of farms and settlements; as such they did not need to have substantial pieces of machinery.



Plate 35: A very small mill in Shetland (Brown 2011)

4.4 LOW WOOD MILL, ELTERWATER (FIGS 13-16)

4.4.1 **Location:** the surveyed fulling mill (at NY 3370 0503) is located below the present day (National Trust owned) High Close Youth Hostel, previously the domicile of the Benson family, an important weaving and fulling family in the region. The location of the mill seems more determined by its proximity to the family seat rather than by its topographic virtues. It is on the line of an extremely small, unnamed beck, which was not supplied by a natural water body and, although a small reservoir was established above High Close house this is a later feature and probably post dates the fulling mill. The beck ultimately feeds into Elterwater.

4.4.2 The mill is on a gentle, south-west facing slope that is presently within a coppiced wood, Low Wood (Plate 36); however, it is uncertain if there was surrounding woodland when the fulling mill was in operation. The site is on an important natural communication route between Grasmere and Langdale which follows a natural hause or col between the two valleys, although this is not the documented route that was used for the transport of cloth in the medieval period (*Section 3.3.13*).



Plate 36: The putative mill platform located at the south-east corner of the mill pond (Site LW01)

4.4.3 **Mill Evidence:** the site of the putative fulling mill consists of a substantial rectangular platform located on the western side of a north/south orientated stream running through the centre of Low Wood. It measures approximately 10m x 8m, with the top of the platform being 5m x 3.75m. There are no visible foundations associated with a built structure on the platform which may suggest that the site had an open air fulling frame and stocks (Site LW01; Plate 12 and Fig 15) or that the superstructure was of wood. The platform is located on the south-eastern side of a mill pond (Site LW03), and, in part, forms a retaining dam for it. To the west of the mill platform was a well-defined wheel pit (Site LW02) that was, from its upstream, northern side, fed by a mill pond and downstream the

water outflowed into a stone-lined tail race (Site **LW04**; Plate 37). The wheel pit has partially collapsed, but there are, nevertheless, good indicators of retaining walls on either side of the pit, which measures 3.5m x 1m and is up to 1.1m deep. The walls comprise large water worn stones and roughly shaped slate slabs.



Plate 37: The wheel pit located on the south side of the mill pond (Site **LW02**)

- 4.4.4 There is a substantial upcast mound located immediately to the east-south-east of the mill platform in Low Wood (Site **LW15**; Fig 15). The mound, along with other slight banking located adjacent to the west side of the divert channel (Site **LW11**), would suggest that this was upcast from the excavation of the mill pond.
- 4.4.5 **Water Supply:** the source of water power for the mill consisted of a slightly sinuous channel running east-north-east/west-south-west through the centre of Low Wood and to the north of the putative mill site, which has been defined as a head race (Site **LW6.1**; Figs 14 and 15). It is visible running downslope through the woods, extending beneath a section of carriage drive (Site **LW12**), and continues for approximately 114m before diverging, to feed a mill pond to the west (Site **LW03.1**; Plate 38), and continuing downslope to the east of the putative mill as a divert channel (Site **LW11**). For part of its length the head race (Site **LW6.1**) was formalised into a stone-lined cutting. There is evidence of it running in a culvert beneath the carriage drive and for a short section further south (Site **LW07**), which may suggest that much more of its length was originally culverted.
- 4.4.6 The head race fed a well-defined rectangular mill pond located upstream and adjacent to the north of the potential fulling mill platform (Site **LW01**). The pond, first depicted on the OS Second Edition mapping (1890), measures approximately 9.5m by 8.3m and, although mostly infilled with silt, remains 1.1m deep on its northern side (Site **LW03.1**; Plate 38). The pond is contained by partially exposed stone retaining walls, which are vertically sided except the northern wall which is battered back at a slight angle. The pond contains a raised platform 2m wide on the west side (Site **LW03.2**; Plate 39). It was fed by a stone-

lined channel (Site **LW06.2**) which separated from a divert channel (Site **LW6.2**) at a junction 5m north-east of the structure (Site **LW11**), and which then extended east of the mill platform and cairn.



Plate 38: The rectangular mill pond set within present day Low Wood (Site **LW03.1**)



Plate 39: The stepped terrace on the west side of the mill pond (Site **LW03.2**)

- 4.4.7 The mill platform also acted as a dam to stop water escaping downslope to the south (Site **LW01**), and a damaged retaining wall on the south side of the pond

(Site **LW08**) may have retained the ground below the wheel pit to strengthen and buttress the local area. The pond may have had a dual function, providing a reliable head of water for the water wheel to ensure a regular and constant supply, while also being utilised for the washing of the fulled woollens; in particular the stepped platform (Site **LW03.2**) might have been used as a shelf to apply fulling solutions, scrub the cloth or even allow the woollens to drain.



Plate 40: Outflow from the wheel pit into the linear tail race (Sites **LW02** and **LW04.1**)



Plate 41: View along the length of the ruler-straight tail race (Site **LW04.1**)

- 4.4.8 An intact linear stone-lined and slate-bottomed tail race flowed south, downstream from the wheel pit. For most of its length the channel is ruler straight, indicating a planned construction of the feature rather than the modification of a natural stream gully (Site **LW04.1**; Plates 40 and 41). The channel measured approximately 38.4m x 0.7m and was 0.3m deep for most of its

length, before turning a right angle to the south-east on the southern end and continuing as a sinuous stream gully (Site **LW04.2**; Fig 16). The tail race turned at the point where there is a small section of retaining wall (Site **LW05**) and continued to outflow into the divert channel which had bypassed the mill site (Site **LW11**). The straight section of the tail race conformed with the eastern boundary of a small plantation or orchard depicted within Low Wood on the Ordnance Survey Second Edition mapping (1890).

- 4.4.9 **Other Water-related Features:** south of the mill site is a short, damaged, section of dry-stone retaining wall (Site **LW05**), located on the north side of the right angled turn in the tail race (Site **LW04.1**). This partially collapsed wall is located where the ground drops away to the south-east and retains a levelled area measuring approximately 16m x 8m upslope to the north (Site **LW16**); it may have functioned as a working/storage area or as a tenter ground. There is no evidence for supports for a water-wheel on top of the retaining wall (Site **LW04.1**) at this location due to collapse, but the tail race does slope down significantly after this point.
- 4.4.10 **Woodland Industry Features:** the majority of the remaining features within the survey area consist of woodland-industry and access features. There is a fragmentary linear wall foundation located on the south-west side of the mill pond (Site **LW08**), which may have buttressed the area when the fulling mill was in use (Section 4.4.7). Alternatively it may have been associated with a small rectangular plantation or orchard enclosure depicted on the Ordnance Survey Second Edition mapping (1890). In addition, there is a linear wall foundation orientated roughly north-west/south-east running through the northern half of Low Wood (Site **LW14**; Fig 14). The boundary probably functioned as a subdivisional hag boundary between separate coppice compartments within Low Wood. Upslope, approximately 50m to the south-east and outside of the present survey area, the foundation continues and connects with further coppice compartment boundaries near to a potash kiln and attached putative building platform, which were checked and confirmed but being outside the study area were not surveyed.
- 4.4.11 Other surveyed woodland-industry features are limited to an oval charcoal burning platform (Site **LW09**; Fig 16) c 12m x 10m, which is cut 0.3m into the slightly sloping ground to the south of the putative mill site, and a pair of fragmentary woodland access trackways that extend through Low Wood (Sites **LW10** and **LW13**). The latter links up to the main carriage drive (Site **LW12**) and may have been reused and adopted as part of the design for the later pleasure grounds.
- 4.4.12 There is one formal landscaping feature associated with the gardens and parkland of High Close that passes through the survey area. It is an elaborately-constructed sinuous carriage drive running downslope through Low Wood from High Close and was clearly a formal drive rather than purely an access track constructed for use by those involved in woodland industries. It is metalled, has a drainage ditch on the upslope side of its surface, and is approximately 6m wide. The carriage drive has a prominent retaining wall on the downslope side where it crosses the head race (Site **LW12**), just to the north of the putative mill site. The retaining wall is up to 2.3m high at this location and has a parapet that is 0.7m high; the

head race has been culverted below the drive. The drives within Low Wood are first depicted on the OS Second Edition mapping (1890).

- 4.4.13 **Discussion:** although there is no direct evidence for a mill structure located on the platform at Low Wood, there seems to be an elaborately-designed element to the surrounding ancillary features and the water-management system. The ruler-straight tailrace and rectangular mill pond have been deliberately constructed rather than remodelled from natural topography and stream gullies. The formal layout of these structures, along with the late depiction of the mill pond on the OS mapping, superficially point to the features being relatively late designed elements for the gardens surrounding High Close. Closer inspection of the water-management features, however, suggests a mill on the platform, and the elaborate design being a reflection of the close proximity of the Benson family home, the most prominent of fulling mill proprietors in the region in the eighteenth century. It is possible that the mill pond was re-used after fulling ceased, possibly as a fish hatchery or some other type of ornamental water feature, although the obvious wheel pit and complex water management system does point to a primary industrial use.
- 4.4.14 The mill itself may have been an open-air fulling frame and stocks, devoid of a permanent structure housing all the machinery, as suggested by the absence of surface evidence for surrounding wall foundations, though these may have been cleared away; it was not uncommon for fulling frames and stocks to be open to the elements (Plate 12). Alternatively, there may have been a wooden-framed building with a perishable roof. The driving power for the fulling stocks would have come from a water-wheel mounted on the gable end which, due to the considerable depth of the wheel pit, was probably breast shot, or less likely undershot, and fed from the mill pond. The mill pond may have had a dual function: the terraced platform on the western side would suggest usage of the pond for the washing of the woollen products, and the cleared level area on the eastern side of the tail race may have been used as a storage area or a tenter ground, although there is no present physical evidence for this. The proximity of two potential potash kilns within Low Wood would lend weight to the site being a fulling mill.

4.5 STICKLE GHYLL MILL, GREAT LANGDALE (FIGS 17-28)

- 4.5.1 **Location:** the surveyed fulling mill is near Mill Beck Farm (at NY 2941 0649) on the gentle sloping valley side at *c* 100m (aOD), situated just above the valley floor and below the craggy Langdale Pikes. The mill was probably located just outside the medieval ring garth and at that stage was on Great Langdale Common; however, during the period 1500-1750 the current pattern of fields to the north of the ring garth was enclosed, and entailed taking the mill from the common into private ownership (Bevan *et al* 1991). It is located on a gentle spur between the very fast and active Stickle and Dungeon Ghylls (Plate 42). The leat that feeds the mill runs from the direction of Stickle Ghyll but there is no evidence that it drew upon it. Stickle Ghyll gully is steep-sided and it would have been difficult to draw water from it without constructing a long and complex leat for some distance in order to obtain a steady supply. There is no evidence for such a leat and, in any case, the water supply is far more abundant than would

have been required by the mill. Instead, it might have drawn upon a rather unreliable supply from an area of mire located on top of the spur. The water collected from this area of upland mire was then collected by a head race, transported to the putative mill site, before flowing off down a tail race and ultimately discharging into Great Langdale Beck. The archaeology of the mill close to Stickle Ghyll has been massively impacted upon by the creation of ancient and modern routeways leading from the valley bottom up towards the high fells. Various footpath and drainage improvements undertaken during the past 30 years have been particularly damaging, obliterating any evidence of the upper part of the head race and any mill infrastructure that may have existed to the east of the rocky outcrop.



Plate 42: View along the head race towards the fulling mill building (Sites **SG01.1** and **SG05**)

- 4.5.2 **Mill Evidence:** evidence for a mill at this location consists of the in-situ foundations and walls of a small rectangular, unroofed structure (Site **SG05**; Fig 18). The building has been partially rebuilt and recently used as a sheepfold, but was depicted as a roofed structure on the OS First Edition mapping (1861). It had been modified and was unroofed by the Second Edition mapping (1890). The building measures approximately 6.8m x 5.8m and survives up to 2m high at its southern corner. It has been cut into the hillside and has a retaining wall on the north-west elevation that is 1.4m deep. Internally, the structure has a level floor that is up to 0.7m higher than the ground to its south-east. It possesses a single entrance located on the eastern end of the south-east wall elevation, but there is no visible original fabric around the aperture. The short revetment wall that abuts the structures western corner links it to an enclosure wall, while its eastern corner is linked to another enclosure wall by a blocked/ infilled entranceway.
- 4.5.3 The surviving fabric of the original mill structure is fragmentary but distinct, with lime-mortared walls containing both surface-gathered and water-worn stones packed by areas of laterally-placed thin slabs of stone (Figs 21-28). The mortared elements relate to the earliest phases of construction, so although there is a

possibility that these relate to an agricultural usage of the structure, the probability is that they were part of the original mill phase. The rest of the superstructure has been rebuilt as a drystone sheepfold with a simple coverband of coping stones on top. The extent of surviving early fabric is variable, often only comprising foundation courses, but the internal south-west facing and north-east facing and the external south-west facing elevations (Figs 22, 23 and 25) have larger areas of original fabric. The south corner wall quoin stack survives up to six courses and is 0.75m high (Fig 21); the south-west wall of the structure has possible surviving elements and apertures that relate to its use as a mill building (Fig 22). Both externally and internally there is evidence for a blocked sub-circular aperture measuring 0.6m in diameter that could conform to the location of the mill wheel axle (Figs 22 and 25).

- 4.5.4 The position of the water-wheel would have been external to the south-west facing wall elevation (Fig 22) and would have been supplied by a divert channel/laundry combination where a (now blocked) scooped area in the outcropping bedrock is located to the west of the mill (Fig 18; Plate 43). Internally, the putative axle aperture is flanked on each side by blocks of original walling with vertical joints 0.45m away from the aperture (Fig 25). It is possible that slots next to these vertical faces were anchoring beam slots or bracing points for the fulling mill frame.

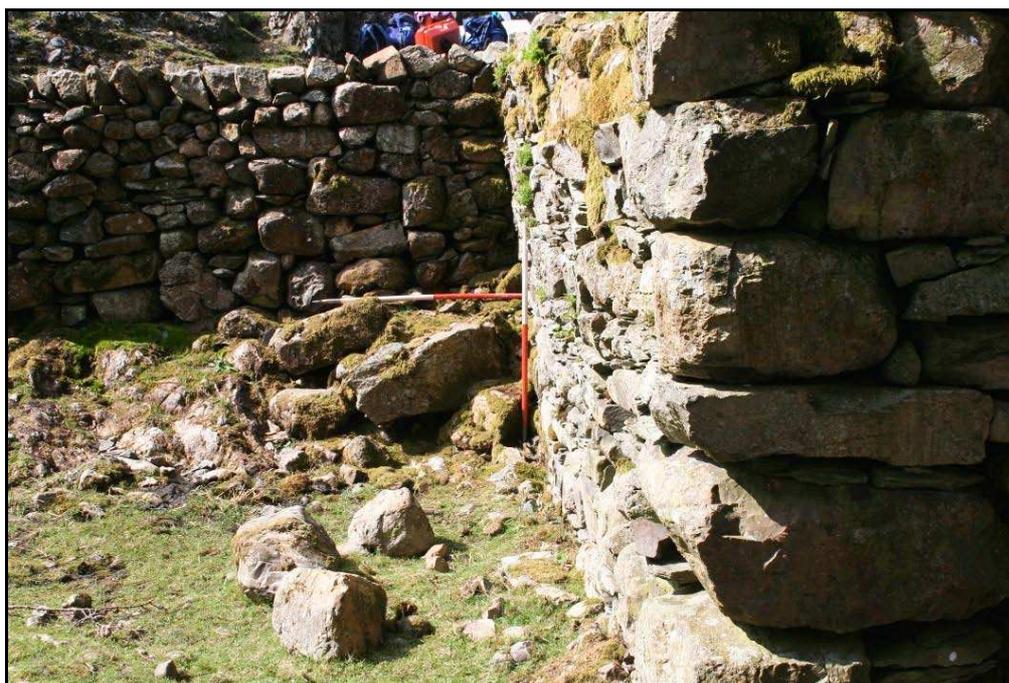


Plate 43: The infilled scooped channel in the bedrock or a step for the laundry running onto the water-wheel

- 4.5.5 **Water Supply:** the mill was supplied by a well-defined, and partially rock-cut, head race. Water outflowed from the putative wheel-pit into a tail race which survives as a slight earthwork feature extending south-east from the supposed position of the water-wheel. The head race (Site **SG01**; Figs 18 and 19) was well defined as a linear, north-north-east/south-south-west orientated, channel that would, originally, have gathered water from an area of mire to the north of the mill site and above the Stickle Ghyll gully, and would then have transported it

southwards towards the putative fulling mill (Plate 44). While the most logical source of water may have been from nearby Stickle Ghyll, the base of the ghyll is substantially below the mill, and any take off point would therefore have been a long way up stream to provide an adequate fall. There is no evidence for a dam or take-off point on the south bank of Stickle Ghyll as the area has been heavily eroded and is covered in large boulders and water-worn stones. The visible section of head race starts just south of the junction of the existing public footpaths in the enclosed field containing the mill site (Fig 19). The main section of the channel is partially rock-cut along its length and has had a retaining earth and stone bank constructed on its downslope, eastern side. This portion of the channel measures approximately 34.5m long by 2.8m wide, with the open channel being up to 1m wide by 0.5m deep. At its southern end the channel runs across a tall rocky outcrop giving it a significant height above the putative mill structure, and affording a good head of water even if the water supply were limited. There is evidence for a possible junction with a divert channel (Site **SG07**; Fig 18) running south-west beneath the modern enclosure wall and, at this point, the head race (Site **SG01.2**) turns sharply to the east to descend the steep face of the outcrop for a further 2.7m as a narrow 0.5m wide and 0.2m deep rock-cut channel. It is probable that this narrow rock-cut channel functioned as a divert channel that led water from this point, towards and eventually, under the water-wheel (Plate 45). A wooden launder might have been positioned at the top of the rocky outcrop/ end of the rock-cut head race leading to the wheel, which was probably at an overshot level given their relative heights.

- 4.5.6 A number of earthworks lie on a flattened sub-circular platform between the putative mill site and the rocky outcrop to the north (Site **SG04**; Plate 46 and Fig 18). These include a smaller, oval flat-topped mound (Site **SG04.1**), a curving break of slope running from the foot of this mound to the foot of the rocky outcrop (Site **SG04.2**), and a short bank above the platform, projecting from the south face of the rocky outcrop (Site **SG04.4**). These earthworks have no obvious mill-related function, but they could relate to ancillary workings or an earlier phase of construction predating the extant mill building (although there is no direct evidence of an earlier mill platform).
- 4.5.7 Other shallow earthworks adjacent to the north-west of the mill structure (Site **SG04**), might provide some evidence of the water-supply system (Plate 47). Traces of a linear bank are present running west-south-west/east-north-east (Site **SG04.3**) which is interrupted at point in line between the bottom of the rock-cut channel (Site **SG01.2**) and an infilled scoop or channel on the west side of the mill structure (now crossed by a modern field wall; Fig 18). The infilled channel presumably took water running under the wheel on the south-west wall elevation of the mill structure. The break in the bank could represent a gap through which either a launder or divert channel fed water down from the head race to the water-wheel or, alternatively, it could have been cut by such a channel.

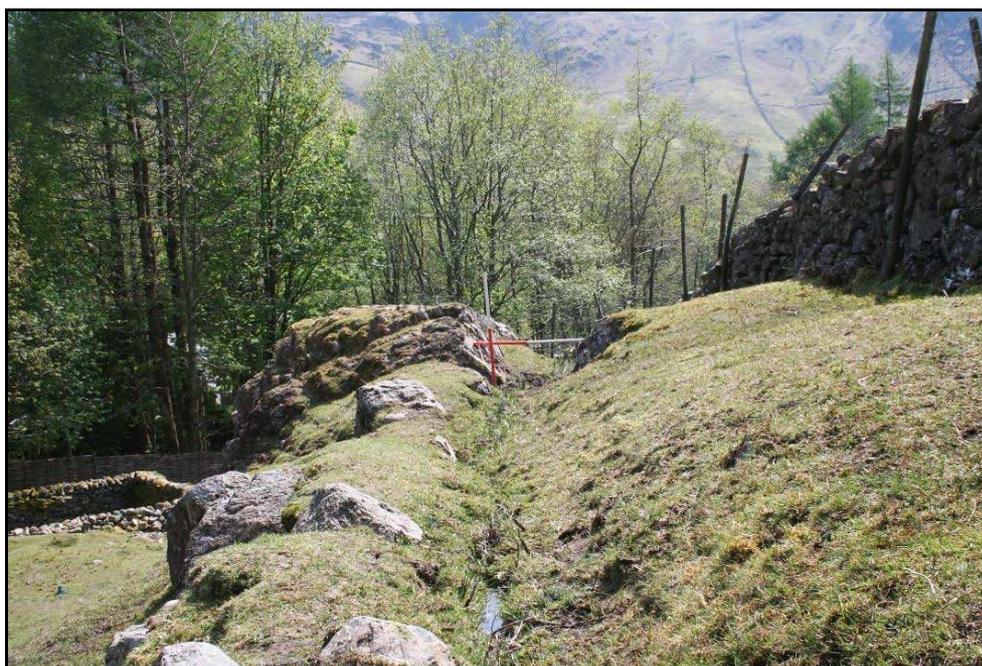


Plate 44: The well-defined rock-cut and banked head race channel (Site **SG01.1**)



Plate 45: A narrow rock-cut channel carrying the head race/secondary divert channel down the rocky outcrop (Site **SG01.2**)



Plate 46: Amorphous earthworks sandwiched between the mill structure and a rocky outcrop (Site **SG04**)

- 4.5.8 *Tail Race*: south-east of the mill structure are the linear remains of a possible tail race (**Site SG06**; Fig 18). It is orientated roughly north-west/south-east, and is aligned with the possible water-wheel location on the external south-west wall elevation of the mill structure; it would have taken water away to the south-east of the mill towards Great Langdale Beck. The feature consists of a slight earthen bank that is lower in height on the south-west side, and it has a short section of possible stone revetment surviving mid way along its surviving length. A slightly curvilinear boundary/feature was depicted in this location of the OS First Edition mapping (1861).
- 4.5.9 *Other Features*: the survey area was limited in extent to the enclosed field surrounding the putative mill site, and few other features were recorded during the survey. The remains of a wide earth and stone constructed boundary bank were recorded orientated roughly north-west/south-east and running through the north-east corner of the enclosed field adjacent to the south side of Stickle Ghyll (Site **SG03**; Fig 19). This bank is approximately 38m long and up to 5m wide, and is clearly of some antiquity as it is overlain by the modern enclosure walls. The bank is crossed and has been eroded by a modern footpath near its northern end, and it cannot be traced south of the modern enclosure wall where gardens are now present. Foundations of a boundary wall can also be seen running north from the corner of the modern enclosure wall towards Stickle Ghyll (Site **SG02**); this boundary was depicted as extant on the OS Second Edition mapping (1890).
- 4.5.10 *Discussion*: the documentary evidence suggests that the surveyed mill site is the location of a medieval fulling mill (*Section 3.3.13*). Our understanding of the development of medieval enclosure in Great Langdale suggests that the mill was established on the common, close to one of the fell gates that provided access through the ring-garth and onto the common. Such a location is typical for a communal and/or manorial-managed structure such as a mill, kiln or pinfold. The surviving fragmentary mill building may, however, may have been remodelled

and rebuilt over time and would include some substantial elements of post-medieval masonry. The remains are relatively simple in form: a small platformed structure cut into the hillside with vestiges of the original wall fabric still evident even after the remodelling of the structure into a sheepfold. The building had been roofed in the mid-nineteenth century, and elements surviving in the wall fabric suggest that it either had a free-standing water-wheel or a wheel set in a shallow pit; given the height of the leat it is very probable that this was an overshot wheel. As there is uncertainty over the existence of a wheel pit, it is difficult to ascertain the size of the wheel, even though an axle mount seems to have been present and its height can be estimated accordingly. It is probable that the wheel did not extend beyond the width of the end wall, and the position of the observed bedrock with respect to the observed axle point would suggest that it had a maximum diameter of 2.9m. Possible beam slots are visible on the internal face of the elevation, and on either side of the putative hole occupied by the mill wheel axle but, in the absence of other internal remains, it is difficult to guess their precise function.



Plate 47: The possible alignment of the launder or head race running from the rock cut channel towards the water-wheel position on the west side of the fulling mill

- 4.5.11 Water management and motive power consisted of a simple rock-cut head race running from the broad direction of Stickle Ghyll, but there was no direct take-off from Stickle Ghyll which suggests that the water might have originated from an area of sloping mire upslope of the leat. It is possible that a more substantial head race channel may have extended into this area in the past. Alternatively, the physical remains of a dam and launder structure set up near the ghyll may have been destroyed by the fast-flowing stream. However, it is clear that water then entered a rock cut head race and flowed in a southerly direction towards the

putative mill building. The head race ran along the top of a large rocky outcrop which provided sufficient height to create a useful head of water. Water would have descended from the top of the outcrop along a launder to an overshot wheel taking full advantage of the height of the crag and allowing considerable propulsion from a low flow of water. A narrow channel (Plate 46) extends from the putative springing off point of the launder and was likely to be a divert channel which then would have extended into the area of the wheel pit, through the scooped channel (*Section 4.5.7*). Ultimately the divert channel would have led to the tail race; this is evidenced by a small step/infilled depression in the bedrock adjacent to the wheel location which would point to a divert or excess water channel running beneath the wheel and discharging into the tail race.

4.6 LITTLE ORE GATE MILL, GRAYTHWAITE (FIGS 29-34)

4.6.1 **Location:** the putative fulling mill (at SD 3711 9330) lies in an area of coppiced woodland at *c* 70m (aOD), at the edge of the flat-bottomed valley that extends between Esthwaite Water and Windermere lake and through which Cunsey Beck flows. It is situated on gentle and subtly-undulating land that marks the edge of the valley floor, but is overlooked by the steep-sided ridge of Black Brows which rises to 268m aOD. Streams and natural drainage lines extend from Black Brows Ridge down towards Cunsey Beck, one of which flows through Little Ore Gate coppice and provides the feed for a leat that extended along the slope towards the mill.

4.6.2 **Mill Evidence:** the putative structure consists of the earthen remains of a narrow two-celled structure located on a small platform, with a smaller sloping putative annex on the eastern side (Site **LOG01**) (Plate 48 and Fig 33). The structure is approximately 8.7m long (east/west) x 2.75m wide and has uniform earthen foundation banks up to 0.5m wide and surviving up to 0.3m high in places. The annex on the eastern side measures a further 4.3m long by 2.6m wide. The western gable end of the structure has been eroded away by the course of a stream which feeds water out from flat boggy land to the south. There is no clear evidence for stone within the suggested building foundations and, as the bedrock is only 0.1m to 0.2m beneath modern ground level here, dug foundations seem unlikely. If genuine, the structure is likely to have consisted of dwarf walling and otherwise perishable building materials, such as a timber beam foundation, timber superstructure and roof. A putative double-channelled head race and launder platform approach the structure from the west (Sites **LOG06** and **LOG02**). A narrow channel on the southern edge of the structure, running east towards the stream, could have served as a possible divert channel.



Plate 48: View east along the length of the putative mill foundations (Site **LOG01**)

- 4.6.3 A free-standing undershot water-wheel could have been positioned on the western gable end of the structure where the stream passes through. There is no evidence for a wheel pit at this location but, as the bedrock is exposed here immediately below the present ground surface, it must have been clear of the ground. The stream continues in a north-easterly direction, serving as a possible tail race and leading to the larger stream that skirts the eastern side of the putative mill site (Site **LOG03**).
- 4.6.4 **Water Supply:** a long, wide and sinuous leat-like feature, 150m long by up to 6m wide, can be traced to the south-west of the putative fulling mill site (Site **LOG06**). It starts adjacent to a stream and cuts into the south-east facing hillslope as it curves around the contour just above the flatter boggy ground to the south (Plates 49-50). It is possible that this was once a head race for the mill, albeit that the structure has been massively disturbed by recent access by forestry vehicles. There is, however, no evidence of a water take-off point from the stream, although this might also have been disturbed by a later forestry track. This roughly-metalled track, depicted on the OS Second Edition 25 inch (1890) mapping, winds down through the plantation further to the west and finishes at the point that it meets the stream adjacent to the south-west corner of a field enclosure (Fig 29). The putative head race channel has a relatively large upcast bank on the downslope side which, in places, is covered by mature trees. A pair of parallel sunken gullies, roughly 2m apart, lie within the channel which are, in places, well defined and vertically sided. These could be vehicle ruts as the south-east end of the bank has been damaged by forestry vehicles as they have exited from the channel.



Plate 49: The southern half of the putative double head race (Site **LOG06**)

- 4.6.5 At its north-east end, the channel curves east and runs to a linear platform (Site **LOG02**; Fig 33), 21.5m long, 5.5m wide and up to 1m high, which continues the alignment of the channel and is orientated on the putative fulling mill (Plate 51). It might have been the base for a pair of channels/wooden launders running towards a water-wheel located on the western gable end of the putative mill and a divert channel immediately south of the mill structure (Site **LOG08**).



Plate 50: The northern half of the putative double head race (Site **LOG06**)



Plate 51: View along the putative launder platform towards the mill site (Site **LOG02**)

- 4.6.6 The function of the putative head race and launder platform features could have been the provision of water power in the form of a pair of leats running down towards the fulling mill (if that was indeed what it was). Alternatively, the feature may be the consequence of regular and repeated access by heavy forest vehicles, leaving behind massive ruts that have the appearance of channels. This route was undoubtedly used for access for forestry vehicles either when the area was cleared and planted in the 1960s and/or felled and replanted in the 1990s, but it is not clear if the access route followed an existing feature, such as a head race channel associated with a mill. The putative head race channel potentially overlies a charcoal burning platform (Site **LOG05**; *Section 4.6.11*; Fig 33), which could indicate a relatively modern origin for the channels. However, it is a possibility that the disturbance of the charcoal burning platform (Site **LOG05**) resulted from recent access by forestry vehicles along the route of an existing head race channel.
- 4.6.7 At the east end of the platform (Site **LOG02**) is the small natural stream (Site **LOG03**) which, as already discussed above, might have acted as a tail race, some 19m in length, leading to the larger stream to the east of the mill site.
- 4.6.8 A linear divert channel ran along the south side of the putative fulling mill structure (Site **LOG08**) (Plate 52). It is approximately 35m long, between 0.8m-2m wide and 0.3m-0.5m deep in places, and runs from the west of the mill platform feature eastwards towards a small sub-rectangular pond (Site **LOG07**; Fig 34), now masked by scrub vegetation. If the mill site is genuine then this feature would be a divert channel passing the mill and providing a water supply for a washing pond.



Plate 52: A possible section of divert channel running east from the mill site (Site **LOG08**).

- 4.6.9 **Other Features:** several other features were surveyed nearby which, collectively if indirectly, can be seen to support the interpretation of this site was a fulling mill. As already mentioned, the small sub-rectangular pond (Site **LOG08**), c 4.3m x 3m and up to 0.3m deep, could be a washing pond fed by a divert channel from the fulling mill.
- 4.6.10 There is a putative potash kiln (Site **LOG04**) consisting of a scooped oval depression cut into the eastern bank of the stream to the east of the site (Fig 34). This turf-covered bowl-shaped depression, 5m x 4m and up to 1.25m deep, has a slight lipped opening, 1.2 m wide, to the east, adjacent to, but higher than, the stream channel. The large size of the kiln, which is larger than a typical pot ash pit, can be interpreted to suggest that the kiln may have functioned as ‘white coal kiln’ or ‘chopwood kiln’. Such kilns dried timber primarily for use by lead smelters, although here are no documented lead smelting sites in the local area. The kiln (Site **LOG04**) may have been previously identified as a chopwood kiln by Mike Davies-Shiel, although his records place the kiln in the adjacent Great Ore Gate wood (Section 3.3.23).
- 4.6.11 Two other identified features are charcoal-burning platforms located adjacent to the head race or trackway (Site **LOG06**). These are associated with woodland industry which abounds in the surrounding region. One of the platforms (Site **LOG05**) is D-shaped, possible because it is overlain or cut by the head race or trackway channel (Plate 53 and Fig 33). It measures approximately 11.5m by 7m and is built up 0.3m higher than the surrounding ground surface on its east side. As already discussed, the relationship with the channel is uncertain, but the plan of the platform would suggest that the leat/trackway overlay the north-west side of the platform and was a later feature than it. The other sub-circular charcoal burning platform (Site **LOG09**; Fig 30) is well defined and situated on the steep hillside adjacent to the north side of the head race/trackway. It measures approximately 12.5m by 10m and is cut into the hillside up to 1m deep.



Plate 53: A charcoal burning platform located abutting or cut by the putative double head race (Site **LOG05**)

- 4.6.12 **Discussion:** there are a number of problems relating to the interpretation of the possible fulling mill site at Little Ore Gate. On initial inspection, the mill structure appears to be genuine; however closer investigation revealed very ephemeral, non-stone foundations. It is possible that the mill may have had thin, timber walls and wall foundations and a perishable roof, and such a building would have been capable of containing mill stocks and frame with a water-wheel suspended on the western gable end. The proposed water-management system, with its double head race, launder platform, tail race channel adjacent to the mill structure and divert channel leading away, also seems plausible on first examination. However, the existence of two leats seems difficult to explain given the size of the putative mill building and our understanding of the fulling process. The site has clearly been heavily disturbed by modern forestry processes that may have damaged an earlier site, and formed or exaggerated the two ‘head race’ channels by creating wheel ruts. A flimsy mill structure is unlikely to have survived being crossed by heavy forest machinery, such as that shown in Plate 54 which was observed on an access road extending out from the putative double leat.



Plate 54: example of heavy forest machinery that had the potential to impact on the putative fulling mill site

- 4.6.13 The putative double head race would have taken water from the main stream, following the contours around the hill on a slight gradient, but there is no evidence of a take-off point. It is possible to postulate that the head race passed onto a launder platform which fed the water-wheel and a divert channel running directly behind the mill. While the form of any putative mill is uncertain, the drop from the western end of the launder bank to the wheel location is up to 1.8m, so the launder could viably have fed an overshot wheel. Other features which may be seen to support the presence of a fulling mill are the putative washing pond (Site **LOG07**) located on the divert channel and the well-defined potash kiln (Site **LOG04**) nearby.
- 4.6.14 Alternatively, the ‘double head race’ channel was a woodland access trackway associated with at least two charcoal burning platforms. Although there is no doubt that the channel has been modified and damaged by forestry activity, and an access trackway depicted on the OS Second Edition mapping did continue from the western end of the feature, it contrasts in form with the other constructed forest tracks. It is peculiar that a track should be carefully constructed to follow the shape of the contours but not metalled, resulting in massive wheel ruts. Some of the elements surveyed may well relate to woodland management, possibly indicating re-use of the site in the eighteenth/nineteenth centuries, but others such as the rectilinear, two-celled structure and the potash kiln seem much more likely to be related to fulling. As it stands there is considerable doubt as to the interpretation of the structures and there exists the possibility that all of the features related to woodland management activities rather than fulling.

5. CONCLUSION

5.1 DISCUSSION

- 5.1.1 The present survey has investigated and recorded four, and possibly five, former fulling mills within the Windermere lake catchment. The distribution of the mills, except that at Little Ore Gate which was identified during an earlier phase of woodland survey (OA North forthcoming), was concentrated in the northern part of the catchment, centred on Grasmere and Langdale. This correlates well with the documentary evidence which indicates that this was an important area for fulling and weaving (*Section 3.1.4*). The reliability of the interpretation of the surviving remains as fulling mills varies significantly between each of the identified sites and is, in part, reliant upon the interpretation of the water-supply systems, rather than the mills themselves. The sites at Sourmilk Gill and Stickle Ghyll, were in the locales of documented medieval fulling mills (*Sections 3.1.4, 3.3.2 and 3.3.13*) and may indeed have medieval origins. The sites at Loughrigg Terrace and Low Wood may be of early post-medieval (fifteenth to seventeenth century) date, a period that coincided with the time when influential and wealthy local families acquired large estates and established regional monopolies in various industries. The most useful illustration of this emerging mercantile class is the Benson family who took a controlling interest in weaving and fulling in the central Lake District (*Section 3.1.10*).
- 5.1.2 **Mill Structures:** the Stickle Ghyll mill was, during at least one phase if not originally, a roofed, stone-founded structure, associated with a well-defined water supply system comprising a head race, wheel pit and tail race. The structure seen today is clearly a product of multiple phases of development and there is an implication that it had an extended life. Indeed, the Stickle Ghyll mill was referred to in the fifteenth century (*Section 3.3.13*) and was still a roofed structure, albeit as an agricultural building, as late as 1861 (*Section 3.3.14*); given that it was reused for agricultural activities it is uncertain as to what proportion of its life related to fulling activities.
- 5.1.3 At Sourmilk Gill, there are the substantial remains of a wheel pit, a water supply system including a large stone launder support, and a large platform for the mill, but the superstructure for this mill was probably of wood. There is a second phase stone structure, on top of the platform, but this did not necessarily relate to fulling.
- 5.1.4 Despite the survey, there has been little evidence for the internal workings of the mills. At Stickle Ghyll, part of the mill building survives but has been heavily modified. It has two vertical slots on the inside of the structure, on either side of the axle mount, but their function is uncertain. At Loughrigg Terrace, the platform is only 4.5m x 2.6m and 0.4m high and there is little evidence for any superstructure, and so it is possible to propose that the stocks and trough would not have been contained within a building. In any case, there would have only been room for a single stock hammer and trough. At Little Ore Gate, the putative mill structure was longer and two celled, being 8.7m long, but again was only 2.75m wide, and although slightly large than the Loughrigg Terrace platform, it is

unlikely, if this was a fulling mill, that it would have had space for more than one stock hammer and trough.

- 5.1.5 **Head and Tail Races:** the head and tail races were the most diagnostic features of all the mills, being visible and, in some instances, providing the most definitive evidence for a mill, notably at Loughrigg Terrace. The head race at Little Ore Gill was a very substantial series of earthworks, but this is perhaps misleading as these features may relate, in part or completely, to recent woodland management. For the most part, however, the head races were very small channels, as typified by the Sourmilk Gill which, in other respects, is the archetypal fulling mill. This reflects that most of the medieval fulling mills used overshot wheels requiring only a limited flow of water.
- 5.1.6 At two of the head races, that at Sourmilk Gill and Loughrigg Terrace, there was possible evidence for a dam like structure at the confluence of the leat and stream. In the case of Sourmilk Gill, this was a small structure edging the head race (Site **SMG10**), which may have been as much about limiting the flow down the leat in times of flood. Similarly at Loughrigg Tarn, the putative dam did not apparently extend across the main stream channel, but did support the edge of the main channel and again may have served to restrict the flow into the head in times of flood.
- 5.1.7 Wooden launders are essential at sites if motive power is to be undertaken using an overshot water-wheel, but the launders may originally have been insubstantial and impermanent structures leaving little evidence surviving today. Possible anchoring stones or steps are evident at Loughrigg Terrace which represents the only evidence for such a structure at this site, and at Sourmilk Gill there was a substantial launder platform albeit no launder. Although the wooden launders do not survive there is often a marked change in the form of the water-supply system in the environs of the mill that implies the existence of a launder. Well-designed leats extend towards the mill structures, but then stop some distance from them and above them, as at Sourmilk Gill, Stickle Ghyll and Little Ore Gate, implying that the flow continued through a now, no longer extant, water transport device *ie* a launder.
- 5.1.8 With the exception of the Low Wood mill, there are substantial drops between the potential take-off points for a launder and the mill structures which would have allowed for the presence of an overshot wheel. At Low Wood mill, the wheel was fed directly from the mill pond, and there was insufficient fall for an overshot wheel. On the other hand, there was a deep wheel pit and an adequate water reserve in the mill pond sufficient to have driven a breast-shot wheel. The fulling process took around three hours and there would have been sufficient water in the pond to power a breast shot wheel for such a period, this would imply that the period between fulling was determined as a minimum by the time taken to fill up the mill pond.
- 5.1.9 **Wash Ponds:** one of the interesting revelations of the survey is the existence of washing ponds at three of the mill sites. At Sourmilk Gill is a series of three small rectilinear ponds, being fed by the northern divert channel, each 1.3m across (Fig 5). At Low Wood, there was a large mill pond in front of the wheel pit, which included a terrace potentially for washing, and at Little Ore Gate a putative sub-rectangular pond (Site **LOG07**) was fed by a possible divert channel with a run-

off into the adjacent stream. At Loughrigg Terrace and Stickle Ghyll the areas downstream of the mill sites have been heavily landscaped, for a car park in the case of Stickle Ghyll and by footpath construction at Loughrigg Terrace, and these are likely to have resulted in the loss of evidence for any ponds. The fact that three do exist demonstrates that the washing of the cloth was a very important part of the process. This seems to have used the divert channel as a water source rather than the tail race, presumably in order to maintain a degree of control over the water flowing into the ponds. At Sourmilk Gill there are two divert channels, and it would have been possible to control the flow of water into either channel and as only one channel fed the ponds this would have allowed an on/off control of water to the ponds. The careful design of these elements suggest that the process of washing cloth needed to be more thorough than could be achieved by simply dunking the woollens in a nearby stream.

- 5.1.10 *Ancillary features:* associated with the fulling mills were a number of features that provide evidence of the wider operations undertaken at the sites. Most notably, potash kilns were present in which bracken was burnt to produce potash and provide one of the key components for fulling. These are typically found in the environs of fulling sites. Potash kilns were reported in the environs of four of the sites surveyed: at Sourmilk Gill there was a potash kiln at Brimmer Head (NY 2242 0857; Davies Shiel 1990); at Loughrigg there was one just above the terrace at NY 3407 056 (Davies Shiel 1990); at Low Wood there were two within the woodland; and at Little Ore Gate there was one very close to the mill (Site **LOG04**). In the latter case, the presence of a kiln may reinforce the interpretation of the site as a fulling mill. The relatively close association between fulling and potash production, highlights that the physical remains of the mill are only one visible component within a landscape that may have been heavily orientated around the production of cloth. There would have been many other activities, such as stock management, shearing, weaving, potash production, washing the cloth, bleaching and dyeing, and the drying of the cloth (tenter fields), only some of which would have left physical remains. Not all activities would have been at the site or the immediate environs of the fulling mill but there was a propensity for activities to be kept within the wider communities. A very degraded enclosure, which was probably a stock enclosure, (Site **SMG03**) was surveyed at Sourmilk Gill, Easedale near to the fulling mill, which was constructed of field clearance stone in marked contrast to the post-medieval sheepfold or washfold to the south-west, on the other side of the gill (Site **SMG15**). It is potentially of medieval date and could be contemporary with the period of operation of the fulling mill.
- 5.1.11 Fulling was, at least in the medieval period, bound up with manorial dues and communal practices, and it is interesting to note that a number of mills appear to have been deliberately sited on common land outside the farmed intake. The Sourmilk Gill mill was just outside an area of enclosed land, as shown by the present intake boundary and also the possible remains of medieval cultivation lying just within the enclosed lands. While this may be coincidental and reflect a need to exploit particular topography, it may also suggest that these mills were used by a number of farms within the manorial demesne and needed to be outwith individual farm holdings. This situation seemed to pertain at Loughrigg Terrace and at Stickle Ghyll, although the latter is now within enclosed lands. At Little Ore Gate, the mill is now within an area of coppiced enclosure but may have been

on common land in the medieval period. The mill at Low Wood is in a slightly different situation as it appears to be a post-medieval mill and was undoubtedly within the control and ownership of the Benson family of High Close.

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APPENDIX 1: PROJECT DESIGN

1.1 INTRODUCTION TO THE PROJECT

1.1.1 Oxford Archaeology North (OA North) has been invited to provide supervision and enablement for a community archaeology project of a series of former fulling mills in the Central Lake District at Easedale, Grasmere, Elterwater, and Gt Langdale, NY 3193 0868, 3431 0589 3370 0503, and 2941 0649 which is to be undertaken on behalf of the National Trust and financed by Heritage Lottery Fund, which is a part of the wider Windermere Reflections. OA North will provide supervision and guidance for a survey of the fulling mills and surrounding landscape, which has a rich archaeological resource.

1.1.2 This is one of three community survey projects being undertaken as part of the Reflections on History, project which is part of the larger Windermere Catchment Restoration Program. The aim of the project is to improve water quality and to bring environmental and economic benefits to the area. The first stage of the project was a GIS based study examining the woodland, water and mineral based heritage of the catchment of Lake Windermere undertaken by OA North (2010). This made recommendations for a series of community projects based around each of the three themes, and the present study is intended to develop the water theme. It will look at the use of water power for a series of four fulling mills in the central Lake District and within the catchment of the Lake.

1.1.3 OA North is required to provide training and supervision to undertake a desk top historical survey of information pertinent to each site, and will include historical maps, the database compiled as part of Stage 1, records held in the Armit Library and Kendal Record Office, and also aerial photographic plotting. Field surveys will entail detailed Level 3 surveys of four sites:

- Sourmilk Gill at Brimmer Head Farm, Easedale (NY 3193 0868)
- Loughrigg Terrace, near to the outflow of Grasmere Tarn (NY 3431 0589)
- Low Wood, Elterwater (NY 3370 0503)
- Stickle Ghyll, Great Langdale (NY 2941 0649)

1.1.3 A principle aim of the project is to involve the local community as widely as possible, and to provide new information on the wealth of archaeological remains in the area. This will entail providing a presentation of the results and guided walks to the volunteers make them aware of the rich heritage in the region. It will entail getting them directly involved in undertaking field surveys, the identification of historical records and to ultimately disseminate that information in reports, and updated records for the Lake District Historic Environment Record and the National Trust SMR.

1.2 BACKGROUND

1.2.1 **Fulling Mills:** fulling entailed a process of scouring, that is the cleaning of the cloth using ammonium salts from urine, and the thickening of cloth by matting the fibres together. The medieval fulling mills were water powered and entailed the beating of cloth with wooden hammers which were operated by cams on the shaft of the water driven wheel.

1.2.2 **Sourmilk Gill:** the fulling mill was worked by Rad De Greenrigge in the 1200s, and it was used by the occupants of the Grasmere and Langdale valleys. It has an extant building, wheel pit, head race, tail race, over flow channel; it also has a raised launder for an over shot wheel.

1.2.3 **Loughrigg Terrace:** this fulling mill is a rectangular building, and has a head race and a possible wheel pit beside the platform.

1.2.4 **Low Wood:** this mill comprises a rectangular pit and associated rectangular platform, with a tail race, head race and overflow channel.

1.2.5 **Stickle Ghyll:** this mill has been rebuilt as a Sheep Fold, and includes extant elements of the fulling mill, such as a thick wall for mounting a wheel bearing. It has an associated head race.

1.3 OXFORD ARCHAEOLOGY NORTH

- 1.3.1 **Outreach:** OA is committed to outreach. As an educational charity, OA seeks to promote an active public relations policy in relation to archaeology, and has a publications department that is experienced and fully equipped to provide general interest text and graphics for release to the press and general public in a wide variety of forms including display boards, leaflets and popular books. In certain circumstances it is possible to hold open days or install public viewing galleries on major sites. OA has considerable experience in the establishment of community based projects, and includes numerous training surveys and excavations. OA North has been providing the professional support for a programme of archaeological investigation into Lathom Park, nr Ormskirk, funded by Local Heritage Initiative. This involved the provision of expertise, training, and resources for surveys, excavations and documentary studies into the landscape associated with the major fourteenth century palace Lathom House. OA North has also been involved providing the consultancy and supervision for the excavation and survey of a complex enclosed settlement at Ingleton in conjunction with the Ingleborough Archaeology Group, and the supervision and of a survey of a nineteenth century designed landscape at St Catherine's Park, Windermere, on behalf of the National Trust, and the local community (See also Appendix 3 on OA North Community projects). OA North is presently undertaking a community excavation of a nineteenth century church, that was demolished when Stocks Reservoir was constructed in the early part of the twentieth century, and is being undertaken on behalf of United Utilities and the Forest of Bowland AONB.
- 1.3.2 **Holwick:** more recently OA North has undertaken a major survey of Holwick village and valley landscape in the North Pennines on behalf of the AONB and also Natural England. This entailed a broad range of survey techniques from specially flown oblique aerial photography, LiDAR, Documentary Studies, Identification Surveys, detailed surveys using a theodolite and Disto. The latter technique was designed to allow cheap, but efficient survey techniques that would be within the pocket of an amateur groups (the maximum budget for equipment was £300.00) and which would result in the plotting / draughting of the survey drawings on site.
- 1.3.3 OA North employs an experienced and qualified archaeological land surveyor, Jamie Quartermaine, who has considerable experience in training survey techniques. He has the expertise to train local teams in a broad and diverse range of low tech survey techniques that will be appropriate for the volunteers who do not have access to modern equipment.
- 1.3.4 **Landscape Archaeology:** OA North has considerable experience in the field of landscape survey work, particularly in the uplands of Northern England and Wales. Numerous surveys have been undertaken across the region and North Wales, and has taken the form of rapid identification surveys of large areas of unimproved land as well as detailed surveys of specific landscapes.

2.1 AIMS OF THE PROGRAMME

- 2.1.1 The primary aims of the project are as defined within the project brief and are as follows:
- To encourage local volunteers to gain an understanding of the history of catchment through surveying and researching their local history. The volunteers will learn techniques of surveying that they will be able to continue beyond the life of the project.
 - The information collated will be able to be used for interpretation purposes, in all the Windermere Reflections projects to inform local communities and visitors in the catchment.

The objectives of the project are as follows:

- To undertake outline documentary research into the fulling mills
- To map the fulling mills
- To undertake survey work in the environs of each mill
- To provide training for community volunteers in archaeological survey techniques

- 2.1.2 **Community Aims:** the project aims to seek a wide community involvement in the research and investigation of areas within the Lake District National Park, and to foster a wider community awareness of the rich cultural heritage in the local landscapes. It is intended to use the present project as a means of training volunteers, and others in the wider community, in archaeological recording techniques. Great emphasis will be placed on the virtue of survey techniques and to encourage a legacy of skills within the community. The project will therefore provide a capacity for further archaeological and historical research in the area.

3. METHODOLOGY

3.1 PROJECT PREPARATION

- 3.1.1 At the outset there will be a process of liaison between OA North, The National Trust, and the Lake District National Park Authority staff. This will entail defining the output formats for incorporation into the HER, and having a field visit to examine the known archaeology and refine the project methodology. OA North will liaise with the National Trust to enable a close co-operation with all the land owners to minimise impact on agricultural operations.

3.2 SURVEY TRAINING / OUTREACH

- 3.2.1 It is proposed to undertake a programme of survey training for members of the public at each of the four fulling mills. This would entail detailed field surveys followed by a desk-based study.
- 3.2.2 The first stage of the project will be a general, widely publicised, launch event in the field at either Grasmere or High Close (31st March or 1st April). This would provide a general introduction, and would include a localised walk around the more visible archaeological remains. It would also introduce a broad range of survey and recording techniques, which would range from basic techniques to the more advanced. It would include tapes, theodolites, plane tables, a total station with pen computer (to display the results), survey grade GPS, and a UAV (small model helicopter capable of carrying a light weight camera). The aim would be to introduce the volunteers to the proposed programme but also to raise interest. Experience of previous launch events (eg at Holwick) was that these attract lots of people, lots of interest and set the project off to a good start.
- 3.2.3 Following the open day a meeting will be held in OA North offices with the National Trust Archaeologist to agree which methods will be most applicable for each site and to refine the programme and methodology.
- 3.2.4 In the course of the documentary and survey work the volunteers would work closely with professional archaeologists, who would provide training and on-the-job experience. The volunteers would undertake survey work under close supervision from the OA North project supervisor, and learn how to identify documentary sources, and how to use the survey instruments and the general principles of survey. The character and significance of the archaeological landscape will be explained.
- 3.2.5 On completion of the project a final presentation will be established for all the volunteers and land managers, and dissemination to the community will be through an evening talk.

3.3 FIELD SURVEY

- 3.3.1 It is proposed that a detailed topographic survey be undertaken of four fulling mills at EH Level 3 (Ainsworth *et al* 2007).

Sourmilk Gill at Brimmer Head Farm, Easedale (NY 3193 0868): the survey will entail the recording of the fulling mill, and associated wheel pits, races and overflow channels. In addition it will include a ruined building just to the north of the site, evidence for a pack horse route, the nearby fell wall and Sheep Fold on the opposite side of the beck. An investigation will be undertaken for any possible tenter grounds in the environs of the site.

The site is covered in bracken which severely restricts visibility of the surface features. At the outset of the project the area around the fulling mill and water features will be cleared of bracken, and this will be undertaken by manual methods. It is anticipated that this will take a day.

Loughrigg Terrace, nr the outflow of Grasmere Tarn (NY 3431 0589): the survey will entail the recording of the fulling mill, associated wheel pit, and races. It will also include archaeological features on the north-west facing flank of Loughrigg and Penny Rock Wood.

Low Wood, Elterwater (NY 3370 0503): the survey will entail the recording of the fulling mill, associated wheel pit, and races. It will also include archaeological features in Low Wood and Christie Wood, including charcoal burning platforms, potash kiln, and access tracks

Stickle Ghyll, Great Langdale (NY 2941 0649): the survey will entail the recording of the fulling mill and race. The possibility of possible tenter grounds will also be investigated.

3.3.2 **Survey Methods:** it is intended that this primarily serve as a training exercise for the volunteers, so the survey techniques will be devised to be easy to understand, and will allow for plotting in the field, and is easily affordable by volunteers. This will inevitably mean the use of more outdated technologies, and will have a significant impact on productivity. There is a broad range of survey options that can be achieved by volunteers with access to non-expensive equipment, and it is proposed to introduce the volunteers to a range of techniques and then concentrate the survey using the plane table and tape offset. In addition all four sites will be surveyed using high level photography, with respect to survey control established by GPS / total station. Similarly a gazetteer and photographic record will be compiled. Details of these techniques are outlined below.

- **Chain / Tape survey:** traditionally this is done with survey chains, however, survey chains are difficult to come by now and so surveys would typically be undertaken using fibron tapes. The technique has the advantage that it can be drawn up on site and is easy to understand, but is error prone on sloping sites and is time consuming. The technique will be applied at those sites which have a relatively flat ground surface without too much undulations or surface vegetation.
- **Plane Table / Alidade:** the technique has the advantage that it produces the drawing in the field and can cope well with sloping sites. The use of a plane table is effective in allowing volunteers to understand the principles of surveying. Using stadia tacheometry an alidade has an effective distance measurement capability of 150m (assuming moderate accuracy), but it is difficult to train volunteers in this technique. The alternative is to bring the technique up to date by mounting a cheap Leica Disto on top of the telescope of the alidade. This provides accurate distance measurement up to a distance of 120m and significantly eases the use of the equipment, and therefore makes it more productive. The application of a disto on both a theodolite and an alidade on the recent Holwick project was found to be a very successful approach.
- **High Altitude Photography:** it is proposed to record the sites and immediate environs by means of high altitude photography, which, using specialist photogrammetric software, can be used to create accurate three dimensional models of the site and topographic surfaces. There are two means of achieving this by means of an extendable mast or using a UAV. The mast has a maximum height of 8m, and for small sites it is very effective in that it can provide high resolution surface images for the modelling process. However, for more extensive sites it generates more photographs than the software can handle. The alternative is the use of the UAV, which provides photography from any altitude up to approximately 80m height. Survey control is introduced to the photographs by the placement of survey control targets across the site which are located by means of survey grade GPS.

The photogrammetric processing is undertaken using Agisoft software which provides detailed modelling using the overlap of up to 30 photographs, and creates a very detailed DTM (Digital Terrain Model) across the site. The photographs are then digitally draped over the model to create an accurate three dimensional model of the ground surface. The primary output, however, is an accurate two dimensional image which can be used to generate accurate plans or profiles.

- **Theodolite Survey (optional):** the use of a theodolite is not specified within the brief but is presented here as an option to be used in conjunction with the plane table. OA North has only one plane table / alidade and if it is required that two instruments are used simultaneously then it is proposed to use a theodolite / Disto combination as well. The data would be drawn up in the field using an accurate film based protractor and ruler.

3.3.3 **Survey Control:** it is proposed that survey control be introduced to the sites by means of a high accuracy survey type differential GPS where possible. This can achieve accuracies of +/- 20mm, and will ensure that the survey is accurately located onto the Ordnance Survey National Grid. If at any of

the sites there is no mobile reception (necessary to provide corrections for the GPS) then the control will be established by means of a total station.

3.3.4 **Detail Survey Overview:** the detail survey by plane table / tape will record all structural and earthwork components, which will be drawn by hachure survey. Survey points will be marked on the ground using spray paint and the survey drawing will be manually drawn up with respect to them. On completion of the survey the field drawings will be digitised into a CAD system. The survey will record all archaeological features, earthworks and elements. The survey will aim to identify, locate and record all built elements of the landscape.

3.3.5 **Gazetteer:** a descriptive record of all features will be compiled using a standard proforma, which will incorporate a provisional interpretation of the function of the site / feature, where possible, and similarly will provide a provisional interpretation of the site's chronology where possible. Once the digital gazetteer has been collated and edited, it will be output as an Access Report and input directly into a Microsoft Word format. The gazetteer output will be compatible with the NT SMR and the LDNPA HER. This data will be formatted and topped and tailed within word to produce the gazetteer volume for the survey project. The description will include the following fields:

- NTSMR Number
- LDNP HER number
- Site Number
- Form
- Site Name
- NGR
- Site Description
- Monument Type
- Period
- Interpretation
- Dimensions
- Threats
- Management
- Photo reference
- Condition
- Surveyor
- Date of survey

3.3.7 **Photographic Record:** a photographic archive will be generated in the course of the field project, comprising landscape and detailed photography. Detailed photographs will be taken of the archaeological features using a scale bar. All photography will be recorded on photographic proforma sheets which will show the subject, orientation and date. The photography will be undertaken using a digital SLR camera with 8 megapixel resolution.

3.4 DESK-BASED STUDY

3.4.1 A desk-based study will be undertaken by volunteers and members of the wider community, but will be directly supervised and guided by staff of OA North. It is intended that training be provided for those members of the public who are particularly interested in this aspect, and it should be recognised that there is only limited space available at both the Kendal record office and the Armit Library and it may be necessary to restrict numbers of volunteers. The study will provide training in the use of desk-based techniques, and how and where to obtain documentary sources pertinent to the study.

3.4.2 The documentary study will seek archaeological information pertinent to the study area, such as earlier investigations of the site or aerial photography that may provide a valuable insight into the character of the study area. It will seek to reconstruct, primarily through mapping sources, how the landscape has developed within the last two or three hundred years. The data generated during the desk-based study will provide the basis for an assessment of the nature and significance of the known surface and subsurface remains. It will also serve as a guide to the archaeological potential of the study area. This work will obtain background information pertinent to the present study, and will draw upon historical mapping and database sources. It will include an appraisal of County histories, early maps, and such primary documentation (tithe and estate plans etc.) as may be reasonably available. Published documentary sources will also be examined and assessed and any potential transcribed early documents will be examined. This work will access the following repositories:

Cumbria Record Office (Kendal), Armit library (Ambleside), Lancaster University Library and the OA North library. It is anticipated that the study will entail four days spent in the record office and Armit library. Good scanned and photographic copies will be obtained of maps and illustrations where possible.

- 3.4.3 **LiDAR plotting:** LiDAR at 1m resolution is also available, which is of sufficient resolution to be able to inform the survey, and it is proposed to purchase two 1sqkm tiles of data as part of the project. The aerial photography will be examined in conjunction with the LiDAR and, if features are shown on both, then plotting will be undertaken from the LiDAR as it is the more accurate. The aerial photography and LiDAR will be used during the survey by the volunteers as they field walk the area around the fulling mills to get a wider context for the sites.
- 3.4.4 **Aerial Photography:** oblique aerial photography is a valuable tool for examining and assessing the sites, so long as there is not a thick bracken vegetation cover across the ground (which there is at Sourmilk Gill). Where there is not thick vegetation cover it is proposed to undertake targeted oblique photography. Depending upon the site, this will either be undertaken from a light aircraft (based from Blackpool Airport) or more likely it will be from a small UAV (Unmanned Aerial Vehicle). The latter is a small electrically powered model helicopter which has the ability to carry a light weight camera up to altitudes of 250 feet. The advantage of the UAV is that it can take photographs from much lower altitudes than can legally be achieved with a light aircraft, but it is not easily targetable, so it typically provides blanket photographic coverage across the area. As far as possible the transcription of photographs will be undertaken by volunteers and the information will be superimposed on the modern and historic mapping within a CAD system.

3.5 REPORT PRODUCTION

- 3.5.1 **Archive:** the results of the management programme will form the basis of a full archive to professional standards, in accordance with current English Heritage guidelines (*The Management of Archaeological Projects, 2nd edition, 1991*). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. This archive will be provided in the English Heritage Central Archaeological Services format. A synopsis (normally the index to the archive and the report) should be placed in the Lake District Historic Environment Record. The archive will include the raw survey digital data in AutoCAD format. A copy of the revised SMR will be deposited with the ADS.
- 3.5.2 **Report:** the report will present, summarise, and interpret the results of the programme detailed in Stages 3.1-3.5 above, and will include a full index of archaeological features identified in the course of the project. The reports will consist of an acknowledgements statement, lists of contents, summary, introduction summarising the brief and project design and any agreed departures from them, a methodology and a statement of the project aims. The report will include a record of all the volunteers who have contributed to the project.
- 3.5.3 The report will identify the significance of the archaeological and architectural evidence and will also include the following:
- An outline history of fulling mills in the region
 - An historical background of the four fulling mills
 - Results of the survey, presented in conjunction with survey mapping of the fulling mills and environs
 - A discussion presenting an interpretative account of the fulling mills, and their context within the landscape and their relationship to local communities
- 3.5.4 The report will also include a complete bibliography of sources from which the data has been derived, and a list of further sources identified during the programme of work. An appendix gazetteer of sites which will be based directly upon the project database and will be compatible with the Lake District HER and NTSMR.
- 3.5.5 The report will incorporate appropriate illustrations, including copies of the site plans, detailed survey plans of each fulling mill, maps of the wider landscape, all reduced to an appropriate scale. The site mapping will be based upon the CAD base. The report will be accompanied by photographs and historic illustrations illustrating the principal elements of the landscape.

3.5.6 **Editing and submission:** the report will be subject to the OA North's stringent editing procedure; then a draft will be submitted to the National Trust for consultation. Following acceptance of the report, six bound copies of the report (and digital copy) will be submitted to the National Trust and to the LDNPS HER. A summary of the work will be provided for OASIS.

3.6 OTHER MATTERS

3.6.1 **Access:** the sites are on open access land or in the ownership of the National Trust, but parking at the Easedale site is restricted and will require that only a very limited number of cars are used to ensure the maintenance of good relations with the farmer.

3.6.2 **Health and Safety:** full regard will be given to all constraints during the survey, as well as to all Health and Safety considerations. The OA North Health and Safety Statement conforms to all the provisions of the SCAUM (Standing Conference of Unit Managers) Health and Safety manual. Risk assessments are undertaken as a matter of course for all projects, and will anticipate the potential hazards arising from the project.

3.6.3 **Insurance:** insurance in respect of claims for personal injury to or the death of any members of the public in the course of the project will be covered by OA North, who has insurance cover which complies with the employers' liability (Compulsory Insurance) Act 1969 and any statutory orders made there under. For all other claims to cover the liability of OA North in respect of personal injury or damage to property by negligence of OA North. The insurance cover is as follows:

- £10 million public liability
- £10 million employers liability
- £5 million professional indemnity

4. WORK TIMETABLE

4.1 The proposed timetable is defined in the brief and is reproduced below:

- 31st March / 1st April Opening Field Meeting
- 9th – 13th April Easedale Survey
- 16th – 20th April Loughrigg Terrace Survey
- 23rd to 27th April Low Wood Survey
- 30th April to 4th May Stickle Ghyll survey
- 7th – 10th May Archive Research
- The submission for the draft report is mid June 2011

5. RESOURCES

5.1 OA NORTH PROJECT TEAM

5.1.1 The survey will be undertaken by Peter Schofield (Project Officer) and Alastair Vannan, under the guidance of the project manager, Jamie Quartermaine. The reports will in part be written by members of the society, and part by staff of OA North. The OA North element of report production will be split between Peter and Alastair.

5.1.2 **Project Management:** the project will be under the project management of **Jamie Quartermaine, BA Surv Dip MIFA** (OA North Project Manager) to whom all correspondence should be addressed. Jamie is a very experienced landscape surveyor, who has undertaken or managed literally hundreds of surveys throughout Northern England since 1984, and has considerable experience of working on similar projects to that proposed. He has managed a major recording programme of Lyme Park, Cheshire, and very detailed surveys of the South West Fells including areas such as Barnscar and Burnmoor. He has also undertaken surveys of Lowther Park, Cumbria, Rufford Park, Lancashire and has also managed the recording programme of Lathom Hall and Park, Lancashire and the survey of the Forest of Bowland for United Utilities. He has been a project manager since 1995 and has

managed over 250 very diverse projects since then, which are predominantly survey orientated, but of all periods from the Palaeolithic to the twentieth century.

- 5.1.3 Jamie is a qualified land surveyor (Topographic Sciences Diploma Glasgow University) and has an exhaustive knowledge and understanding of surveying techniques. He regularly runs training courses in survey techniques and has the expertise to devise a variety of low tech survey techniques for training volunteers.
- 5.1.4 **Project Surveyors:** the survey will be undertaken by **Peter Schofield** and **Alastair Vannan**. **Peter Schofield** (OA North Project Officers). Peter works full time on landscape surveys across the north-west. He has undertaken surveys at Hardknott Forest, Cumbria, Hartley Fold Estate, Cumbria, Ennerdale Valley, West Cumbria, a major programme of landscape survey across nine upland areas in North Wales, Little Asby Common for the Friends of the Lake District, and the Holwick and Force Garth surveys, Teesdale. With the exception of Jamie Quartermaine, he is our most experienced landscape archaeologist.
- 5.1.5 **Alastair Vannan:** Alastair Vannan has considerable experience in the survey of upland landscapes. Fore example he undertook with Peter the surveys of Buttermere and Nether Wasdale on behalf of the National Trust. He also has considerable experience of documentary work and undertook both the documentary study for the recent Holwick community survey, but also supervised the field teams. Alastair would undertake the documentary study for the proposed fulling mill survey. Alastair has been leading a number of community excavations, which included the major excavation of Lathom House (nr Ormskirk), and also the excavations of Stocks Church, Forest of Bowland.
- 5.1.6 **David Maron:** support for the surveyors will be provided by David Maron, who has considerable experience of assisting with surveys from all across the country. He was formerly a head teacher and has a remarkable aptitude for training volunteers.

APPENDIX 2: PROJECT BRIEF

Invitation to Tender: Community based survey and investigation of former fulling mills in Easedale, Grasmere, Elterwater and Great Langdale, Cumbria

1 Introduction

The National Trust is inviting tenders for various archaeological services that will facilitate the survey, investigation and recording of the remains of four former fulling mills. The first site is located on the eastern bank of Sourmilk Gill, close to the point where the beck enters the enclosed land belonging to Brimmer Head Farm in Easedale (NGR NY3193 0868). The second site is located close to the outflow of Grasmere Tarn and alongside a small beck fed by a small tarn to the south-west of Ewe Crag above Loughrigg Terrace (NY3431 0589). The third site is located in Low Wood which once formed part of the High Close Estate, located between Grasmere and Elterwater (NY 3370 0503). The fourth site is located close to the Stickle Barn Tavern and Stickle Ghyll in Great Langdale and has been rebuilt as a Sheep Fold (NY 2941 0649).

The location of these four sites are highlighted on the attached maps in Appendix 1.

The contractor will be required to approach and undertake the specified program of archaeological services as a 'community engagement' focused event, providing support and training in archaeological skills to groups of volunteers. The initial recruitment of volunteers falls outside the contractor's brief, although the management and supervision of volunteers, along with a responsibility for their safety and welfare while on-site, is the responsibility of the contractor.

2 Project background

This campaign of survey forms one third of the 'Reflections on History' project, which will deliver community focused archaeological events on the themes of woodland, water and minerals between 2011 and 2013. 'Reflections on History' is part of the larger 'Windermere Catchment Restoration Program' which has secured a grant from the Heritage Lottery Fund to run 'Windermere Reflections', a catchment wide project that will improve water quality and bring environmental and economic benefits to the area. 'Reflections on History' is one of seventeen conservation and community focused to be delivered under the banner of 'Windermere Reflections'.

The stated aims of this project as stated in the application to the Heritage Lottery Fund are twofold:

- The aim of the project is to encourage local volunteers to gain an understanding of the history of the catchment through surveying and researching their local history. The volunteers will learn techniques of surveying that they will be able to continue to use beyond the life of the project.
- The information collated will be able to be used for interpretation purposes, in all the Windermere Reflections projects, to inform local communities and visitors in the catchment.

The final project bid accepted by the Heritage Lottery Fund included a target that the project would utilise a minimum of 120 volunteer days. The means by which this figure is reached is flexible, however this brief has been based on using a team of six volunteers on-site each day for a total of 20 days (over a four week period) in order to complete the survey of all four mills. Any additional volunteer days collected during the subsequent archive research phase would take the project above and beyond the minimum target set down in the final project brief accepted by the Heritage Lottery Fund.

3 Site background

3.1 Sourmilk Gill, Easedale

The former fulling mill located on the eastern bank of Sourmilk Gill in Easedale (NGR NY3193 0868) is covered in bracken for much of the year. However, preliminary investigation has revealed that the remains of former rectangular mill building, wheel pit, launder support, bridge footings, Head Race, Tail Race and overflow channel can be seen. A small ruinous stone building also exists approximately 100m north of the mill, it is not known if this relates to the nearby mill. There are a

number of surviving Medieval references that suggest the mill was worked by one Rad De Greenrigge in the 1200's and that there a toll was paid by Langdalian to Grasmarians for bringing wool over the route via Pye How to Sourmilk Gill. It was this toll that led to the construction of the fulling mill at Stickle Ghyll!

The mill alongside Sourmilk Gill is located on land owned by the Lowther Estate and currently let and managed by the National Trust. As registered common land Easedale Common is grazed by sheep belonging to a number of farms in the neighbouring valleys. The site is situated close the bridleway from Far Easedale to Easedale Tarn which is a popular visitor route, Easedale Common is classified as open access land and therefore has unrestricted public access.

The site appears on the National Trusts Sites and Monuments Record (NTSMR 23039), but is absent from the Lake District National Park Authority Historic Environment Record. The site is not designated.

3.2 Loughrigg Terrace, Grasmere

This site is located close to the outflow of Grasmere Tarn and alongside a small beck that has its source in the form of a small tarn to the south-west of Ewe Crag above Loughrigg Terrace (NY3431 0589). The site is fairly conspicuous as a clearly artificial rectangular building platform with a grassy covering, located on the edge of a large bracken bed which covers much of the lower flank of Loughrigg. Preliminary investigation has identified evidence of a head race and possible wheelpit above and alongside the building platform.

Loughrigg Fell is owned by the Lowther Estate and currently let and managed by the National Trust. As registered common land Loughrigg Fell is grazed by sheep belonging to a number of farms in the neighbouring valleys. Loughrigg is classified as open access land and therefore has unrestricted public access.

Surprisingly this site is absent from the National Trusts Sites and Monuments Record and Lake District National Park Authority Historic Environment Record. The site is not designated.

3.3 Low Wood, Elterwater

The former fulling mill located along the course of a small beck in Low Wood, located some 250 south-west of High Close Youth Hostel (NY 3370 0503). The site is located in former coppice and standard woodland with little in the way of understorey. Preliminary investigation has identified the site of a possible unpowered fulling mill, recognisable as a rectangular sunken pit with a rectangular platform on the western side. Below this a long straight Tail Race which runs for around 80m before ending at the site of another possible structure. A Head Race and overflow channel are also evident. The surrounding woodlands contain numerous other archaeological features, including access tracks and a potash kiln presumably associated with the fulling mill. Some of the previous owners of the High Close Estate have had close associates with the cloth trade and it is possible that documents might survive from the seventeenth and eighteenth centuries that mention the fulling mill.

The mill in Low Wood is located on land owned by the National Trust. The woodland is not grazed, other than by wild deer. Low Wood has free public access and can be accessed by visitors to High Close Youth Hostel.

Surprisingly this site does not appear on the National Trusts Sites and Monuments Record and is also absent from the Lake District National Park Authority Historic Environment Record. The site is not designated.

3.4 Stickle Ghyll, Great Langdale

The former fulling mill located to the north-east of Stickle Barn Tavern and south of Stickle Ghyll appears to have been rebuilt as a simple single cell Sheep Fold (NY 2941 0649). The walls of the Sheep Fold stand well over 1m in height, possibly incorporating fabric from the former fulling mill. One wall, which may have supported a waterwheel, is more than twice as thick as other walls. Gaps and rebuilds can be identified along other walls suggesting that close recording and analysis would be rewarding. A partially cut put Head Race can be seen which still runs with water collected from Stickle Ghyll.

The mill alongside Sourmilk Gill is located on land owned by the Lowther Estate and currently let and managed by the National Trust. As registered common land Langdale Fell is grazed by sheep belonging to a number of farms in the valley. The site is situated close the popular public footpath to

Stickle Tarn. Langdale Fell is classified as open access land and therefore has unrestricted public access.

The site appears on the National Trusts Sites and Monuments Record (NTSMR 23039), but is absent from the Lake District National Park Authority Historic Environment Record. The site is not designated.

4 Project methodology

4.1 The different components and methodology for the survey and investigation are set out below:

4.1 Sourmilk Gill, Easedale

The proposed survey and investigation of the former fulling mill alongside Sourmilk Gill will include the following:

- Removal of all dead bracken from the site, including all structures and associated watercourses. This is expected to take one full day.
- Survey of the mill and associated features using a plane table and alidade.
- Survey of the mill and associated features using high level digital photography (utilising an extending pole).
- Creation of a site grid using a combination of EDM and GPS technologies.
- Creation of a written gazetteer based on the collection of information in the field using a standard site record form. The gazetteer should include information to be incorporated into the final site report and entry on the National Trust Sites and Monuments Record (NTSMR)/ Lake District National Park Authority Historic Environment Record (HER). The gazetteer should include the following mandatory description fields: site number, site name, NGR, site description, monument type (using the English Heritage site thesaurus or similar), period, condition, threats, management recommendations and photo ref.
- A standard digital photographic record of all sites and features identified during the survey.
- The survey of the fulling mill alongside Sourmilk Gill should also include the ruined building 100m to the north, any evidence of the original packhorse route to Great Langdale via Pye How (within 200m of the mill) along with the fell wall to the south and the intake field and Sheep Fold on the opposite bank.
- The survey should be extended into the neighbouring pasture fields to identify and record any evidence of tenter grounds (subject to permission for access).

4.2 Loughrigg Terrace, Grasmere

The proposed survey and investigation of the former fulling mill alongside Loughrigg Terrace will include the following:

- Survey of the mill and associated features using a plane table and alidade or tape offset survey.
- Survey of the mill and associated features using high level digital photography (utilising an extending pole).
- Creation of a site grid using a combination of EDM and GPS technologies.
- Creation of a written gazetteer based on the collection of information in the field using a standard site record form (as previous).
- A standard digital photographic record of all sites and features identified during the survey.
- The survey of the fulling mill in Low Wood should also be broadened out to include all other features of archaeological interest on the north-west facing flank of Loughrigg and Penny Rock Wood on the opposite river bank.

4.3 Low Wood, Elterwater

The proposed survey and investigation of the former fulling mill in Low Wood will include the following:

- Survey of the mill and associated features using a plane table and alidade or tape offset survey.
- Survey of the mill and associated features using high level digital photography (utilising an extending pole).
- Creation of a site grid using a combination of EDM and GPS technologies.
- Creation of a written gazetteer based on the collection of information in the field using a standard site record form (as previous).
- A standard digital photographic record of all sites and features identified during the survey.
- The survey of the fulling mill in Low Wood should also be broadened out to include all other features of archaeological interest in Low Wood and neighbouring Christle Wood. Archaeological sites within the wood include charcoal burning platforms, a pot ash kiln, ruined walls and a series of well made carriage tracks associated with the High Close Estate.
- The survey should be extended into the neighbouring pasture fields to identify and record any evidence of tenter grounds (subject to permission for access).

4.4 Stickle Ghyll, Great Langdale

The proposed survey and investigation of the former fulling mill situated near Stickle Ghyll will include the following:

- Survey of the mill and associated features using a plane table and alidade or tape offset survey.
- Survey of the mill and associated features using high level digital photography (utilising an extending pole).
- Creation of a site grid using a combination of EDM and GPS technologies.
- Creation of a written gazetteer based on the collection of information in the field using a standard site record form (as previous).
- A standard digital photographic record of all sites and features identified during the survey.
- The survey should be extended into the neighbouring pasture fields to identify and record any evidence of tenter grounds (subject to permission for access).

4.2 Archive and documentary research

There is a wealth of documentary and cartographic information available for fulling mills which would add a great deal to our understanding and interpretation of the two sites under investigation.

While there is no scope within the current project for detailed investigation of primary source material, some assessment of the readily available secondary source material should be undertaken.

The contractor should anticipate visiting the following local archives.

- *Kendal Records Office – 2 days.*
- *Armitt Library – 2 days.*

In each case the contractor should seek to obtain good copies (or photographs of relevant parts) of all historic maps and other documents considered particularly important to the project and reproduce them within the final report.

4.3 Report writing

After the completion of the fieldwork and documentary research, the contractor should use the information generated to produce a comprehensive and well illustrated report that brings together and presents the results of the investigations. The report should include the following:

- a description of the project and its methodology,
- an outline of the history of fulling and fulling mills in the region,
- a summary of the known historical and social history of the four fulling mills investigated based upon secondary source material,
- a detailed and annotated survey drawing of each fulling mill along with a survey map showing other recorded sites in the vicinity if appropriate,
- a complete photographic record of all four fulling mill sites,
- a complete gazetteer of all sites recording during the project at the four locations.

4.4 Presentation of results

In addition to the work described above, the contractor will be required to prepare and deliver a presentation on the results of the site survey and documentary research at a to an audience of project volunteers shortly after the completion of the report. The responsibility for booking a venue and advertising the event will fall to the National Trust Archaeologist.

5 *Survey outputs*

On completion of the program of archaeological works listed above a draft report containing the results of the investigations at both sites should be completed and passed to the National Trust Archaeologist for comment and review. The draft report should include copies of all maps, photographs and other illustrations that will appear in the final report.

The draft report will then be examined and any comments returned to the contractor along with any suggested amendments within seven days.

After reviewing comments on the draft report the contractor will provide the following to the Windermere Reflections partnership.

Six bound paper copies of the report. Each copy should be accompanied by a set of paper plans if not included in the bound report.

Three separate digital copies of the complete report (including all digital mapping information in formats compatible with both MapInfo Version 7 and AutoCAD packages). The digital media should also include complete and 'ready to print' copies of the project report in both Word and PDF formats. Please note that the PDF version should be suitable for sharing via e-mail (i.e. less than 10MB in size).

A series of files that contain hard copies (or digital folders containing digital copies) of all archive and documentary information examined as part of the project.

6 *Site conditions*

The sites of all four fulling mills are located in areas with unrestricted public access, the sites at Easedale, Loughrigg and Suckle Ghyll being located on open access land, and the site in Low Wood being owned by the National Trust. However, there are certain access restrictions that the contractor should be aware of.

Parking in Easedale is notoriously difficult, even in early April. As such the National Trust has made arrangements to park a maximum of three vehicles in the farmyard at Brimmer Head Farm, a short distance from the site. Therefore we ask that the contractors make arrangements to arrive on site in a single vehicle. It is critical that contractors do not try and park on the road into Easedale as this might endanger the existing goodwill towards the project from the local community!

Volunteers will be asked to meet at the National Trust's office in Grasmere and travel to Brimmer Head Farm in two cars. This system will be established and supervised by the National Trust Archaeologist.

There is currently no easy access across Sourmilk Gill to the fulling mill site. However, the National Trust have already agreed to install a wooden footbridge alongside the fell wall by the start of April 2012.

There are no difficulties with accessing the fulling mill site in Loughrigg, Low Wood and Stickle Ghyll. There is ample parking for contractors and volunteers in the overflow car park adjacent to High Close Youth Hostel which can be utilised for the surveys at Loughrigg and Low Wood. The National Trust car park will be available for use for contractors and participants free of charge during the survey at Stickle Ghyll.

7 *General terms*

The Windermere Reflections partner organisations will retain copyright over the resulting report and all associated archival material (including all digital maps and photographic material), and shall have absolute control over the use and dissemination of that information. The Windermere Reflections partnership fully recognises the originator's moral right to suitable accreditation in any publication of the results.

It is the policy of the National Trust to deposit copies of all surveys undertaken on its land with the appropriate regional archives, authorities and organisations. The National Trust will also deposit a copy of the updated Sites and Monuments Record with the Archaeological Data Service based in York.

The project will be undertaken by the contractor acting on an independent basis. Staff working on the project will not be deemed employees of the National Trust. Tenders should reflect this fact and more specifically the Contractor will take sole responsibility for the payment of tax, National Insurance contributions, etc. If VAT is payable, this too should be indicated in the bid.

8 *Timescale*

Given the 'community engagement' focus of this project it is critical that the professional contractor can commit to delivering this project to a fixed timetable. A proposed timetable (to be discussed with the contractor as part of the tendering process) appears below.

We recommend that a introductory session and guided walk open to all volunteers be held in Grasmere or at High Close YHA on either the 31st March or 1st April. The responsibility for booking this venue falls to the National Trust.

Survey and investigation of the site at Easedale will take place over five days between the 9th to the 13th April 2012.

Survey and investigation of the site at Loughrigg will take place over five days between the 16th to the 20th April 2012.

Survey and investigation of the site in Low Wood will take place over five days between the 23rd to the 27th April 2012.

Survey and investigation of the site in Stickle Ghyll will take place over five days between the 30th to the 4th May 2012.

A short campaign of archive research and volunteer training based at the Armit Library and the Public Records Office in Kendal will then take place from the 7th to the 10th May 2012.

The contractor should then produce a draft report by the middle of June and a final report by the end of June.

The contractor should then allow time for the production of an attractive and thoroughly prepared presentation on the results of the survey by the end of June/ start of July.

The contractor should indicate their availability for carrying out this work within the timescale indicated above as part of their bid.

9 Costing

We ask that contractors provide the client with a detailed break down of costs as part of the tender including travel, accommodation, report writing and production etc. Specific costs will be needed for all elements of the work program (on-site staffing, materials, documentary research, report writing, preparation for presentation etc).

The contractor should feel free to add in costs for any other task that they believe might be useful or add value to the project in order to create a 'shopping list' of items that can then be incorporated into the project if the required.

10 Contacts

Please send tenders to:
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Archaeological Consultant
The National Trust
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APPENDIX 3 SURVEY GAZETTEER

SOURMILK GILL SITES

Site Number SMG01
Site Name Structure, Sourmilk Gill, Easedale
LDNPHER 35921
NGR NY 31900 08725
Type Structure
Period Post-medieval
Description A sub-rectangular stone feature measuring 9m by 3.5m located on the north bank of Sourmilk Gill. The sunken area measuring some 3.8m by 3m is contained and defined by what appears to be a series of deliberately placed field clearance boulders, measuring 3.8m by 3m. The original form and function of this feature is not clear from initial inspection. It is possible that the feature is entirely natural in origin. It is located approximately 1m south-east of a stone structure, likely to be a shepherd's hut or peat hut (Site SMG02).

Site Number SMG02
Site Name Structure, Sourmilk Gill, Easedale
LDNPHER -
NGR NY 31896 08730
Type Structure
Period Post-medieval
Description A single celled sub-rectangular stone-built structure. It measures approximately 4.5m by 3.7m and has a gable end surviving on the north-west end which would suggest an originally pitched roof to the structure, although there are no slates evident surrounding it. Much of the eastern end of the structure has collapsed and the rubble has been removed from the site. There is a probable entrance on the south-east side and a small sub-rectangular annex is attached to the western wall of the structure. There is a levelled platform cut into the slope to the north of the structure measuring 4m square. This feature may have found use as a shepherds hut or as a peat hut.

Site Number SMG03
Site Name Stock Enclosure, Sourmilk Gill, Easedale
LDNPHER -
NGR NY 31959 08731
Type Stock Enclosure
Period Post-medieval
Description The sub-square stone foundations of a stock enclosure measuring approximately 13.5m square. The walls survive only as a foundation course of double-thickness stones and surface-gathered stones. It incorporates earthfast stones and a large natural boulder on the east corner. An accumulation of stone in the north-west internal corner may be collapsed walling or, alternatively, represent a badly eroded sub-rectangular platform with retaining stones. The alternative possibility is that it was related to the fulling mill and perhaps served as a storage yard for cloth and raw materials associated with the fulling; however, it is extremely large given the relatively small size of the fulling mill and was not roofed, which would probably be prerequisite for storage.

Site Number SMG04
Site Name Washing Ponds, Sourmilk Gill, Easedale
LDNPHER 35921
NGR NY 31990 08685

Type Pond
Period Medieval to Post-medieval
Description An adjoining series of three small pools that each measure approximately 2m square. They are located downstream of the fulling mill adjacent to a modern field wall and are on the course of a divert channel near its outflow into Sourmilk Gill (Site **SMG09**). The water flows between the separate ponds in a broadly cascading arrangement, and the southernmost pond is roughly stone-lined on two sides. The ponds may have had an industrial washing purpose associated with the nearby fulling mill (Site **SMG11**).

Site Number **SMG05**
Site Name Putative bridge Abutment, Sourmilk Gill, Easedale
NTSMR -
LDLDPHER -
NGR NY 31985 08669
Type Bridge
Period Medieval to Post-medieval
Description A slightly domed sub-oval grass-covered area located within the south side of Sourmilk Gill. It measures approximately 6.5m by 2m and, due to its alignment with the walled outgang lane, running onto the common may have originally functioned as a bridge abutment.

Site Number **SMG06**
Site Name Head Race, Sourmilk Gill, Easedale
LDNPHER 35921
NGR NY 31914 08719 to NY 31932 08708
Type Head Race
Period Medieval to Post-medieval
Description The head race for the fulling mill (Site **SMG11**). It is orientated roughly north-west/south-east and is cut into the gently sloping north bank of Sourmilk Gill. It measures approximately 21m long and at its western end is roughly 0.55m wide and up to 0.3m deep. At the eastern end the head race is aligned with a stone founded launder support (Site **SMG08**) and excess water is controlled by a pair of divert channels (Sites **SMG07** and **SMG09**) that skirt either side of the mill.

Site Number **SMG07**
Site Name Divert Channel, Sourmilk Gill, Easedale
LDNPHER 35921
NGR NY 31932 08708 to NY 31956 08698
Type Mill Race
Period Medieval to Post-medieval
Description A curvilinear divert channel running on the south side of the mill for approximately 27m. For the most part the channel does not appear deliberately cut and seems to follow a natural course through the rocky outcrops to the south of the launder support (Site **SMG08**). The channel carried water around this launder from its confluence with the head race on the west end (Site **SMG06**) and flowed into the tail race (Site **SMG13**) adjacent to the mill wheel pit on the east end (Site **SMG12**). At the eastern end adjacent to the outflow of the wheel pit the channel seems to have been deliberately cut up to 1m wide by 0.4m deep.

Site Number **SMG08**
Site Name Launder support, Sourmilk Gill, Easedale
LDNPHER 35921
NGR NY 31932 08708 to NY 31943 08704
Type Launder
Period Medieval to Post-medieval
Description The foundations of a linear stone-constructed launder support or platform orientated roughly west-north-west/east-south-east. It would have formed the base for a wooden launder flowing

down from the confluence of a head race and divert channels upstream to the west (Sites **SMG06**, **SMG07** and **SMG09**) towards the mill wheel pit to the east (Site **SMG12**). The structure is a roughly horizontal sub-rectangular drystone platform running over an area of natural outcrop that is constructed of surface gathered stones measuring approximately 12m long by up to 2.2m wide and 2.8m high. There is a break of 2m in the centre of the structure where there is no obvious construction and most of the facing stones are missing on the north side. It is clear that the northern elevation of the eastern end of the launder has collapsed, giving the impression that the launder support narrows towards its end. This, however, is not the case. Close inspection reveals that this elevation has collapsed. The collapsed stone, which is not visible at the foot of the rocky outcrop, is believed to have been used to construct the sheep fold or bield that sits on top of the platform constructed for the mill building (Site **SMG11.2**).

Site Number	SMG09
Site Name	Divert Channel, Sourmilk Gill, Easedale
LDNPHER	35921
NGR	NY 31932 08709 to NY 31991 08677
Type	Mill Race
Period	Medieval to Post-medieval
Description	A sinuous divert channel running on the north side of the mill for approximately 77m. On the western end the channel does not appear deliberately cut and seems to follow a natural course through the rocky outcrops to the north of the launder base (Site SMG08). The channel carried water around this launder from its confluence with the head race on the west end (Site SMG06), and flowed into a series of potential washing ponds (Site SMG4), before outflowing into Sourmilk Gill downstream of the mill. On levelled ground the divert channel has been cut into the ground surface and measures 0.6m wide by 0.3m deep.

Site Number	SMG10
Site Name	Bank, Sourmilk Gill, Easedale
LDNPHER	35921
NGR	NY 31912 08719
Type	Bank
Period	Medieval to Post-medieval
Description	A stone-revetted bank running perpendicular to the eastern end of the mill head race (Site SMG06). It measures approximately 2.4m long by 1.4m wide and survives up to 0.2m high. It extends up to the edge of the head-race and may have served either as part of a sluice mechanism or been intended to restrict flow into the head-race in times of flood.

Site Number	SMG11
Site Name	Fulling Mill, Sourmilk Gill, Easedale
NTSMR	23039
LDNPHER	35921
NGR	NY 31952 08704
Type	Fulling Mill
Period	Medieval to Post-Medieval
Description	The single celled sub-rectangular foundations of a fulling mill site located on the north side of Sourmilk Gill. The main structure comprised a large revetted platform and on top was a dwarf walled, dry-stone structure reflecting a separate phase of construction, although the structure was not necessarily related to a use as a fulling mill. Much of the stone from the northern side of the nearby launder was missing and there were no accumulations of stone at the base of the crag, as would be expected if the structure had partially collapsed. It appears that this stone was removed from the structure for reuse and it is possible that a large accumulation of similar stones at the western side of the mill platform (Site SMG11.2) might have originated from the launder base. If this was the case then the later phase of construction on top of the mill platform would post date the usage of the launder and fulling activities

The mill structure was attached to the north side of a stone-lined wheel pit (Site **SMG12**). The mill platform measures approximately 7m square, while the small sheepfold or bield constructed on top of the platform measures 6.2m by 5.5m. The platform has large stones set within the north corners of the revetted walls and the foundation walls survive up to 0.75m wide by 0.5m high. There is a flight of two steps built into the southern end of the eastern wall elevation and the southern wall of the platform forms the northern side wall of the wheel pit. The main structure/final phase is partially collapsed but the original fabric was observed in the north wall elevation where the walling was of double-thickness drystone construction measuring up to 0.9m wide. The west wall elevation survives up to 0.6m high in places. The entrance (on the east side) corresponds with the flight of two steps placed on the platform.

Site Number	SMG12
Site Name	Wheel Pit, Sourmilk Gill, Easedale
LDNPHER	35921
NGR	NY 31950 08700
Type	Wheel Pit
Period	Medieval to Post-medieval
Description	A sub-rectangular stone-constructed wheel pit located adjacent to the southern end of the fulling mill at Sourmilk Gill (Site SMG10). It shares its northern side wall with the south wall elevation of the mill building. Internally the wheel pit measures approximately 4m long by 0.75m wide and 1.2m deep. The wheel pit is aligned with a launder support to the west (Site SMG08) and the outflow to the east was into a tail race (Site SMG13). The wheel pit is of double-thickness drystone construction and externally, including an additional shallow foundation course on the south of the pit, measured 6.5m by 3.2m. The southern wall of the wheel pit would have been very wide (up to 2m thick), which would have supported the wheel axle.

Site Number	SMG13
Site Name	Tail Race, Sourmilk Gill, Easedale
LDNPHER	35921
NGR	NY 31953 08699 to NY 31981 08675
Type	Tail Race
Period	Medieval to Post-medieval
Description	A curvilinear tail race running roughly north-west/south-east from the south-east side of the fulling mill. The channel took water flowing from the confluence of both the wheel pit and divert channel (Sites SMG07 and SMG12) and outflowed into the north side of Sourmilk Gill further downstream. The tail race is a well-defined sloped-cut channel with partially tumbled retaining walls, particularly evident on the north side. It measures approximately 36m long by 2.5m wide and is up to 1.5m deep in places.

Site Number	SMG14
Site Name	Platform, Sourmilk Gill, Easedale
LDNPHER	35921
NGR	NY 31923 08705
Type	Platform
Period	Unknown
Description	A possible teardrop-shaped natural platform located on the west side of the mill. It is formed on the south side by the course of Sourmilk Gill and to the north by the head race (Site SMG06). The area measures approximately 22m long by 13m wide.

Site Number	SMG15
Site Name	Sheep Fold, Sourmilk Gill, Easedale
LDNPHER	-
NGR	NY 31894 08703
Type	Sheep fold or wash fold

Period	Medieval to Post-medieval
Description	A two celled sub-rectangular sheepfold or washfold located on the south bank of Sourmilk Gill. Overall the fold measures approximately 15m by 11.5m and it has entrances on both the south and north-east sides. The entrance to the north-east has an external setting of stones piled into Sourmilk Gill. The sheepfold overlay an earlier peat track running downslope from the south-west (Site SMG16). The entrance facing onto an active stream would suggest that this structured functioned as a washfold.

Site Number	SMG16
Site Name	Trackway, Sourmilk Gill, Easedale
NTSMR	-
LDNPHER	-
NGR	NY 31889 08698 to NY 31842 08684
Type	Trackway
Period	Post-medieval
Description	A sinuous section of sunken trackway ascending the hillside on the south side of Sourmilk Gill. It is overlain on the north end by a sheepfold (Site SMG15).

LOUGHRIGG TERRACE SITES

Site Number	LTG01
Site Name	Fulling Mill, Loughrigg Terrace, Grasmere
NTSMR	181816
LDNPHER	30709
NGR	NY 34358 05912
Type	Fulling Mill
Period	Post-medieval
Description	A small rectangular grass-covered platform located at the base of the east bank of a deep gully adjacent to the south shore of Grasmere Tarn. The platform potentially is the location of a fulling mill although its size (approximately 4.5m by 2.6m and 0.4m high) would preclude a substantial built structure surrounding the fulling frame and stocks. The adjacent stream bypasses the western side of the platform and on the opposite east side there is a slight sunken area abutting the base of the gully bank which may relate to the position of a water wheel (Site LT04.1). Another potential configuration of the water wheel would be on the north end of the platform where the stream kinks around it (Site LT04.2) and here the platform has a well-defined straight cut edge. Other potential mill evidence consists of deliberately placed stones to the south of the mill platform which may have provided support for a wooden launder that carried water to the waterwheel (Site LT03), and a line of stones external to the east side of the gully containing the platform (Site LT12). These stones may potentially represent ballast for the end of a perishable roof projecting over the fulling frame and stocks.

Site Number	LTG02
Site Name	Ramped Platform, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34346 05917
Type	Platform
Period	Post-medieval
Description	A large sub-circular platform cut into the hillside and embanked downslope that is located just above the south shore of Grasmere Tarn. The platform, measuring approximately 12m in diameter by up to 1.3m high, is accessed from the west by a slightly sloping ramp that again is cut and embanked from the hillside. The access ramp is at least 12m long by 8m wide and has a small drain running along the south side. The platform is separated from the mill site by a large curvilinear embankment that is constructed atop the western bank of the stream gully running around the mill platform (Site LT01). The embankment would have precluded the

construction of the fulling mill on this platform, it also suggests that the transmission of water power from a wheel across to the platform would also have been unlikely. The function of the platform could be as some sort of working or storage area adjacent to the mill. Unfortunately the land to the south, close to the shore of the tarn, has been eroded and a footpath constructed across part of the feature, as such any contemporary evidence based interpretation of the site is compromised.

Site Number	LTG03
Site Name	Putative Launder Support or step, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34358 05904
Type	Launder
Period	Post-medieval
Description	A series of flat-topped stones located at the confluence of the head race and another channel (Sites LT05 and LT06) some 4.5m-5.5m upstream of the potential mill platform (Site LT01). The area to the south of the stones is particularly boggy and there is a slight drop in height to the north of the stones. Potentially both the head race and subsidiary channel deposited water into a wooden launder which used these stones as an initial foundation/ pad stones to route water towards the wheel pit. There is no other direct evidence here for a launder mechanism. If the presence of a wooden launder support is accepted it suggests that the stream to the west side of the mill platform acted as a very small divert channel, or the head race merged with the channel at a higher point in antiquity.

Site Number	LTG04
Site Name	Wheel Pit, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34359 05912
Type	Wheel Pit
Period	Medieval to Post-medieval
Description	There are two potential locations for the water wheel adjacent to the potential fulling mill platform on both the east and north sides of the structure. The most obvious wheel position (Site LT04.1) consists of a small sunken depression sandwiched between the east side of the mill platform (Site LT01) and the base of the eastern bank of the gully containing the site. The rectangular depression measures approximately 2.5m by 0.6m and is up to 0.15m deep, and the depression is higher than the stream channel to the north. On the north end of the mill platform the stream gully kinks almost a right-angle around the platform; it is possible that a water wheel could have been positioned here along the well-defined straight cut edge of the platform (Site LT04.2).

Site Number	LTG05
Site Name	Channel/Leat, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34356 05892 to NY 34357 05902
Type	Mill Race
Period	Post-medieval
Description	A small linear stream channel which drains through a boggy flush located upslope of the mill site. It is orientated roughly north/south and measures at least 10m long by 2m wide and the northern end of the channel forms a confluence with the main head race (Site LT06) above a potential launder step (Site LT03). The channel may have taken water off of a stream gully running downslope to the south-west of the mill site although there is no direct evidence for a section of cut channel adjacent to this stream.

Site Number **LTG06**
Site Name Head Race, Loughrigg Terrace, Grasmere
NTSMR -
LDNPHER 30709
NGR NY 34434 05824 to NY 34359 05906
Type Head Race
Period Post-medieval
Description A long sinuous head race consisting of a natural gully running roughly south-east/north-west downslope towards Grasmere Tarn. It junctions onto a running stream on the south-east upslope end, where there is a small blocking dam (Site **LT09**) and a notched stone in the base of the beck may have supported the end of a wooden launder that would have collected water and transported it over the small blocking dam, depositing it into the head race (Site **LT10**). The head race measures approximately 110m long by 6m wide by up to 2m deep in places. The north western end is denuded and there is a slight gap in a boggy flush before the potential launder step (Site **LT03**) at the confluence of another channel/lead (Site **LT05**). There is an area of blocking near the start of the head race (Site **LT11**) which is probably more recent material rather than an aspect of the water management for the mill.

Site Number **LTG07**
Site Name Tail Race, Loughrigg Terrace, Grasmere
NTSMR -
LDNPHER 30709
NGR NY 34358 05907 to NY 34357 05927
Type Tail Race
Period Post-medieval
Description A short sinuous section of tailrace located downslope to the north of the mill platform. It starts upslope at the foot of the potential launder steps (Site **LT03**), curves around the west side of the mill platform as a divert channel, and passing the two potential water wheel positions, and flows north towards Grasmere Tarn. It is a partially modified section of a natural stream gully and measures approximately 26m long by 3m wide and up to 2m deep. At the northern end it disappears into a culvert running beneath the modern footpath along the shore.

Site Number **LTG08**
Site Name Platform, Loughrigg Terrace, Grasmere
NTSMR -
LDNPHER 30709
NGR NY 34360 05922
Type Platform
Period Post-medieval
Description A small D-shaped platform located adjacent to the modern footpaths on the eastern side of the tail race (Site **LT07**) to the north side of the mill site. The feature is possibly natural in origin and/or has an unknown function associated with the mill. The platform measures approximately 5m by 4.5m and is up to 1.5m high. Unfortunately the land to the south on the shore of the lake has been eroded and a footpath crosses it that makes full comprehension of the site difficult.

Site Number **LTG09**
Site Name Mill Dam, Loughrigg Terrace, Grasmere
NTSMR -
LDNPHER 30709
NGR NY 34432 05825
Type Mill Dam
Period Post-medieval
Description A small slightly curvilinear section of drystone walling blocking the upslope end of the head race (Site **LT06**) at the junction with its feeder stream. The dam structure measures

approximately 3.8m long by 1m wide and is up to 0.6m high and is likely to have ensured excess water did not enter the head race during periods of high flow. Water could possibly have been allowed into the blocked head race via a moveable wooden launder to control the water flow. It would have crossed the dam and was set on a notched stone in the stream bed (Site **LT10**).

Site Number	LTG10
Site Name	Launder Step, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34435 05822
Type	Launder
Period	Post-medieval
Description	An angular stone located in the stream bed just upslope from the junction with the head race (Site LT06). The stone, measuring 0.4m by 0.3m and 0.4m high, has a linear dressing on the upper surface that may have formed the eastern anchoring point for a moveable wooden launder to control the water flow into the head race over the blocking wall (Site LT09).

Site Number	LTG11
Site Name	Stone Blocking, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34426 05837
Type	Structure
Period	Post-medieval
Description	An area of rubble infilling located near the upper end, and within the head race for the mill (Site LT06). The feature does not seem to have an obvious function and probably post-dates the use of the mill and head race, and was intended to disable the divert along the head race.

Site Number	LTG12
Site Name	Stone Feature, Loughrigg Terrace, Grasmere
NTSMR	-
LDNPHER	30709
NGR	NY 34362 05912
Type	Structure
Period	Post-medieval
Description	A small roughly linear north/south orientated setting of stones visible on the ground surface on the east side of the gully containing the mill platform (Site LT01). There are multiple stones visible in a line measuring up to 3.5m long running parallel to the mill platform. It is possible that these stones were anchoring points or ballast for weighing down a perishable roof structure over the mill platform.

LOW WOODSITES

Site Number	LW01
Site Name	Fulling Mill, Low Wood, Elterwater
LDNPHER	181817
NGR	NY 33710 05027
Type	Fulling Mill
Period	Post-medieval
Description	A substantial rectangular platform located on the west side of a north/south orientated stream running through the centre of Low Wood. The platform probably formed the location of a fulling mill although there are no visible foundations associated with a built structure surrounding the site of a fulling frame and stocks. The platform is located on the south-east side of a mill pond (Site LW03), and, in part, forms a retaining dam for it. The platform is

flat-topped and measures approximately 10m long by 8m wide, with the top of the platform 5m by 3.75m. To the west of the platform is a well-defined wheel pit leading through to a stone-lined tail race (Sites **LW02** and **LW04**).

Site Number	LW02
Site Name	Wheel Pit, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33705 05029
Type	Wheel Pit
Period	Post-medieval
Description	A well-defined wheel pit located adjacent to the west side of a putative fulling mill platform in Low Wood (Site LW01). The pit has partially collapsed opposing retaining walls on either side and measures 3.5m long by 1m wide and up to 1.1m deep. The walls comprise large water worn stones and roughly shaped slate slabs. The retain wall survives best on the west side of the structure. The wheel pit was fed upstream to the north from a mill pond and downstream outflowed into a stone-lined tail race (Sites LW03 and LW04).

Site Number	LW03
Site Name	Mill Pond, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33709 05034
Type	Mill Pond
Period	Post-medieval
Description	A well-defined rectangular mill pond located upstream and adjacent to the north of a potential fulling mill platform in Low Wood (Site LW01). The pond measures approximately 9.5m by 8.3m and although mostly infilled with stones and silt, is nevertheless 1.1m deep on the north side (Site LW03.1). The pond is contained within stone partially exposed stone retaining walls. The walls are all vertical sided except the north wall which is battered back at a slight sloping angle. The pond contains a raised platform measuring 2m wide on the west side (Site LW03.2). The pond is fed by a stone lined head race and was passed by a divert channel at a junction 5m north-east of the structure (Sites LW06 and LW11). The pond powered the mill site via a wheel pit on the south end that fed through into a stone lined tail race (Sites LW02 and LW04). The mill platform (Site LW08) presumably acted as a dam to stop water escaping downslope to the south. The pond may have had a dual function of both water power and washing of the fulled woollens. In particular the stepped platform (Site LW03.2) could have been used to access the pond for washing the material. The pond was first depicted on the OS Second Edition mapping (1890).

Site Number	LW04
Site Name	Tail Race, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33705 05025 to NY 33700 04969
Type	Tail Race
Period	Post-medieval
Description	An intact and impressive linear stone-lined and slate bottomed tail race located downstream of the wheel pit associated with (Site LW02) the putative fulling mill site. For most of its length the channel is ruler straight suggesting a planned construction of the feature rather than modification of a natural stream gully (Site LW04.1). The channel measures approximately 38.4m long by 0.5m wide and 0.3m deep for most of its length before turning a right angle to the south-east on the southern end and continuing as a sinuous stream gully (Site LW04.2). The tail race turned at the point where there is a small section of retaining wall (Site LW05) and continued to outflow into the divert channel bypassing the mill site some 23m further downstream (Site LW11). The straight section of the tail race conformed with the eastern boundary of a small plantation or orchard within Low Wood first shown on the OS Second Edition mapping (1890), but was not on the OS first edition map (1860), and suggests that the plantation was established in the intervening period.

Site Number	LW05
Site Name	Retaining Wall, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33696 04990
Type	Retaining Wall
Period	Post-medieval
Description	A short damaged section of drystone constructed retaining wall is located on the north side of a right angled turn in the tail race (Site LW04) running south-east from the putative mill site in Low Wood. The partially collapsed wall measures approximately 5.9m by 1.3m and up to 1.8m high on the south side where the ground drops away to the south-east. It has a slight stub of wall corner on the west end where the wall originally turned north to follow the east side of the tail race. The wall retains a levelled area of indeterminate size upslope to the north (Site LW16) which may have functioned as a working/storage area or as a tenter ground. There is no evidence for support for a water wheel on top of the retaining wall at this location due to collapse, although the tail race does slope down significantly at this location.

Site Number	LW06
Site Name	Head Race, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33762 05146 to NY 33714 05037
Type	Head Race
Period	Post-medieval
Description	The slightly sinuous water channel running east-north-east/west-south-west through the centre of Low Wood, and to the north of the putative mill site it has been defined as a head race. It is visible running downslope through the woods and beneath a section of carriage drive (Site LW12) for approximately 114m before junctioning to feed a mill pond to the west (Site LW03) and continuing downslope to the east of the putative mill as a divert channel (Site LW11). The channel varies in width and depth along its length primarily, and unsurprisingly, due to severe water erosion. It is clear that, for most of its length, as with most of the other drainage channels running through the wood, it was formalised into a stone-lined cutting. There is evidence of it being culverted beneath the carriage drive and for a short section further south (Site LW07).

Site Number	LW07
Site Name	Culvert, Low Wood, Elterwater
LDNPHER	-
NGR	NY 33728 05058
Type	Culvert
Period	Post-medieval
Description	A short damaged section of stone culverting located upon the head race running through Low Wood (Site LW06) and just to the south of a carriage drive (Site LW12). The section measures approximately 4.6m long by 0.7m wide and there are collapsed sections of stone-lined culvert immediately to both the north and south of the covered section.

Site Number	LW08
Site Name	Wall Foundation , Low Wood, Elterwater
LDNPHER	-
NGR	NY 33699 05030
Type	Wall
Period	Post-medieval
Description	A fragmentary linear wall foundation located on the south-west side of the mill pond (Site LW03) at the putative mill site in Low Wood. The wall is orientated roughly south-east/north-west and measures approximately 9.7m long by 0.3m wide. Only the southern edge of the wall is visible and it survives up to 0.2m high with collapsed material downslope

to the south. The wall may be associated with retaining the wheel pit above, or alternatively, was associated with a small rectangular plantation or orchard enclosure depicted on the OS Second Edition mapping (1890).

Site Number LW09
Site Name Charcoal Burning Platform, Low Wood, Elterwater
LDNPHER -
NGR NY 33683 04974
Type Charcoal Burning Platform
Period Post-medieval
Description An oval charcoal burning platform cut into the slightly sloping ground to the south of the putative mill site in Low Wood. It measures approximately 12m long by 10m wide and is cut into the slope 0.3m deep on the north end.

Site Number LW10
Site Name Trackway, Low Wood, Elterwater
LDNPHER -
NGR NY 33717 04977
Type Trackway
Period Post-medieval
Description A fragmentary linear section of woodland access trackway located to the south of the putative mill site in Low Wood and east of the divert channel (Site LW11). The recorded section measured up to 25m long orientated north/south by 2m wide. The trackway was clearly used for woodland industry and was not a formal carriageway.

Site Number LW11
Site Name Divert Channel, Low Wood, Elterwater
LDNPHER -
NGR NY 33718 05039 to NY 33700 04969
Type Millrace
Period Post-Medieval
Description A slightly sinuous divert channel running roughly north/south to the east of, and bypassing, the putative mill site in Low Wood. The often deeply eroded and cut channel measures approximately 75m long by up to 2m wide in places. The north end junctions onto the head race (Site LW06) approximately 5m away from its inflow into the mill pond (Site LW03) and continues down to the south where it meets with the tail race (Site LW04).

Site Number LW12
Site Name Carriage Drive, Low Wood, Elterwater
LDNPHER -
NGR NY 33813 05127 to NY 33798 04900
Type Carriageway
Period Post-medieval
Description An elaborately constructed sinuous carriage drive running downslope through Low Wood from High Close farm. It is clearly a formal carriage drive rather than purely an access track used for woodland industry. It is metalled, has a drainage ditch on the upslope side of the surface, and is approximately 6m wide. The carriage drive has a prominent retaining wall on the downslope side where it crosses the head race (Site LW06) just to the north of the putative mill site. The retaining wall measures up to 2.3m high at this location with a parapet that is 0.7m high. The head race has been culverted below the drive. The drives within Low Wood are first depicted on the OS Second Edition mapping (1890).

Site Number LW13
Site Name Trackway, Low Wood, Elterwater
LDNPHER -
NGR NY 33724 05066 to NY 33679 04900
Type Trackway
Period Post-medieval
Description A curvilinear section of woodland access track running roughly north-east/south-west on the west side of the putative mill site in Low Wood. The recorded section of trackway measures approximately 100m long by 2.3m wide. It junctioned onto a more elaborate carriage drive on the north end and ran downslope through the rest of Low Wood. The trackway was clearly used for access for the woodland industry, but given that it links up to the main carriage drive (Site LW12) it may have been reused and adopted as part of the design for the later pleasure grounds.

Site Number LW14
Site Name Wall Foundation, Low Wood, Elterwater
LDNPHER -
NGR NY 33742 05079
Type Wall
Period Post-medieval
Description A linear wall foundation orientated roughly north-west/south east running through the northern half of Low Wood. The recorded section of the boundary, where it crossed the head race (Site LW06), measured approximately 14.5m long by 2m wide and survived up to 0.3m high. The boundary was probably related to woodland management and functioned as a sub-divisional hag boundary between separate coppice compartments within Low Wood. It extends upslope for approximately 50m to the south-east (outside of the present survey area); the foundation continues and connects with further coppice compartment boundaries near to a potash kiln and attached putative building platform.

Site Number LW15
Site Name Upcast mound, Low Wood, Elterwater
LDNPHER -
NGR NY 33720 05020
Type Clearance Cairn
Period Post-medieval
Description A substantial oval upcast mound located immediately to the east-south-east of the putative mill platform in Low Wood. It measures approximately 5.5m by 3.7m and is up to 0.5m high; is constructed of small stone, silt and earth. The mound, along with other slight banking located adjacent to the west side of the divert channel (Site LW11), would suggest levelling works adjacent to the mill platform to create a working area or clearance of the divert channel or occasional scouring of the mill pond to remove material deposited by the flow of water. A less likely possibility is that the site could relate to the clearance of demolition rubble from the mill site, but there are no obvious visible foundations for a mill building on the platform (Site LW01).

Site Number LW16
Site Name Levelled Area, Low Wood, Elterwater
LDNPHER -
NGR NY 33698 04995
Type Platform
Period Post-medieval
Description A flat cleared area measuring approximately 16m long by 8m wide located to the immediate east side of the tail race (Site LW04) running south from the putative mill site in Low Wood. The south end of the area is defined by a small retaining wall (Site LW05). The area is possibly a working area associated with mill processes.

STICKLE GHYLL SITES

Site Number	SG01
Site Name	Head Race, Stickle Ghyll, Great Langdale
NTSMR	-
LDNPHER	30571
NGR	NY 29397 06533 to NY 29407 06500
Type	Head Race
Period	Medieval to Post-medieval
Description	A well-defined, roughly linear, north-north-east/south-south-west orientated head race that would originally have channelled water from an area of more above the site southwards towards the putative fulling mill site (Site SG05). There is no evidence for a dam or take-off point on the south bank of Stickle Ghyll as the area has been heavily eroded and is covered in large boulder sand water washed stones; the gully is in any case substantially below the head race for the mill. The visible section of the head race starts at its northern end just south of the junction of two modern public footpaths in the enclosed field containing the mill site. The main section of the channel is partially rock-cut on both the shallow covered and visible rock outcropping and has had a retaining bank constructed on the downslope eastern side. This portion of the channel measures approximately 34.5m long by 2.8m wide, with the open channel up to 1m wide by 0.5m deep. At the south end the channel runs across a tall rocky outcrop giving it significant height above the putative mill structure. There is a junction with a possible divert channel running south-west beneath the modern enclosure wall (Site SG07) and the head race turns sharply to the east to descend the steep face of the outcrop for a further 2.7m as a narrow 0.5m wide and 0.2m deep rock-cut channel. It is probable that this forms the start of a divert channel taking water through, and under, the position of the water wheel as a wooden launder positioned at either the top or bottom of the sloping rocky outcrop face would carry water only to the waterwheel. There is slight evidence for a gap between two small banks in the shallow earthworks just north of the mill structure (Site SG04) which would suggest water and/or launder passing south-east from the rock-cut channel towards the water wheel. There is also an infilled scoop in the rocky outcrop on the west side of the mill structure that is now crossed by a modern field wall that could relate to a channel for taking water under the water wheel.

Site Number	SG02
Site Name	Boundary Wall Foundation, Stickle Ghyll, Great Langdale
NTSMR	-
LDNPHER	30571
NGR	NY 29392 06549 to NY 29393 06526
Type	Boundary Wall
Period	Post-medieval
Description	The linear foundations of a boundary wall running north from the extant corner of the modern enclosure wall on the north-west side of the field containing the putative fulling mill towards Stickle Ghyll. The boundary was depicted as extant on the OS Second Edition mapping (1890). The double thickness wall foundations measure approximately 23m long by 0.8m wide and survive in places up to 0.3m high. The boundary has been severely denuded, probably as a result of stone robbing after the feature fell out of agricultural use, and is crossed by the modern footpath.

Site Number	SG03
Site Name	Boundary Bank, Stickle Ghyll, Great Langdale
NTSMR	-
LDNPHER	30571
NGR	NY 29411 06544 to NY 29438 06520
Type	Boundary Bank
Period	Medieval to Post-medieval
Description	The remains of a wide earth and stone constructed boundary bank orientated roughly north-west/south-east and running through the north-east corner of the enclosed field containing the putative mill site, and adjacent to the south side of Stickle Ghyll. The boundary is overlain by

the modern enclosure walls, and measures approximately 38m long by up to 5m wide. The bank is crossed by a modern footpath near the northern end and at the southern end the wall disappears where the area has been landscaped as gardens.

Site Number	SG04
Site Name	Earthworks, Stickle Ghyll, Great Langdale
NTSMR	-
LDNPHR	30571
NGR	NY 29411 06501
Type	Bank (Earthwork)
Period	Medieval to Post-medieval
Description	A series of amorphous and ambiguous shallow earthworks located in the small flat area sandwiched immediately between north-west side of the putative mill structure (Site SG05) and a natural rocky outcrop. The overall area of the features measures approximately 13.5m long by a maximum of 6.5m wide on the northern end. The earthworks consist of a shallow flattened sub-circular platform containing a smaller oval flat-topped mound. To the south is a short and slight linear break of slope or depression running at the foot of the rocky outcrop and curving at the northern end toward the sub-circular platform. There is also a short bank stub running out from the south face of the rocky outcrop. Immediately to the north-west corner of the mill structure is a linear bank with a gap in the middle that is aligned with both an infilled scoop and the foot of a rock-cut channel (Site SG01). It is possible that this relates to an aperture through which either a launder, or divert channel, fed water down from the head race towards the water wheel on the south-west wall elevation of the mill structure. The earthworks have no obvious direct function, and they could be related to ancillary working as the mill or could be related to an earlier phase of construction predating the present walled mill building, although there is no direct evidence of an earlier mill platform.

Site Number	SG05
Site Name	Fulling Mill, Stickle Ghyll, Great Langdale
NTSMR	181818
LDNPHR	30571
NGR	NY 29416 06499
Type	Fulling Mill
Period	Medieval to Post-medieval
Description	Extant foundations of a small rectangular fulling mill building located to the south of Stickle Ghyll and immediately north-west of the present day Stickle Barn, which was formerly a part of the Mill Beck Farm complex. The building, now surviving as a partially rebuilt sheepfold, was depicted as a roofed structure on the OS First Edition mapping (1861) but had been modified by the Second Edition mapping (1890). The building measures approximately 6.8m by 5.8m and survives up to 2m high downslope on the south corner. The structure has been cut into the hillside with a retaining wall on the north-west elevation 1.4m deep. Internally the structure is a level platform up to 0.7m higher than externally downslope to the south-east. The structure is abutted by a later revetment wall stub which attaches it to the enclosure wall to the south-west and to the east it is attached via a blocked gateway to another enclosure wall. There is a single entrance located on the eastern end of the south-east wall elevation (adjacent to the blocked external doorway) but this is associated with the later use of the site and there is no visible original fabric around the aperture.

The surviving fabric of the mill structure is fragmentary but distinct, being lime mortared and containing both surface gathered and water worn stones packed by areas of laterally placed thin slabs of stone. The rest of the superstructure has been rebuilt as a drystone sheepfold structure with a simple coping stones on top. The surviving fabric is variable in places often with only visible foundation courses but with the internal south-west facing and north-east facing and the external south-west facing wall elevations having most original fabric. The south corner wall quoin stack survives up to six courses and is 0.75m high; the south-west wall elevation of the structure has possible surviving elements that point to the structure originally being a mill building. Both externally and internally there is evidence for a blocked

sub-circular aperture measuring 0.6m in original diameter that could conform to the location of the mill wheel axle. The position of the water wheel would be external to this wall elevation and would have been serviced by a divert channel/laundry combination where a (now blocked) scooped area in the outcropping bedrock is located to the west of the mill. Internally the putative axle aperture is flanked 0.45m equidistant on both sides by a single blocked vertical slot in the original wall fabric. It is possible that these slots relate to anchoring beam slots or bracing points for the fulling mill frame. The mill was clearly serviced by both a well defined partially rock-cut head race (Site **SG01**), and a tail race south-east of the putative water wheel position which survives as a slight earthwork feature (Site **SG06**).

Site Number	SG06
Site Name	Tail Race, Stickle Ghyll, Great Langdale
NTSMR	-
LDNPHER	30571
NGR	NY 29419 06491 to NY 29428 06482
Type	Tail Race
Period	Medieval to Post-medieval
Description	The damaged linear remains of a possible tail race orientated roughly north-west/south-east and leading away to the south-east of and aligned with the possible water wheel location on the putative mill structure. The feature consists of a slight break of slope of single sided channel that is lower in height on the south-west side; it also has a short section of possible stone revetment surviving in the centre of its length. A slightly curvilinear boundary/feature was depicted at this location of the OS First Edition mapping (1861).

LITTLE ORE GATE SITES

Site Number	LOGG01
Site Name	Fulling Mill?, Little Ore Gate, Graythwaite
LDNPHER	-
NGR	SD 37109 93304
Type	Fulling Mill
Period	Medieval to Post-medieval
Description	The putative foundations of a fulling mill structure located within woodland at Little Ore Gate. The main structure appears to consist of earthen remains of a narrow two celled platform structure with a possible smaller sloping annex on the east side. The structure measures approximately 8.7m long (east/west) by 2.75m wide, with uniform banks surviving up to 0.5m wide by 0.3m high in places. The annex on the east side measures a further 4.3m long by 2.6m wide. The western end of the structure has been eroded by the course of a stream feeding water out from the flat boggy land to the south. If the mill structure is genuine it is possible that a free-standing undershot water wheel would have been positioned at this location on the western gable end of the structure. There is no evidence for a wheel pit at this location as the bedrock is exposed here immediately below the present ground surface. The stream continues on in a north-easterly direction as a tail race running towards a larger stream that skirts the eastern side of the putative mill site (Site LOG03). There is no clear evidence for stone within the construction of the putative building foundations and the bedrock is only 0.1m to 0.2m beneath modern ground level so would preclude obvious dug foundations here. If genuine the structure would have consisted of dwarf walling with a perishable superstructure and roof. A putative double channelled head race and then a laundry platform approach the structure from the west (Sites LOG06 and LOG02), and a narrow channel passed the south edge of the structure to the east towards the stream.

Site Number	LOG02
Site Name	Platform for Laundry?, Little Ore Gate, Graythwaite
LDNPHER	-

NGR SD 37082 93303 to SD 37102 93305
Type Launder
Period Post-medieval
Description A rectangular platform area orientated west/east and located on the west side of a putative fulling mill at Little Ore Gate. The feature measures approximately 21.5m long by 5.5m wide and is platformed up to 1m high downslope on the north side. The platform may have been the base for a pair of wooden launders running towards a water wheel located on the west gable end of the structure and a channel running south immediately behind the mill structure. Alternatively the feature could potentially relate to a modern plantation trackway running over a natural rocky ledge.

Site Number **LOGG03**
Site Name Tail Race?, Little Ore Gate, Graythwaite
LDNPHER -
NGR SD 37104 93306 to SD 37128 93327
Type Tail Race
Period Post-medieval
Description A small natural stream gully orientated roughly south-west/north east that drains a boggy area within Little Ore Gate. The stream crosses a platform (Site **LOG02**) adjacent to the west gable end of what may be the foundations of a fulling mill (Site **LOG01**). If this relationship is correct then the downslope portion of the stream acted as a tail race that was some 19m in length and outflowed into the larger stream that curves around the possible mill site.

Site Number **LOG04**
Site Name Potash Kiln, Little Ore Gate, Graythwaite
LDNPHER -
NGR SD 37145 93301
Type Potash Kiln
Period Medieval to Post-medieval
Description A potash kiln consisting of a scooped oval depression constructed into the eastern bank of the stream skirting the putative fulling mill at Little Ore Gate. The turf-covered bowl shaped depression measures 5m long by 4m wide and is up to 1.25m deep. There is a slight lipped opening on the eastern end which is adjacent to, but higher than, the stream channel that is 1.2m wide.

Site Number **LOGG05**
Site Name Charcoal Burning Platform, Little Ore Gate, Graythwaite
LDNPHER -
NGR SD 37083 93298
Type Charcoal Burning Platform
Period Post-medieval
Description The D-shaped remains of a damaged charcoal burning platform located adjacent to, and possibly overlain by the leat/forestry trackway passing through Little Ore Gate (Site **LOG06**). It measures approximately 11.5m by 7m and is slightly platformed on the east side by up to 0.3m high. The double leat/trackway bank is denuded but abutts the charcoal burning platform so it is uncertain if one feature cuts the other, but the plan of the platform would suggest that the leat/trackway overlay the north-west side of the platform and was a later feature.

Site Number **LOG06**
Site Name Head Race?, Little Ore Gate, Graythwaite
LDNPHER -
NGR SD 36971 93253 to SD 37082 93303
Type Head Race

Period Post-medieval

Description A long sinuous feature located on the south-west side of a putative fulling mill site within Little Ore Gate. The feature consists of a wide feature that is cut into the south-east-facing hillslope and curves around the contour along the bottom break of the slope between the hill and flatter boggy ground to the south. The feature starts in the south-west adjacent to a stream and skirts around the mill site. The feature is aligned with a well-defined roughly metalled forestry track which winds down through the plantation further to the west, and which itself was depicted on the OS Second Edition 25 inch (1890) mapping but finished at the point it met the stream adjacent to the south-west corner of a field enclosure. It would appear that the track utilised the feature, certainly at the western end, but it is not evident if this was created for the forestry track. It is possible that this stream fed the putative leat system, although there is no evidence of a water take-off point, but this would have been disturbed by its later use as a forestry track. The sinuous feature is orientated roughly south-west/north-east and measures approximately 150m long by up to 6m wide. It has a relatively large upcast bank on the downslope side which in places is covered in mature trees and there are a pair of parallel running sunken features within the site that are roughly 2m apart. In places the depressions are well-defined and vertical sided. The southern portion of the bank has been damaged by forestry vehicles where they have diverted off the putative leat feature. At the north-eastern end the feature curves eastwards and adjoins a platformed area (Site **LW02**). The function of the feature could be as a pair of leats running down towards the fulling mill. Alternatively the feature could be an access track associated with woodland industries as it skirts two charcoal burning platforms (Sites **LOG05** and **LOG09**). The feature was definitely used to some degree as access for forestry vehicles when the area was either planted in the 1960s and/or felled and replanted in the 1990s but that would not discount the re-use of an earlier feature.

Site Number **LOGG07**

Site Name Washing Pond?, Little Ore Gate, Graythwaite

LDNPHER -

NGR SD 37127 93293

Type Pond

Period Post-medieval

Description A sub-rectangular slightly sunken area along the line of an east/west running channel (Site **LOG08**) that passes the south side of the putative fulling mill site and outflows into the stream to the east. The feature measures approximately 4.3m long by 3m wide and is up to 0.3m deep and is masked by scrub vegetation. The feature could possibly be a washing pond associated with the adjacent fulling mill that is fed by the channel.

Site Number **LOG08**

Site Name Divert Channel?, Little Ore Gate, Graythwaite

LDNPHER -

NGR SD 37103 93303 to SD 37139 93292

Type Mill Race

Period Post-medieval

Description A slight linear channel orientated roughly west/east located along the immediate south side of the putative fulling mill structure at Little Ore Gate. The channel measures approximately 35m long by up to 0.8m-2m wide and is 0.3m-0.5m deep in places. The channel is connected in the west to a platformed feature (Site **LOG02**), passes the mill structure (Site **LOG01**) and crosses adjacent to a pond (Site **LOG07**) before meeting the stream that surrounds the putative mill site on the eastern end. If the mill site is genuine this feature would be a divert channel passing the site and feeding a washing pond. The other outside possibility is that it was simply a wheel rut, but the absence of a corresponding rut would argue against it.

Site Number **LOGG09**

Site Name Charcoal Burning Platform, Little Ore Gate, Graythwaite

LDNPHER -

NGR	SD 37011 93235
Type	Charcoal Burning Platform
Period	Post-medieval
Description	A well-defined sub-circular charcoal burning platform located on the steep hillside adjacent to the north side of the leat/trackway passing through Little Ore Gate (Site LOG06). It measures approximately 12.5m by 10m and is cut into the hillside by up to 1m deep. The platform on the south side adjoins the leat/trackway.

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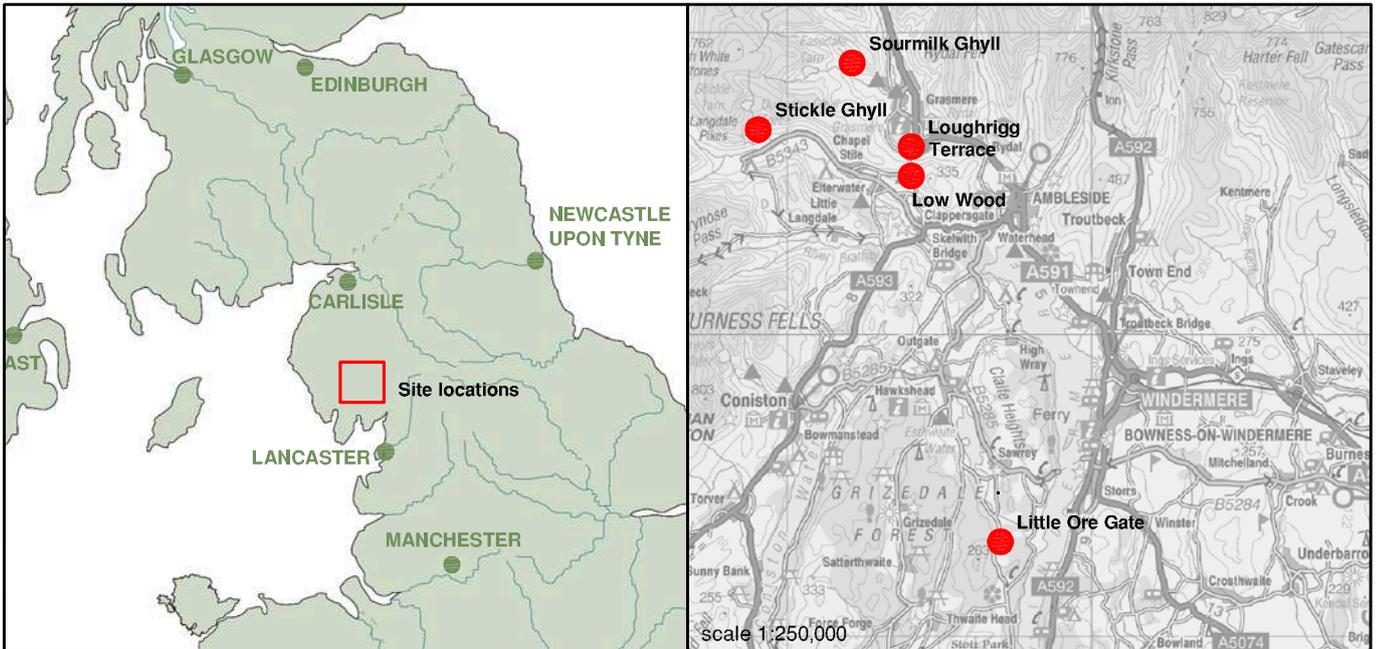
Figure 34: Little Ore Gate Fulling Mill, Graythwaite (east)

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Figure 1: Site locations

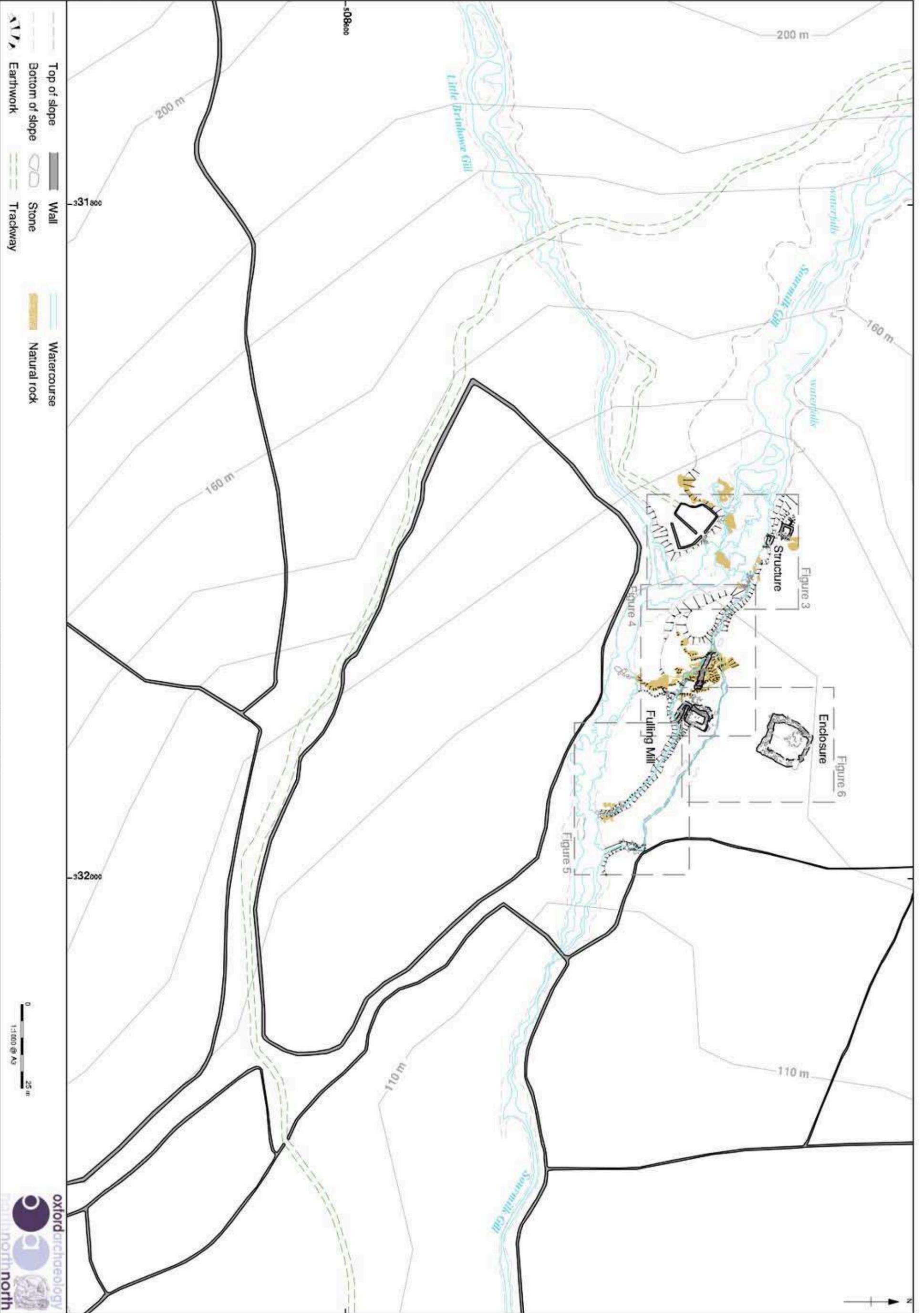


Figure 2: Sournmilk Gill Felling Mill, Easedale

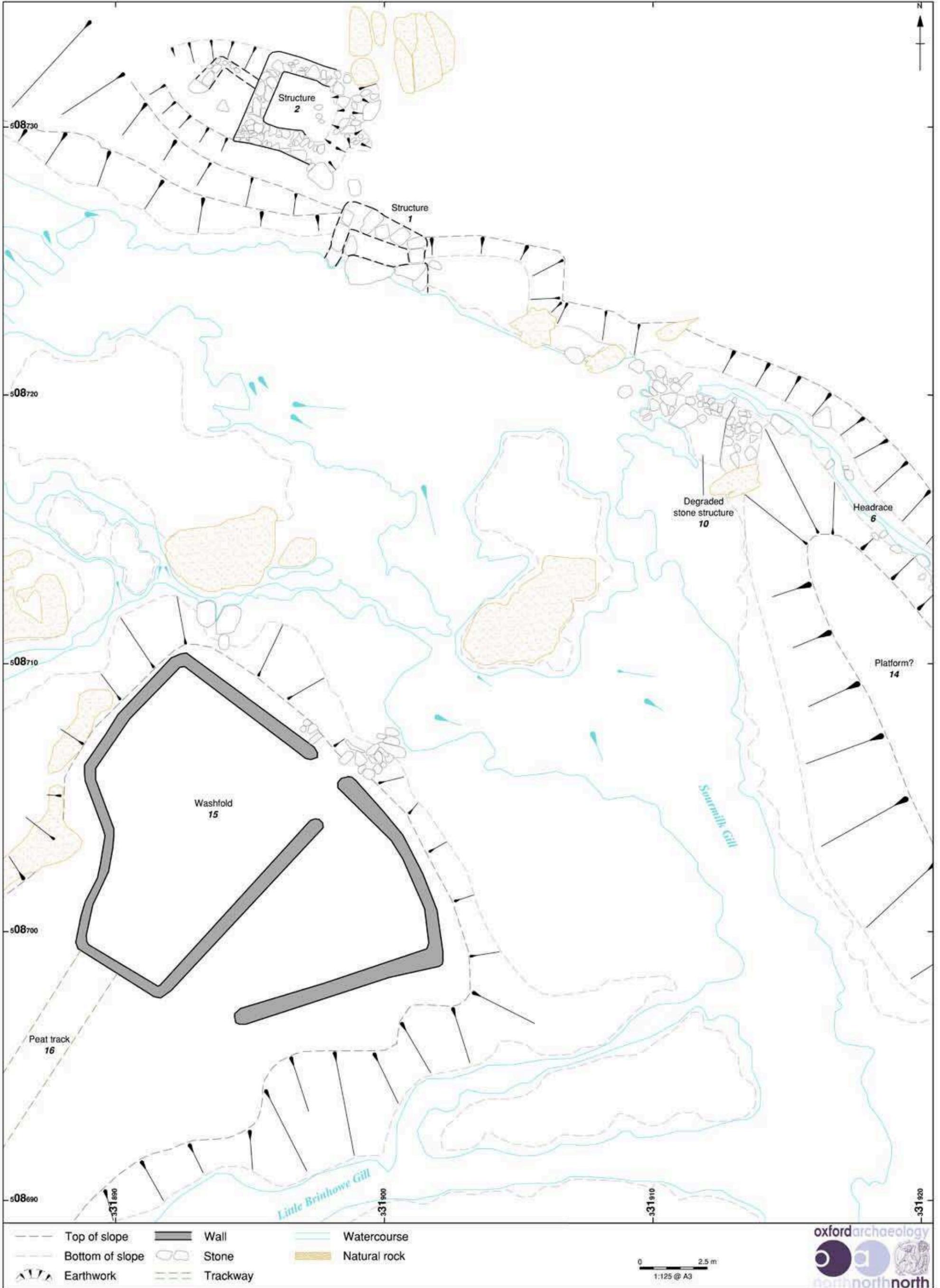


Figure 3: Sourmilk Gill Felling Mill, Easedale (west)

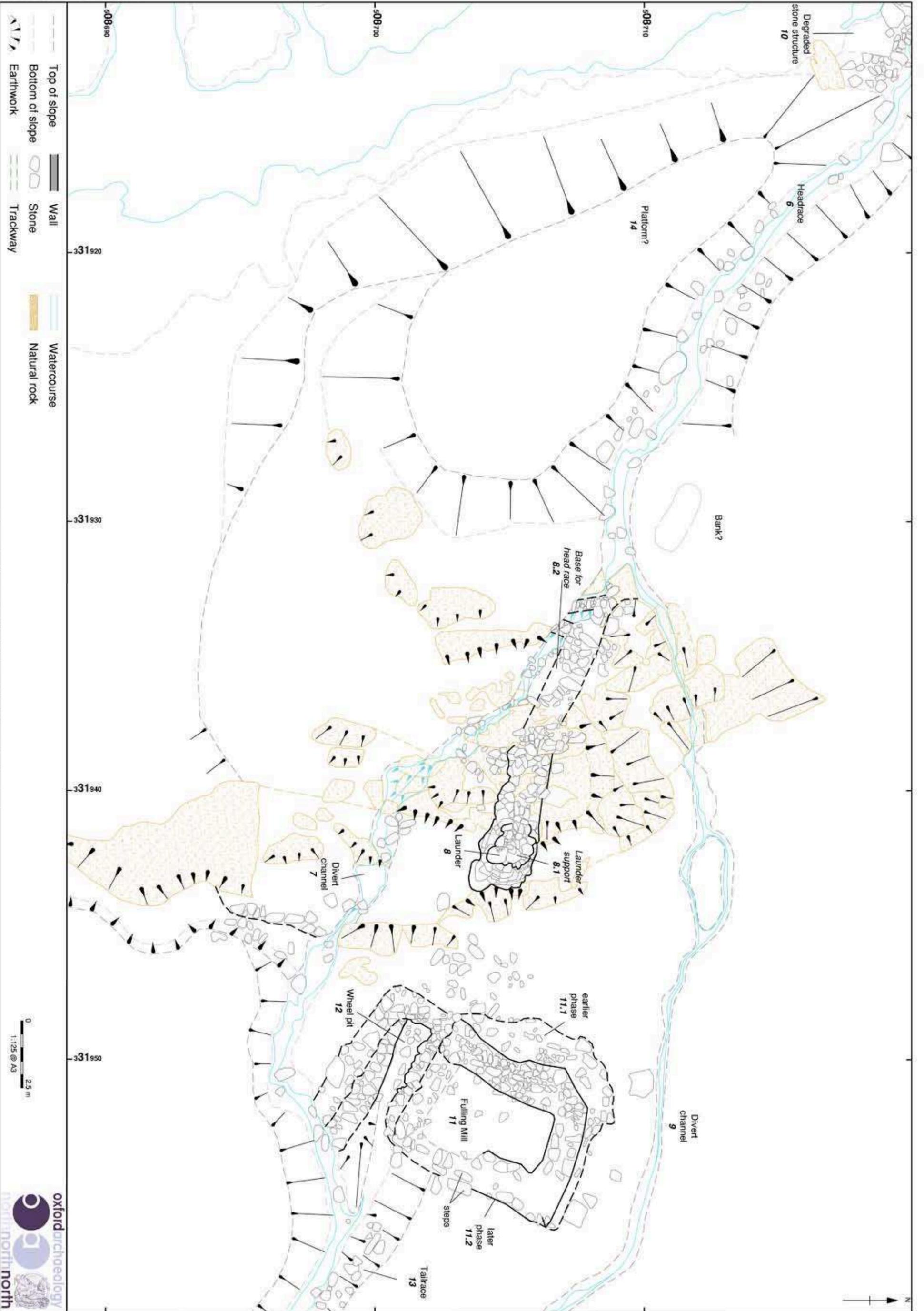


Figure 4: Sournilk Gill Fulfilling Mill, Easedale (centre)

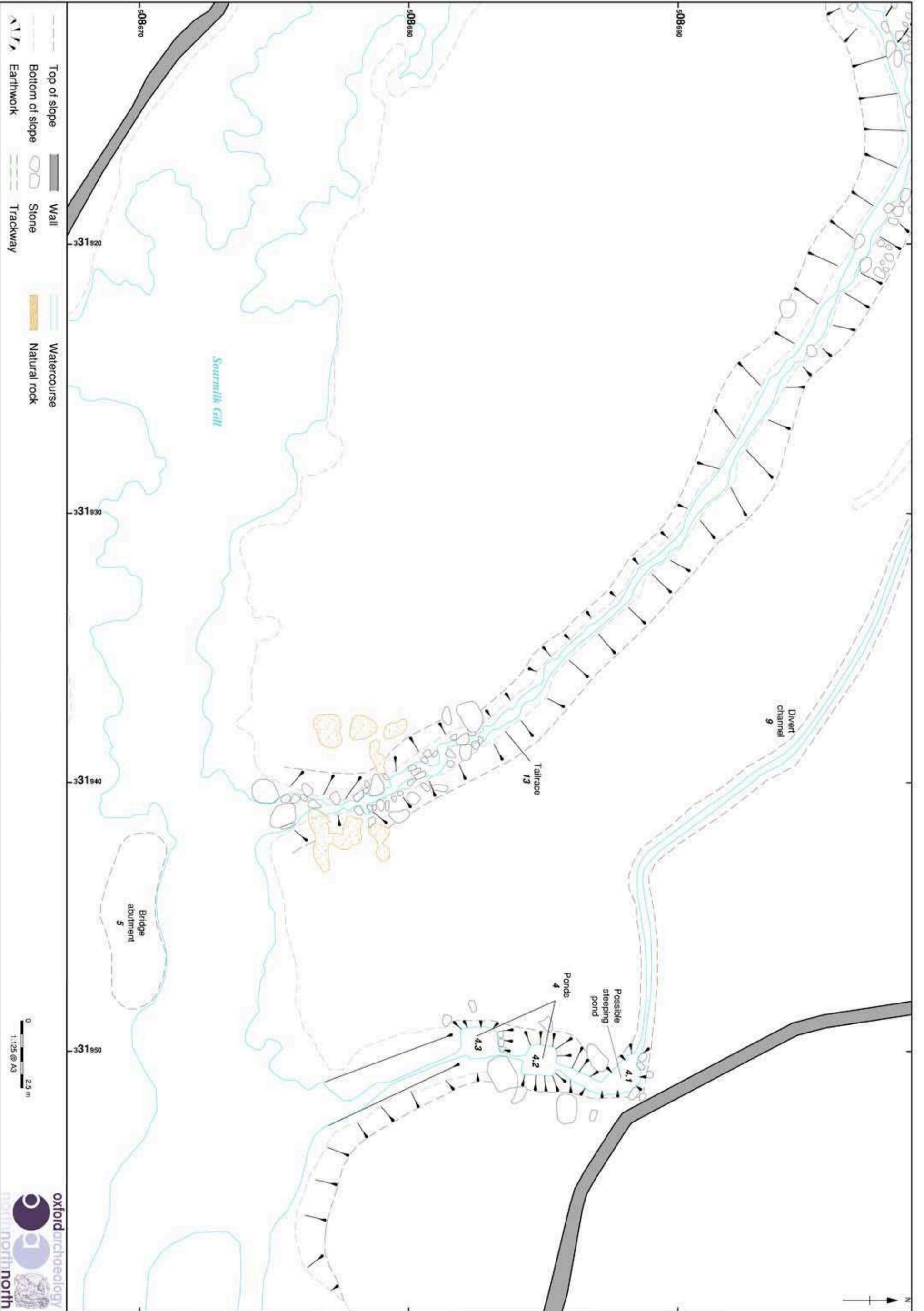


Figure 5: Sournmilk Gill Filling Mill, Easedale (east)

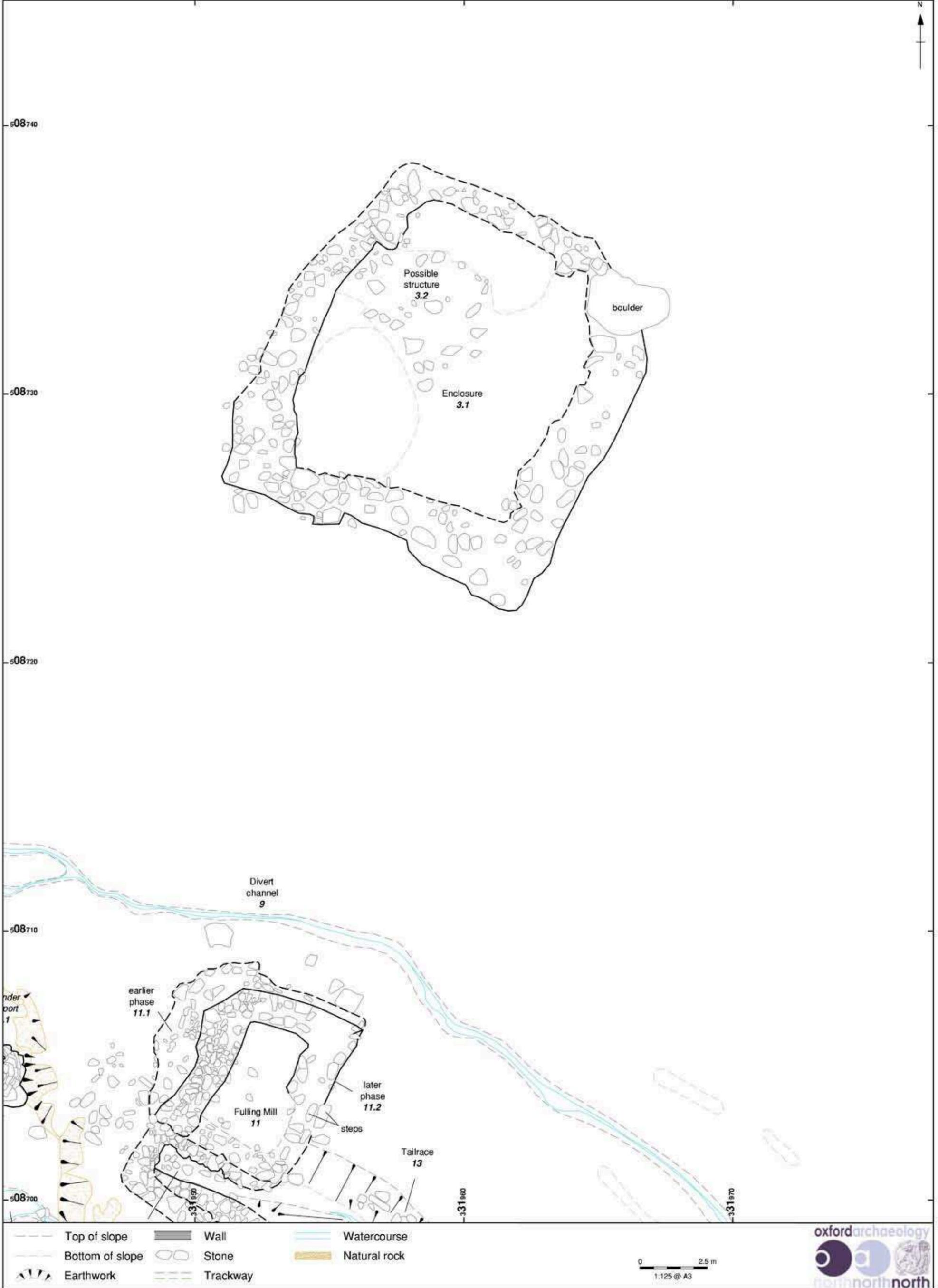


Figure 6: Sourmilk Gill Fulling Mill, Easedale (north)

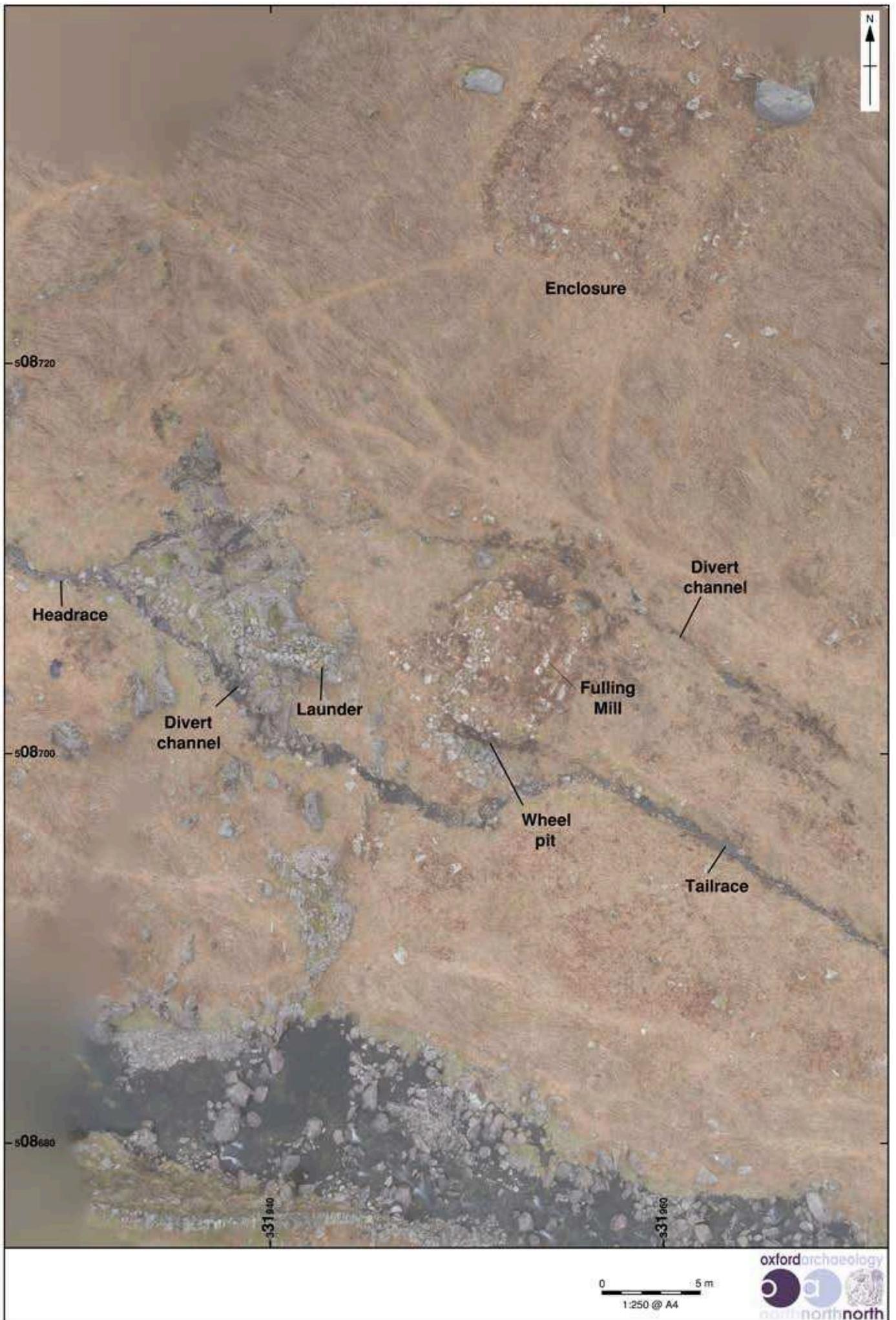


Figure 7: Aerial survey photograph of Sourmilk Gill Filling Mill, Easedale

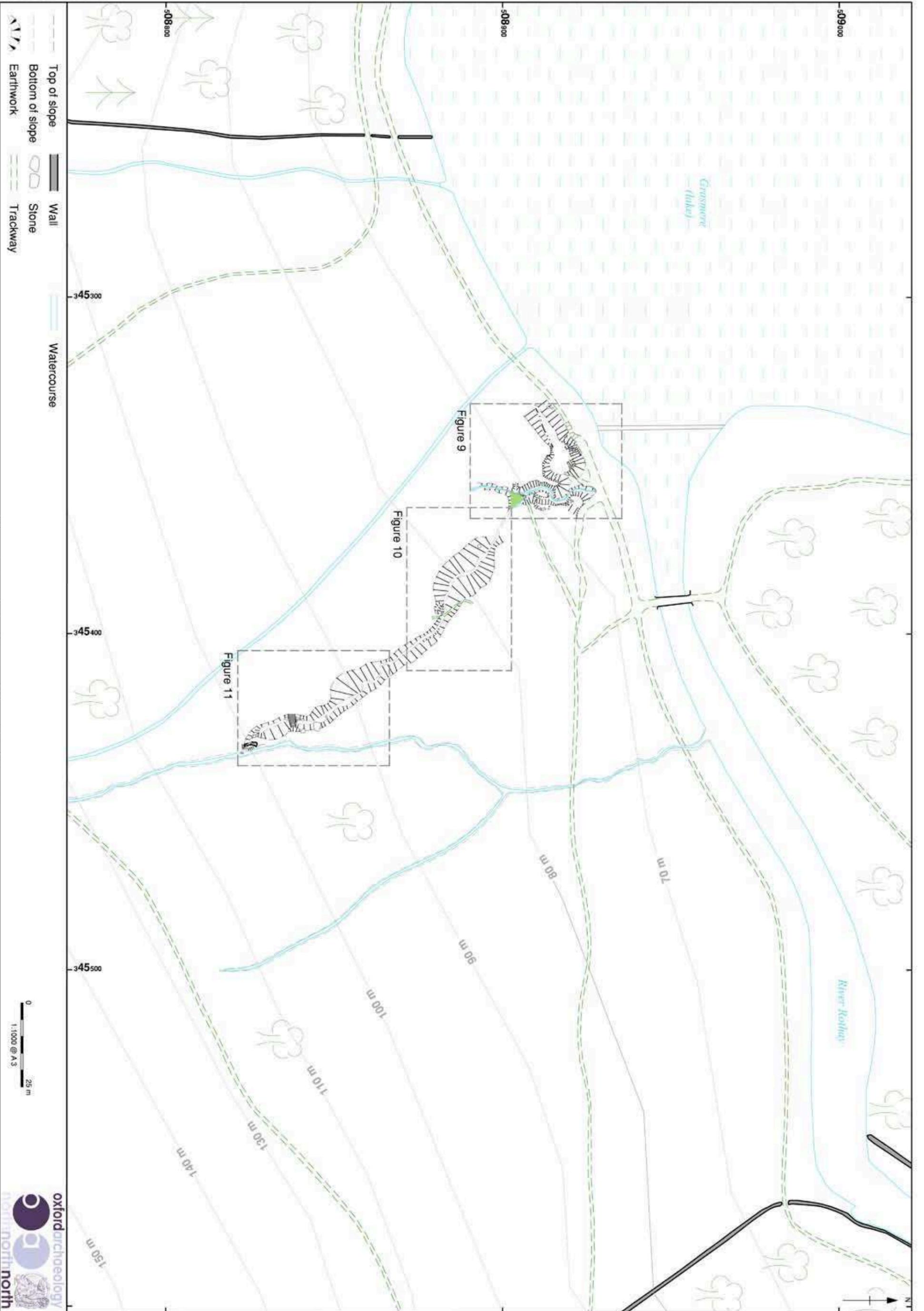


Figure 8: Loughrigg Terrace Filling Mill, Grasmere

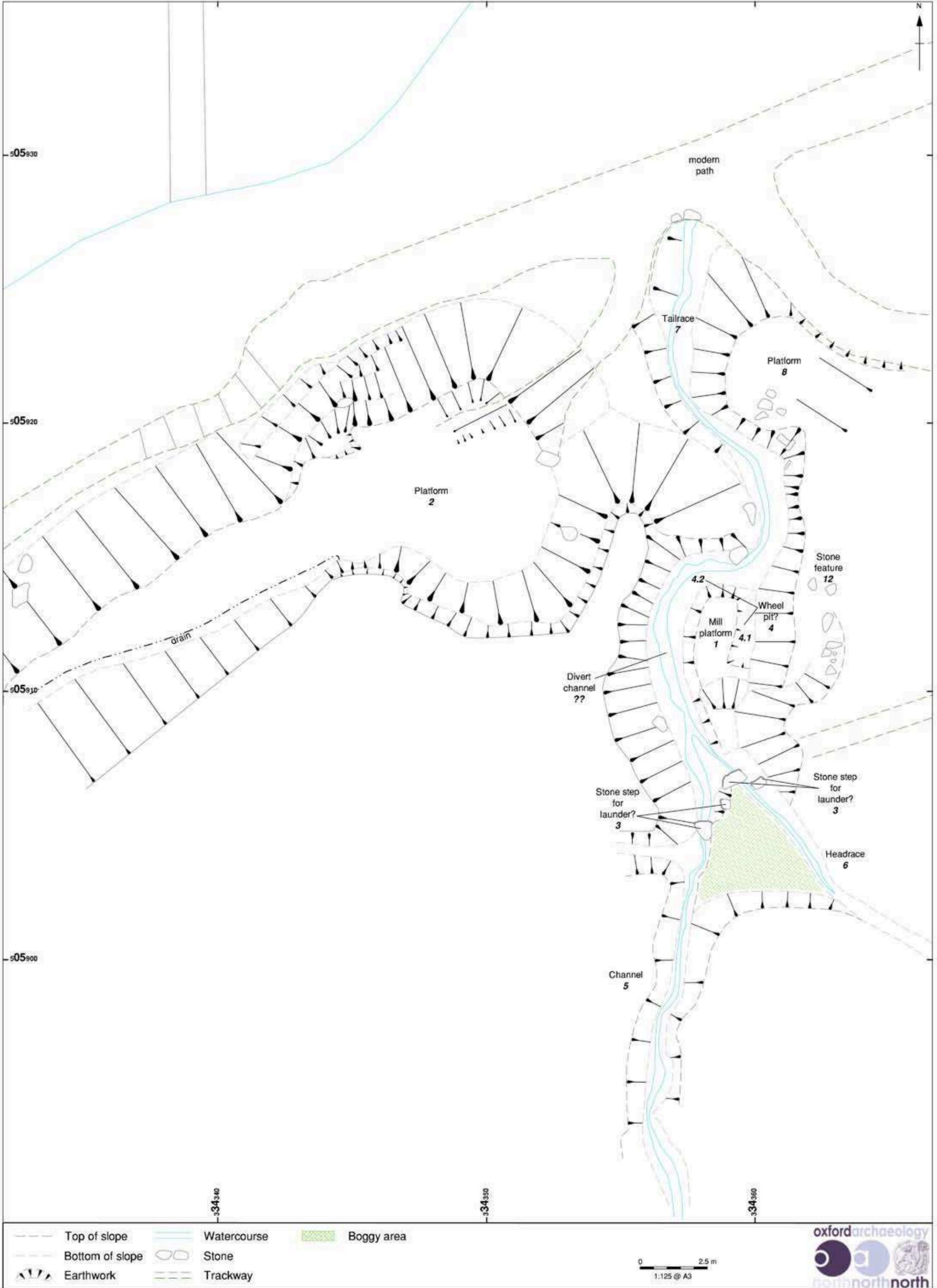


Figure 9: Loughrigg Terrace Fulling Mill, Grasmere (north)

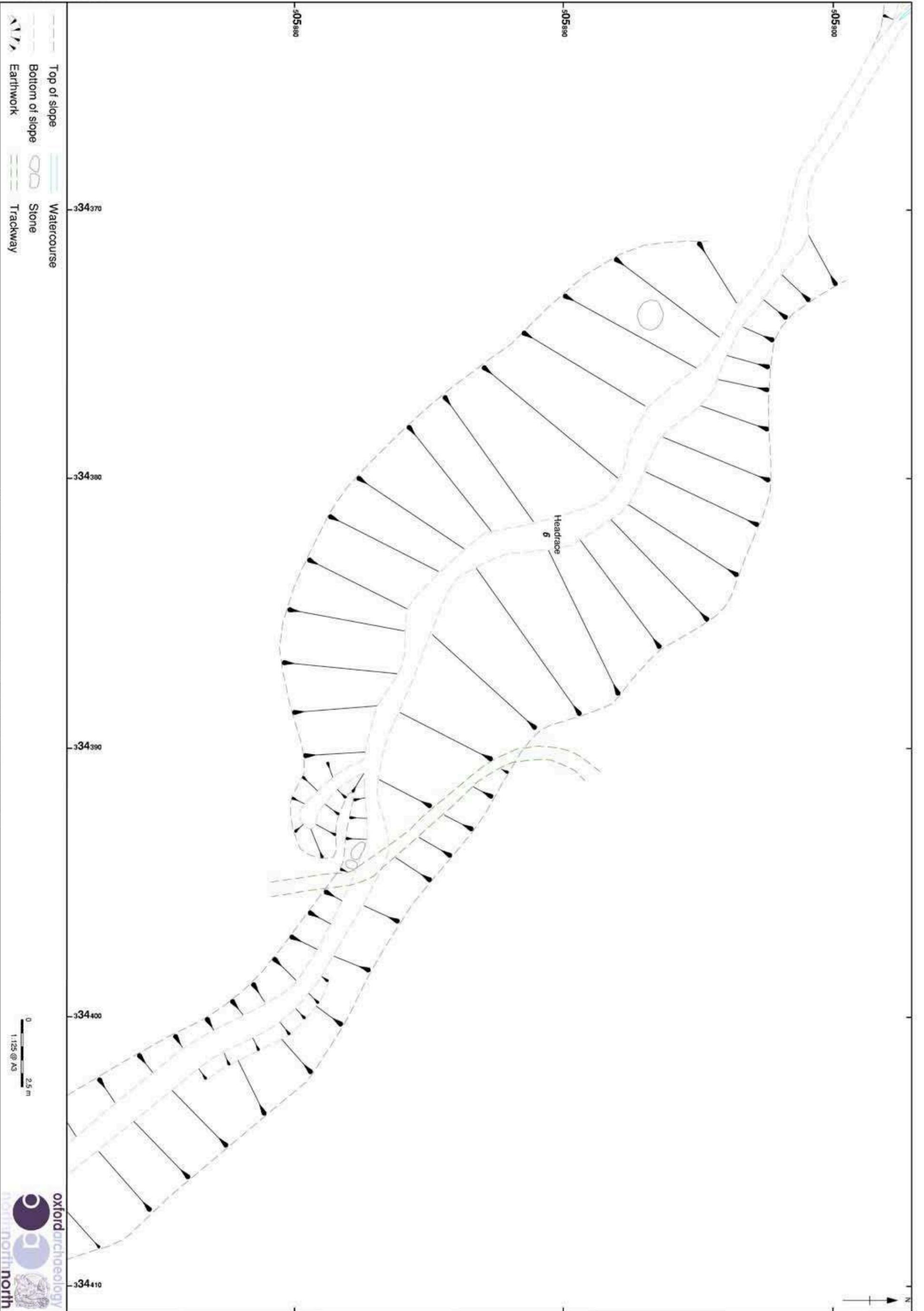


Figure 10: Loughrigg Terrace Filling Mill, Grasmere (centre)

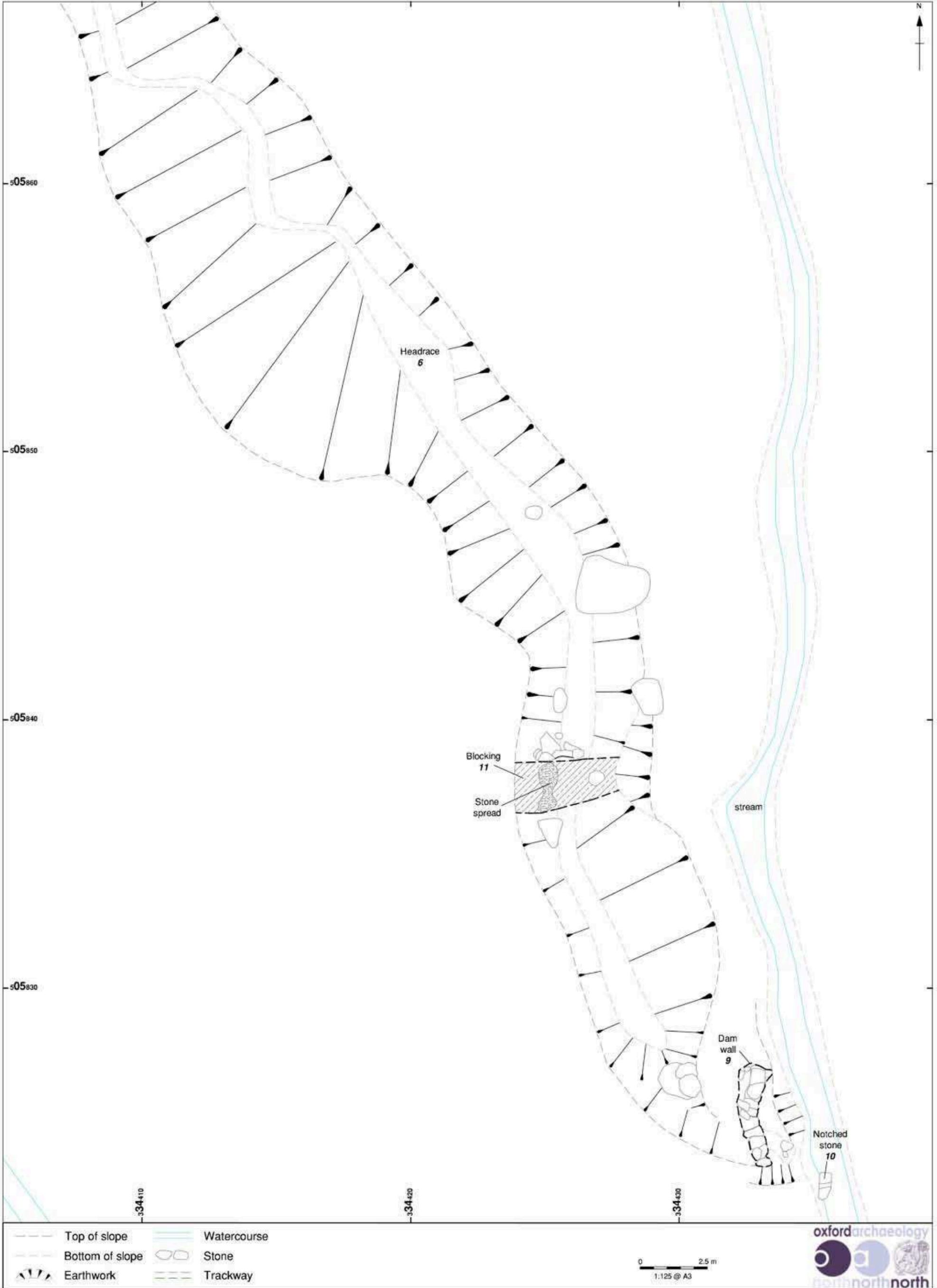


Figure 11: Loughrigg Terrace Fulling Mill, Grasmere (south)



Figure 12: Aerial survey photograph of Loughrigg Felling Mill, Grasmere

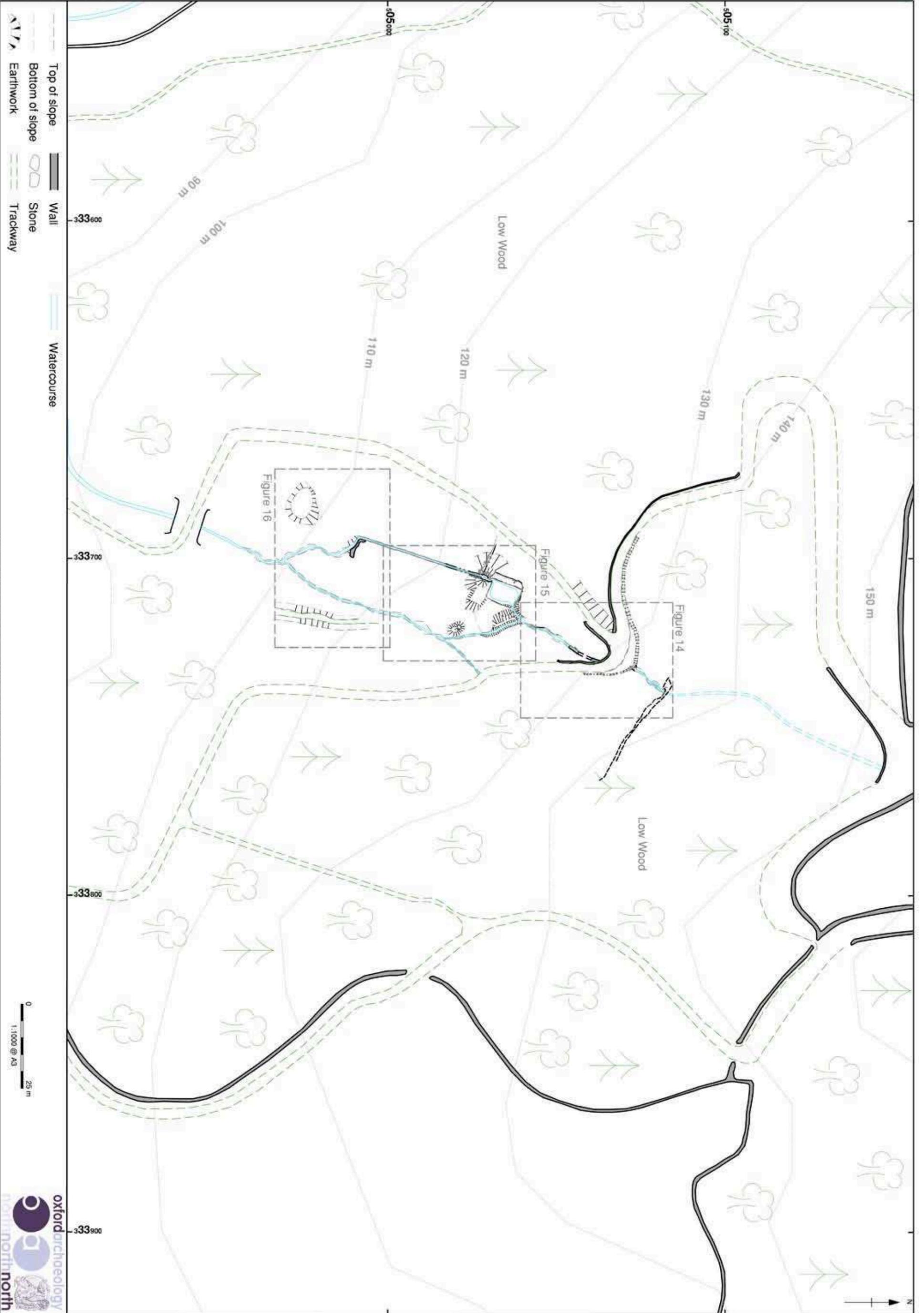


Figure 13: Low Wood Fulfilling Mill, Etenwater

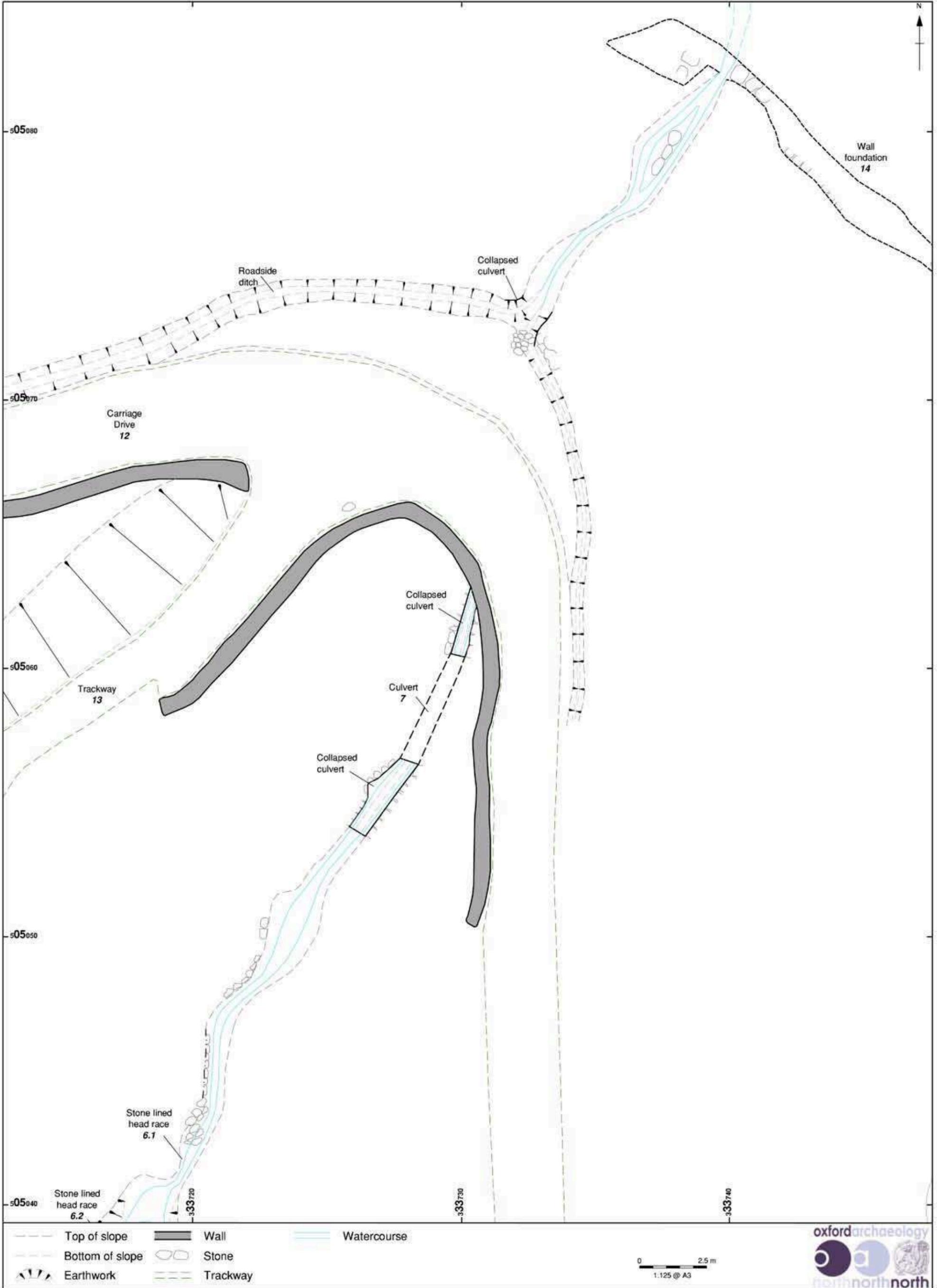


Figure 14: Low Wood Fulling Mill, Elterwater (north)

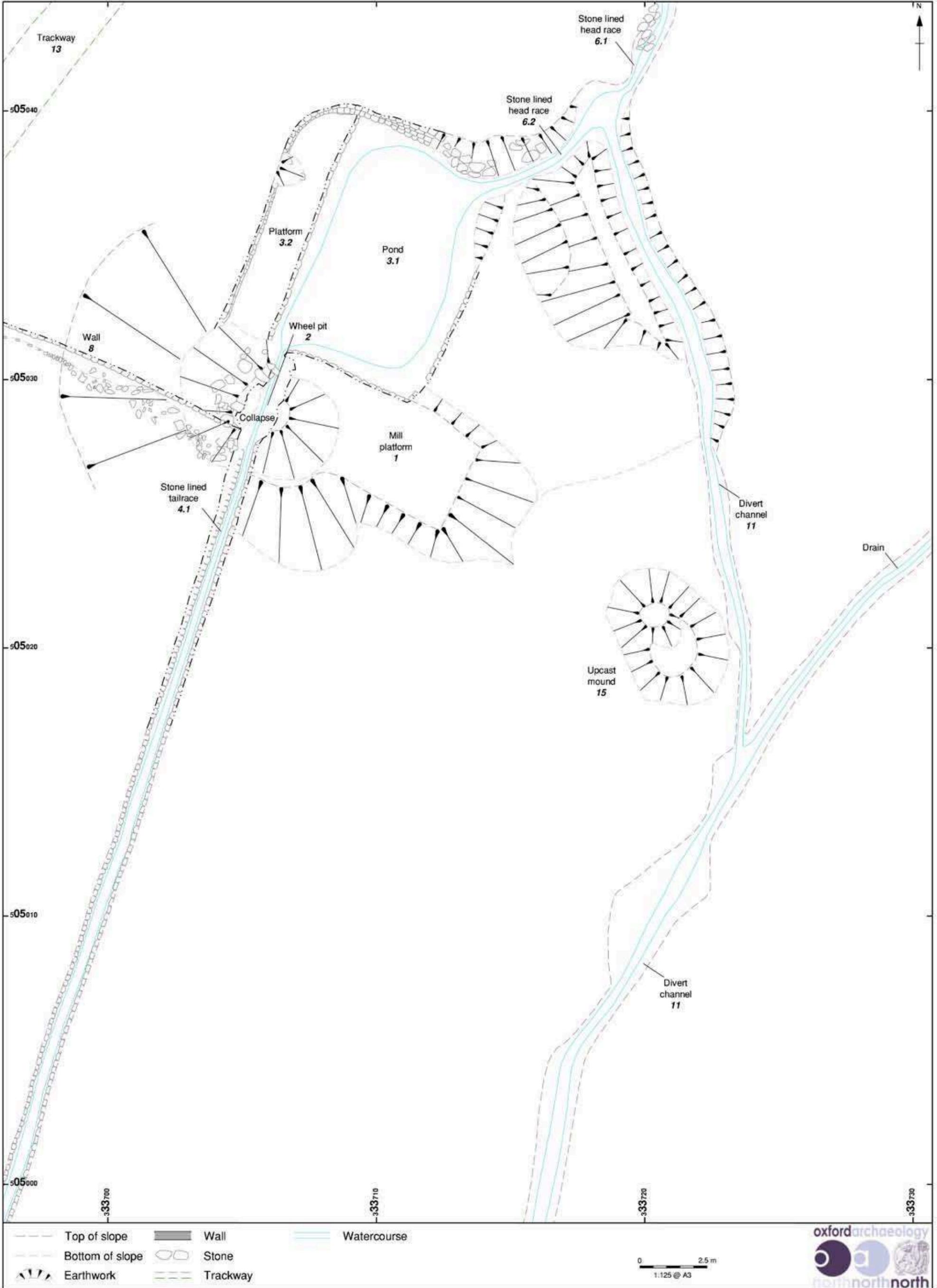


Figure 15: Low Wood Fulling Mill, Elterwater (centre)

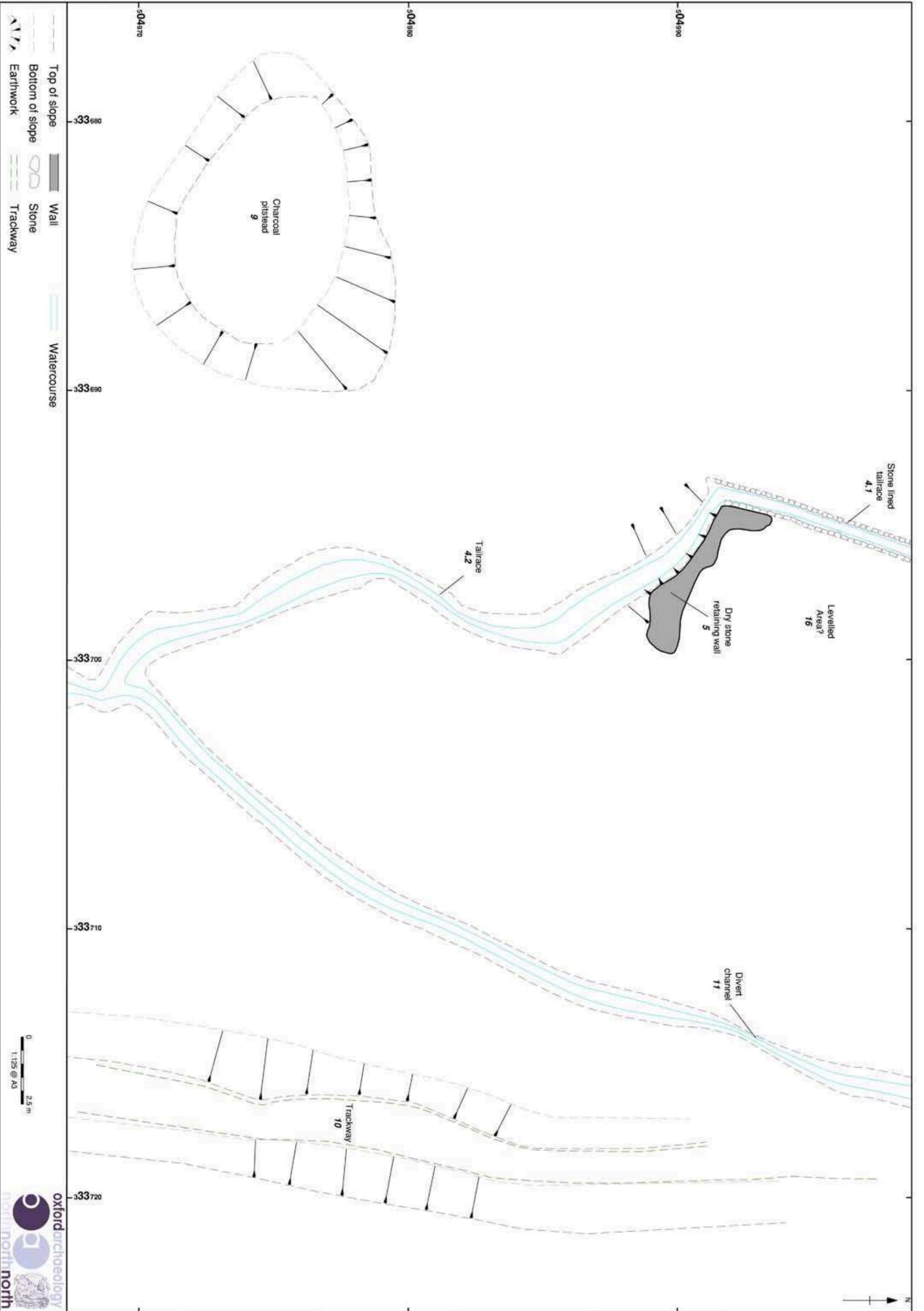


Figure 16: Low Wood Fulfilling Mill, Eterwater (south)

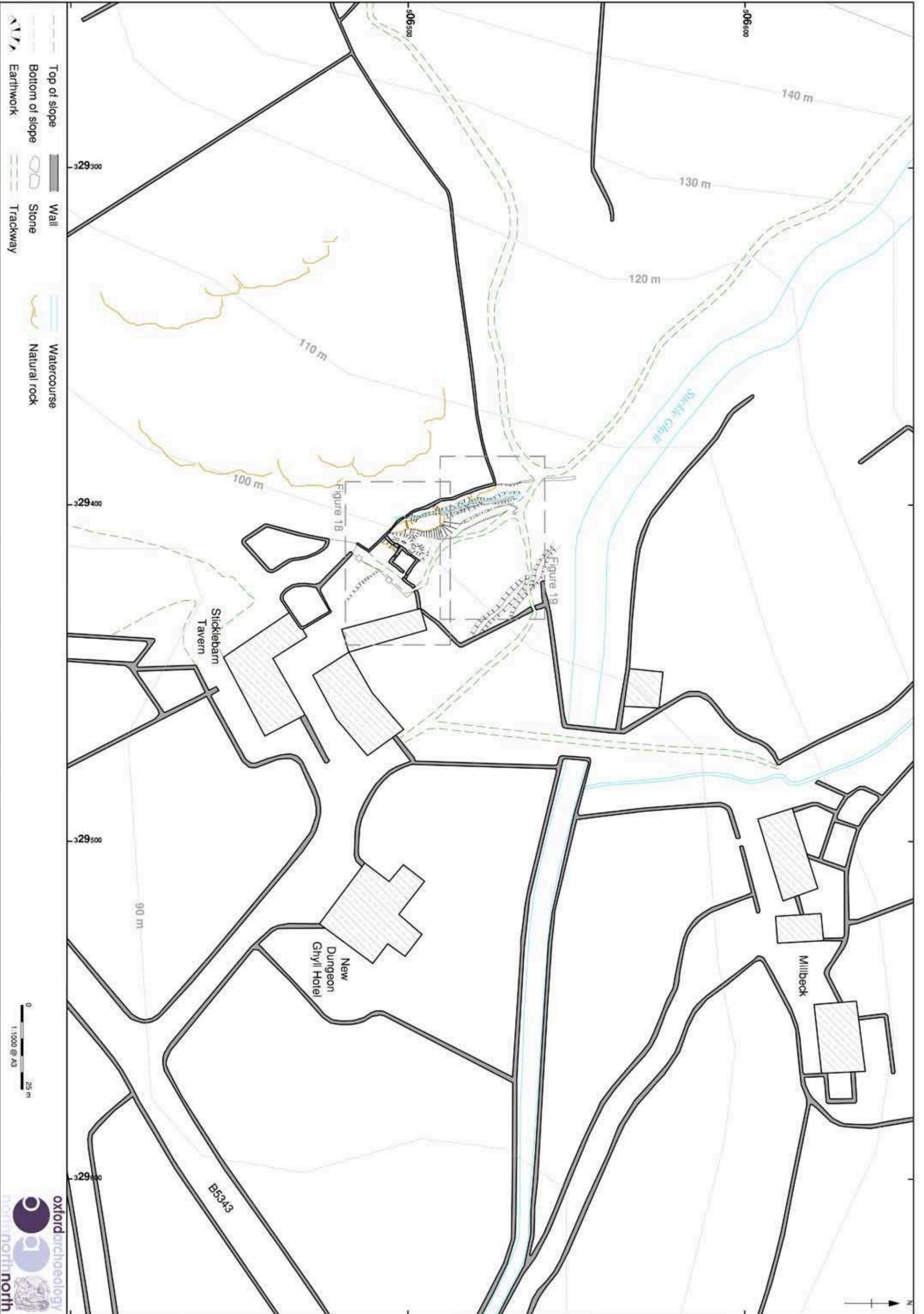


Figure 17: Stickle Ghyll Filling Mill, Great Langdale

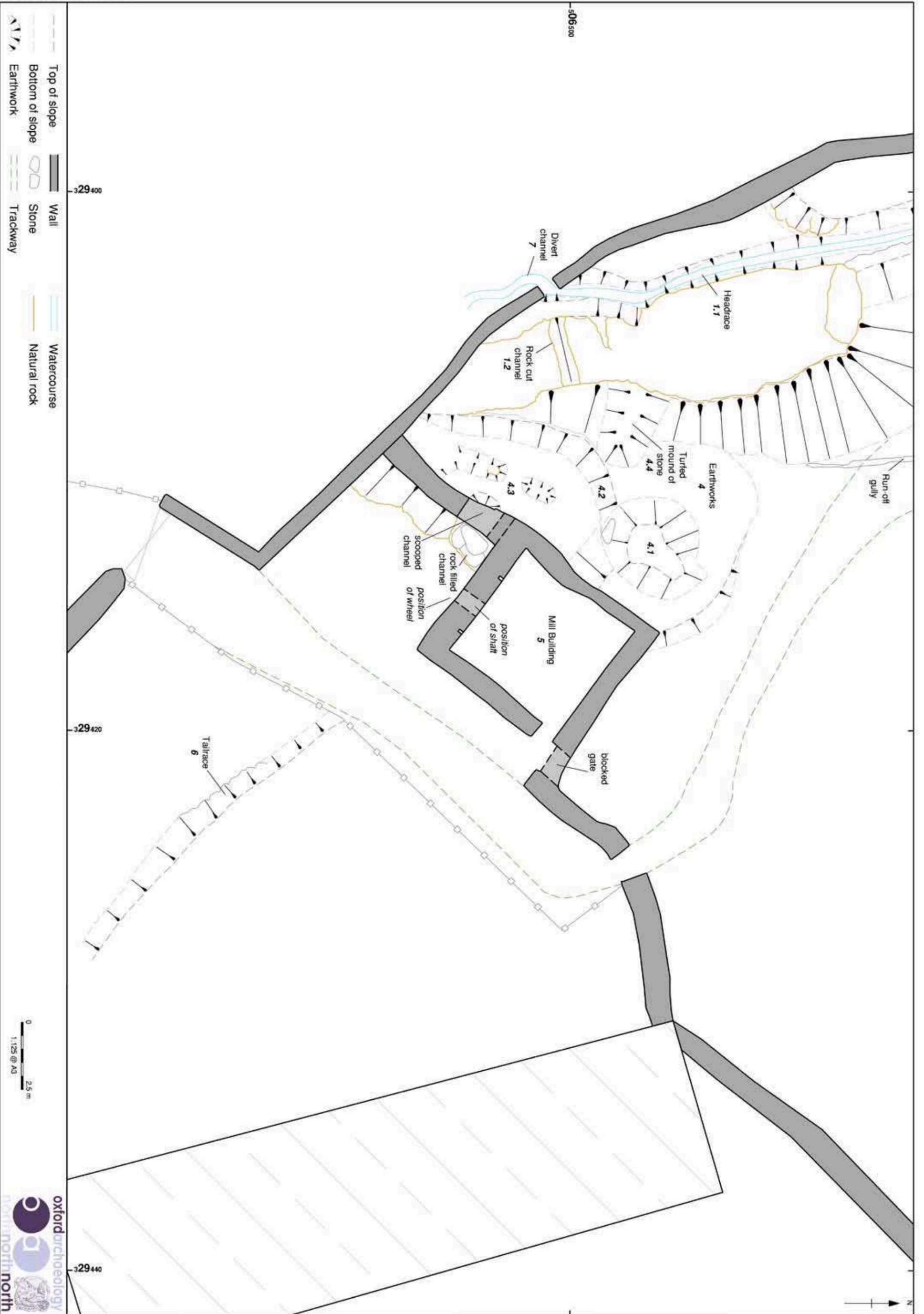


Figure 18: Stickle Ghyll Fulling Mill, Great Langdale (south)

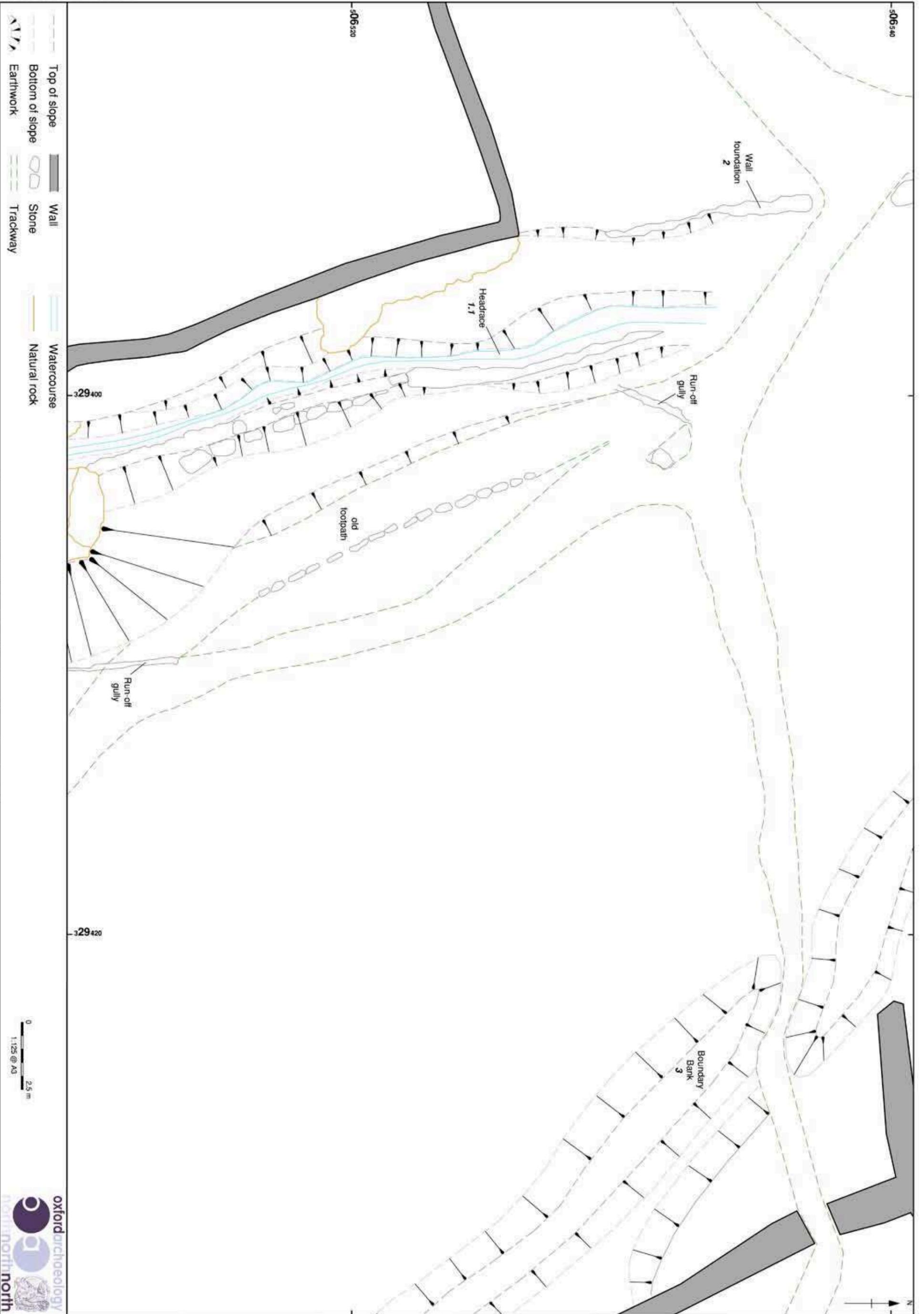
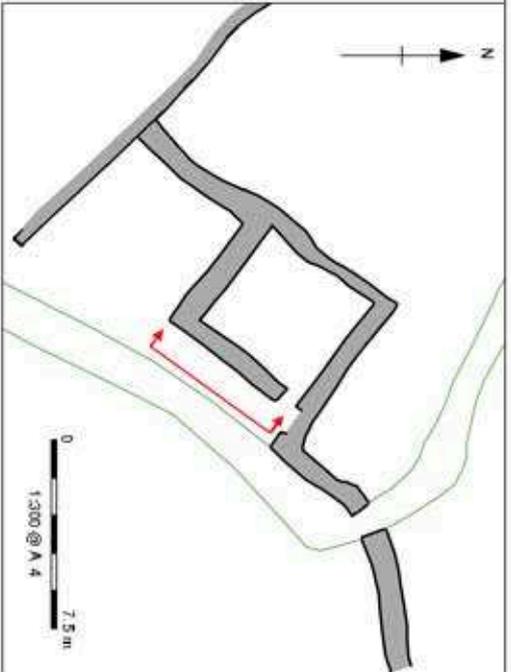


Figure 19: Stickle Ghyll Filling Mill, Great Langdale (north)



Figure 20: Aerial survey photograph of Stickle Ghyll Felling Mill, Great Langdale



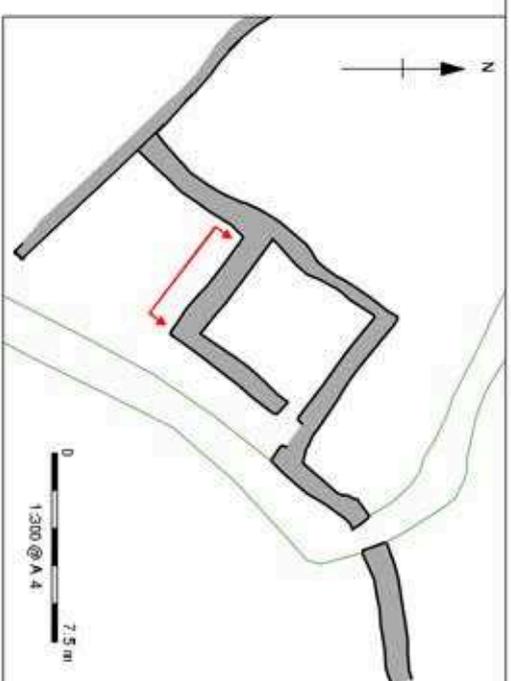
Elevation position



Original fabric



Figure 21 : South-east-facing external elevation of Stickle Ghyll Mill



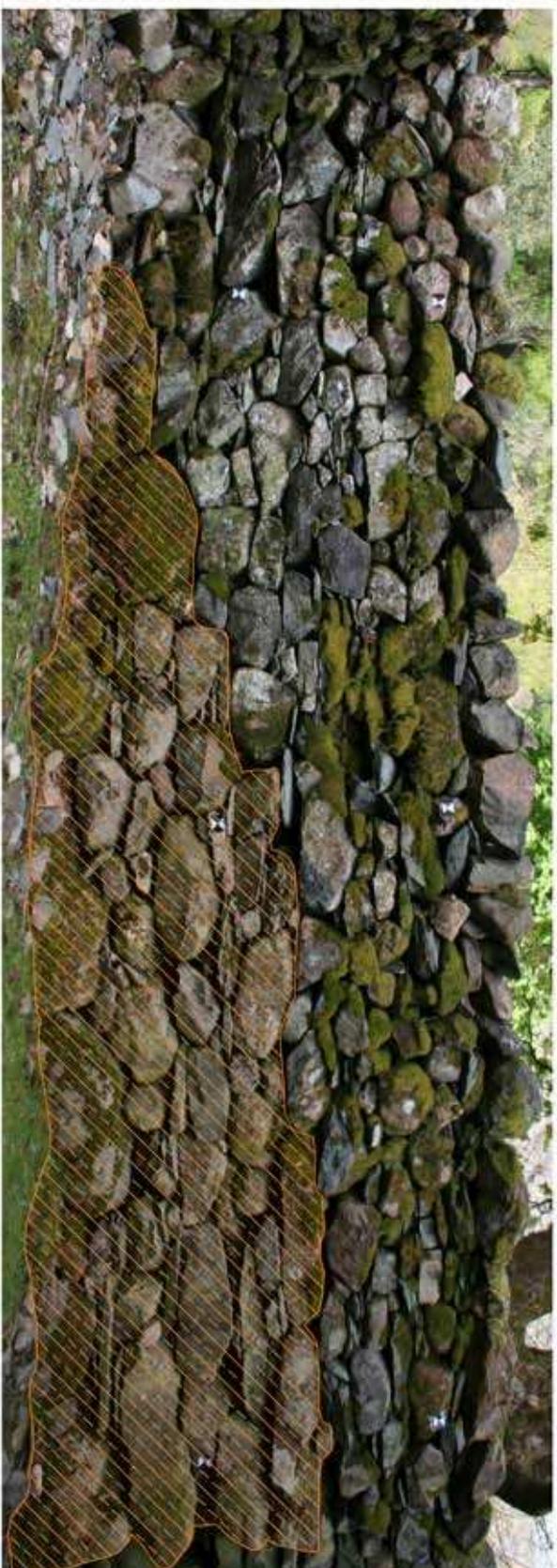
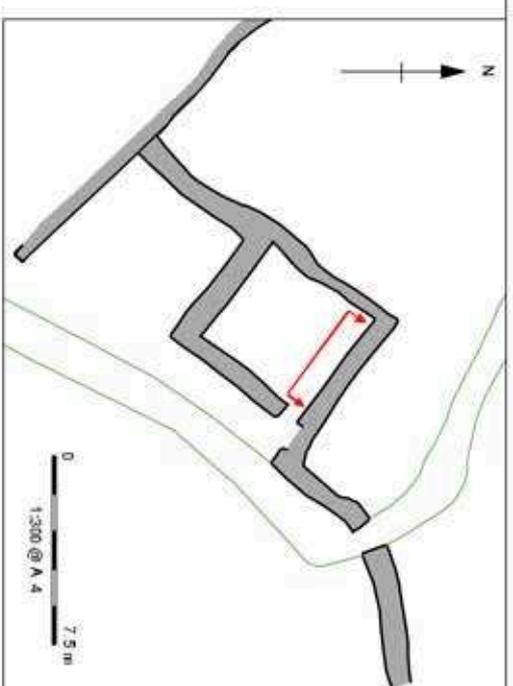
Elevation position



Original fabric



Figure 22: South-west-facing external elevation of Stickle Ghyll Mill



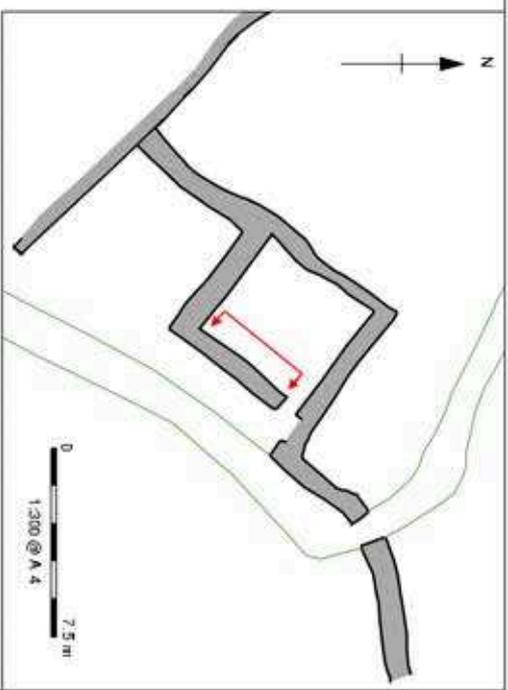
Elevation position



Original fabric



Figure 23: South-west-facing internal elevation of Stickie Ghyll Mill



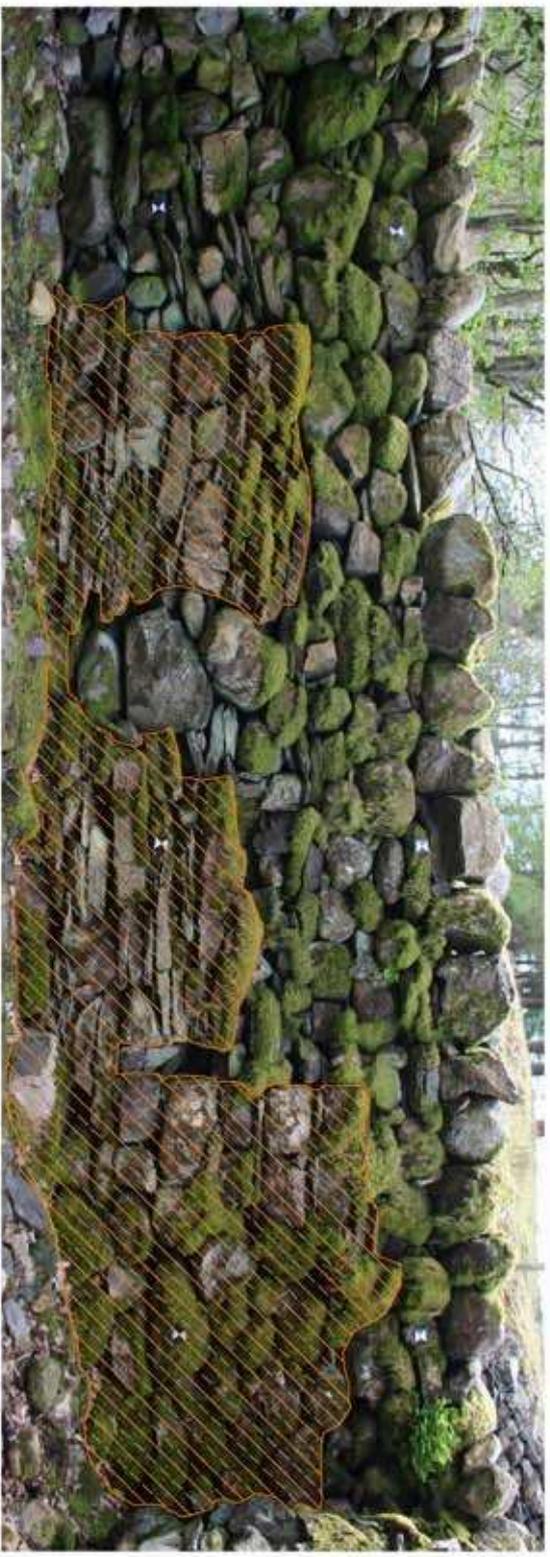
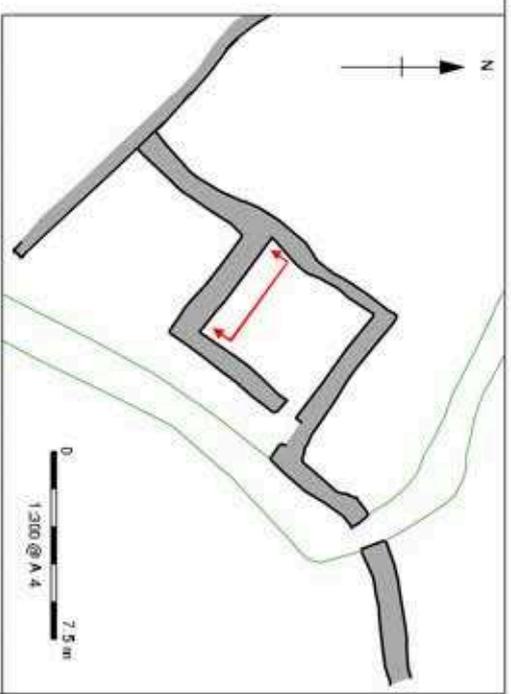
Elevation position



Original fabric



Figure 24: North-west-facing internal elevation of Stickie Ghyll Mill

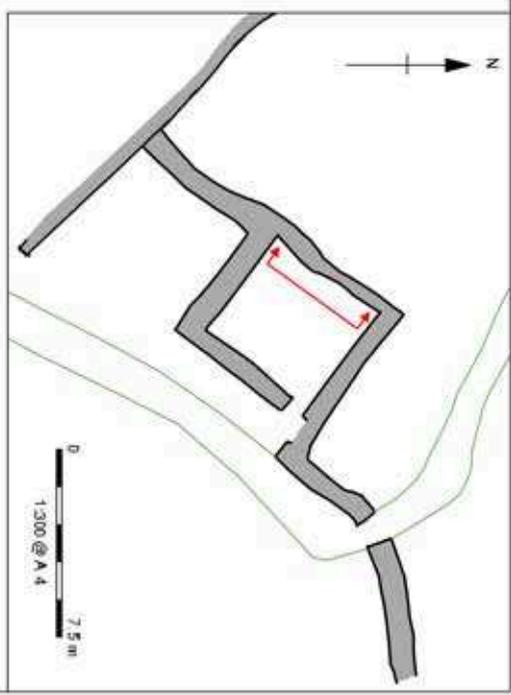


Elevation position

Original fabric



Figure 25: North-east-facing internal elevation of Stickie Gnyll Mill

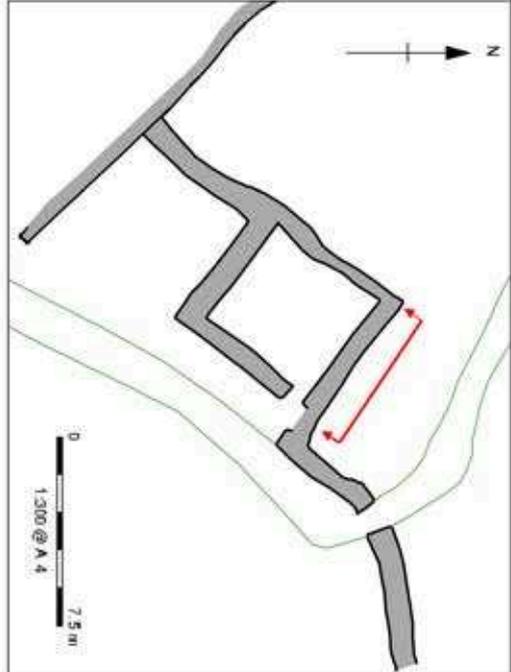


Elevation position

Original fabric



Figure 26: South-east-facing internal elevation of Stickie Ghyl Mill



Elevation position



Original fabric



Figure 27: North-east-facing external elevation of Stickle Ghyll Mill



Figure 28: South-east-facing adjoining wall elevation of Stickle Ghyll Mill

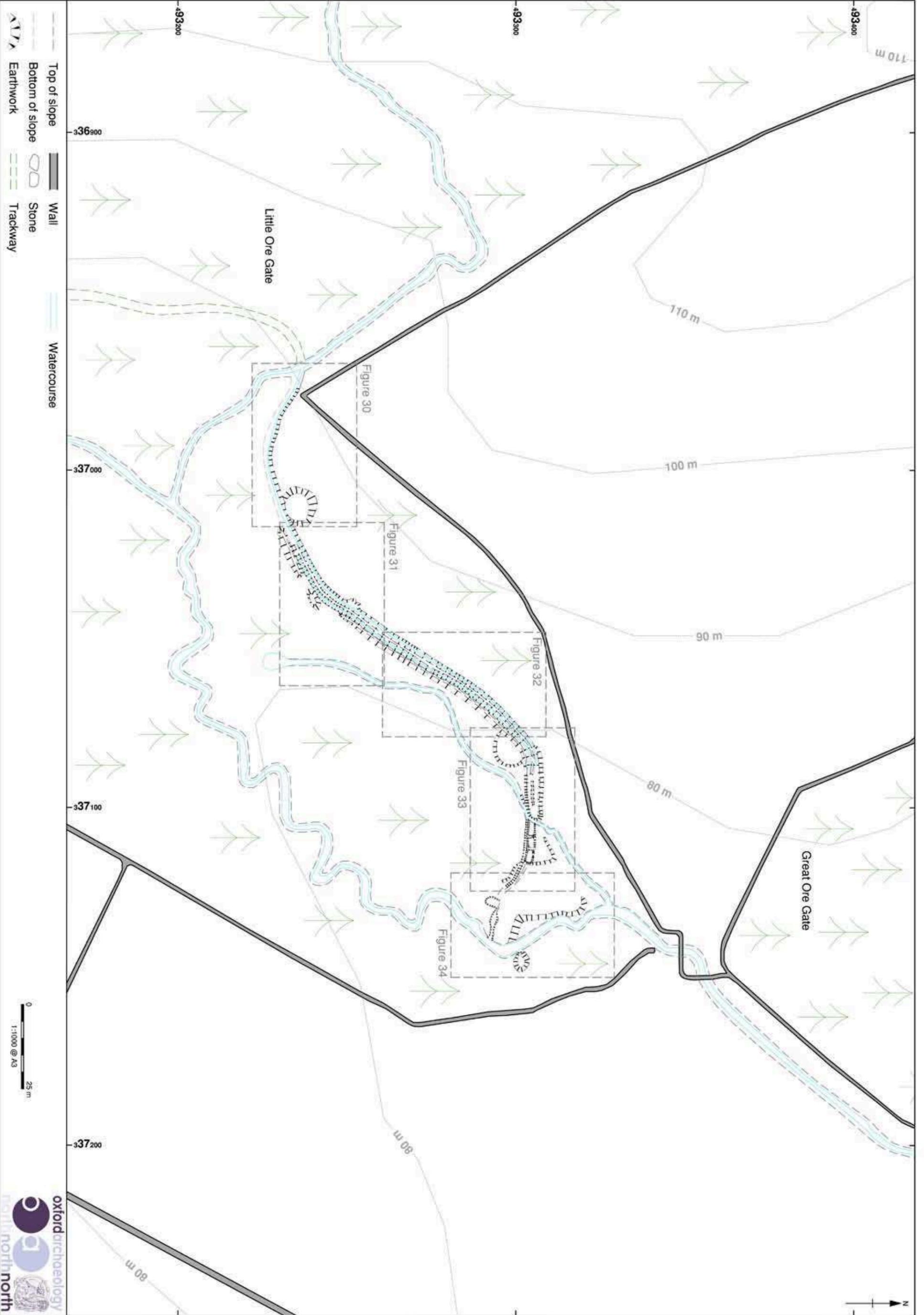


Figure 29: Little Ore Gate Fulfilling Mill, Graythwaite

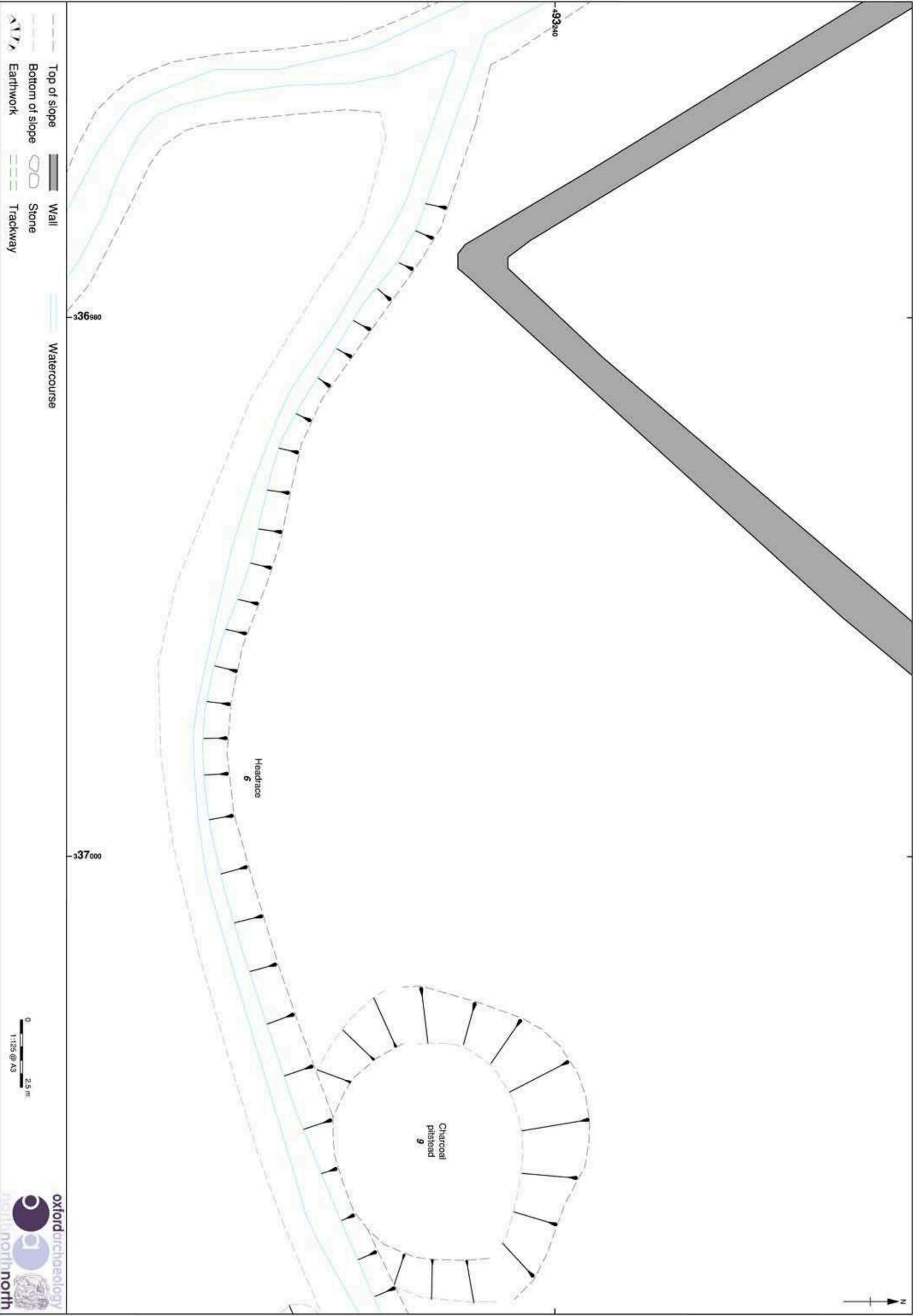


Figure 30: Little Ore Gate Fulfilling Mill, Graythwaite (south-west)

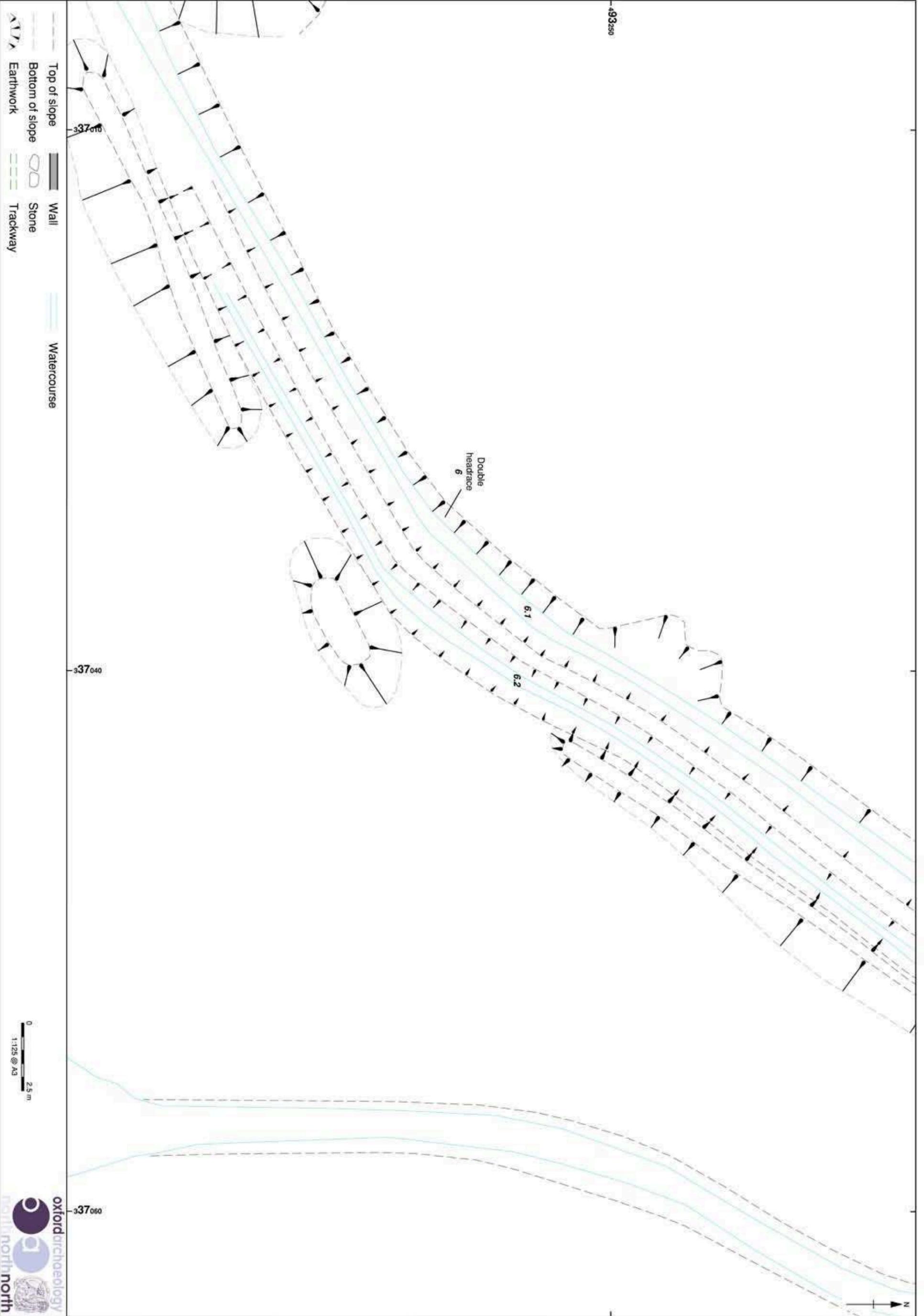


Figure 31: Little Ore Gate Fulfilling Mill, Graythwaite (west)

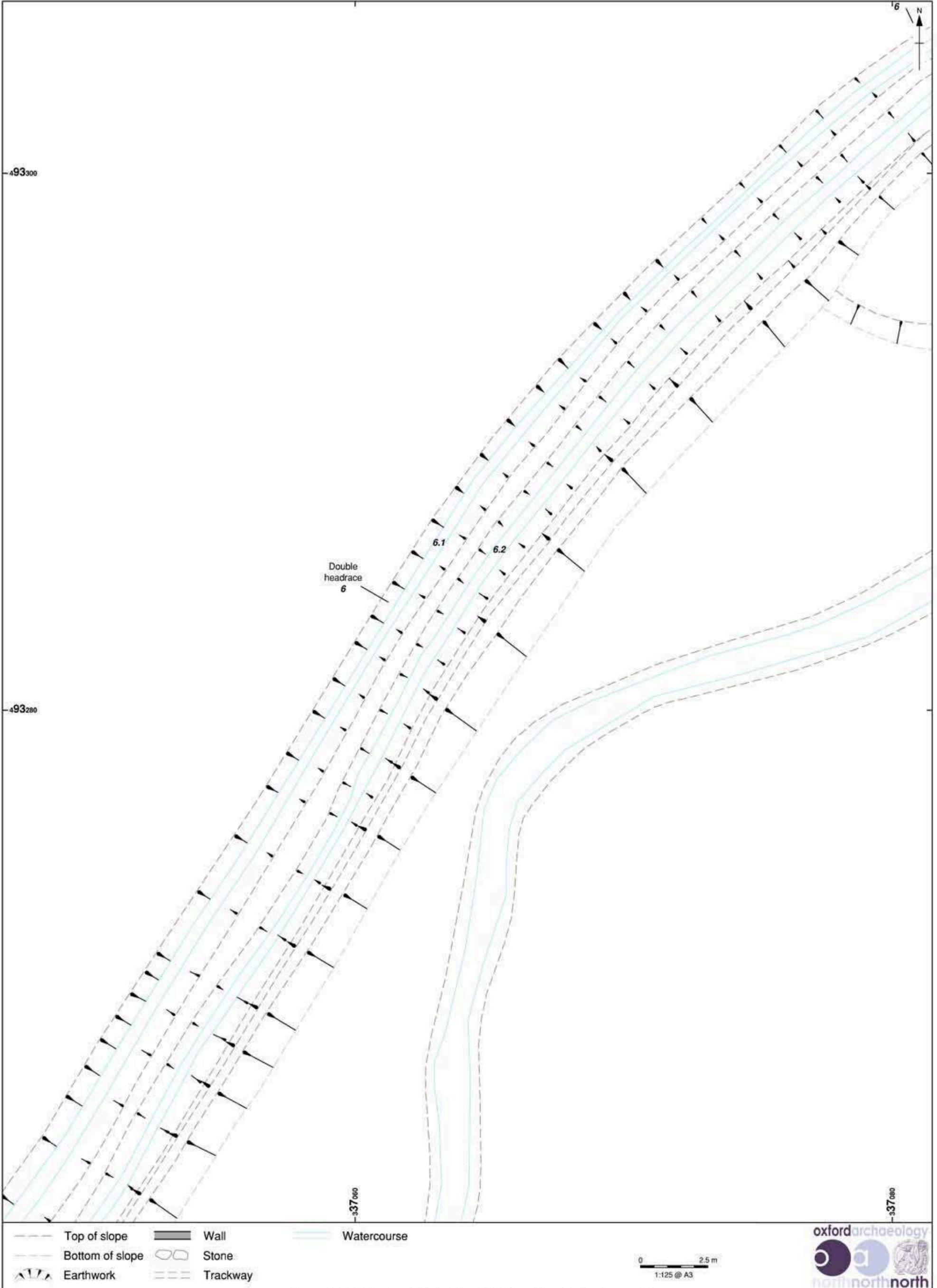


Figure 32: Little Ore Gate Fulling Mill, Graythwaite (centre-west)

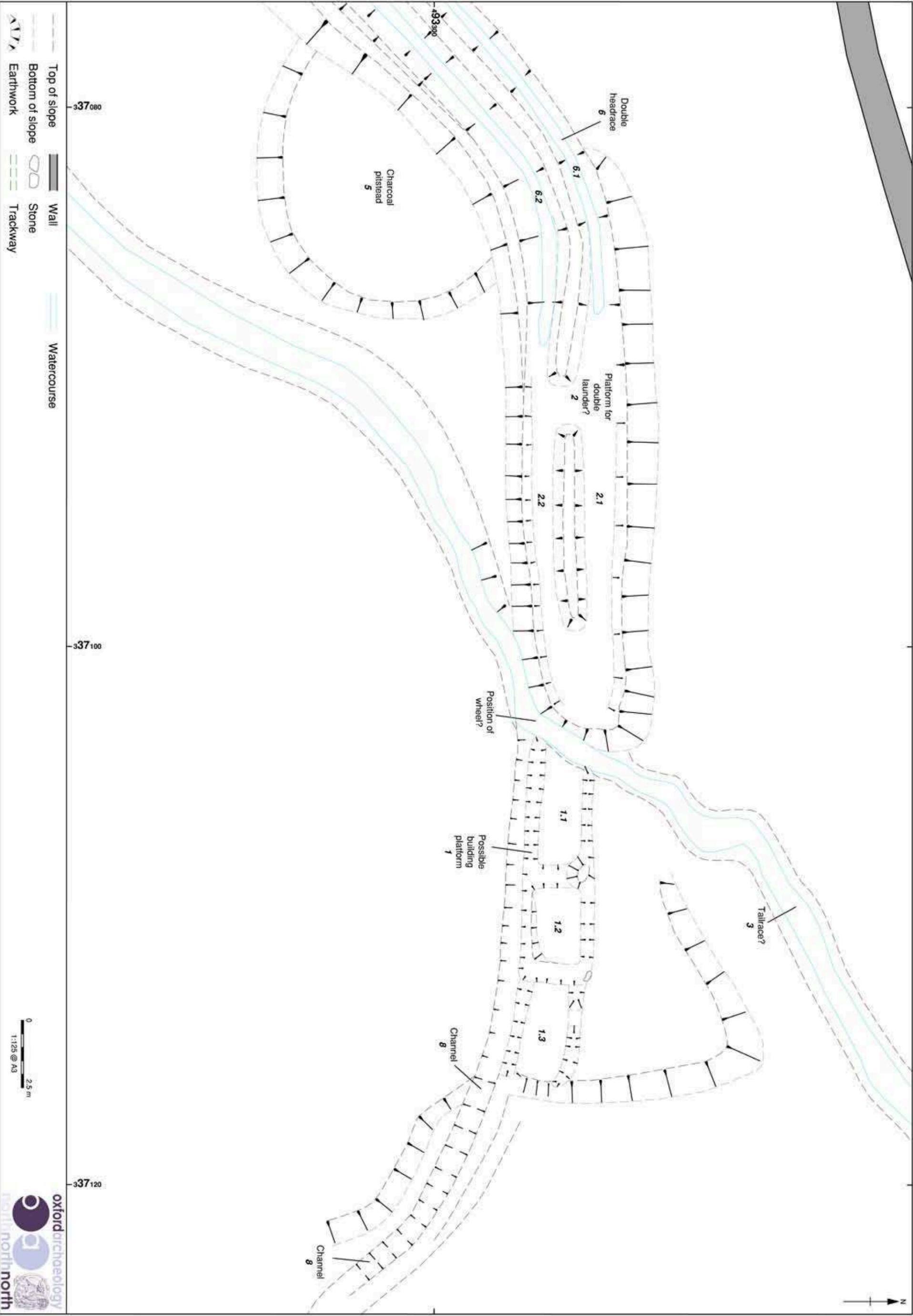
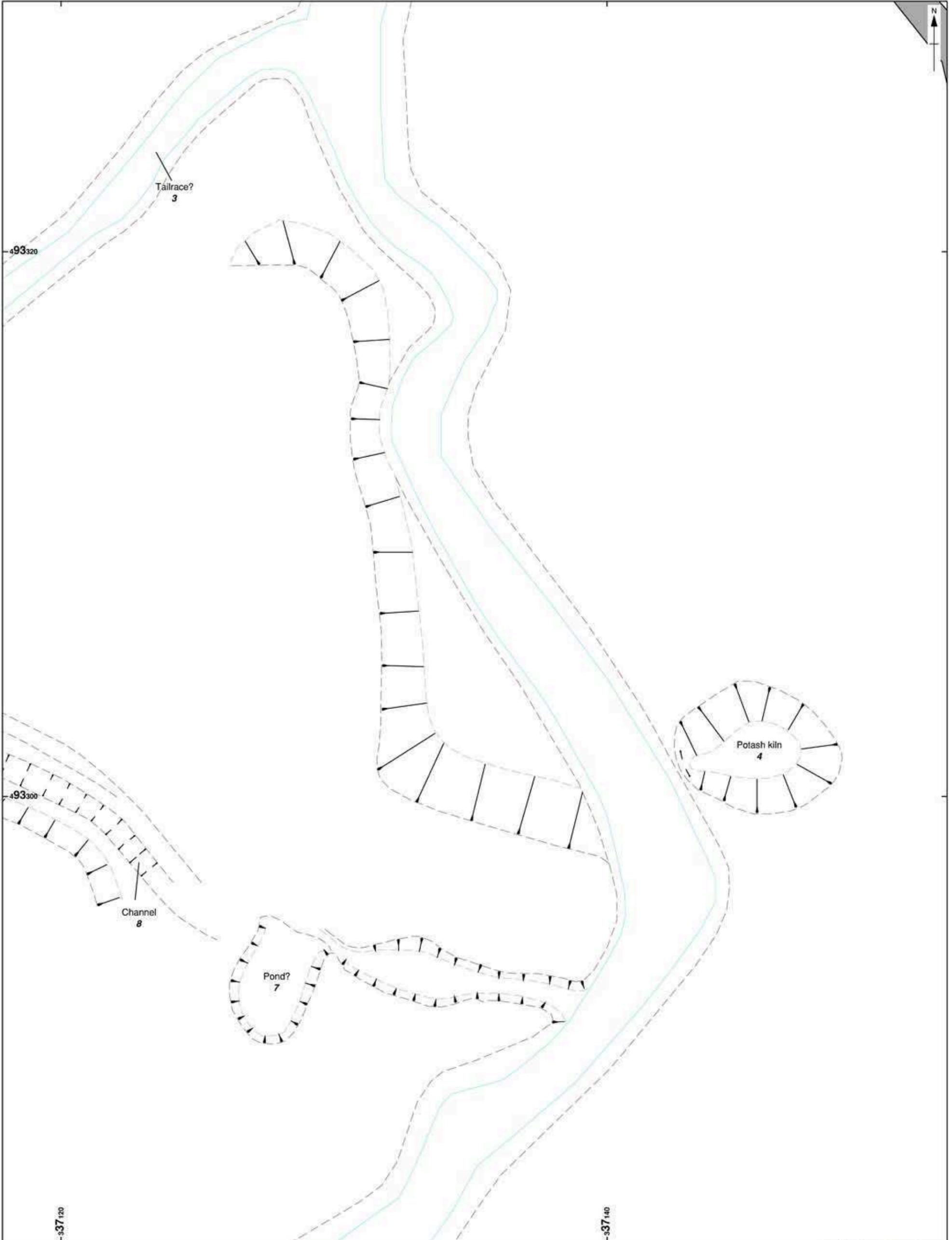


Figure 33: Little Ore Gate Filling Mill, Graythwaite (centre-east)



	Top of slope		Wall		Watercourse
	Bottom of slope		Stone		
	Earthwork		Trackway		

0 2.5 m
1:125 @ A3

Figure 34: Little Ore Gate Fulling Mill, Graythwaite (east)