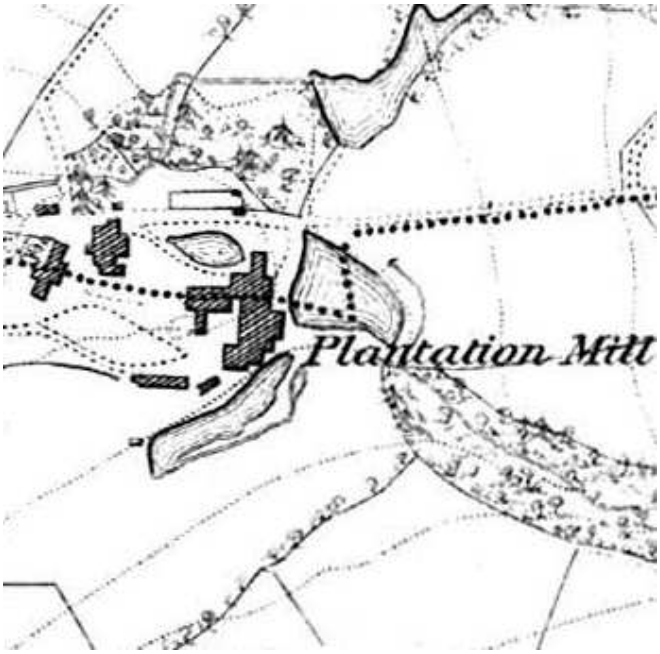

Plantation Mill, Peel Park, Accrington

Lancashire

Archaeological Survey

Oxford Archaeology North

May 2010

Jacobs Engineering (UK) Ltd

Issue No: 2009-10/1059
OA North Job No: L10245
NGR: SD 77480 28690

Document Title: PLANTATION MILL, PEEL PARK, ACCRINGTON, LANCASHIRE

Document Type: Archaeological Survey

Client Name: Jacobs Engineering (UK) Ltd

Issue Number: 2009-10/1059
OA Job Number: L10245
National Grid Reference: SD 77480 28690

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CONTENT

SUMMARY

In April 2010, Oxford Archaeology North (OA North) was commissioned by Jacobs Engineering (UK) Ltd, to carry out an archaeological survey of a former industrial site in the Peel Park area of Accrington, Lancashire (centred on NGR SD 377480 428690). The survey was required to inform and support design proposals for the regeneration of the park and the site, which was occupied from the late eighteenth century by a textile-manufacturing works.

The study area comprised two parcels of land, with a total area of approximately 6000m². The site was occupied from the late eighteenth century by a water-powered fulling mill, and redeveloped in 1810 as a calico printworks, known as Plantation Mill. For a supply of water and source of power, both of these textile works relied on the Pleck Brook, which flows through a steep ravine on the northern boundary of the study area. Plantation Mill was rebuilt during the mid-nineteenth century, as part of a programme of expansion to the works; it is likely that this remodelling included the installation of printing machines for the first time. The complex was expanded further prior to 1894, reflecting the continued regional growth and concentration of the calico-printing industry. However, the operating company went into decline in the early twentieth century and closed in 1934, with the mill complex finally being demolished in the 1940s.

Despite the complete demolition of the site, and the establishment of scrub deciduous woodland subsequently, the archaeological survey revealed that multi-phased structural elements of the printworks survive *in-situ*. Unexpected surface features also suggest that further structural elements of the former works almost certainly survive as buried remains, sealed by the demolition debris.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Sandra Jack, of Jacobs Engineering (UK) Ltd, for commissioning and supporting the project on behalf of Lancashire County Council. The survey was undertaken by Chris Wild and Tim Christian. Chris Wild wrote the report, and the drawings were prepared by Marie Rowland. Ian Miller edited the report, and was responsible for project management.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 Peel Park is a large site, covering some 88 hectares of open moorland, reservoirs, deep valleys, and former industrial sites, on the eastern fringe of Accrington, Lancashire. It has been identified by Lancashire County Council as an area that incorporates derelict and brownfield land, which has considerable potential to be cleaned up and turned into a quality public space for the benefit of the local and regional community (Lancashire County Council 2009). This scheme of environmental improvement is being facilitated by REMADE (**Re**clamation and **Ma**nagement of **De**relict Land), which is managed by Lancashire County Council and funded by the Northwest Development Agency, as part of their commitment to tackling the region's derelict land problem. The scheme is focusing on several key themes, which include: improved public access routes, with new signage, seating and interpretation; enhancing the ecological assets of the area, such as grassland and wetland habitats; improving the formal and informal recreation facilities; and celebrating the rich heritage of the site through improved interpretation of historic features, such as Arden Hall and a former textile-manufacturing site known as Plantation Mill, which lies in the south-eastern corner of the schem area.

1.1.2 Plantation Mill originated in the late eighteenth-century as a water-powered mill for the fulling and carding of wool. In the early nineteenth century, the mill was converted for use as a calico printworks, where colorful and intricate patterns were printed onto cotton goods. The mill remained in production until 1934, and was eventually demolished during the 1940s. The foundations of the buildings were covered by demolition rubble and obscured further by the subsequent unofficial tipping of rubbish and the development of scrub vegetation and woodland (Rothwell 1979, 4-5).

1.1.3 The fragmentary physical remains of this important industrial complex survive as low footings that are visible within the undergrowth, although the central part of the former works is obscured by tipped material. Sections of historic fabric are visible within the steep-sided ravine of the Pleck Brook, and under the track that passes through the site.

1.1.4 In April 2010, Oxford Archaeology North (OA North) was commissioned by Jacobs Engineering (UK) Ltd, acting on behalf of Lancashire County Council, to carry out an archaeological survey of the historic fabric of the mill complex that survives above ground. The survey was required to inform and support detailed proposals for the regeneration of the park and, specifically, the interpretation of the mill complex. The archaeological survey was carried out in April 2010, and focused on two parts of the site: a reservoir and associated buildings forming the southern part of the mill complex; and structural remains associated with a reservoir to the east and within the ravine of the Pleck Brook.

1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

1.2.1 The study area is situated in Peel Park, which lies a short distance to the east of Accrington town centre, in the parish of Accrington, on the western edge of the Pennines (Fig 1). In broad terms, the park is bounded by Burnley Road (the A679), the A56, and Plantation Road, which provides the main access route through the southern part of the park.

1.2.2 The central part of Peel Park is dominated by open moorland, which rises to a height in excess of 260m above Ordnance Datum (aOD), whilst the northern part of the park is characterised by former quarries and rough grassland, with some areas of hard standing to the rear of private properties on Burnley Road. The southern part of the park, which includes the site of Plantation Mill, comprises a variety of landscape features, such as woodland plantations, steep-sided valleys, and reservoirs and ponds. The remains of Plantation Mill (centred on NGR SD 377480 428690) lie to the south of the Pleck Brook, astride an access track that forms a continuation of Plantation Road. The site is covered by woodland (Plate 1).

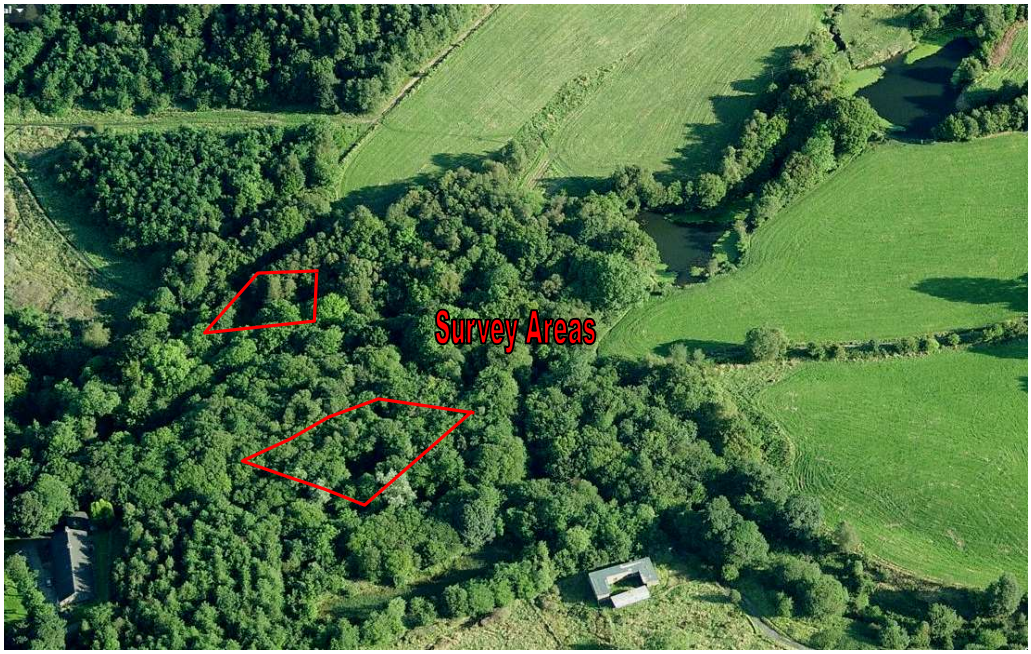

Plate 1: Recent aerial view of the site of Plantation Mill

1.2.3 The underlying solid geology is Lower Westphalian coal measures of the Carboniferous era, which provided a major contribution to the early industrial exploitation of the area (Ordnance Survey 1951). The hills surrounding the town are generally formed of Carboniferous sandstones, ranging from the more recent Accrington mudstones to older gritstones and other formations, such as Dyneley Flag and Dandy Rock. The former were locally used for flagstones and roofing before the introduction of Welsh slate and later for brick-making, whilst the latter were widely used in the locality for providing stone setts and kerbstones (Countryside Commission 1998, 102). The drift cover consists primarily of soils of the Brickfield Association, being medium- to fine-textured tills derived from Carboniferous sandstones.

2. METHODOLOGY

2.1 ARCHAEOLOGICAL SURVEY

2.1.1 The archaeological survey was consistent with a Level III-type survey (English Heritage 2006), and comprised an analytical record, combined with measured drawings and a detailed photographic record.

2.1.2 ***Descriptive Record:*** written records using OA North *pro-forma* record sheets were made of all principal building elements, in addition to any features of historical, archaeological or architectural significance. Particular attention was made to the relationship between the various parts of the buildings, especially those that could allude to their development.

2.1.3 ***Instrument Survey:*** the plans, and outline elevations of the building remains were surveyed with a reflectorless electronic distance measurer (REDM). These were produced in order to illustrate the form, phasing and development of the buildings. Features of historical, structural and archaeological significance were annotated on to the drawings. An industry standard CAD package was used to produce the final drawings.

2.1.4 ***Photographic Survey:*** photography was undertaken using 35mm cameras on archivable black and white print film as well as colour transparency, and also with a high-resolution digital SLR cameras. The photographic archive consists of both general site views and detailed photographs of features of particular interest. Given the lack of safe access to the extant fabric within Area 1, additional photographs were taken to capture detail not surveyed, and this was corrected using CAD-based photo-correction software, to add further detail to the elevation drawings.

3. HISTORICAL BACKGROUND

3.1 INTRODUCTION

3.1.1 The following section presents a summary of the historical background and chronological development of Plantation Mill. This is preceded by a summary of fulling mills, and an account of the calico-printing industry, which is intended to place the site in its historical and technological context.

3.2 FULLING MILLS

3.2.1 Fulling was an important stage in the production of woollen cloth which, during the later medieval period, was England's most important export commodity. The fulling process fulfilled two functions that were necessary to produce a satisfactory finish to woollen cloth; scouring, and the consolidation of the fibres of the fabric. From the twelfth century onwards, fulling became a mechanised process; fulling of woollen cloth after weaving was the earliest textile process to be mechanised and power driven (Ashmore 1969, 37-8). Water-powered fulling mills were active in Burnley, Colne, Manchester and Salford by 1300, and were numerous in all woollen-manufacturing areas by the late eighteenth century (Cossons 1975, 255).

3.2.2 Woollen cloth straight from the loom usually has an open and loose texture, and requires tightening. The fulling process consolidates and thickens the structure of the fabric by knitting the fibres together more thoroughly, and by shrinking them. This essentially transformed the looseness of the woven threads into a compact and tight cloth. Fulling also scoured the cloth to rid it of any natural oils and greases. It involved the use of water and several different agents, including fuller's earth. In essence, fuller's earth is a fine clay that contains a high silica component, and was valued in the fulling process for its degreasing and decolourising properties (Ponting 1970).

3.2.3 After mixing water and the cleaning agent together, the cloth was pounded in the resultant solution by fulling stocks or beaters. The initial goal was to remove all traces of grease by smearing the newly woven cloth with soap, soda and covering with hot water. This was then trampled in a trough or between rollers until all traces of oil or grease were removed. The cloth was then passed between large wooden mallets, usually three times. Initially, the trough beneath the mallets contained urine. The second fulling was with the fuller's earth, and the third with hot soapy water, followed by a final thorough rinsing in clean water. The amount of fulling required was dependent on the type of wool, the type of water, the cloth texture, the temperature of the water, and the time allowed under the fulling stocks (Baines 1825).

3.2.4 Fulling stocks used a large wooden frame to support an inclined arm with a stock at one end. This pivoted at one end to allow it to swing in an arc down onto the cloth, which was contained in a wooden trough (Plate 2). The stocks were usually pushed back by large cams on a horizontal shaft, which was

powered by a waterwheel. In larger mills, a long camshaft raised a series of stocks, although fulling stocks were usually set in pairs, each working alternately and swinging like a pendulum down onto the cloth.

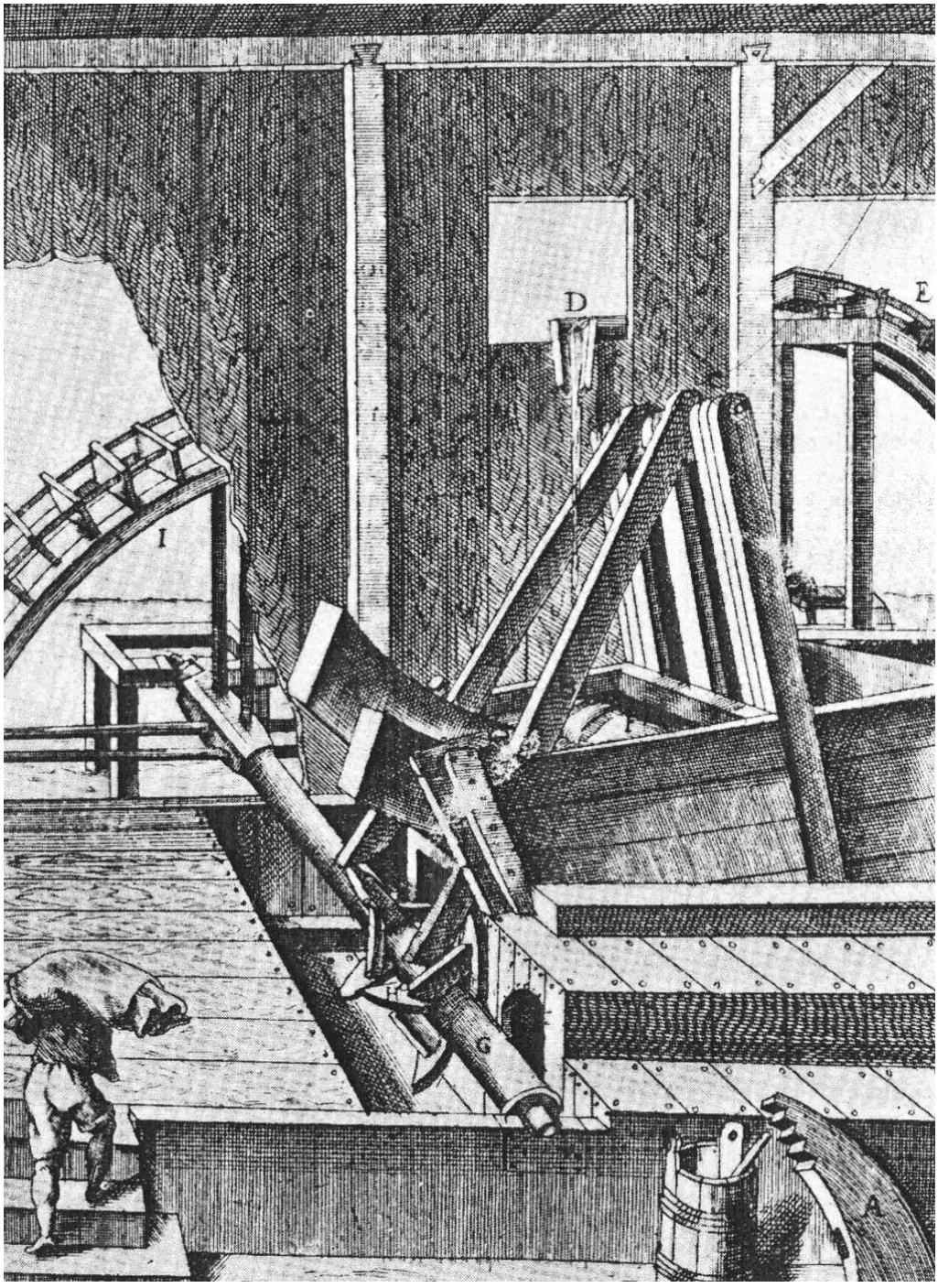

Plate 2: Interior of a fulling mill (taken from Zonca 1607)

3.2.5 Despite the regional importance of fulling mills, their surviving physical remains are rare, as many were developed into larger spinning factories with the advent of powered spinning and carding machinery. One of the few surviving examples of the fulling mechanism in the country, and certainly the best example in Lancashire, is preserved at Helmshore Mill, near Haslingden (OA North 2006).

3.3 CALICO-PRINTING INDUSTRY

3.3.1 Calico printing is a term applied generically to the printing of any textiles, although the term originated to describe specifically the printing of cotton cloth (Murphy 1911, 2). The first printed cotton cloth, known as chintz, was introduced into England from India during the seventeenth century. At that time, clothes in Britain were made from wool, linen, or silk, and plain dyed with natural colours. Indian chintz was very fine cotton, brightly coloured with exotic patterns (O'Brien 1792). It quickly became fashionable and English printers, based primarily in London, began to manufacture copies, whilst wealthy wool and silk manufacturers tried to stop chintz from being imported (Turnbull 1951). In the 1720s chintz was made illegal with those wearing it risking being arrested. In Lancashire, weavers produced an alternative cloth, with a linen warp and cotton weft known as fustian (Aspin 1995). This was exempt from the law, and dyers and printers found ways of copying the Indian chintz using fustian. When public demand led to the regulations against cotton cloth being removed, British printers and dyers were able to produce their own chintz. This quickly became more popular than the imported material.

3.3.2 The block printing method was the oldest method of printing, using engraved wooden blocks in a similar manner to reproducing book illustrations by woodcuts. It was invented in China in 2500 BC, but not used in Europe until the seventeenth century. The block was made of layers of wood sandwiched together, one side of which had a raised printing surface that varied depending on the type of cloth and the pattern to be printed. Three types of block were commonly used to print on cotton cloth: line blocks for printing outlines and small details; blotch blocks with felted surfaces for large areas of colour; and ground blocks, also felted, for small areas of colour. Each colour was applied with a different block; there could be over a 100 blocks in a set.

Plate 3: An engraving of 1839, showing a printer at work (taken from Chaloner and Musson 1965)

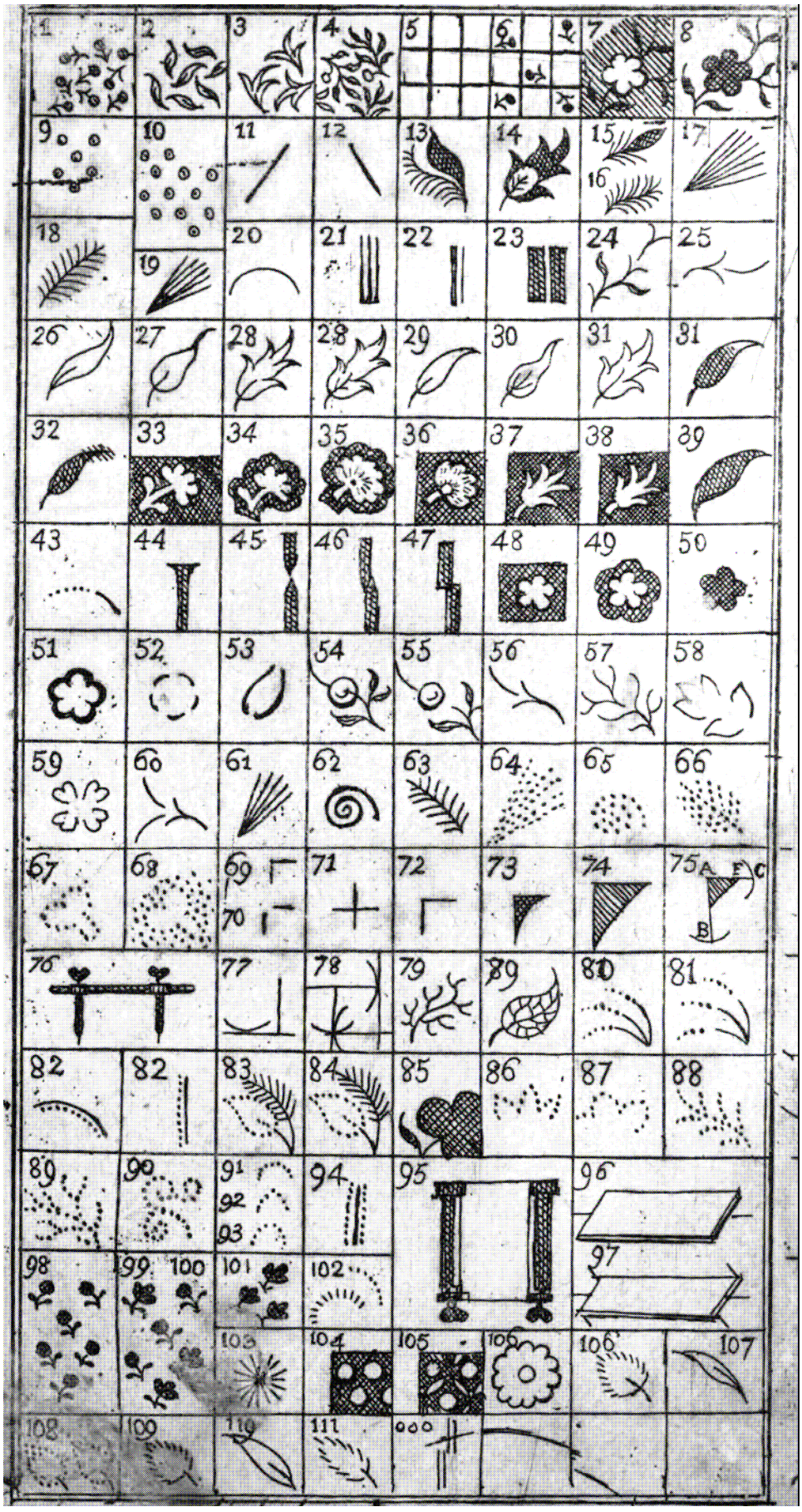

Plate 4: Patterns used by eighteenth-century block printers (from O'Brien 1792)

3.3.3 To help the printer match up each part of the pattern there were pitch pins on the corners of the block. In the nineteenth century the block printer worked with a tierer, usually a child, who pushed a trolley of printing colour along the printing table. Frequently, such printing formed part of a bleaching and dyeing concern, providing a cloth finishing service to the textile trade. A large works would employ a few hundred hand-block printers, each man with his own printing table or bench. Many firms also had their own block-making department. Although it began to be replaced around the 1770s-80s by machine printing, hand-block printing lasted well past the mid-1800s (Jones 1996).

3.3.4 Machine printing of cloth by roller or cylinder was invented in the 1770s. A patent (no. 1007) was granted to Charles Taylor, Thomas Walker, and Joseph Adkin, all of Manchester, in 1772 for printing by engraved wooden rollers (Turnbull 1951). The printing machine with the pattern engraved on copper rollers was introduced in the 1780s, and gradually superseded hand-block methods during the first half of the nineteenth century (Ashmore 1969). There were many attempts to mechanise block printing, but they could not compete with the speed of roller printing machines. Thomas Bell, of Walton-le-Dale in Lancashire, took out a patent in 1783 (no. 1378) for a copper-covered roller engraved on its curved surface, which worked in the reverse manner to hand blocks, *ie* the engraved lines were the printing area, and smooth areas were kept clear of colour (Plate 5). Instead of the pattern being on a flat surface, it was engraved around a copper roller.

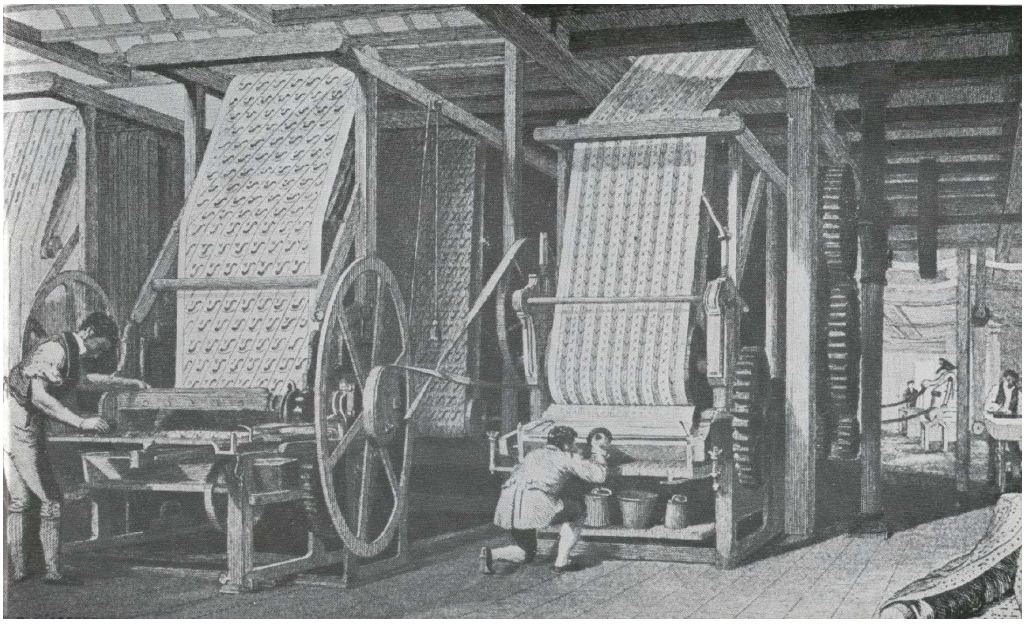

Plate 5: The mechanised calico-printing process in a cotton mill during the 1830s, showing on the left a machine with engraved copper rollers transferring the pattern onto the cloth, and on the right is a block printer using a hand-carved wooden block. (drawn by T Allom and engraved by J Carter, and taken from Chaloner and Musson 1965)

3.3.5 Cloth was passed continuously from an overhead roller through the nip between the engraved roller and a plain roller called a pressure bowl. The lower part of the engraved roller dipped into a colour trough, and as it revolved its surface was wiped clean by a doctor knife before the cloth reached

it. Colour was thus left only in the engraved lines, which transferred the pattern onto the cloth. The pattern was printed full width, and repeated itself in the distance equal to the circumference of the copper roller. At first, single colours only were printed, but soon multi-colour machines were invented with several rollers, each carrying part of the pattern and fitted with its own colour trough and doctor knife. The cloth passed each roller in sequence, building up the final multi-coloured design (Baines 1825). The cloth moved continuously through the machine and, unlike block printing, was much quicker. There were many ways of making the pattern on the copper roller: hand engraving; mill engraving where the pattern is pressed into the copper; or etching, where the pattern is cut into the copper surface by acid.

3.3.6 Once printed, the inks had to be fixed to the cloth, and any excess mordant or other chemicals needed to be removed. The first process, known as ageing, aimed to remove the mordants and acetic acid used to fix the dyes to the cloth during the printing process. This process was only really understood after *c* 1800, when it was realised that moisture was also required during the drying of the cloth (Turnbull 1951, 62), in order to 'age' (fix) the colour. In the humid atmosphere of England, particularly in north-west England, where the industry had become specialised by this time, it had been sufficient for ageing rooms to be placed near rivers or ponds (*ibid*). These rooms were originally heated by flues from fires, and later by steam pipes, but as it became necessary to reduce the ageing time, which had previously been about four days (*ibid*), whilst increasing the quantities of cloth, the amount of steam required in the ageing rooms soon became too great for men to work within (*op cit, 64*).

3.3.7 The first enclosed steaming machine was invented by John Thom in 1849, and was further developed by Walter Crum in 1856, when he applied it at Thornliebank Printworks (*ibid*). Uptake by the major printworks ensued, culminating in the highly successful 'Rapid Ager', patented by Mather & Platt in 1879, which comprised an enclosed metal steaming chamber with rollers for continuous running (Plate 6). This revolutionised the processing of prints and long outlived the types of colour (mordents and vegetable colourings) for which it was first devised (Mather & Platt 1958).

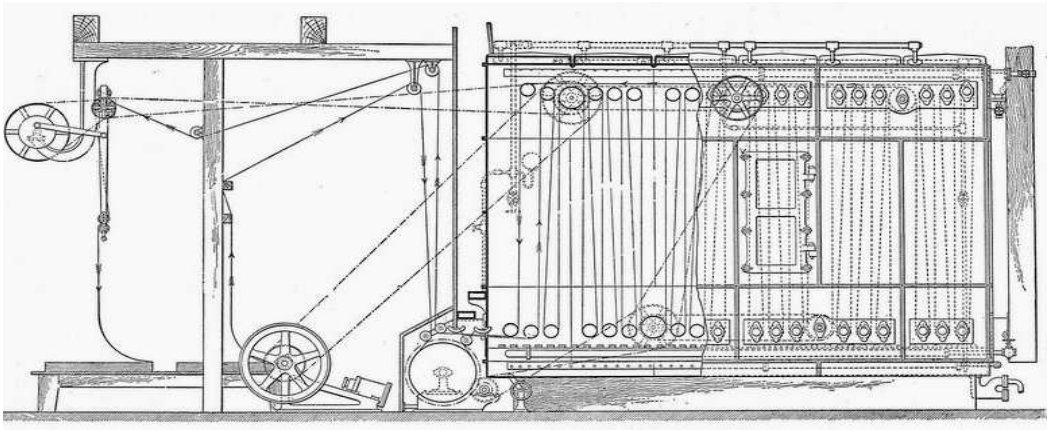

Plate 6: Mather and Platt continuous ageing machine (Murphy 1911)

3.3.8 After the cloth had been aged, it still contained several impurities, namely; excess mordant rendered insoluble by steaming; surplus insoluble compound; and thickening matter (gums and starches) used during printing (Turnbull 1951, 66). It was discovered in the mid-eighteenth century that cow dung, mixed with water, was a very efficient agent for removing these residues, and its use in the process, which became known as 'dunging' continued well into the twentieth century (*ibid*). By this time, the process had become highly mechanised, and again dominated by machinery designed by Mather & Platt of Manchester. An account of dunging from 1911 (Murphy 1911, 34) describes a dunging range as having three baths, the first being heated to 75°C, and containing '*512 gallons* (2328 litres) *of water, 16lb* (7.3kg) *of phosphate of soda, 16lb* (7.3kg) *of ground chalk, and 8lb* (3.6kg) *of ammonia liquor*'. The second bath, for which no temperature was specified, so was presumably cold, was of similar constituents except that the '*ammonia liquor*' was replaced with '*100lb* (45.4kg) *of cow dung*'. The final bath, again at 75°C, contained '*500 gallons* (2273litres) *of water, 50lb* (22.7g) *of cow dung and 5lb* (2.3kg) *of ground chalk*'. The cloth was passed on roller through the first two baths over a period of around one minute, but remained in the final bath for approximately half an hour (*ibid*), following which it was washed thoroughly with water.

3.3.9 The dyes used in all branches of the textile industry until the mid-nineteenth century were natural, and came mainly from animals (*eg* cochineal), plants (*eg* woad, logwood), shell-fish (*eg* murex and purpura, which formed the 'imperial purple' of Roman times), and minerals. Indigo and madder were the two most important dyes, both used extensively in Europe in the eighteenth century (O'Neill 1862). Indigo is a plant native to India and other Asian countries and forms a blue dye. Madder is a red dye from the roots of the madder plant, imported mainly from the Middle East. Turkey Red dye, made in that country, could not be copied, and up to the eighteenth century clothes were exported to Turkey for dyeing and re-imported. In 1780, however, Borelles set up the first Turkey Red factory at Blackley near Manchester, after discovering that the secret to the dye was the use of a range of mordants, including oil, oak galls, alum, dung, and ox-blood (Cossons 1975).

3.3.10 The simplest way of dyeing was mixing a colouring agent with water in a vat and placing a textile within the dye bath. The textile fibres would then absord the colour, although many natural colours do not fix well, or cannot be made into dyes easily; at this time there was no natural green dye, and textiles had to be dyed yellow then blue. After dyeing the cloths were fixed in a steaming cottage, effectively a steam room; later in the nineteenth century, steam was directed at the cloth as it was drawn over heated rollers (Aspin 2000).

3.3.11 The first commercial artificial dye was mauve analine, which was extracted from coal-tar, a waste product from gas-works, by William Henry Perkins, a student of the Royal College of Chemistry, in 1856. He was trying to make quinine, but discovered by adding alcohol, he could produce a rich purple dye. Immediately he set up his own company for the dye and, by 1859, the dye was the height of fashion, with Queen Victoria wearing a mauve dress to the International Exhibition of 1862 (Aspin 2000).

3.4 THE GROWTH OF THE TEXTILE INDUSTRY IN ACCRINGTON AND EAST LANCASHIRE

3.4.1 The weaving of woollens and the production of linen were important trades in Lancashire throughout the sixteenth century, when silk and mixed fabrics classed as small wares and fustians started to gain popularity, with cotton frequently forming the weft in the latter fabric; the earliest known reference to cotton in Lancashire dates from 1601, when it is mentioned in the will of a Bolton fustian weaver (Wadsworth and Mann 1931, 15). During the second half of the eighteenth century, the technical revolution in the cotton-spinning industry was largely responsible for the dramatic change to the economic and social structure of the region, and resulted in the transformation of Lancashire from an isolated and predominantly rural region to a textile-manufacturing centre of international repute.

3.4.2 By the end of the eighteenth century, the area around Accrington supported numerous water-powered textile mills, such as the fulling mill on Pleck Brook. The area also emerged as an important centre of a rapidly growing calico-printing trade, with important works being established at Broad Oak, Scaitcliffe, and Church Bank in Accrington, Foxhill Bank in Oswaldtwistle, several works in Clayton-le-Moors (Oakenshaw Printworks and the Hyndburn Printworks), and at Baxenden (Fig 2). One of the earliest, however, was the Brookside works near Oswaldtwistle, where hand-block calico printing was started by Robert Peel in *c* 1764, representing the genesis of what became the Peel textile empire. The works was abandoned following disturbances of 1779, although it was recommenced in 1818. By 1846, this works works housed four printing machines, 104 block printing tables and two steam engines (Graham 1846). Printing finally ceased at Brookside in 1862 and, following a short period of use as a bleachworks and then as a paper works, the buildings were all demolished (Rothwell 1993, 9).

3.4.3 The Peel family also established the Church Bank Printworks in Accrington, which commenced in in *c* 1772 (Graham 1846). The works occupied the site of a water-powered corn mill, which had existed on the site during the thirteenth century. By 1778, the works included old and new printshops and dyehouses, and major extensions over the next 20 years resulted in Church Bank becoming the centre of Peel, Yates & Company's north-east Lancashire business. Machine printing was introduced after 1785 and, in 1801, a 24hp beam engine manufactured by John Blackie was installed, representing the inception of steam power in the local area. By 1812, the works housed four roller printing machines, two surface printers and 138 block printing tables. The works remained in the hands of the Peel family until 1836, when it was sold to Frederick Steiner, previously manager of the chemical department at Broad Oak Works (Ashmore 1969, 258).

3.4.4 By 1793, Peel, Yates & Company had also taken over the Foxhill Bank Printworks in Oswaldtwistle, which had been established by a Mr Brewer in *c* 1785 (Graham 1846, 378). The works were leased to James Simpson, William Bury, EV Fox and James Langdon in 1813, who purchased the works subsequently and began a period of major extensions, including the introduction of machine printing. The firm eventually became Simpson &

Young during the mid-1840s, by which date the works housed 14 printing machines and 273 hand-block tables, with power provided by a 65hp beam engine (Graham 1846, 378).

3.4.5 Another important printworks in the area was the Oakenshaw Works in Clayton-le-Moors, which was established in *c* 1786 by Jonathan Peel, and sold to the firm of Taylor, Fort and Bury in 1787. This firm eventually became Fort, Brothers & Co which, in 1846, operated eight printing machines, 229 hand-block tables, two steam engines, and a large waterwheel (Graham 1846).

3.4.6 Arguably the most important calico printworks in the area, however, was that at Broad Oak in Accrington. This was founded in 1792 as bleaching crofts by Taylor, Fort, Bury & Co of Oakenshaw (Graham 1846, 356). James Bury withdrew in 1794 to run Sabden Printworks, and in 1811 Taylor & Fort dissolved the partnership. In 1812, the works were taken over by Thomas Hargreaves, previously a manager for the firm, and Adam Dugdale (*Manchester Times* 22 December 1893). A plan of the works dated 1813 illustrates a typical layout of an early printworks. The most striking feature is the series of separate shops or departments along the stream from east to west: a wash house, two dye houses, sour house, bleaching house, blue dyehouse and singeing house, dry house, stove house, large print house, block shop, machine room, and old print shop (Rothwell 1979). Power was provided by seven waterwheels and the cloth moved downstream from one end of the works to the other as it was processed. The works expanded greatly after 1816, steam power was introduced, and new print shops erected. The works housed three single colour machines, 216 tables, two steam engines of 10hp, one of 14hp and one 20hp by 1829. By 1846, the works housed 12 machines, 300 tables, five steam engines (25hp, two 14hp, two 110hp) and water power, with approximately 850 employees (Graham 1846). Expansion between 1880 and 1890 increased the number of machines to 32, and by the latter date 56 buildings of various sizes occupied the site. About 1000 people were employed at the works during this period. A major modernisation and reconstruction scheme was implemented after 1920, and new printshops were built in early 1930s. The works contracted after World War II; machine printing ended in 1958, engraving ceased in 1960, the screen printing department closed in 1966, and the finishing operations were transferred to Loveclough in 1970.

3.5 PLANTATION MILL

3.5.1 Plantation Mill Printworks was originally a fulling mill, established in the early 1790s; it was working in 1793, when the *Blackburn Mail* recorded the drowning of a young man in a reservoir of water at Plantation Mill (Crossley and Ainsworth 1995, 50). By 1797, the mill appears to have been occupied by the firm of William Hacking & Co, baize and flannel manufacturers, who are named in a newspaper article of 1797 (*London Gazette*, 25 Nov 1797). Henry Aspinall joined the partnership in the same year and, when the firm was finally dissolved in 1803, Aspinall was the only remaining original member (*London Gazette*, 19 Nov 1803).

3.5.2 It is a little uncertain precisely who occupied the mill subsequently. John Graham, writing in 1846, considered that the mill was converted for use as a printworks in *c* 1804, with a few block printing tables, although this business was short lived (Graham 1846). Rothwell, however, states that in 1804 the mill comprised a three-storey wool carding mill, powered by a 36' high interior overshot waterwheel, a wool fulling mill with a 21' overshot wheel, and a dry house (Rothwell 1979, 4-5). Rothwell considers that the site was converted to calico printing in 1810 by the firm of Oldham & Holding.

3.5.3 In 1814, the mill was occupied by Gibson, Swain & Co, who are listed as calico printers at Plantation Mills in a trade directory for 1818 (Rogerson 1818, 62). A newspaper article of 1819, however, identifies a Mr Greaves as the calico printer at Plantation Mill. This article also states that Greaves lived in a house that adjoined the mill (*Lancaster Gazette* 18 September 1819). Swain died in 1820, and the partnership was dissolved (*London Gazette*, 24 October 1820), and business was continued by Gibson and Greaves until 1826, when they were declared bankrupt (*London Gazette* 11 June 1826). The extent of the mill during this period is depicted on a plan of 1824, which provides the earliest known survey of the site (AL C15/C61; Plate 7). This plan was produced for Henry Aspinall, and whilst detail is lacking, four buildings situated around a large pond or reservoir can be discerned, together with additional reservoirs situated to the north and west.

3.5.4 After bankruptcy in 1826, the firm became Greaves, Denham & Grimshaw. James Grimshaw was the foreman, but later took over entirely after the deaths of the other partners. Although the works were owned by the Hargeaves family, James Grimshaw's company continued to run it throughout the nineteenth century and into the early twentieth century, becoming James Grimshaw & Sons. James Grimshaw was considered one of Accrington's more notable inhabitants and an exemplary employer (Crossley 1930, 113). Grimshaw is named as the owner of the printworks in newspaper article of 1842, when the works was attacked by a mob (*Preston Chronicle* 3 September 1842). It housed four machines, 72 tables, and about 150 employees in 1846 (Graham 1846). This early uptake of printing machines suggests that the firm was at the forefront of the new technology, although block printing appears to have been retained within the printworks, forming the majority of the output. During this period, production at the mill was concentrated on the printing of 'purple plates with machine' and 'no delaines' (*ibid*). Purple plates were economical dress prints in one or two shades of madder purple, usually with

simple spot and trail motifs. Delaine, a wool mixture fabric, was normally block printed, and was intended for a middling or better clientele; there was a general shortage of high-end work at this time (P Sykas pers comm).

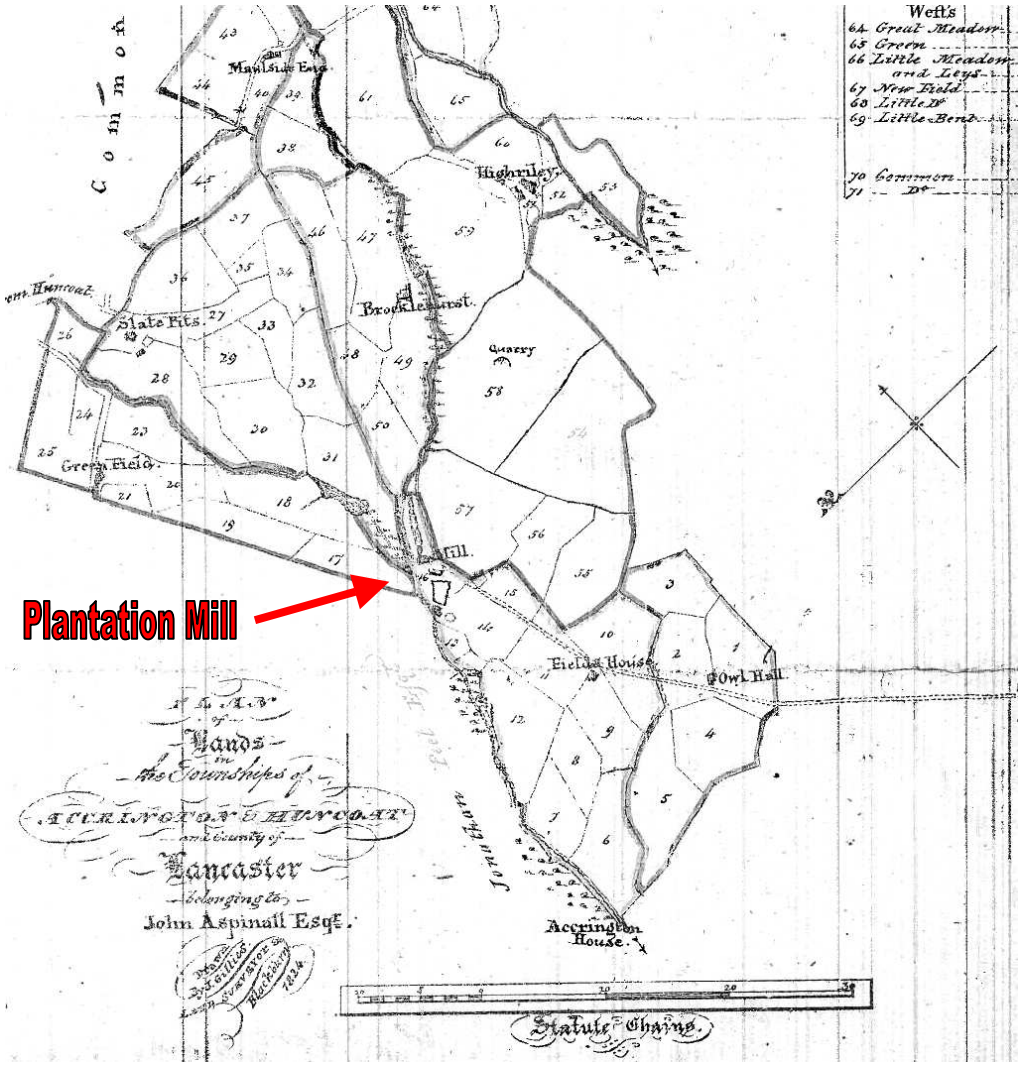

Plate 7: Extract from a plan of the site produced for Henry Aspinall in 1824 (AL C15/C61)

3.5.5 The first clear plan of the site is provided by the Ordnance Survey first edition 6": 1 mile map of 1848 (Fig 3), which depicts the structures and reservoirs of the Plantation Mill complex. The bridge over Pleck Brook can certainly be inferred, with the majority of structures laying to the south, sandwiched between three reservoirs. The largest buildings, presumably representing the heart of the manufacturing process, lie within the eastern part of the site.

3.5.6 The mill was subject to a fire in 1860, which was reported in the local press: 'On Sunday night last, a fire was discovered in one of the buildings of the above works, belonging to Mr. James Grimshaw. The building stands alone, although there are others very near to it filled with dry goods. The roof was soon in flames, and had there not been a fire engine connected with the works, the damage must have been considerable, for it was a long time before the Accrington fire brigade could get their heavy engine to the spot. However, when they did arrive, the fire was soon put out. The damage is thought to be about £50, which is covered by insurance' (*Preston Guardian* 21 April 1860).

During this period, it appears that the company was engaged in commission printing for particular markets in several distinctive styles (P Sykas pers comm).

3.5.7 The mill is also mentioned in a newspaper advertisement of 1880, which refers to the proposed sale of the site (*Blackburn Standard* 10 July 1880). However, detail is lacking, and it remains unknown whether it was actually sold at this date.

3.5.8 The subsequent 25": 1mile Ordnance Survey edition of 1893 (Fig 4) provides a more detailed view of the complex, showing it to have expanded to the south and west. The sluice at the eastern end of Area 1 is named on the map, whilst the remainder of the buildings are only shown in block plan.

3.5.9 The No 3 reservoir at Plantation Mill is mentioned in a newspaper article of 1899, as it provided the home for an exceptionally large fish. The fish in question was a trout, which weighed 5lbs 2oz, and was just over 2ft long (*Weekly Standard* 24 June 1899).

3.5.10 A small, square structure attached to the western side of the largest structure, is marked as a chimney on the following edition of 1911, strongly suggesting that a boiler lay in the rectangular structure to east.

3.5.11 After the death of WD Grimshaw in 1923, a limited company was formed with FW Greenwood as the managing director. Part of the works during this period is captured on a photograph dated 1927 (Plate 8). This shows two buildings that both appear on the Ordnance Survey map of 1848 on the western fringe of the mill complex, straddling Plantation Road. The small building on the western side of the road lies adjacent to the ravine of the Pleck Brook. As such, it is tempting to identify this as a component of the eighteenth-century water-powered textile mill site, either the fulling mill or the carding mill, although firm evidence is lacking. The intended function of the building range on the opposite side of Plantation Road is similarly uncertain, although its position on the periphery of the complex suggests that it was ancillary to the principal manufacturing buildings. The locations of both of these buildings lay outside the area of the present archaeological survey.

3.5.12 Both buildings may also be seen in part on another photograph of the mill complex, which similarly dates to 1927 (Plate 9). This view shows the works to have incorporated two large chimneys, the positions of which suggest that the principal manufacturing areas were focused in the eastern part of the site. This implies that the primary source of power in the mill was steam, as these buildings are not clustered along the banks of the Pleck Brook.

Plate 8: Photograph of part of Plantation Mill in 1927 (AL HO1/M314 903)

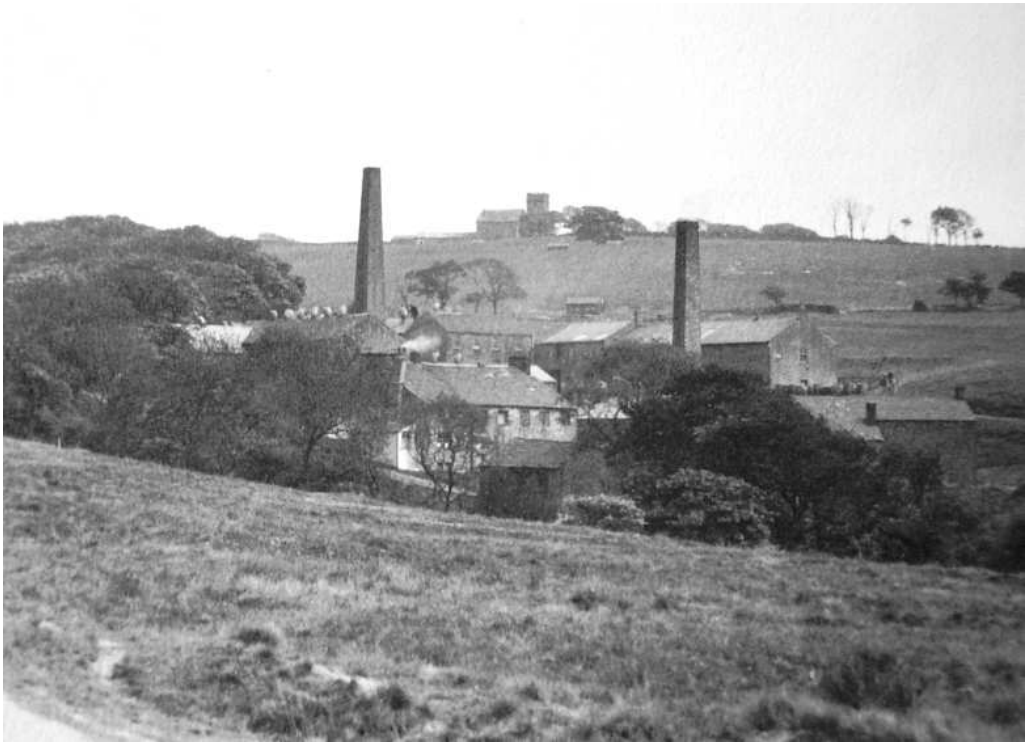

Plate 9: Photograph of Plantation Mill in 1927 (AL HO1/M314 905)

3.5.13 The works closed 1934 (Rothwell 1979, 4-5), and was purchased by the Co-operative Workers' Society for conversion to a proposed dairy in 1936, but the plan never materialised. Demolition followed, and the site was later used as a tip.

4. ARCHAEOLOGICAL SURVEY

4.1 INTRODUCTION

4.1.1 The survey comprised the recording of extant structural remains within two areas (Figs 3, 4, and 5). The northern area (Area 1) was located within and along the southern side of a deep ravine, thought to have housed a waterwheel associated with an eighteenth-century fulling mill (*Section 3.4.1, above*). The second area (Area 2), was situated to the south, and comprised the southern extent of the former building complex, bordering an extant reservoir. Another reservoir, situated at the eastern end of Area 1, had been largely infilled during the demolition of the mill complex.

4.2 AREA 1

4.2.1 Area 1 comprised some 2200m², and was dominated by the deep ravine for the Pleck Brook (Plate 10). This area incorporated the remains of three structural elements: a sluice from the former reservoir bordering the eastern boundary of the area; a bridge over the sluice; and the remnants of a retaining wall along the southern side of the ravine beyond the sluice (Fig 6). A raised area between the ravine and a trackway, marking the southern edge of Area 1, also had three visible features: a wall foundation; and culvert/tank; and a series of walls which appear to be associated with horticulture/gardening activity.

Plate 10: Looking north-east across the ravine of Pleck Brook, beyond the reservoir

4.2.2 ***Sluice:*** the sluice formed a controlled water channel from the north-west corner of the former reservoir, into the natural watercourse of Pleck Brook, which flows to the west in a deep ravine (Plate 10). The majority of the remains of the walls of the reservoir, and the eastern end of the sluice are overgrown, and have become earthfast, particularly on the northern side (Fig 7). The north wall of the sluice (Wall A1_1) emerges from the undergrowth as

a straight, east/west-aligned wall of coursed local sandstone-rubble construction (Plate 11). The wall is bonded in what appeared to be a pale lime mortar, although the wall contained a large proportion of hungry joints. It was exposed for a length of 3.9m, and survived to a maximum height of 2.15m (Fig 8), which corresponds to present ground level, and the level of the track, which crosses the bridge immediately to the west. This probably represents the original full height of the wall, which would most likely have been capped with an additional course of coping stones. At its western end, the north wall abuts the bridge (Plate 11), demonstrating that it is of a later construction.

Plate 11: North wall of sluice (A1_1) with rebate for sluice gate

4.2.3 Positioned approximately centrally within the extant fabric of the north wall is the housing of the sluice gate (Fig 8; Plate 11). This comprises a rebate in the wall, 0.22m wide, 0.31m deep, and 1.13m high, although where the wall facing survives on the eastern side of the aperture, this has a straight-edged return, suggesting the rebate for the sluice gate continued to the full height of the wall, at a reduced depth of 0.19m. At the base of the wall, a rectangular-section timber placed in the sluice channel (Plate 12) underlies the wall, and forms the bottom seal for the retractable sluice gate above. The north wall reduces in height by 0.65m at a distance of 0.72m to the east of the sluice (Fig 8). The extant higher section of the wall has a faced return into the hill slope, suggesting that the wall height was increased in the area of the sluice and the bridge, and was of a reduced height to the east.

Plate 12: Timber sluice board, with stone flooring to the left

4.2.4 The south wall (Wall A1_3; Fig 9) survives for a length of 8.13m, and curves sharply to the south-east from the position of the sluice gate, and becomes an earthfast bank below a well-established tree. The wall is of similar construction to the north wall, but is keyed into the bridge at its western end, with one of the upper stones being keyed across the joint between the two elements at an angle of approximately 45° (Plate 13). The aperture for the sluice gate is of similar dimensions to that in the north wall, although it survives to a much lower height (Fig 9; Plate 13). Again, it appears integral to the initial construction of the wall, and incorporates the timber sluice board within its base. The wall curves sharply to the east, through an angle of approximately 90°, presumably forming the western boundary wall of the reservoir. The wall was constructed to a greater height to the west of the sluice aperture, extending up to the level of the bridge to the west.

Plate 13: South wall of sluice (A1_3) with rebate for sluice gate

4.2.5 At the base of the south wall, at its junction with the bridge, a square-section stone post, 0.48m high, projects 0.2m from the wall face (Fig 9). This corresponds with the position of a 0.30 x 0.23m rectangular aperture, set slightly higher in the north wall (Fig 8). This probably housed a timber beam, which would have been placed across the sluice, forming the top of a grate, to prevent larger items of debris becoming lodged under the bridge. The base of the sluice, to the east of the bridge, was largely covered by silts, demolition debris, and recent tipping, but two areas of partial survival of the original flooring were observed (Fig 7; Plate 12). These comprised edge-set sandstone blocks, aligned in rows, and sloping from the side-walls of the sluice towards the centre of the channel. These were well-preserved under the bridge to the west, where they had been protected from damage by the bridge above.

4.2.6 The sluice widens into the ravine of Pleck Brook to the west of the bridge, and has been remodelled heavily (Fig 7). This mainly involved the insertion of a concrete channel into the base of the sluice, which overlies the original edge-set sandstone floor at its eastern extent. This has sloping outer edges, with a vertical drop into a 0.61m wide, flat-bottomed central channel. It was presumably constructed to repair the base of the sluice, which terminates at the end of the concrete flooring (Plate 14).

Plate 14: North wall of sluice (A1_4) with concrete sluice channel

4.2.7 The majority of the north wall (Wall A1_4) survives along this part of the sluice, although it has collapsed at its western end, and has lost several of the capping stones along its length (Fig 10). It has an offset plinth, 0.42m above its base (Plate 14), presumably for structural stability, and also allowing a greater flow of water through the channel when required. The southern wall (Wall A1_6) survives to a greater height (a maximum of 2.59m), and retains several of its coping stones, laid in buck and doe style, comprising alternating raised and lower coping stones (Plate 15; Fig 11). At its western end, level with the end of the concrete channel within the sluice, the wall has a sharp curve to the south-west into the ravine of the Pleck Brook. However, the wall has collapsed almost immediately beyond this change of direction, surviving only as a loose rubble core (Plate 15). Both walls of the sluice abut the bridge to the east.

Plate 15: South wall of sluice (A1_6) with concrete sluice channel

4.2.8 ***Bridge:*** a bridge appears to be depicted in this position in all the detailed historic mapping (*Section 3.5.5, above*), and carries a track over the Pleck Brook towards farms higher up the valley. It is still in use, and has a mud and rubble track bed, which appears to be very shallow, above the structural elements of the bridge. The bridge itself is of coursed, local sandstone rubble construction, with arches formed of edge-set, sandstone blocks, which have been roughly dressed (Figs 12 and 13; Plate 16). Whilst the two elevations of the bridge (Walls A1_2 and A1_5) survive in relatively good condition (although the western facade is heavily overgrown), the arch is in a very poor state of repair. At its western end it has been heavily compressed on its southern side (Fig 13; Plate 17), whilst in part of the central area of the bridge, it has collapsed completely, leaving a large void (Fig 7; Plate 18).

Plate 16: East face of bridge (A1_2)

Plate 17: West face of bridge (A1_2)

Plate 18: collapsed section of bridge, showing instability of arch to west

4.2.9 ***Retaining walls:*** the watercourse widens into a steep-sided ravine immediately to the west of the sluice and bridge. This is the most probable location for one of the overshot waterwheels referred to in the historical documentation, although the area has been eroded heavily following the abandonment of the mill complex. This erosion is still ongoing, with much of the northern bank overhanging the ravine, and a bare erosion scar below. The erosion is slightly less severe on the southern side of the ravine, presumably reflecting the flow of the water channel towards the northern side.

4.2.10 No physical evidence for either the wheel pit or any associated structural elements survive on the northern side of the ravine. However, two sections of retaining wall do survive on the southern side. The eastern section of wall (Wall A1_6; Fig 11) probably formed the southern part of the sluice. It is of roughly squared and coursed local sandstone rubble construction, similar to the sluice wall, and has a ragged eastern edge, with exposed core and rubble collapse in the intervening gap (Plate 19). The collapse may have originated at a structurally weak point where the vertical wall of the sluice changed to the battered retaining wall, the surviving elements of which have an angle of 18°. At its western edge it has a faced return into the hillslope, demonstrating this to be the end of the wall.

4.2.11 Further wall core recessed into the exposed slope of the ravine, immediately to the west, suggests that a lower retaining wall continued from the rear edge of the buttressed end of the retaining wall. One section of the lower retaining wall survived for a length of 6.41m, and to a maximum height of 1.89m (Fig 11). It is of similar sandstone construction to the other walls, but was heavily moss-covered, obscuring any possible features (Plate 20). At its eastern end it had collapsed, whilst its western end ran into the hillslope, suggesting the termination of the retaining walls along the southern bank of the ravine.

Plate 19: Buttressed retaining wall on the south side of the ravine

Plate 20: Overgrown and partially collapsed retaining wall on the south side of the ravine

4.2.12 ***Wall foundation:*** the outline of two parallel walls was revealed within the undergrowth towards the eastern end of the woodland above the ravine (Fig 6). These walls were aligned approximately east/west, and were set 1.41m apart. They were composed of machine-made, red brick construction, each of a full-brick thickness, and surviving to a maximum length of 2.1m. The position of these walls corresponds with a small, detached structure shown on the Ordnance Survey map of 1893 (Fig 6), although their function remains unclear. Further associated structural elements probably survive below ground in the immediate vicinity.

4.2.13 ***Tank/culvert:*** situated at a distance of approximately 6.5m to the west, a larger area of *in-situ* remains was revealed within the undergrowth (Fig 6; Plate 21). These remains included a wall of machine-made brick construction, which was 1½ bricks wide, and abutted a wall of sandstone rubble construction at its eastern end. The latter wall survived to three courses height, and had a 0.40m wide channel of brick and stone construction in its base. This ran 2.85m to the west, where it disappeared below another stone wall, which was capped with a small square structure, constructed of an edge-set refractory brick. Part of the channel, was also capped with refractory tile, suggesting that a possible tank overlying the culvert in this position may have been heated.

Plate 21: Culvert below probable tank, Area 1

4.2.14 ***Garden features:*** further to the west, several rows of bricks and a row of edge-set sandstone flags, delineated the boundary of two beds (Fig 6). The flags presumably formed the front of each bed, with a path running along the southern side next to the retaining wall of the trackway (Fig 6). The other edges comprised machine-made bricks, edge-set into the ground, at an angle of approximately 30°, giving an appearance of pyramids projecting from the surface. This dogtooth-type arrangement was a fairly typical design used in early/mid-twentieth century gardens (Taylor 1983). A similarly lined path, 0.5m wide, separated the two beds. It was not possible to establish the extent of either of the beds, although further evidence may survive within the undergrowth.

4.3 AREA 2

4.3.1 The southern area comprised some 3800m², and was bounded on its southern side by the remains of a heavily silted reservoir, and along its northern side by a rough earth track (Figs 5 and 14). The area is wooded, with both large and sapling trees, and has an under-storey of brambles and other scrub vegetation, which probably conceal further structural remains of the mill complex.

4.3.2 The reservoir was situated at a higher level to the buildings that it served, and the adjoining walls of these structures survived the demolition of the complex, presumably in order to maintain the integrity of the reservoir wall. Several earthfast banks beyond the eastern limit of the study area possibly represent similar features. The top of one earthfast bank within Area 2, situated immediately to the rear of the surviving walls, is utilised as a narrow path along the north-western edge of the reservoir.

4.3.3 At the eastern end of the study area, an east/west-aligned sandstone wall (Wall A2_1) survived for a length of 1.76m, and to a maximum height of 0.47m (Figs 15 and 16). At ground level at its eastern end, the vestiges of a possible northward return survived, whilst a damaged return to the south survived at its western end. This survived for a length of 2.57m, where it had an unclear junction with a more substantial east/west-aligned wall (Wall A2_2), which survived to a maximum height of 1.73m, and for a length of 13.85m (Fig 15). This contained elements of phasing, demonstrating the development of the printworks over time. The initial phase comprised a wall of roughly dressed and coursed sandstone rubble, bonded in a lime mortar, although the majority of the wall face comprised hungry joints (Plate 22).

Plate 22: Wall A2_2, with blocked window apertures and inserted ceramic pipes

4.3.4 The earliest element of the wall contained three apertures, each measuring 0.92m wide, and almost certainly representing windows into the structure to the north. The sills and straight-sided jambs were constructed of the same fabric as the wall, suggesting that the most inexpensive construction techniques were employed in this building. The presence of windows in this wall implies that the area immediately to the south of the building had originally been open space. However, this space was infilled subsequently and the window apertures blocked, with similar, but slightly smaller-sized sandstone rubble. A series of six ceramic pipes were then cut through the wall face, not only through each of the former window apertures, but also in other positions in the wall (Fig 17). These were all laid with a fall to the north, and would have supplied water directly from the reservoir into the building. At its western end, the wall was heavily degraded, comprising almost exclusively rubble core, and terminating in an earthen bank, which presently forms the path along the north-western edge of the reservoir (Fig 15).

4.3.5 Immediately beyond the bank of the path the wall returns to the south (Wall A2_3), emerging from the bank and surviving to a height of 1.00m. It curved sharply to the west through 90° (Figs 15 and 18; Plate 23), probably forming the rear of a storage bin, as these typically had curved walls to prevent the contents accumulating in corners. At its western end, the wall abuts a double-skinned stone wall (Wall A2_4) with rubble core, which presently terminates at this point, but originally extended further to the north, the footings of which survive for a short distance at ground level (Fig 19). This wall is 0.5m thick and survives to a maximum height of 1.45m, bonded in its core with a pale lime mortar. At its southern end, where it is keyed into an east/west-aligned return, it has been partly remodelled subsequently to allow for the insertion of an overflow associated with a leat from the reservoir above (Figs 19 and 20).

Plate 23: Curved Wall A2_3, possibly forming a storage bin

4.3.6 The leat from the reservoir was constructed of machine-made red bricks and concrete, and incorporated the remains of a sluice gate at its eastern end (Plate 24). It appears to have originally dog-legged slightly to the south, and entered what was probably a tank that was situated between the reservoir wall and the return wall of the building (Wall A2_5; Figs 19 and 21). The aperture of the leat had been brick-blocked subsequently, and the area between the retaining wall of the reservoir and the rear wall of the building had been infilled with rubble, forming a gradual slope between the two structures. The wall face containing the leat aperture appeared to be part of a buttress, and whilst this could not be established with confidence, it may have been constructed as a return of the south wall of the building (Figs 19, 20, and 22; Plate 24).

Plate 24: Blocked aperture for leat in Wall A2_4, and attachment bolt protruding from face

4.3.7 An iron bolt projects 0.1m from the face of Wall A2_5 into the building, immediately to the east of the return, presumably forming an attachment point for framing or a fixture. A lower wall butts the buttress, and continues to the west, presumably forming the southern wall of the building, but surviving only to a maximum height of 0.92m. At its western end it continues at ground level into the undergrowth. Further vestiges of this wall projected slightly from an earthfast bank (Fig 21), suggesting that the wall originally continued further to the west, possibly forming the original southern external wall of the building, given its apparent width of *c* 0.5m.

4.3.8 The western end of the surviving section of Wall A2_5 was butted on its southern side by a wall of similar construction (Wall A2_6), which survived to a similar height for a distance of 1.39m (Figs 21 and 23), before returning at an angle of approximately 45° (Figs 21 and 23; Plate 25). It seems likely that this infilled the available space to the reservoir wall, demonstrating the documented expansion of the complex during the second half of the nineteenth century. Two further foundational remains of similar width walls, on a similar orientation to that to the north, appeared to represent an earlier L-shaped extension to the southern side of the complex (Fig 21; Plate 26). A 0.93m wide gap in one of the walls also appeared to represent a doorway, although given the overgrown nature of these walls, it was not possible to determine whether this was an original feature, or inserted after the building was extended to the reservoir wall to the south (Figs 3 and 4).

Plate 25: Wall A2_7, with partially blocked aperture, and invasive large tree

Plate 26: Remains of earthfast walls forming an earlier external wall of the printworks

4.3.9 The angled extension along the reservoir wall (Wall A2_7; Fig 23) contained a large recessed aperture, measuring 0.68m wide and 0.45m deep, which survived to the full height of the extant wall (Plate 25). Its rear wall comprised vertically set sandstone flags, the upper of which had been flattened into a horizontal position by a large tree growing out of the reservoir wall (Plate 25). The aperture, which had been stone blocked subsequently, probably represents a deep window light, affording daylight into what may have been a half-basement level; it could not be confirmed with confidence that this part of the mill complex incorporated a half basement, although this was implied from the level of the window light relative to the surrounding ground. Conversely, it is possible that the feature represented a vertical chute, perhaps leading into a culvert in this narrow part of the building, which appeared to be a passage into a larger room to the south-west (Fig 21). A less well-preserved and narrower aperture to the west, again partially infilled with stone (Fig 23), may have served a similar function.

4.3.10 The boundary wall has a further dog-leg at its western end (Wall A2_8), parallel to the stub-walls to the north (Figs 21 and 23), and survives in a poor state of repair, before returning to the south-west (Wall A2_9; Figs 21 and 24). This has a low return at its south-western end (Wall A2_10; Figs 21 and 24), which butts the extant southern end of the earlier earthfast walls to the north (Wall A2_11; Figs 21 and 25). This has a keyed, perpendicular return (Wall A2_12), which terminates at a large tree trunk (Figs 21 and 26).

4.3.11 The wall is obscured completely to the west by vegetation for a distance of approximately 12m, reappearing as a stone wall lined with machine-made bricks (Wall A2_13; Figs 27 and 28). This represents a remodelled or strengthening of the wall, and comprises locally-made 'Accrington' red bricks (Plate 27). At its western end, both the stone and brick elements of the wall return to the north, at a height of only 0.39m, before returning west as a shallow battered, stone retaining wall, for a distance of 13m (Fig 29; Plate 28). At the western end of the study area, this has a northward return as an earthfast wall, the vertical face of which is visible intermittently for approximately 12.7m. In the undergrowth between these two walls, the partial remains of a culvert are visible (Plate 29). This is of stone construction, measures 1.86m wide, and survives to a height of two courses on its northern side. It still retains water at its western end, and follows the alignment of the retaining walls. Its precise function remains, although it possibly represents a drain from the main processing areas from the structures adjacent to the reservoir to the east.

Plate 26: Section of Wall A2_13, with 'Accrington' brick refacing

Plate 27: Battered retaining wall at the western end of Area 2

Plate 29: Heavily overgrown culvert at western end of Area 2

4.3.12 Two further features were observed within the surface of the rough earth trackway. The western of these represents the return of a building wall (Fig 19), possibly forming the western end of Elevation A2_2 (Fig 14), and forming the north-western corner of a rectangular room of approximately 17 x 7.75m. It was of double-skinned construction, with a rubble core, and was 0.51m wide (Plate 30), similar to those walls where both faces were observed elsewhere.

Plate 30: Exposed return of building wall within trackway in Area 2

4.3.13 To the north-east, and spanning the whole width of the track, a series of sandstone blocks projecting from the road surface, represent part of the base of a large machine (Figs 7 and 30; Plate 31). The machine bed comprised several dressed sandstone blocks, situated on a similar orientation to the main structural walls. Each contained bolts of varying sizes and arrangements in their surfaces (Plate 32), with the areas of rubble between, almost certainly representing housings within the machine bed. The structure almost certainly survives to a significant depth, and continues beyond the exposed area to the north and east.

Plate 31: Exposed machine base within trackway in Area 2

Plate 32: Fixing bolts and housings within dressed blocks of machine base

5. DISCUSSION

5.1 INTRODUCTION

5.1.1 The archaeological survey has revealed that significant remains relating to the calico-printing works survive across the study area. Although demolition of the complex in the mid-twentieth century removed the majority of the fabric of the complex, several walls around the perimeter of the site survive to some extent. Moreover, it appears that a considerable extent of the building footprint survives as buried remains within the undergrowth, and probably at a shallow depth in other areas.

5.1.2 The survey has also identified several phases of activity within the study area, and an attempt at ascribing dates to these phases has been undertaken based on both the cartographic sequence, and the fabric of the relative features.

5.2 PHASE 1

5.2.1 The evidence provided by the available documentary sources indicates that the initial phase of activity on the site pertains to the late eighteenth-century fulling mill (*Section 3.5.1 above*). The earliest cartographic evidence, dating to 1824 (Plate 7), is schematic in its detail, although suggests that a waterwheel was positioned within the upper part of the ravine to utilise the plentiful, fast-flowing water supply to power the mill. Documentary sources further suggest this to have been an overshot wheel (*Section 3.5.2 above*), which would have been the most suited for the steep slope in the upper part of the ravine. Unfortunately, no physical evidence for either the mill or the waterwheel survive, with the extant fabric within the ravine almost certainly dating to the Phase 2 expansion of the calico printworks. It is likely, however, that the focus of the eighteenth-century textile-manufacturing site lay a short distance to the west of the nineteenth-century calico printworks, and beyond the areas of the archaeological survey.

5.3 PHASE 2

5.3.1 This phase dates to the expansion of the complex, after its conversion to calico printworks. It is uncertain precisely when this programme of expansion was carried out, although it may be dated on cartographic evidence to the period between the plan of 1824 and the Ordnance Survey first edition 6": 1 mile map of 1848.

5.3.2 The structural evidence for this phase in Area 1 comprises the bridge, sluice and the associated retaining walls, all of which were integral to the construction of the reservoir to the immediate east of the study area, prior to 1848. The new buildings were constructed to the south of the existing mill, which was served by two new reservoirs; one to the east; and one to the south of the new buildings. The sluice, positioned in the north-west corner of the reservoir served as a bypass, allowing the water level to be controlled within

the reservoir, and discharging excess water back into Pleck Brook. The sluice and bridge are of continuous build on the southern side, showing them to be contemporary with the construction of the reservoir, although the remaining walls of the sluice butt the bridge, and may have been rebuilt, or simply constructed immediately after the bridge. Although much of the retaining wall on the southern side of the ravine has collapsed, the height of the surviving elements suggest that it would be extremely unlikely that the waterwheel would have been retained, as the linkage required to transmit the driveshaft up and over the wall, would have been extremely inefficient.

5.3.3 The earliest fabric within Area 2, relates to the rebuilding of the calico printing complex during the early/mid-nineteenth century. This encompassed a small part of the extant fabric within Area 2, incorporating walls A2_4, and A2_5 (Fig 14).

5.3.4 The surviving fabric of this period within Area 2 relates to buildings positioned close to the reservoir. It is very likely that these were used specifically for the processes requiring the greatest amounts of water. Given that the earliest stages of the textile-finishing process, comprising the bleaching and dyeing of the fabric, would most likely have been undertaken elsewhere within specialist works, the largest demands for water within the printing process would have been for fixing the print by steaming or 'ageing', and then for washing residues from the fixed garments, which had the highest water consumption. An apparent tank situated to the south of wall A2_5, probably controlled the supply of water from the reservoir above.

5.3.5 The function of the structure at the south-western corner of the complex, incorporating the stone element of Wall A2_13, remains unclear. It is located at some distance from the reservoir, and is depicted as being sited at the end of the main approach from the west on the Ordnance Survey map of 1848, suggesting that it was probably used as offices or warehousing. The culvert to the west may purely have been for drainage from the processing areas to the east, rather than relating to a building in this position.

5.4 PHASE 3

5.4.1 The third phase of activity identified across the study area relates to a further expansion of the complex towards the end of the nineteenth century, prior to the publication of the Ordnance Survey first edition 25": 1 mile map of 1893. This expansion of the complex reflects the growth of the Lancashire printing industry in the latter part of the nineteenth century, which accompanied the burgeoning expansion of the cotton industry in the region.

5.4.2 Whilst it is possible that some rebuilding of the sluice walls dates to this period, the main structural activity within Area 1 at this time appears to have been to the south of the ravine of Pleck Brook (Fig 6). The stone-built culvert, and associated stone walls, may represent the remains of a heated tank, placed on refractory slabs, which were commonly used from the mid-nineteenth century.

5.4.3 The provision of heat was an important part of the printing process, and became increasingly more so after the application of steam to the various processes of printing. Washing of the finished product, to remove residues of both colour and mordants (fixatives used during printing), required the use of both boiling and cold water, and from the early-nineteenth century steam was applied to the fabric following printing, to produce brighter, 'steam colours' (Turnbull 1951, 62).

5.4.4 The expansion of the complex during Phase 3 is clearly visible within Area 2. This comprises Walls A2_6 to A2_12, and probably the earthfast walls to the north of Walls A2_1 to A2_3, and A2_7 to A2_9, although these may comprise an earlier extension to the Phase 2 structure to the north (Fig 14). The new build appears to represent a passageway along the southern boundary of the site, leading to two larger rooms who's southern boundaries were formed by Walls A2_9 to A2_12. The original window apertures in Wall A2_2, demonstrate that good lighting was required, and suggests that the demolished structures to the south probably represented low storage tanks, fed from the reservoir and servicing the building to the north (Fig 14).

5.4.5 The curved, probable storage bin (Wall A2_3), also probably dates to this phase, and was most probably used to store chemicals associated with washing or dunging of the printed cloth. The stone element of wall A2_13 (Fig 14) appears to represent an outshut adjacent to the southern wall of a long narrow building shown in approximately this position on the Ordnance Survey map of 1894 (Figs 4 and 14), and the overgrown culvert to the west, was almost certainly associated with the western end of this structure (Fig 14), and appears to take waste water from the building.

5.4.6 The stone blocks exposed across the modern access track almost certainly represent foundations beds for large machinery within the mill. These foundation beds lie within the footprint of buildings shown on the Ordnance Survey first edition 6": 1 mile map of 1848, suggesting that they may represent elements of the mid-nineteenth-century calico-printing works. Subsequent editions of Ordnance Survey mapping, such as the second edition 25": 1 mile map of 1911, indicate that a large chimney had occupied this part of the site, which is also shown on historical photographs (*eg* Plate 9). It seems likely that this would have been placed adjacent to the boiler and engine houses that provided the steam power for the mill, and it would therefore be reasonable to suggest that the exposed foundation beds may have been intended to house a mid-nineteenth century steam engine.

5.5 PHASE 4

5.5.1 This phase represents early twentieth-century remodelling of the complex, and is signified by the use of machine-made red brick, for which the town had become renowned at this time. The mass production of bricks in the town made it a cheaper alternative than even locally quarried sandstone, and its uniform size and shape, combined with its exceptional strength, made it ideally suited for use within industrial buildings.

5.5.2 Concrete also began to be commonly used during this period, and a rebuilding of the sluice channel, to the west of the bridge, almost certainly dates to this phase.

5.5.3 Within Area 2, the final phase of modifications to the working printworks appears mainly to comprise alterations in water supply. This may relate to a change in machinery, as advances in fixing technology were made in the late-nineteenth century, with the invention of the steam-ager, by Mather & Platt in 1879 (Turnbull 1951, 65). Associated improvements in dunging and washing, where machines similar to those used in the bleaching process, spiralling the cloth several times through water tanks and squeezing bowls, 'depends entirely on a good supply of water' (*op cit*, 67). The remodelled water supply appears to have been delivered directly from the reservoir to the tanks via ceramic pipes, with the supply being controlled by taps adjacent to the tanks, rather than via sluices in the reservoir. However, the sluice to the east of wall A2_4, was remodelled in brick, although its aperture into the probable tank between the building and the reservoir was blocked at this time, suggesting that the water was now piped directly into the building.

5.6 PHASE 5

5.6.1 This phase comprises the demolition of the complex in the 1930s, which removed most of the structural fabric of the mill. Whilst nothing was constructed at this time, it formed the basic layout of the present site, removing most of the structures, infilling reservoirs, and raising the ground level with piles of demolition debris.

5.7 PHASE 6

5.7.1 The final phase of activity relates to post-calico printing use of the site. Within the study area the structural element of this phase comprise what appear to be garden beds between the ravine and the track. There is no documentary evidence pertaining to such activities within this part of the park, although their style suggests that they might possibly relate to domestic market gardening to increase the available food during the rationing years during and following the Second World War.

5.7.2 Further deterioration of the structural remains of the complex have also occurred during this phase. Of most significance is the establishment of mixed deciduous woodland, the roots of which will have damaged any extant below-ground remains. Similarly, the establishment of several large trees along the edge of the reservoir has severely compromised some of the extant wall fabric. Continual erosion has also occurred within the ravine, and part of the bridge has also collapsed. This problem has been further compounded by recent fly-tipping and burning of refuse.

5.7.3 The track which afforded access to the western side of the printworks was also extended, becoming the major access to the farms to the east, compromising the structures eroding out of the roadway, but also facilitating their discovery.

5.8 RECOMMENDATIONS FOR FURTHER INVESTIGATION

5.8.1 The archaeological survey has demonstrated that important structural elements of Plantation Mill survive extant, some of which are obscured by scrub vegetation or material that has been tipped following the demolition of the buildings. The survey has also indicated that there is considerable potential for important buried remains of the mill to survive *in-situ*, offering considerable opportunities for further research and investigation.

5.8.2 Further investigation of the site could inform some of the initiatives for archaeological research of the industrial and modern periods stated in the current *Archaeological Research Framework for North West England* (Brennand 2007). In particular, 'industry specific studies are needed for those industries that have received little archaeological attention' (Newman and McNeil 2007, 154). Whilst the physical remains of the region's textile industry has received a considerable amount of archaeological investigation and research since the late twentieth century (*eg* Williams with Farnie 1992; Giles and Goodall 1992; OA North 2010), this has tended to focus on those sites intended for cotton spinning and weaving, as these dominated the industry. However, the textile-finishing branches of the industry, including bleaching, dyeing and printing, were of key importance to many Lancashire towns. Very few, if any, nineteenth-century calico-printing works survive in tact in the modern county of Lancashire, most having been converted for other uses or demolished (OA North 2010). In this respect alone, Plantation Mill is of considerable archaeological interest as it incorporates rare physical evidence for a nineteenth-century calico-printing works, and has potential to be presented a type site for this former industry.

5.8.3 Whilst this project has provided a detailed record of two significant areas of the complex, many other features survive within the vicinity. A systematic photographic, and possibly drawn record of the remainder of the site would comprise a very economical next stage of fieldwork, and is likely to enhance the present understanding of the complex.

5.8.4 Intrusive archaeological investigation of the site through targeted excavation is similarly likely to provide further understanding of the complex, and provide important evidence for the operation and development of the mill. Excavation of the site could be usefully targeted on the main processing area, including the area crossed by the modern track. This is likely to include the putative engine and boiler houses, together with their associated flues and water-management features. The excavation and recording of these buried structures could be achieved through a community archaeology programme, involving volunteers from the interested local community working with professional archaeologists.

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Ordnance Survey 2nd edition 25" to 1 mile map of 1911, Sheet 63.16

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APPENDIX 1: PHOTOGRAPHIC INDEX

Frame	Date	Area	Description	Dir
001	16/04/10	Area 2	General view of walls A2_1 & A2_2	S
002	16/04/10	Area 2	General view of wall A2_2	S
003	16/04/10	Area 2	General view of wall A2_2	S
004	16/04/10	Area 2	General view of wall A2_2	S
005	16/04/10	Area 2	General view of walls A2_2 - A2_5	S
006	16/04/10	Area 2	General view of walls A2_5 - A2_8	S
007	16/04/10	Area 2	General view of walls A2_6 - A2_8	SE
008	16/04/10	Area 2	General view of walls A2_6 - A2_8	SE
009	16/04/10	Area 2	General view of walls A2_7 - A2_9	SE
010	16/04/10	Area 2	General view of walls A2_9 & A2_10	SE
011	16/04/10	Area 2	General view of walls A2_11 & A2_12	SE
012	16/04/10	Area 2	General view of wall A2_13	S
013	16/04/10	Area 2	General view of wall A2_13	S
014	16/04/10	Area 2	General view of wall A2_13	S
015	16/04/10	Area 2	General view of Retaining wall, west of Wall A2_13	S
016	16/04/10	Area 2	General view of Retaining wall, west of Wall A2_13	SW
017	16/04/10	Area 2	General view of Retaining wall, west of Wall A2_13	SW
018	16/04/10	Area 2	General view of Retaining wall, west of Wall A2_13	SW
019	16/04/10	Area 1	General view of Retaining wall, along edge of trackway	N
020	16/04/10	Area 1	General view of Retaining wall, along edge of trackway	N
021	16/04/10	Area 1	Worn flagstones in footpath to west of area 1	N
022	16/04/10	Area 2	General view, Area 2	SW
023	16/04/10	Area 2	General view of walls A2_5 - A2_8	S
024	16/04/10	Area 2	Detail of surviving internal walls, Area 2	w
025	16/04/10	Area 2	Detail of Wall A2_1	S
026	16/04/10	Area 2	Detail of Wall A2_1	S

027	16/04/10	Area 2	Detail of Wall A2_2	S
028	16/04/10	Area 2	Detail of Wall A2_2	S
029	16/04/10	Area 2	Detail of Wall A2_2	S
030	16/04/10	Area 2	Detail of Wall A2_2	S
031	16/04/10	Area 2	Detail of Wall A2_2	S
032	16/04/10	Area 2	Detail of Wall A2_2	S
033	16/04/10	Area 2	Detail of Wall A2_2	S
034	16/04/10	Area 2	Detail of Wall A2_2	S
035	16/04/10	Area 2	Detail of Wall A2_2	S
036	16/04/10	Area 2	Detail of Wall A2_2	S
037	16/04/10	Area 2	Curved wall, A2_3	SE
038	16/04/10	Area 2	Curved wall, A2_3	SE
039	16/04/10	Area 2	Detail of Wall A2_4	E
040	16/04/10	Area 2	Detail of Wall A2_4	E
041	16/04/10	Area 2	Detail of Wall A2_5	S
042	16/04/10	Area 2	Detail of Wall A2_5	S
043	16/04/10	Area 2	Retaining wall to rear of Wall A2_5	S
044	16/04/10	Area 2	Retaining wall to rear of Wall A2_5	S
045	16/04/10	Area 2	Detail of Wall A2_7	SE
046	16/04/10	Area 2	Detail of Wall A2_7	SE
047	16/04/10	Area 2	Detail of Wall A2_7	SE
048	16/04/10	Area 2	Detail of Wall A2_7	SE
049	16/04/10	Area 2	Detail of Wall A2_8	S
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061	16/04/10	Area 2	Detail of Wall A2_11	E
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063	16/04/10	Area 2	Detail of Wall A2_12	S
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065	16/04/10	Area 2	Detail of Wall A2_13	S
066	16/04/10	Area 2	Detail of Wall A2_13	S
067	16/04/10	Area 2	Detail of Wall A2_13	S
068	16/04/10	Area 2	Detail of Wall A2_13	S
069	16/04/10	Area 2	Detail of Wall A2_13	S
070	16/04/10	Area 2	Retaining wall, west of Wall A2_13	S
071	16/04/10	Area 2	Retaining wall, west of Wall A2_13	S
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080	16/04/10	Area 2	Retaining wall, west of Wall A2_13	SW
081	16/04/10	Area 2	Retaining wall, west of Wall A2_13	SW
082	16/04/10	Area 1	Reservoir wall, A1_3	SW
083	16/04/10	Area 1	Reservoir wall, A1_3	SW
084	16/04/10	Area 1	Sluice wall, A1_3	SW

085	16/04/10	Area 1	Sluice wall, A1_3	SW
086	16/04/10	Area 1	East wall of Bridge, A1_2	W
087	16/04/10	Area 1	Sluice wall, A1_1	NE
088	16/04/10	Area 1	Sluice wall, A1_1	NE
089	16/04/10	Area 1	Sluice wall, A1_1	NE
090	16/04/10	Area 1	Collapsed void in bridge arch	NW
091	16/04/10	Area 1	Collapsed void in bridge arch	NW
092	16/04/10	Area 1	Collapsed void in bridge arch	NW
093	16/04/10	Area 1	Collapsed void in bridge arch	NW
094	16/04/10	Area 1	Collapsed void in bridge arch	NW
095	16/04/10	Area 1	General view of Retaining wall, along edge of trackway	S
096	16/04/10	Area 1	General view of Retaining wall, along edge of trackway	S
097	16/04/10	Area 2	General view of machine bed	SW
098	19/04/10	Area 2	General view of machine bed	N
099	19/04/10	Area 2	General view of machine bed	N
100	19/04/10	Area 2	Detailed view of machine bed	N
101	19/04/10	Area 2	Detailed view of machine bed	N
102	19/04/10	Area 2	Detailed view of machine bed	S
103	19/04/10	Area 2	Detailed view of machine bed	S
104	19/04/10	Area 2	Detailed view of machine bed	S
105	19/04/10	Area 2	Detailed view of machine bed	N
106	19/04/10	Area 2	Detailed view of machine bed	N
107	19/04/10	Area 2	Detailed view of machine bed	E
108	19/04/10	Area 1	Brick wall footings, Area 1	W
109	19/04/10	Area 1	Brick wall footings, Area 1	N
110	19/04/10	Area 1	Brick wall footings, Area 1	S
111	19/04/10	Area 1	General view of culvert and probable tank base	NE
112	19/04/10	Area 1	General view of culvert and probable tank base	NE
113	19/04/10	Area 1	General view of culvert and probable tank base	NE

114	19/04/10	Area 1	General view of culvert and probable tank base	W
115	19/04/10	Area 1	General view of culvert and probable tank base	W
116	19/04/10	Area 1	General view of culvert and probable tank base	S
117	19/04/10	Area 1	Detail of culvert and probable tank base	S
118	19/04/10	Area 1	Detail of culvert and probable tank base	S
119	19/04/10	Area 1	Detail of culvert and probable tank base	SW
120	19/04/10	Area 1	Detail of culvert and probable tank base	SW
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123	19/04/10	Area 1	Detail of culvert and probable tank base	NE
124	19/04/10	Area 1	Detail of culvert and probable tank base	NW
125	19/04/10	Area 1	Detail of culvert and probable tank base	SW
126	19/04/10	Area 1	Detail of culvert and probable tank base	SW
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128	19/04/10	Area 1	Detail of culvert and probable tank base	NE
129	19/04/10	Area 1	Detail of culvert and probable tank base	NE
130	19/04/10	Area 1	Detail of culvert and probable tank base	NE
131	19/04/10	Area 1	Path edging/kerb for possible garden bed	S
132	19/04/10	Area 1	Path edging/kerb for possible garden bed	W
133	19/04/10	Area 1	Path edging/kerb for possible garden bed	N
134	19/04/10	Area 1	Edge-set flagstone kerb	W
135	19/04/10	Area 1	Edge-set flagstone kerb	S
136	19/04/10	Area 1	Kerbs and retaining wall	S
137	19/04/10	Area 1	Detail of retaining wall	S
138	19/04/10	Area 1	General view over possible garden beds	SW

ILLUSTRATIONS

LIST OF FIGURES

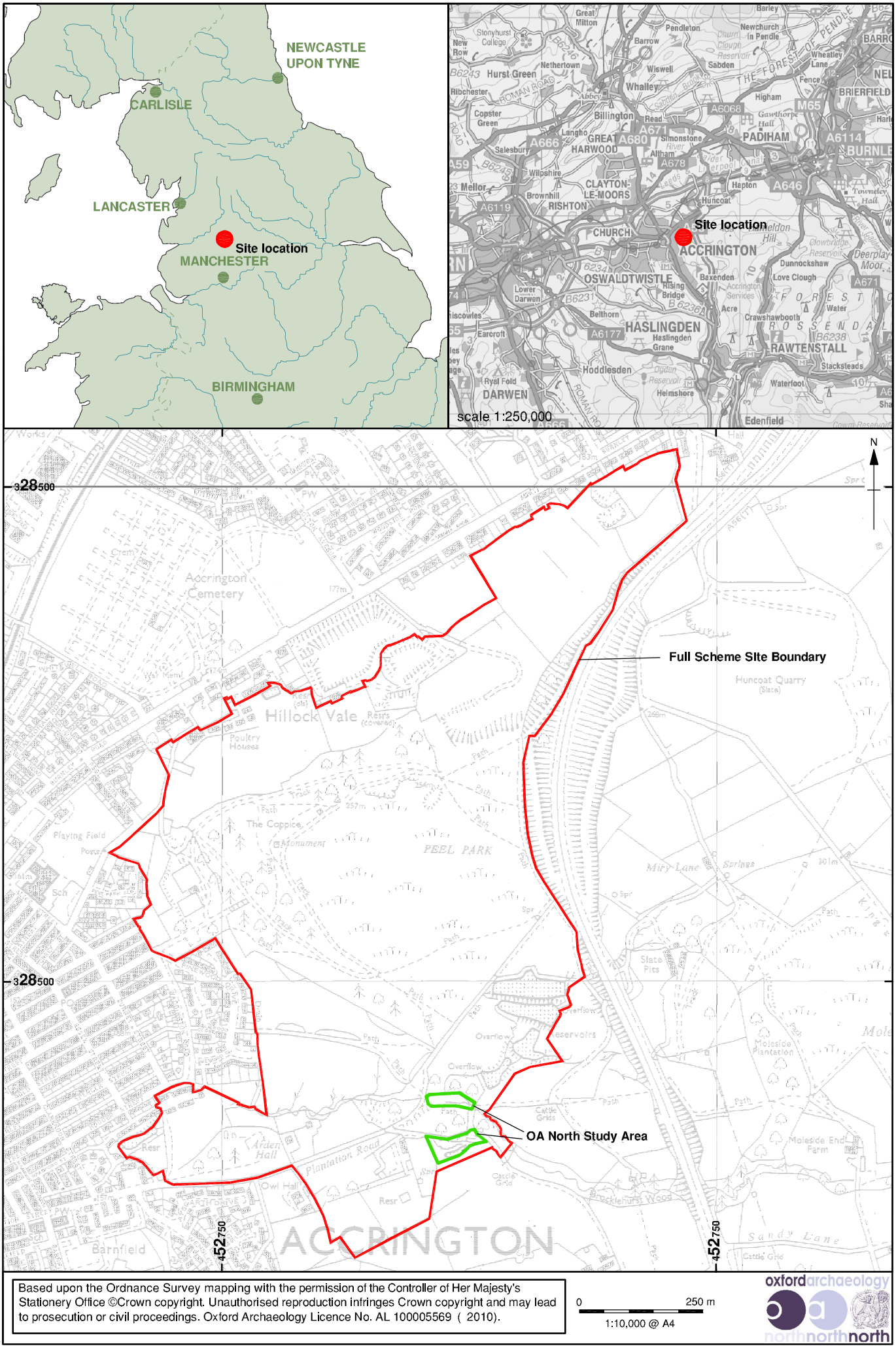


Figure 1: Site location

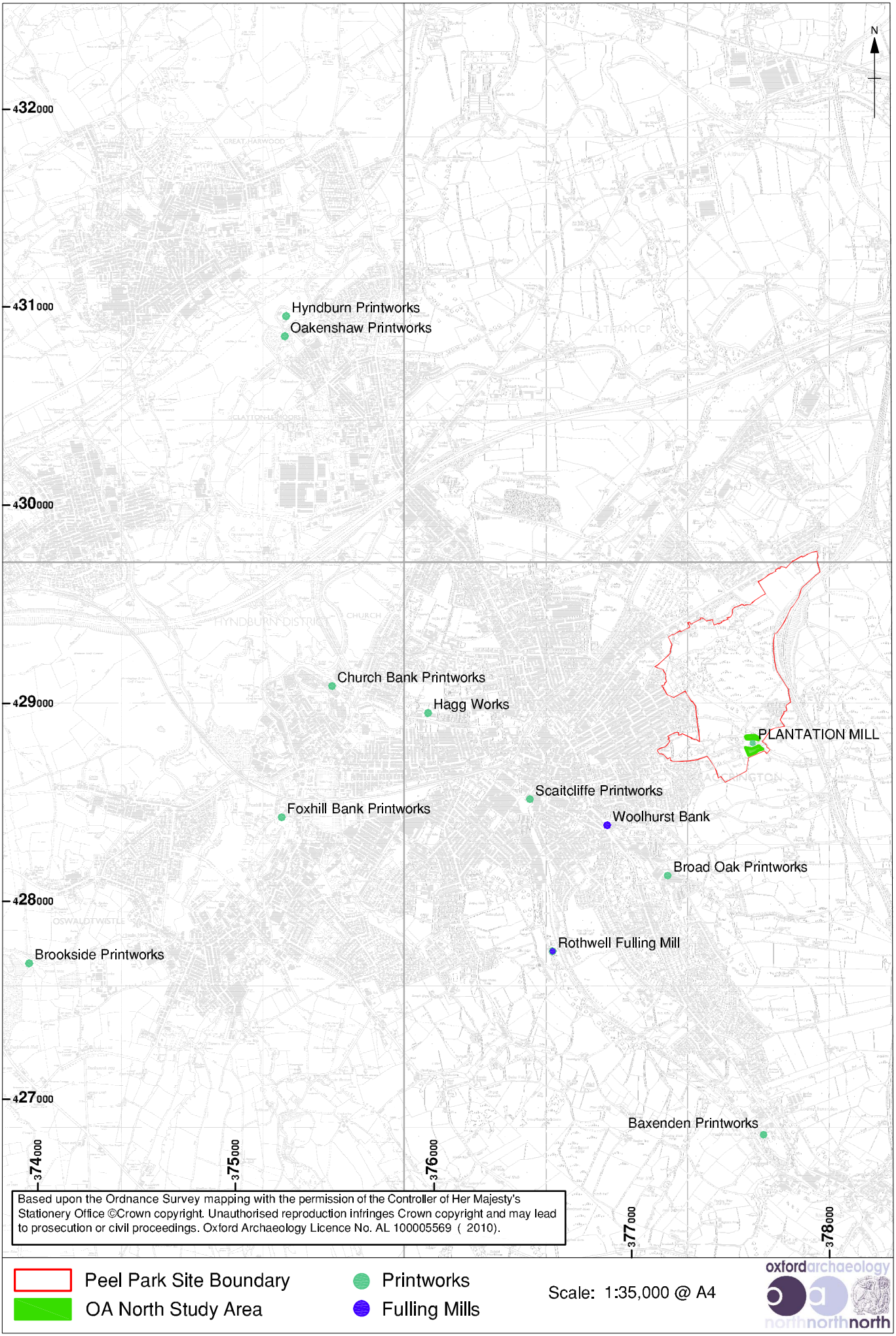


Figure 2: Location of principal calico printworks and fulling mills in the Accrington area

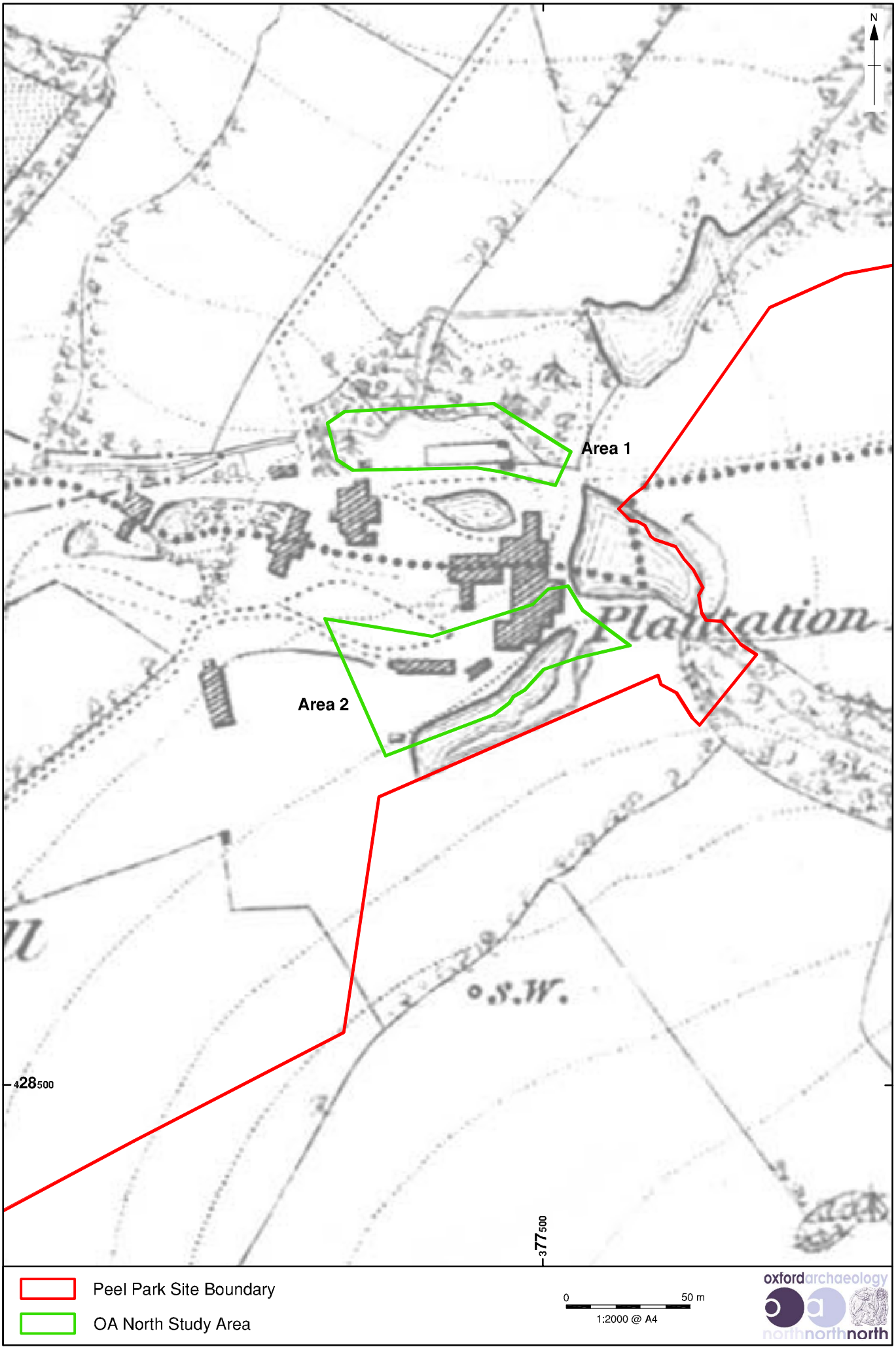


Figure 3: Survey areas shown on the Ordnance Survey first edition 6": 1 milemap of 1848

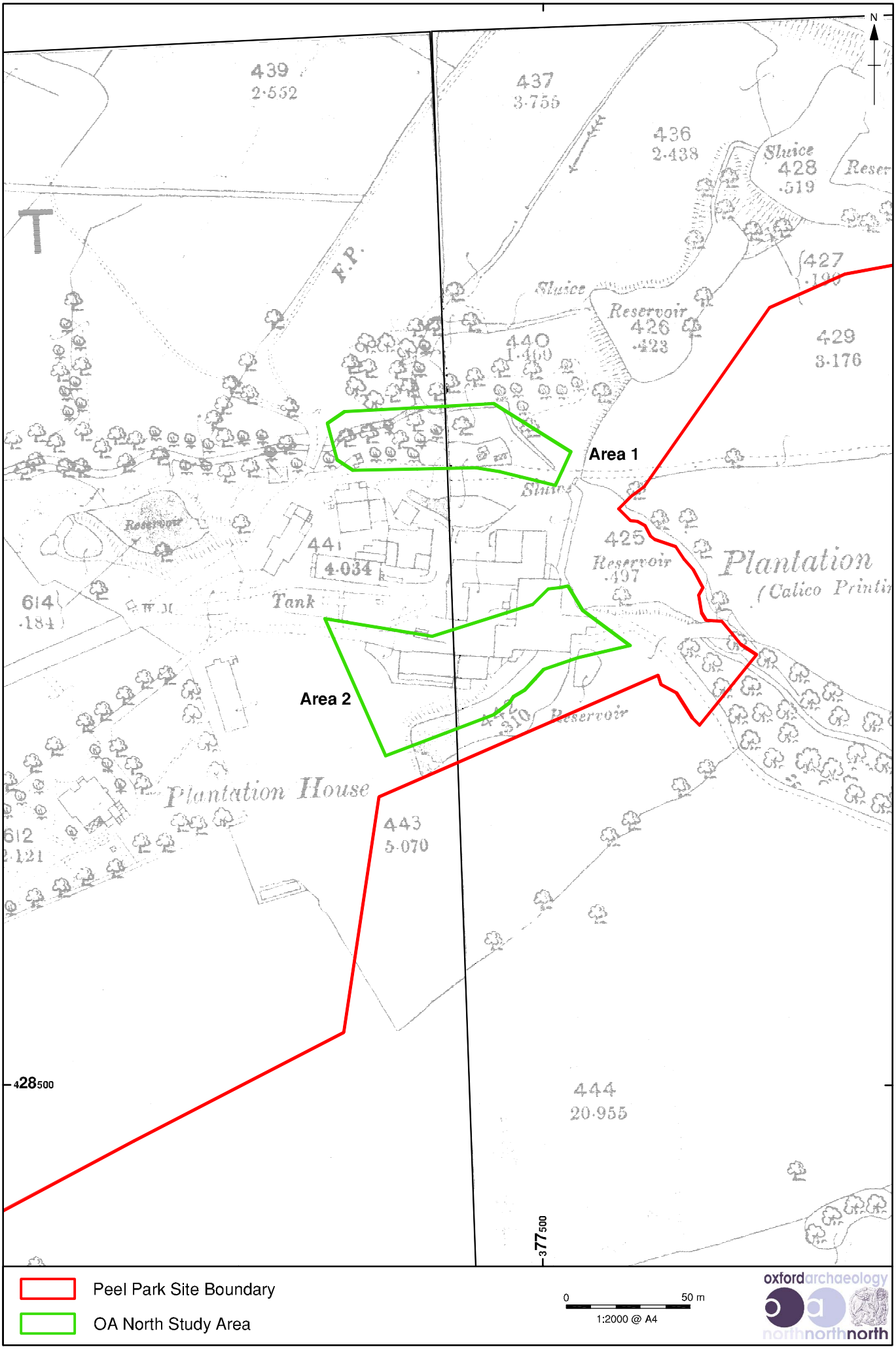


Figure 4: Survey areas shown on the Ordnance Survey first edition 25": 1 mile map of 1893

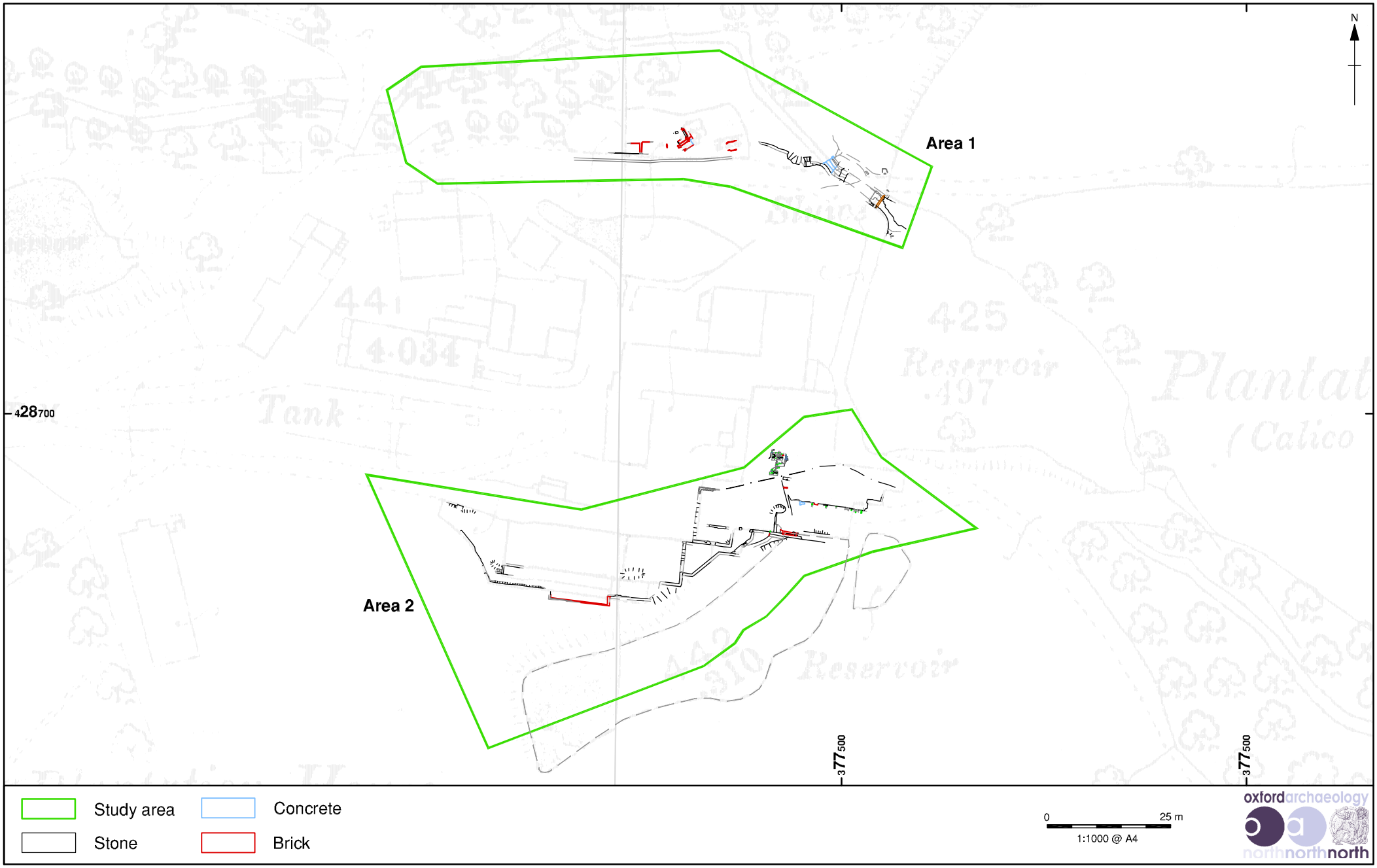


Figure 5: Survey areas overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893, showing surviving structural remains

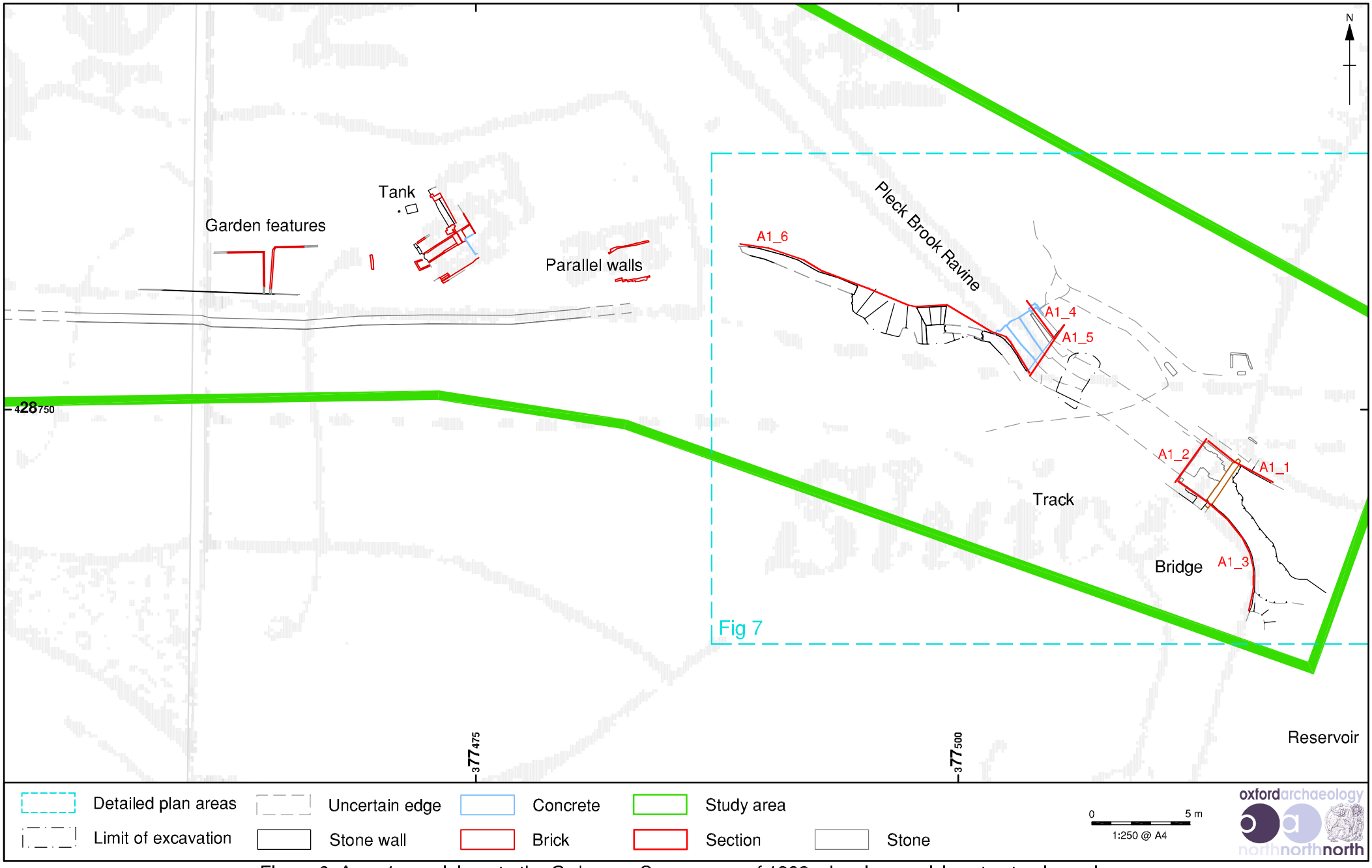


Figure 6: Area 1, overlain onto the Ordnance Survey map of 1893, showing surviving structural remains

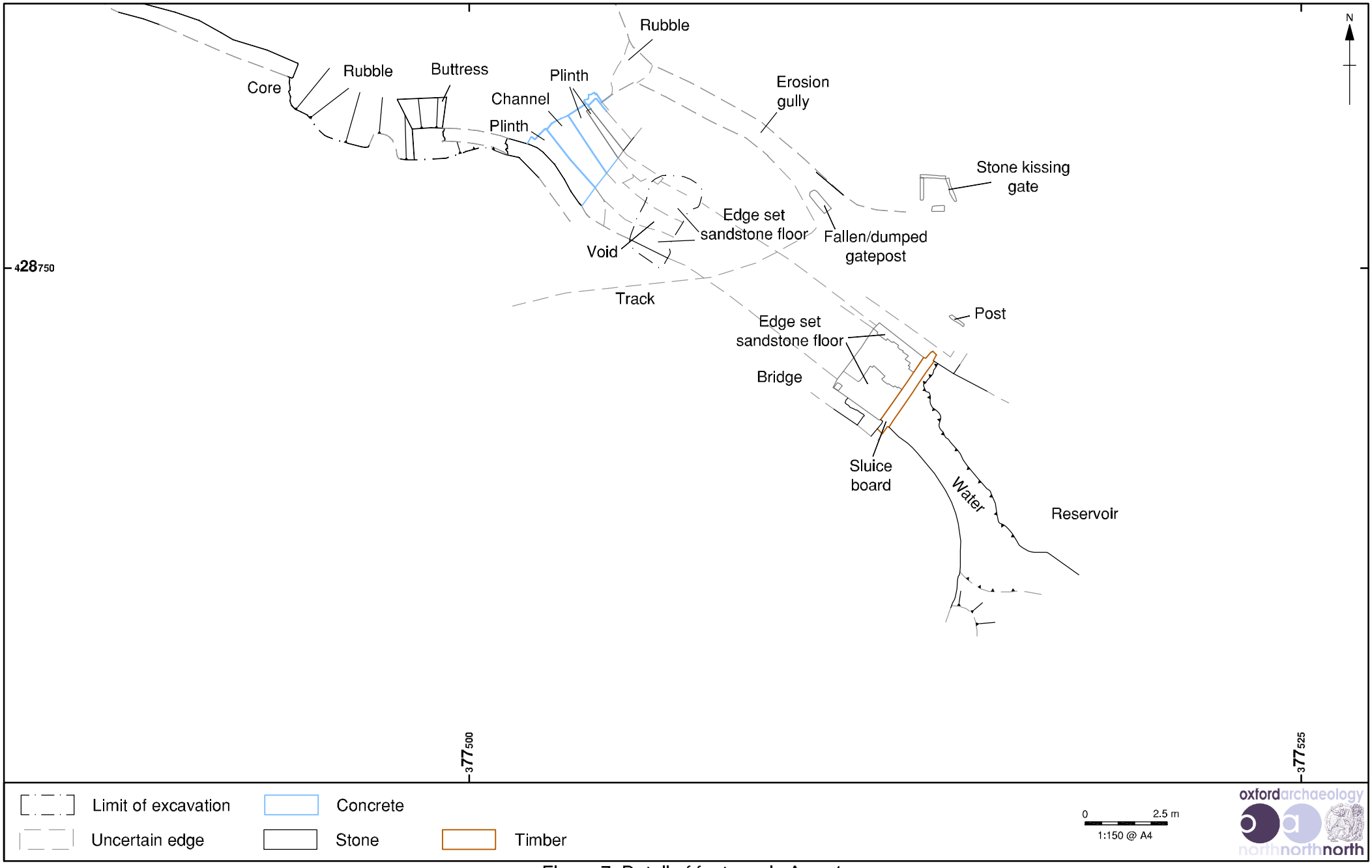


Figure 7: Detail of features in Area 1

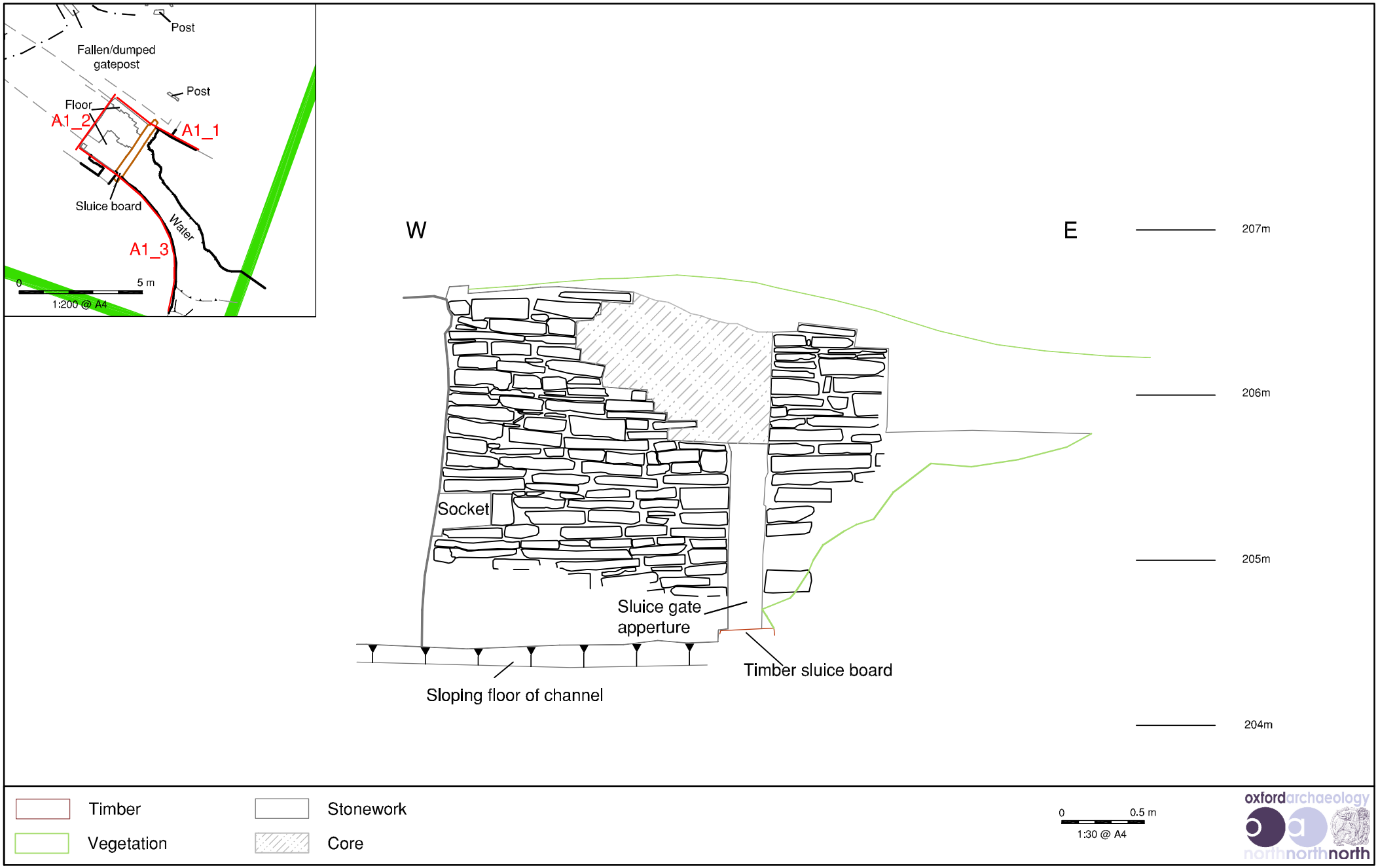


Figure 8: Area 1, Elevation A1_1

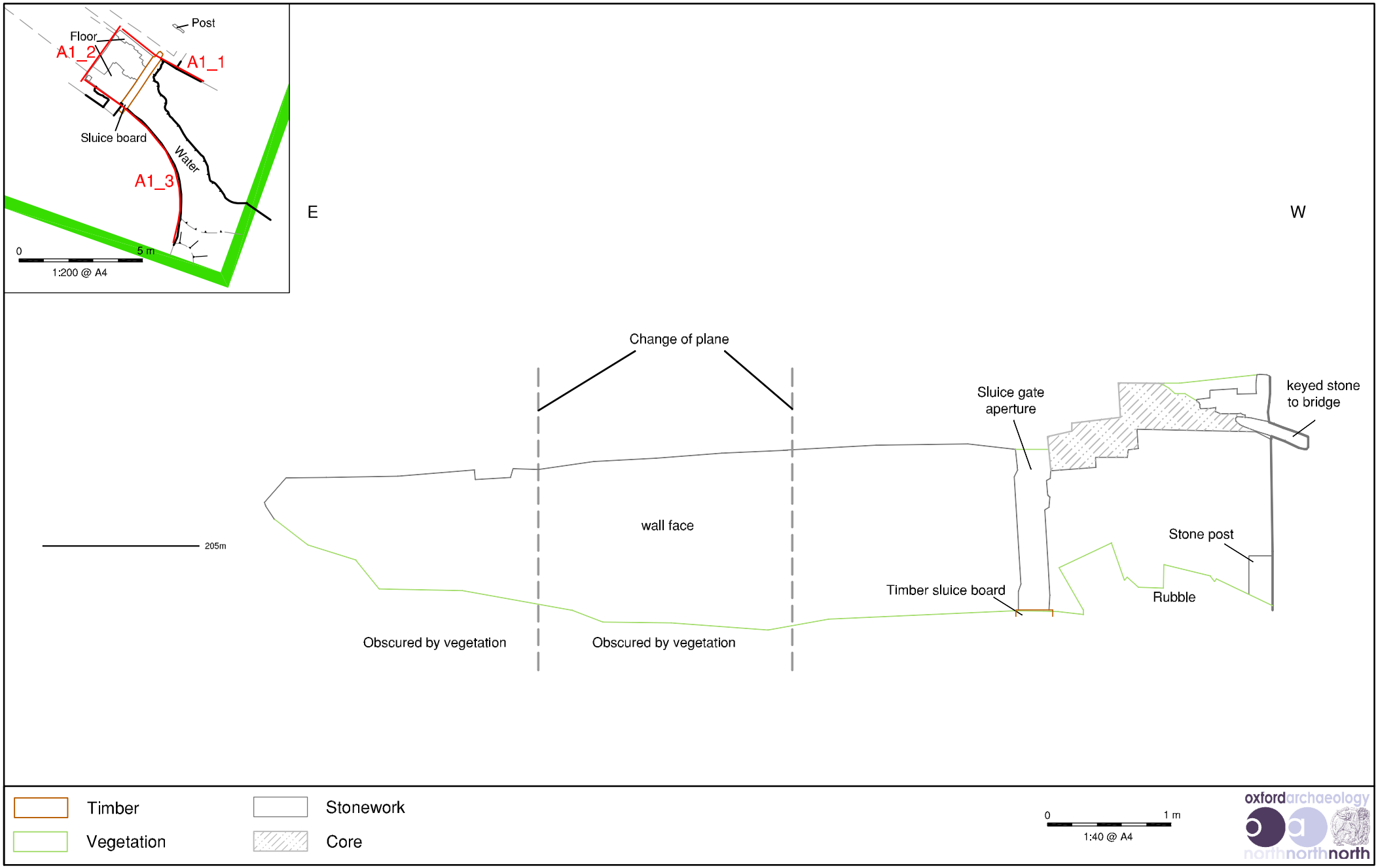


Figure 9: Area 1, Elevation A1_3

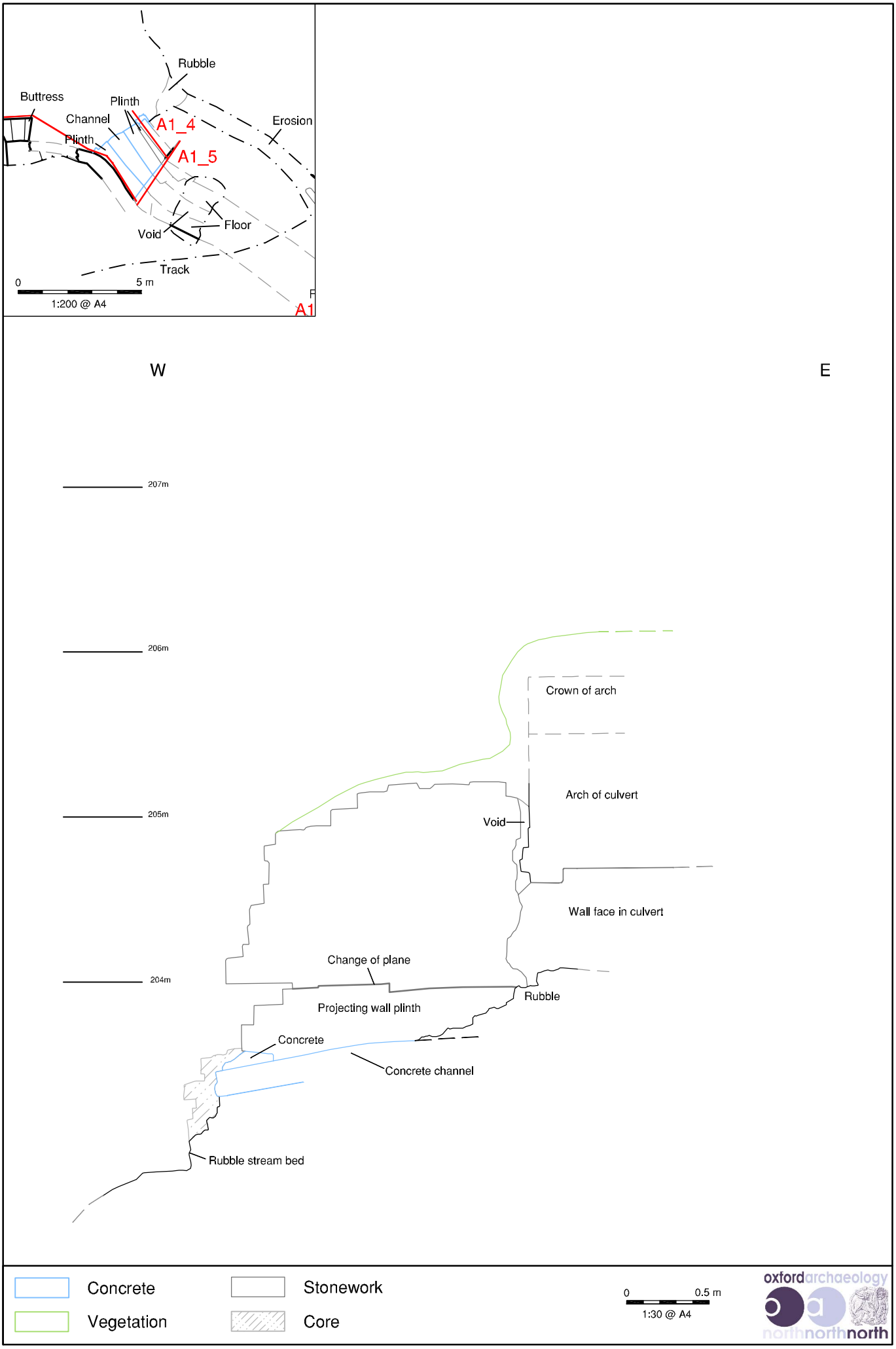


Figure 10: Area 1, Elevation A1_4

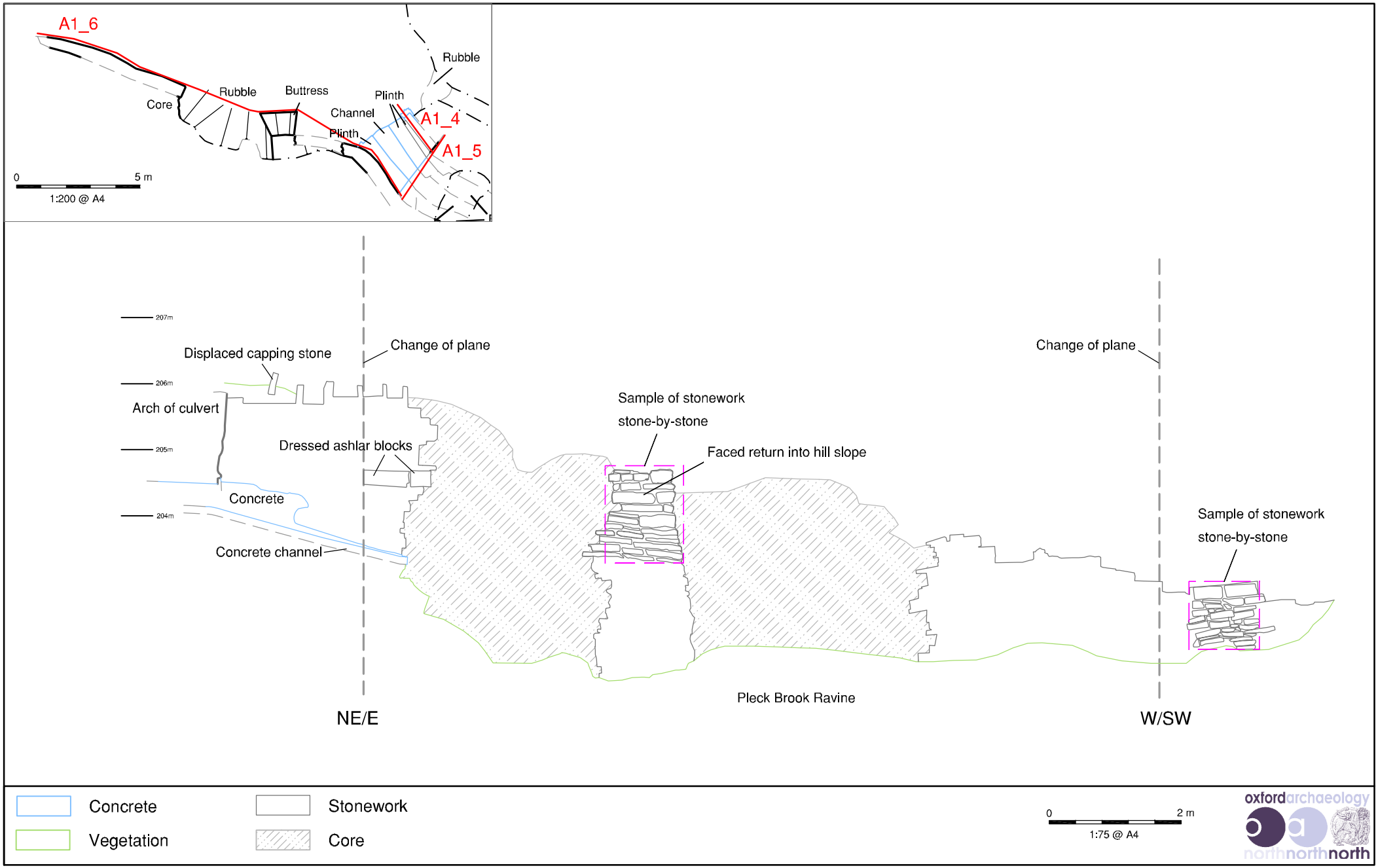
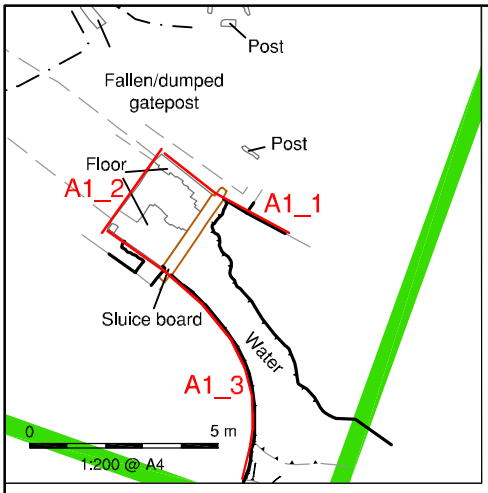


Figure 11: Area 1, Elevation A1_6



Stonework

Vegetation

Core

0 0.5 m

1:30 @ A4

oxfordarchaeology northnorthnorth

Figure 12: Area 1, Elevation A1_2

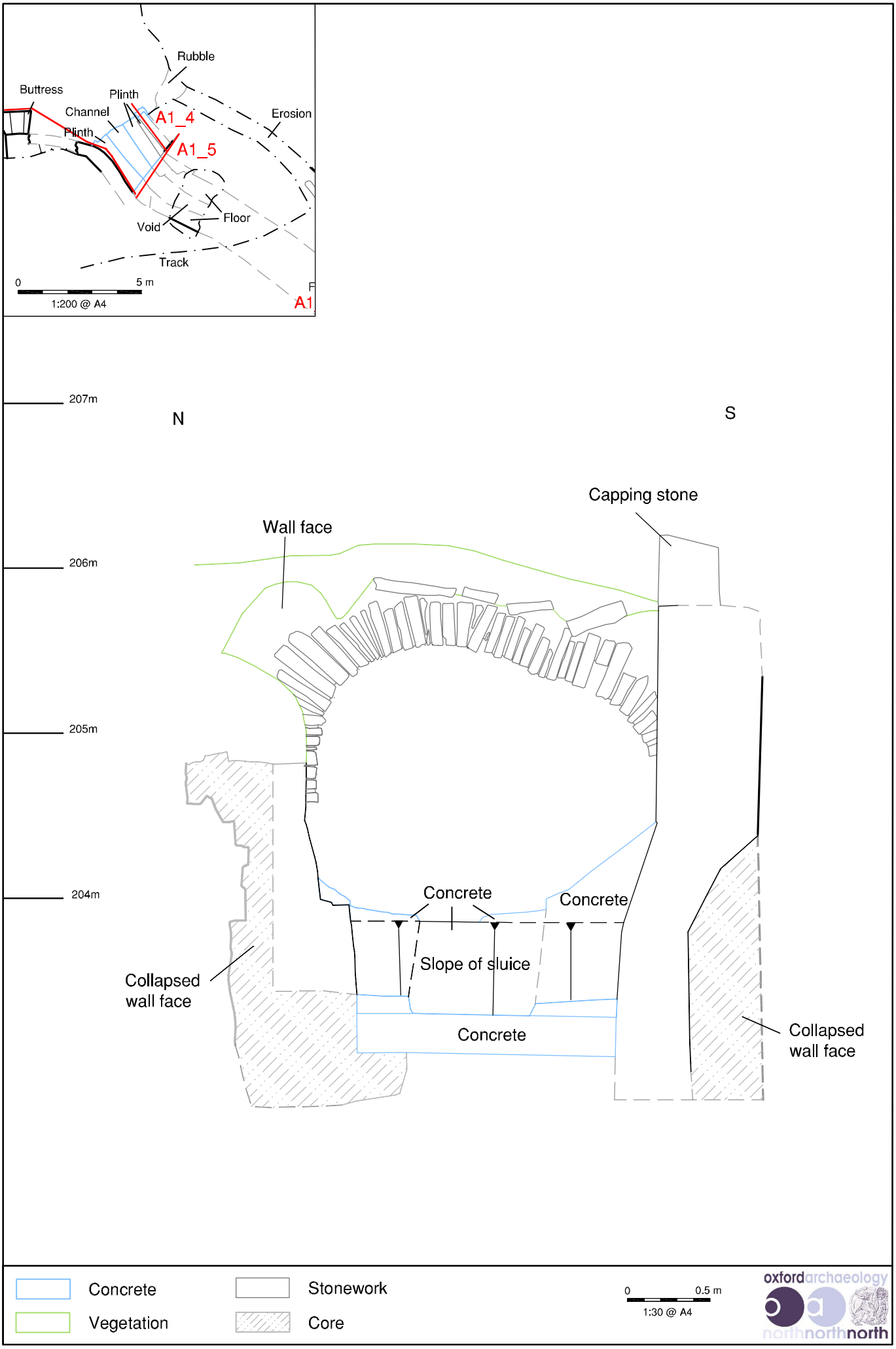


Figure 13: Area 1, Elevation A1_5

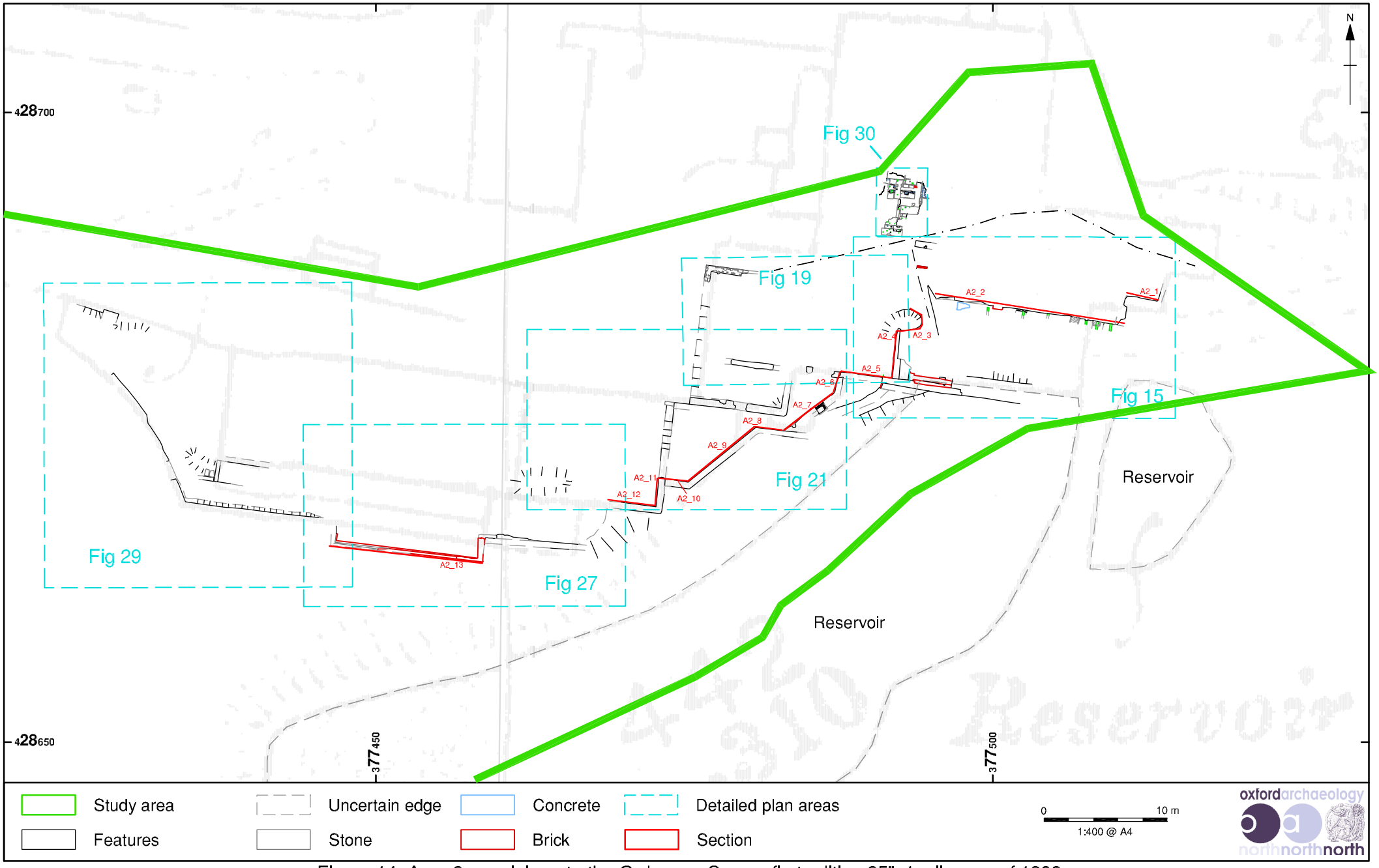


Figure 14: Area 2, overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893

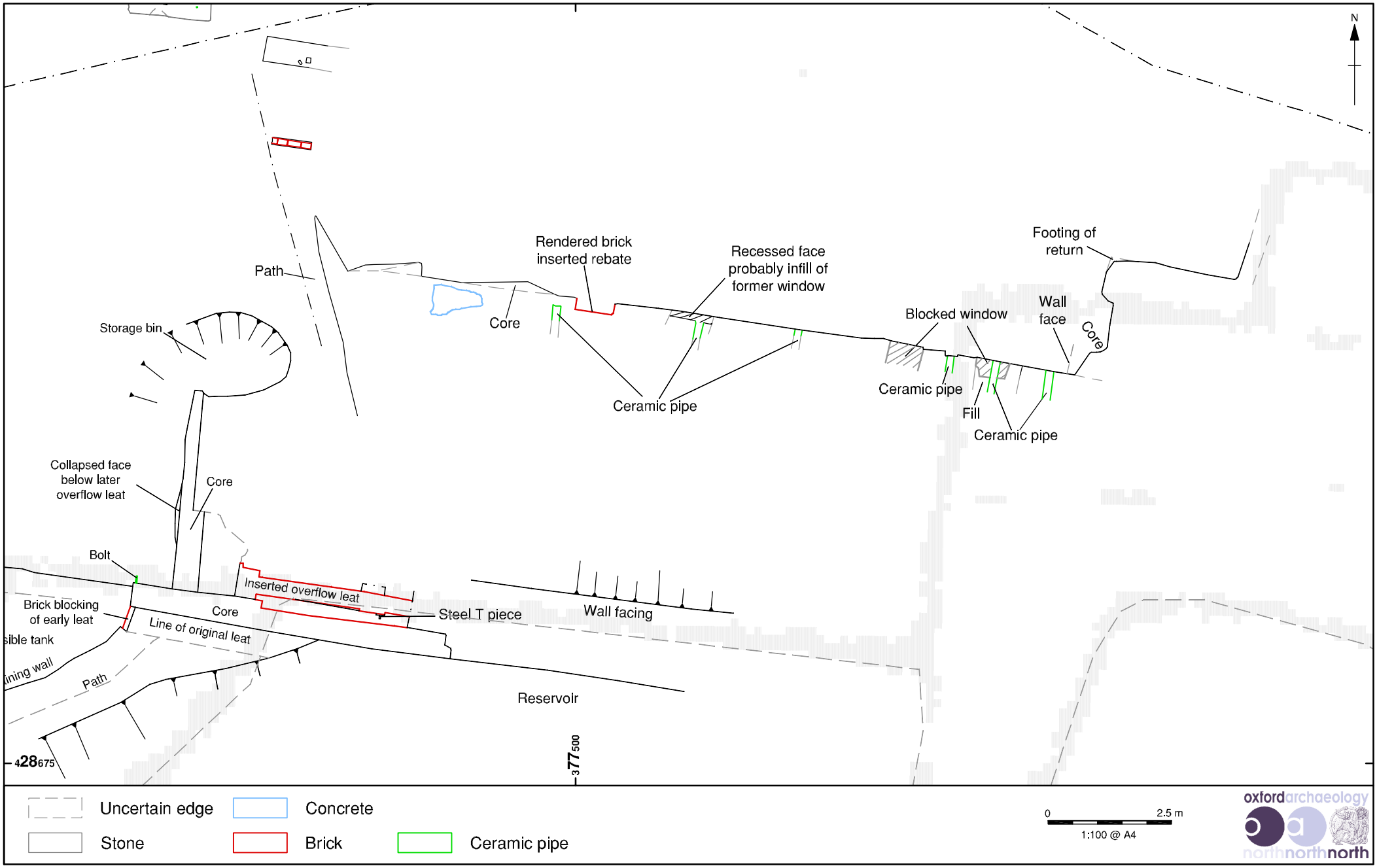


Figure 15: Detail of Walls A2_1 to A2_4, overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893

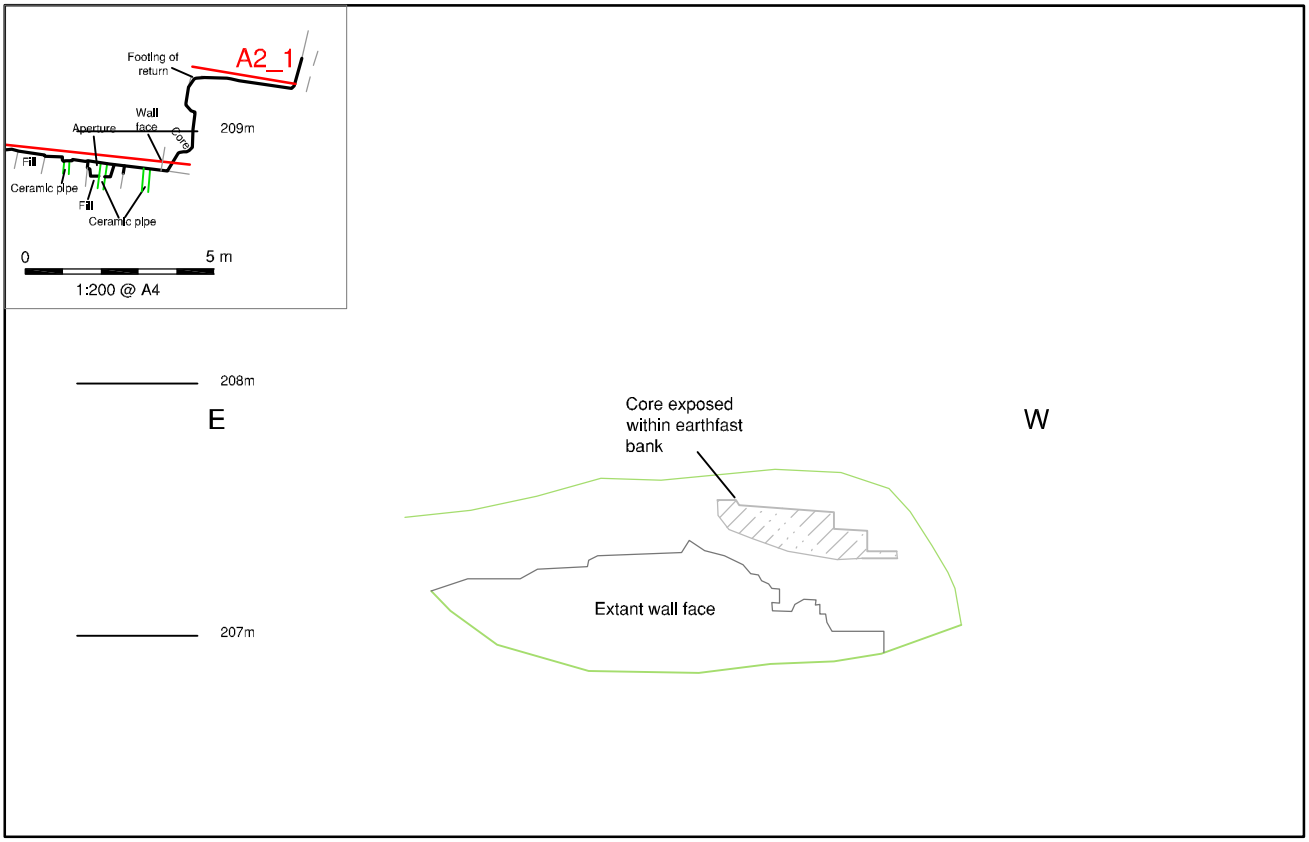


Figure 16: Area 2, Elevation A2_1

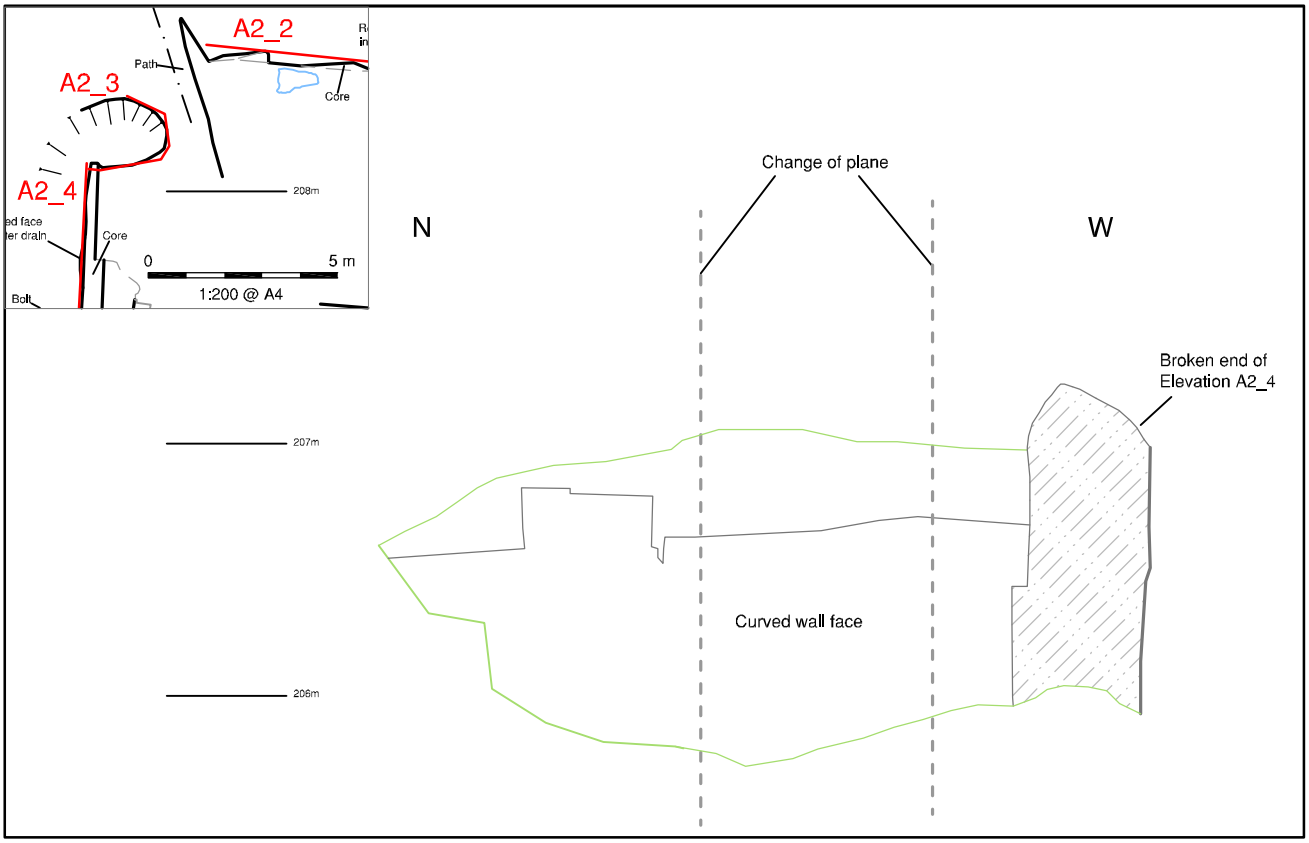


Figure 18: Area 2, Elevation A2_3

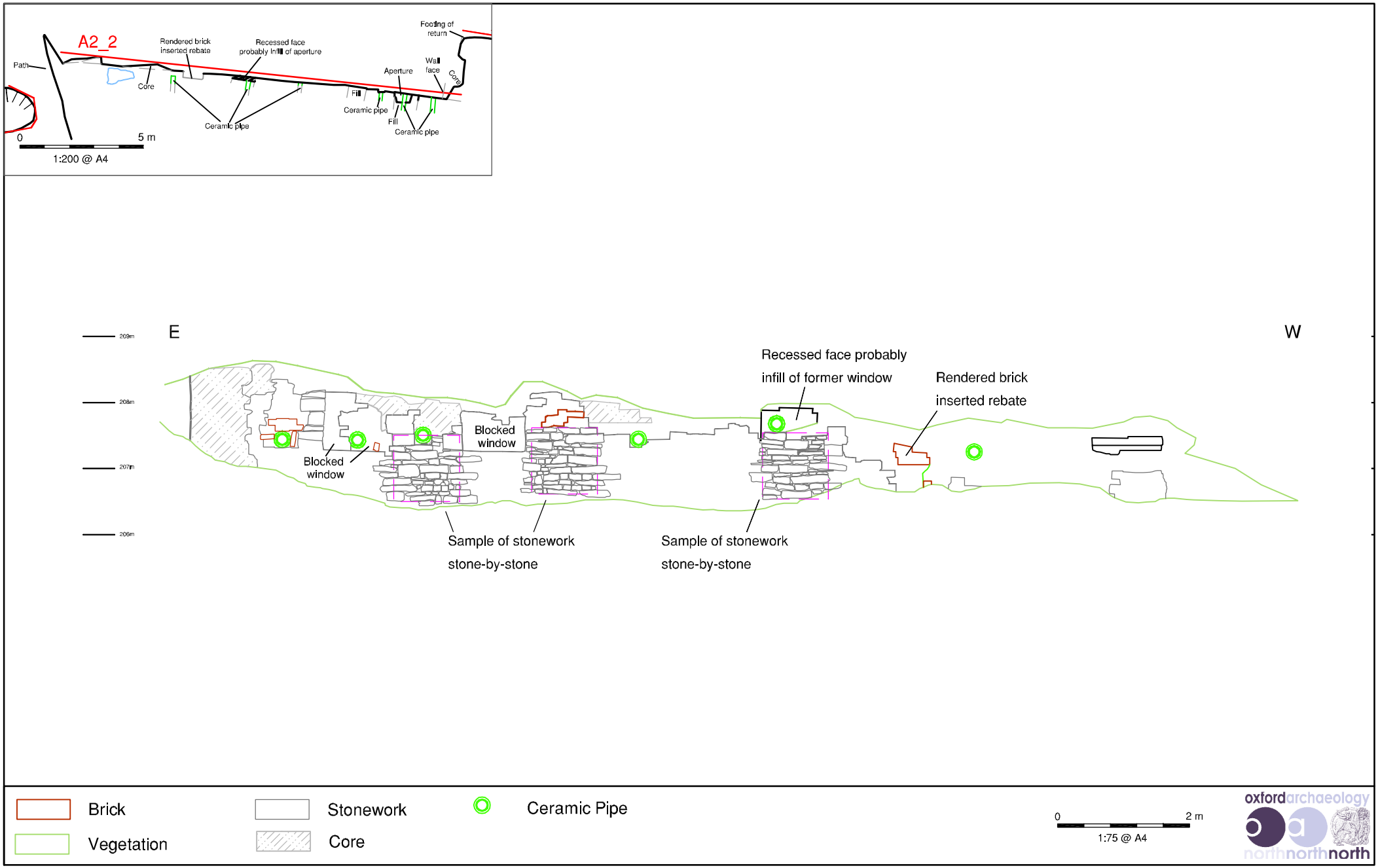


Figure 17: Area 2, Elevation A2_2

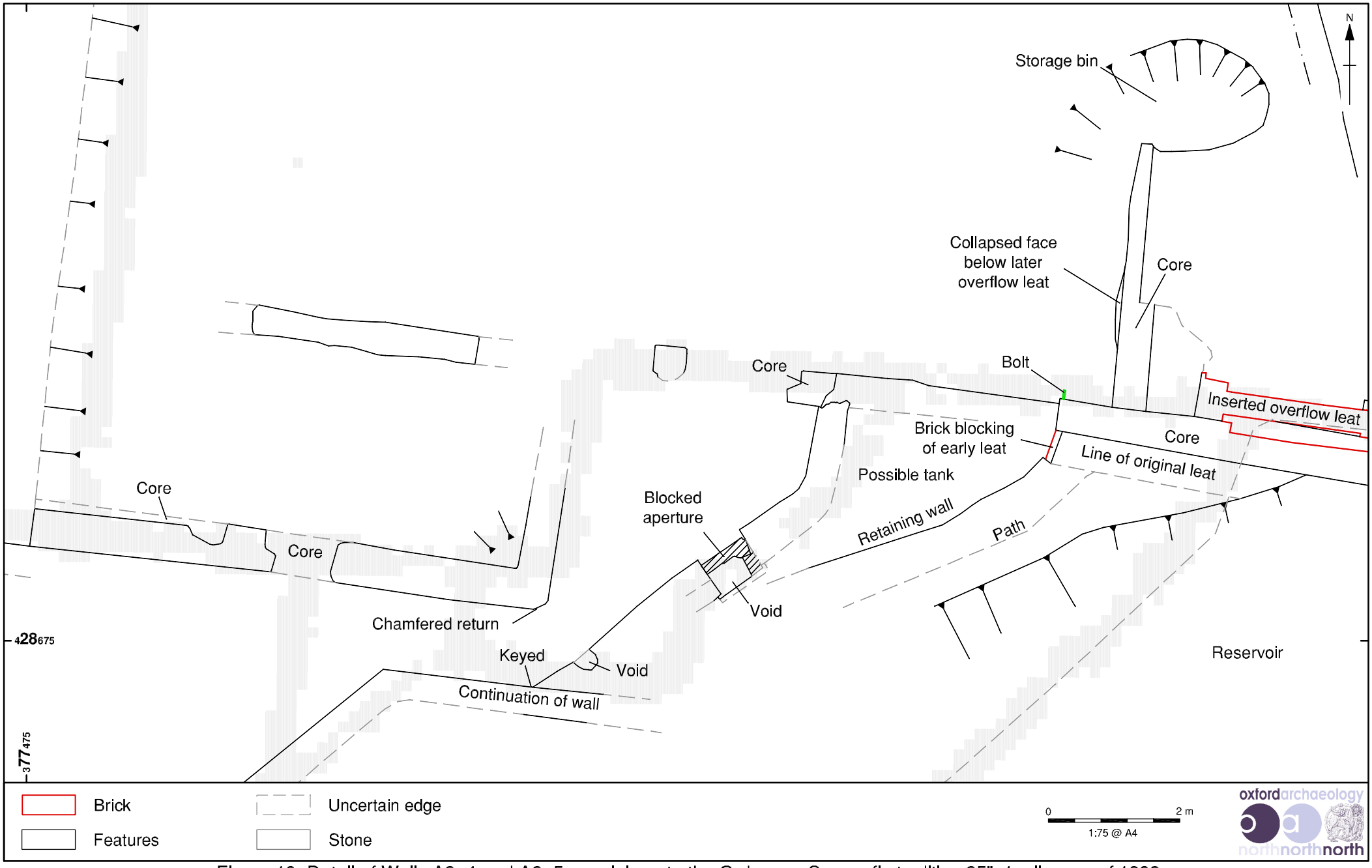


Figure 19: Detail of Walls A2_4 and A2_5, overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893

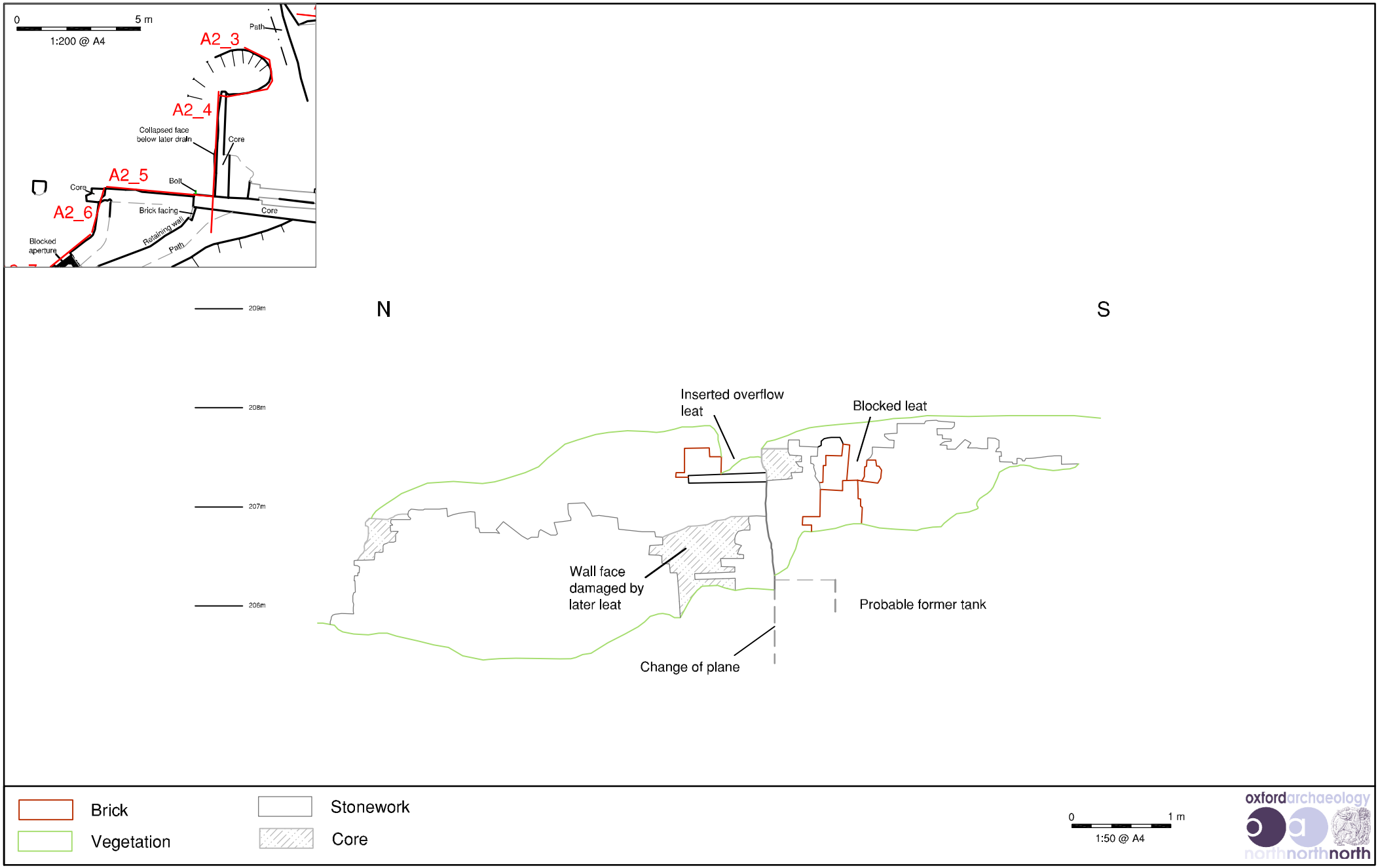


Figure 20: Area 2, Elevation A2_4

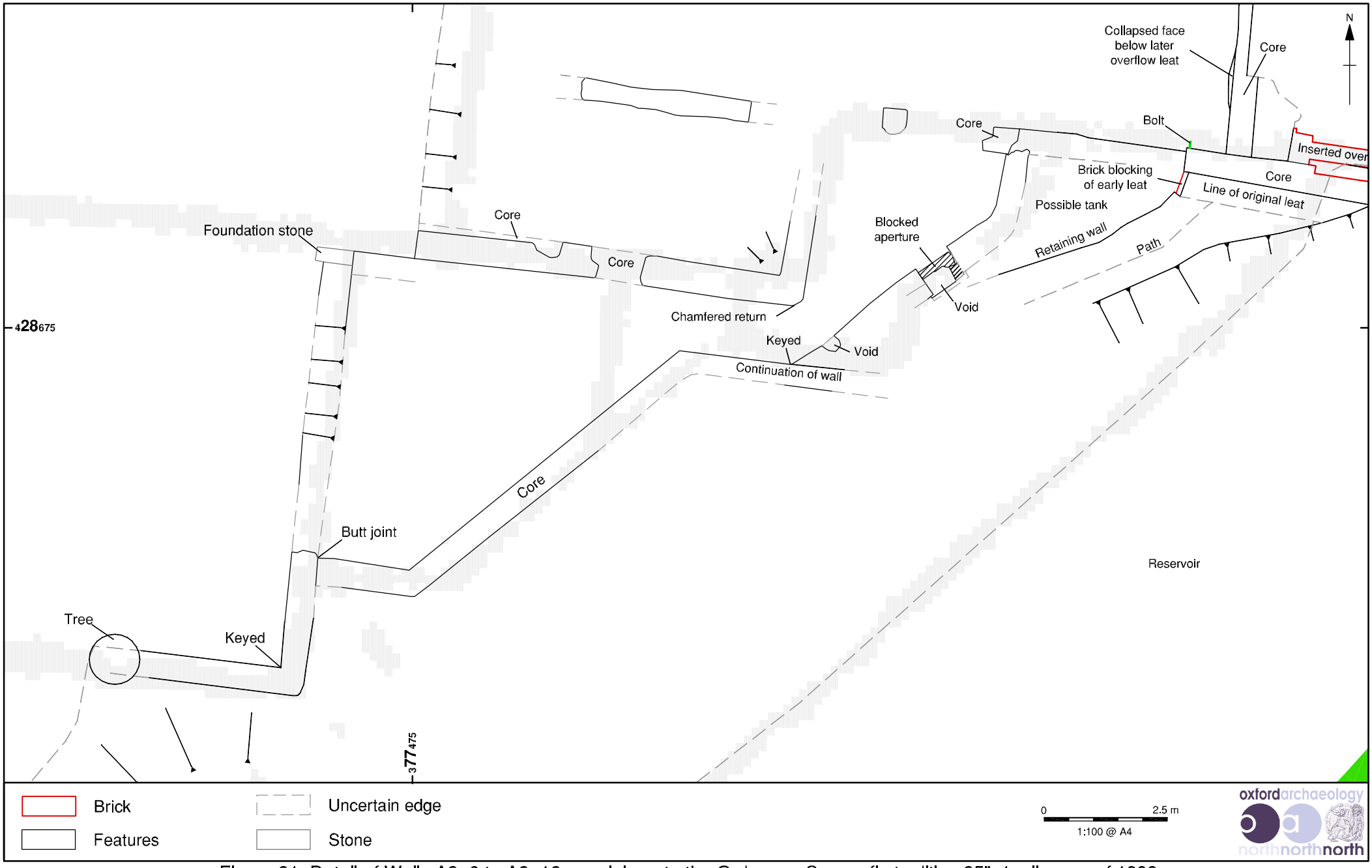
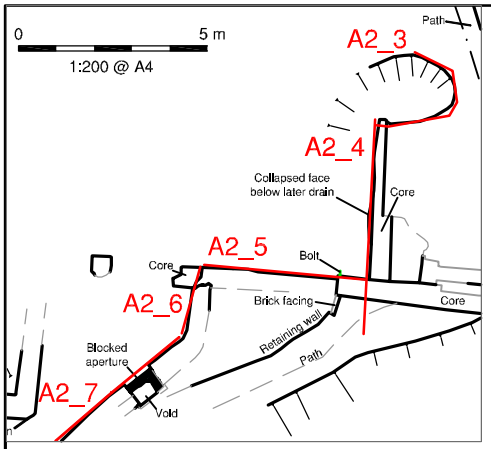
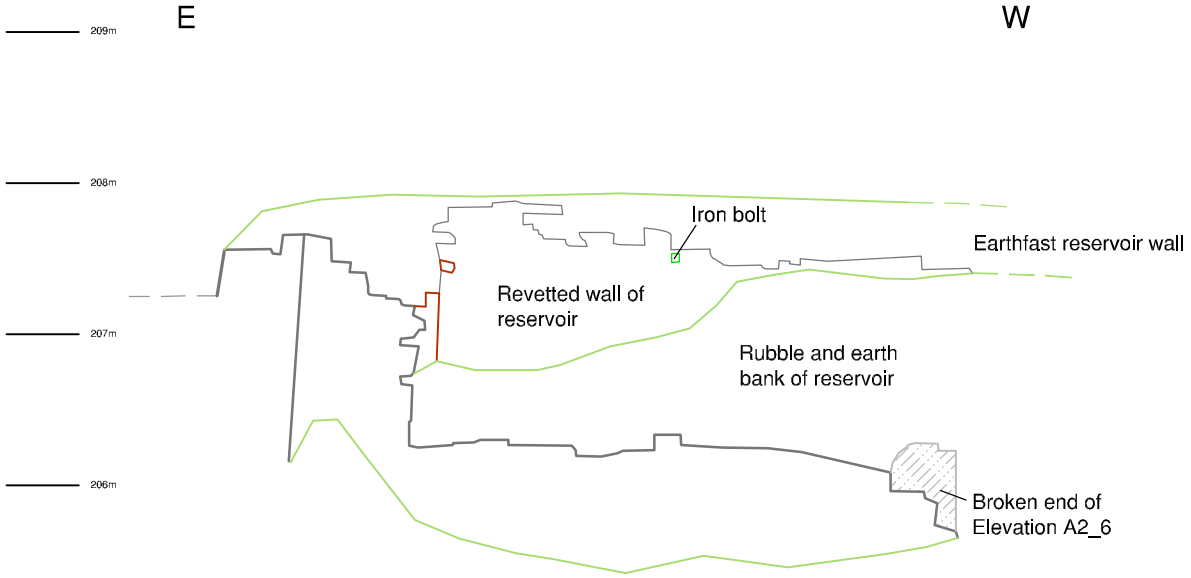


Figure 21: Detail of Walls A2_6 to A2_12, overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893





Uncertain edge
Vegetation
Stonework
Core

0
1 m
1:50 @ A4

oxfordarchaeology
northnorthnorth

Figure 22: Area 2, Elevation A2_5

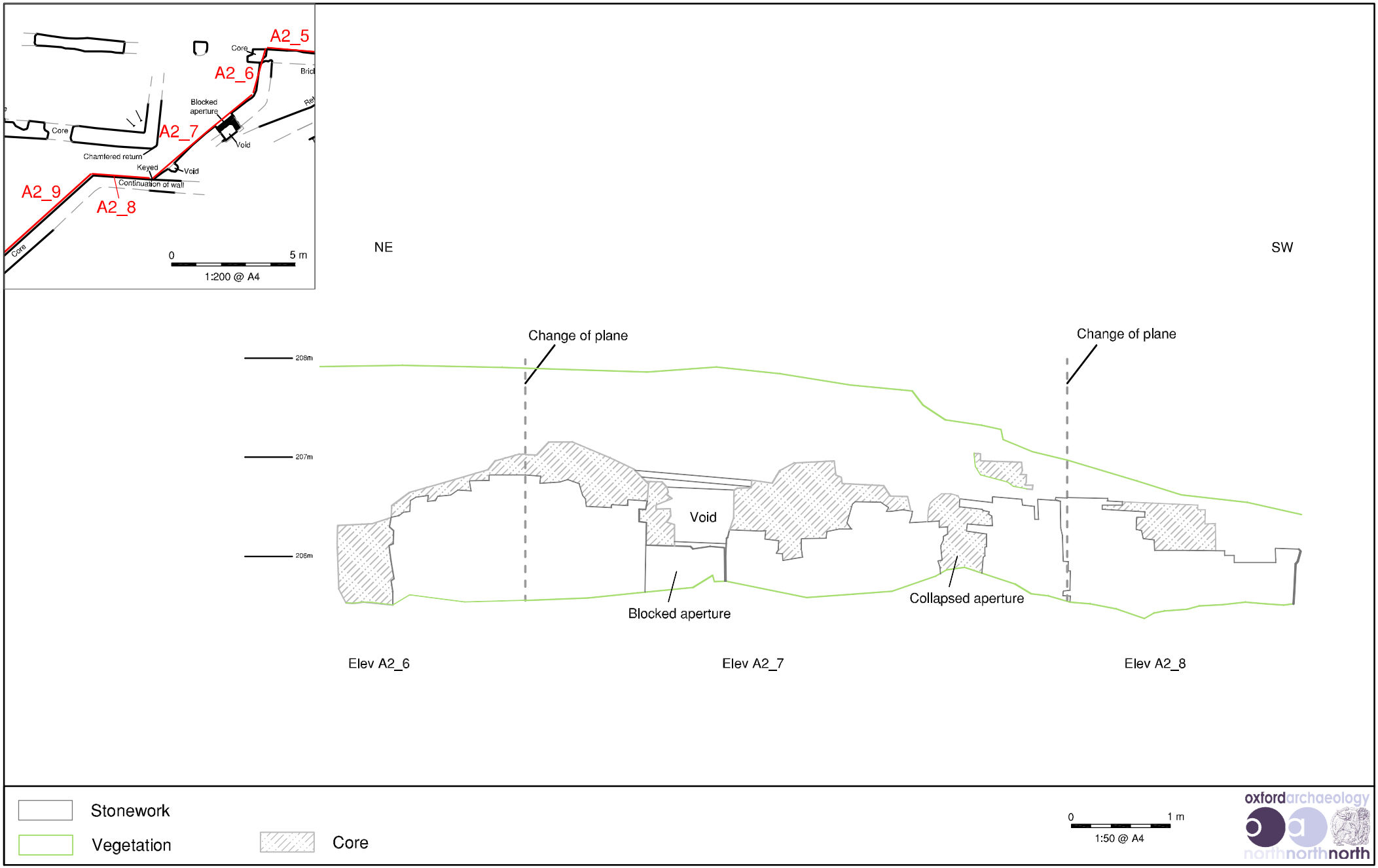


Figure 23: Area 2, Elevations A2_6 to A2_8

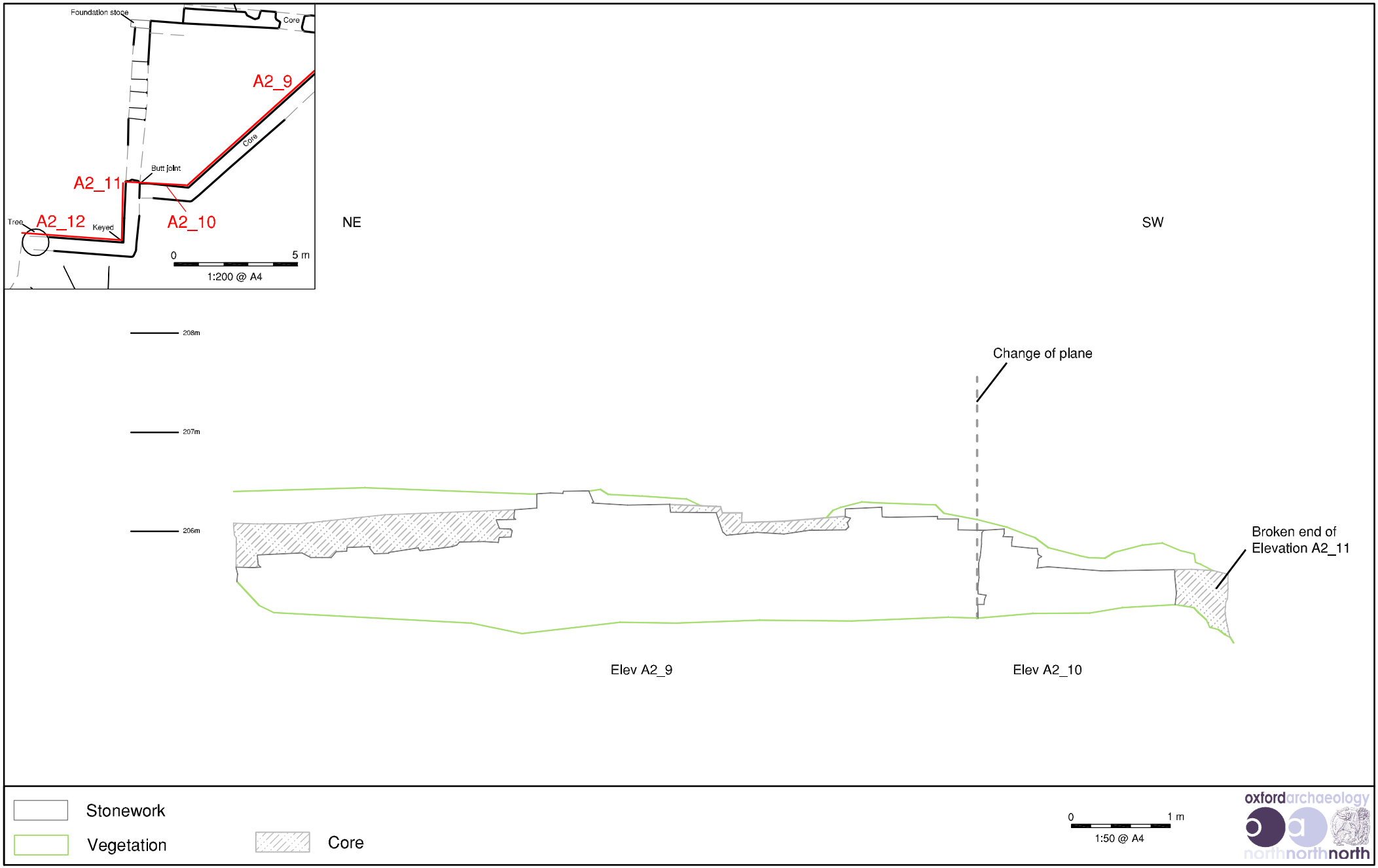


Figure 24: Area 2, Elevations A2_9 and A2_10

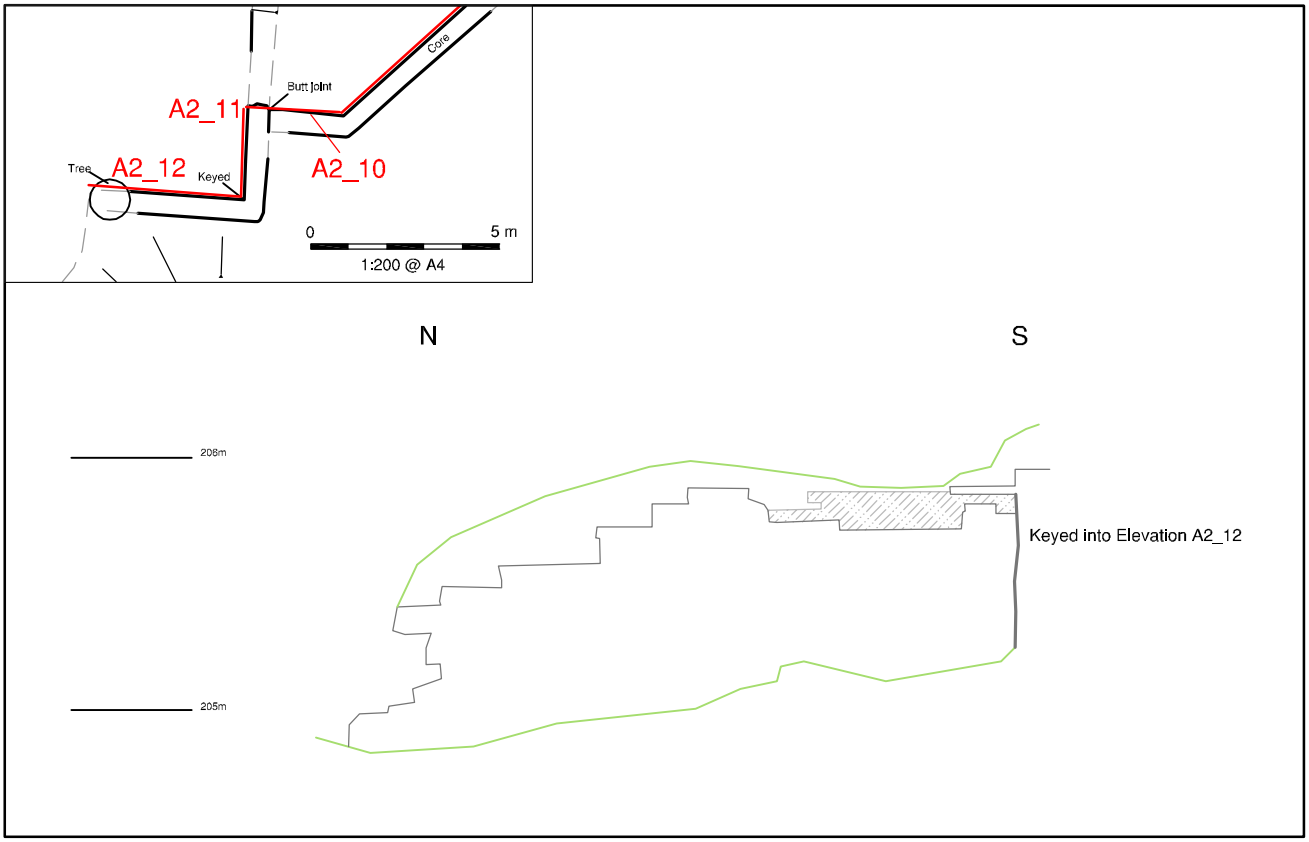


Figure 25: Area 2, Elevation A2_11

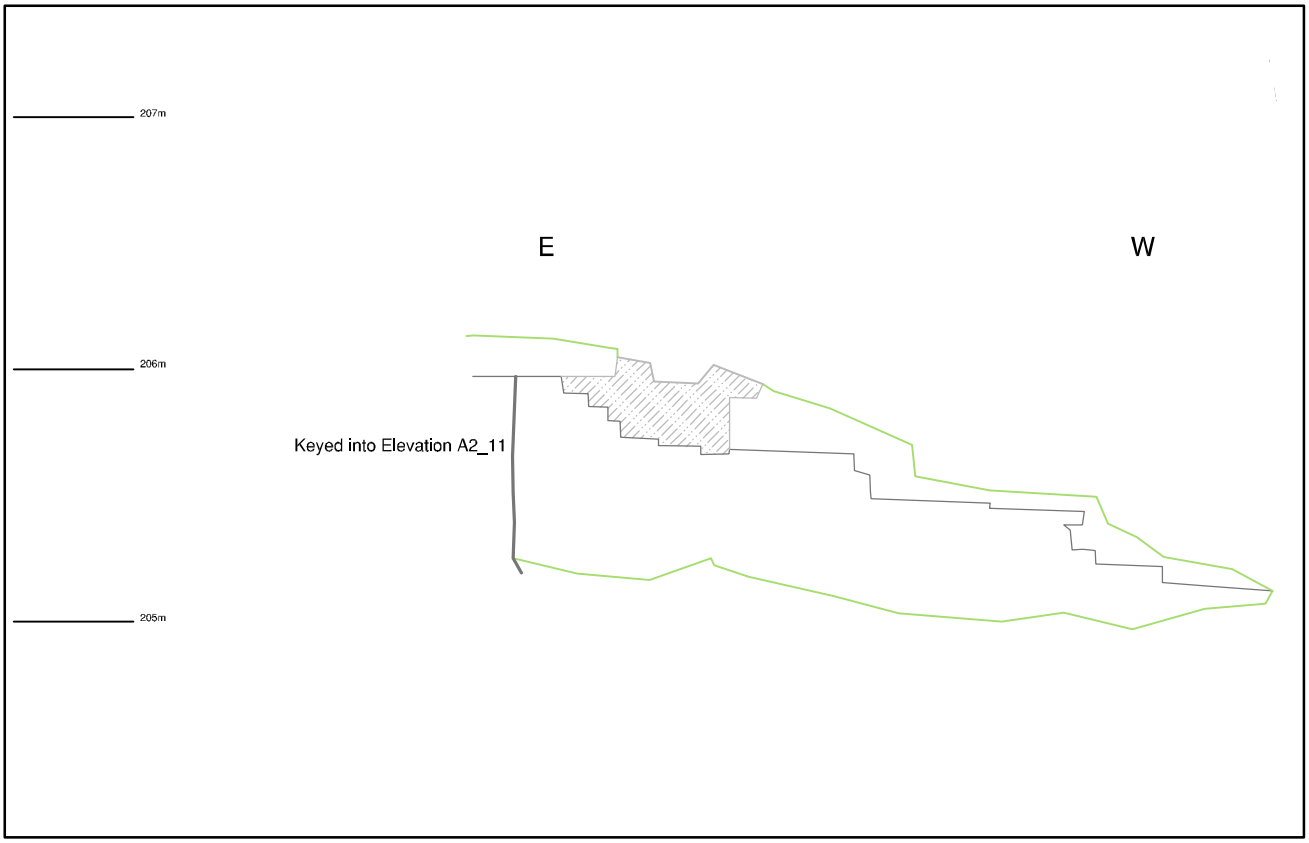


Figure 26: Area 2, Elevation A2_12

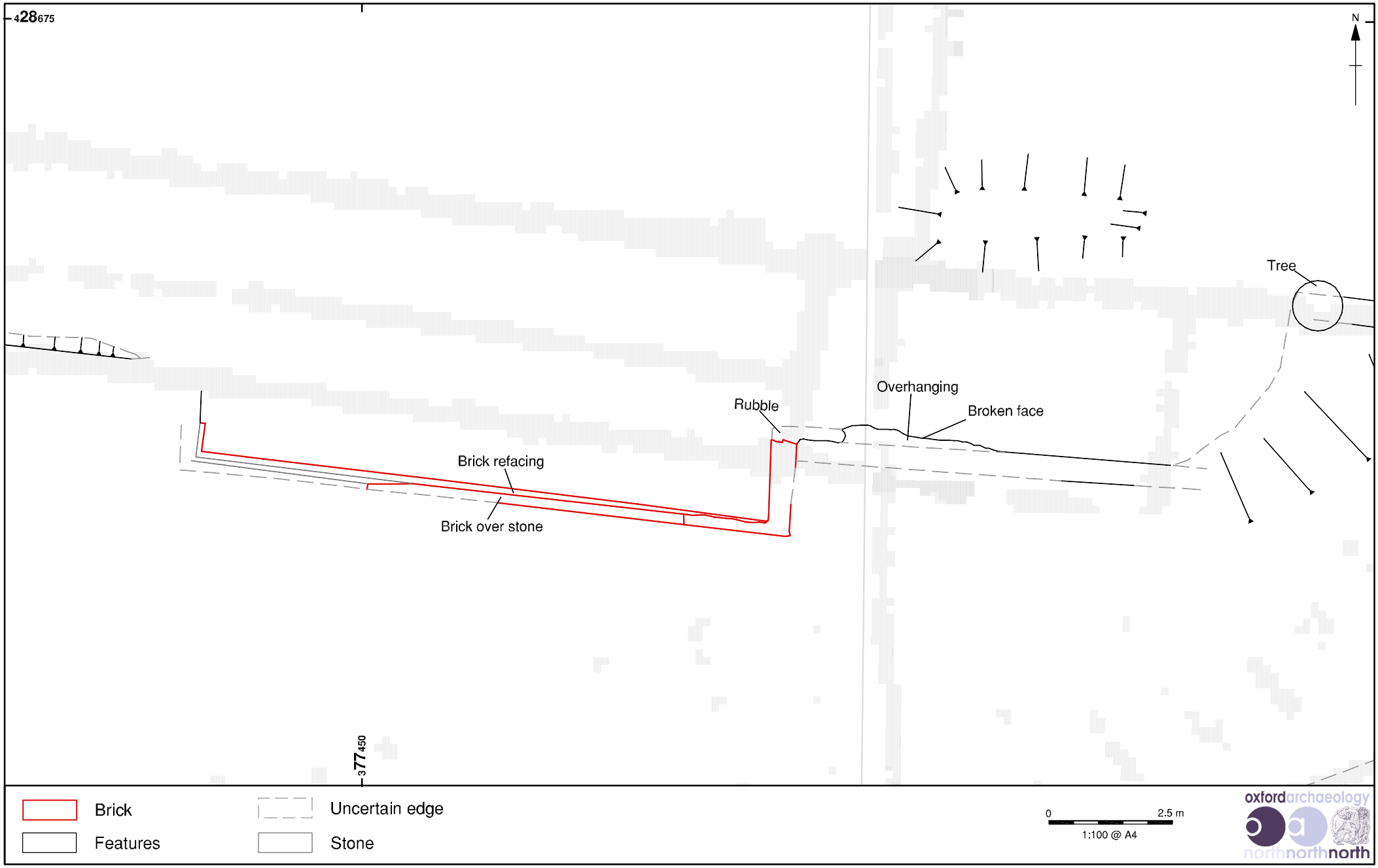


Figure 27: Detail of Wall A2_13, overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893

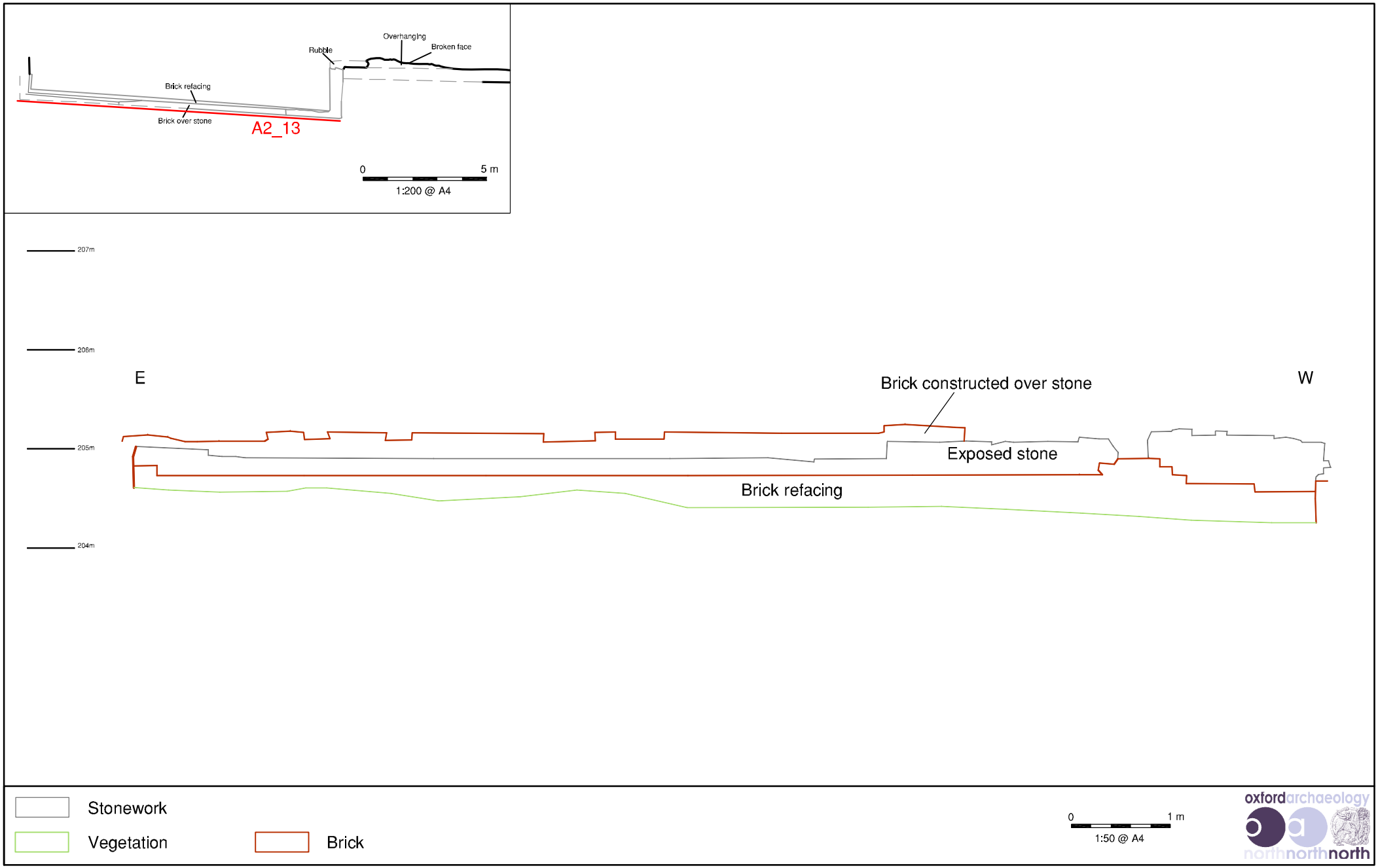


Figure 28: Area 2, Elevation A2_13

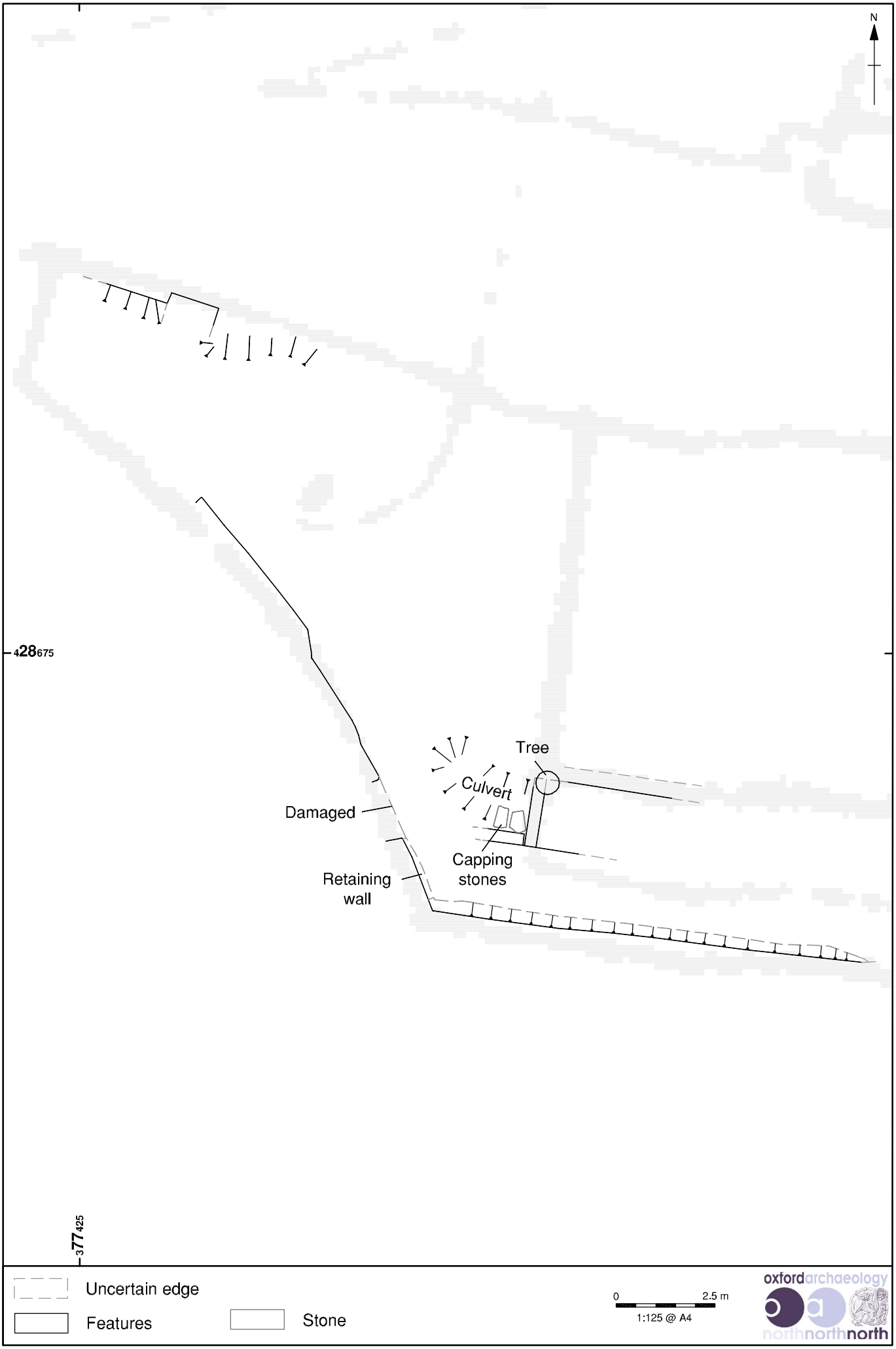


Figure 29: Detail of retaining wall and culvert, overlain onto the Ordnance Survey map of 1893

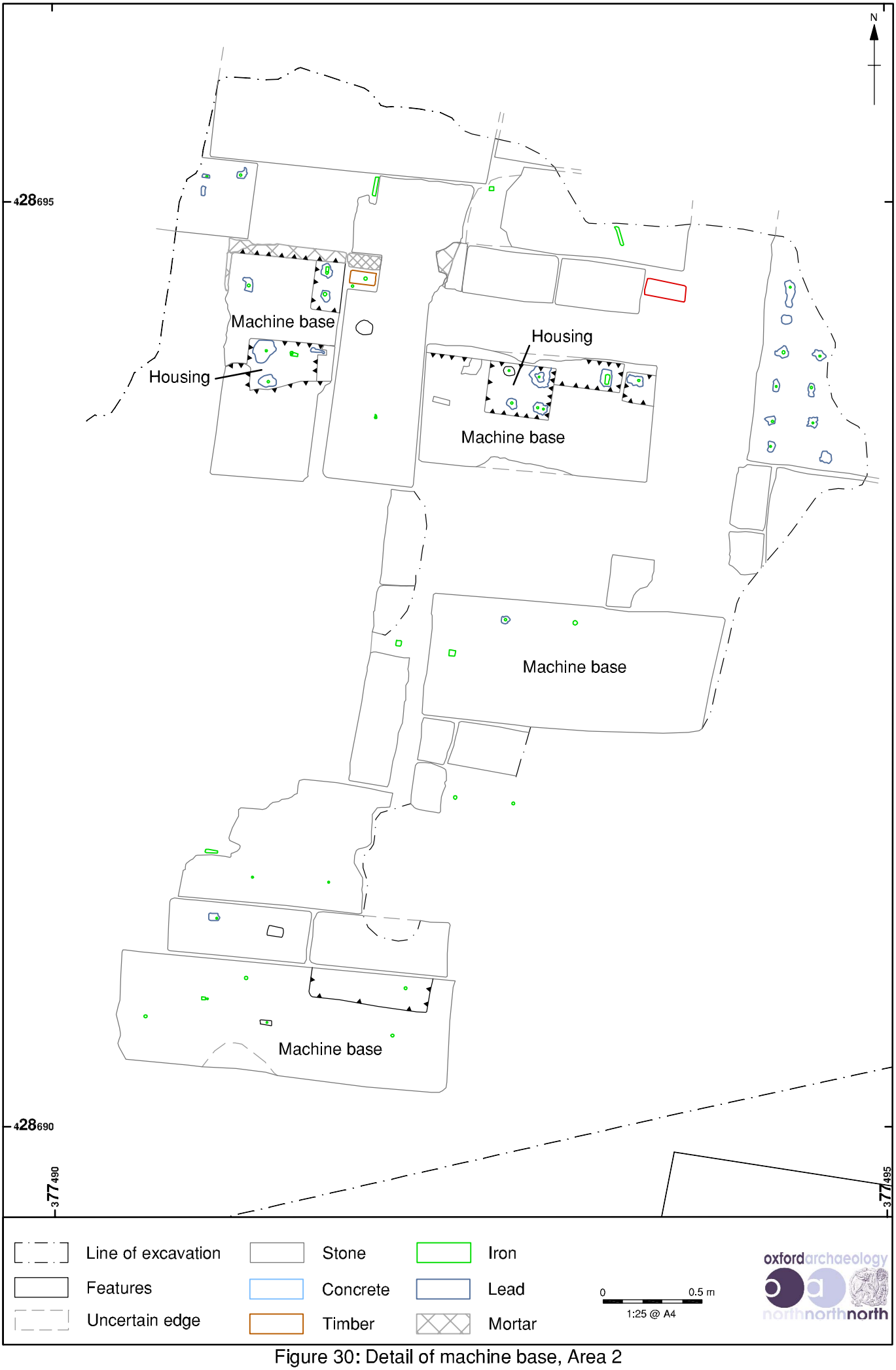


Figure 30: Detail of machine base, Area 2

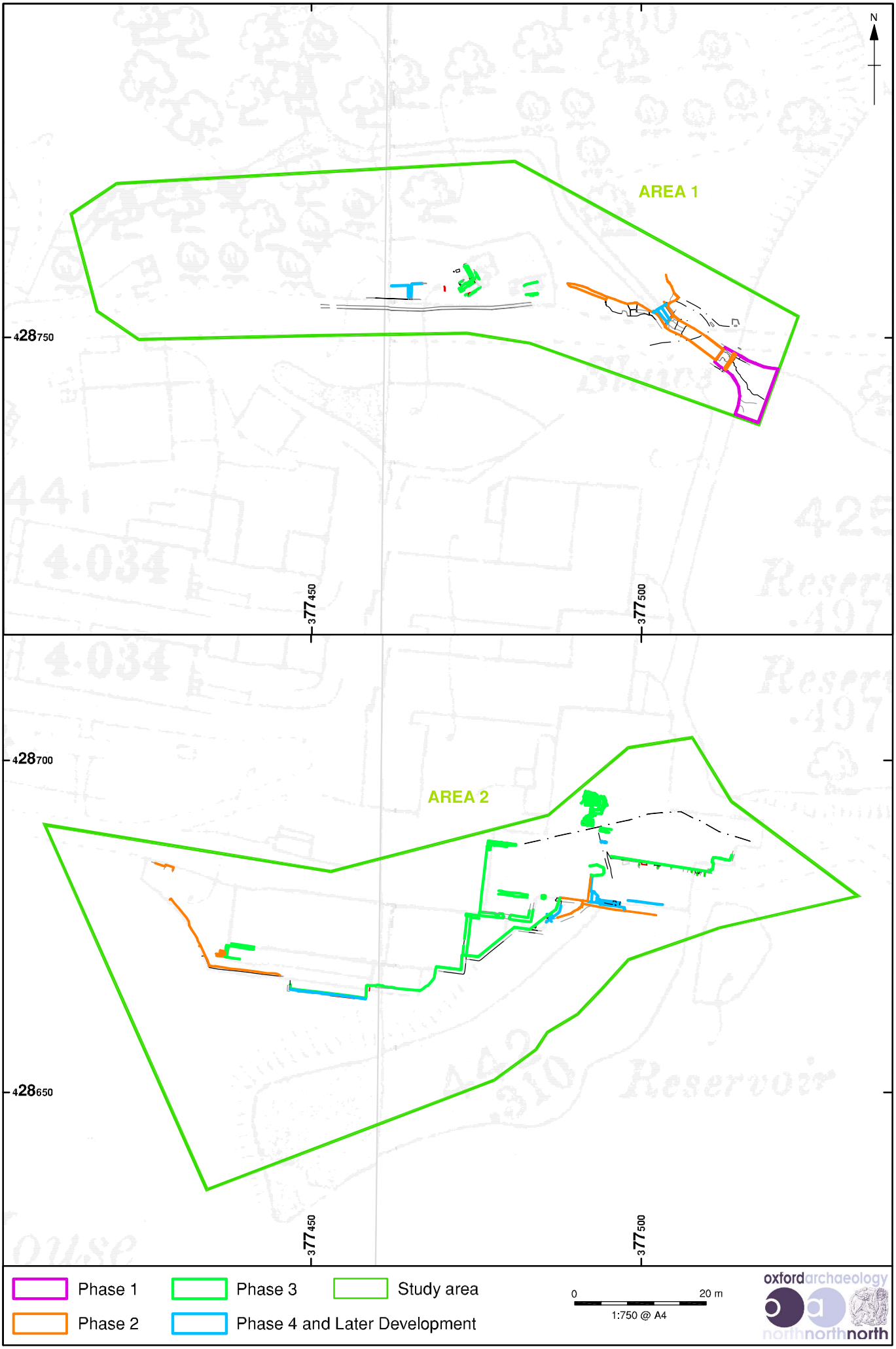


Figure 31: Phased site plan overlain onto the Ordnance Survey first edition 25": 1 mile map of 1893

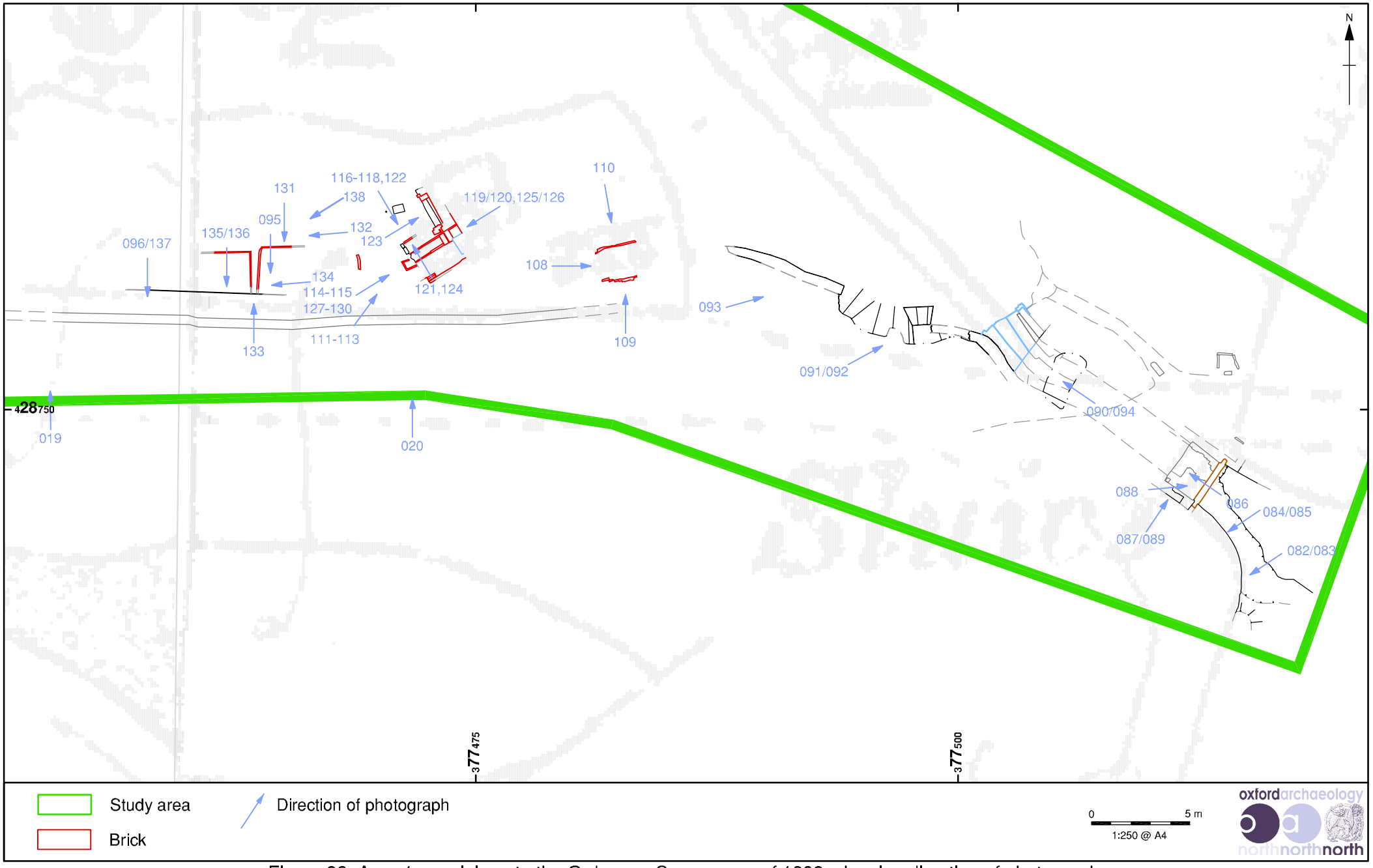


Figure 32: Area 1, overlain onto the Ordnance Survey map of 1893, showing direction of photographs

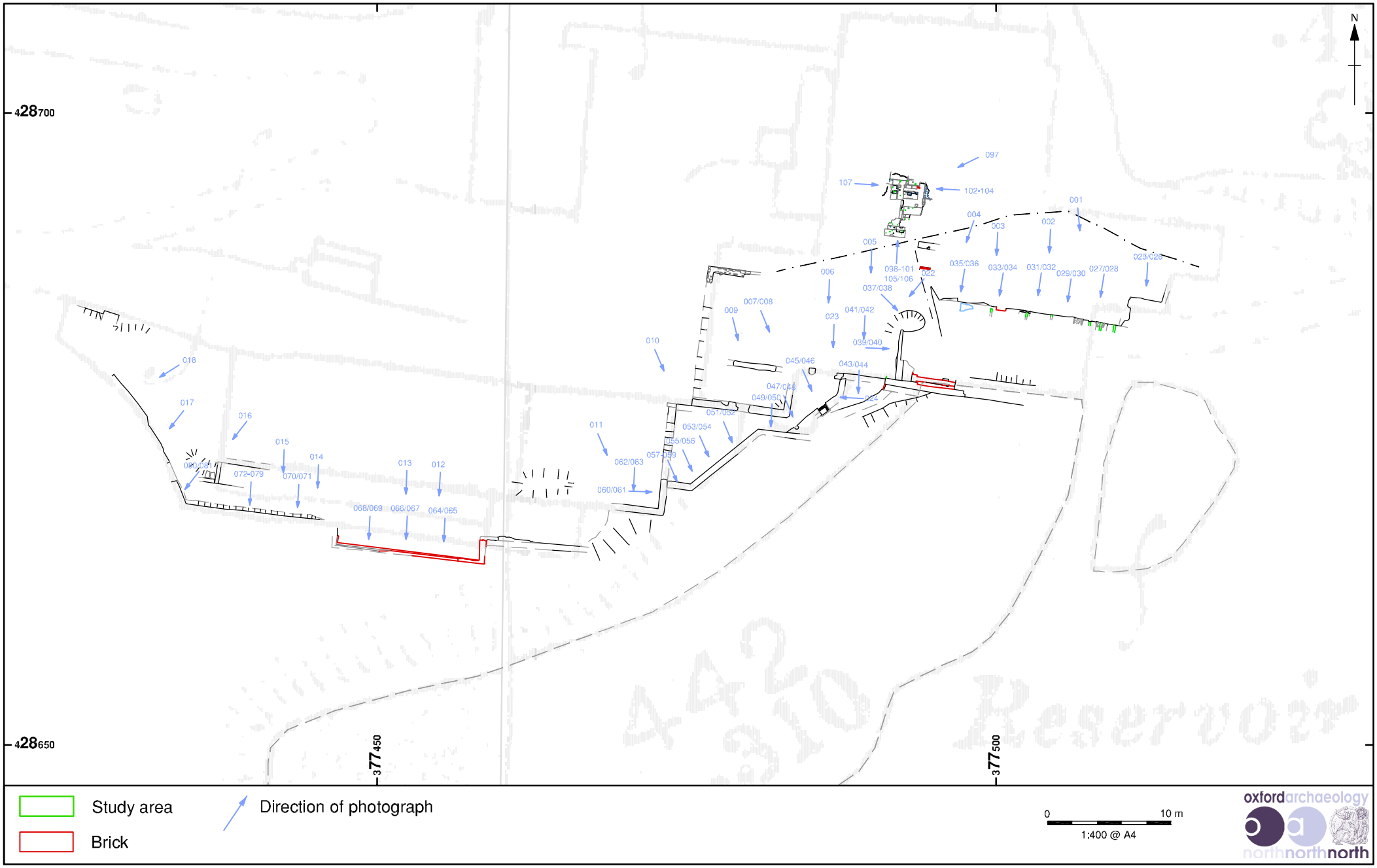


Figure 33: Area 2, overlain onto the Ordnance Survey map of 1893, showing direction of photographs