DARLEY ABBEY FISH PASS, DERBY, DERBYSHIRE

Final Report on an Archaeological Watching Brief

Photographs of the excavation and removal of medieval and post medieval structural remains

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SUMMARY

Trent and Peak Archaeology was commissioned by Trent Rivers Trust to undertake a watching brief during the construction of a fish pass within the River Derwent at Darley Abbey, Derby, Derbyshire. The world heritage status of Darley Abbey required the fish pass to be a discreet addition to the landscape. The structure's appearance was therefore disguised by constructing it in an existing artificial island within the weir. Archaeological monitoring of the project was requested as a result of the significant local industrial heritage and recent medieval research which has largely focused on the now demolished medieval Abbey. The work was carried out between March and July 2013.

Darley Abbey is located approximately 2km to the north of Derby city centre, with the fish pass situated within the River Derwent centred at SK 35328, 38492, at a height of c.47.5m OD (Figure 1). This site lies within the Derwent Valley Mills World Heritage Site and within the Darley Abbey Conservation Area. The site is situated on alluvium clay, silt and gravels on a bedrock of keuper marl with skerry bands (British Geological Survey of Great Britain, Sheet 125).

The watching brief revealed that the artificial island was formed by the deliberate alteration of a land promontory which extended into the River Derwent from the village. Prior to the extensive modification of the promontory, a 15th-16th century mill, which was constructed from timber and stone, was in operation on the site and appears to have been in use for several decades.

Interestingly, the latest recognisable date of modification or renovation undertaken on the structure (as provided by dendrochronology) was 1536, the year of the dissolution of the monasteries. The abandonment of the mill at a time of such national and local political upheaval suggests that the mill may have been managed by the monastery and was surrendered with the wider complex.

Once vacated, the structure appears to have been destroyed and dismantled by a combination of riverine erosion and asset stripping, with the remaining structural elements apparently then providing a foundation of sorts for the construction of the island and the weir.

The observations from the watching brief provide highly significant evidence for the late medieval and early post medieval management of the River Derwent and the development of the pre-industrial landscape of the Derwent Valley Mills World Heritage Site.

DARLEY ABBEY, DERBY, DERBYSHIRE: FINAL REPORT ON AN ARCHAEOLOGICAL WATCHING BRIEF

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1. INTRODUCTION

Trent & Peak Archaeology was commissioned by the Trent Rivers Trust to undertake an Archaeological Watching Brief as part of the construction of a Larinier fish pass in the weir within the River Derwent at Darley Abbey, Derbyshire. The world heritage status of Darley Abbey required the fish pass to be a discreet addition to the landscape. The structure's appearance was therefore disguised by constructing it in an existing artificial island within the weir. The discovery of a late medieval structure towards the lower reaches of the island resulted in the scaling up of the project from a Watching Brief to a formal excavation. This work was conducted between March and July 2013.

The artificial island is clearly visible in the south-west quadrant of the Darley Abbey weir. An ashlar perimeter retaining wall is clearly visible encompassing the island, which may indicate post medieval or modern construction and/or upkeep. The earliest map of this part of the River Derwent dates to the 1760s and appears to show a land promontory extending into the river from the village. Although the earliest activities identified in the excavation predate the map, this does demonstrate that the weir has been the focus of alteration in subsequent years and has resulted in the present day manifestation of an island.

The excavation revealed that prior to the alteration of the promontory a timber and stone structure had once existed. Analysis of the excavated material and of comparative examples suggests that the structure may have once been either a dam associated with milling or a mill itself. On balance, the more likely interpretation is that the remains represent a mill which was managed by the medieval monastery and was in used for several decades. The latest timber dated by dendrochronology provides a date of 1511-1536, which may indicate that the site fell into disuse at the time as the dissolution of the monasteries.

2. PROJECT BACKGROUND

Darley Abbey is located approximately 2km to the north of Derby city centre, Derbyshire, with the fish pass placed within the River Derwent weir centred at SK 35328, 38492 at a height of c.47.5m OD. The site is situated within the Derwent Valley Mills World Heritage Site and the Darley Abbey Conservation Area.

A total of four areas were excavated under archaeological supervision. Area 01, located on the southern bank of the River Derwent was excavated and used as the site compound for the developer; Areas 02-04 were excavated for the removal of tree stumps on an island within the river, with Area 02 subsequently being extended and becoming the main focus of the watching brief and excavation (Figure 1).

The island is located in the south-west corner of the weir and is oval in shape. It slopes to the east in a similar fashion to the weir, stands proud of the water table and has vertical edges. The site is situated on alluvium clay, silt and gravels on a bedrock of keuper marl with skerry bands (British Geological Survey of Great Britain, Sheet 125). Many of the later layers identified in the excavation appear to have been either as a result of flooding or have been deliberately deposited in order to increase the level of the island or promontory.

3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Prehistoric

The HER contains no record of sites of finds for this period. No artefacts or features of interest pertaining to prehistoric periods were identified during the excavation or the Watching Brief.

Romano-British

Evidence of Romano-British activity at Darley Abbey consists of the discovery of isolated finds, including pottery on the site of the Old Abbey Building (HER 32468), and a 4th century bronze coin (HER 18902) approximately 100m from the riverbank.

Medieval and post medieval

Medieval and post-medieval historical research of Darley Abbey has largely been concerned with the now demolished medieval Abbey. With the exception of a few partially extant building remains, the majority of what is known about the Abbey and the monastic landholdings largely derive from documentary evidence. Physical remains of the Abbey and the wider complex have proved to be elusive and the actual location is still unknown (Robinson 2001). The prominent bend in the River Derwent to the south of the weir does present itself as a suitable candidate for its location as it is so close to fresh flowing water. Researchers such as Robinson have however cast doubts on such interpretations preferring a location further up the hill to the west of the river (Robinson 2001).

The Abbey was founded c.A.D.1137 as an Augustinian Abbey by wealthy benefactor Robert de Ferrers, second earl of Derby. The abbey was slow to develop and had little regional influence. This somewhat parochial position dramatically changed in the 1160s when the Abbot of Darley was requested by Pope Alexander III to adjudicate regional disputes between other monastic houses. The emerging status of the abbey as viewed by the Vatican and the other British Abbeys began to change the fortunes of the abbey (Peters 1974).

In the later 12th century the Abbey became relatively prosperous by mining lead from the Derbyshire hills and trading with other monastic houses around the country. In addition to mining industries, there are records which detail the making of leather goods such as bridles, saddles and a large resource of pigs and sheep, believed to have been valued at tens of thousands of pounds (Peters, D. 1974).

Although there are cursory records which detail the economic prosperity of the Abbey, there are few records in existence which detail how the River Derwent directly contributed towards this. Fishing rights and water powered industries such as milling have unfortunately not been documented and there are no maps which indicate that such activities were ongoing during the occupation of the Abbey. No evidence exists of medieval milling at Darley but it is known to have played a prominent role at other abbeys in the region and may have been undertaken at Darley Abbey (Peters 1974).

Late medieval milling was both a secular and a monastic enterprise as the capital required to build and maintain a mill could only be afforded by wealthy lords and monastic houses. The leasing of the mills suited the entrepreneurial spirit prevalent in the 14th century which brought about the proliferation of the milling industry (Langdon 2004). The entitlement to borrow money from local lords enabled people of moderate income the ability to build or lease the mill from the lord or church. Documentary evidence from a local example at Burton Abbey does demonstrate the leasing of mills by the Abbey estate in the early 12th century (Langdon 2004).

During the two year Act of Suppression, which eventually lead to the Dissolution of the monasteries in 1538, Darley Abbey's wealth was reported to have been barely affected (Peters 1974). The monks' income was enough to be able to pay the Crown's extortionate tax and the Abbey continued to prosper until the 22nd of October 1538 when the entire monastic estate was surrendered to the Royal Commission. The Abbey suffered the same fate as the other English monasteries and was stripped of all assets which were sold or given to wealthy peers (Robinson 2001).

There are few medieval upstanding remains which are visible such as the 15th century 'Old Abbey Building' (HER 32468 / SM 84; now the Abbey public house) and elements within the elevations of Nos 7, 8 and 9 Abbey Lane (HER 32468 and 32469). Archaeological excavations have been relatively rare but the interventions which have been conducted have revealed a few disparate medieval remains.

A watching brief conducted at the Old Barn, just to the south of New Street, as part of a restoration project revealed ashlar walls and a paved area in association with Burley Hill Ware pottery which suggest a medieval date for the remains. These structural remains are believed to have formed part of a building as part of the larger monastic complex (Shakarian 2007).

Ridge and furrow earthworks (SMR 32431) are also prevalent in the area. Although these are undated is seems likely that they formed part of the Abbey's medieval field system.

Industrial

By the 17th century Darley Abbey had grown as an industrial hamlet surrounding a number of mills. During the 18th century the area continued to develop as a major contributor to the industrial revolution. By 1770 there were five mills situated in the area: a paper mill, a corn mill, two flint mills and a leather mill. A total of 20 mill related structures have been recorded along with three further industrial structures; the Post-Medieval St Matthews Church; and 19 listed domestic buildings (Elliott et al 2008).

Of particular relevance is the site of the Evans Paper Mill which is located on the riverbank immediately to the south of the fishpass. The Evans mill is first recorded for sale in 1713 and was demolished in 1930. It is quite possible that it was built on the site of earlier mills (Elliott et al 2008).

Cartographic evidence produced by Burdett in 1762-1767 (Figure 2) is the earliest example which details the area now occupied by the weir. Despite the limited accuracy expected of a mid 18th century map, the bend in the river towards Folly House does not appear to be too dissimilar to the present route. There are however two noticeable differences. The first of these is the mill leat to the west of the main channel to south which has since been closed off in a culvert. The second difference is the apparent land promontory which extends easterly from the village. This significant difference to the modern landscape is best demonstrated when compared to the 1821 map (Figure 3).

Figure 2. Map detailing Darley Abbey dating to 1762-1767. North is aligned to the page

Figure 3. Map detailing Darley Abbey dating to 1821. North aligned to the page.

The 1821 mapping (Figure 3) demonstrates alterations to local landscape. Between 1767 and 1821 there is the appearance of the island and the disappearance of the land promontory. This may be the result of large scale ground works along the western half of the promontory to increase the flow energy of the River Derwent towards the now culveted south flowing leat. This may have been a response to extra power requirements for the proposed site of Evans mill in the early 19th century. No record of any large scale ground works appears to have been recorded within the 54 year interval.

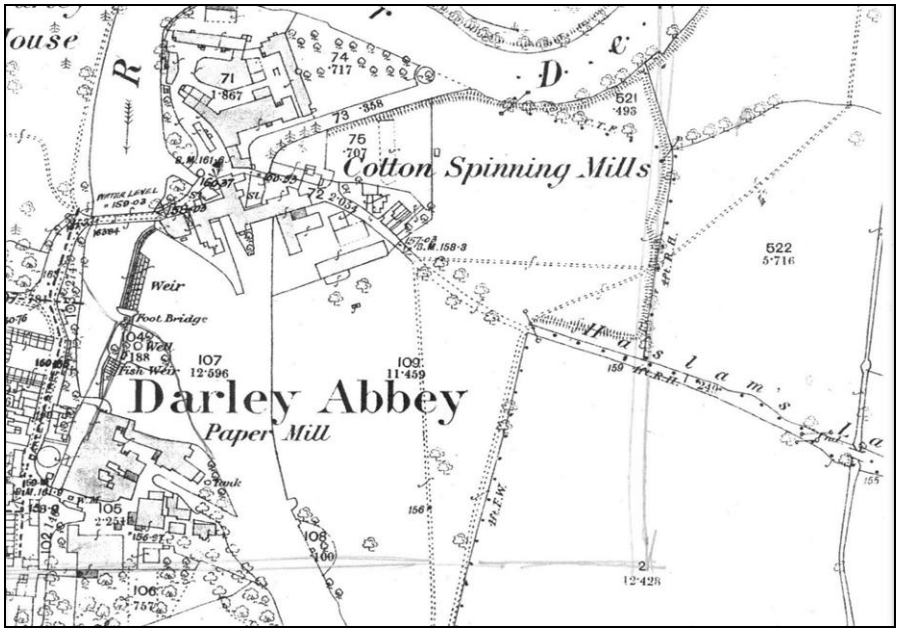

Figure 4. Map detailing Darley Abbey dating to1882. North is aligned to the page.

A further piece of supporting evidence for the separation of the island from the village is the presence of the well which can be seen in Figure 4. It seems unlikely that a well would have been constructed in such an isolated location with such difficult access. If we consider that the well was

constructed when the promontory was still joined to the village it becomes much more understandable.

4. METHODOLOGIES

4.1 Site Methodology

A 5m wide trench was excavated through the 37m x 25m wide artificial island with the use of a 360° tracked excavator fitted with a flat bladed ditching bucket in spits of c.100mm. Tree stumps from recently felled trees were removed from the northern end of the island by a machine with a toothed bucket.

During the measured ground reduction numerous soil layers and features of archaeological significance were encountered. These were rapidly dealt with by the archaeologist in attendance. Once the horizon at which the timber remains were identified, a larger team of professional archaeological excavators were contracted to appropriately deal with the unexpected remains.

All archaeological features were cleaned by hand and recorded by black & white and digital photography. Structural remains and features of potential archaeological significance were excavated to ascertain their date, nature and levels of preservation. Plans and sections of all features were recorded by hand drawn scale drawings.

Each fragment of wood was planned and catalogued with at least 2 heights recorded in order to accurately situate the position of the timbers. Upon excavation they were tightly double wrapped in plastic film which returned them to the anoxic environment in which they were discovered. The timbers were taken to the Trent & Peak Archaeology stores in Nottingham where they were assessed and analysed.

4.2 Wood Recording Methodology

A total of 97 vertical earth-fast driven piles, ranging in size from 0.1-0.3m diameter and up to 4m in length, were identified within context 0034 in Area 02. Of the 97 timbers, 42 were retrieved for specialist assessment and analysis.

4.2.1 Assessment

The assessment of the wood was conducted at the Trent & Peak warehouse. Each of the timbers was firstly unwrapped, cleaned and re-saturated with clean water. The timbers were then systematically measured and any evidence of charring, tool marks, wood working evidence, condition and the presence of bark and sapwood was also recorded. A suite of photographs was taken of each timber during the assessment process and samples for species identification were taken of timbers which were favoured for dendrochronological dating.

4.2.2 Analysis

The analysis of the wood was conducted by Michael Bamforth. This comprised an inspection of the tool marks, wood working strategies employed and an assessment of the quality of the wood selected for use. As well as discerning what tools were used for conversion and for demolition, an analysis of the current condition of the timber was also undertaken.

4.2.3 Identification

A small sample of timbers, AAT, AAU, AAV, AAZ, ABQ, ABR, ABT, ABY, ACA, ACC, ACD, ACF, ACH, ACK, ACP, ACU, ACY, ACZ, ADA, ADE and ADF were forwarded for microscopic analysis in order to determine the species. Three thin sections were prepared and examined under a Zeiss D-7082 Oberkochen microscope. Thin sections across the transversal (Fig. 5), radial (Fig. 6) and tangential (Fig. 7) planes of the wood were analysed for distinctive cellular growth patterns (Hoadley 2000). Nomenclature follows Schwiengruber (1990).

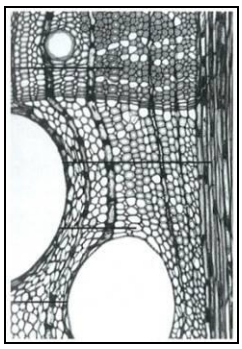

Fig.5

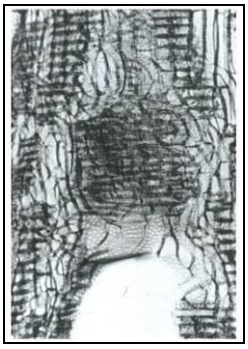

Fig. 6

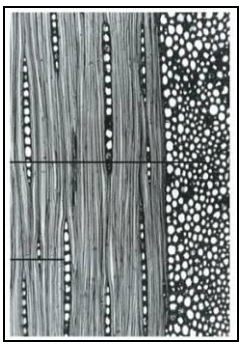

Fig.7

4.2.4 Dendrochronology

By Robert Howard

A total of 21 timber baulks appeared possibly suitable for tree-ring analysis by way of their circumference and length. Each of these baulks was examined and those which were believed to contain sufficient numbers of rings for reliable dating (ie, at least 30) were sampled by slicing with a circular saw. This selection process provided 18 sliced cross-sections, leaving three timbers unsliced.

Each sample was given the tree-ring code DAF- (following the excavation site-code) and numbered A01–A18. The sliced samples were initially frozen to harden them and then, once sufficiently solid, they were reduced in size to narrow-width, cross-sectional, radii. The cross-sectional surfaces of the radii were then prepared using rasps, jack-planes, and scalpels to clearly reveal the annual growth rings. This process involving intermittent re-freezing of the samples. During this preparation process it was seen that seven samples had insufficient rings for reliable analysis (ie, less than 30), and they were rejected from this programme of analysis.

Having obtained the date span of the individual samples the felling date of the tree or trees represented may be calculated. Where a sample retains complete sapwood, that is, it has the last or outermost ring produced by the tree before it was cut, the last measured ring date is the felling date of the tree.

Where the sapwood is not complete it is necessary to estimate the likely felling date of the tree. Such an estimate can be made with a high degree of reliability because oak trees generally have between 15 to 40 sapwood rings. For example, if a sample with, say, 12 sapwood rings has a last sapwood ring date of 1400 (and therefore a heartwood/sapwood boundary ring date of 1388), it is 95% certain that the tree represented was felled sometime between 1403 (1400+3 sapwood rings (12+3=15)) and 1428 (1400+28 sapwood rings (12+28=40)).

5. RESULTS

5.1 Site Results

The stratigraphy and formation processes discussion will begin with the modern stratigraphic units encountered and will continue through the progressively deeper archaeological contexts.

5.1.1 Modern features and deposits

The latest archaeological context identified was (0003), a 150mm thick layer of poured concrete which acted as a footpath around the edge of the island. Sealed by this layer were (0010) and (0005) which were described an earlier degraded concrete layer and layer of topsoil respectively. The topsoil sealed (0037), a layer which varied in depth between 2mm in thickness and 490mm. This continued along almost the entire length of the island and comprised a friable black silt mixed with charcoal. As context (0037) was observed to vary in depth and progress for the entire length of the island it has been interpreted as a levelling deposit. The appearance of topsoil layer (0005) existing above (0037) indicates that the topsoil has been imported rather than forming through natural pedogenic processes. Context (0037) also sealed (0038), a mid brown friable silt loam.

Below (0010), the degraded concrete layer, layers (0011), (0012) and (0013) were identified. All three of these contexts played a crucial role in the modern appearance of the island. Context (0012) was assigned to the large dressed stonework which can be seen around the perimeter and essentially defines the island. Both (0011) and (0013) appear to be packing agents behind (0012) and were used to reinforce the outer stone boundary of the island.

A large feature believed to be modern, [0078], was discovered cutting the levelling material (0037) towards the south-east end of the island. The full length and width of the feature was not observed as it extended beyond the limits of the excavation. The depth was recorded as 1.64m. A total of two fills were observed within the feature and were recorded as (0070) and (0069). The earliest of these, (0070) was described as a loose yellow sand measuring 240mm in depth and the later fill, (0069) as a mixed loose mid brown silty sand.

5.1.2 Post medieval robbed out walls (Figure 10, Plates 1-2)

A series of largely robbed out walls [0018], [0019], [0020], [0021] believed to be post medieval in date were identified at a depth of c.0.8m BGL. The earliest of these walls, [0020] and [0018] were cut into (0026) and (0022), which were described as a yellowish brown sand which measured 190mm in depth and a mixed red and brown re-deposited clay and sand respectively.

A north-westerly aligned robbed out wall, [0018] measuring 3.6m in length, 1m in depth and 0.27m in depth was located towards the northern limit of excavation. Its profile consisted of near vertical sides with a gradual break of slope and an undulating base. The fill of the feature comprised (0018a) and (0018b), large angular sandstone blocks 200mm-500mm within 20% dark brown silt clay loam and a compact sandy silt respectively. Fragments of post-medieval brick and tile (AAN-AAP) were recovered from the fill of this feature.

A further northerly oriented robbed out wall, [0020], was located to the south of [0018], and extended 1.5m to the south, beyond the limits of excavation. It measured 0.45m wide x 0.21m deep and exhibited vertical sides with a sharp break of slope and a flat base. Its fill comprised red angular gritstone fragments c.150-250mm within a matrix of mid brown friable sand.

An additional north-westerly to south-easterly wall, [0021], was identified which cut layer (0022) and wall [0020]. It measured 1m in length, 0.7m in width and 0.1m in depth with a profile of near vertical sides and demonstrated a sharp break of slope and flat base. Its fill, (0021a) comprised angular red gritstone fragments c.200mm within a matrix of mid brown silt. Finds AAL and AAM were recovered from this feature.

A north-westerly oriented feature, [0019], cutting (0021a) was located 0.5m south-west of 0018 and measured 1.9m x 1.1m. Its fill, (0019a) comprised angular red gritstone fragments 150mm-200mm within a matrix of friable brown sand. Fragments of post-medieval brick and tile (AAI-AAK) were recovered from this feature.

A partial robbed out wall, [0032], was observed extending from the southern baulk. Only 0.34m was visible in the trench and it measured 0.56m wide. The fill, (0032a) was recorded as a mid brown silty clay and large sub angular stones. As only a small amount of the wall was visible it is difficult to infer what the function of the wall was.

5.1.3 Post medieval features and layers

A series of contexts which were sealed by (0022) and (0026) were identified. These have been described in the table below;

Table 1. Table detailing layers used to construct the artificial island

Context	Description	Measurement	Interpretation
(0024)	Loose grey brown sand	Max depth 120mm – min depth 5mm	Deliberately deposited material used to increase the height of the artificial island.
(0056)	Compact yellow sand	Max depth 180mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0057)	Compact dark yellow sand	Max depth 240mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0058)	Mid to dark brown charcoal rich sand	Max depth 250mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0059)	Mid dark brown sand with yellow sand inclusions	Max depth 490mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0060)	Compact mid brown sand	Max depth 450mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0064)	Mid grey brown sand	Max depth 620mm - min depth 1mm	Deliberately deposited material used to increase the height of the artificial island.
(0080)	Strong brown stone rich dark brown clayey silty sand.	Max depth 120mm- min depth 2mm	Deliberately deposited material used to increase the height of the artificial island.

A large pit, [0079] to the southern end of the site can clearly be seen in Figures 9 and 10. The feature had a gradual break of slope at the top and the base and also displayed a rounded and a slightly undulating base. This was primarily filled with (0073) and subsequently by (0072) and (0071). These were recorded as a light yellow sand, a light grey friable sand and a mid grey brown sand respectively.

Stratgraphically preceding the large pits towards the southern limit of the excavation were seven layers which are believed to represent a combination of deliberate deposition intended to increase the height of the island and possible flood inundation. The layers are described in the table below;

Table 2. Table detailing layers used to construct the artificial island

Context	Description	Measurement	Interpretation
(0006)	Redish brown loose and soft stoney sandy clay with moderate inclusions of brick fragments.	Max depth 640mm - min depth 30mm	Deliberately deposited material used to increase the height of the artificial island.
(0039)	Firm grey sandy clay and occasional charcoal	Max depth 160mm – min depth 20mm	Deliberately deposited material used to increase the height of the artificial island.
(0040)	Mid grey soft and friable silty clay with evidence of root action	Max depth 340mm – min depth 15mm	Deliberately deposited material used to increase the height of the artificial island.
(0041)	Mid grey brown soft silty clay	Max depth 230mm –	Deliberately deposited material

	and very occasional slag	min depth 16mm	used to increase the height of the artificial island.
(0042)	Mid greyish brown clayey sand	Max depth 120mm – min depth 8mm	Deliberately deposited material used to increase the height of the artificial island.
(0043)	Loose yellow sand	Max depth 140mm – min depth 9mm	Possible flood inundation
(0044)	Mid to light loose sand with grey clay lenses	Max depth 260mm – min depth 50mm	Possible flood inundation

The layers described in Table 2 sealed a narrow pit, [0049] with near vertical edges and a sharp break of slope top and bottom. The base of the feature sloped to the south and measured 320mm in depth and 180mm in width. A single fill was observed within the feature and was described as a mid grey clay sand. The pit was observed cutting through layers 0050 and 0045, and were described correspondingly as a loose mid to light yellow clayey sand and a mid greyish brown and loose sand.

Sequences of layers located towards the centre of the excavation were observed stratigraphically preceding (0050) and (0064). The layers were recorded as 0051 a mid grey soft clayey sand, (0052), a compact grey sand, (0053), a loose grey sand (0065) and (0066) a light to mid grey sand.

5.1.4 Medieval and post medieval structural remains (Figure 11. Plates 3-10)

A series of medieval and post medieval walls, which have been dated in association with dendrochronologically dated timbers, were identified at a depth of 2m.

A north-north-easterly aligned wall, [0036] was discovered towards the centre of the excavation and was sealed by (0066) and (0053). The wall was constructed out of angular stone ranging in size between 100mm and 550mm. A packing, (0036b) in-between the wall and the cut [0036] was recorded as mid greyish brown soft friable clay sand. A row of upright timbers to the west appears to respect the wall. Although no physical stratigraphic relationship was observed, the apparent spatial organisation strongly suggest a shared function.

A further two walls, [0030] and [0033] were located below (0048) and (0035). Wall [0030] was oriented north-north-easterly and turned 90 to the south-east-east. The stone work was packed tightly into the construction cut, [0032] and no packing was observed. This was recorded as been constructed out of large angular stone. Upright timbers were discovered extending through the wall and are believed to be part of the same structure. Context (0077), a mixed grey and brown sandy silty clay and brushwood appears to have been deliberately deposited on which to construct the wall and building surface.

Wall [0033] was also oriented north-north-easterly with a slight turn to the north-west. Although no physical relationship was observed between the two walls, the stratigraphy and the spatial organisation suggests that they were contemporary. The stonework was densely packed in certain places but had clearly been robbed in other locations towards the south of the excavation and was only visible as cut [0033]. This wall was observed clearly cutting through (0054), a mid to dark grey soft silty sandy clay, onto (0034), the earliest deposit identified. This was recorded as a mid grey sand and is believed to be a riverine deposit. A layer of soft mid grey clay and brushwood was identified partially sealing (0033a). This is one of the rare examples of evidence for the flood events which appear to have directly affected the structural remains post abandonment.

An additional curving robbed out wall, [0067] appears to have largely been disturbed by modern pits [0078] and [0079]. The part of the wall which was available for observation was recorded as having shallow edges and a southerly slope to the base. The wall comprised (0067a) and (0067b), a mid brownish grey friable sandy stoney clay and a mid brown friable sand with 20% sub angular and sub rounded stone measuring 10mm-30mm respectively. Interestingly, the other walls all share similar dimensions and alignment which demonstrate some level of functional homogeneity. Wall [0067] does not readily appear to fit with the spatial arrangement of the other structural remains. This is somewhat anomalous but is likely to be the artefact of disturbance from modern and post medieval activities.

The cut of a 3.2m wide ditch, [0082] was also identified. This was located equidistantly between walls [0036] and [0033]. It was filled with (0081), a mid to dark grey soft silt sandy clay which could barely be distinguished from (0034), the riverine material through which the ditch cut. The presence of this material may be the result of re-deposited natural substrate transported by hydrological agency. No stratigraphic relationship between the feature and the walls was identified but the location does suggest that the feature may well have been contemporary with the other structural remains.

5.2 The timber remains (Plates 11, 12)

5.2.1 Earth-fast driven piles

A total of 97 vertical earth-fast driven piles, ranging in size from 0.1-0.3m diameter and up to 4m in length, were identified within context (0077) and (0034). The timbers appear to accompany the medieval and post medieval walls which were discovered and, in the case of wall [0030], have either been constructed contemporaneously as part of the same edifice or have been added later as a renovation. More information pertaining to the individual timbers are detailed in Table 5, a photographic catalogue is also provided (CD Rom).

5.2.2 Horizontal timbers

Several horizontal timbers were also found within context 0034. Two large fragments of horizontal wooden plank were identified within (0077). Unfortunately, there appears to be nothing characteristic about them which would allow to determine whether they were part of the mill furniture, machinery or part of the superstructure.

6. TIMBER ANALYSIS RESULTS

6.1 Thin section analysis

The thin section analysis identified earlywood rings in the transversal plane which become more solitary in the late wood. Simple perforation plates were observed with square cells in uniseriate rays in the radial section and both uniseriate and multi-seriate rays were present in the tangential section. These characteristics are indicative of *Quercus* sp. (Oak) (Hather 2000). Oak appears to have been the preferred building material for this particular structure, probably on account of its robust structure and heartwood which is relatively resistant to fungal rot (Miric & Popovic 2006). In other excavated examples of medieval mills such as Batsford mill, Warbleton, Sussex and Castle Donnington, Leicestershire, oak was by far the most predominant timber used (Langdon 2004).

6.2 Timber analysis

By Michael Bamforth

The timber analysis involved the detailed inspection of nine of the more interesting, well preserved and dated timbers. The conclusion of the analysis was that a combination of traditional splitting and axe work had been employed as a wood working method. The upright timbers were driven into the soft river bed and had, as a result, been damaged. Some of the timbers demonstrated evidence for the decay of the posts after abandonment as well as the sawing of the timbers. This could be evidence that the more intact posts were appropriated from the abandoned site and re-used. The condition of the timbers is not considered as being of particularly high quality and as artefacts themselves they are not considered as holding a value worthy of conservation. However, the significance of the timbers in the context of the earliest mill thus far discovered in this landscape prized on its industrial heritage means that conservation for display at a later date may be prudent. A detailed description of the timbers follows;

ABY: Boxed heart and sapwood remains on three of four converted surfaces. The pith was observed as being relatively central and the grain as being straight with even growth and only occasional visible knots. This can be considered to be a good quality timber. Given the size of the timber and the centrally aligned pith, it is highly likely to be the butt end of a tree trunk.

The converted surfaces are not well enough preserved to retain evidence of the primary conversion (e.g.: saw marks, tool facets, clearly split faces). However, given that they are not particularly flat, it seems likely that the timber was split into shape.

The bottom end has been trimmed to a tapered point from four directions and there are very faint traces of tool marks – these are too partial, faint and ephemeral to be measurable. There is, unsurprisingly, driving damage to the pointed tip.

ACQ: The top end of the timber was in the ground (proximal / butt end of tree) and appears to be slightly more than a boxed half, bottom end in ground (distal end of tree). It appears to be a boxed heart. The rings and rays are not especially clear at the visible ends.

All the outer faces of the timber are degraded and have distinct, longitudinal troughs running along the grain, with a sub-rectangular profile measuring 20x20mm. This may well represent the effects of wet rot (Eaton and Hale 1993). This degradation has removed any indication of the method of primary conversion.

There is one large visible side branch that can be seen extending from one face of the timber. The orientation of this side branch suggests that the pile was driven into the ground 'upside down'. This timber has a somewhat wavy grain and several visible knots / side branches. It can be considered as being of moderate to good quality.

The top end of the pile has degraded into a shape that is suggestive of a mortise hole. However, the degradation follows the grain of the timber, making it likely that the shape is simply an artefact of the degradation process. There is no evidence for deliberate shaping.

Although the bottom end tapers, there is no real 'point' as seen with the other piles. This end may well have broken in the ground.

ADE: Unconverted oak. One end has been trimmed from all directions to a tapered pencil point. Although there are very faint partial toolmarks visible, they are too ephemeral to record. This is a straight grained, knot free, good quality timber.

ADI: Radial 1/6 split with outside tangentially split away. Straight grained with occasional small knots. This is a good quality timber.

ACK: Radially aligned with a small amount of sapwood remains. Possible sawn end removed for dendrochronology sample.

ACH: Post depositional vertical drying kink present. The worked end (one end / one direction) is very flat and may have been sawn. There are possible faint traces of saw marks.

ABU: Unfortunately too damaged to see if the end is sawn.

ACP: Boxed heart. Top end cross cut, probably with an axe, although the timber is too degraded to show any detail of working. The mortise shaped hole at the bottom end is heavily degraded and shows no positive evidence of wood working. However, it is very centrally located and symmetrical meaning that the presence of the mortise hole should be considered and this has to remain as an ambiguous, 'possible mortise'.

Condition: Using the Humber wetlands scoring system it is possible to classify the timber for its condition upon analysis. The timber was considered to be in a condition appropriate for species identification (Van de Noort et al 1995). Although the material remains very hard and fibrous, the worked surfaces generally score a 3 for condition. Any evidence for primary conversion / tool marks that is present is very faint and ephemeral.

Table 3. Scoring system

	Museum Conservation	Technology analysis.	Woodland management	Dendro-chronology	Species ID
5	+	+	+	+	+
4	-	+	+	+	+
3	-	+/-	+	+	+
2	-	+/-	+/-	+/-	+
1	-	-	-	-	+/-
0	-	-	-	-	-

Woodworking: Although the majority of worked surfaces are too degraded to provide evidence of the method of conversion (e.g.: tool facets / saw marks / split surfaces) it seems appropriate to suggest that anything that is radially aligned will have been split into shape as opposed to sawn or hewn.

Although the boxed heart timbers could theoretically have been sawn into shape, the converted surfaces are none-too flat, again suggesting they were split or possibly split and then finished via hewing.

Where faint traces of tool marks are visible, it seems that the pointed ends have generally been shaped with an axe.

Conservation: As discussed, there is no particularity impressive evidence of woodworking that would, of itself, warrant conservation. The particularly rare context of the material may present reasons to conserve a portion of timbers.

6.3 Dendrochronology

By Robert Howard

Tree-ring dating has produced dates for 7 of the 11 samples that were thought potentially suitable for analysis, this analysis suggesting that there are four distinct phases of felling

represented by these timbers. The earliest material dates to the third quarter of the fifteenth century, there also being a timber of late-fifteenth to very early sixteenth century date. There are two further phases of felling, one in the early-sixteenth century and another in between about 1516 and 1536. An attempt to illustrate the relative date of these felling is given in the bar diagram, Appendix 1, Figure 7.

However, it should be noted that although there appear to be distinct phases of felling, it is not certain that groups of trees were all felled at exactly the same time as each other. Given the riverine nature of the structure examined here, potentially a mill, it might not be unusual to find that, rather than being an integral, single-date, structure, as one might find with a house or other above-ground structure, repairs and insertions have had to be made as erosion has taken its toll, and that individual trees have been felled as required for on-going maintenance work over a long period of time. It is also of interest to note that there is no post-Dissolution timber amongst the dated material, suggesting perhaps that the mill was indeed directly in the care of Abbey.

Table4. Dendrochronology results

Sample number	**Sample location/identifier code**	**Total rings**	**Sapwood rings***	**First measured ring date (AD)**	**Heart/sap boundary**	**Last ring date**	**Estimated felling date range****
DAF-A01	AAT	37	h/s	1460	1496	1496	1511 – 36
DAF-A04	ABY	52	13	1400	1438	1451	1453 – 78
DAF-A05	ACA	72	16	1423	1478	1494	1493– 1518
DAF-A06	ACC (Sample at dendro lab)	64	20	1452	1495	1515	1510 – 35
DAF-A08	ACK 2	81	26	1418	1472	1498	1499 – 1512
DAF-A09	ADE	64	h/s	1399	1462	1462	1477 – 1502
DAF-A10	ADF	50	h/s	1426	1475	1475	1490 – 1515
*h/s = heartwood/sapwood boundary, i.e., only the sapwood rings are missing							
**Felling date range based on a minimum of 15 sapwood rings and a maximum of 40 sapwood rings (and allowing for the last extant ring on any sample)							

7. DISCUSSION

7.1 The Structure

The medieval and post-medieval structural remains suggest two prominent possible interpretation: a building, which may have been a mill; or a possible artificial barrier or embankment which may have related to water management, such as a mill dam (Clay 1990). However, given the configuration of the former promontory it seems implausible that the reaches of the Derwent would have extended to this part of the promontory and water management in this location would have been unnecessary. A further aspect of the structural remains which does not readily suit the interpretation as a constructed barrier or dam is the apparent returning arrangement of wall [0030]. The construction of a large embankment would be unlikely to have returning walls and would presumably continue towards dry land or another artificial construction. An example of a mill dam from Hemington Fields does not contain any similar internal arrangements (Clay 1990). Langdon has observed that mill dams are more likely to be set a right angle to the flowing water and not in alignment with the flow. The timbers in the Darley Abbey example were broadly aligned north-north-easterly and have therfore been constructed in the direction of flow of the river and would therefore not be effective as a dam (Langdon 2004).

An alternative interpretation is that the remains may have formed part of a mill. Although there are no artefacts or apparent mill machinery which suggests that the structure was used for milling, there are several structural attributes which have been identified which compare with other examples of late medieval mills. Based on these examples, and the available excavation evidence, the preferred interpretation is that of a mill. The absence of finds and mill machinery unfortunately means that the exact use of the mill, or even if it was used for industrial purposes such as fulling or for food processing, cannot be determined.

One of the more pertinent comperanda with other examples of mills is the ditch in-between walls [0033] and [0036] which may have served as the wheel pit chamber fed by a head race from the north. The timber and stone elements which encompass this possible wheel pit may therefore have related to a superstructure which housed mill machinery such as the water wheel and the pit wheel. It is quite possible that the wheel(s) were mounted on a main shaft supported within walls [0033] and [0036]. Mills of this type, often referred to as straddle mills, were common on monastic sites and have been recorded at Fountains Abbey, Baysdale nunnery, Glastonbury Abbey and Abbotsbury Abbey (Watts 2000 & Syson 1980). Generally speaking, straddle mills which have pit wheels in this kind of configuration are usually undershot, meaning the wheel was powered by water flowing beneath the wheel.

An examination of a comparative example from Abbotsbury, Dorset demonstrates that the wheel chamber in such structures is often located towards the centre of the building (Holt, R. 1988). This would suggest that wall [0067] does actually represent the easternmost wall of the structure. This wall has been much more damaged and is not as coherent as the other walls to the west but this may be an artefact of disturbance by later activities which may account for the apparent slight curve to the north which may be artificial.

The full dimensions of the building were unfortunately not identified during the development. The length of the structure does however appear to be complete if the limits are measured between walls [0030] and [0067]. This provides a length of 17m which makes the size and organisation of the structure strikingly similar to the Abbotsbury example which was recorded as being 16m in length. The easterly 90° turn in wall [0030] and the arguable turn to the west of wall [0033] suggest that the northernmost limit of the structure may have only just extended slightly beyond the excavation to the north. Using the Abbotsbury example as a comparison the width of the Darley Structure is estimated at 5-6m, suggesting that the southern outer wall is located just outside of the southern limit of the excavation.

The widest compass of dates felling dates of the timbers provided by dendrochronology is 83 years whilst the shortest possible interval is 44 years. No evidence for the re-use of the timbers was identified during the analysis which indicates that the timbers were felled for the use of the structure. This suggests that the temporal intervals provided by the felling dates are a genuine reflection of the duration of use. The dendrochronological analysis did identify four apparent phases of activity, the earliest dating to the third quarter of the fifteenth century, a second in the

late 15th-early 16th century, a subsequent phase in the early 16th century and a final phase in the early to mid 16th century. It is quite possible that these different phases represent consecutive renovations or repairs to the building.

Based on the dates obtained from the timbers, it appears that the structure was abandoned around the time of the dissolution, which occurred at Darley in 1538. Afore mentioned examples of Baysdale Abbey from North Yorkshire and Glastonbury Abbey in Dorset were also abandoned during the dissolution. These examples demonstrate that the relinquishment of the mills to the crown appears to be a common occurrence and this may explain the demise of this example at Darley Abbey. The apparent abandonment of the mill at the time of the dissolution adds weight to the suggestion that the mill was indeed associated with the monastery and not a private enterprise which was becoming particularly common during this period (Watts2000).

The noticeable absence of finds or artefacts associated with milling does seem peculiar. However, the absence of mill furniture such as mill stones, lantern pinions and pit wheels may be the result of asset stripping once the abbey had been handed to the crown. These valuable pieces of equipment may well have been sold to private entrepreneurs interested in developing their own business.

7.2 Post Medieval and later features

Once abandoned, the mill appears to have been occasionally flooded. Some of the timbers appear to have been sawn and taken away for re-use whilst others rotted on site and were partially destroyed by riverine erosion.

Following the dilapidation of the mill, a series of re-deposition events to accumulated in this location (0035), (0053), (0052), (0046), (0045), (0044), (0043, (0042), with the disused timber and stone structural elements apparently providing a foundation of sorts for the construction for the weir. The promontory continued to be used as functioning part of the village with at least one late structure being constructed on the island, formed by walls (0018), (0019), (0020) and (0021). During the period between 1761 and 1821 the island was constructed and the perimeter retaining wall (0012 and 0067) was built.

8. CONCLUSION

The observations from the watching brief and the excavation provide highly significant evidence for the late medieval and early post medieval management of the River Derwent and the development of the pre-industrial landscape and economy of the Derwent Valley World Heritage Site.

The discovery of a medieval mill at Darley Abbey represents an extremely important find. This is the earliest structure – indicative of a mill – built for the purpose of mechanised production recovered from the Derwent Valley Mills World Heritage Site. The Darley Abbey Fish Pass structure adds an important new chapter to the early development of industry in the World Heritage Site; a story perhaps dominated here by ecclesiastical control over the means of production. Given that the significance of the Derwent Valley Mills is derived from its early industrial heritage, and particularly early milling, the Darley Abbey Fish Pass structure is a discovery of regional, if not national, importance.

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1821. Map detailing Darley Abbey by Creighton

1882. Map detailing Darley Abbey by Ordnance Survey. 1:2500

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Trent & Peak Archaeology would like to thank the Trent Rivers Trust and A.V. Squires Ltd for their facilitation in the conduction of the fieldwork.

Plates

Plate 1. South-east facing photograph of wall [0018]

Plate 2. East facing section of wall [0018]

Plate 3. North-east facing photograph of wall 0030

Plate 4. South facing photograph of wall 0030

Plate 5. North facing photograph of wall 0030

Plate 6. South-west facing elevation showing wall 0030 and timber AAY

Plate 7. South facing photograph of wall 0033

Plate 8. North-west facing photograph of wall 0033

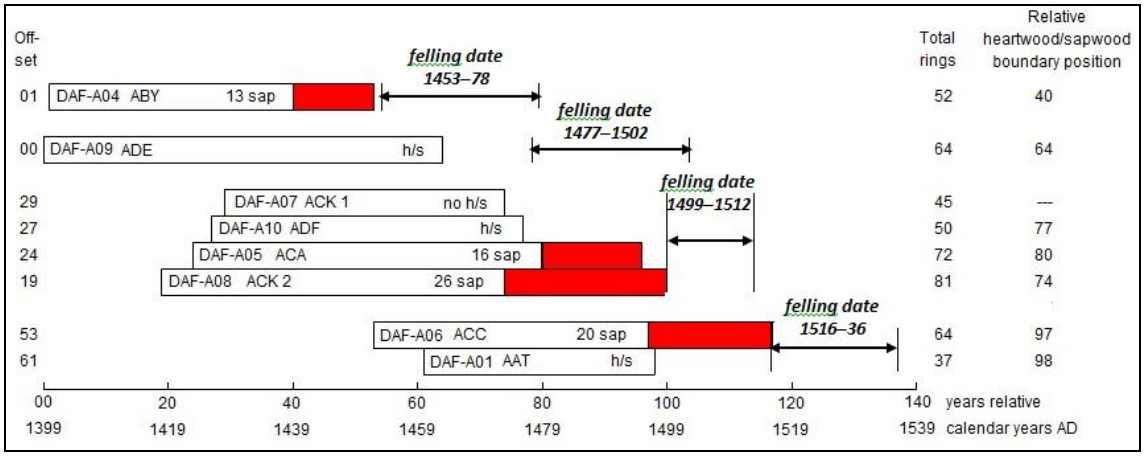
Plate 9.South-east facing section of wall 0036

Plate 10. South facing photograph of wall 0067

Plate 11. North-facing photograph of row of timbers including ADC, ADB, ACZ, ADA and ACY

Plate 12. Photograph of timber after removal by machine excavator

Appendix I



blank bars = heartwood rings, shaded bars = sapwood rings
h/s = heartwood/sapwood boundary, i.e., only the sapwood rings are missing

Figure 7: Bar diagram showing the relative date of the samples and their estimated felling date ranges, these ranges based on a minimum of 15 and a maximum of 40sapwood rings, and taking into account the latest extant dated ring on any sample.

Although it is not certain that the trees represented by samples DAF-A05, A07, A08, and A10, or by DAF-A01 and A06, were felled at exactly the same time as each other, it would appear that there are four distinct phases of felling represented amongst the dated material; third quarter of the fifteenth century, late-fifteenth to very early sixteenth century, early-sixteenth century, and first third of the sixteenth century.

Appendix II- Wood catalogue

Table 5. Wood catalogue

Finds code	Type	Dimensions mm Length, width, thickness	Conversion	Charring	Tool Marks	Bark/ Sapwood	Species	Suitable C14	Dendro-chronology	Comments
AAT	Timber	1215mm x 162mm x 76mm	Radial half split, tapered pencil point	No	Yes	Sap	Oak	No	AD1511-AD1536	Top end damaged by machine.
AAU	Timber	962 x 113 x 80	Radial half split, tapered pencil point	No	Yes	No	Oak	No	Failed to produce date	Top end sawn on site
AAV	Timber	472 x 39 x 108	Tangential outer cord radially modified split. Tapered pencil point.	No	Yes	Sap	Oak	No	Failed to produce date. Wide ringed	Earth fast driven pile
AAZ	Timber	1195 x 163 x 90	Radial half split, tapered pencil point	No	Yes	Sap	Oak	No	Failed to produce date	Top end sawn on site
ABB	Timber	567 x 130 x 58	Radial half split	No	?	Bark	?	Yes	Not sampled	Horizontal timber
ABC	Roundwood	440 x 55 x 90	One end trimmed to off centre point from four directions.	No	Yes	Bark	?	Yes	Not sampled	Horizontal timber
ABF	Timber	575 x 15 x 115	One end cross cut, one end trimmed to chisel point.	No	No	Bark	?	Yes	Not sampled	Horizontal timber
ABM	Timber	310 x 42 x 91	Unconverted. One end cross cut with saw. One end trimmed from five directions to point.	No	No	Sapwood		Yes	Not sampled	Horizontal timber
ABQ	Timber	948 x 94 x 140	Radially split	No	Yes	Poss hs	Oak	No	Failed to produce date. Wide ringed	Top end degraded
ABR	Timber	985 x 86-105 x 75	Radially split, tangentially modified	No	Poss	Poss h/s	Oak	No	Not sampled	Earth fast driven pile

ABS	Timber	300 x 35 x 85	Trimmed from four directions to point	No	No	Sap	?	No	Not sampled	Stake
ABT	Timber	781 x 100 x 75	Radial half split, tapered pencil point	No	Yes	H/s	Oak	No	Not sampled	Earth fast driven pile
ABU	Roundwood	381 x 50	Cross cut top end. Bottom end chisel point.	No	No	Bark	?	Yes	Not sampled	Earth fast driven pile
ABV	Roundwood	700 x 58	Extremely degraded	No	No	Bark	?	Yes	Not sampled	Horizontal
ABW	Roundwood	200 x 30	One end cross cut	No	No	Bark	?	Yes	Not sampled	Horizontal
ABX	Roundwood	70 x 4-40 170 x 16-23 96 x 19-21	Tangentially faced	No	No	Bark	?	Yes	Not sampled	Horizontal
ABY	Timber	3930 x 60-245 x 200	Boxed heart. Bottom end trimmed from four directions to tapped point. Faint tool marks. Straight even grain. Good quality timber.	No	Yes	Sap	Oak	No	AD1453-AD1478	
ABZ	Timber	335 x 26-70 x 69	Radial half split, tapered pencil point	No	Yes	No h/s	?	No	Not sampled	Post point
ACA	Timber	1185 x 56-111 x 100	Radial half split	No	No	No	Oak	No	AD1493-AD1518	One end damaged during machining
ACC	Timber	240 x 180 x 150	Radially split	No	No	Sap	Oak	No	AD1510-AD1535	Earth fast driven pile, sawn on site
ACD	Timber	447 x 99 x 80	Radially split	No	No	No	Oak	No	Not sampled	Earth fast driven pile, sawn on site
ACE	Roundwood	580 x 70 x 69	No wood working evidence was apparent as it was badly degraded.	No	No	Bark	?	Yes	Not sampled	Earth fast driven pile
ACF	Timber	350 x 15-90	Radially splits	No	Yes	Sapwood	Oak	No	Not sampled	Earth fast driven pile, sawn on site
ACG	Timber	331 x 38 x	Cross cut	No	No	Bark frags	?	Yes	Not	Horizontal

		50							sampled	
ACH	Timber	412 x 100 x 123	Cross cut	No	No	Sap	Oak	No	Not sampled	Waste
ACI	Timber	145 x 13-55 120 x 20-60 115 x 28-70	Boxed	No	No	No	?	No	Not sampled	Post, poor sample
ACJ	Timber	350 x 170 x 220	Unconverted. Pencil point at bottom end	No	No	Sap	?	No	Not sampled	Earth fast driven pile, sawn on site
ACK Part I	Timber	1486 x 90-120 x 90	Boxed heart	No	No	No	Oak	No	AD1499-AD1512	
ACK Part II	Timber	2110 x 95-162 x 140	Boxed heart	No	No	No	Oak	No	AD1499-AD1512	
ACL	Timber	400 x 35-130	Pencil point at one end	No	Yes	Sapwood	?	No	Not sampled	Earth fast driven pile, sawn on site
ACO	Timber	1180 x 140 x 92	Radially split pencil point	No	Yes	H/s	?	No	Not sampled	Earth fast driven pile
ACP	Timber	3464 x 261-190 x 221	Boxed heart. Top end cross cut with axe	No	Yes	H/s	Oak	No	Failed to produce date. Wide ringed	Possible mortise hole.
ACQ	Timber	2411 x 195-242 x 146	Boxed half	No	No	No	?	No	Not sampled	Possible partial mortise hole at one end damaged during groundworks
ACR	Timber	1861 x 230 x 169	Radially half split one end cross cut	No	No	Sapwood	?	Yes	Not sampled	No point observed
ACS	Timber	865 x 220 x 65	Tangentially faced.	No	No	No	?	No	Not sampled	Split timber
ACT	Timber	1016 x 182 x 170	Boxed half one end pencil point	No	No	No	?	No	Not sampled	Split timber
ACU	Timber	758 x 124 x	Boxed half one end wedge point	No	No	Sapwood	Oak	Yes	Not	Short boxed

		69							sampled	timber. Either upright or horizontal
ACY	Timber	1558 x 117 x 108	Roundwood with one face tangentially cleft, one end pencil point	No	Possibly. Very degraded	Sapwood	Oak	Yes	Failed to produce date. Wide ringed	Earth fast driven pile
ACZ	Timber	1687 x 146 x 108	Tangential faced, one end to pencil point	No	No	Sapwood	Oak	Yes	Failed to produce date. Wide ringed	Sapwood and point is very degraded
ADA	Timber	2128 x 163 x 152	One end trimmed in four directions to pencil point. One end degraded.	No	No	Sapwood	Oak	Yes	Failed to produce date. Wide ringed	Degraded earth fast driven pile
ADE	Timber	1680 x 190 x 170	Degraded at one end. One end pencil point.	No	Yes	No	Oak	No	AD1477-AD1502	Partial tool marks
ADF	Timber	2062 x 189 x 87	Four directions trimmed to a point.	No	No	Sapwood	Oak	Yes	AD1490-AD1515	Possible horizontal timber
ADI/1	Timber	1571 x 122 x 101	Radial 1/6 split tangentially modified. One end pencil point.	No	No	No		No	Not sampled	
ADI/2	Timber	1564 x 102 x 114	Radial 1/6 split tangentially modified.	No	No	No		No	Not sampled	Sawn at upper end

Appendix III- Figures

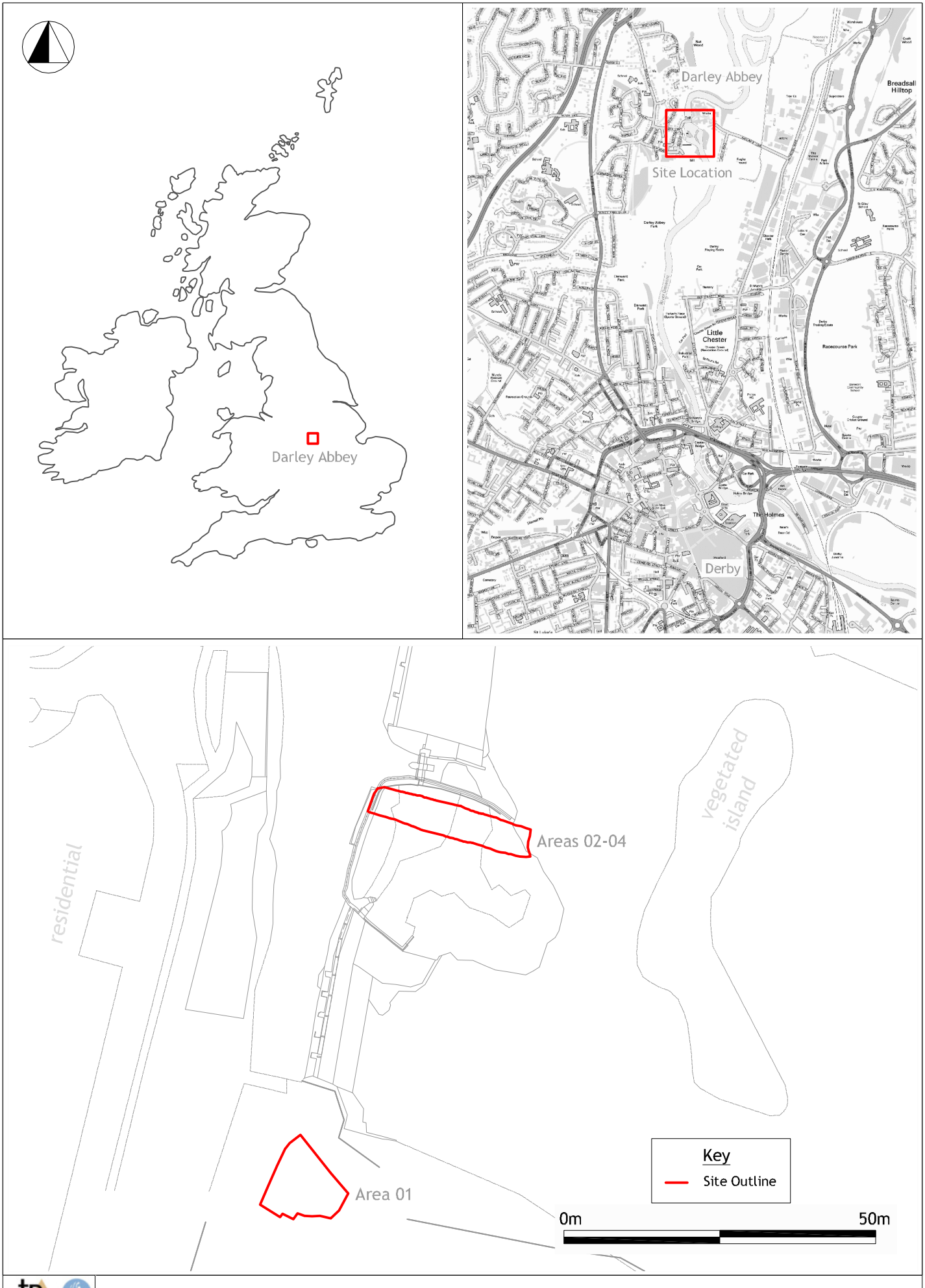


Figure 1: Site location map

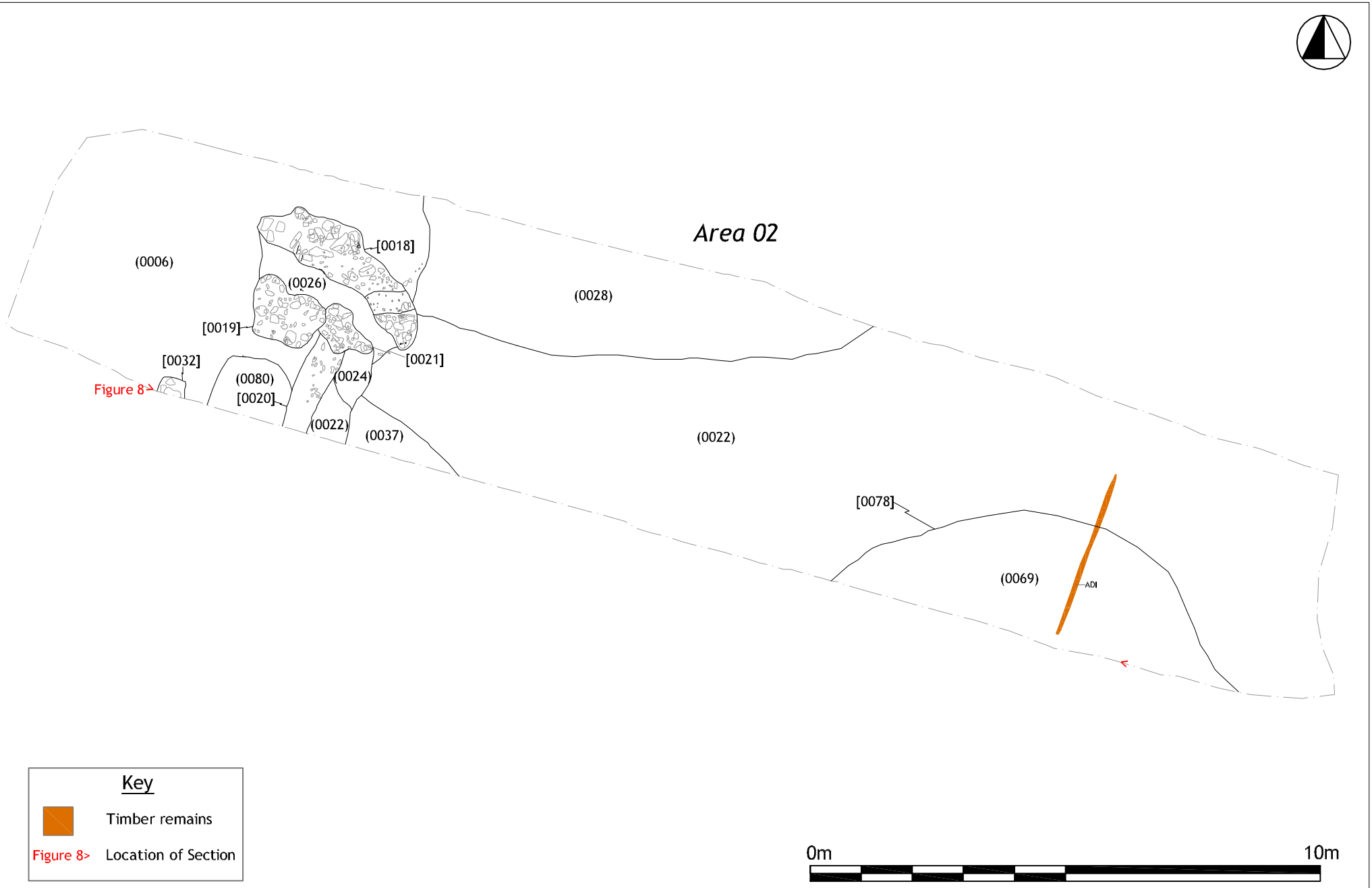


Figure 10: Post medieval features

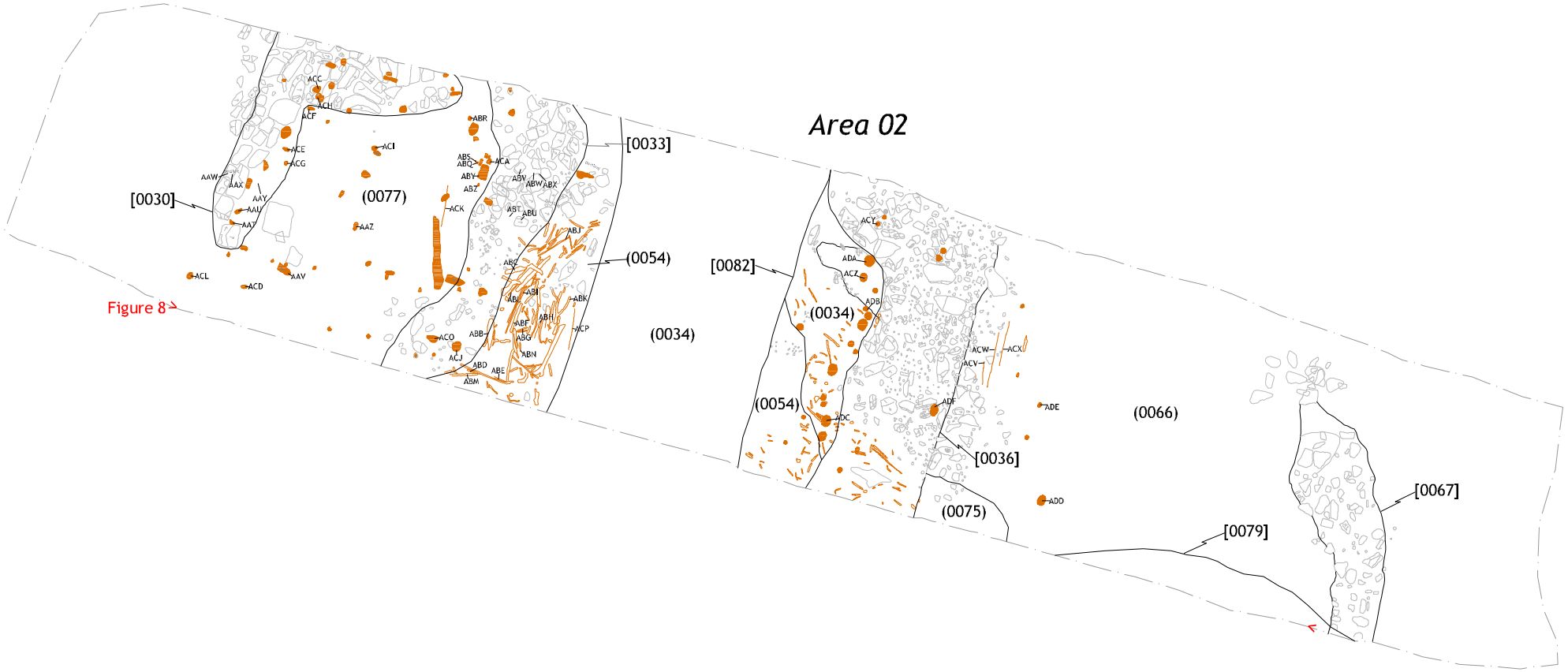


Figure 11: Medieval walls and post medieval structural remains

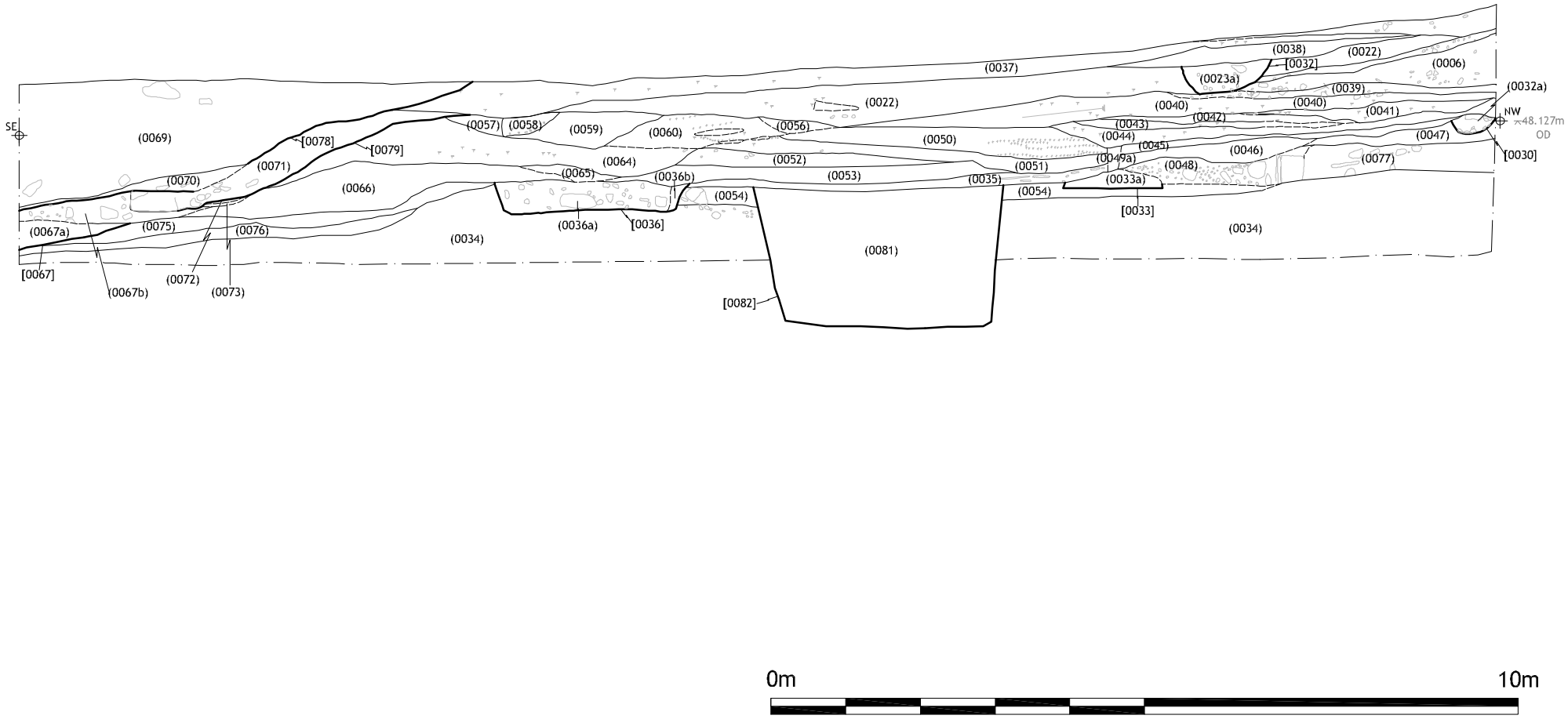


Figure 9: Section demonstrating formation of artificial island

Figure 14: Illustration of timber ACA

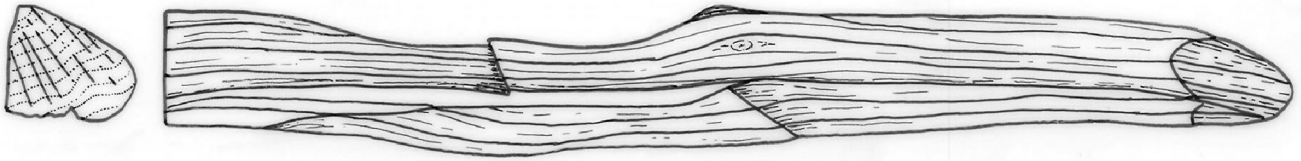
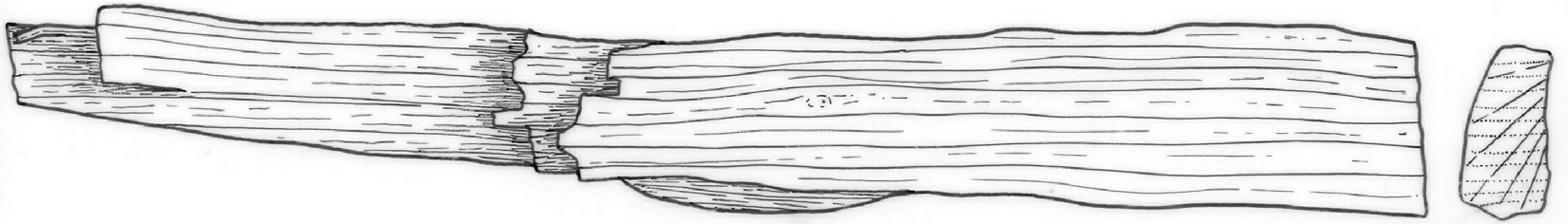


Figure 15: Illustration of timber ACK1



Figures 12-13: Illustrations of timber ABY1 and ABY2

Figure 14: Illustration of timber ACA

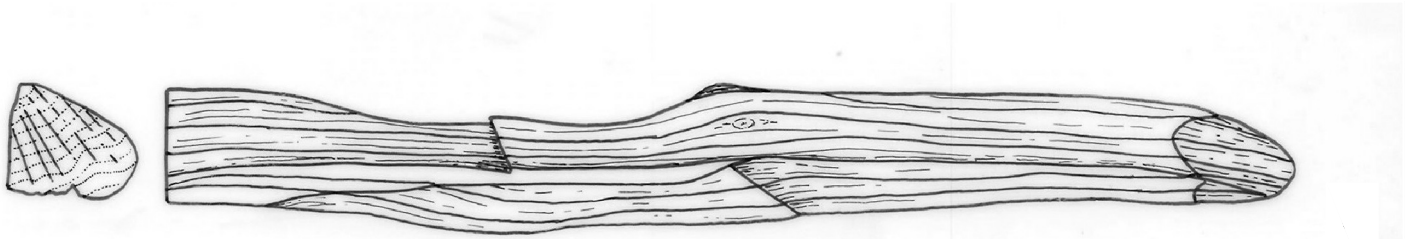


Figure 15: Illustration of timber ACK1

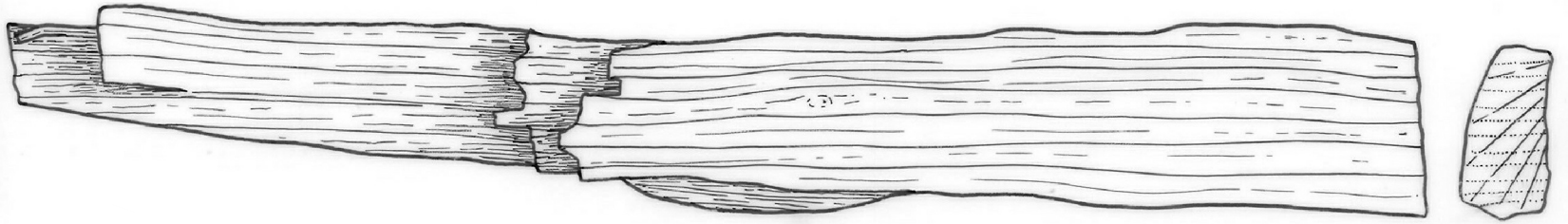


Figure 16: Illustration of timber ACK2

Figure 17: Illustration of timber ACQ

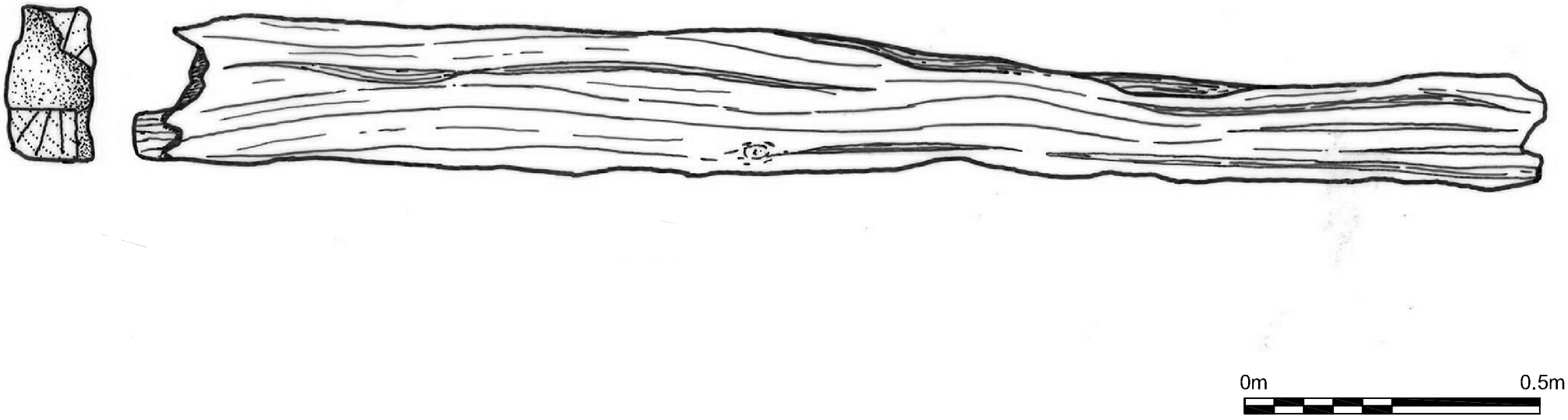


Figure 18: Illustration of timber ADE

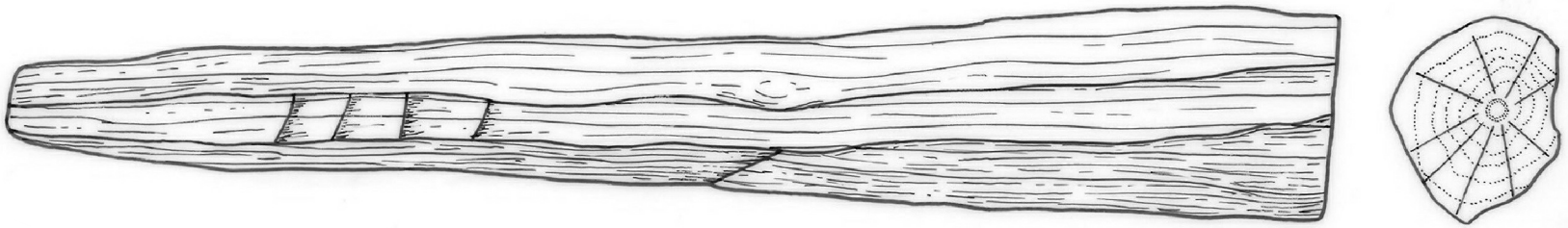
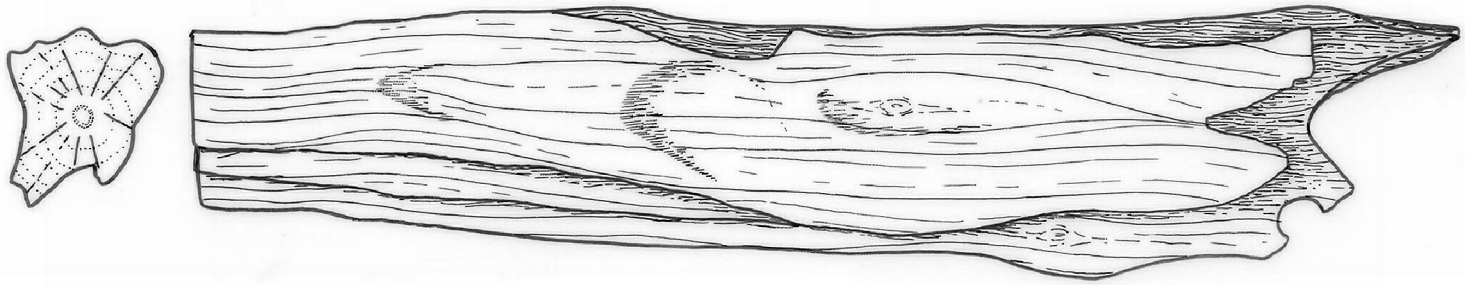


Figure 19: Illustration of timber ACP



Wood Catalogue. 1 (AAT)

Wood Catalogue. 2 (AAU)

Wood Catalogue. 3 (AAZ)

Wood Catalogue. 4 (ABB)

Wood Catalogue. 5 (ABK)

Wood Catalogue. 6 (ABQ)

Wood Catalogue. 7 (ABR)

Wood Catalogue. 8 (ABT)

Wood Catalogue. 9 (ABU)

Wood Catalogue. 10 (ABV)

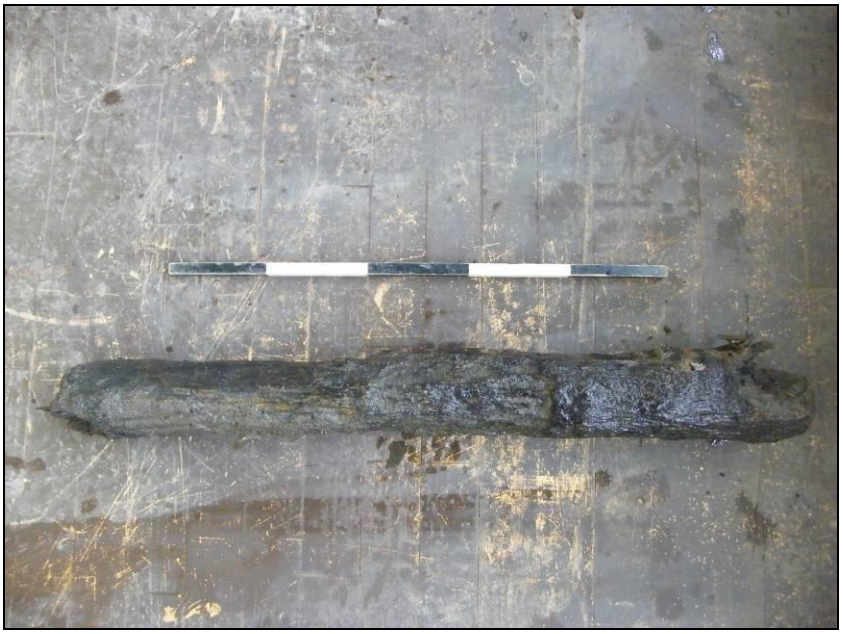
Wood Catalogue. 11 (ABW)

Wood Catalogue. 12 (ABY)

Wood Catalogue. 13 (ABY)

Wood Catalogue. 14 (ABZ)

Wood Catalogue. 15 (ACA)



Wood Catalogue. 16 (ACB)

Wood catalogue. 17 (ACC)

Wood Catalogue. 18 (ACD)

Wood Catalogue. 19 (ACE)

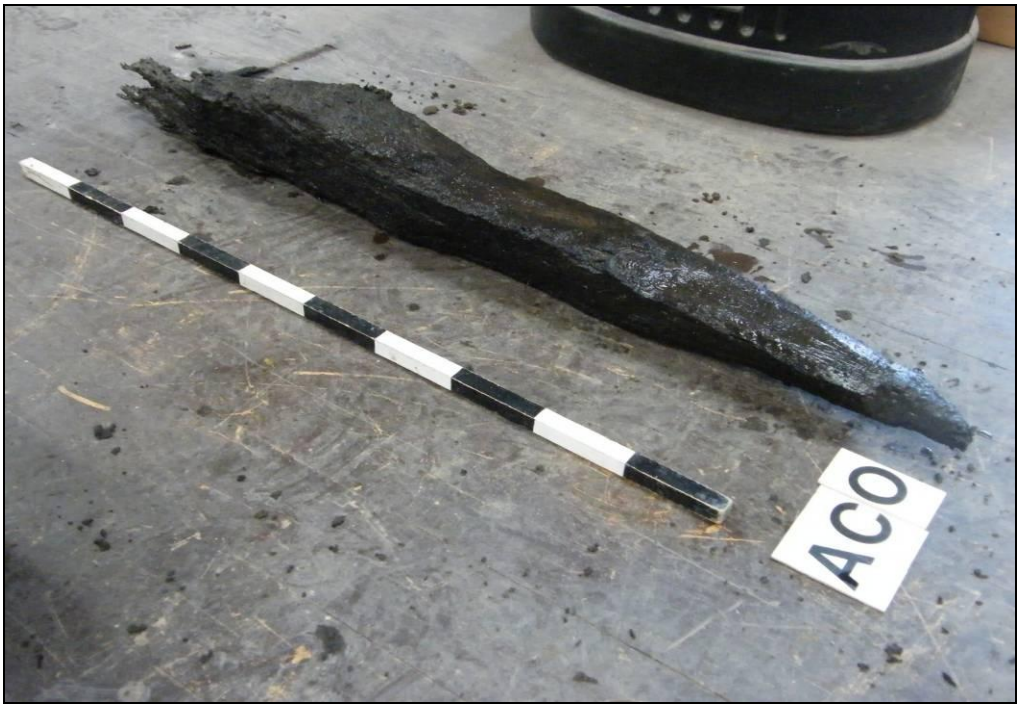
Wood Catalogue. 20 (ACH)

Wood Catalogue. 21 (ACG)

Wood Catalogue. 22 (ACJ)

Wood Catalogue. 23 (ACK)

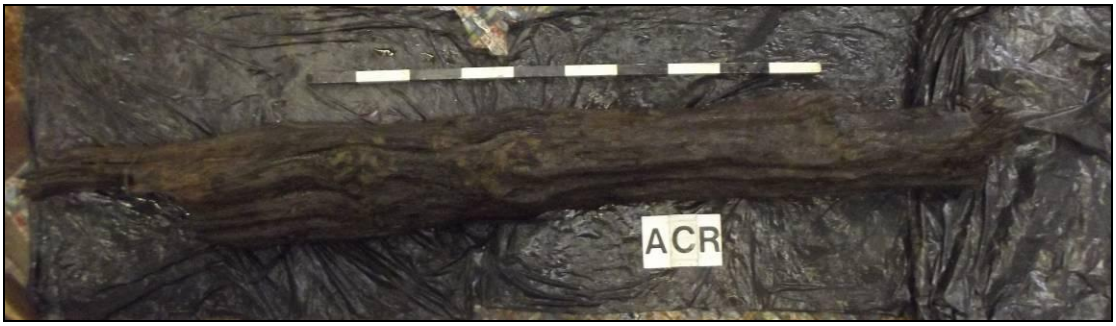
Wood Catalogue. 24 (ACK)



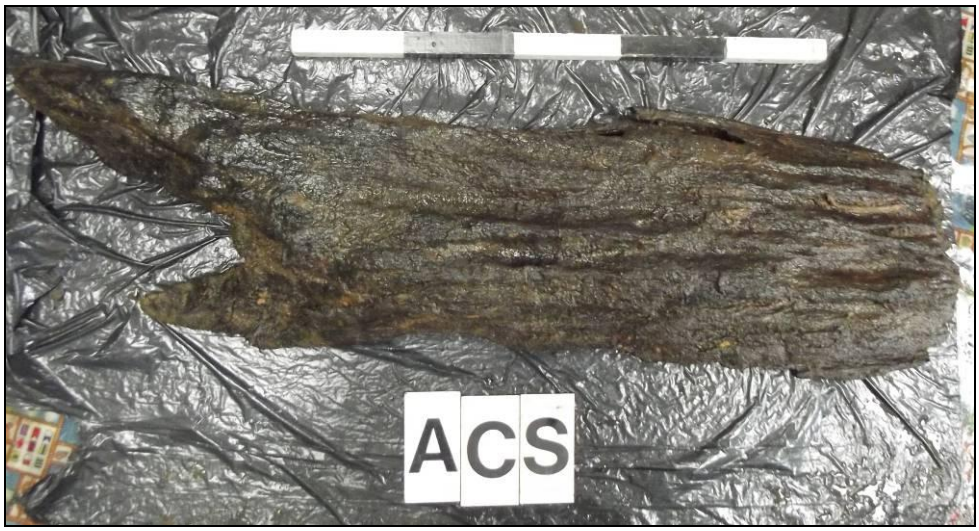
Wood Catalogue. 25 (ACO)

Wood Catalogue. 26 (ACP)

Wood Catalogue. 27 (ACQ)



Wood Catalogue. 28 (ACR)



Wood Catalogue. 29 Reverse view of (ACS)

Wood Catalogue. 30 Front view of (ACS)

Wood Catalogue. 31 Reverse view of (ACT)

Wood Catalogue. 32 Front view of (ACT)

Wood Catalogue. 33 Reverse view of (ACU)

Wood Catalogue. 34 Front view of (ACU)

Wood Catalogue. 35 (ACY)

Wood Catalogue. 36 (ACY)

Wood Catalogue.37 (ACY)

Wood Catalogue.38 (ACZ)

Wood Catalogue. 39 (ADA)

Wood Catalogue. 40 (ADA)

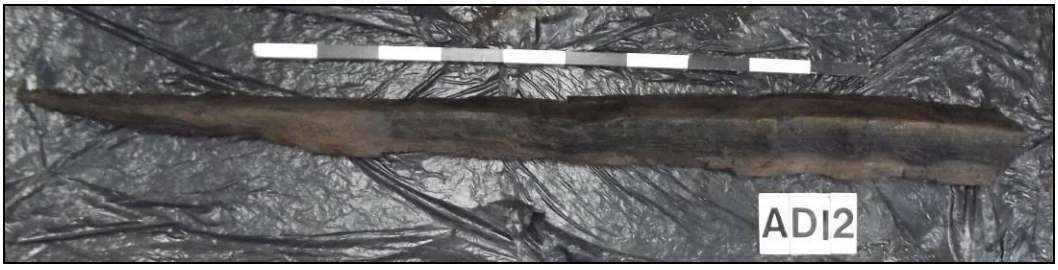
Wood Catalogue. 41 (ADB)

Wood Catalogue. 42 (ADE)

Wood Catalogue. 43 (ADF)

Wood Catalogue. 44 (ADF)

Wood Catalogue. 45 Reverse view of (ADI/2)



Wood Catalogue. 46 Front view of (ADI/2)

Wood Catalogue. 47 reverse view of (ADI)

Wood Catalogue. 48 Damage to tip of (ADI)

Wood Catalogue. 49 Front view of (ADI)

Wood Catalogue. 50 (ADF)