

DARLEY ABBEY FISH PASS, DERBY, DERBYSHIRE
Assessment Report on an Archaeological Watching Brief

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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 fish pass required the partial dismantlement of a deliberately constructed island within the Derwent. 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 435328, 338492 at a height of c.47.5m OD (Figure 1), and is situated 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).

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; Areas 02-04 were excavated for the removal of tree stumps on an island within the river, with Area 02 subsequently being extended. Areas 01 and 02 were excavated by 360° tracked excavator with flat bladed ditching bucket in spits of c.100mm. Tree stumps were removed from the northern end of Area 02 and from Areas 03-04 by a machine excavator with a toothed bucket.

The watching brief revealed that the island at Darley Abbey was formed as a series of flooding and re-deposition events overlying multiple phases of archaeological features constructed within the River Derwent. These include two deliberately constructed and near contemporary structures/platforms built of timber and stone and dating to the late 15th century/early 16th century of, as yet, uncertain function. A likely interpretation requiring further exploration is that the structures represent part of a mill complex managed by the monks of Darley Abbey. The latest timber dated by dendrochronology provides a date of 1510-1535, which may indicate that the site fell into disuse at the time of the dissolution of the monasteries.

Once abandoned, the timber structures appear to have been destroyed by riverine erosion, with the remaining structural elements apparently then providing a foundation of sorts for the construction of the artificial eyot.

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

The report concludes by setting-out recommendations for the remaining analyses, conservation and reporting that may be required on the site and the timbers by Derbyshire County Council.

The timbers - and the structure they represent - recovered from Darley Abbey represent an extremely important find. This is the earliest timber structure – probably 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 at 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 recovery of regional, if not national, importance.

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

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1. INTRODUCTION

1.1. 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 work was carried out between March and July 2013.

2. PROJECT BACKGROUND

2.1. Darley Abbey is located approximately 2km to the north of Derby city centre, Derbyshire, with the fish pass situated within the River Derwent centred at SK 435328, 338492 at a height of c.47.5m OD (Figure 1), and is situated within the Derwent Valley Mills World Heritage Site and within the Darley Abbey Conservation Area.

2.2. The site is situated on alluvium clay, silt and gravels on a bedrock of keuper marl with sherry bands (British Geological Survey of Great Britain, Sheet 125).

3. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

Prehistoric

3.1. The HER contains no record of sites or finds for this period.

Romano-British

3.2. 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

3.3. Darley Abbey was founded c.A.D.1137 as an Augustinian Abbey by Robert de Ferrers, second earl of Derby. It was dissolved in 1538. The exact extent of the abbey complex is unknown, although upstanding remains are visible in the 15th century 'Old Abbey Building' (HER 32468 / SM 84; now the Abbey public house) and as elements within the elevations of Nos 7, 8 and 9 Abbey Lane (HER 32468 and 32469).

3.4. Excavations within Darley Park in 2004 revealed substantial structural walls and mid-13th to 14th century pottery approximately 100m south of the Abbey public house, whilst burials were located during excavations along New Road.

3.5. Ridge and furrow earthworks (SMR 32431) are also prevalent in the area, and probably formed part of the abbey's medieval field system.

Post-Medieval

3.6. 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).

3.7. Of particular relevance is the site of the Evans Paper Mill which is located on the riverbank immediately to the south of the proposed site. The Evans mill is first recorded for sale in 1713 and was demolished in 1930. Structural remains of the mill are still visible in the riverbank. It is possible, however, that it was built on the site of earlier mills (Elliott et al 2008).

3.8. The current weir structure spanning the River Derwent at Darley Abbey is on the site of a fish weir (HER 32091) that is recorded on late 19th and 20th century OS maps, which also show a well located on the island.

4. METHODOLOGY

4.1. An initial area (Area 01) located on the southern bank of the River Derwent, and measuring c.14m x 13m was excavated to a depth of c.0.1m as the site compound. Three further areas (Area 02-04) measuring between 2.7m x 3.4m and 6.6m x 3.7m were excavated to a depth of up to 0.9 for the removal of tree stumps on an island within the river. Area 02 was subsequently extended to measure 26m x 5m and was excavated to a depth of c.2.8m. Areas 01 and 02 were excavated by 360° tracked excavator with flat bladed ditching bucket in spits of c.100mm. Tree stumps were removed from the northern end of Area 02 and from Areas 03-04 by machine with a toothed bucket.

4.2. 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.

5. RESULTS

5.1. Groundworks on the island consisted of three areas of excavation (Areas 02-04) for the removal of tree stumps, with Area 02 extended to measure 26m north-west – south-east x 5m north-east – south-west and excavated to a depth of up to 3.2m. The stratigraphic sequence of Area 02 consisted of sandy clay riverine deposits overlain by a series of sand flood deposits, redeposited clay, sand subsoil and imported modern topsoil (see Figure 3):

Context	Thickness	Descriptions
0005	400mm	Dark brown clay silt loam
0006	200mm+	Red brown sand clay with 20% sub angular stone 200-300mm
0069	1620mm	Mixed loose mid brown silt and sand with 30% grey sand
0005	290mm	Mid grey brown friable and soft clay silt with 10% angular stone 30-100mm
0037	220mm	Black friable silt with 20% charcoal
0038	200mm	Mid brown friable silt loam
0070	220mm	Loose yellow sand
0071	440mm	Mid grey brown sand
0022	440mm	Light-mid brown friable sand with 15% sub angular red gritstone fragments c.200mm
0057	220mm	Yellow sand
0023	100mm	Mid brown friable silt clay sand sand with 20% sub angular sandstone fragments 10-30mm
0058	200mm	Mid-dark brown sand with 30% charcoal
0006	650mm	Mid red brown soft-firm clay with 20% sub angular sandstone and brick fragments 20-100mm, 3% charcoal flecks
0056	180mm	Yellow sand
0059	480mm	Mid-dark brown sand with 30% yellow sand
0039	170mm	Mid grey friable silt with 5% sub angular stone
0060	430mm	Mid brown sand
0040	350mm	Mid grey soft silt clay with 30% root action
0041	240mm	Mid grey brown soft silt clay with 3% root action
0042	100mm	Mid grey brown clay sand
0043	130mm	Yellow loose sand with 20% root action
0044	180mm	Mid-light grey loose sand with 20% grey clay lenses and 10% root action
0049	200mm	Mid grey clay sand
0045	120mm	Mid grey brown loose sand
0050	410mm	Mid-light yellow loose sand with 20% grey clay lenses
0072	40mm	Light grey friable sand
0046	300mm	Light yellow loose sand
0051	180mm	Mid grey soft clay sand with 15% yellow sand
0064	580mm	Mid grey brown sand
0073	40mm	Loose yellow sand
0047	260mm	Mid grey soft sand clay

0052	180mm	Grey sand
0065	200mm	Yellow sand with 15% orange sand bands
0074	500mm	Mid brown friable sand with 20% sub angular – sub rounded stone 10-30mm
0053	230mm	Orange yellow sand
0066	670mm	Light-mid grey clay sand with 20% orange sand patches
0048	340mm	Light yellow loose sand with 65% sub rounded stone 30-50mm and large sub angular stone 200-300mm
0035	140mm	Mid grey soft clay with 30% brushwood
0054	270mm	Mid-dark grey soft sand clay
0075	200mm	Mid blueish grey soft clay
0076	160mm	Loose yellow sand
0034	1600mm+	Mid grey loose clay sand

The limits of the island were enclosed within a curvilinear flat edged concrete revetment (0003) that extended around the northern and western perimeter for a length of approximately 30m x c.1m wide x 0.1m deep. Beneath this was a further concrete support (0004) measuring 4m north – south x 0.12m deep. This in turn overlay a sandstone wall (0012) to a depth of 1.8m.

5.2. Within Area 02 a series of linear stone features (0018, 0019, 0020, 0021) were identified at a depth of c.08m, with further stone features (0030, 0031, 0033, 0036, 0067), flood deposits (0035) and a series of wooden posts identified at a depth of c.1.5m.

Robbed-out wall 0018

5.3. A linear north-westerly robbed out wall measuring 3.6m x 1m x 0.27m deep was located along the northern limit of excavation. Its profile consisted of near vertical sides with a gradual break of slope leading to an undulating base. The fill of the feature comprised large angular sandstone blocks 200mm-500mm within 20% dark brown silt clay loam. Fragments of post-medieval brick and tile (AAN-AAP) were recovered from the fill of this feature.

Robbed-out wall 0019

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

Robbed-out wall 0020

5.5. A further linear northerly oriented robbed out wall was located at the south-eastern end of 0019, and extended 1.5m to the south, beyond the limits of excavation. It measured 0.45m wide x 0.21m deep with vertical sides with a sharp break of slope and flat base. Its fill comprised red angular gritstone fragments c.150-250mm within a matrix of mid brown friable sand.

Robbed-out wall 0021

5.6. An additional feature (0021) had been cut into the intersection of 0019 and 0020. It measured 1m north-west – south-east x 0.7m wide x 0.1m deep, with a profile of near vertical sides with a sharp break of slope and flat base. Its fill comprised of angular red gritstone fragments c.200mm within a matrix of mid brown silt. Finds AAL and AAM were recovered from this feature.

The stratigraphically later deposits and features narrated in 5.1 to 5.6 above are not depicted in plan (Figure 2) in this report but full archive drawings have been produced.

Linear stone foundation or packing 0030 Figure 2, Plate 1

5.7. Approximately 2.5m from the north-western limits of excavation, a linear stone foundation/packing (0030) orientated north – south was identified. It measured 4m (extending beyond the northern limit of excavation) x 1m wide x 0.73m deep. Its profile consisted of near

vertical sides with a gradual break of slope and flat base. The stone foundation/packing was constructed from large angular and sub angular sandstone blocks c.300-500mm within a matrix of wet friable grey brown sand and grey clay.

Linear stone foundation or packing 0031 Figure 2

5.8. A north – south orientated return of 0030 (0031) extended 2.2m from the northern end of 0030 and 1.1m south from the northern limits of excavation. Its profile consisted of near vertical sides with a gradual break of slope and a flat base. The stone foundation/packing was constructed from large angular and sub angular sandstone blocks c.300-500mm within a matrix of wet friable grey brown sand and grey clay.

Linear stone foundation or packing 0032 Figure 2

5.9. Located 0.9m south, and on the same alignment as 0030 a further stone wall (0032) was identified protruding from the southern limit of excavation. It measured 0.35m north – south x 0.5m wide, with a profile of near vertical sides with a gradual break of slope and a flat base. It was constructed from large sub angular sandstone blocks 150mm-300mm within a matrix of mid grey soft sand clay.

Linear stone foundation or packing 0033 Figure 2, Plate 2

5.10. A further stone foundation/packing (0033) was identified c.3.5m to the south-east of 0030. It was oriented northerly and measured 5m x 1.2m x 0.3m deep and was constructed from angular sandstone blocks c.100-400mm within a matrix of mid grey brown clay silt. Approximately half way towards its southern end, the stonework was much more degraded and the stones were fragments c.10-300mm in size.

Flood deposit 0035 Figure 2, Plates 2, 3, 4

5.11. Partially overlying stone foundation/packing 0033 was a layer of mid grey soft clay with 30% brushwood (0035). It measured 3.6m north-west – south-east x 1.6m x 0.13m deep.

Rubble foundation 0036 Figure 2, Plates 5, 6

5.12. Approximately 4m to the south-east of 0033 an additional stone foundation/packing (0036) was identified. It was oriented north-westerly and measured 5m x 2.4m x 0.4m deep. Its profile consisted of near vertical sides with a sharp break of slope and a flat base, whilst the fill comprised angular sandstone 100-500mm within a matrix of mid brown soft sand clay.

Linear stone foundation or packing 0067 Figure 2, Plate 7

5.13. Along the eastern edge of the island a further curvilinear stone wall (0067) was identified. It was oriented north-westerly and measured 4.5m x 0.8m x 0.35m deep. Its profile consisted of near vertical sides with a sharp break of slope and flat base. Its fill comprised sub angular stone within a matrix of grey sand clay. Brick fragments ADG and ADH were recovered from this feature.

Wooden posts

5.13. A total of 97 vertical wooden posts, ranging in size from 0.1-0.3m diameter and up to 4m in length, were identified within context 0034 in Area 02. For the most part, the timbers appear to have been arranged in a series of rows. The rows were constructed on two distinct orientations. Rows A, B, C and F were aligned north-north-easterly and rows D, E and G were arranged north-westerly. Interestingly, rows A, B, C, D and E were organised in an isolated cluster in clear association with a considerable amount of stonework and horizontal timber and roundwood. A similarly organised series of timber rows, F and G, and stonework was located 3.7m to the east. Excavation of the stonework revealed underlying horizontally lain brushwood. These collections of structural remains and features are referred to as platform 1 and platform 2 respectively.

Platform 1

Post alignment A Figure 2, Plate 3

5.14. Post alignment A, located 3.27m from the western end of Area 02, was orientated north-north easterly and consisted of 21 wooden posts ranging in size from 0.05m - 0.2m diameter and spaced between 0.1 - 0.4m apart. All of the posts appeared to have been driven into context 0034, with no evidence of post holes visible.

Two upright timbers from alignment A were sampled for dendrochronological dating. Timbers AAT and ACC provided felling dates ranging between AD1511-AD1536 and AD1510-AD1535 respectively. The distinctly similar potential felling dates for both of these timbers strongly suggest that post alignment A was constructed in one event and dates to the early 16th century.

Post alignment B Figure 2, Plate 3

5.15. Post alignment B was located approximately 2.3m to the south-east of alignment 'A' and was also oriented north-north easterly. It consisted of 25 wooden posts ranging in size from 0.05m – 0.15m diameter and spaced between 0.2m – 0.65m apart. All of the posts appeared to have been driven into context 0034, with no evidence of post holes.

A total of three timbers were submitted for dendrochronological dating from post alignment B. Timbers ACA and ACK returned felling dates of AD1493-AD1518 and AD1499-AD1512 respectively. There seems to be sufficient overlap in the dates, suggesting that these timbers were potentially erected in the same event which appears to have dated to the late 15th century-early 16th century. Timber ABY returned a rather anomalous date in comparison the other dated timber within the alignment. The felling date for the timber was between AD 1457 and AD 1478 which suggests that it was either from an earlier part of the structure, perhaps post alignment E, or may represent an older reused timber.

Post alignment C Figure 2, Plate 3

5.16. Located on the same orientation as rows A and B, post alignment C contained 9 upright timbers. No post holes were apparent, suggesting that the post were driven into the ground rather than inserted into pre cut slots.

Post alignment D Figure 2, Plates 6, 8

5.17. Post alignment D is more tentative than rows A, B and C. Its interpretation is largely supported by the posts which were identified in-between the aforementioned rows. Alignment D comprised 13 upright posts. The posts in this row are smaller diameter, measuring a maximum of 0.21m.

Post alignment E Figure 2, Plates 6, 8

5.18. Located 1.3m to the north of D, post alignment E was oriented on the same alignment and comprised 14 upright posts. This alignment is also rather tentative but should be considered at this point until a more comprehensive analysis of the structures can be conducted. A cluster of timbers at the south eastern extent of the alignment were dated chronologically. It is uncertain which alignment they potentially belong to but is expected that further analysis of the geospatial elements of the structure, scientific dating and technological attributes of the wood may elucidate on the organisation of the structure.

Platform 2

Post alignment F Figure 2, Plates 6, 8

5.19. Post alignment F was located approximately 4.5m to the south east of Platform 1. It was oriented on the same alignment as post alignments A,B and C in Platform 1 which broadly suggests some contemporary use and perhaps even functional homogeneity. The alignment contained 21 large upright timbers.

Post alignment G Figure 2, Plate 3

5.20. A second post alignment, oriented north-westerly, within Platform 2 was identified. Whilst this was on a counter orientation compared to alignment F, it was on the same orientation as post alignments D and E. The posts all appeared to have been driven into context 0034, with no evidence of post holes visible.

A dendrochronological date was obtained from timber ADF. It suggests that it was felled between AD1498 and AD1515 which suggests that it was erected around the same time as post alignment B and potentially E.

Horizontal timbers

5.18. Several horizontal timbers were also found within context 0034. Two large fragments of horizontal wooden plank were identified within post alignment B, whilst a further example was located 5m to the west of Platform 2.

6. ASSESSMENT OF WATERLOGGED WOOD REMAINS

By Paul Flintoft

Summary

6.1 Of the 111 pieces of which were identified and recorded in plan during the excavation, 42 were collected for assessment with a sub-sample of this total reserved for a programme of dendrochronological dating. The assemblage which was retrieved included timber, roundwood and waste fragments. The assessed material appears to represent worked upright posts and horizontally deposited timbers which join the posts and may have formed a scaffold as part of two deliberately constructed structures.

Results

6.2 The 42 timbers which were excavated were cleaned, photographed and assessed for their condition, evidence of wood working and tool marks, characteristics which would assist with scientific dating as well as their potential function.

6.3 All of the timbers were recovered from context (0034), a mid grey loose clay sand natural river bed deposit with the exception of 11 unstratified timbers.

6.4 A total of 24 of the timbers which were assessed appear to have been upright posts, four were horizontal, two were indeterminate and one piece appears to be a fragment of waste timber. All 11 of the unstratified timbers appear to have acted as horizontal beams or timbers linking the vertical posts.

6.5 AAT- This *Quercus* s.p (oak) timber measured 1215mm in length, 162mm in width and was 76mm thick. It was essentially a trunk which has been radially split centrally with a series of tangential strikes forming a point. The timber was in a reasonable condition but displayed considerable modern damage to the distal end. Tool marks were observed at the proximal end. The shape of this timber, complete with a well fashioned point, and its vertical situation upon discovery suggests that the timber was an upright post. Further analysis of these may allude to the tools used to create this post and may even provide a relative date based on the technologies used. Dendrochronological dating of the timber provided a felling date between AD1511 and AD1536.

6.6 AAU- Timber AAU was very similar to timber AAT. It appeared to be a *Quercus* s.p (oak) trunk radially split in half with a series of tangential strikes at the proximal end forming a point with a sequence of tool marks clustered around the point. It measured 962mm in length, 113mm in width and 80mm thickness. The similarity in shape and size between this timber and AAT suggests that this too acted as an upright post. The timber was assessed for dendrochronological dating but was not sampled as it was felt that a reliable felling date would not be obtained.

6.7 AAV- AAV is believed to have been an upright post. The timber measured 472mm in length, 108mm in width and 39mm in thickness and displayed a single radial and a single tangential split. Tool marks on the timber appear to suggest that a sharp narrow bladed tool was used to convert the wood into a usable post. It is not clear whether this timber was an upright post or a horizontal beam. An inspection of this timber revealed it to be *Quercus* s.p (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.8 AAZ- This apparent upright post measured 1195mm in length, 163mm in width and 90mm thickness. Timber AAZ was a further example of a half trunk which had been radially split in half. A series of tangential strikes at the proximal end of the timber which formed a well defined tip. A clear succession of tool marks was evident around the tip suggesting the use of a narrow bladed tool such as an axe or an adze. Further analysis of the tool marks may allude to the tools used to create this post and may even provide a relative date based on the technologies used. The timber, which proved to be *Quercus* s.p (oak) was sampled for dendrochronological dating but was unfortunately unsuitable.

6.9 ABQ- This timber is part of a partial upright post. There were two radial splits which tapered towards what may have been intended to be a tip but any kind of tip was not present, apparently snapped off in antiquity. Measuring 948mm x 94mm x 140mm, the timber did not display any bark or sapwood. An inspection of this timber revealed it to be *Quercus* s.p (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.10 ABR- This was recorded as the top portion of a larger upright post. The post had been formed with two radial splits and a single tangential split. It measured 985mm x 105mm x 75mm.

6.11 ABS- Timber ABS was utilised as an upright stake. A total of four tangential strikes had been used to shape an end of the timber into a tip. The post measured 300mm in length, 85mm in width and 35mm in thickness. No bark was associated with the timber but a small amount of sapwood was observed.

6.12 ABT- This timber was a trunk which had been radially split down the centre and then tangentially split at the proximal end to form a point. Tool marks at the proximal end suggest that a narrow bladed tool such as an adze or axe was employed to fashion the tip. This shares characteristics with other upright posts such as AAT, AAU and AAZ. Further analysis of the tool marks may indicate which tools may have been used in the production of the timber.

6.13 ABU- ABU was a piece of roundwood which displayed a flat tangential cut at the distal end and a tangential strike at the proximal end to a point. The situation in which this was discovered, displaying an almost vertical inclination of axis, suggests that it may have served as an upright stake.

6.14 ABV- This timber measured 700mm in length, 58mm in width and 38mm in thickness. The tip of the timber was badly degraded and no wood working evidence could be observed as a result of this. A single tool mark suggestive of a narrow bladed instrument was identified approximately half way down the timber. The horizontal situation of the timber when discovered is suggestive of it once acting as a linking beam in the timber scaffold.

6.15 ABW- This was recorded as a piece of roundwood. It had been cut tangentially at the distal end displayed considerable degradation at the proximal end. This piece of roundwood measured 200mm in length, 30mm in width and 30mm in thickness. The situation of the wood in conjunction with its size and wood working evidence hint at this once been a horizontal fragment, possible interlinking the upright timbers.

6.15 ABX- This fragment of roundwood demonstrated a degraded distal end and a tangentially split proximal end. The wood had bark associated with it and measured 170mm in length, 23mm in width and 16mm in thickness. It is likely to have served as a horizontal rod, possibly used to interlink the upright timbers.

6.16 ABY- Timber ABY appears to have been a full *Quercus* s.p (oak) trunk which was sawn in half and trimmed tangentially with a narrow bladed tool. The proximal end appears to have been tangentially swan and trimmed to a tip. This kind of wood working evidence is likely to belong to period including or post dating the post medieval. No bark was found to be present on the timber but a proportion of sapwood was evident. The timber measured 3930mm in length, 245mm in width and 200mm in thickness. This particular timber was found to be vertically upright and well set into context 0034 strongly suggesting that it was discovered *in-situ*. A sample of the timber was taken for dendrochronological dating. It provided a felling date between AD1453 and AD 1478.

6.17 ABZ- This appears to have been a full trunk which has been centrally radially split. Numerous tangentially strikes were observed which formed the end of the post into a tip. The well formed tip strongly suggests that this was the end of an upright post, the rest of which may have degraded. The tool marks on the timber are reminiscent of those of a small bladed instrument such as an axe or an adze. The timber measured 335mm in length, 70mm in width and 69mm in thickness.

6.18 ACA- This oak timber appears to have been a full trunk which was radially split down the centre. A few partial tangential strikes were observed at the distal end but the timber was damaged to an extent where any wood working evidence was difficult to identify. It measured 1185mm in length, 111mm in width and 100mm in thickness. The wood working evidence and the situation of the timber suggests that it acted as an upright timber. A sample of the timber was taken for dendrochronological dating which provided a felling date ranging between AD1493 and 1518.

6.19 ACC- Measuring 240mm in length, 180mm in width and 150mm thickness, timber ACC displayed two clear radial splits which terminated at a point. It is likely that this timber acted as an upright timber. An inspection of the timber proved it to be oak and a sample was taken for dendrochronological dating which provided a felling date which ranges between AD1510 and 1535.

6.20 ACD- This timber displayed two clear radial splits terminating at a point, decayed bark and sapwood. Measuring 447mm x 99mm x 80mm, timber ACD was sawn at the distal end to remove it from context (0034). This timber demonstrated all the characteristics of an upright post.

6.21 ACE- ACE was a piece of roundwood which has been sawn at the distal end and had become particularly degraded at the proximal end. The wood measured 580mm long, 70mm wide and was 69mm thick. No tool marks were evident but bark was present. Although it appeared to be smaller and more delicate than the other upright timbers within the alignment, the situation of the wood appeared to suggest that it was an upright post.

6.22 ACF- Timber ACF displayed two radial cuts and a single tangential cut which formed a badly degraded tip and no wood working evidence could be observed as a result of the poor condition. A single tool mark which was also in poor condition was also observed. It measured 350mm in length, 90mm in width and 15mm in thickness. The timber probably acted as an upright timber.

6.23 ACG- Timber ACG was recorded as a piece of roundwood. It appears to have been sawn at the distal end in antiquity and the proximal end was badly degraded. It measured 331mm in length, 50mm in width and 38mm in thickness. The wood working evidence is not consistent with the other upright posts and the inclination of axis of the wood is ambiguous which does not suggest either a vertical or horizontal situation of the wood. On balance it seems more likely that the wood represents a degraded horizontal fragment wood.

6.24 ACH- This piece of timber was very gnarled and displayed an obliquely sawn distal end and an extremely degraded proximal end. The absence of any wood working evidence except for the sawn end suggests that this represents a lump of waste wood created whilst the other timbers were being shaped.

6.25 ACI- Timber ACI displayed four tangential strikes and was effectively boxed. It measured 115mm in length, 70mm in width and 13mm in thickness and was considered to be a particularly degraded example. The purpose of this timber is unclear but it is unlikely to have acted as an upright post.

6.26 ACJ- Timber ACJ appears to have been an entire trunk with the bark removed which was struck tangentially 8 times at the distal end to form a point. The situation of the timber and the wood working evidence appear to suggest that this was an upright post. The timber measured 350mm in length, 220mm in width and 170mm in thickness.

6.27 ACK- ACK was a particularly large piece of *Quercus* s.p (oak) timber measuring 3596mm in length, 162mm in width and 90mm in thickness. It had been boxed by four tangential strikes and no sapwood was apparent. A saw may have been used to convert this timber. It is not clear what the use of this timber may have been. A sample of the timber was taken for dendrochronological dating which provided a date between AD1499 and AD1512.

6.28 ACL- ACL was recorded as being 400mm long, 130mm wide and 35mm thick. The proximal end was snapped and largely degraded and the distal end demonstrated a radial and a tangential split to a tip. The poor condition makes it particularly difficult to firmly interpret what the

purpose of the timber was but the morphology of the timber is suggestive of an upright post. Although no bark was present on the timber, a clear layer of sapwood was observed.

6.29 ACO- Timber ACO appears to have acted as an upright timber. It displayed two radial splits and a suite of tangential strikes at the proximal end forming a tip. Tool marks on the timber suggest that the timber had been prepared with a narrow bladed instrument, possibly an axe or an adze. The timber measured 1180mm in length, 140mm in width and 92mm in width. An inspection of this timber revealed it to be *Quercus s.p* (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.30 ACY- ACY appears to have been a tree or large branch stripped of bark and cut laterally into two pieces with a saw. A total of six tangential strikes at the proximal end of the timber formed then end into a convincing tip. The distal end was snapped in antiquity. The timber measured 1558mm in length, 117mm in width and 108mm in thickness. The size and morphology of the timber suggest that the timber may have been an upright post. An inspection of this timber revealed it to be *Quercus s.p* (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.31 ACZ- Timber ACZ appears to have been tangentially sawn in half very close to the pith. Four tangential strikes were also observed at the proximal end which formed a tip. The distal end was largely degraded. No bark was evidently associated with the timber but a thin horizon of largely decomposed sapwood was present. The timber measured 1687mm in length, 146mm in width and 108mm in thickness. The wood working evidence and situation of the timber strongly suggests that this acted as an upright post. An inspection of this timber revealed it to be *Quercus s.p* (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.32 ADA was an entire branch or tree 326mm in approximate diameter which was somewhat degraded, especially at the distal end. The proximal end was tangentially struck 4 times to form a tip. No tool marks were apparent but a possible worked notch was present, although this could be natural. The timber, thought to have been an upright post measured 2128mm in length. An inspection of this timber revealed it to be *Quercus s.p* (oak). It was sampled for dendrochronological dating but it was found to be wide ringed and was not suitable for dating.

6.33 ADE- Timber ADE measured 1680mm x 190mm x 170mm and appears to have acted as an upright post. Six tangential cuts worked the timber to a tip and a further four tangential cuts effectively rounded the other end of the timber. The timber was sampled for dendrochronological dating which provided a felling date between AD1477 and AD 1502.

6.34 ADF- This large piece of *Quercus s.p* (oak) timber was essentially a piece of roundwood which was stuck tangentially at the distal end to form a tip. No bark was present but a small amount of badly degraded sapwood was present. Measuring 2062mm in length, 189mm in width and 87mm in thickness, ADF was vertically inserted into context (0034) which suggests that it was an upright post. The timber was sampled for dendrochronological dating which provided a felling date of between AD1490 and 1515.

Unstratified timbers

6.35 All of the unstratified timbers appear to have been deposited horizontally within the structure. These timbers were presumably disturbed by the machine excavator during the stripping of the soil layers and accumulated overburden. The upright timbers, at the height at which the horizontal were discovered, had presumably decayed with good preservation been favoured in the riverine clays.

6.36 ABB- ABB was half a trunk which was radially split. It measured 567mm x 130mm x 58mm and appears to have been a horizontal timber.

6.37 ABC- The proximal end of ABC appears to have been struck at 90° across the proximal end and had 4 tangential strikes at the distal end to form a tip. It measured 440mm x 90mm x 55mm and appears to have been a horizontal timber.

6.38 ABF- Timber ABF received a tangential cut at the distal end a single oblique tangential cut at the proximal end. It measured 575mm x 115mm x 15mm and appears to have been a horizontal timber.

6.39 ABM- Timber ABM appears to have been sawn at the distal end and been stuck tangentially five times at the proximal end. The distal end has been snapped, probably in antiquity which may be a result of an attempt to fit it in-between upright posts.

6.40 ACP- ACP was a large *Quercus* s.p (oak) timber which was half a trunk which was radially split and received a series of tangential strikes with a narrow bladed instrument to shape it. The timber contained 2 rows of nails and a mortise/peg hole. It measured 3463mm x 261mm x 221mm and it thought to be a horizontal timber. A sample of the timber was taken for dendrochronological dating but was found to be unsuitable for this method of dating.

6.41 ACQ- Timber ACQ was half a trunk which was radially split and then tangentially boxed. A possible mortise hole was unfortunately damaged during the ground works. The timber measured 2411mm x 242mm x 146mm and thought to represent a horizontal timber.

6.42 ACR- This timber appears to have been split radially down the centre. There is no apparent tip and each end appears to have been sawn suggesting it was horizontal timber. It was recorded as been 1861mm in length, 230mm in width and 169mm in thickness.

6.43 ACS- ACS was a timber plank which had been struck radially once and tangentially three times. Both of the ends of the timber had largely degraded. The plank, which measured 865mm x 220mm x 65mm, is likely to have been a horizontal timber.

6.44 ACT- ACT was first radially split and then sawn tangentially sawn forming a boxed timber. A blunt tip was formed by various tangential strikes. The timber measured 1016mm x 182mm x 170mm and may have been used a horizontal timber.

6.45 ACU- Timber ACU was boxed by the utilisation of a saw on a radial plane and three saw lines on a tangential plane. A further 2 tangential strikes were made at the distal end and measured 758mm x 124mm x 69mm. This timber is believed to have been deposited horizontally.

6.46 ADI- ADI was recorded as been 3135mm in length and was sawn in half on-site as a way of effectively retrieving it. The timber was radially split twice and had one large tangential strike to form a blunt point. It is not clear whether this timber represents a vertical or a horizontal structural addition.

Condition

6.47 Using the Humber wetlands scoring system, it is possible to score the wooden remains condition (Van de Noort et al 1995). The waterlogged upright posts, horizontal rods and waste were considered to largely be in a condition ranging between 2 and 4, with occasional examples in 5. The wood which scored a 5, ADA, ABY, ADI and ACQ could be conserved and many of the remaining examples can have technological analysis conducted.

Table 1. Scoring system

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

Dendrochronology results

By Robert Howard

6.48 A total of 15 timbers were sampled for dendrochronological dating by Robert Howard of Nottingham Tree Ring Laboratory. A report detailing the methodology of the tree ring dating will follow.

6.49 Of those timbers only 7 (ACK was dated twice) were successful. The absence of bark associated with timber or an incontestable final growth ring meant that 'sapwood estimates' were used produced an estimated felling date. These are detailed in the table below.

Table 2. dendrochronology

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-A07	ACK 1	45	h/s	1428	-----	1472	After 1487
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)							

Results/Discussion

6.50 With the exception of timbers AAT, ABY and ACC, the timbers all fall within a range of AD1477 and AD1518. This suggests that there were broadly involved within contemporary activities associated with the construction of the structures. Timbers AAT and ACC appear to be relate to the same spatial group and these similar dates, AD1510-1536, certainly bolster the suggestion that this group (post alignment A) was built in a single event and was a later addition to the western most structure. Interestingly, the earliest timber detected was ABY which had a felling date of AD1453-AD1578. The presence of this timber within the structure suggest that either the structures construction was actually earlier than the other dates suggest, or the timber was felled some time previous to its deposition or represents a re-used timber.

6.51 The pattern of upright driven timbers in association with the horizontal timbers does appear to form some kind of upright structure, the higher aspects of which have since degraded. Although there is a reasonable collection of wooden remains, the joining structural elements are not particularly well represented and more comparisons of similar structures should be sought to assist with an interpretation.

Recommendations

6.52 The tool marks require analysis by a specialist of post medieval wood working and tool marks. The dates which have been provided may act as calibrative examples which can relatively date the tool mark morphologies and can be applied to the rest of the assemblage.

6.53 Timbers ADA, ABY, ADI and ACQ are excellent candidates for conservation. A suitable anoxic environment should be found as soon as is possible before the timbers begin to degrade.

7. DISCUSSION AND INITIAL CONCLUSIONS

7.1. The watching brief revealed a large number of important archaeological features that can now be summarised:

Late Medieval to Early Post Medieval Mill Timbers and stonework associated with a probable mill leat

The earliest features identified during the watching brief comprised two stone and timber 'platforms' (Platforms 1 and 2) built into the river bed, with a 4.5m channel between them which may have allowed water to flow in-between. The assessment of the wooden remains suggests that the upright timber posts were initially driven into the river bed (0034), with possible stone revetments constructed above brushwood platforms placed behind. The upright timbers were then joined by horizontal timber beams which formed slats between upright posts. Up to six portions of linear stone foundations or packing stones, in some places abutting timber alignments serving as revetments, (e.g. [0036]), were also observed. For purposes of initial analysis the timbers have been divided into up to seven observed alignments (A-G), although at this stage interpretation is not finalised.

The dates provided by the dendrochronology indicate that all observed structures were broadly contemporary (with alignment A perhaps slightly later) and constructed during the later phases of occupation of the medieval monastery. Indeed, the proximity of the abbey to the structures hints that modification of the river and the erection of the structures was associated with the monastic complex. Furthermore, the latest timber dated by dendrochronology provides a date of 1510-1535, which may indicate that the site fell into disuse at the time of the dissolution of the monasteries.

Although it is currently uncertain what these structures represent, they were clearly a prominent structure (s) within the River Derwent during the end of the 15th century and the beginning of the 16th century AD. It seems most probable that the structures represent part of a mill complex and possibly part of a leat. Further analysis of the material and the development of these structures, including a search for comperanda, will provide a more satisfactory explanation of what these enigmatic structures were and how the river was modified at this time.

8.2. *Post Medieval and later features*

Once abandoned, the timber structures appear to have been destroyed by riverine erosion. Following the disuse of the possible mill leat, a perimeter retaining wall (0012 and 0067) may have been constructed around the island. This may have allowed for a series of flooding and re-deposition events to accumulate 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 of an artificial eyot.

8.3 At a later date the perimeter retaining wall appears to have either collapsed or been demolished along the eastern edge. The alignment of structural stone [0033] and [0036] matches that of the 17th century mill race feeding the mills to the south of the island perhaps indicating a land-use continuity of sorts. At least one late structure appears to have been constructed on the island, formed by walls 0018 and 0019, which may relate to structures identified on the 1821 OS map.

8.4. 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 and economy of the Derwent Valley World Heritage Site. These initial observations can be more fully explored during a programme of formal post-excavation analysis and publication. In addition, the timbers themselves, of undoubted regional (and possibly national) significance, can also be conserved for display in an appropriate museum. Recommendations for these remaining tasks are now set-out below.

8. RECOMMENDATIONS AND OUTSTANDING TASKS.

9.1 The full analysis, publication and conservation of the timbers is now necessary and will allow this site to make an important contribution to Research Objectives set-out in the recent East Midlands Research Agenda and Strategy (e.g. Research Objective 8G; Study the post-Dissolution re-use of monastic structures and the continuity of monastic estates, and Research Objective 7E/7F) (Knight, Vyner and Allen, 2012).

9.2 The following post-excavation tasks set-out by the Derbyshire County Council Development Control Archaeologist and detailed under section 2.3 of the WSI remain outstanding.

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Plate 1 Linear stone foundation or packing (0030), Area 02



Plate 2 Brushwood 0035 partially overlying linear stone foundation or packing (0033), Area 02



Plate 3 Brushwood 0035 (foreground) with linear stone foundation or packing (0033) and post alignments 'A' 'B', 'C', 'D' and 'E' Area 02



Plate 4 North facing section of Area 02 showing layers of flood deposits stone foundations



Plate 5 Linear stone rubble foundation/packing 0036, Area 02



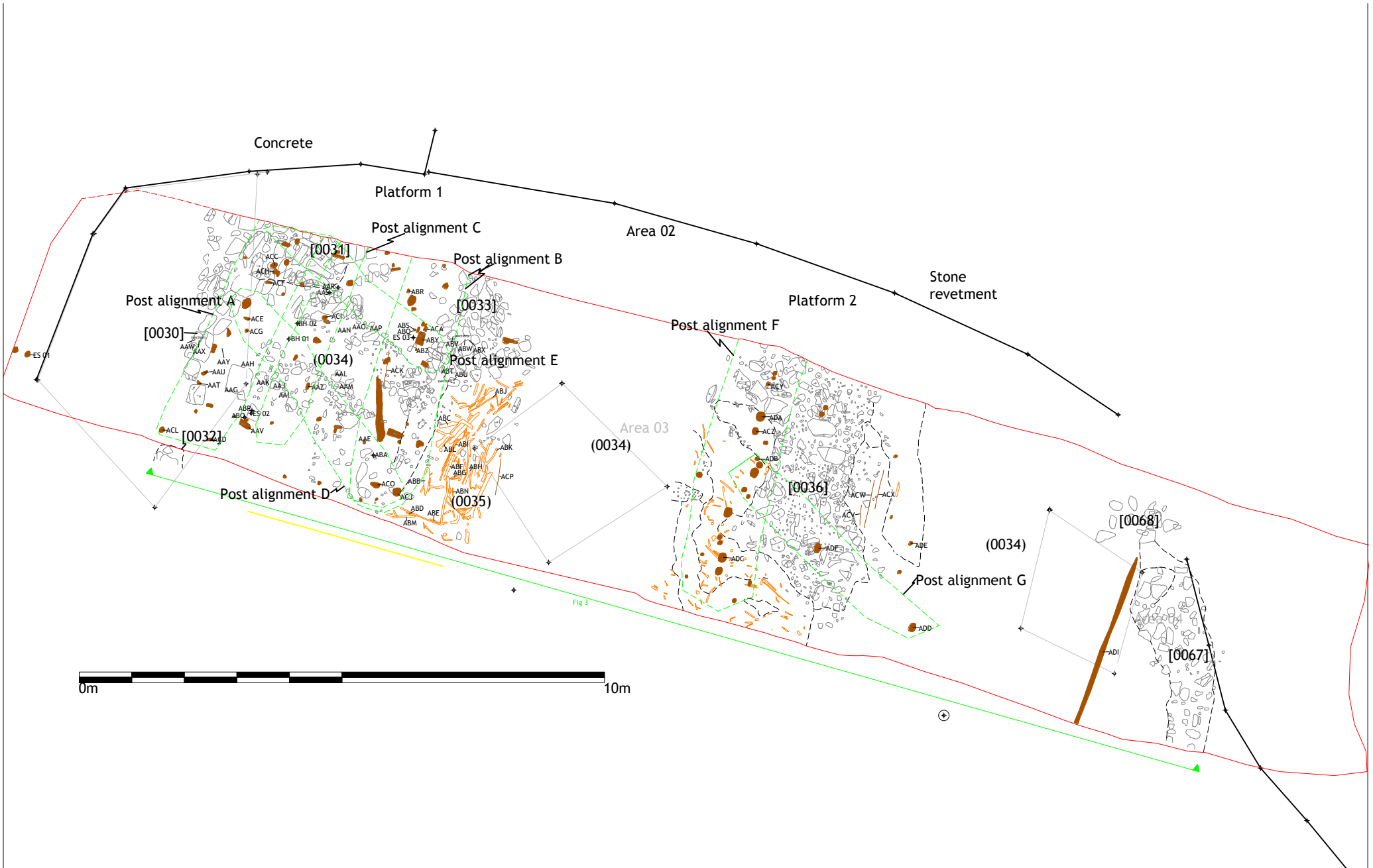
Plate 6 Section through robbed-out rubble foundation 0036 with post alignment 'F' immediately to the west, Area 02



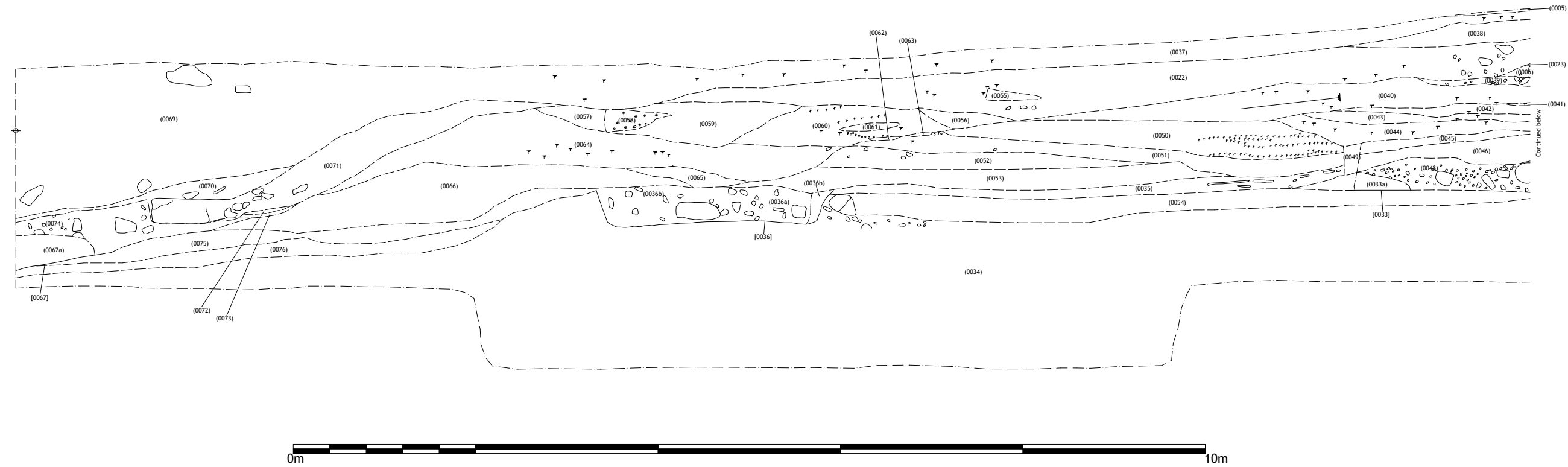
Plate 7 Linear stone foundation or packing 0067, Area 02



Plate 8 Post alignment 'F', Area 02



Site Code: DAF	Site Name: Darley Abbey Fish Pass		
Scale at A4:	Description: Plan of Platform 1 and Platform 2		
Figure 2			



- 0005 Mid grey brown friable and soft clay sily with 10% angular stone 30-100mm
- 0037 Black friable silt/charcoal
- 0038 Mid brown friable silt loam
- 0022 Light-mid brown friable sand with 15% sub angular red gritstone 200mm
- 0023 Mid brown friable clay sand with 40% crushed sub angular sandstone
- 0006 Redepleted red clay
- 0039 Mid grey friable sand clay with 5% sub angular stone
- 0040 Mid grey soft and friable silt clay with 15% root action
- 0041 Mid grey brown soft silt clay with 3% root action
- 0042 Mid grey brown clay sand
- 0043 Yellow loose sand with 20% root action
- 0044 Mid-light grey loose sand with 20% grey clay lenses and 10% root action
- 0045 Mid grey brown loose sand
- 0046 Light yellow loose sand
- 0047 Mid grey soft sand clay
- 0048 Light yellow loose sand with 65% sub rounded stone 30-50mm and large sub angular stone 200-300mm
- 0049 Mid grey clay sand
- 0050 Mid-light yellow loose sand with 20% grey clay lenses
- 0051 Mid grey soft clay sand with 15% yellow sand
- 0052 Grey sand
- 0053 Orange yellow sand
- 0035 Mid grey soft clay with 30% brushwood
- 0054 Mid-dark grey soft sand clay
- 0055 Yellow sand
- 0056 Yellow sand
- 0057 Yellow sand
- 0058 Mid-dark brown sand with 30% charcoal
- 0059 Mid-dark brown sand with 30% yellow sand
- 0060 Mid brown sand
- 0061 Yellow sand
- 0062 Black grit
- 0063 Orange sand
- 0064 Mid grey brown sand
- 0065 Yellow sand with 15% orange sand bands
- 0066 Light-mid grey clay sand with 20% orange sand patches
- 0067a Mid brown-grey friable sand clay with 50% sub-angular stone 100-500mm
- 0069 Mixed loose mid brown silt and sand with 30% grey sand - dump deposits from excavation
- 0070 Loose yellow sand
- 0071 Mid grey brown sand
- 0072 Light grey friable sand
- 0073 Loose yellow sand
- 0074 Mid brown friable sand with 20% sub-angular - sub-rounded stone 10-30mm
- 0075 Mid blueish grey soft clay
- 0076 Loose yellow sand
- 0034 Mid grey loose clay sand

