STONE WHARF
London SE7

London Borough of Greenwich

Watching brief report

May 2013

MUSEUM OF LONDON ARCHAEOLOGY

REGISTERED ORGANISATION IfA

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FGW 14

A report on the archaeological watching brief

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Summary (non-technical)

Museum of London Archaeology (MOLA) and The Thames Discovery Programme (TDP) were commissioned by Patricia Mak of Atkins Group, on behalf of their client the Environment Agency in order to record and assess the results of a watching brief carried out at Stone Wharf, Anchor and Hope Lane, Charlton, London Borough of Greenwich, SE7.

Work on the reconstruction of the river wall was monitored between the 20th of November 2012 and the 28th of February 2013

Thirty three nautical timbers were recorded, having either been recovered from behind the former river wall or disturbed on the foreshore during the enabling works. They appear to predominantly come from two Royal Navy warships, probably of brig, sloop or corvette size dating to the early-mid 19th century. A possible fragment of rudder was also recorded which probably came from a much smaller vessel such as a Thames sailing barge.

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1 Introduction

1.1 Site background

The watching brief took place at the river Thames foreshore at Stone Wharf, Charlton hereafter called 'the site'. The site is located at Stone Wharf, Riverside, Charlton, London Borough of Greenwich, SE7 (see Fig 1). It is bounded to the south by the Thames path, to the west by Vaizey's Wharf and to the north and east by the Thames foreshore. The centre of the site is at OS National Grid Reference 541005 179165. The site code is FGW14 .

An *Archaeological assessment and watching brief report* was previously prepared by MOLA/TDP, which highlighted the archaeological potential of the site (Wragg 2012a).

The Museum of London site code, by which the records are indexed and archived, is FGW 14.

The watching brief took place both on the foreshore and behind the river wall. The general area of this foreshore has been surveyed previously during the last four years by the Thames Discovery Programme, although no detailed work has been carried out on the specific area impacted upon by the proposed development.

Note: within the limitations imposed by dealing with historical material and maps, the information in this document is, to the best knowledge of the author and MOLA/TDP, correct at the time of writing. Further archaeological investigation or more information about the nature of the present features may require changes to all or parts of the document.

1.2 The planning and legislative framework

The Environment Agency is carrying out the work as permitted development and is therefore not subject to the general planning framework. The work is however, being carried out in accordance with archaeological best practice.

The Greenwich Unitary Development Plan identifies a number of Areas of Archaeological Potential within the Borough, one of which encompasses the riverfront extending out to the low tide mark. The site, therefore, is situated within this zone.

1.3 Origin and scope of the report

This report was commissioned by Atkins Group, on behalf of their client the Environment Agency and produced by Museum of London Archaeology (MOLA) and the Thames Discovery Programme (TDP). The report has been prepared within the terms of the relevant Standard specified by the Institute for Archaeologists (IFA, 2001).

The purpose of the watching brief was to determine whether archaeological remains or features were present behind the river wall and, if so, to record the nature and extent of such remains. Furthermore, if the works were to impact upon the known archaeological features on the foreshore, then they were to be recorded in mitigation.

The assessment has been carried out in accordance with the standards specified by the Institute for Archaeologists (IfA 2001), DCLG (2010), English Heritage (2008), and the Greater London Archaeological Advisory Service (EH 1998, 1999, 2009). Under the 'Copyright, Designs and Patents Act' 1988 the Environment Agency retains the copyright to this document.

All archaeological analysis and recording during the investigation on site was done in accordance with the Museum of London *Archaeological Site Manual* (1994) and MoLAS *Health and safety policy* (2009) and the evolved foreshore methodology developed by the TDP.

1.4 Aims and objectives

The Written scheme of Investigation for this work (Wragg 2012b) contained a number of research questions which can be summarized thus:

- Do any features or deposits of archaeological significance survive behind the existing river wall? If so what is their extent ,nature and dat?

All research is undertaken within the priorities established in the Museum of London's *A research framework for London Archaeology*, 2002

2 Topographical and historical background

2.1 Geology and natural topography

London occupies part of the Thames Basin, a broad syncline of chalk filled in the centre with Tertiary sands and clays. In the City, and in most of London, this Tertiary series of bed-rock consists of London Clay. Above the bed-rock lie the Pleistocene (Quaternary) fluvial deposits of the River Thames arranged in flights or gravel terraces. These terraces represent the remains of former floodplains of the river, the highest being the oldest with each terrace becoming progressively younger down the valley side.

During the post-glacial rise in sea level, Britain became separated from the European Continent. Subsequent climatic changes produced fluctuations in sea levels resulting in change to coastal and river patterns. In the Lower Thames Valley and Medway a series of silt and peat deposits in the estuaries have produced evidence for five marine transgressions over the past 8,500 years. Over that period the sea level has risen by 25m.

The result of this rise in sea level was that the Lower Thames Valley saw a build up of alluvial silts. The rise was not constant and during periods of regression the exposed areas of newly deposited silt was colonised by vegetation resulting in the deposition of peat. These processes of transgression and regression have resulted in layers of peat being sandwiched between layers of alluvial silts and sands.

Three geological borehole surveys have been undertaken approximately 150m east of the site. The first, undertaken at New Charlton, Riverside, recorded a layer of soft, grey silty clay with layers of brown, friable peat lying at between 4.3 and 5.2m below ground level (BGL). The second, some 50m further south, revealed friable, dark brown/black peat at between 5.7 and 6.5m BGL. The third, just to the east, recorded friable, dark brown/black peat at between 4.2 and 5.3m BGL.

The site is situated on the south bank of the river Thames below the Thames River Path. The geology of the area has been previously observed to comprise natural sands. The foreshore at Vaizey's Wharf has been previously surveyed by the TDP (site code FGW14).

2.2 Prehistoric

To the south of the site, in Charlton, evidence of Iron Age and earlier activity has been recorded although there is no evidence of activity in the immediate area of the site itself. As discussed in 2.1 above, the earlier borehole surveys revealed peat deposits at between 4.2 and 6.5m BGL. At Bugsby's Way, some 700m to the south-west of the site, an auger hole survey recorded deposits dating from the Upper Palaeolithic to the late Neolithic periods. Geoarchaeological monitoring at the Thames Barrier, approximately 500m east of the site, revealed gravels overlain by peat, and organic and alluvial clay. At Greenwich Industrial Estate, some 900m south-west of the site, further geoarchaeological survey recorded sediments and peat deposits which suggested a possible river channel. North of the river, auger holes at Royal Victoria Dock recorded possible ancient river channels. Excavations

during the early 20th century, at Maryon Park, approximately 900m south-east of the site, revealed Bronze Age lithics and ceramics. North of the river at Silvertown, a sherd of prehistoric pottery was recovered.

2.3 Roman

There is no evidence of Roman activity in the immediate vicinity of the site, although it has been suggested that Woolwich Road may be of Roman origin, while a signalling station is believed to have been located east of the Greenwich peninsular. It has also been suggested that gravel may have been quarried from Maryon Park during this period. Excavations in the wider area have also revealed evidence for salt making, metalworking, substantial timber buildings and a possible circular mausoleum. North of the river, at North Woolwich Road, a borehole survey found sediments dating to the Roman and post-Roman period.

2.4 Medieval

The only evidence of activity dating to this period in the area of the site is the recovery of an 11-12th century cooking pot recovered from the river near Silvertown on the north bank. Charlton itself dates to the Anglo-Saxon period, the name meaning the town of the husbandmen or *coerles.* There is documentary evidence for Woolwich Road dating to 1023, when the body of St Alphege was brought from Canterbury to London along it. Charlton church is mentioned in a document dating to 1077, while *Cerleton* is mentioned in the Domesday Book of 1086.

2.5 Post-medieval

Post-medieval chalk and sand pits have been located at Valley Grove, approximately 800m south of the site, while finds dating from the 15th to 18th century have been recovered from the north bank foreshore near Customs House Quay.

The area of the site itself appears to have been relatively undeveloped until recent times. In 1622 a waterman, John Taylor, told of his journey down river:

...past Greenwich marshes where a small colony of watermen and fishermen lived in isolation, past the pig farms of Charlton, the Isle of Dogs with its fishing village, past small gunpowder plants dotting the shoreline to Gravesend and beyond.

The Rocque map of 1746 showed a rural environment of fields with a lane running from the main east-west road towards, but not reaching the riverbank, now known as Anchor and Hope Lane, with its distinctive kink, it was, at this time, depicted as Manor Lane. The site probably lies towards the bottom of the foreshore depicted here, as later developments appear to have encroached into the river.

The Ordnance Survey map of 1869 shows that, although the immediate area was still dominated by fields, the first stirrings of riverfront development had begun. A rope manufactory had been set up to the west of Anchor and Hope Lane, now extended to the river and known by its modern-day name. Immediately to the north of the rope works was a public house and associated structures, while three buildings and a pump had been erected east of the lane. At the end of Anchor and Hope Lane, and west of the site, Charlton Wharf had been built, jutting out onto the foreshore, on which stood a crane. A causeway was depicted further to the west, and beyond it more structures were shown. To the east Charlton Ballast Wharf had been erected,

along with an associated railway track, probably to deal with the sand then being exported from Charlton.

It seems likely that Charlton Wharf was occupied by the shipbreaking firm Castle and Beech by this time; documentary evidence suggesting that they opened a yard here around 1856. Known as “Riverside Wharf” or “Anchor and Hope Wharf”, the site appears to have been Crown property and leased to the firm. In 1864 the Admiralty approved the styling of the works as an “Admiralty shipbreaking Yard”. Castles’ used the recovered timbers primarily for the construction of garden furniture, while the figureheads were used to decorate the walls of their yard at Baltic Wharf, Millbank.

A slipway comprising approximately 80 re-used warship timbers has been recently located some 10m south of the study site by the TDP and recorded as α327. The timbers appear to have come from at least three vessels of brig, sloop, corvette or frigate size; the slipway seems most likely to have been built between 1861 and 1885. It seems likely that this structure was associated with the shipbreaking which took place on the foreshore

The Ordnance Survey map of 1894-6 showed further development, most noticeably that the former Charlton Wharf had been extended, Durham Coal Wharf and Charlton Parish Wharf had been built further to the west, and still further west a barge building works had been constructed. Although still largely rural, the area behind the riverfront also showed signs of encroachment; to the east of Anchor and Hope Lane and just south-west of the site a timber yard had been erected, and to the west, south of the rope manufactory a number of other isolated structures had been built. The barge building yard was owned by William Cory and Sons, established in 1896, whose main trade was importing coal to London and exporting rubbish to be dumped on the Essex and Kent marshes. To the south of the site itself, an east-west running path or track was in evidence, while the land south of this was still undeveloped. Further east of the site, the Silicate Paint Works has been constructed.

Recent surveys and research by the TDP has suggested that a structure, recorded as α333, was built on the foreshore to the north west of the site in front of what is now known as Vaizey’s Wharf, during the period 1904/5. The structure appears to have been built from more than 100 timbers from the first rate warship HMS *Duke of Wellington* launched in 1852 and at least one of the second rates HMS *Anson*, *Edgar* or *Hannibal* launched in1854, 1858 and 1860 respectively, along with fragments of armour plate from the iron proto-battleship HMS *Ajax* launched in 1880. This structure, again, seems likely to be associated with the shipbreaking activity.

Two timber revetments and a possible crane base have recently been recorded behind, and thus probably pre-date, this structure. The earlier revetment (α337) contained only three un-diagnostic re-used vessel timbers, and has therefore been suggested to date to the establishment of the ship-breaking yard in c.1856. The crane base (α341) contained four re-used vessel timbers, two of which have been interpreted as deck beams from a first rate ship of the line, suggesting a date range of 1875-1904. The later revetment (α336) contained a number of re-used vessel timbers including a number which have been identified as deck beams from vessels of fifth to third rate size. It suggests that this revetment dated to the period 1862-1894.

The revetment on the eastern face of Vaizey’s Wharf, immediately west of the site, also appears to comprise some re-used warship timbers, in this case, side planking.

It has been recorded by the TDP as α340 but has not yet been investigated in any detail.

A recent engineering trial hole dug behind the current river wall in the car park west of the flats on Vaizey's Wharf revealed a possible wooden capstan which may also be related to the ship-breaking yard.

The 1916 Ordnance Survey Map showed the new structure built in 1904/5 (α333) on the foreshore. The land immediately south of the site was still undeveloped, although a glass bottle works had been erected to the west of Anchor and Hope Lane with allotments and a paint works further south. To the south of the paint works two groups of housing had been constructed around Derrick Gardens and Atlas Gardens, with allotments further east. It appears that by this date the river wall is now on its current alignment.

By 1937 the Ordnance Survey Map demonstrated that the immediate area had now been fully developed; the area south of the site being occupied by an engineering works.

The 1952-3 Ordnance Survey Map shows a broadly similar picture, although the engineering works has now been replaced by a foundry.

In 2008 a walkover survey undertaken by TDP identified a small number of timbers protruding from the foreshore at the eastern end of the site. These were tentatively interpreted as part of a buried vessel and noted as α325.

A watching brief was carried out during the geotechnical investigations undertaken in 2011 which revealed prehistoric alluvial and organic deposits beneath 19th/20th century made-ground behind the river wall.

3 The watching brief

3.1 Methodology

All archaeological excavation and recording during the watching brief was done in accordance with the *Archaeological Site Manual* (MoLAS, 1994) and to the standards set out in the English Heritage, London Region, *Archaeological Guidance Papers 1-5* (revised 1998).

The project has been designed to produce an archive that could be integrated with the Thames Archaeological Survey (TAS) records. Observations and features have been given α (Alpha) numbers, forming part of a continuing series covering this part of the Thames Archaeological Survey Foreshore Zone, within which the site lies.

Timbers which needed recording were drawn in detail at a scale of 1:10 and allocated numbered context. A full photographic record was kept of the site.

The site finds and records can be found under the site code FGW14 in the on-going TDP/TAS archive held at MOLA.

3.2 Results of the watching brief

The deposits observed behind the river wall were similar to those observed in the 2011 watching brief (Wragg 2012a) and have not been commented upon here.

3.2.1 Foreshore timbers

During the engineering works one of the timbers comprising the foreshore structure was impacted upon and a number of others were displaced by propeller wash from the river tug whilst positioning a jack-up barge. These are discussed below.

Timber [100], probably oak, was partially moved by one of the legs of the jack-up barge and pushed into the foreshore, its position now, however, appears to be stable. It had previously been recorded by the TDP as a futtock (one of the curved timbers that forms a rib in the frame of a ship), being moulded 2.32m by 0.23m at one end and 0.21m at the other. Two 0.08m diameter mortises were recorded in its moulded face along with three 0.03m treenail holes. The part of the internal side seen during this watching brief was visible for a length of 1.92m and measured 0.24m wide. It contained one 0.03m treenail hole, two 0.08m diameter mortises, (which were 0.04m deep), along with three 0.015m bolt holes, which could have accommodated bolt heads 0.04m in diameter. The joint to the next frame was visible and comprised a 0.08m diameter mortise which was 0.04m deep and contained a 0.015m inner hole, along with a squarish protrusion measuring 0.04m by 0.05m by 0.01m high.

Timber [101] was displaced by the propeller wash of the tugs. Probably of oak, this timber was moulded at the head 0.21m and its sided (outward) face 0.25m and was in the form of a shallow ‘v’ in its moulded face. It had a central rebate in its underside measuring 0.33m by 0.02m. Its moulded face showed four 0.08m diameter mortises which were 0.04m deep, with 0.015m inner holes. It’s sided (outward) face showed eight 0.015m diameter holes along with a bolt hole (0.015m diameter, 0.04m head)

in the rebate. Both ends of the timber contained 0.08m diameter/0.04m deep mortises with 0.015m inner holes. This timber was interpreted as a floor timber.

Possibly elm timber [102] was heavily damaged by one of the legs of the jack-up barge, but had previously been recorded by the TDP as being sided 0.28m and moulded 0.33m. It was 7.33m long and appeared to have been sawn up during the ship-breaking process- no scarf joints being recorded. Despite having been previously heavily damaged, a 0.06m deep by 0.07m wide rabbit was also recorded running along its moulded face, along with a large number of small copper alloy nails; it was identified as a keel timber. As recorded during the watching brief, now further damaged, it was 4.80m long; its upper surface contained seven 0.03m diameter holes, had four areas of iron concretion- possibly indicating the positions of bolts, and two areas which were raised approximately 0.01m with widths of 0.15m and 0.012m respectively. Its lower surface contained one 0.08m diameter mortise, three 0.06m diameter mortises and two with a diameter of 0.05m, all of which had 0.015m inner holes. This face was also liberally studded with small copper alloy nails.

Timber [103], probably oak, had been slightly moved by the tug, but appeared to have re-established itself as stable in a new position. Degraded at one end, it was 2.08m long, and moulded 0.20m at one end and 0.19m at the other and sided 0.20m. Its moulded face revealed three 0.015m diameter holes, one of which contained its treenail, its sided (external) face had twelve 0.015m diameter holes, five of which contained treenails. Its undamaged end had a 0.08m diameter mortise with a 0.015m diameter inner hole, and there was a slight chamfer in its internal face suggesting diagonal framing. It was interpreted as a futtock.

Probable oak timber [105], was moulded 2.01m by 0.22m at one end and 0.17m at the other, and was sided 0.25m. Its internal face had six 0.015m diameter holes, two of which contained treenails. One of the treenails was located within a slight (0.01m deep) almost rectangular rebate measuring 0.14m by 0.12m. Two bolt holes were recorded which would have accommodated 0.015m diameter bolts with 0.05m heads, along with one area of iron concretion which may represent the presence of an iron bolt. Its external face contained nine 0.15m diameter holes and two 0.03m diameter holes containing treenails, along with two rectangular rebates measuring 0.60m by 0.06m by 0.03m and 0.70m by 0.06m by 0.04m, both of which had a lateral 0.15m diameter hole, and the first of which had a 0.03m diameter hole containing a treenail. A further rectangular 0.03m deep rebate moulded 0.13m was recorded at the wider end. One of its moulded faces revealed a 0.15m diameter treenail hole, along with two upstanding 0.08m diameter tenons, the opposite face revealed iron concretion in the area of the tenons suggesting the presence of iron bolts along with a further 0.15m diameter treenail hole. Each end had 0.08m diameter mortises with 0.015m diameter inner holes. This timber was identified as a lower (possibly first) futtock.

‘ V’ shaped timber [106], probably oak, had been slightly more exposed by the propeller wash of the tug but had not moved position. It was moulded 0.18m at the head and sided 0.22m. Its moulded face revealed three 0.08m diameter mortises, one of which was filled with iron concretion, another contained an iron bolt with a 0.04m diameter head, the other contained a 0.015m diameter hole. A rebate measuring 0.34m by 0.04m was recorded at the central base of the timber. Its sided face contained three 0.15m diameter holes, one copper alloy bolt with a 0.03m diameter head, one area of iron concretion suggesting the presence of an iron bolt and a 0.03m diameter hole with its treenail located within the central rebate. Its

visible end contained a 0.08m diameter mortise with a 0.015m inner hole and was slightly canted. It was identified as a floor timber.

Probable oak timber [107], dislodged by the tug, was moulded 2.61m by 0.22m at one end and 0.17m at the other and sided 0.20m. Its internal face revealed six 0.03m diameter holes, four of which contained treenails, one iron bolt with a 0.03m diameter head, two bolt holes for 0.015m bolts with 0.04m diameter heads, and a 0.02m deep by 0.14m wide diagonal rebate containing a 0.015m diameter hole. Its external face revealed two 0.03m diameter treenail holes containing treenails, four 0.015m diameter holes, one of which had its treenail, and an oblique bolt hole for a 0.15m diameter bolt with a possible 0.05m head. No fittings were observed in the moulded faces, while the narrower end contained a 0.08m diameter mortise; the wider end revealed a 0.015m diameter hole and a bolt hole for a 0.015m bolt with a 0.04m head. This timber was identified as a (possibly upper) futtock.

Dislodged timber [110], probably oak, was moulded 2.11m by 0.23m at one end and 0.20m at the other, and sided 0.25m. Its internal face contained two 0.015m diameter treenail holes, four 0.03m diameter holes, one of which had its treenail, a concreted iron bolt within a 0.08m diameter tenon, a damaged 0.08m diameter mortise and three bolt holes for 0.015m diameter bolts with 0.03m heads. Its external face revealed nine 0.015m diameter holes, one of which contained a treenail, five 0.03m diameter holes, two of which had their treenails. There was also a 0.03m deep rebate moulded 0.21m. One of its moulded faces contained one 0.08m diameter tenon and one 0.08m diameter mortise containing iron concretion, along with one 0.015m diameter hole. The other moulded face had an area of iron concretion in the area of the tenon on the other side, suggesting the presence of an iron bolt and three 0.03m holes containing iron concretion, again suggesting the presence of bolts. The wider end contained a 0.08m diameter tenon, the other end was to degraded to identify any fittings. This timber was interpreted as a (possible first) futtock.

Dislodged, probable oak timber [111] was moulded 2.12m by 0.25m at one end and 0.20m at the other, and sided 0.22m. Its internal face revealed eight 0.015m diameter holes, three of which contained treenails, two areas of iron concretion suggesting the presence of bolts, and two boltholes for 0.015m diameter bolts with 0.03m heads. Its external face had seven 0.03m diameter holes, two of which had their treenails, three 0.015m diameter treenail holes, one area of iron concretion suggesting the presence of a bolt, a rectangular 0.05m deep rebate measuring 0.07m by 1.36m, along with a 0.03m deep rebate, moulded 0.19m at its wider end. One of the moulded faces had two 0.08m diameter mortises, one with a visible 0.015m central hole, three 0.015m diameter holes, one of which contained a treenail, one 0.03m diameter hole and one area of iron concretion suggestive of the location of a bolt. Both ends had 0.08m diameter mortises with 0.015m diameter inner holes. This timber was interpreted as another (possible first) futtock.

Probable oak, ‘V’ shaped timber [114], had been more exposed during the works, but appeared to have remained *in situ*. It was moulded.21m at the head, and was sided at least 0.15m (not fully visible). Its moulded face had four 0.08m diameter mortises with 0.015m inner holes, a small rectangular rebate measuring 0.03m by 0.26m. A further rebate measuring 0.03m by 0.30m was located centrally, and its visible end had a 0.08m diameter mortise with a 0.015m central hole. It was identified as a floor timber.

Dislodged timber [116] was probably oak, moulded 2.29m by0.23m at one end and 0.20m at the other, and sided 0.22m. Its internal face revealed sixteen 0.015m diameter holes, two of which contained treenails, one 0.03m diameter hole with its treenail and four bolt holes for 0.015m diameter bolts with 0.03m heads. Its external face had twenty 0.015m diameter holes, three of which contained treenails, and one of which a copper alloy bolt. It also had one 0.03m diameter hole and an area of iron concretion suggesting the presence of an iron bolt. A slight rebate was also recorded in an area of damage measuring 0.02m by 0.02m by at least 0.20m. One of the moulded faces contained two 0.015m diameter holes; the other had three 0.03m diameter holes and two areas of iron concretion suggesting the position of bolts. Both ends had 0.08m diameter mortises with 0.015m inner holes. This timber was interpreted as a futtock.

Probably oak timber [176] had previously been damaged, and while displaced by the actions of the tug had settled into a new yet stable location. It was moulded 2.05m by 0.21m at one end and 0.16m at the other, and sided at least 0.15m. Its moulded face had one 0.03m diameter hole and six of 0.015m diameter, along with a partial lateral 0.015m diameter treenail. Its visible internal face should two areas of concretion possibly suggesting the location of bolts and a diagonal rebate 0.02m deep by 0.14m wide. It was interpreted as a (possible cant) frame.

Dislodged timber [177], probably oak, was moulded 2.28m by 0.25m at one end and 0.22m at the other, and sided 0.20m. Its internal face revealed seven 0.015m diameter holes, one of which contained a treenail, three 0.03m diameter holes, two of which contained treenails, a diagonal rebate 0.02m deep and 0.13m wide, and two interconnecting rectangular rebates at its wider end; the deepest measured 0.08m by 0.09m by 0.55m, the other 0.04m by 0.14m by 0.34m. The external face had nine 0.015m holes, two of which contained treenails and one 0.05m diameter hole. One of the moulded faces revealed one 0.015m diameter hole and an area of iron concretion suggesting a possible bolt location. The other had nine 0.015m diameter holes, three of which appeared to have iron bolts *in situ*. The thicker end had a 0.08m diameter mortise with 0.015m inner hole, while the narrower end had a protruding 0.08m diameter tenon. This timber was identified as a futtock.

Probable oak timber [178] had had a small amount of previous damage prior to dislodgement. It was moulded 1.81m by 0.21m at one end and 0.18m at the other and sided 0.19m. Its inner face had four 0.015m diameter holes, two of which contained treenails, one 0.03m hole complete with treenail, and a diagonal rebate 0.02m deep and 0.14m wide. The external face had ten 0.015m diameter holes, seven of which contained treenails. One of the moulded faces had one 0.015m hole and a lateral one of the same diameter. The other had one 0.03m diameter hole, one area of iron concretion suggestive of a bolt location, and a series of possible tool/builders marks. Both ends had 0.08m diameter mortises filled with iron concretion suggesting the presence of bolts. It was interpreted as a futtock.

3.2.2 River wall timbers

A number of nautical timbers were also removed from behind the river wall during the works and are discussed below.

Probable oak timber [229], fairly damaged and degraded, was moulded 1.57m by 0.19m at one end and 0.18m at the other and sided 0.18m. It had four 0.03m diameter holes, and a diagonal rebate 0.02m deep and 0.14m wide with a 0.15m hole within. There was also possibly part of a further diagonal rebate at the narrower

end. Its external face revealed one 0.03m diameter hole and twelve 0.015m diameter holes, two of which contained treenails. One of the moulded faces had four 0.03m diameter holes and one 0.015m diameter hole, along with a larger (post breaking?) hole 0.08m by 0.08m and up to 0.03m deep; the other had three 0.03m diameter holes, and two 0.015m diameter holes within a possibly triangular 0.07m deep rebate which was 0.31m long and up to 0.08m wide. The ends showed no evidence of joints, possibly as a result of being sawn through during the breaking process. This timber was identified as a futtock.

Timber [230], probably oak and slightly damaged, was moulded 2.82m by 0.18m and sided 0.19m. Its internal face revealed seven 0.03m holes, two 0.02m deep and 0.14m wide diagonal rebates, and some small fragments of red paint. Its external face contained eight 0.03m holes. Both of its moulded faces each had three 0.03m diameter holes, and each end contained a 0.08m diameter mortise with a 0.015m inner hole. It was identified as a futtock.

Probable oak timber [231] which was slightly damaged, was moulded 1.99m by 0.03m at one end and 0.29m at the other, and sided 0.24m. Its presumed upper surface revealed eight 0.03m diameter holes, two of which contained treenails, while the lower face had seven 0.03m diameter holes, again, two containing treenails. One of the supposed vertical faces had one 0.03m diameter hole, one 0.015m diameter hole, and two 0.01m diameter holes containing treenails with traces of white paint. The other revealed three 0.015m holes. This timber has been tentatively interpreted as rising deadwood.

Red wood (teak?) timber [232] had been heavily damaged and it was not possible to identify it (although one chamfered edge suggests that it may be a breast hook or crutch?). As a result it was not possible to establish the moulded or sided dimensions and was measured as being 1.95m long, had a maximum width of 0.27m and a maximum height of 0.18m. One face had five 0.03m diameter holes, one containing a treenail; another face had one 0.03m diameter hole containing a treenail; while a third face had five 0.03m holes, three of which contained treenails.

Probable oak timber [233] was heavily damaged and, again, it was not possible to identify it. It was 1.98m long, had a maximum width of 0.10m and maximum height of 0.25m. There was a definite rectangular rebate in one end measuring 0.55m by 0.04m, and a possible further rebate in the other end measuring 0.03m by 0.18m. One edge was chamfered. One face had six 0.03m diameter holes and two bolt holes; one accommodating a 0.15m diameter bolt with 0.04m head, the other a 0.03m diameter bolt with a 0.05m head. The opposite face had six 0.03m diameter holes.

Damaged probable oak timber [234] was not identified. It was 2.07m long, up to 0.18m wide and 0.15m high. Two of the faces had no fixtures or fittings, while one had a 0.03m diameter hole. The other had three 0.03m diameter holes and a 0.05m deep and 0.35m long rectangular rebate in one end.

Probably oak timber [235] was heavily damaged and not identified. It was 2.24m long, 0.20m wide and had a maximum thickness of 0.17m. One face had no fixtures or fittings; one had two 0.03m diameter holes, one of which contained a treenail, and one copper alloy nail; one had one 0.03m hole complete with treenail; and the last had four copper alloy nails, and a scarfed end 0.53m long within which were three 0.03m diameter holes, one of which contained a treenail and the other a copper alloy bolt.

Timber [236], probably of oak, was heavily damaged and tentatively identified as side or bottom planking. 1.08m long, 0.11m thick and up to 0.13m wide, it had five 0.03m diameter holes, one containing a treenail, one 0.025m diameter hole with a treenail, four 0.02m diameter holes, one of which had a treenail and a 0.01m diameter copper alloy nail or tack.

Fairly damaged timber [237], most likely oak, was not identified. 1.54m long, 0.19m thick and up to 0.30m wide it was chamfered down one edge. One edge had six 0.03m diameter holes, five which contained treenails, one of which had a triangle inscribed in its end. The other edge contained three 0.03m diameter holes containing treenails and one area of iron residue.

Probable oak timber [238] was quite heavily damaged and could not be positively identified. 2.10m long, up to 0.21m wide and 0.17m thick it was chamfered at either end. One face had a 0.05m diameter hole and one with a diameter of 0.04m, another had a 0.02m square hole, and a third had an oval hole roughly 0.08m by 0.05m.

Fairly damaged probable oak timber [239] was 1.13m long, 0.21m wide, 0.09m thick and was identified as bottom planking. The internal face had one 0.02m diameter hole, while the external face had three 0.025m diameter holes, two holes for 0.02m diameter bolts with 0.05m diameter heads and two lines of copper alloy nails showing where the edges of copper sheathing overlapped.

Slightly damaged, probably oak timber [240] was tentatively identified as a (cant?) frame, and was moulded 0.32m at one end and 0.17m at the other end of its 1.35m length, and sided 0.15m. It was chamfered at its wider, supposed lower, end and had a 0.08m diameter mortise with a 0.015m diameter inner hole at the other. Its presumed external face had eight 0.03m diameter holes containing treenails and one hole of 0.02m diameter, while the possible inner face showed four 0.03m diameter holes, three of which contained treenails, and one area of ferrous residue.

Heavily damaged and degraded timber [241] was probably oak and possibly part of a frame. It was 1.40m long, moulded 0.21m at one end and 0.17m at the other and sided 0.21m. Both ends were heavily degraded, but the possible lower end may have had a 0.08m diameter mortise. The possible external face had four 0.02m diameter holes and a rectangular rebate measuring 0.52m x 0.02m x 0.03m, while the presumed inner face had a rectangular rebate measuring 0.19m x 0.05m x 0.02m and a 0.015m diameter iron bolt. One of the moulded faces had traces of white paint suggesting that it may have been a fragment of an internal frame such as a rider.

Probable oak timber [242] was heavily damaged and identified as a fragment of bottom planking; it was 1.18m long, 0.21m wide and 0.10m thick. One face had three 0.03m diameter holes, one 0.02m diameter hole and one bolt hole for a 0.03m diameter bolt with a 0.06m diameter head. The other face had two possible 0.02m diameter holes, two 0.03m diameter holes, one 0.025m diameter hole, one bolt hole (0.03m diameter, 0.06m head) and three copper alloy nails.

Slightly damaged probable oak timbers [243] and [248] appear to comprise a fragment of a rudder. Timber [243] 1.37m high, 0.39m long and 0.09m thick, while [248] 1.30m high, 0.17m long and 0.09m thick. Both timbers had areas of iron concretion, [243] had an iron bolt or nail in one of its sided faces and an iron bolt in its end, while [248] had had a further iron bolt in its end.

Extremely degraded probable oak timber [244] was 1.28m long 0.19m wide and up to 0.23m thick; there was no possibility of identifying it. One face had two 0.15m iron bolts, two 0.03m? diameter holes and a possible rebate, another had one 0.03m? hole and areas of ferrous concretion, a third had a large iron bolt surrounded by concretion and four 0.03m? diameter holes, while the fourth had two 0.03m? diameter holes.

Probable oak timber [245] was shaped like a frame element, but there were not nearly the amount of required fixtures and fittings for it to function as a frame. It, therefore, has not been positively identified, but was recorded as being 2.60m long, up to 0.21m wide and with a maximum thickness of 0.19m. One face had a rectangular rebate in the end measuring 0.59m by 0.23m by 0.03m; a second had one 0.03m diameter hole; the third had a rebate measuring 1.31m by 0.22m by 0.03m which contained a 0.03m diameter hole; the last had a rebate in one end measuring 0.18m by 0.06m by 0.08m and a 0.06m diameter mortise with a 0.008m diameter inner hole.

Fairly damaged probably oak timber [246] was identified as a frame. 2.36m long, it was moulded 0.22m at one end and 0.20m at the other while being sided 0.21m. One of the moulded faces had two 0.03m diameter holes, one 0.015m diameter hole and a 0.08m diameter mortise with a 0.03m diameter inner hole, along with a rebate measuring 0.57m by 0.05m by 0.03m; the other had a degraded 0.03m hole and a small rebate in one end measuring 0.10m by 0.04m by 0.01m. Its outer face had five 0.03m diameter holes, one hole of 0.02m diameter and another of 0.05m, along with a 0.02m diameter copper alloy fitting and a 0.12m diameter mortise with a 0.03m diameter inner hole. The inner face had three 0.03m diameter holes, two 0.015m diameter holes and a 0.015m diameter iron bolt. This timber was heavily iron-stained; it was impossible to determine whether this was a pre- or post- breaking deposit, although the latter seems more likely.

4 Potential of archaeology

4.1 Original research aims

The Written Scheme of Investigation (Wragg 2012b) prepared for this work outlined three research questions which can be summarised thus:

- Do any features or deposits of archaeological significance survive behind the existing river wall? If so what is their extent nature and date?

Seventeen probably 19th century nautical timbers were recorded, having been removed from behind the river wall. They appear to be associated, broadly correlating in size, type, fixtures and fittings, with the timbers comprising the foreshore structure and are, therefore, discussed together below.

4.2 New research aims

- What was the function and extent of the foreshore structure?

Although the structure has been widely referred to as a slipway, there is no evidence of shipbuilding in the area, and no fixtures or fittings recorded on the timbers suggest that any of the necessary props had been erected. Likewise, given that industry replaced agriculture in the area, it is unlikely to have functioned as a slipway for the launching of small craft. Sloping down the foreshore it is much more likely to have been a causeway, with the purpose of accessing vessels at low states of the tide. The location of a number of the timbers behind the river wall also suggests that it was originally larger than its current extent and may have extended beyond the line of the current river wall.

- What date is the foreshore structure?

The establishment of the Castle's ship-breaking yard in the mid-1850s appears to have been the first industrial development in the area (see 2.5). It therefore seems highly likely that the structure post-dates this development. Possible candidate vessels for the timbers have been assembled from documentary sources (Lyon and Winfield 2004) and suggest a possible date range of 1856-1933 (most probably 1856-1908).

- What ship timbers can be identified with any certainty?

Timber [102] was quite clearly part of a keel, while timbers [101], [106] and [114] are certainly floor timbers. Timbers [105], [110] and [111] appear to be first futtocks having a distinctive rebate to fit the keel at their lower ends; while timbers [100], [103], [107], [116], [177], [178], [229], [230] and [246], lacking the rebate, would seem to be higher, probably second and third futtocks. Timbers [239] and [242] were quite clearly fragments of bottom planking; while timber [241] appears to have been an internal frame or rider. Timbers [243] and [248] seem to represent a rudder fragment.

Other timbers have been tentatively identified with considerably less certainty; [176] and [240] may have been cant frames (angled frames in the extreme forward or aft ends of a ship which form the sharp ends of the vessel's hull), [231] may be rising deadwood (timber built into the ends of a ship when too narrow to permit framing), [236] may have been side or bottom planking, [241] may have been a rider, while [246] appears to have been a frame of some type..

- How many vessels did the timbers come from?

While the timbers appear to be of broadly similar size and thus superficially may be from the same ship, further interrogation demonstrates that they cannot work together as a coherent single vessel.

Table 1 below shows how dimensions for various timbers would vary depending on their position in the vessel, and would vary proportionately between vessel classes (data taken from Admiralty specifications). For example *Druid's* keel was sided 0.356m amidships and 0.292m fore and aft (an 18% reduction), while *Alecto's* keel was sided 0.356m amidships and 0.241m fore and aft (a 32% reduction). For another example, *Druid's* first futtocks were sided from 0.279m amidships to 0.203m fore and aft, and moulded at the head 0.241m, her second futtocks sided 0.216-0.191m and moulded at the head 0.191m, third futtocks sided 0.216-0.191m and moulded at the head 0.171m etc.

Ship	*Druid*	*Alecto*	*Lively*
Launched	1867	1839	1794
Displacement (bm)	1,322 tons	800 tons	805 tons
Length O/A	220 ft	164 ft	135 ft 3 in
Maximum beam	36 ft	32 ft 8 in	36 ft 8½ in
Keel:			
Moulded		0.381m	
Sided fwd	0.292m	0.241m	
Sided mid	0.356m	0.356m	
Sided aft	0.292m	0.241m	
Floors*:			
Moulded at the head	0.241m		
Fwd			0.260m
Mid			0.254m
Aft			0.260m
Sided fwd	0.203-0.229m	0.203-0.229m	0.305m
Sided mid	0.229-0.279m	0.229-0.254mm	0.330m
Sided aft	0.203-0.229m	0.203-0.229m	0.305m
First futtocks**			
Moulded at the head	0.216m	0.152m	0.241m
Sided fwd	0.203-229m	0.178m	0.279m
Sided mid	0.229-0.279m	0.203m	0.330-0.305m
Sided aft	0.203-229m	0.178m	0.279m
Second futtocks			
Moulded at the head	0.191m	0.140m	0.241m
Sided fwd	0.191m	0.178m	0.273m
Sided mid	0.191-0.216m	0.203m	0.292m
Sided aft	0.191m	0.178m	0.273m
Third futtocks			
Moulded at the head	0.171m	0.127m	0.197m
Sided fwd	0.191m	0.178m	0.267m
Sided mid	0.191-0.216m	0.191m	0.279m
Sided aft	0.191m	0.178m	0.267m
Fourth futtocks ***			
Moulded at the head	0.127m	0.102m	
Sided fwd	0.178m	0.165m	
Sided mid	0.178m	0.178m	0.273-0.279 to 0.241m at the head
Sided aft	0.178m	0.165m	
Iron Diagonal Riders	0.114m	0.089m	
Diagonal Plank Trussing			
Fwd		0.102m	
Mid		0.229-0.254m	
Aft		0.076m	
Outside Planking	0.102m	0.102m Larch	0.076m English [oak]

Table 1: Comaprison of scantlings fore and aft

**Alecto* specification refers to 'half floors'.
** *Alecto* and *Lively* specifications refer to 'lower futtocks'.
*** *Alecto* specification refers to 'top futtocks'

This variation would allow for the differing sidings and mouldings of the keel, floor timbers and first futtocks recorded to be consistent with a single vessel. When the angle of each timber from the keel is examined, however, this hypothesis falls apart. Whilst the sidings of the keel, and the size of the corresponding rebates in floors and first futtocks should decrease the closer they are to bow or stern, the angle from the keel should correspondingly increase; the head mouldings apparently remaining constant. Table 2 demonstrates the problem.

Timber	[106]	[105]	[114]	[110]	[101]	[111]
Angle from keel	25º	25º	25º	16º	9º	0º
Keel siding*	0.34m	0.26m	0.30m	0.42m	0.33m	0.38m
Floor siding	0.22m				0.25m	
Floor moulding at the head	0.18m		0.21m		0.21m	
First futtock siding		0.25m		0.25m		0.22m
First futtock moulding at the head		0.17m		0.20m		0.20m

Table 2: Lower frame scantlings and angle off keel

* First futtock rebates are assumed to represent half of the keel siding. Although this does not work for timber [110]. Admiralty plans show that certain vessels such as *Hecla*, however, do not appear to have floor timbers extending fully to bow or stern which may explain this apparent anomaly.

This problem demonstrated by the difference in keel siding between [106] and [105] might possibly be explained by the differing outfall at bow and stern, but there is no way of reconciling the keel and first futtock siding shown by [111] with [105] and [110]. [111] can, however, work with [106]. It seems most likely, therefore, that the timbers in the table above come from at least two vessels. Table 3 and Table 4 below show how the identified timbers might work as two vessels (A and B) based on the relative proportions displayed in the probably relatively contemporary Admiralty specifications referred to above. NB. For the purposes of this exercise the foreshore timbers are assumed to come from the forward section of the parent vessel- they may just as equally come from towards the stern.

Timber		[105]	[102]	[114]	[110]	[101]
Angle from keel		25º		25º	16º	9º
Keel siding*		0.26m	0.28m	0.30m	0.42m	0.33m
Floor siding						0.25m
	First futtock siding	0.25m			0.25m	
Floor moulding at the head				0.21m		0.21m
	First futtock moulding at the head	0.17m			0.20m	
Timber		[246]		[100]	[116]	
Second futtock siding				0.24m		
	Third futtock siding	0.21m			0.22m	
Second futtock moulding at the head				0.21m		
	Third futtock moulding at the head	0.20m			0.20m	

Table 3: Timber vessels A

Timber		[106]			[111]	
Angle from keel		25º			0º	
Keel siding*		0.34m			0.38m	
Floor siding		0.22m				
	First futtock siding				0.22m	
Floor moulding at the head		0.18m				
	First futtock moulding at the head				0.20m	
Timber		[103]	[229]	[107]	[178]	[230]
Second futtock siding		0.20m		0.20m		
	Third futtock siding		0.18m		0.19m	0.19m
Second futtock moulding at the head		0.19m		0.17m		
	Third futtock moulding at the head		0.18m		0.18m	0.18m

Table 4: Timber vessels B

* First futtock rebates are assumed to represent half of the keel siding.

The various timbers, therefore, make considerably more sense as two vessels. Furthermore, diagonal rebates were only found to have been recorded on timbers [107], [178], [229], [230] and possibly on [103], all of which had previously been attributed to Vessel B by nature of their scantlings and angle off the keel.

It would seem most likely, therefore, that the assemblage is largely formed from the remains of two vessels. The rudder fragment represented by timbers [243] and [248] would appear to be from an entirely different vessel, possibly a Thames barge, by nature of its relatively small size.

- Can the parent vessels be identified?

The scantlings of the identified timbers can be compared with those known from Admiralty specifications and plans in order to inform us as to the possible size of the parent vessels (Table 6). As above, the foreshore timbers are assumed to come from forward for this exercise.

Ship	*Cossack*	*Druid*	Vessel A	Vessel B	*Alecto*
Launched	1854	1867			1839
Tonnage Builders Measure (bm)	1,322 tons	1,322 tons			800 tons
Length O/A	195 ft	220 ft			164 ft
Maximum beam	38 ft 6 in	36 ft			32 ft 8 in
Keel:					
Moulded	0.381m		0.330m		0.381m
Sided fwd		0.292m	0.260m	0.340m	0.241m
Sided mid	0.305m	0.356m	0.330m	0.380m	0.356m
Sided aft		0.292m			0.241m
Floors*:					
Moulded at the head	0.265m	0.241m	0.210m	0.180m	
Fwd					
Mid					
Aft					
Sided fwd	0.203-0.356m	0.203-0.229m	0.250m	0.220m	0.203-0.229m
Sided mid	0.356m	0.229-0.279m			0.229-0.254mm
Sided aft	0.280-0.356m	0.203-0.229m			0.203-0.229m
First futtocks**					
Moulded at the head	0.254m	0.216m	0.185m	0.200m	0.152m
Sided fwd	0.254-0.305m	0.203-229m	0.250m	0.220m	0.178m
Sided mid	0.305m	0.229-0.279m			0.203m
Sided aft	0.254-0.305m	0.203-229m			0.178m
Second futtocks					
Moulded at the head	0.242m	0.191m	0.21m	0.180m	0.140m
Sided fwd	0.229-0.254m	0.191m	0.24m	0.200m	0.178m

Sided mid	0.254m	0.191-0.216m			0.203m
Sided aft	0.229-0.254m	0.191m			0.178m
Third futtocks					
Moulded at the head	0.229m	0.171m	0.20m	0.180m	0.127m
Sided fwd	0.216-0.229m	0.191m	0.215m	0.185m	0.178m
Sided mid	0.229m	0.191-0.216m			0.191m
Sided aft	0.216-0.229m	0.191m			0.178m

Table 5: Comparison of foreshore scantlings with selected Admiralty specifications and plans.

It would appear, therefore, that the two possible foreshore vessels are of broadly similar size to *Cossack, Druid* or *Alecto.* Vessels known to have been broken up at Charlton with a tonnage of between 500 and 2000 tons (bm) (Lyon and Winfield 2004) are listed below in Table 6:

Ship	Launched	Tonnage (bm)	Broken Up
Janus	1844	763	1856 or 58
Messenger	1824 or 1830	733	1861
Vixen	1841	1054	1862
Tyne	1826	600	1862
Vestal	1833	913	1862
Cleopatra	1835	918	1862
Spartan	1841	911	1862
Portland	1822	1476	1862
Prometheus	1839	800	1863
Daphne	1838	726	1864
Roebuck	1856	868	1864
Inflexible	1845	1124	1864
Phoenix	1832	812	1864
Penelope	1829	1091	1864
Venus	1820	1069	1864 or 65
Alecto	1839	800	1865
Eurotas	1829	1170	1865
Hecate	1839	817	1865
Horatio	1807	1090	1865
Inconstant	1836	1422	1866
Flying Fish	1855	871	1866
Archer	1849	971	1866
Calypso	1845	731	1866
Terpsichore	1847	602	1866
Tartar	1854	1322	1866
Modeste	1837	562	1866
Devastation	1841	1380	1866 or 67
Arrogant	1848	1872	1867
Leander	1848	1987	1867
Niger	1846	1013	1869
Hydra	1838	817	1870

Medusa	1838	889	1872
Icarus	1858	580	1875
Pylades	1854	1278	1875
Chanticleer	1861	950	1875 or 78
Serpent	1860	877	1875
Cossack	1854	1322	1875
Arethusa	1817	1085	1883
Rhin	1806	1080	1884
Spartan	1868	1269	1882 or 84
Vestal	1865	1081	1884
Rosario	1860	673	1884
Sirius	1868	1268	1885
Plover	1867	663	1885
Vulture	1869	664	1885
Lapwing	1867	663	1885
Diamond	1848	1051	1885
Laurel	1813	1088	1885
Worcester	1843	1468	1885
Aeolus	1825	1035	1886
Druid	1869	1322	1886
Leonidas	1807	1067	1894

Table 6: Ships known to have been broken up at Charlton between 500 and 2000 tons bm in size.

The *Alecto, Prometheus* (Alecto class), *Cossack* and *Druid* can be ruled out, as their scantlings do not match the foreshore vessels

Further interrogation of Admiralty plans has ruled out a number of vessel classes beyond *Cossack, Druid* and *Alecto* as shown in Table 7 below.

Ship	Serpent	Hecla	Vessel B	Vessel A	Pylades	Lively	Constance
Launched	1860	1838			1854	1794	1846
Displacement (bm)	877 tons	814 tons			1,267 tons	805 tons	2,125 tons
Length O/A	185 ft	165 ft			192 ft 9in	135 ft 3 in	
Maximum beam	28 ft 4 in	32 ft 10 in			38 ft 4 in	36 ft 8½ in	52ft 8 in
Keel:							
Moulded	0.240m	0.336 m		0.330m	0.468m		0.444m
Sided fwd			0.340m	0.260m			0.432m
Sided mid			0.380m	0.330m	0.372m		0.468m
Sided aft							0.408m
Floors*:							
Moulded at the head			0.180m	0.210m	0.305m		0.394m
Fwd						0.260m	
Mid						0.254m	

Aft						0.260m	
Sided fwd		0.192 m	0.220m	0.250m	0.254m	0.305m	0.356m
Sided mid		0.259 m			0.305m	0.330m	0.381m
Sided aft		0.259 m			0.254m	0.305m	0.356m
First futtocks**							
Moulded at the head			0.200m	0.185m	0.267m	0.241m	0.330m
Moulded at the base towards fwd	0.360m				0.494m		
Moulded at the base amidships	0.432m				0.600m		
Moulded at the base towards aft	0.360m				0.432m		
Sided fwd		0.192 m	0.220m	0.250m	0.254m	0.279m	0.330m
Sided mid		0.259 m			0.305m	0.330-0.305m	0.356m
Sided aft		0.259 m			0.254m	0.279m	0.330m
Second futtocks							
Moulded at the head			0.180m	0.21m	0.235m	0.241m	0.305m
Sided fwd			0.200m	0.24m	0.229m	0.273m	0.330m
Sided mid					0.254m	0.292m	0.356m
Sided aft					0.229m	0.273m	0.330m
Third futtocks							
Moulded at the head			0.180m	0.20m	0.216m	0.197m	0.292m
Sided fwd			0.185m	0.215m	0.216m	0.267m	0.292m
Sided mid					0.254m	0.279m	0.318m
Sided aft					0.216m	0.267m	0.292m

Table 7: Further comparison of foreshore timber scantlings with Admiraly plans and specifications.

The large frigate *Constance* has been included here to show the wide disparity in size of scantling and thus the rationale for excluding vessels above 2,000 tons bm.

Vessels of the classes above can be ruled out as well; these being *Hydra, Hecate, Pylades, Serpent* and *Leonidas.* The remaining possible vessels are listed below in Table 8.

Ship	Launched	Tonnage (bm)	Broken Up
Janus	1844	763	1856 or 58
Messenger	1824 or 1830	733	1861
Vixen	1841	1054	1862

Tyne	1826	600	1862
Vestal	1833	913	1862
Cleopatra	1835	918	1862
Spartan	1841	911	1862
Portland	1822	1476	1862
Daphne	1838	726	1864
Roebuck	1856	868	1864
Inflexible	1845	1124	1864
Phoenix	1832	812	1864
Penelope	1829	1091	1864
Venus	1820	1069	1864 or 65
Eurotas	1829	1170	1865
Horatio	1807	1090	1865
Inconstant	1836	1422	1866
Flying Fish	1855	871	1866
Archer	1849	971	1866
Calypso	1845	731	1866
Terpsichore	1847	602	1866
Tartar	1854	1322	1866
Modeste	1837	562	1866
Devastation	1841	1380	1866 or 67
Arrogant	1848	1872	1867
Leander	1848	1987	1867
Niger	1846	1013	1869
Medusa	1838	889	1872
Icarus	1858	580	1875
Chanticleer	1861	950	1875 or 78
Arethusa	1817	1085	1883
Rhin	1806	1080	1884
Spartan	1868	1269	1882 or 84
Vestal	1865	1081	1884
Rosario	1860	673	1884
Sirius	1868	1268	1885
Plover	1867	663	1885
Vulture	1869	664	1885
Lapwing	1867	663	1885
Diamond	1848	1051	1885
Laurel	1813	1088	1885
Worcester	1843	1468	1885
Aeolus	1825	1035	1886

Table 8: Remaining possible parent vessels.

Further research will continue to try and eliminate the various remaining contenders and may possibly result in identifying the parent vessels.

4.3 Significance of the data

Individually the features identified are of significance for the history of the immediate locality. In conjunction with the other nautical remains found elsewhere on the foreshore as at Vaizey's Wharf, however, they are of international importance in the field of vessel archaeology:

As discussed above the timber structures with which this report is concerned make up a small part of a much larger site comprising elements from at least six or seven 19th century (or possibly late 18th century in one or two cases) warships.

These vessels range in size from brig, sloop or corvette to the *Duke of Wellington*, on her launch in 1852 the most powerful warship in the world. To the author's knowledge, no site in the world has so far been recorded with elements of remotely the same range of 19th century warship types. The period 1805-1860 was one of rapid change in wooden warship design, primarily through the use of different framing techniques and improved bow and stern designs, before steam propulsion started to be applied to warships from 1822 onwards, thus causing further structural change. And yet simultaneously, as these radical design changes were taking place, the quantity of Admiralty plans, specifications and models preserved for study declines dramatically (Wragg 2009: 79, 84-5, 91-3). So much so that:

> Surprisingly perhaps, aspects of maritime related woodwork, shipwrightry and foreshore carpentry from the industrial age up to the mid 19th century are still little known in detail (Heard with Goodburn 2003: 34).

Not only does the wider site have a plethora of diagnostic timbers from the various final evolutions of the sailing warship, it also has elements from one of the experimental warships constructed from 1860 until warship design finally caught up with technology in the late 1880s, and is, therefore, unique in having features which bridge a transition in naval architecture even greater than that from 1805-1860. As has been written elsewhere in relation to structure α333 alone:

> The discoveries on the foreshore at Charlton give us a rare opportunity to investigate one of the most revolutionary and dynamic periods in naval architecture when steam was replacing sail, and iron, subsequently steel, was replacing wood. The *Duke of Wellington* was designed as a larger and more powerful version of HMS *Victory* but was modified to take a steam engine while under construction; while documentary evidence suggests that the 2nd rate vessel[s] seems to have been designed from the outset for steam engines. Further analysis of the timbers at Charlton should give us a new insight into the construction of these final examples of the 'wooden walls'. The last of the candidate 2nd rates to be built, HMS *Anson*, was launched in the same year as the famous HMS *Warrior*, the first iron capital ship, which instantly revolutionised naval warfare.
>
> HMS *Ajax*, launched only 20 years after the *Anson*, represents a completely different vessel; solely steam powered, with a small number of huge guns and a few smaller breach loaders and machine guns, rather than the bristling rows of smaller muzzle loading cannon of the wooden vessels, and built of iron, with a massively thick armoured belt.

> While she provides pointers to the future development of naval architecture, with her anti-torpedo boat armament and lack of sailing rig, she too would be almost immediately rendered obsolescent. She and her sister *Agamemnon* were the last British capital ships to be constructed of iron rather than steel, were the last to mount muzzle loading guns as their main armament, and were the last to have wrought iron armoured belts rather than using the improved compound armour then being introduced.
>
> Apart from HMS *Warrior* and the Danish sail and steam frigate the *Jylland*, both largely modern reconstructions, no other examples of parts of large, first class, warships of this period are so easily accessible (ie. not underwater) in Europe. In the United States a number of civil war ironclads have been recovered from the seabed, but these are small, unseaworthy, mainly coastal craft which represent a backwater and virtual dead-end in warship development, not frontline cutting edge ships of war as are those represented at Charlton.
>
> For more than 200 years warship design had remained relatively stable and yet, in little under forty, the ships that Nelson knew and that Drake or even Columbus would have understood, had been replaced by infinitely more powerful vessels; direct precursors of the mighty battleships of the 20th century. At Charlton we have the only known easily accessible archaeological evidence in Europe of this most remarkable and fast-moving period in the development of warship construction (Wragg 2009: 91-2).

The further research undertaken at the Charlton foreshore since the above was written has only served to enhance the significance of the site.

5 Publication and archiving

Information on the results of the excavation will be made publicly available by means of a database in digital form, to permit inclusion of the site data in any future academic researches into the development of London.

The results of this survey will be published along with the results of the other work carried out by the TDP on this foreshore in the *International Journal of Nautical Archaeology*. The results of this survey alone will also be published in summary form in the annual excavation round-up in the *London Archaeologist*.

The site archive will continue to be held with the on-going open TAS/TDP archive held at MOLA.

6 Acknowledgements

Museum of London Archaeology and the Thames Discovery Programme would like to thank Patricia Mak of Atkins Group for commissioning the work, on behalf of their client the Environment Agency.

The author would like to thank Courtney Nimura for her work on site, Mark Burch for digitising the plans, Judit Peresztegi for the illustrations and Stewart Hoad for his project management.

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Wragg, E, 2012b *Written scheme of investigation for an archaeological watching brief. Stone Wharf, Riverside, Charlton London SE7.* MOLA unpublished document

Admiralty Plans consulted

Profile of inboard works of *Cossck* and *Tartar* 25th April 1854

Midships section and disposition of frame HMS *Cossck* and *Tartar*

Profile of inboard works HMS *Constance* as fitted 24th September 1864

Plan of the hold as fitted HMS *Constance* 24th September 1864

Midships section for the *Constance* building at Pembroke 30th May 1843

Profile of the inboard works of the *Emerald* of 50 guns

Plan of the hold of the *Emerald* of 50 guns January 1855

Profile of the *Serpent*

The disposition of frame for the *Hecla* Steam Vessel showing the specie of timber by the different tints 26th January 1839

Profile and inboard works for the *Pylades* Jamuary 1854

Midships section of the *Pylades* screw corvette to be built at Sheerness 22nd December 1852

8 NMR OASIS archaeological report form

8.1 OASIS ID: thamesdi1-151309

Project details	
Project name	An archaeological watching brief at Stone Wharf, Charlton, Greenwich.
Short description of the project	Work on the reconstruction of the river wall was monitored between the 20th of November 2012 and the 28th of February 2013 33 nautical timbers were recorded, having either been recovered from behind the former river wall or disturbed on the foreshore during the enabling works. They appear to predominantly come from two Royal Navy warships, probably of brig, sloop or corvette size dating to the early-mid 19th century. A possible fragment of rudder was also recorded which probably came from a much smaller vessel such as a Thames sailing barge.
Project dates	Start: 20-11-2012 End: 28-02-2013
Previous/future work	Yes / Not known
Any associated project reference codes	FGW14 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Current Land use	Coastland 2 - Inter-tidal
Monument type	WATERCRAFT Post Medieval
Monument type	WATERCRAFT Post Medieval
Monument type	CAUSEWAY Post Medieval
Significant Finds	NONE None
Methods & techniques	"Measured Survey","Photographic Survey","Visual Inspection"
Development type	Shoreline development
Prompt	Voluntary/self-interest
Position in the planning process	Not known / Not recorded

Project location	
Country	England
Site location	GREATER LONDON GREENWICH WOOLWICH Stone Wharf, Riverside, Chalton, London SE7
Postcode	SE7 8BS
Study area	200.00 Square metres
Site coordinates	TQ 41005 79165 51 0 51 29 35 N 000 01 53 E Point

Project creators

Name of Organisation	Thames Discovery Programme/Museum of London Archaeology
Project brief originator	Consultant
Project design originator	Eliott Wragg and Stewart Hoad
Project director/manager	Stewart Hoad
Project supervisor	Eliott Wragg
Type of sponsor/funding body	Environment Agency

Project archives

Physical Archive Exists?	No
Digital Archive recipient	LAARC
Digital Contents	"none"
Digital Media available	"Text"
Paper Archive recipient	LAARC
Paper Contents	"none"
Paper Media available	"Drawing","Photograph","Plan","Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	A report on the archaeological watching brief. Stone Wharf, Riverside, London Borough of Greenwich, London SE7
Author(s)/Editor(s)	Wragg, E.
Date	2013
Issuer or publisher	MOLA
Place of issue or publication	London
Description	A4 pamphlet

Entered by	Eliott Wragg (e.wragg@thamesdiscovery.org)
Entered on	22 May 2013

Fig 1 Site location

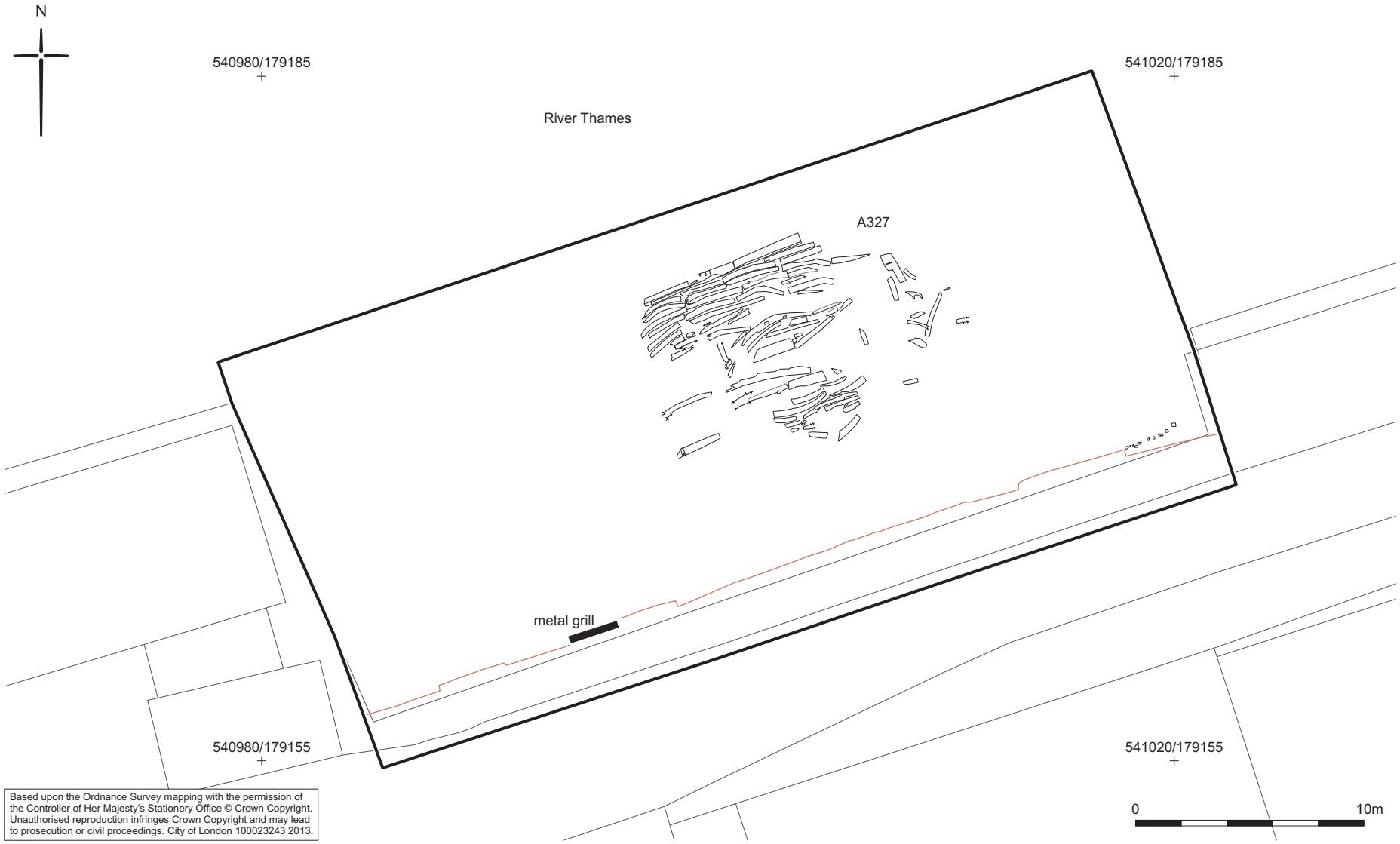
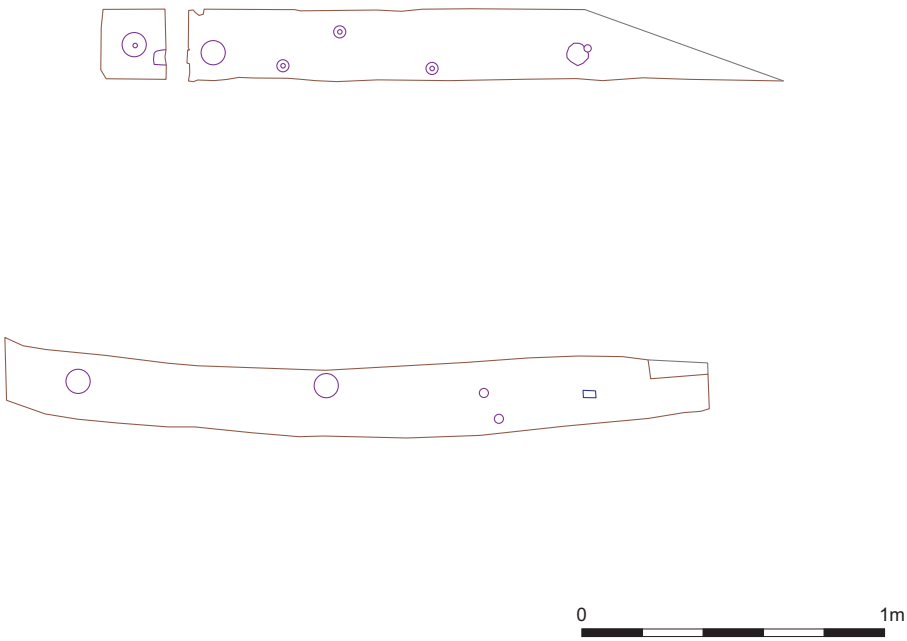


Fig 2 Causeway A327 and river wall



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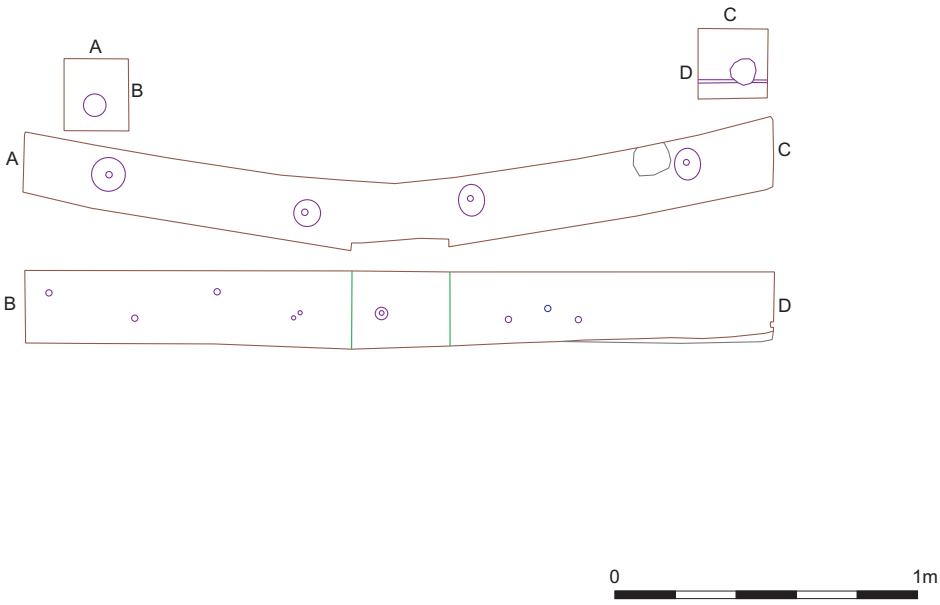

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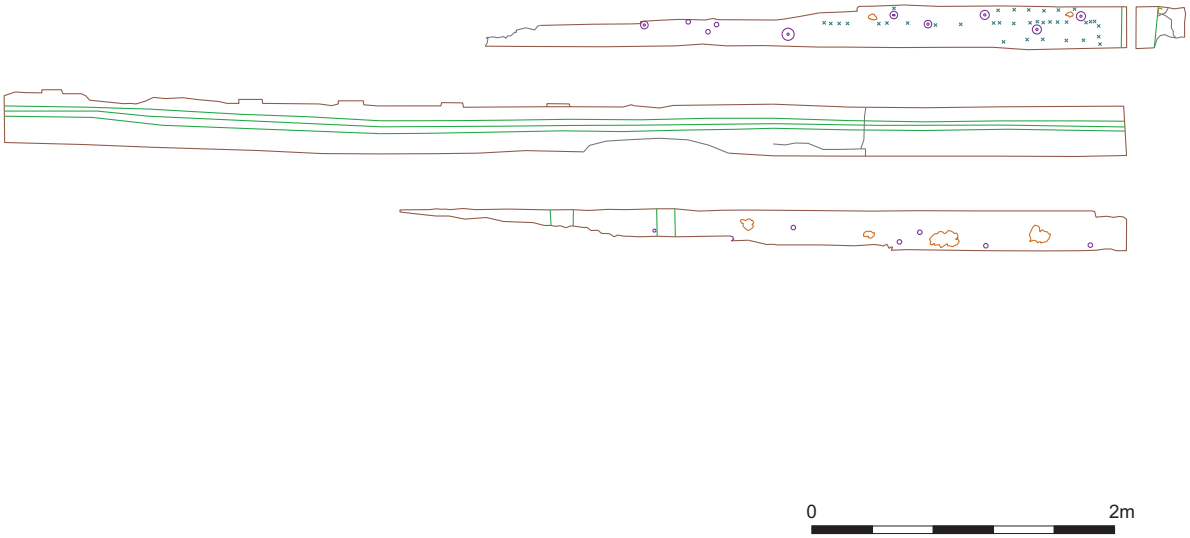

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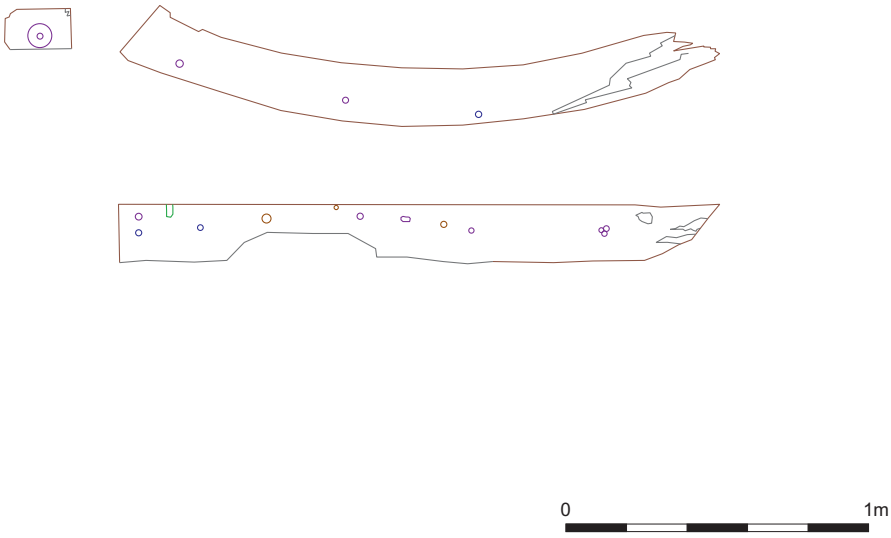

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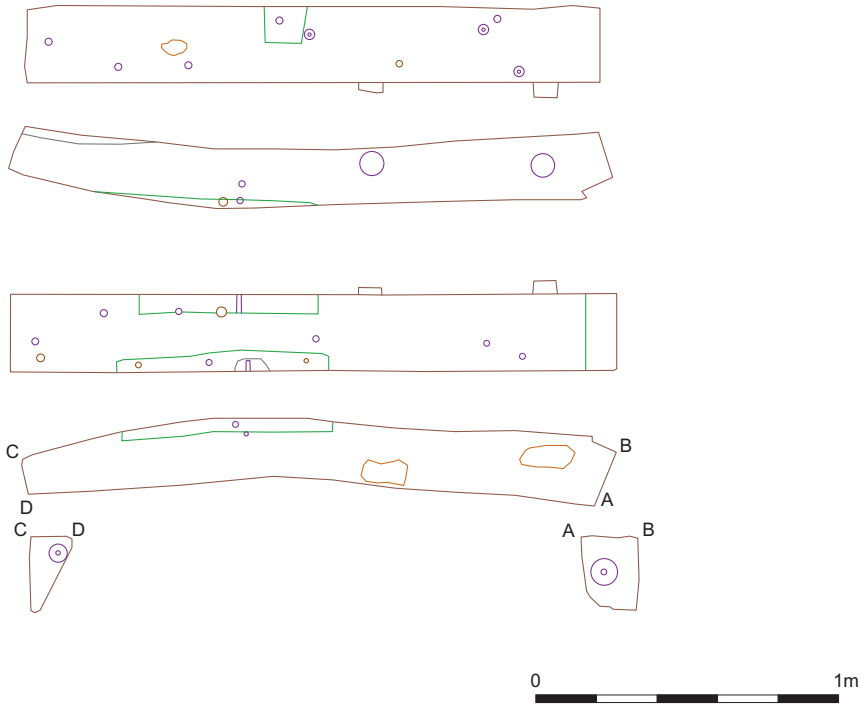

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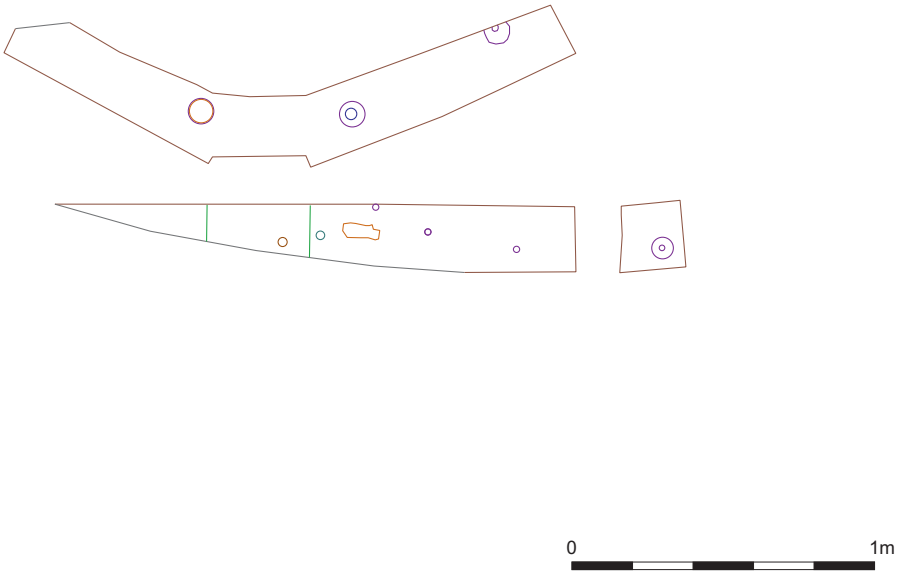

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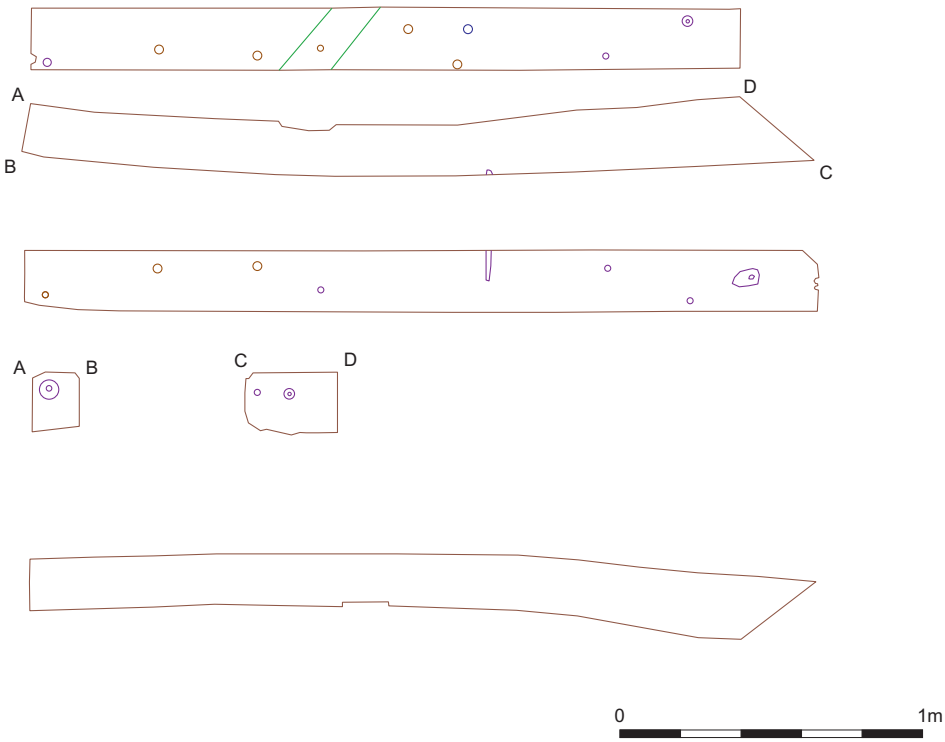

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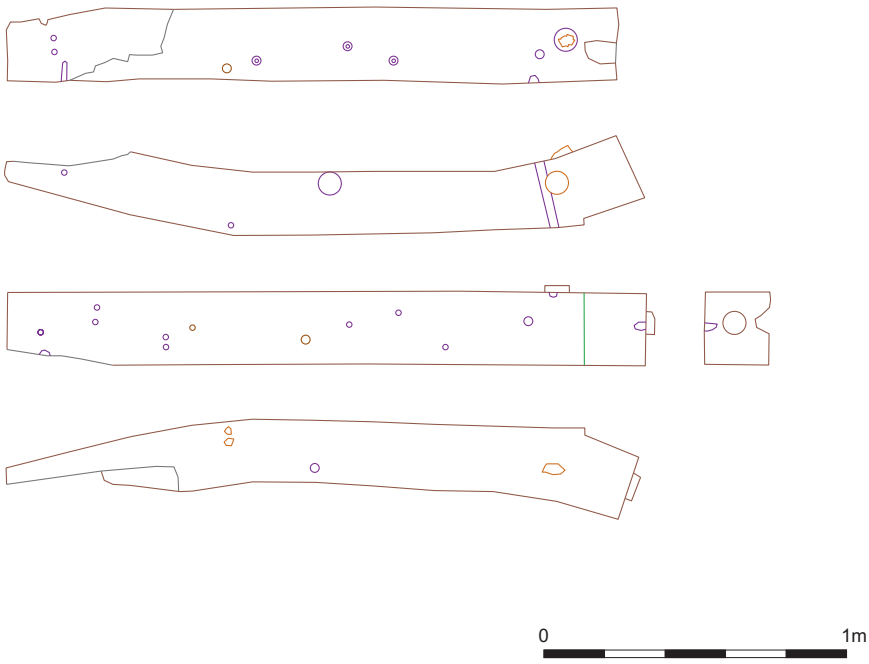

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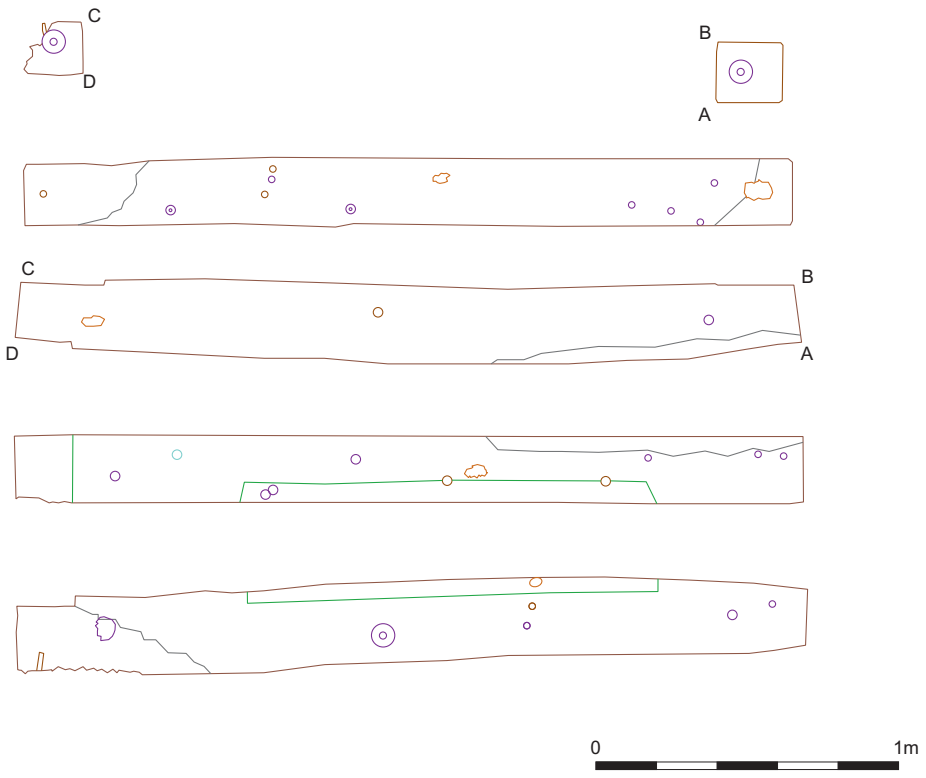

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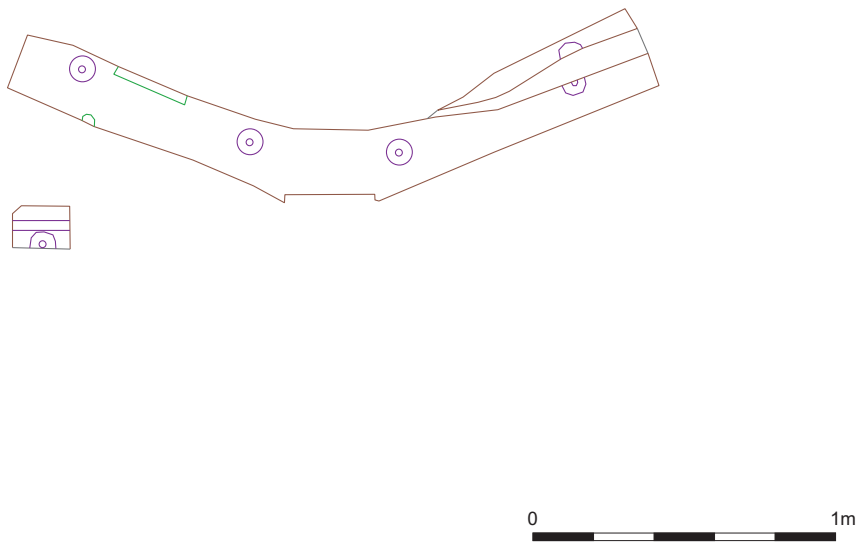

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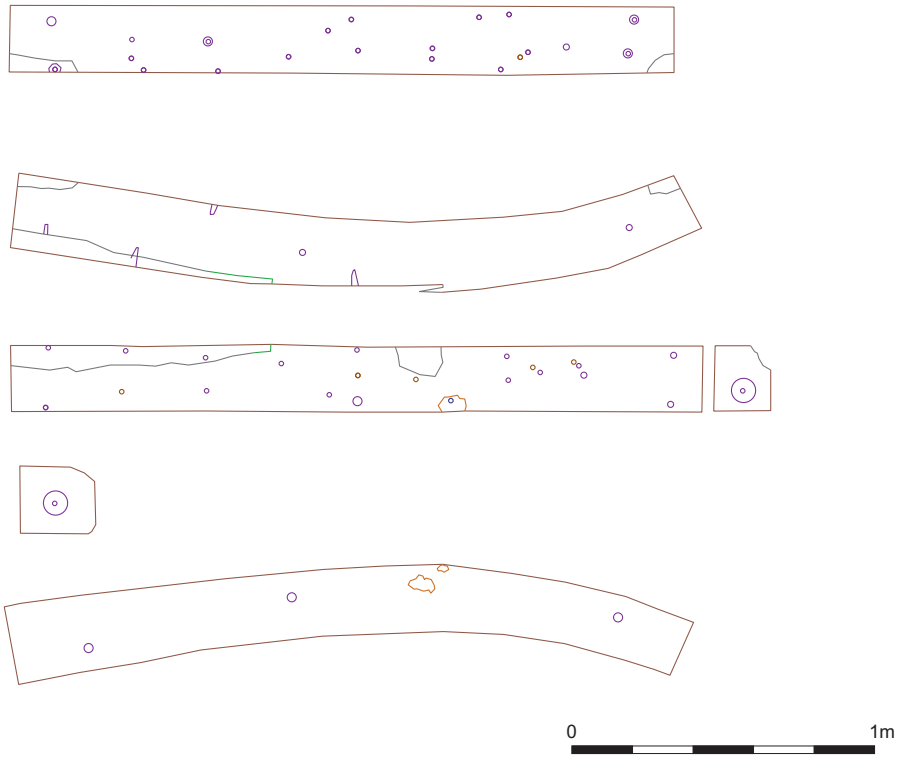

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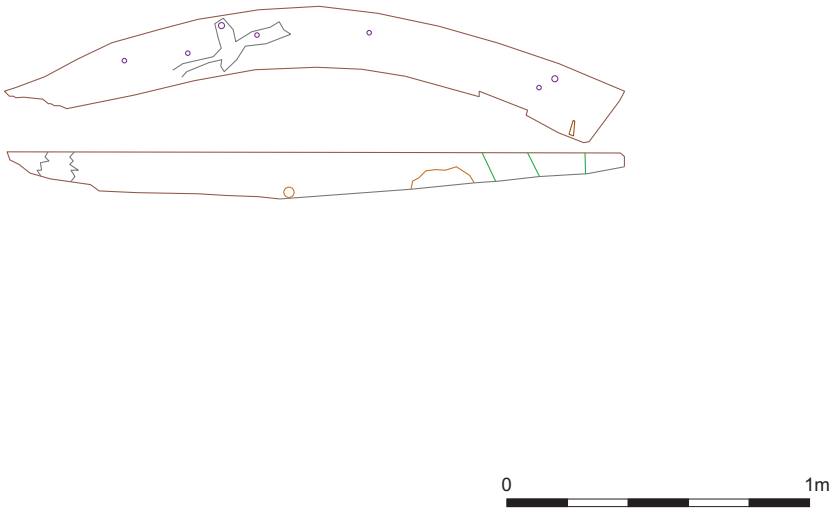

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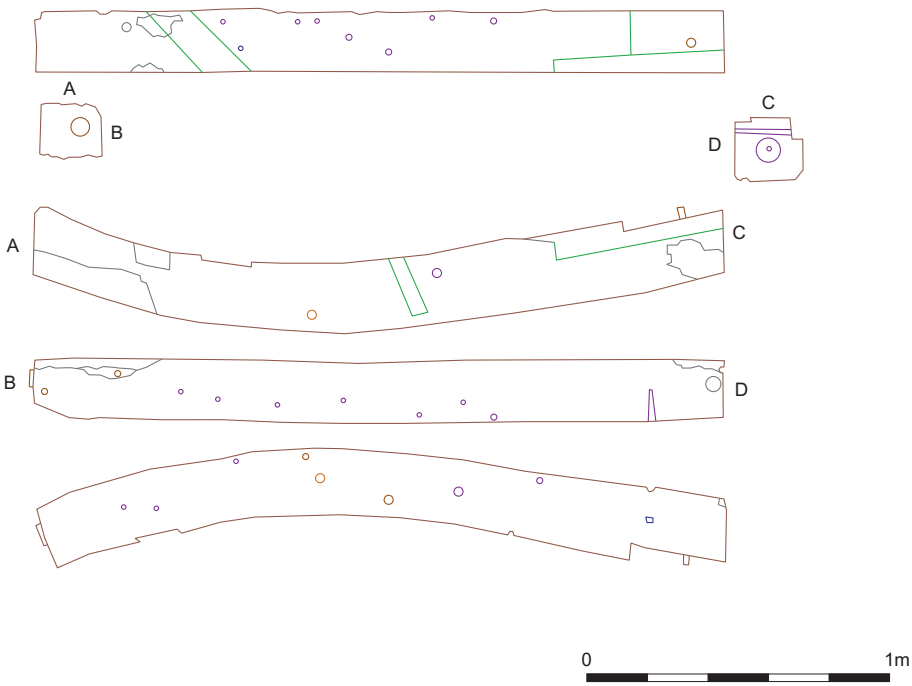

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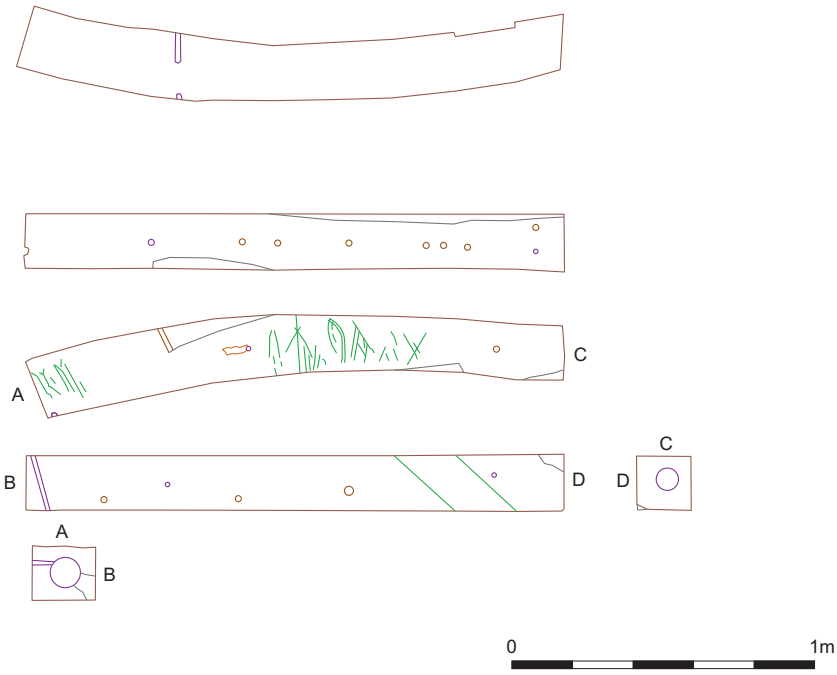

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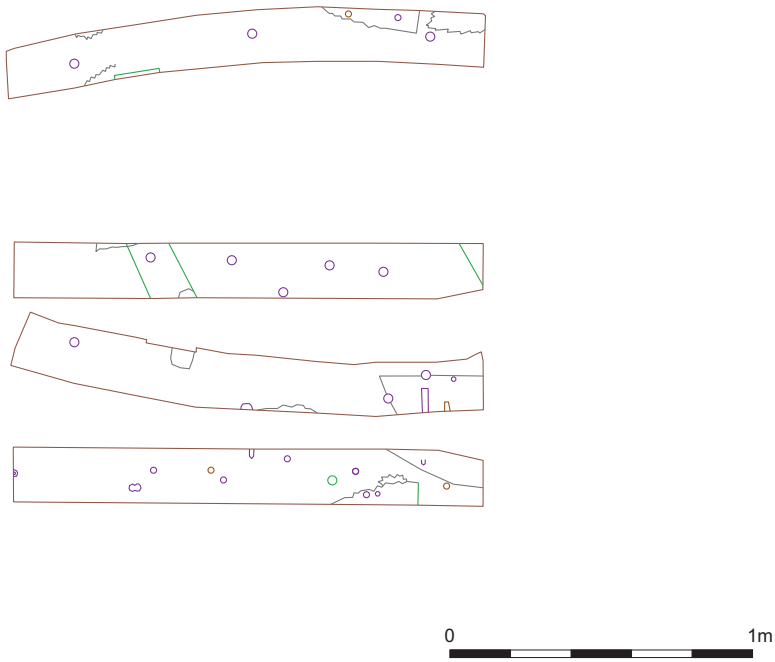

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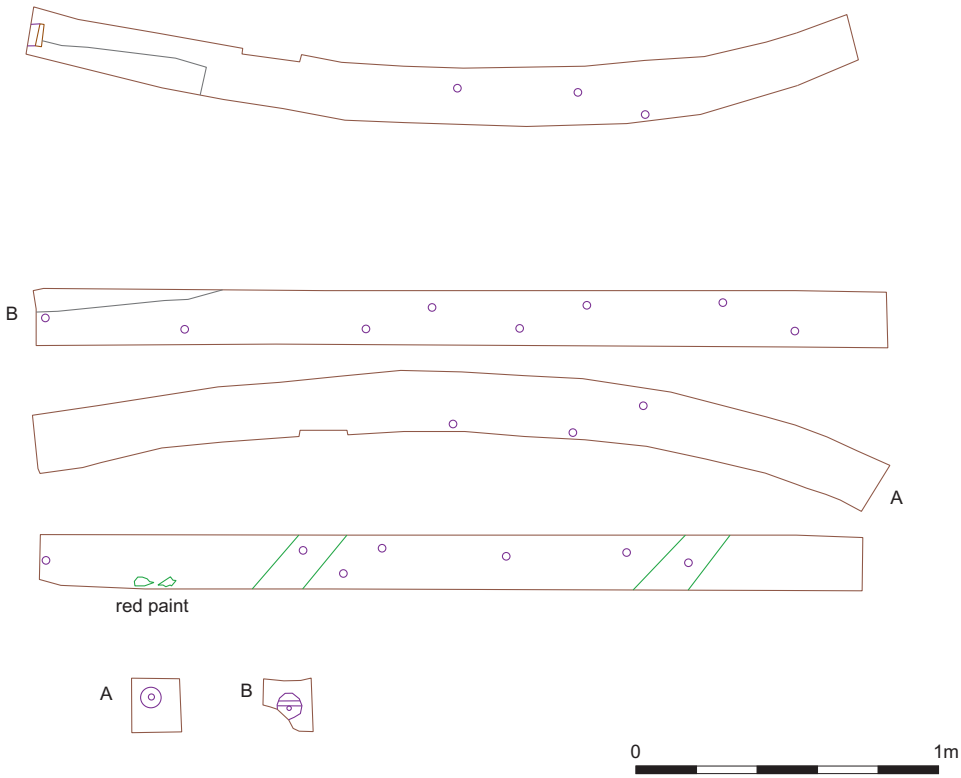

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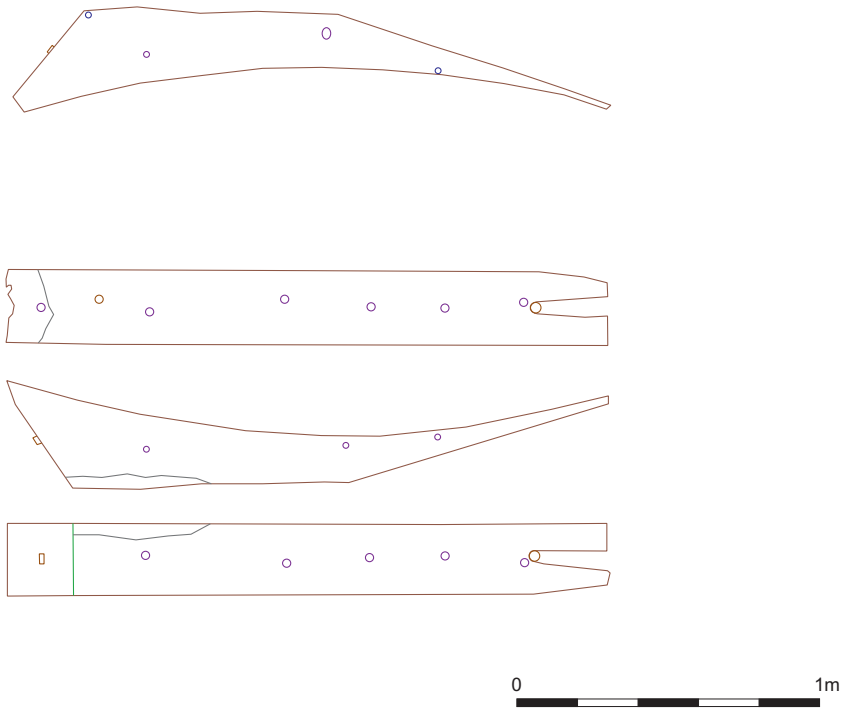

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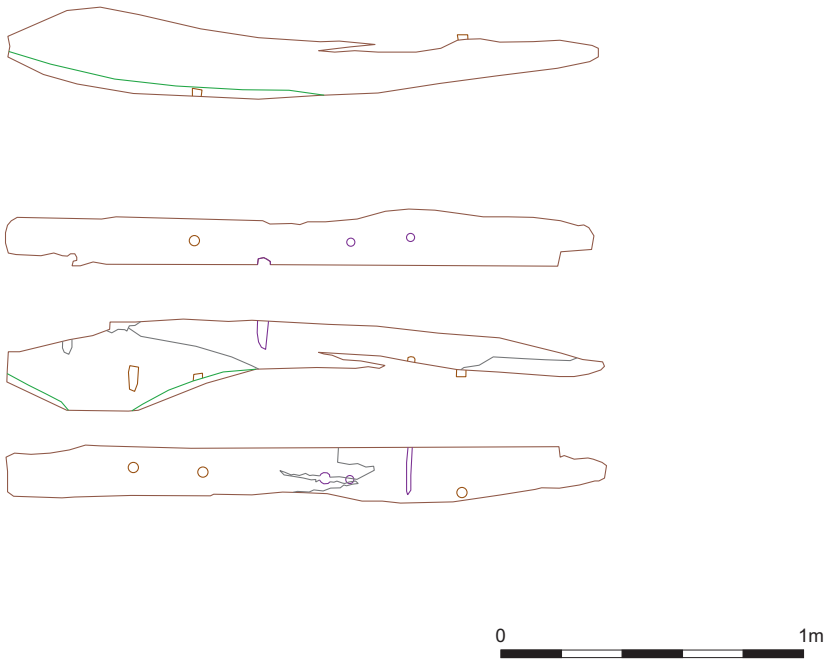

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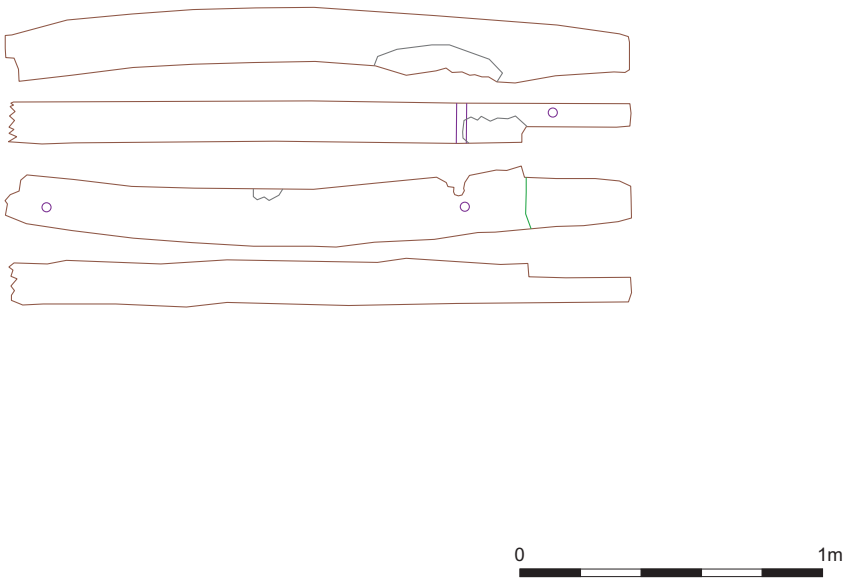
Fig 21 Timber [233]



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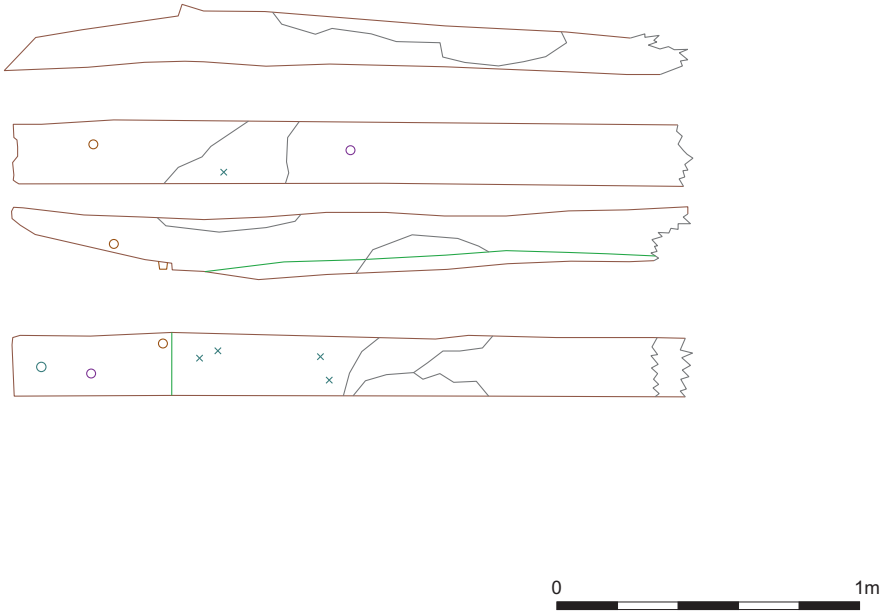

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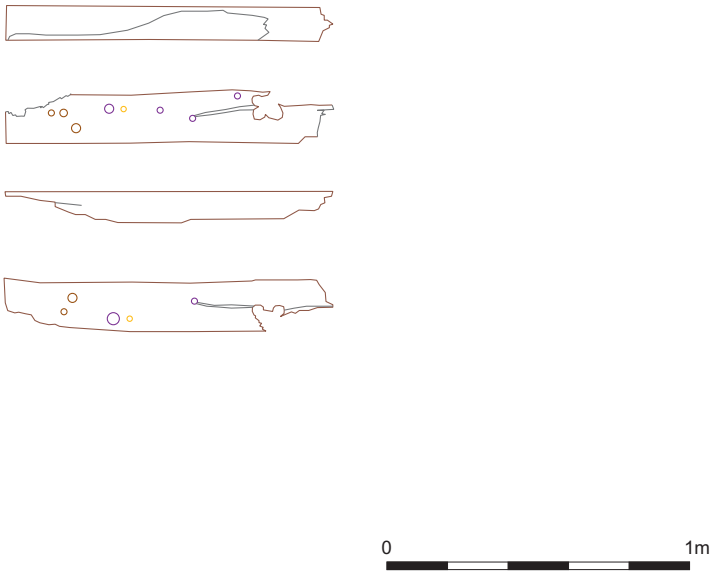

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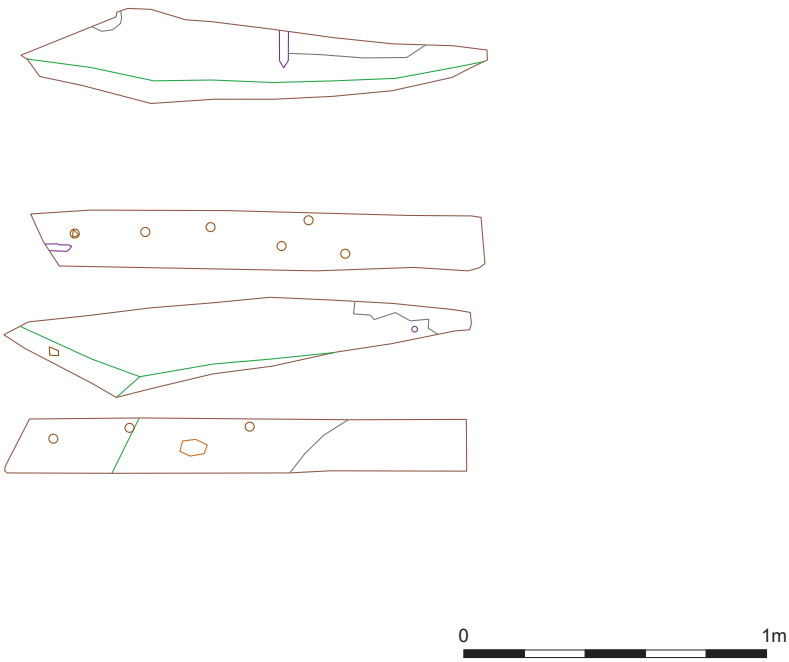

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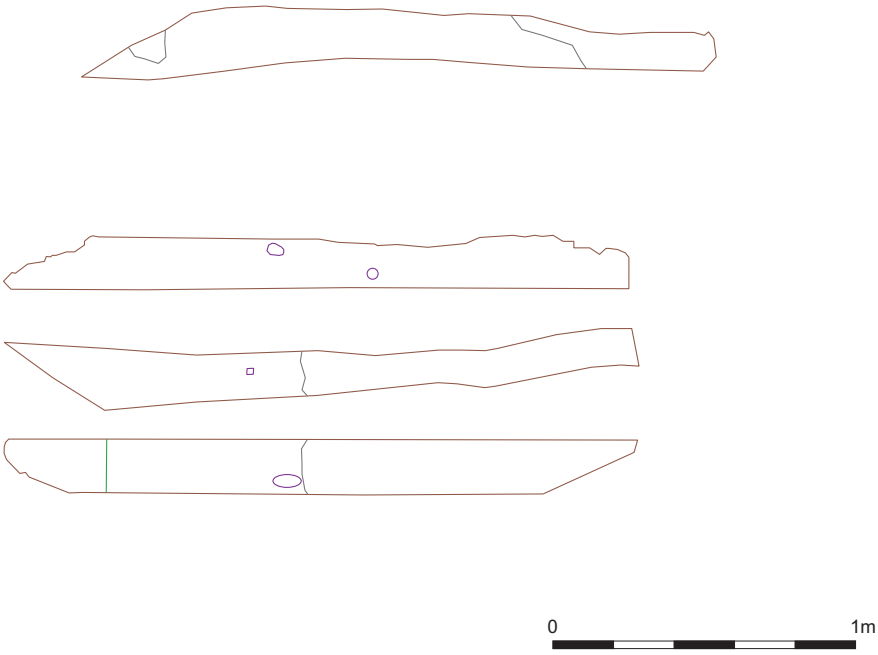
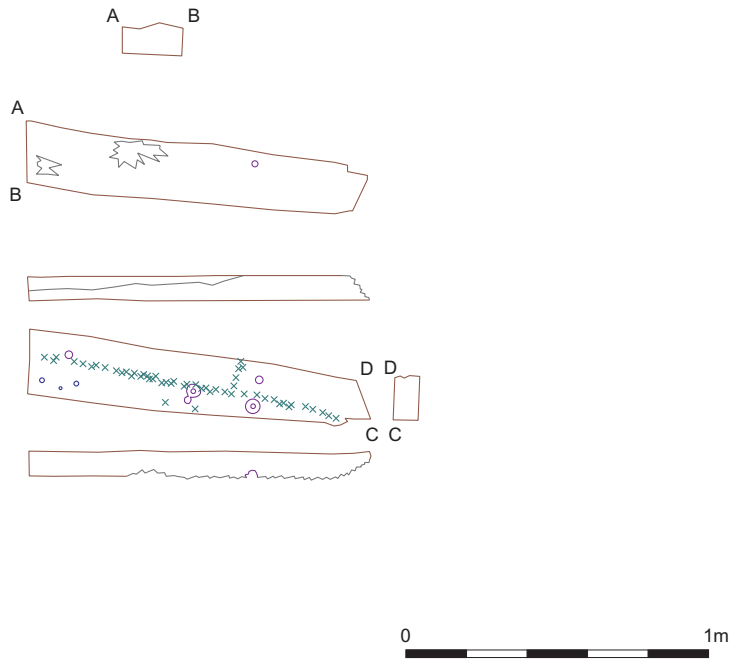


Fig 26 Timber [238]



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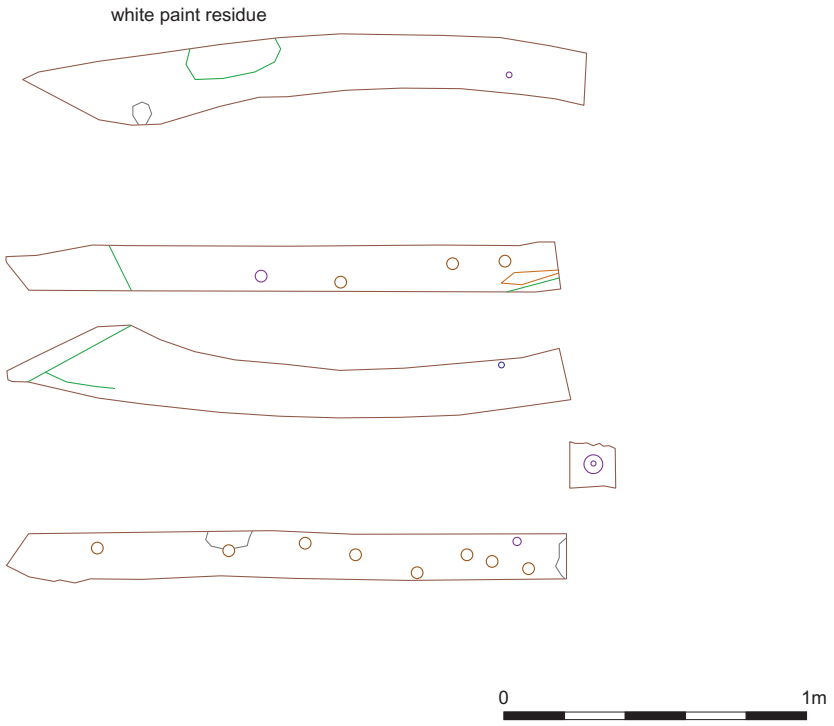

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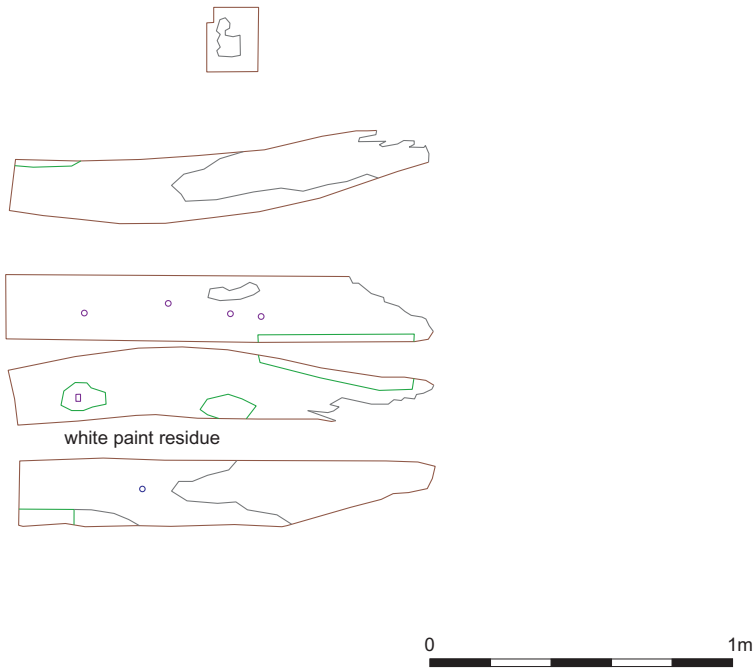

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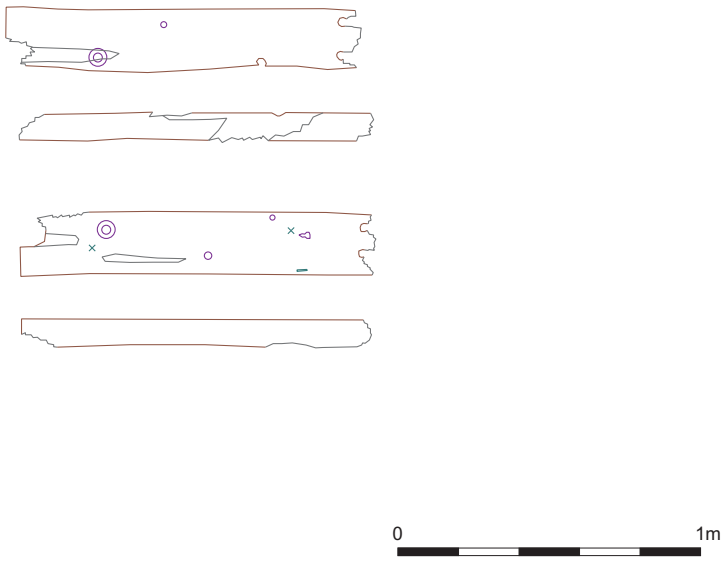

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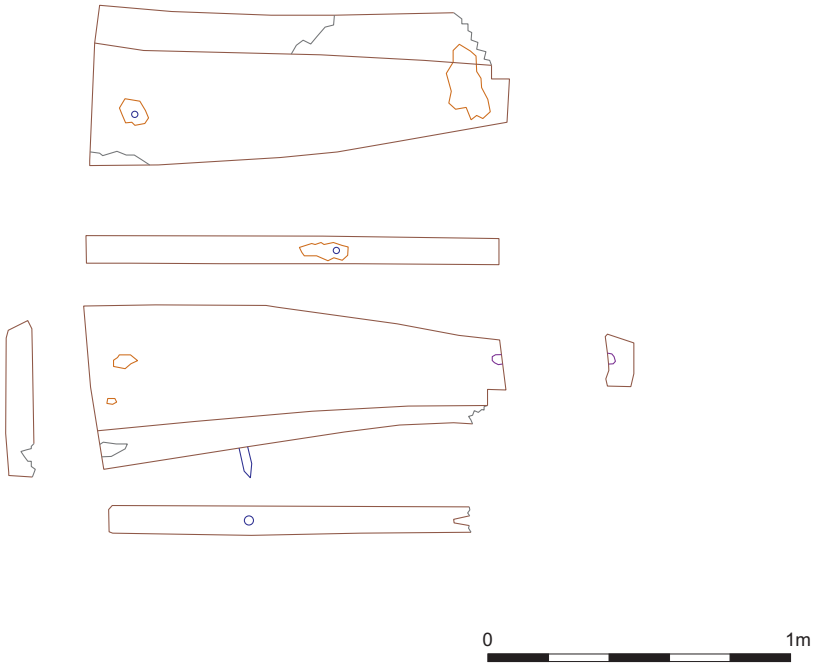
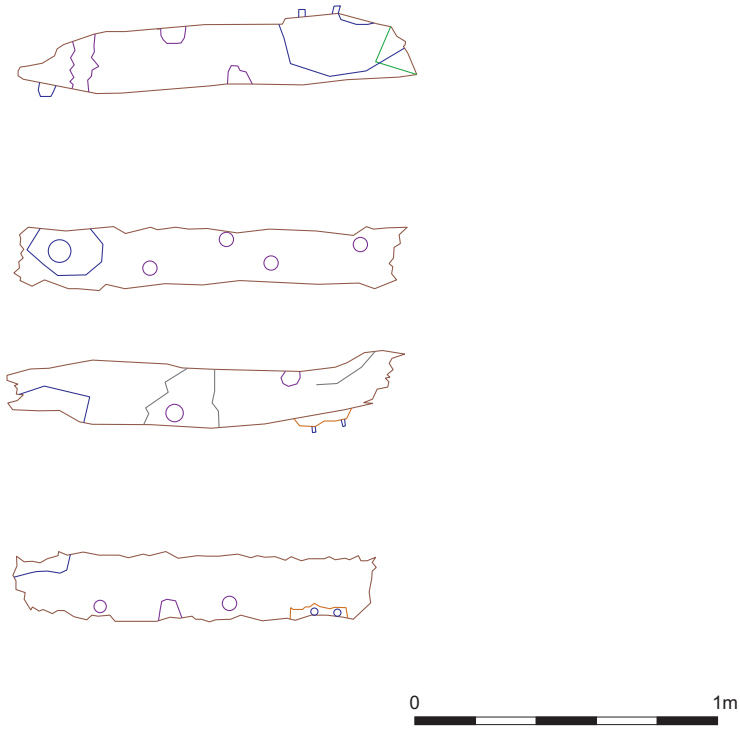


Fig 31 Timber [243] & [248]



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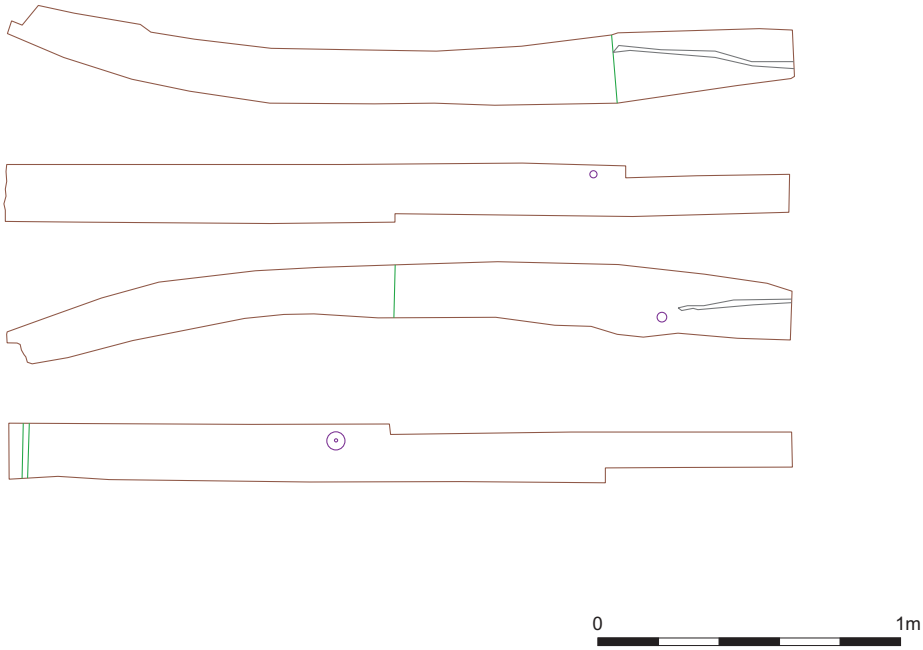

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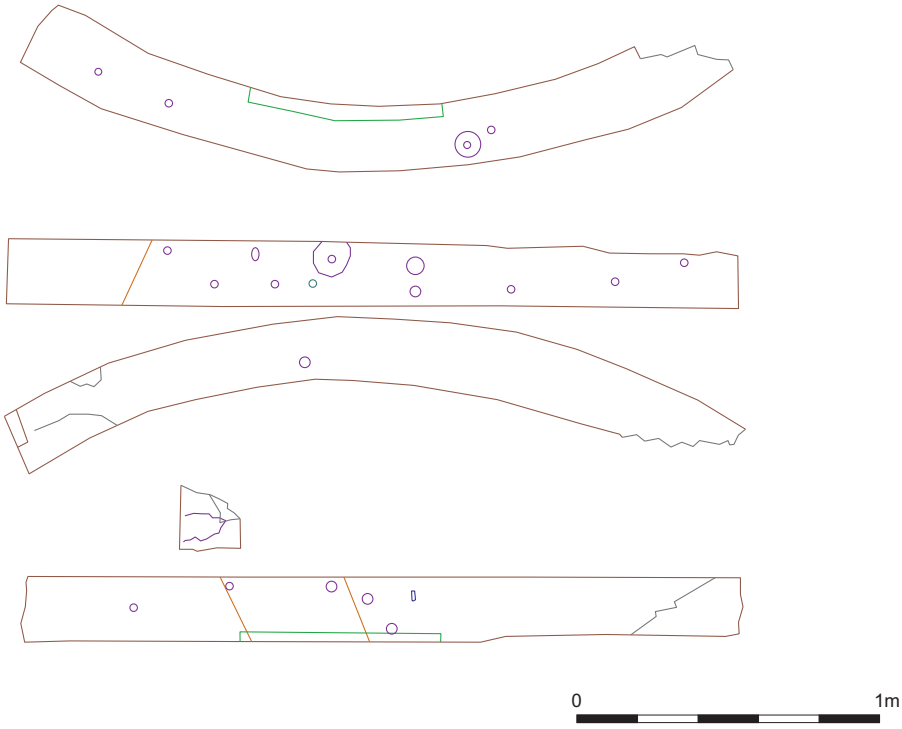

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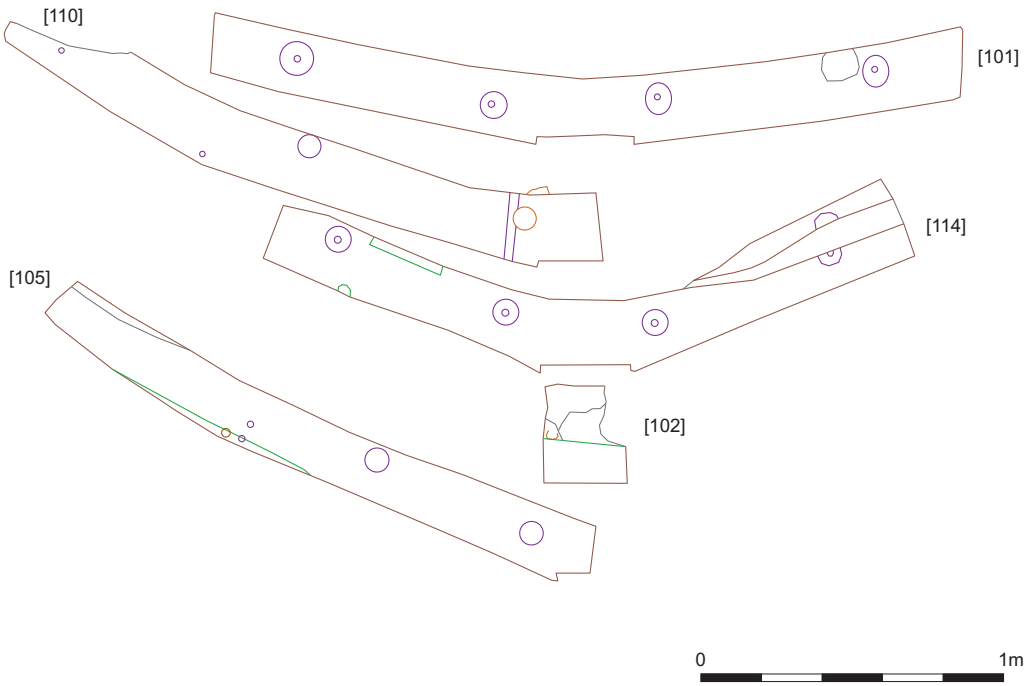

Fig 35 Lower timbers possible Vessel A

Fig 36 Lower timbers possible Vessel B

Plate 1: Timber [100]

Plate 2: Timber [101]

Plate 3: Timber [102]

Plate 4: Timber [103]

Plate 5: Timber [105]

Plate 6: Timber [106]

Plate 7: Timber [107]

Plate 8: Timber [110]

Plate 9: Timber [111]

Plate 10: Timber [114]

Plate 11: Timber [116]

Plate 12: Timber [176]

Plate 13: Timber [177]

Plate 14: Timber [178]

Plate 15: Timber [229]

Plate 16: Timber [230]

Plate 17: Timber [231]

Plate 18: Timber [232]

Plate 19: Timber [233]

Plate 20: Timber [234]

Plate 21: Timber [235]

Plate 22: Timber [236]

Plate 23: Timber [237]

Plate 24: Timber [238]

Plate 25: Timber [239]

Plate 26: Timber [240]

Plate 27:Timber [241]

Plate 28: Timber [242]

Plate 29: Timbers [243] & [248]

Plate 30: Timber [244]

Plate 31: Timber [245]

Plate 32: Timber [246]