

Old Mill, Old Malden Lane Worcester Park Surrey

*Post-Excavation Assessment and
Updated Project Design*



for:
Taylor Wimpey (South
Thames) Ltd

CA Project: AN0222
CA Report: AN0222_1

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SUMMARY

Project name:	Old Mill, Old Malden Lane
Location:	Worcester Park, Surrey
NGR:	522757 165701
Type:	Watching Brief
Date:	(Stage 1) 20 February – 24 March 2020 & 10 June – 31 July 2020 (Stage 2) 05 – 07, 13 – 16, 19 – 21 October 2020 (Stage 3) 16 November 2020
Planning reference:	18/01430/FUL
OASIS ID:	TBC
Location of Archive:	To be deposited with Bourne Hall Museum, Ewell, Epsom
Accession Number:	TBC
Site Code:	OMOM20

In 2020 Cotswold Archaeology (CA) undertook an archaeological watching brief in advance of the re-development of a brown field site at Old Mill, Old Malden Lane, Worcester Park, Surrey adjacent to the Hogsmill River. Five trenches were subject to archaeological investigation between February and October for Taylor Wimpey (South Thames) Ltd. It followed an archaeological trial-trench evaluation undertaken by CA during November and December 2019 which had indicated the presence of the remains of buildings and structures associated with a documented gunpowder mill of which no evidence had remained on the surface. The structural remains which were uncovered were recorded to provide an archaeological record, and where it was safe to do so, measures were taken to preserve below ground elements of the buildings *in situ*.

The Worcester Park Powder Mill (1720-1865) was depicted on 19th century maps and in illustrations by John Smeaton dated to c.1771. The drawings are preserved in the collections of The Royal Society (London) and can be viewed on-line through their Picture Library by searching for Worcester Park (<https://pictures.royalsociety.org/image-rs-17746>).

Evidence recorded at the site has been provisionally assigned to five phases of late post-medieval and modern activity. In Trench 1, two incorporating underdriven powder mills (assigned labels A & B) were found, their foundations recorded at a depth of up to 4.5m below ground level. Remains uncovered also included a water management culvert system, which would have powered an overshot waterwheel, that would have turned two pairs of large edge-runner millstones within each mill.

In Trench 2 part of a former canal system was discovered. In Trench 4 further evidence for ancillary outbuildings and a yard were also revealed. One of these, Structure H, is comparable in plan to John Smeaton's design for a steam drying house of late 18th-century date. No structures were found within Trenches 3 and 5, only a depth of deposits comprising made ground, and these trenches were not investigated further. No evidence for any earlier (for example medieval) activity at the site was identified.

Evidence of the seven explosions known to have happened at the Mill and for consequent repairs was found on the surviving structural remains of both Powder Mills and possibly on structures in Trench 4. Many shattered millstone fragments were recovered and possible *in-situ* brick blast debris. This included one 'almost' complete millstone that had broken into two pieces within the north barrel-vault of Powder Mill B. Other finds included a cluster of wooden teeth from wooden cogs found within a sealed deposit in the north vault of Powder Mill B. These may have powered an underdriven gear system. Small wedges or chocks from both barrel-vaults of Powder Mill A, may be indicative of waste from industrial repairs. Alternatively, they may have been part of the tooth to cog assembly, i.e. wedges used to secure the teeth in place. Preserved timbers included some *in-situ* decking within the barrel-vaults of Powder Mill B. Structural timbers were also recorded within its waterwheel pit, as well as the lower culverts of Powder Mills A and B that indicated these were also decked with timber planking. A well-preserved silt trap with worked timbers was identified within the upper culvert of Powder Mill A. All the structural timbers recorded at the site appeared to have been reused. The powder mills and the culverts were either butted by or covered with up to five thick layers of extensive re-deposited clays. This suggests that the brick structures of both Powder Mill A and B were most likely to have been hidden from view. They may have resembled a type of brick-built bunker, with perhaps, only the timber superstructures constructed above likely to have been visible. These would have housed the edge-runner millstones.

The 'Worcester Park Corn Mill' was constructed at the Site in c.1874. The corn mill is said to have burnt down in c.1891 and production of flour ceased but the brick components of the corn mill continued to be used for other purposes until demolition in c. 2019. Evidence for a corn mill at the site was confirmed. This included surviving coursing of walls, cement floors, and a re-use of the water management system associated with Powder Mill A and a 'Little Giant' turbine and penstock that can be dated to the late 19th century. Most of the later structural additions that were found were built upon the south barrel-vault of Powder Mill A. This document presents a quantification and assessment of the evidence recovered from the excavation. It briefly considers the evidence collectively in its local, regional and national contexts, and presents an updated project design for a programme of post-excavation analysis to bring the results to publication.

1. INTRODUCTION

- 1.1. Between February and November 2020, Cotswold Archaeology (CA) undertook an archaeological watching brief amounting to 73 days of fieldwork, five trenches (Trench 1, 2, 3, 4, & 5) associated with a development at Old Mill, Old Malden Lane, Worcester Park in Surrey.
- 1.2. The watching brief, its monitoring and recording, was undertaken at the site (the Site) for Taylor Wimpey (South Thames) Ltd. The investigations followed on from an archaeological trial-trench evaluation undertaken by CA at the Site during November and December 2019 (CA 2020a). The investigation was undertaken in accordance with a Written Scheme of Investigation (WSI) produced by CA (CA 2020b), which was subject to the advice and approval of the Local Planning Authority (LPA) archaeological advisor and the Archaeological Officer for Surrey County Council, Nigel Randall; AOSCC.

Planning background

- 1.3. Planning permission (ref: 18/01430/FUL) for the demolition of existing buildings and the erection of 80 new dwellings with access, associated parking and landscaping works has been granted by Epsom and Ewell Borough Council (the Local Planning Authority - LPA). The development is subject to a program of archaeological works, the scope of which was defined during discussions between CA and the Archaeological Officer for Surrey County Council, Nigel Randall; AOSCC.
- 1.4. The Site is situated in an area of high archaeological potential, especially 18th – 20th century structural remains, on which basis, the LPA stated that: *'No development, with the exception of demolition, shall take place until the applicant has secured the implementation of a program of archaeological work to be conducted in accordance with a Written Scheme of Investigation which has been submitted by the applicant and approved by the Planning Authority'*.
- Reason: The Site is of high archaeological potential and it is important that the archaeological information should be preserved as a record before it is destroyed by the development in accordance with Policy CS5 of the Core Strategy 2007 (Epsom and Ewell Borough Council 2007, 23-4).

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- 1.5. In compliance with the approved WSI (CA 2020b), the watching brief comprised three stages of archaeological monitoring and recording (Stages 1 – 3), (Trenches 1, 2, 3, 4 & 5) The watching brief trenches were targeted on areas of potential archaeological interest which had been identified by earlier trial-trench evaluation (CA 2020a).
- 1.6. The watching brief was also in line with *Surrey Archaeological Research Framework* (Bird 2006) and *A Research Framework for London Archaeology* (Museum of London/English Heritage 2002) so that the remains can, if possible, be placed within their local and regional context; *Standard and guidance for an archaeological watching brief* (ClfA 2014), and *Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide* (Historic England 2015).

The site

- 1.7. The development area is approximately 1.57ha of roughly triangular shaped land that had most recently been used as a depot facilitating the collection and delivery of waste skips, maintenance of company vehicles and office space (Fig. 1). An underground fuel tank (petrol) had been located centrally, in the northern part of the Site but was removed prior to the archaeological trial-trench evaluation (CA 2020a). The site is bounded by the Hogsmill River to the west and Old Malden Lane (B28854) to the east, with a road to the south and buildings immediately to the north. It lies c. 550m from the historic core of Old Malden.
- 1.8. The Site is situated on the eastern bank of the Hogsmill River on ground, ranging from approximately 19.5m above Ordnance Datum (aOD) in the northern corner to 21m aOD in the south-east.
- 1.9. The geology for the Site is mapped as London Clay Formation with superficial deposits of alluvium – clay, silt, sand and gravel associated with the Hogsmill River (British Geological Survey 2020).

2. ARCHAEOLOGICAL BACKGROUND

- 2.1. A detailed summary of the archaeological and historical development of the Site was presented in a Desk-Based Assessment (DBA) (CgMs Heritage 2018) and this forms the basis for the summary below, supplemented by additional research. Geotechnical investigations within the Site demonstrated the presence of considerable depths of made ground as well as alluvium and London Clay (RSK 2018). A trial-trench evaluation (CA

2020a) confirmed the findings of this research, with the discovery of preserved structural remains associated with the Worcester Park Powder Mill. The evidence corresponds with structures depicted on 19th century maps (CgMs Heritage 2018).

Prehistoric Period (Pre - AD 43)

- 2.2. A Levallois flake dating to the Palaeolithic Period was found approximately 350m to the north of the Site, in the Hogsmill Valley (MLO12306). Such Palaeolithic artefacts, associated with the early hunter gatherers are quite common within the Middle/Lower Thames Valley, providing evidence of early activity in a riverine environment that would have offered attractive natural resources.
- 2.3. Similarly, it is likely that Mesolithic hunter-foragers would have used the areas around the Hogsmill River, as evidenced by local finds. Approximately 600m from the Site, flint arrowheads, blades and cores of Mesolithic date were found in a field at Old Malden close to the river (MLO12445/MLO8174). Approximately 700m north of the Site at Manor Percy Gardens, excavation revealed an assemblage of Mesolithic flintwork including tools and cores, with some rare *in situ* material (MLO58366). Also, in this area, two Mesolithic adzes were seemingly deliberately re-deposited within a Middle Iron Age hearth at Manor Farm (MLO67664); with residual Mesolithic flint also noted at Old Malden (MLO71469).
- 2.4. A single recorded find of Neolithic date close to the Site is a multi-purpose piercer/scrapper/blade flint tool. This was recovered from approximately 400m north of the site (MLO99816).
- 2.5. Bronze Age activity is represented in the area by flintwork found approximately 600m north of the Site (ML012444). In addition, Late Bronze Age / Early Iron Age pottery was recorded in the same area at the former St John's Vicarage (Andrews 2001).
- 2.6. Indications of Iron Age settlement are focused between Old Malden and Percy Gardens, approximately 600m north of the Site. At Percy Gardens pits, post-holes, gullies and a substantial ditch were excavated (MLO58371; 58598; 58606). Roundhouses within a substantial enclosure, along with other features indicative of Iron Age settlement were located at St John's Vicarage, approximately 600m from the Site. Iron Age to Romano-British settlement activity was noted at Old Malden, in the gardens of the vicarage of St John the Baptist, approximately 550m to the north of the Site (Andrews 2001).

Roman Period (AD 43 – AD 410)

2.7. In Old Malden, settlement activity has been suggested by agricultural ditches and pits of Late Iron Age date continuing use into the Roman period at Manor Farm approximately 700m from the Site.

2.8. Roman period occupation continuing from Iron Age activity was also noted at Percy Gardens, approximately 600m from the Site; as well as Roman period ditches and gullies associated with an enclosure at the former St John's Vicarage, Old Malden (MLO64290; Andrews 2001).

Early-Medieval and Medieval Periods (AD 410 – 1539)

2.9. Evidence of Anglo-Saxon occupation and activity is limited in the vicinity of the Site. Old Malden, to the north of the Site, was a late Saxon village and is mentioned in the Domesday Survey as *Meldone* under the ownership of the de Wattville family.

2.10. The only recorded entry in the Surrey HER of the Anglo-Saxon period is an account of the origin of St. John the Baptist's Church at Old Malden, to the north of the Site.

2.11. From the medieval period through to the early 17th century, the Site lay at the western edge of a deer park known as 'Worcester Park'. Elsewhere in the locality activity is recorded at Old Malden in the form of the church, which has medieval origins, and finds of medieval pottery along with undated human bone found in the churchyard. In addition, a watermill was located approximately 400m west of the Site near to Old Kingston Road in the 14th century (MLO54817).

2.12. Medieval features, a trackway and water channel were recorded at the former St. John's Vicarage (MLO64292; MLO71474; 76; 77). Medieval artefacts have also been noted from the Percy Gardens and Manor Farm approximately 700m from the Site.

Post-Medieval & Modern periods (AD 1540 - Present Day)

2.13. There is a considerable body of documentary, cartographic and illustrative evidence regarding the history of the site of which this is only a very brief summary. Much technical information about the process of making gunpowder, and the historic significance and role of gunpowder manufacture in British history has also been gathered in the course of the rapid Post-excavation Assessment which will prove invaluable for future analysis and publication, but it will not be presented here.

2.14. The Site has undergone several boundary changes due partly to changes in the course of the adjacent Hogsmill River, and it now lies entirely in Worcester Park, Surrey.

It lies towards the western edge of Worcester Park, which was once part of 'Great Park' acquired together with the adjacent 'Little Park' by Henry VIII. The current name was derived from Edward Somerset, 4th Earl of Worcester and who was appointed keeper by James I in 1606. Both parks were originally used as deer parks.

2.15. In c. 1720 William Taylor (Snr), leased the land at the Site and commenced the manufacture of gunpowder (Prosser 1828), and in c.1750 he was able to purchase land and property including the original Worcester Park House mansion and the Site (Crocker 1990). Under the management of William Taylor (Snr), Worcester Park Powder Mill is recorded as one of ten manufacturing sites in the country that held a contract with the Ordnance Office to produce government proof quality gunpowder for the Seven Years' War (c.1756 - 1763); another gunpowder manufacturing site to win such a contract was a former powder mill located at nearby Ewell, Surrey.

2.16. Prior to c.1771, it is likely that the Site produced black powder by hand or with horses to turn the edge-runner millstones thus producing less gunpowder. Waterpower would increase production considerably. William Taylor (Jnr) appears to have employed the services of civil engineer John Smeaton in c.1771 to design a new style of under-driven water powered incorporating mill with an overshot waterwheel and a steam heated stove for a steam drying house (Crocker 1996). The new waterwheel designed for the Site comprised a unique size specific to the Site, measuring 9ft in diameter, with a width of 6ft. No other waterwheel designed by John Smeaton is comparable in size and width (Wilson 1955). Smeaton and James Watt were in c.1778 asked to provide a steam pump at the Site, in order to increase the water supply by pumping water as it left the waterwheel (via the tail conduit or tailrace) back to the headrace (head conduit). This would have enabled the Site to have two waterwheels rather than just one designed in c.1771 (Rymill 2012). William Taylor (Jnr), was registered as bankrupt on 6 April c.1832 (Elwick, 1843, 405), however in 1850 the Worcester Park Powder Mill was listed under a business name 'William Taylor' (Poole, 1852, 180-181).

2.17. Four workers are known to have been killed at the Site during the c. 144 years in gunpowder production and there were seven documented explosions. The first two of these occurred in 1741 and 1742 and each caused two fatalities, followed by further serious, but fortunately non-fatal, explosions in 1760, 1843, 1844, 1849 and 1854.

2.18. The Long Ditton Tithe Map (Fig. 1, insert) and Apportionment of 1841 (Genealogist 2021) show that, at that time, plots 317 (Worcester Park), 318 (mansion, offices, buildings

and garden) and plot 319 which comprised most of the present site and continued to the north-east (powder mills and yards of 5 acres, 2 rods and 6 perches) were all owned by William Taylor. The Site was leased to 'Curtis's & Harvey Ltd' in c.1854, who became the largest private gunpowder manufacturers in Britain. Their involvement was short-lived, and the Site closed in c.1865 (Crocker 1990).

2.19. The land was eventually sold in connection with the development of the new Worcester Park suburb 'New Malden'. Worcester Park Corn Mill was constructed at the Site in c.1874. A sale of notice of c.1879 revealed that the mill contained four pairs of grinding stones along with a newly erected house located immediately to the north-east of the Site. The corn mill is said to have burnt down in c.1891 and production of flour ceased. There was watercress production in the vicinity thereafter (Crocker 1990). Brick components of the former corn mill continued to be used for other purposes until demolition in 2019 (CA 2020a).

Previous Investigations

2.20. An archaeological trial-trench evaluation conducted to the north-east of the present site in 2006 revealed the partial remains of a structure, possibly associated with a gunpowder mill (ASE 2006). It indicated both the likely presence of structural remains and heavy modern truncation (SHER ESE790; NGR 5211616565, ASE 2006 cited in CgMs Heritage 2018).

2.21. The trial trench evaluation undertaken in November - December 2019 (CA 2020a) served to identify elements of the former mill structures in several locations within the Site. The archaeological evidence discovered recorded structural remains associated with 'Powder Mills and Yard' at the former Worcester Park Powder Mill Site. Structural remains were identified in Trenches 3, 4, 6, 7, 8 and 11 (Fig. 2). These comprised remains of phases of red to orangey-red brick buildings probably dating from the 19th century to the modern period.

2.22. A re-use of the earlier wall foundations to help later building construction was also discovered, which corresponded with buildings shown on 19th and later 20th century maps. The evidence included remains of a large building complex within Trench 3, which comprised several English Bond with lime mortar brick-built structures; and an intact red brick barrel-vault and substantial culvert, which may have functioned to channel water from the nearby former canal system, to power the workings of the former gunpowder mill buildings. At the south-west corner of one of the earlier southernmost buildings in Trench

3 there appeared to be severe structural damage, which was thought to have provided evidence for one of the known explosions at the site.

2.23. A large red brick building complex was also identified in Trenches 7, 8 and 11. An associated red brick canal system with a bridge crossing point was also recorded in Trench 6. A hardwood square cut timber was also recorded in the trench, which appeared to run perpendicular across the projected former canal system. Well preserved square-cut granite cobbled paving defining the southern and western edge of a possible courtyard was found in Trenches 7 and 8 (CA 2020a).

2.24. Trench 3 identified evidence of London Clay Formation geological horizons, at a depth of between 2.2m and 2.4m, where test pits were machine dug. A third test pit machine dug to a depth of 2.8m in Trench 2 failed to identify evidence of a natural geological horizon. Several buried greyish-green clay soils were identified above the natural substrate, in Trenches 2, 3 and 4, and numerous tertiary levelling layers and demolition rubble layers continued the overburden sequence of 'made ground'. Most of the trenches contained levelling deposits of modern 'made ground' dating from the late post-medieval period and modern period. These were overlain by a final layer of modern concrete and to the south, within the Site, an extensive modern dumped deposit was found immediately above the most recent archaeological horizon in the vicinity of Trenches 7, 8 and 11 (CA 2020a).

2.25. No evidence was identified during trial-trench evaluations, either within or to the north-east of the present site (ASE 2006:CA 2020a) or the watching brief undertaken by CA for medieval activity in an area where it has been conjectured an earlier gunpowder mill may have been located.

3. AIMS AND OBJECTIVES

3.1. The aims of the watching brief were to establish and record the character, level of survival, date, significance and extent of any archaeological remains or deposits surviving within the Site.

3.2. The objectives of the watching brief were laid out in the WSI produced by CA (2020b) and were as follows:

- To record the nature of the main stratigraphic units encountered;
- To assess the overall presence, survival and potential of structural and industrial remains; and
- To assess the overall presence, survival, condition, and potential of artefactual and ecofactual remains.

3.3. The specific aims of the work were to:

- to monitor groundworks, and to identify, investigate and record all significant buried archaeological structural and industrial remains, features and deposits revealed on the Site during the development groundworks; and,
- at the conclusion of the project, to produce an integrated archive for the project work and a report setting out the results of the project and the archaeological conclusions that can be drawn from the recorded data.

4. METHODOLOGY

4.1. In compliance with the approved WSI (CA 2020b), the watching brief comprised three stages of archaeological monitoring and recording (Stages 1 – 3), (Trenches 1, 2, 3, 4 & 5). The Site had previously been the subject of an archaeological desk-based assessment (DBA) produced by CgMs Heritage (2018) and the watching brief trenches were targeted on areas of potential archaeological interest which had been identified by earlier trial-trench evaluation (CA 2020a).

4.2. Stage 1 (Trenches 1, 2 and 3) commenced on 20 February but was suspended on 24 March (24 days) by Taylor Wimpey (South Thames) Ltd due to the coronavirus (Covid-19) global pandemic. Stage 1 recommenced on 10 June with Covid-19 health & safety restrictions in place and included partial opening of Trench 4 (230m² eastern half). Trenches 1, 2 and 3 were completed on 31 July 2020 (38 days).

4.3. With continued health and safety restrictions in place, Stage 2 incorporated further machine supervision and archaeological monitoring and recording of Trench 4 (322m² western half) from 05 - 07, 13 – 16 to 19 – 21 October 2020 (10 days) until completion.

4.4. Stage 3 completed the archaeological monitoring at the Site with a single day of fieldwork recording of Trench 5 (1 day).

4.5. In total 1940m² (0.194ha) were excavated, broken down as follows:

- Trench 1: 1300m² (0.13ha)
- Trench 2: 21m² (0.0021ha)
- Trench 3: 35m² (0.0035ha)
- Trench 4: 552m² (0.0552ha)
- Trench 5: 32m² (0.0032ha)

4.6. The Archaeological Officer for Surrey County Council, Nigel Randall; (AOSCC requested that full investigation be undertaken during the watching brief, specifically in Trenches 1 and 4 based on the evidence shown on 19th-century historic mapping (CgMs Heritage 2018) and the brick built structural remains and depth of deposits identified during the trial trench evaluation (CA 2020a). During the watching brief the remains of two Powder Mills A and B and associated brick culverts 1.5, 1.6, 1.7 and 1.8, canal walls 1.16, and 1.17 and furnace 1128 were recorded in Trench 1 during controlled machine excavation (Fig. 3). It became apparent during the work that lower culvert 1.6 extended outside the Site boundary and therefore its full length could not be fully revealed. Also, during the watching brief, brick-built structures C, E, F, G, H and J, cobbled surface D, trackway I and canal wall 4.1 were recorded in Trench 4 (Fig. 3). Agreed further exploratory trenches; Trenches 2, 3 and 5 were machine excavated to try to identify structural evidence depicted on 19th century mapping (Fig. 2). A canal wall (2.1) was found and recorded in Trench 2 (Fig. 3). No structures were found within Trenches 3 and 5, only a depth of deposits comprising made ground and these trenches were not investigated further.

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- 4.7. All fieldwork was undertaken in accordance with the Health & Safety at Work Act 1974 and Safe Systems of Work for – Excavations, Manual Handling and Lifting, Working Outdoors, Avoiding Overhead Services & Underground Services, Asbestos, Substances/Contaminated Ground, Confined Spaces, Spill Control, Access and Egress, Working at Height, Working within a Standing Building, Water Management during Excavations, Waste Handling and Disposal, Safe Use of Excavation Plant, Safe Use and Operations of Dumpers, Noise Monitoring and Control, Dust and Fumes, COSHH, First Aid, Fire Prevention and Emergency Procedures. A safe system of work was in place that adequately addresses the risks associated with unexploded ordnance (UXO). Construction Leadership Council (CLC) guidelines concerning Site Operating Procedures - Protecting Your Workforce During Coronavirus (Covid-19) were adhered to and correct PPE always worn.
- 4.8. Ground contaminants identified during the previous trial-trench evaluation (CA 2020a) were dealt with by Taylor Wimpey (South Thames) Ltd prior to and during the watching brief. Trenches 1 and 4 suffered from flooding and hydrocarbon contamination, specifically within the vicinity of Powder Mill B and all on site constraints were managed, monitored and inspected daily throughout the work by Taylor Wimpey (South Thames) Ltd and dealt with accordingly for the watching brief to be completed safely and successfully.
- 4.9. Fieldwork commenced with the removal, under continuous archaeological supervision, of a compact surface layer of modern concrete and subsequent landfill dumped deposits to reveal *in situ* redeposited clays and structural remains (Trenches 1, 2, 3, 4 and 5). This was undertaken by a mechanical excavator, first with a hydraulic ground breaker and a toothless grading bucket thereafter, until such time as archaeological features/deposits were observed or natural geology encountered, whichever was identified first. Trench edges were stepped or benched by machine where appropriate according to Safe Systems of Work, specifically within Trench 1; for example, the base of Powder Mill A where structural remains were recorded at a depth of approximately 4.5m (15ft) below the existing ground surface. This made it essential that trenches edges were stepped, always monitored and made safe.
- 4.10. All archaeological features and deposits were fully recorded prior to controlled demolition and removal of all structures affected by the development groundworks to proposed reduction levels specified by Taylor Wimpey (South Thames) Ltd and agreed by Nigel Randall (AOSCC). Once reduction levels were established, controlled demolition

was carried out under constant archaeological supervision and all archaeology to be preserved *in situ* was fully recorded.

- 4.11. The archaeological features thus exposed were recorded in plan, and hand-excavated where appropriate, to the bottom of their archaeological stratigraphy in accordance with *CA Technical Manual 1: Excavation Recording Manual* (CA 2017). Within the areas investigated, specifically Trenches 1, 2 and 4, the hand-cleaning of stripped surfaces was undertaken, where necessary, to better define identified archaeological features and deposits. The investigation and recording of exposed features concentrated on recovering their plan, with particular emphasis placed on retrieving a stratigraphic and chronological sequence, thus obtaining a detailed phasing for the Site.
- 4.12. Deposits were assessed for their environmental potential and were sampled appropriately in accordance with *CA Technical Manual 2: The Taking and Processing of Environmental and Other Samples from Archaeological Sites*. (CA 2012). All artefacts recovered from the excavation were retained in accordance with *CA Technical Manual 3: Treatment of finds immediately after excavation* (CA 1995).
- 4.13. A summary of information from this project, as set out in Appendix K will be entered onto the OASIS online database of archaeological projects in Britain.

5. RESULTS

Summary

- 5.1. Deposits and / or archaeological features were identified in Trenches 1, 2, 3, 4 and 5 during controlled machine watching brief in accordance with an agreed WSI (CA 2020b). The remains of Powder Mill A and Powder Mill B and associated brick culverts, canal walls and a furnace were recorded in Trench 1. The foundations of brick-built structures, a cobbled surface, a trackway and canal wall were recorded in Trench 4. Agreed further exploratory trenches; Trenches 2, 3 and 5 were machine excavated to try to locate structural evidence depicted on 19th-century maps. A canal wall was found and recorded in Trench 2. Within Trenches 3 and 5, only deposits comprising made ground were recorded but no structures were found therefore these trenches were not extended.

Phasing

- 5.2. Features / deposits were assigned to provisional periods (Periods 1 to 5), based on their morphology, construction, brick type and bonding, spatial and stratigraphic relationships

as well as deposit sequence. Some features contained datable artefacts while some features remained undated but the majority have been phased on the basis of stratigraphic relationships or other dateable evidence (for example historic maps).

5.3. Most principal elements of the individual features have been allocated set and group numbers for ease of interpretation. For the purposes of this report, a group number is a unique individual feature label defined by a letter to represent a structure such as 'Powder Mill A' in Trench 1 or 'Structure C' in Trench 4. A set number can incorporate a component part associated with a structure to represent a single event of building activity. For example, Powder Mill A, comprised set numbers; North Vault 1.1, South Vault 1.2, Upper Culvert 1.5 and Lower Culvert 1.6, Blast Walls 1.9 and 1.10 and Water Wheel Pit 1.13. Each group and set number also contain individual context numbers. For example, north-west facing section AA of South Vault 1.2 (Powder Mill A), shows Corn Mill Period 3 construction activity represented by floor 1001, 1095 / 1098, walls 1002, 1004, 1093, wall render 1008, deposit 1015, overflow drain 1144.

5.4. This section provides an overview of the watching brief results and individual context numbers mentioned below, may not be illustrated on the figures (Figs. 3 to 13), however detailed summaries of all recorded contexts are given in Appendix A. Artefactual material recovered from the Site are given in Appendices B to I. Environmental samples (biological evidence) are given in Appendix J. Based on the criteria discussed above, features / deposits were assigned to the following provisional periods:

- **Period 1: (Pre-dating c.1720) Prehistoric to late post-medieval**
(Features / Deposits pre-dating Worcester Park Powder Mill)
- **Period 2: (c.1720 - 1874) Late Post-Medieval / Modern**
(Worcester Park Powder Mill, Associated Structures & Destruction Deposits)
- **Period 3: (c.1874 - 1891) Modern**
(Corn Mill Features)
- **Period 4: (c.1891 - 1935) Modern**
(Deposits post-dating the Corn Mill)
- **Period 5: (c.1935 to present) Modern**
(Structures, dumped deposits and demolition)

Geology

5.5. Trenches 1, 3, 4, and 5 identified evidence of London Clay Formation geological horizons during the watching brief. Trench 2 failed to identify evidence of a natural geological horizon.

Trench 1

Powder Mill A (Fig. 4)

5.6. Excavation of Powder Mill A (Period 2) in Trench 1 revealed London Clay Formation at varied and considerable depths below the existing ground level: in North Vault 1.1 and South Vault 1.2, the depth of the geological horizon (1136) was recorded at a depth of approximately 3m and stepped down significantly a further 1.2m, shown by construction cuts 1137 (not illustrated) and 1142 (Fig. 7), from the west into both barrel-vaults and Waterwheel Pit 1.13. The Lower Culvert 1.6 Fig. 4 recorded London Clay Formation (1023/1025) at a depth of approximately 4.3m and Upper Culvert 1.5 (section AA, Figs. 4, 7 and 9) recorded the natural clay (1116/1136) at a depth of approximately 2.7m (Fig. 9).

5.7. Up to five redeposited clays were found that probably represent levelling, or construction backfill layers associated with the initial building of Powder Mill A in Trench 1 possibly to deliberately raise the ground level around it. The clays were found to butt up against Blast Wall 1.9 (Figs. 4 and 6), to butt east and west of and also to cover the north part of Blast Wall 1.10 (Figs. 4 and 6) and cover Upper Culvert 1.5 (section AA, Figs. 4,7, and 8, 9) and Lower Culvert 1.6 (Figs 4, 8, section AA, (projected base) and. 9). Seven explosions had occurred at the Site, but excavation of the re-deposited clays revealed that there was very little brick rubble that could be associated with explosion debris encompassing Powder Mill A, suggesting that these layers were from early in the mill's history.

Powder Mill B (Fig. 4)

5.8. Excavation of Powder Mill B (Period 2) in Trench 1 revealed London Clay Formation 1136 at depths below the existing ground level similar to Powder Mill A. Geological horizons were found immediately north of the Blast Wall 1.12, immediately west of North Vault 1.12 and west of Waterwheel Pit 1.14 and within the South Vault 1.2 after controlled demolition to agree reduced level had been completed (Fig. 10. The geology was recorded at depths of approximately between 2.3m and 2.6m in these locations. Lower Culvert 1.8 (section DD) recorded London Clay Formation at a depth of approximately 3.10m below ground level.

5.9. Up to five layers of re-deposited clays were found which probably represent levelling layers possibly associated with the initial construction of Powder Mill B in Trench 1 similar to Powder Mill A. The clays were found to butt against all external surviving faces of north Blast Wall 1.12, to butt and cover Upper Culvert 1.7(Figs. 5 and 8) , as well as Lower Culvert 1.8 (section DD; Fig. 12). However, excavation of the re-deposited clays revealed spreads of brick rubble, some of which comprised large blocks of bonded brick. These remains were found immediately to the south, west and north of the powder mill and are likely to have been associated with explosion debris, or be rubble from other structures on the site, or remnants from periods of repair or modification.

5.10. Concluding the geological evidence for Trench 1, the watching brief identified that both powder mills and culverts were butted by or buried and protected with extensive layers of re-deposited clays. This evidence suggests that these features were hidden from view, resembling a type of bunker during their functional use, with only the possible timber superstructures located above the barrel-vaults of each powder mill likely to have been visible as per John Smeaton's elevation drawing of the powder mill design for the Site (<https://pictures.royalsociety.org/image-rs-17745>) The re-deposited clays that covered the brick-built culvert systems (for example Fig. 9, Section BB) associated with both powder mills were possibly to prevent any leaks from potential failure of the culvert brick construction during its functional use, utilised as a kind of protective sealant, or simply to raise the ground level around them It is also possible that when the canal water management system was constructed, described as a 'Mill Pond' which probably fed the upper culverts of both powder mills, the excavated clay was used for this purpose. The extensive spread of re-deposited clays can be dated from the late post-medieval to early modern (Period 2). These were overlain by two modern layers 1000 comprising a conglomerate of demolition and construction debris and a final layer which formed a concrete yard surface across the Site (Periods 4 & 5).

Trench 3 (Fig. 3)

5.11. London Clay Formation was identified throughout the base of Trench 3 at a depth of 3m below the existing ground level. Five layers of redeposited silty clays of various colour and composition were recorded, ranging from 0.35m to 0.70m in thickness. These were covered by a final layer of compacted rubble from demolished buildings located within the vicinity, possibly the remains of 'Old Mill Cottage' (Period 4) and including, recent

demolition of Period 5 structures at the Site. No buried soils such as former land surfaces, structures or features were identified.

Trench 4 (Fig. 3)

5.12. London Clay Formation was recorded at a depth of 0.76m below ground level throughout Trench 4. The geology was covered by a silty clay subsoil 4002 measuring up to 0.36m in thickness. Brick-built Structures C, E, J, Cobbled Surface D, Trackway I (Period 2) were contained within foundation trenches that cut subsoil 4002 (Period 1) but not the geological horizon. This suggests the structural remains possibly functioned as a low foundation course to support single storey timber outbuildings adjacent to a modest cobbled yard surface and crude gravel trackway. The foundation trench cuts associated with the walls of Structures F, G, H and Canal Wall 4.1 (Period 2) were identified to cut subsoil 4002 and the London Clay Formation. This indicates these features were of more substantial construction. The structures recorded during the trial-trench evaluation within Trenches, 7, 8 and 11 are currently thought to date to Period 3 and 4 based on their construction form and stratigraphic sequence, and they were located above the features found in Trench 4 (CA 2020a). These structures were removed carefully by machine during the watching brief (CA 2020b).

Trench 5 (Fig. 3)

5.13. Throughout the base of Trench 5 a geological horizon of London Clay Formation was recorded at a depth of 1.2m below the existing ground level. It was covered with up to two layers of compacted rubble from recent demolished buildings of Period 4 and Period 5 date. No archaeological features or deposits of significance were identified. The area of Trench 5 appeared to have been heavily disturbed and truncated by later intrusion. The shallow foundation of two poorly preserved concrete capped wall remains dating to Period 4 or Period 5 were found to the south within the trench. Close to the vicinity of the trench a former building known as 'Old Mill Cottage' once stood but was demolished in recent years.

Trench 1

Period 1: (Pre-dating c.1720) Prehistoric to late post-medieval

5.14. Minimal evidence was identified below South Vault 1.2, Powder Mill A in Trench 1, that can be provisionally dated to Period 1 stratigraphically. Silty clay 1076 was of a composition consistent with a buried subsoil which appeared to be naturally formed. It was located immediately west of South Vault 1.2, below Blast Wall 1.9. The subsoil was

cut by shallow pit 1075 (fill 1074) that comprised an irregular base and the function of which remains uncertain. Both pit 1075 and the earlier deposit 1076 pre-dated Blast Wall 1.9 (Period 2).

Period 2: (c.1720 - 1874) Late post-medieval / modern

Powder Mill A (Fig. 4)

5.15. The structural remains are represented with construction directly associated with Powder Mill A and provisionally date to Period 2; North Vault 1.1, South Vault 1.2 (barrel-vaults), Waterwheel Pit 1.13, Blast Wall 1.9 and Blast Wall 1.10, Upper Culvert 1.5, Lower Culvert 1.6 and Canal Wall 1.16. This includes sub-phases of construction such as structural modifications or additions but also repairs that were possibly a result of gunpowder explosions that had occurred at the Site. Additional construction details were identified and recorded that are likely to be associated with Corn Mill phase Period 3. No finds were identified within any of the foundation trench cuts to confirm a terminus post quem date for the Period 2 features. It is possible from the evidence recorded, to hypothesise that the foundations of the two barrel-vaults of Powder Mill A, predate its culvert system, dating to between c.1720 and c.1771. It was discovered during controlled demolition that the lower culvert wall foundations are likely to post-date the barrel-vault wall foundations within the wheel pit location.

5.16. Powder Mill A consisting of North Vault 1.1 and South Vault 1.2 (barrel-vaults), Waterwheel Pit 1.13 and Blast Wall 1.9 and Blast Wall 1.10 was rectilinear in plan, orientated north-west / south-east along its long axis, similar to Powder Mill B. It comprised a maximum total external length of approximately 18.30m and a maximum external width along its north-east / south-west axis of approximately 7.35m, not including Upper Culvert 1.5 and Lower Culvert 1.6. The structural remains of Powder Mill A measured approximately 4.5m (15ft) in depth from the base of its lowest foundation course to the top level of each barrel-vault.

North Vault 1.1, Powder Mill A (Period 2) (Figs. 6, and 10).

5.17. Several sub-phases of construction were identified that represent gunpowder mill activity during Period 2 within North Vault 1.1 which was rectilinear in plan. Some of the earliest structural evidence recorded associated with the main structure of the barrel-vault was the remains of wall foundation 1101 located on the west side but which appeared to predate the superstructure above, cutting natural geology 1136. wall foundation 1101 contained a re-use of bonded brickwork from a previous structure. This evidence indicated

the barrel-vault had either been repaired or re-built after perhaps after a dramatic event such a gunpowder explosion. Constructed above 1101, brick arch Wall 1051 formed the main east and west walls and the earliest arch. Brick arch Wall 1052 was located above but built the same time as Wall 1051. Brick Wall 1041 appeared to be constructed shortly afterwards, with structural brick deposit 1053 thereafter. Walls 1051 and 1052 enclosed the east, west and north sides of the barrel-vault superstructure giving additional strength and support along with Wall 1041. Wall 1052 appeared to suggest a deliberately constructed level platform built on top of the vault. This construction detail, of what could appear to be an incomplete or truncated brick arch, is comparable to John Smeaton's c.1771 illustrations (<https://pictures.royalsociety.org/image-rs-17746>). The feature was less well preserved than the example located on South Vault 1.2. Located centrally within the top of the barrel-vault was a modification comprising a concrete filled access point 1054 (Period 3). This may have originally been an opening to allow for an underdriven vertical drive shaft to turn a pair of edge-runners on top of the vault. It appeared circular in plan. A similar opening 1003 was found on top of North Vault 1.1. The internal dimensions of the barrel vault measured approximately 3.06m in width, a height of approximately 3m and an internal depth of approximately 3.75m. The barrel-vault was constructed in English Bond style, of soft handmade un-frogged red to orangey red un-frogged brick, bonded with a light yellowish white lime mortar.

5.18. Built within North Vault 1.1 were the remains of several low-lying red brick walls found at its base which were only discovered in their full extent during controlled demolition. Wall 1176 was located to the north and Walls 1175 and 1174 to the south, which upon further investigation the latter walls formed one wall, were parallel to each other and seen to butt the barrel-vault walls to the east and west. There was a small gap measuring up to 0.25m deep which had been cut within the central part of the Walls 1175 and 1174 which appeared to align with possible drainage access point 1102, located centrally within Wall 1090 to the south. Between the walls redeposited clays were found; 1146, 1171, 1180 and 1181. The deposits were charcoal rich but compact as if trampled, within which numerous artefacts were recovered. Including metal and timbers remains, shattered millstone fragments and what appeared to be fragments of small wooden wedges. *In situ* timbers 1178, 1179 and 1177 were found to the north of Wall 1176 and two large *in situ* timbers, 1172 and 1173 were located parallel with each other, with both possibly functioning as timber supports for an underdriven gear system according to John Smeaton's c.1771 illustrations. Located immediately above and covering these features was a charcoal rich deposit 1169, which extended into Waterwheel Pit 1.13 and appeared

to be industrial waste from industrial workings or explosion debris associated with Period 2 activity. This deposit was covered by later floor 1098 / 1095, comprising of a solid grey cement with crushed ceramic building material inclusions. Its upper surface was smooth and flat and extended across and covered the central waterwheel pit area and the interior of South Vault 1.2 throughout. A thick and extensive Period 5 deposit was found to cover floor 1098 / 1095. This loose fill comprising what appeared to be demolition debris deliberately imported from elsewhere. It measured up 2.5m thick and filled the interior space of both barrel-vaults and the waterwheel pit area. Finds recovered from this context indicate a mid 20th-century date for this backfill deposit (Period 5).

South Vault 1.2, Powder Mill A (Period 2)

5.19. Several sub-phases of construction were identified that represent gunpowder mill activity during Period 2 within South Vault 1.2 which was rectilinear in plan. The earliest walls (Fig. 7, Section AA and Fig. 8) recorded within the main structure of the barrel-vault was the construction of brick arch Wall 1013 which also formed the main east and west walls, including brick arch Wall 1014. Both were built as one construction. Wall 1012 appeared to be constructed shortly after wall 1013 and 1014. All of which cut natural geology 1136 and enclosed the east, west and south sides of the barrel-vault superstructure giving additional strength and support. Careful removal of the interface between later corn mill Wall 1002 (Period 3) located above Wall 1012 (Period 2) appeared to suggest a deliberately constructed level platform had been built on top of the vault. Although it appears to resemble an unfinished brick arch. This construction detail although appears to be an incomplete or truncated brick arch, is comparable to John Smeaton's c.1771 illustration. A series of flat sandstone marble-like slabs 1165 had been deliberately placed centrally on the top of the barrel-vault along its north-west / south-east axis. The slabs possibly supported a bed-stone to house edge-runner millstones. Located centrally within 1165 and inserted into the apex of the barrel-vault was a later modification (Period 3) comprising a red brick-built faced square access point 1003. This may have originally been an opening to allow for an underdriven vertical drive shaft that would have turned a pair of edge-runners on top of the vault. A similar opening 1054 was found on top of North Vault 1.1. The internal dimensions of the barrel vault measured approximately 3.05m in width, a height of approximately 3m and an internal depth of approximately 3.68m. The barrel-vault was constructed in English Bond style, of soft handmade un-frogged red to orangey-red un-frogged brick, bonded with a light-yellowish white lime mortar.

5.20. Built within South Vault 1.2 were the remains of several low-lying red brick walls; Wall 1184, 1187 and 1188. These walls were found at the base of the barrel-vault and were only discovered in their full extent during controlled demolition. They appeared to be positioned similar to walls discovered within North Vault 1.1, butting its east and west inner face. An additional feature, Wall 1185 was found located between Wall 1184 and 1187. Located upon its inner face were the remains of deep scarring that was possibly made by the turning motion of a gear mechanism. Two *in situ* timbers, 1193 and 1194, were also found to be located close to the west and east inner face of the barrel-vault, with both butting Walls 1184 and 1187. The positioning of the deep scarring, the *in situ* timbers and the internal walls is intriguing, possibly functioning to support an underdriven gear system according to John Smeaton's c.1771 illustrations. Between the walls within the barrel-vault, demolition, re-deposited clays and sand was found; Deposits 1183, 1223 and 1204. Re-deposited clay 1183 was compact as if trampled by industrial occupation. Deposit 1204 was partially excavated and consisted mainly of what appeared to be compacted silty sand but may in fact be remains of powdered millstone. Abutting Wall 1188 and the western inner face of South Vault 1.2, the remains of *in situ* handmade square orangey-red ceramic tiles 1189 and 1190 were found. These are likely to have formed a paved surface. Their full extent was not established due to poor preservation, possibly a result of internal barrel-vault collapse.

5.21. Numerous artefacts were recovered Deposits 1183, 1223 and 1204, from metal and timbers remains and shattered millstone fragments, to a large millstone fragment 1203. Timbers 1193 and 1194 were located immediately above Wall 1187 and deposit 1204 and appeared to be parts of a possible collapsed underdriven timber structure that functioned as timber supports for an underdriven gear system according to John Smeaton's c.1771 illustrations. Located immediately above and covering these features was a crushed red brick rubble deposit 1098, which extended throughout the barrel-vault, into Waterwheel Pit 1.13. This deposit appeared to be the shattered but compacted structural remains from explosion debris associated with Period 2 activity. This deposit was covered by later (Period 3) cement floor 1098 / 1095 comprising of a solid grey cement with crushed ceramic building material inclusions. The solid cement floor's upper surface was smooth and flat and extended across and covered the central waterwheel pit area and the interior of South Vault 1.2 throughout. A thick and extensive deposit 1048 (Period 5) was found to cover Period 3 floor 1098 / 1095. This loose fill comprising what appeared to be demolition debris deliberately imported from elsewhere. It measured up 2.5m thick and

filled the interior space of both barrel-vaults and the waterwheel pit area. Finds recovered from this context indicate a mid-20th century date for this backfill deposit.

Upper Culvert 1.5, Powder Mill A (Period 2)

5.22. An elaborate brick-built water management system, Upper Culvert 1.5 (Fig. 9, Section BB), comprised a series of three brick-built segments; 1026, 1029 and 1031, which extended from Powder Mill A's east side southwards towards Canal Wall 1.16. Structural supports 1028 and 1030 appeared to give additional strength to this part of the culvert system. The brick-built segments and the structural supports were constructed of orangey red brick, bonded with a white lime mortar. Upper Culvert 1.5 comprised a total length of approximately 17.50m in length. It comprised an external width of 3.52m and internal width of 2.8m. Its external height measured 1.80m, with an internal height of 1.14m. Its shallow foundation trench 1113 / 1114 cut a dumped deposit 1110 (Period 2). Within Upper Culvert 1.5, a series of internal redeposited clay infill deposits were identified; the earliest 1109 and 1108 with a foundation deposit 1107 and ceramic paved tile surface 1106 / 1087 completing the constructional sequence. Above these were, silty fills 1118 and 1117, possibly waterlain or disuse silts. Controlled demolition revealed the paved tile surface was laid in a different style to that of Upper Culvert 1.7, Powder Mill B.

5.23. At the northern end of Upper Culvert 1.5, brick paved surface 1020 and timbers 1027, 1080 and 1082 were found to be built within the paved surface 1020, adjacent to Waterwheel Pit 1.13. The timbers were possibly the remains of a possible contemporary sluice gate system. Later Period 3 features were seen to cut paved surface 1020. Located at the southern end of Upper Culvert 1.5, several sub-phases of Canal Wall 1.16 (Period 2, Fig. 6), comprising Wall 1058 and 1059 was identified to be constructed above Upper Culvert 1.5. controlled demolition, a silt trap system was discovered at the southern end Upper Culvert 1.5.

5.24. The feature was hidden within the location of where brick-built segments 1029 and 1031 were located. It was defined by an earlier Canal Wall 1156 to the south, with two opposing silt trap walls either side; Wall 1153, 1154, 1155, 1157 and 1158. To the north a large re-used square-cut timber 1152 divided the silt trap from the upper culvert brick paving 1106. A square-cut re-used timber 1154 was suspended across the middle of the silt trap but built within Wall 1154, 1155, 1157 and 1158. The depth of the silt trap measured approximately 0.50m, and its base revealed natural geology 1136 at a depth

of 1.10m below ground level. The silt trap was filled with silty organic fill 1150 which contained organic remains and metal artefacts.

Lower Culvert 1.6, Powder Mill A (Period 2)

5.25. An elaborate brick-built water management system, Lower Culvert 1.6 (Fig. 6), extended from Powder Mill A's east side north-east towards the Hogsmill River. It was only partially revealed due to the feature extending outside of the Site limits. The structure (1047, section AA, Fig. 7) was constructed of orangey-red brick, bonded with a white lime mortar and measured 10.47m in length. It comprised an external width of 3.76m and internal width of 2.68m. Its external height measured 2.90m, with an internal height of 2.04m. Its foundation trench 1219 / 1221 cut natural geology 1136 and was butted by substantial re-deposited clays including 1123, 1124 and 1125. Within the base of Lower Culvert 1.6 was a timber structure comprising two longitudinal timbers with a series of cross-member timbers fixed between them using mortise and tenon joints. This appears to have been built at the same time as structure 1047. Timbers stakes 1211, 1212 and 1216 were also found to support the timber cross-members. Also, within Lower Culvert 1.6, a silty fill 1119 was recorded. The extent north-east within Lower Culvert 1.6 was photographed and identified to be complete but not surveyed, due to health and safety reasons. Its western extent was seen to have been modified during Period 3 with the introduction of a 'Little Giant' turbine. Substantial concrete piling (Period 5) was identified to intrude into the lower culvert in several places.

Blast Wall 1.9, Powder Mill A (Period 2)

5.26. Blast wall 1.9 (1010) was C shaped in plan and located immediately to the south, east and west of South Vault 1.2, Powder Mill A (Figs. 6, 13)). It measured 7.55m north-west / south-east, and up to 7.44m south-west / north-east and comprised a height of up to 1.6m and a width of up to 0.70m. The blast wall was of solid construction, comprising soft handmade un-frogged red to orangey-red brick, bonded with white lime mortar. The foundation trench 1071 was shallow but cut re-deposited clay 1072. Excavation revealed that once the blast wall had been built, butting the barrel vault sides, a series of re-deposited clays were found to butt the external face of the features up to a height of 0.80m with only approximately 0.50m of the blast exposed. It was presumably designed to strengthen the barrel-vault, but it is equally likely to have functioned as a form of protection in order to try to contain any shockwave from a gunpowder explosion, forcing it upwards rather than sideways. The feature is comparable to John Smeaton's c.1771 design. Further modifications were recorded upon its west and east sides.

Blast Wall 1.10, Powder Mill A (Period 2)

5.27. Blast wall 1.10 (1032, 1033 & 1038) was C shaped in plan and located immediately to the north, east and west of North Vault 1.1, Powder Mill A (Fig. 6). It measured up to 7.16m north-west / south-east, and up to 7.50m north-east / south-west and comprised a height of up to 1.81m. Its width was variable, measuring up to 0.79m on its east and west sides, and up to 0.50m to the north. Remains of three buttresses was discovered to the north; Buttress 1034, 1035 and 1036 and two buttresses to the west; Buttress 1099 and 1100. The blast wall and the buttresses were of solid construction, butting the barrel vault sides, comprising soft handmade un-frogged red to orangey-red brick, bonded with white lime mortar. It was presumably designed to strengthen the barrel-vault, but it is equally likely to have functioned as a form of protection in order to try to contain any shockwave from a gunpowder explosion, forcing it upwards rather than sideways.

Waterwheel Pit 1.13, Powder Mill A (Period 2)

5.28. The Waterwheel Pit 1.13 was located centrally between the North Vault 1.1 and South Vault 1.2 (Fig. 6). The structure was constructed of handmade un-frogged red to orangey-red brick and bonded with a yellowish-white lime mortar. It was square in plan and was broadly defined in its simplest form by four walls: Wall 1090 to the north, Wall 1091 to the south, Wall 1092 to the west, including Walls 1141 and 1009 and Wall 1017 to the east between the two vaults. Wall 1017 was part of the construction that included Upper Culvert 1.5 and Lower Culvert 1.6. Natural geological clay was found at the base of the waterwheel pit above which deposits 1089 and 1088 were identified. Numerous finds were recovered from both fills, specifically well-preserved organic finds such as leather artefacts and timber remains from the earliest dark charcoal rich deposit 1089. Walls 1090 and 1091 and upper deposit 1088 had been covered by later cement floor 1098 / 1095 (Period 3). Deposits 1088 and 1089 are likely to date to between c.1865 and c.1874 (Period 2): dates which mark the end of gunpowder production at the Site and the commencement and re-use of Powder Mill A as a corn mill (Period 3).

5.29. Scars from the action of the waterwheel were found on the inner faces of waterwheel pit walls 1090 and 1091 within Powder Mill A. These features were possibly made by the turning motion of a vertical waterwheel. The diameter of the surviving waterwheel scarring was calculated from the circumference or arc of the available evidence. The calculation gave an almost identical 9ft diameter waterwheel dimension to the design illustrated on John Smeaton's drawings. The internal width of the waterwheel pit measured 2.76m (9ft) with a length of 3.05m, suggesting the waterwheel measured approximately 9ft diameter

x 9ft wide. This indicates Powder Mill A potentially operated a larger waterwheel which could handle more water volume and generate more power than Powder Mill B, in order to turn two pairs of large edge-runner millstones.

5.30. Waterwheel Pit 1.13 was a simple pit which would help direct water from a rotating waterwheel out through the Lower Culvert tailrace. The flow of water from the Upper Culvert headrace would turn a waterwheel fixed to a horizontal axle that extended across into both the north and south vaults. This rotating axle would turn a series of cogs or gears, which transferred the rotating energy by revolving a vertical driveshaft fixed in place within the barrel-vault. The driveshaft extended up through an access point within the brick arched vaults and drove two pairs of edge-runner millstones upon millstone bedstones that ground gunpowder at a regulated speed. Beam slots were recorded within the north and south vault inner wall faces to the east and west, suggesting these recesses could have been fixing points for a structure that supported the waterwheel axles and vertical driveshaft.

Powder Mill B (Period 2) (Figs. 10, 11 and 12)

5.31. Structural remains are represented with construction directly associated with Powder Mill B and are provisionally dated to Period 2: North Vault 1.3, South Vault 1.4 (barrel-vaults), Waterwheel Pit 1.14, Blast Wall 1.11 and Blast Wall 1.12, Upper Culvert 1.7, Lower Culvert 1.8 and Canal Wall 1.17. This includes sub-phases of construction such as structural modifications or additions but also repairs that were possibly a result of gunpowder explosions that occurred at the Site. An additional construction detail was identified and recorded within South Vault 1.4 that is likely to be associated with Corn Mill phase Period 3. No finds were identified within any of the foundation trench cuts to confirm a *terminus post quem* date for the Period 2 features. It is possible to hypothesise, although certainly not proven, that the foundations of the two barrel-vaults of Powder Mill B predate its culvert system, dating to between c.1720 and c.1771. It was discovered during controlled demolition that the lower culvert wall foundations are likely to post-date the barrel-vault wall foundations within the wheel pit location.

5.32. Powder Mill B was rectilinear in plan consisting of North Vault 1.3 and South Vault 1.4 (barrel-vaults), Waterwheel Pit 1.14 and Blast Wall 1.11 and Blast Wall 1.12, orientated north-west / south-east along its long axis. It comprised a maximum total external length of approximately 17.55m and a maximum external width along its north-east / south-west

axis of approximately 7.50m, not including Upper Culvert 1.7 and Lower Culvert 1.8. The structural remains of Powder Mill B measured approximately 4.5m (15ft) from the base of its lowest foundation course to the top of each barrel-vault.

North Vault 1.3, Powder Mill B (Period 2)

5.33. Several sub-phases of construction were identified that represent gunpowder mill activity during Period 2 within North Vault 1.3. The barrel-vault was poorly preserved with much of the west and north side destroyed. The surviving remains of the barrel-vault was constructed in English Bond style, of soft handmade un-frogged red to orangey-red un-frogged brick, bonded with a light-yellowish white lime mortar. The structure comprised an external length measuring up to 4.93m north-west / south-east and an external width of approximately 7.35m. The wall height of the structure was more prominent to the east, measuring from 0.45m on the west to up to 2.05m westwards. No brick arch associated with a barrel-vault remained *in situ*. During excavation brick rubble comprising bonded brick arch fragments was observed to be spread across within the vicinity, indicating an explosion had occurred. Some of the earliest structural evidence recorded associated with the main structure of the barrel-vault were the remains of wall foundation 1651 which was more visible to the north and west. The wall cut natural geology 1136 and a possible alluvial layer 1526 to a depth of approximately 0.7m. Wall 1540 was found to be constructed above wall foundation 1651 but appeared to be offset. This evidence indicated the barrel-vault had either been repaired or re-built. Construction of the structure to the north-east requires analysis as part of the next stage of post-excavation analysis.

5.34. Built within North Vault 1.3, Powder Mill B, were the remains of several low-lying brick walls found at its base parallel with each other and butting the internal face of the barrel-vault interior (not illustrated) which were only discovered in their full extent during controlled demolition. Between these walls redeposited clays were found which sloped down into Waterwheel Pit 1.14. The deposits were charcoal rich but compact as if trampled. Well-preserved timber decking was discovered as were charcoal rich deposits that contained organic remains including timber teeth for a gear mechanism. Copper fragments, suggested an area of increased industrial activity. The features and deposits were covered by a charcoal rich deposit 1542 (Fig. 11) which measured up to 0.85m thick in places. This deposit contained fragmented brick rubble and was found to extend throughout the interior of Powder Mill B and westwards. Excavation of deposit 1542 also revealed the remains of a large millstone which had broken in half; RA512 (1563) and RA513 (1564) (Fig. 13). It is possible that deposit 1542 represents a dramatic episode

such as an explosive event. Located immediately above and covering these features, deposits 1541 (a grey clayey silt rich in finds) and above that, 1515 (a brownish clayey silt), completed the archaeological deposit sequence.

South Vault 1.4, Powder Mill B (Period 2)

5.35. Several sub-phases of repair and modification were identified that represent gunpowder mill activity during Period 2 within South Vault 1.4 (section CC, Fig. 11) The barrel-vault was poorly preserved with much of north side and top of the barrel-vault destroyed. The surviving remains of the barrel-vault was constructed in English Bond style, of soft handmade un-frogged red to orangey-red brick, bonded with a light yellowish white lime mortar. Only the remains of a brick arch located on the south side of the barrel-vault remained left in place and apparently supported by remains from Period 3. The evidence in this location showed that the structure comprised an external length measuring up to 4.85m north-west / south-east. The total wall height measured up to 3.62m from its base to the top of the barrel-vault. The barrel-vault internal height measured approximately 3.42m and the internal width between the east and west walls measured 3.05m. During excavation brick rubble comprising bonded brick arch fragments was observed to be spread across within the vicinity of the barrel-vault, indicating a possible explosion had occurred.

5.36. Based on the available evidence, it is possible an explosion occurred within North Vault 1.3. The shockwave destroyed the north and west side of North Vault 1.3 and wall 1660 to the west of Waterwheel Pit 1.14, weakened the south vault structure, which acted like a funnel for the shockwave, resulting in destroying Blast Wall 1.11. Interpretation of the construction of South Vault 1.4 requires further study at analysis stage of the project. What is clear however is that the barrel-vault cut 1580 / 1588 comprised steep to gradual sides and cut re-deposited clays 1579 and 1586. This was followed by the construction of Wall Foundation 1589 and Wall 1590, Brick Arch 1508 and 1509, Wall 1582 and 1591 and 1591 respectively, completing the construction sequence for the barrel-vault. Wall 1514 located on the south-west corner of the barrel-vault indicates a later repair (Period 2).

5.37. Built within South Vault 1.4 were the remains of several low-lying brick walls remains comparable in plan with North Vault 1.3. The internal wall remains were found at its base, were only discovered during controlled demolition. Their remains are tentative and require further analysis at the next stage of the project. Later Period 3 activity disturbed much of

the deposits within its interior. However, remains of *in-situ* timber decking 1559 were discovered to the north-east within the barrel-vault butting Wall 1508, including many millstone fragments and brick rubble.

Upper Culvert 1.7, Powder Mill B (Period 2)

5.38. An elaborate brick-built water management system, Upper Culvert 1.7 (Fig. 10), extended from Powder Mill B's east side southwards towards the former canal system depicted on 19th century maps. The structure 1504 was constructed of orangey-red brick, bonded with a white lime mortar and measured 16.80m in length. It comprised an external width of 2.94m and internal width of 2.25m. Its external height measured 1m, with an internal height of 0.79m. Its shallow foundation trench 1599 cut a re-deposited clay 1586. At its southern end, Canal Wall 1.17 (Period 2) was identified which comprised several sub-phases of brick construction. To the north brick paving 1552 and 1554 was identified which was broadly similar to 1020 within Upper Culvert 1.5, Powder Mill A.

Lower Culvert 1.8, Powder Mill B (Period 2)

5.39. An elaborate brick-built water management system, Lower Culvert 1.8, comprised a series of five brick-built segments; 1520, 1521, 1522, 1566 and 1567, which extended from Powder Mill B's east side north-east towards the Hogsmill River. Brick-built segment 1567 appeared to be a later addition or modification during Period 2. The structure 1520 (Fig. 12, Section DD) was constructed of orangey-red brick, bonded with a white lime mortar and measured 32.10m in length. It comprised an external width of 2.92m and internal width of 2.02m. Its external height measured 2.50m, with an internal height of 2.14m. Its deep foundation trench 1667 cut natural geology 1136 and re-deposited clays 1526 and 1669. Within Lower Culvert 1.8, structure 1679 comprised a series of cross-member timbers with mortice and tenon joints which appeared to have been built at the same time as structure 1520. There was evidence to indicate these timbers had been boarded with timber planks. Also, within Lower Culvert 1.8, two silty fills were recorded; 1666 and 1663. At its north-eastern end, Leat 1.15 (Period 2) was identified, which comprised Wall 1571, 1572 and 1574 and appeared to form a wide opening or exit point, with additional walls 1569, 1570 and 1571 indicating constructional repairs. Two parallel walls; Wall 1573 and 1575 suggested that their proximity to one another may have been to house a mechanism that controlled water flow that exited the tailrace. They followed

the alignment of Lower Culvert 1.8 but extend further north-east outside the Site towards the Hogsmill River. The fill between Wall 1573 and 1575 was heavily contaminated with hydrocarbons and a crude concrete repair 1568 was identified at the end of Lower Culvert 1.8 upon brick-built segment 1567.

Blast Wall 1.11, Powder Mill B (Period 2)

5.40. The surviving fragmented remains of Blast Wall 1.11 (Figs. 10); Wall 1516, 1507, (Fig. 11, section CC), 1514, 1513, 1605, 1585, 1602, 1603 and 1604, was likely to have been C-shaped in plan but its preservation was poor to the north-west, south and south-east. The remains appear to represent the results of a possible explosion. The blast wall was located to the west, south and east of South Vault 1.4, Powder Mill B. Brick rubble indicative of an explosive event was located throughout the south of South Vault 1.4, Powder Mill B. The features measured 4.9m north-west / south-east, and up to 7.35m north-east / south-west and comprised a height of up to 1.20m and a width of up to 0.47m. It was of solid construction, comprising soft handmade un-frogged red to orangey-red brick, bonded with white lime mortar. The foundation trench 1584 cut re-deposited clay 1579. Excavation revealed that once the blast wall had been built, butting the barrel vault sides, a series of re-deposited clays were found to butt the external face of the features up to a height of 0.70m with only approximately 0.50m of the blast wall exposed. It was presumably designed to strengthen the barrel-vault, but it is equally likely to have functioned to try to contain any shockwave from a gunpowder explosion, forcing it upwards rather than sideways. The evidence in this location has shown the forces involved from such a dramatic event. Further modifications were recorded upon its west and east sides.

Blast Wall 1.12, Powder Mill B (Period 2)

5.41. The surviving remains of Blast Wall 1.12 (Fig. 10); Wall 1536 and 1540 and foundation 1651 was likely to have been C-shaped in plan but its preservation was poor, and its interpretation requires further investigation in the next phase of the project. The blast wall was located to the west and east of North Vault 1.3, Powder Mill B. At least two sub-phases of construction were recorded. This blast wall is different in plan and profile to the other barrel-vaults found at the site. Brick rubble indicative of an explosive event was located throughout the north, west and east of North Vault 1.3. The feature was comparable in size to the south vault. It comprised a height of up to 1.20m and a width of up to 0.47m. It was of solid construction, comprising soft handmade un-frogged red to orangey red brick, bonded with white lime mortar. Excavation revealed that once the blast

wall had been built, a series of re-deposited clays were found to butt the external face of the features. Further modifications were recorded.

Waterwheel Pit 1.14, Powder Mill B (Period 2)

5.42. The Waterwheel Pit 1.14 was located centrally between the North Vault 1.3 and South Vault 1.4 (Fig. 10). The structure was constructed of handmade un-frogged red to orangey red brick and bonded with a yellowish white lime mortar. It was square in plan and was broadly defined in its simplest form by four walls; Wall 1638 and 1520 to the north, Wall 1626 and 1664 to the south with the tentative remains of Wall 1660 to the west. Due to the water table the base of the waterwheel pit was not established, but it measured approximately 3.05m north-east / south-west and 2.10m north-west / south-east. Machine excavation revealed preserved remains of substantial structural timbers; 1636, 1637, 1635 1662 and 1661. The timbers were square-cut and appeared to resemble the base of the surviving framework that may have held a waterwheel in place.

Period 3 (c.1874 - 1891) Modern

5.43. Period 3 is represented by the physical remains that are likely to have dated to the late 19th century, such as brickwork, mortar and cement floors discovered, including some surviving mechanical workings associated with a mill dating to this period. It is recorded that 'Worcester Park Corn Mill' was constructed at the Site in c.1874 (CgMs Heritage 2018). The corn mill is said to have burnt down in c.1891 and production of flour ceased but the brick components of the corn mill continued to be used for other purposes until demolition in c.2019 (CA 2020a). Evidence for a corn mill at the Site was confirmed during the investigations which identified surviving coursing of walls of red frogged brick and cement floors mixed with a crushed ceramic building material (CBM) and a re-use of the water management system associated with Powder Mills A and B.

Powder Mill A, Trench 1 (Period 3)

5.44. Later Period 3 walls; Walls 1002 (section AA, Fig. 7), 1004, modified access point 1003 and floor 1001 can be associated with the corn mill. These were observed to be built upon the surviving Period 2 remains of South Vault 1.2 of Powder Mill A. The corn mill also appeared to utilise the space within and between the two barrel-vaults, with the discovery of a solid cement floor 1098 / 1095. Period 3 floors were also built upon Blast Wall 1.9 suggesting that the interior and exterior of Powder Mill A was utilised during the

corn mills functional use. A re-use of the Period 2 water management system was also evident. Modifications were seen at the exit point from the headrace (Upper Culvert 1.5) into Waterwheel Pit 1.13 with the addition of brick-built Wall 1021. Modifications were also recorded at the entrance of Lower Culvert 1.6 which included the blocking up with brick, Walls 1093 and 1105 (Section AA, Fig. 7). Period 3 evidence was also found within North Vault 1.1 (Period 2), with the discovery of a driveshaft access point within the brick arch ceiling that had been blocked up with a form of concrete.

5.45. Excavation revealed a surviving well-preserved late 19th century cast iron ‘Little Giant’ turbine 1224 (Period 3) which was still fixed in position within the entrance into Lower Culvert 1.6, Powder Mill A (Period 2). This also included a well-riveted tubular penstock 1084 (Period 3) consisting of rolled sheet iron or sheet steel coated with a lead-tin alloy. It had been encased later during its functional use with what appeared to be a timber shuttered form of concrete, presumably due to the penstock having leaked water. Water was channelled from the modified Upper Culvert 1.5 (Period 2) with the additional aid of Wall 1021 (Period 3). The wall directed water through penstock 1084, down into the ‘Little Giant’ turbine 1224. By doing so, the power the turbine generated, would turn a vertical driveshaft (missing during excavation), which passed up through a cast iron spigot 1022 that was firmly fixed to the base of Upper Culvert 1.5. The spigot was located at the exit point of the headrace. Walls 1093 and 1105 had been added at the entrance into the tailrace of Lower Culvert 1.6 during Period 3. These walls are likely to have helped direct the water flow north-east through Lower Culvert 1.6, preventing any water flowing into the former Period 2 Waterwheel Pit 1.13. No evidence was found to establish how the driveshaft that turned within spigot 1022 functioned the working of possible Period 3 corn mill grinding stones. There are several known examples of ‘Little Giant’ turbines still working within mills; at Caudwell’s Mill in Derbyshire and Hinxton Mill in South Cambridgeshire.

Powder Mill B, Trench 1 (Period 3)

5.46. Period 3 activity was found on South Vault 1.4 and Lower Culvert 1.8, Powder Mill B. Excavation of South Vault 1.4 revealed a crudely constructed foundation 1617 constructed above explosion debris 1542 (Period 2). The foundation extended into the south vault and supported a red brick pillar 1510 (Period 3) (Fig. 11, section CC) Bonded with poor quality lime mortar, the brick pillar supported the remains of brick arch 1508 (Period 2). The brick pillar also supported vitrified brown glazed ceramic pipework which extended from the former canal system or ‘Mill Pond’ located to the south, and continued

northwards into South Vault 1.4 at a higher level. The function of the brown ceramic pipe remains uncertain. It is likely that it was inserted during Period 3 to control the level and flow of water within the canal system, as an overflow pipe. It is also equally possible it was utilised to help flood the former lower levels of the site during late 19th century / early 20th century watercress production, either of which would suggest that Lower Culvert 1.8 continued in use for some time after gunpowder production had ceased at the Site.

Furnace 1128, Trench 1 (Period 3)

5.47. Furnace 1128 (Figs. 4 and 5) was located immediately to the south-west of Powder Mill A. It measured 2.07m in length, a width of up to 1.4m and a thickness that ranged from 0.2m to 0.45m. It was constructed of a compact lime mortar with brick fragments. The edges of the furnace were crudely finished but its interior was concave and smooth and had been heated affected. It comprised an industrial fill 1148 containing remains of slag and copper-alloy. The furnace construction trench 1147 was seen to cut into a final phase of re-deposited clay 1067, thought to represent a ground level that existed during the functional use of Powder Mill A (Period 2). However, it is likely this was temporary feature, possibly used during Corn Mill Period 3 modifications.

Trench 2

Periods 2 & 5 Late Post-Medieval / Modern

Canal Wall 2.1

5.48. To the north within Trench 2 the remains of Canal Wall 2.1 (2003) (Fig. 3) were discovered. The canal wall measured 0.5m wide and was exposed to height of 1m below ground level. It was poorly preserved but appeared to be lined with large flint nodules butting its south face. The location of Canal Wall 2.1 corresponds with the former canal or 'Mill Pond' depicted on 19th century maps. Fill 2002 located within the canal location was identified to butt the canal wall from the south within the trench and appeared to represent silting up by natural process to a 1m depth below ground level. To the north of the canal wall, an unexcavated redeposited clay butted its north face (Period 2). Fill 2002 was covered by dumped deposit 2001 and a final layer of concrete and tarmac 2000 (Period 5).

Trench 3

Period 2, 4 & 5 late post-medieval / Modern

5.49. London Clay Formation was identified throughout the base of Trench 3 at a depth of 3m below the existing ground level. Five layers of redeposited clays of various colour and

composition were recorded, the earliest 3005, 3004, 3003, 3002 and 3001 respectively, ranging from 0.35m to 0.70m in thickness. These deposits were similar to the re-deposited clays found to encompass both Powder Mill A and B. The uppermost redeposited clay 3001, was covered by a final layer of compacted rubble from demolished buildings located within the vicinity, possibly the remains of 'Old Mill Cottage' (Period 4). Above this was, recent building rubble 3000 from demolition of upstanding structures at the Site (Period 5). No burial soils such as former land surfaces, structures or features were identified.

Trench 4

Period 2 (c.1720 - 1874) late post-medieval / modern

Structures C, E, F, G, H and J, Cobbled Surface D, Trackway I and Canal Wall 4.1

5.50. Activity associated with Period 2 was identified in Trench 4 during the watching brief (Fig. 3) with the discovery of Structures C, E, F, G, H and J, Cobbled Surface D (Fig. 13), Trackway I and Canal Wall 4.1. These features were found during excavation and removal of a series of structures previously identified during the trial-trench evaluation in the same location; Trenches 7, 8 and 11 (CA 2020a).

Structure C (Period 2)

5.51. Structure C was rectilinear in plan and broadly corresponded to the location of a similar building depicted on 19th century mapping. It measured approximately 17.20m in length and an excavated width of up to 5.20m. Its full extent south-east was not established due to it extending outside Trench 4 limits. The surviving remains measured in height from 0.25m to 0.52m. To the south-east within the trench, the remains of Wall 4004 defined the north-east corner of Structure C, which was L-shaped in plan and constructed of orangey-red handmade unfrogged brick, bonded with yellowish-white lime mortar in English Cross Bond style. The wall revealed evidence for a possible doorway at its eastern side, as if to gain access from the projected route of the former trackway depicted on 19th-century mapping. Wall 4055 possibly defined the western limits of the structure, constructed of similar brick type and bonding. No contemporary internal floors survived. The buildings function has not been established and was poorly preserved but is likely to represent an ancillary building associated with Worcester Park Power Mill.

Cobbled Surface D (Period 2)

5.52. The well-preserved remains of a heavily worn and trampled cobbled surface (Fig. 13) were found immediately south-west of Structure E and north-west of Structure C in Trench 4. The surface was constructed of large water-worn cobbles and measured 4.70m north-

west / south-east and 4.17m north-east / south-west and comprised a single course of natural stone measuring up to 0.10m thick. The cobbled surface is likely to be associated with a yard depicted on 19th century mapping. Possible Yard 4.2 is located immediately to the south-west.

Structure E (Period 2)

5.53. Structure E was square in plan and broadly corresponded to the location of a similar building depicted on 19th-century mapping. It measured approximately 10.25m north-east / south-west in length and a width of up to 7.53m north-west / south-east. The surviving remains measured in height up to 0.37m. To the north-east within the trench, the crude remains of Wall 4006 defined the north-east side of Structure E which was constructed of brownish-red handmade shallow frogged brick, bonded with a white lime mortar in Flemish Bond style. The wall possibly flanks the western edge of the projected route of the former trackway depicted on 19th-century mapping. To the north, Wall 4013 comprised a similar construction, with brick-built Wall 4008 and Drain 4010 defining the north-east cornering of the structure. Remains of Wall 4018 and 4024 were located on a similar alignment defining the north-west side, with further drainage located to the west with the discovery of a brick-built Drain 4042 and possible brick-built paved hearth 4045. Wall 4015 containing brick paving 4016 was located within the north-west and its function has yet to be established. Several brick column bases were also found to the south-east, brick column base 4040 and 4038. No contemporary internal floors survived. The function of the building has not been established and was poorly preserved but is likely to represent a covered area associated with Worcester Park Power Mill.

Structure F (Period 2)

5.54. Structure F was L-shaped in plan and broadly corresponded to the location of a similar building depicted on 19th-century mapping. It comprised of foundation trench 4028 with unexcavated fill 4029, and the remains of L-shaped Wall 4020. Wall 4022 butted Wall 4020 to the west and was butted by Wall 4024 to the south. The structure measured approximately 10m north-east / south-west, 5.50m north-west / south-east and a height from between 0.38m to 0.47m. Its width measured up 0.38m and was constructed of brownish-red handmade unfrogged brick and bonded with a white lime mortar. Its eastern half had been destroyed, either a result of an explosion or have been robbed. Although poorly preserved the surviving remains were substantial. No contemporary internal floors survived. The function of the building has not been established but is likely to represent an ancillary building associated with Worcester Park Power Mill.

Structure G (Period 2)

5.55. Structure G was rectilinear in plan and broadly corresponded to the location of a similar building depicted on 19th-century mapping. Comprising Foundation 4073 and Wall 4072 it measured approximately 5.30m in length and an excavated width of up to 3m but its full extent south-east was not established due to it extending outside Trench 4 limits. The surviving remains measured in height up to 0.67m, a width of up to 0.34m, and was constructed of brownish red handmade unfrosted brick, bonded with yellow lime mortar in English Bond style. No contemporary internal floors survived. The buildings function has not been established and is likely to represent an ancillary building associated with Worcester Park Power Mill.

Structure H (Period 2)

5.56. Structure H was square in plan and broadly corresponded to the location of a similar building depicted on 19th-century mapping. The structure comprised what appeared to be several sub-phases of construction represented by a series of butting walls; Walls 4079, 4081, 4083, 4085, 4087 and 4095. The walls varied in construction style, thickness and bonding, from handmade unfrosted brownish-red brick across most of the structure to a mixed composition of red brick and tile on its western end. Overall, it measured approximately 7.40m north-east / south-west, 6.47m north-west south-east and extended a further 4m south-east from its south-west corner. It comprised a height of up to 0.97m with wall widths measuring up to 0.90m. No contemporary internal floors survived but within the structure re-deposited compact clays 4093 and 4094 were identified but only partially excavated. The function of the building has not been established but is likely to represent an ancillary building associated with Worcester Park Power Mill. Its location immediately next to the former canal system is intriguing, and its shape in plan, including an internal partition wall, is similar to John Smeaton's design for a steam drying house.

Trackway I (Period 2)

5.57. Trackway I was linear in plan, located to the north-east within Trench 4 and orientated north-west / south-east. The feature broadly corresponded to the location of the former route of Old Malden Lane depicted on 19th-century mapping. The trackway was exposed for a length of 13m and it comprised a width of approximately 6.30m. Its full extent was not established due to it extending outside Trench 4 limits. The surviving remains were represented by cut 4051 which cut natural geology 4003 and comprised gradual sides, a flat base and is likely to represent a hollow-way. The feature was filled with a lower gravel

deposit 4049 and a final chalk deposit 4048, with silty clay fill 4050 indicating abandonment.

Structure J (Period 2)

5.58. Structure J broadly corresponded to the location of a similar building depicted on 19th-century mapping. Its full extent was not established due to it extending outside Trench 4 limits to the south-west. The surviving remains were constructed of orangey-red handmade unfrogged brick, bonded with yellowish-white lime mortar. The function of the wall has not been established and was poorly preserved but is likely to represent an ancillary building associated with Worcester Park Power Mill.

Canal Wall 4.1 (Period 2)

5.59. To the north within Trench 4 the remains of Canal Wall 4.1 (4034) were discovered. The location of this wall corresponds with the former canal or 'Mill Pond' also depicted on 19th century maps. The canal wall was orientated north-east / south-west and measured approximately 50m in length, 0.34m to 0.45m wide and was exposed to height of up to 0.70m below ground level. The wall was constructed of brownish orangey red handmade unfrogged brick, bonded with white lime mortar in English Cross Bond style. Further north-east, later phases of Period 2 wall construction; Walls 4036 and 4037, were identified during the earlier evaluation (CA2020a) that were associated with the former bridge crossing point depicted on 19th-century mapping.

Possible Yard 4.2 (Period 2)

5.60. Located centrally within Trench 4, the remains of the possible poorly preserved and heavily truncated clay deposit (Period 2) were found. The extent of the deposit measured up to 5.50m north-west / south-east, 10m north-east / south-west and comprised a thickness of up to 0.47m. This somewhat large feature may represent an open space associated with a yard depicted on 19th century mapping. Cobbled Surface D is located immediately to the north-east.

6. FACTUAL DATA AND STATEMENTS OF POTENTIAL

Stratigraphic record: factual data

- 6.1. Following the completion of the excavation fieldwork, an ordered, indexed, and internally consistent site archive was compiled in accordance with *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (ClfA 2014; updated October 2020), *Archaeological Archives: A Guide to Best Practice in Creation, Compilation, Transfer and Curation* (Archaeological Archives Forum 2007) and *Standard and Guide to Best Practice for Archaeological Archiving in Europe: EAC Guidelines 1* (*Europae Archaeologia Consilium* 2019).
- 6.2. A database of all contextual and artefactual evidence was also compiled and cross-referenced to spot-dating.
- 6.3. The fieldwork archive comprises the following records:

Context sheets	469
Digital site survey	1
Drawn sections	12
Sample register sheets	3
Artefact record sheets	28
Timber record sheets	29
Digital photograph register sheets	69

- 6.4. The survival and intelligibility of the site stratigraphy was moderate to good, despite considerable disturbance and truncation in places, post-medieval and archaeological remains survived at depth as standing structures. Stratigraphic relationships were present and although in some cases these were very localised, extrapolation with regard to structures was possible. Historic maps depict some of the structures and there is additional supporting illustrated documentary evidence in the form of engineering drawings (Smeaton collection which can be found at the Royal Society, (<https://pictures.royalsociety.org/image-rs-17746>) (though these do not necessarily show 'as constructed' equipment and buildings). Most features have been assigned a preliminary period based on stratigraphic relationships, context dates and/or spatial association.

Stratigraphic record: statement of potential

- 6.5. A secure stratigraphic sequence is essential to elucidating the form, purpose, date, organisation and development of the various phases of activity represented. This can be

achieved through detailed analysis of the sequence and further integration of the artefactual dating evidence. The refined sequence will then serve as the spatial and temporal framework within which other artefactual and biological evidence can be understood.

Comparison of stratigraphic record with documentary evidence: factual data

- 6.6. There are similarities between John Smeaton's illustrated designs for Worcester Park Powder Mill and the archaeological evidence recorded during the trial trench evaluation (CA 2020a) and this phase of investigation). William Taylor (Snr) Esq. was in ownership of the Site at the time of his death in c.1764 (The National Archives 2020). It is also proven that the business continued to operate under the management of his son, William Taylor (Jnr), who between c.1771 and 1772 requested the engineer John Smeaton 'the father of civil engineering' to design a new style of under-driven water powered incorporating mill with an overshot waterwheel and a steam heated stove for a steam drying house at Worcester Park Powder Mill (Crocker 1996), John Smeaton's detailed illustrations are comparable to the recent archaeological evidence.
- 6.7. During the watching brief it was discovered that the internal width between the side walls of the waterwheel pit recorded in Powder Mill B measured 2.10m wide (6ft 9ins). This broadly fits the 6ft wide dimension depicted on John Smeaton's illustrated waterwheel design. Although no waterwheel scarring was found, the internal dimensions of this powder mill are similar to Powder Mill B.
- 6.8. Both Powder Mill A and Powder Mill B comprised two barrel-vaults each (two mills), an internal working space between the two barrel-vaults which include a waterwheel pit and an impressive head race and tail race culvert system, which made use of a 'Mill Pond' and leat shown on 19th-century maps. Evidence for the canal system was discovered during the recent work, including the discovery of Canal Walls 1.16, 1.17, 2.1 and 4.1 (CA 2020a & 2020b). Parallels can also be made between Powder Mill A and Powder Mill B with their shape in plan, size, construction style and morphology, which are remarkably similar to John Smeaton's detailed structural plans and elevations.
- 6.9. In c. 1778, it is recorded that the engineer, James Watt, along with John Smeaton, were asked by William Taylor (Jnr) to provide a steam pump at the Site. The request was made to increase water supply by pumping water as it left the waterwheel (via the tailrace or tail conduit) back to the headrace (head conduit). The need for more water probably reflects the fact that there were two wheels, one each in both Mill A and Mill B. Scarring that was

possibly made by the turning motion of a waterwheel was found during the watching brief upon the inner faces of waterwheel pit walls 1090 and 1091 within Powder Mill A. The diameter of the surviving waterwheel scarring was calculated from the circumference or arc of the available evidence. The calculation gave an almost identical 9ft diameter waterwheel dimension to the design illustrated on John Smeaton's drawings. The internal width of the waterwheel pit in Powder Mill A measured 2.76m (9ft), suggesting the waterwheel measured 9ft diameter x 9ft wide. This also indicates Powder Mill A potentially operated a larger waterwheel which could handle more water volume and generate more power than Powder Mill B, in order to turn two pairs of large edge-runner millstones.

- 6.10. The structural evidence gathered from both Powder Mill A and B has also confirmed the overshot waterwheel design shown on John Smeaton's illustration was adopted, due to the elevated positioning of the upper and lower culverts attached to both powder mills. Water would have flowed from the 'Mill Pond' or head race, through the head conduits of both powder mills, along a trough feed, onto a waterwheel positioned within the waterwheel pit, and out through the lower culvert tail conduits. John Smeaton's illustrated plan of a steam drying house, shows a similar morphology to the building footprint of Structure H, which was built of similar brick and mortar to both powder mills in Trench 1. The structure was discovered within Trench 4 during the watching brief.
- 6.11. Frederick Taylor, continued production of gunpowder at the Site until the middle of the 19th century (Rivington and Rivington 1845). Seven explosions are recorded at the Site. Evidence for these explosions and repairs was identified and recorded from the surviving structural remains on both Powder Mill A and Powder Mill B within Trench 1. The latter showed the most dramatic evidence of an exploded powder mill during the watching brief. The gunpowder mill Site had won numerous lucrative Government Ordnance contracts and is likely to have been producing large amounts of gunpowder during certain periods of its functional use which may have put pressure on the production process.
- 6.12. Evidence for a re-use of wall foundations and structures identified at the Site was recorded in Trenches 6, 7, 8 and 11 during the trial-trench evaluation (CA 2020a). During the watching brief, a re-use of the brick-built culverts system associated with Powder Mill A and lower culvert associated with Powder Mill B in Trench 1 was recorded. A Corn Mill (Period 3) commenced production at the Site during the latter half of the 19th century and early 20th century and the archaeological evidence found confirms the Corn Mill made use of the former gunpowder mill structural remains, most notably that of Powder Mill A.

Comparison of stratigraphic record with documentary evidence: statement of potential

6.13. There is potential for more detailed comparison of stratigraphic record with documentary records which could further elucidate our understanding of the Site.

Artefactual record: factual data

6.14. All finds collected during the excavation have been cleaned, quantified and catalogued by context. Metalwork has been x-rayed and stabilised where appropriate.

Type	Category	Count	Weight (g)
Pottery	Roman	2	44
	Post-medieval/modern	65	15,953
	Total	67	15,997
Brick/tile	All	148	31,9896
Glass	Vessel	49	5512
	Window	28	228
Clay Tobacco Pipe		2	6
Flint	Worked/burnt	1	14
Stone	Millstones	38	-
	Building stone	9	-
	other	2	-
Leather		4	-
Coins	Farthing	1	-
Metals	Iron	225	140,191
	Copper alloy	10	873
	Lead alloy	3	20,138
Composite	Various, stone & metal	18	34,510
Industrial Residues	Not ferrous	12	350

Table 1: Summary of finds from the site

6.15. A large assemblage, though limited in its categories comprising mainly post-medieval and modern artefacts, was recovered from the site as detailed in the table above. In addition, a small number of extremely heavy objects comprising two halves of a large mill stone, several other large but broken up mill stones, and part of a 'Little Giant' turbine of late 19th century date were left at the site. The curator of the Bourne Hall Museum, Ewell, Epsom is to collect the latter, while the former will be retained at the site to be displayed after the development is complete so as to retain a link with the historic use of the site.

Pottery

6.16. An assemblage of 67 sherds, (15,997g) of pottery was recovered. The pottery was recovered from seven deposits. The bulk of the assemblage comprises post-medieval or modern pottery (65 sherds, 15,953g), the majority of which comprised British stonewares (BSW) (30 sherds, 13,843g). These date to between the 17th and 19th/earlier 20th centuries, although the bottles and other represented vessels indicate overall dating late

in this range (see Fig 15). Two sherds from a Roman open bowl with an upright bevelled rim made in an unprovenanced colour-coated fabric were also recovered (44g).

Ceramic Building Material (CBM)

6.17. The collection (31,9896g) consisted of several types of brick and several kinds of tiles. Most items had mortar adhering to one or more surfaces and some entries in the catalogue consisted of bricks still mortared together. The great majority of bricks, (60), are hand-made, frogless bricks probably from a wooden mould. The fabric is the traditional type of brick for this area, probably of 18th century date. All the brick fabrics are clearly local.

Glass

6.18. The excavation produced 77 fragments of glass weighing 5740g, dating to the post-medieval or modern period and in was in a mixed condition, with some complete vessel and other more broken-up fragments. Finds included recognisable brands such as a 'Cinzano' bottle, two Bovril bottles and a 'Pepsi Cola' bottle which most likely dates to the 1950s or 1960s. Also present were a poison and a tincture bottle, as well as probable ink or perfume containers.

Clay Tobacco Pipe

6.19. Just two fragments (6g) of post-medieval or modern clay-tobacco pipe stem in a fragmented and moderately poor condition were recorded from one deposit. In the absence of dateable indicators such as bowl form or makers' marks, the clay pipe can only broadly be dated to the late 16th to late 19th centuries. It is noted that a modern cigarette tin was also recovered from the site.

Worked Stone

6.20. A single worked flint flake (14g) was retrieved from fill 1074 of cut 1075, which produced no other finds.

6.21. Some 48 pieces of stone were either removed from site for analysis or recorded on site and sampled. (A series of samples was taken for geological identification purposes). Most of these (38 fragments from 32 items) are millstones, but there are items of structural stone too. Most of the millstones are fragmentary and it is not always possible to determine whether the fragments are from upper or lower stones. However, eight fragments of the lower millstones (bedstones) are present and four could be positively identified as upper millstones (edge runners) by the presence of wear on the circumference. One of the edge runners measures at least 0.9m diameter.

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- 6.22. The millstones for the gunpowder mill are made of limestone, which was common in gunpowder mills and those from the site are of two variants of black limestone with recrystallized calcite crystals. The rock is superficially similar to Black Rock limestone from the Mendips, but the precise provenance is uncertain at present. Other possible sources are Derbyshire and Namur in Belgium, both known to be sources of gunpowder millstones. Of these, Namur seems probable since gunpowder millstones from Namur were widely transported.
- 6.23. In addition to the gunpowder millstones, there are fragments of two sandstone discs. One of these is in form and size typical of grindstones, but it demonstrates no wear to the circumference and retains the original tooling. If it were a grindstone, then it was never used. Alternatively, it could be a small millstone associated with a phase of corn grinding at the site. It would be very small for this use, but it is hinted at by wear to one of the faces.
- 6.24. Building stone from the site includes ashlar blocks of Reigate stone and of oolitic limestone. Flooring slabs of white limestone from a number of possible sources and Purbeck limestone were also recorded, as were a single black limestone rod and a single fragment of slate roofing.

Leather

- 6.25. Remains from three shoes were recovered from Trench 1: Two were boots of brass riveted construction- a type used on inexpensive footwear from the middle of the 19th century through to the middle years of the 20th century. The choice of brass riveted footwear is not directly connected with the milling of gunpowder at this location. These shoes are both of common 19th century styles and are not 'magazine shoes' (a style of footwear, 'colloquially known as 'Waltham Abbeys', worn by those manufacturing and working with explosives well into the 20th century). One of these was a type of boot typically worn by labourers while the second was of a style more likely to have been worn by someone in an office, possibly someone involved with the mill's administration. The third item was a low stacked leather heel.

Metal

- 6.26. A considerable volume of post-medieval and / or modern metal in varied condition (much of it poor) was retained. This has been scanned for items of definite form or function. No items were present which could be diagnostically associated with gunpowder production. Most of the items consisted of large mechanical or structural components, which while possibly associated with the powder mill, could equally have derived from

other activities on the site, including the later flour mill. However, several items were present which were suggestive of an association.

6.27. These included numbers of large hand-forged nails and bolts possibly associated with the frangible timber sheds which were constructed to cover the gunpowder mill machinery. Also recovered were iron barrel bands. Production of gunpowder would typically require barrels for storage both of raw materials and finished powder, whereas these would not be typical of a flour mill. It is possible therefore that these originated from barrels associated with powder-making, although copper alloy or hazel bands might have been more appropriate for powder storage barrels.

6.28. Non-ferrous metal objects included two rectangular pieces of sheet copper alloy and a fragment of thick lead sheet, perforated by rivets around its edge. While no specific function could be ascribed to these objects, their presence was noted as it was common to use non-ferrous metals for a variety of functions in the gunpowder-making process in order to avoid sparking. Thus again, these items are suggestive of powder-making.

6.29. A small number of items of social history or dating interest have been catalogued, and they include a pencil/pencil holder of thin, gold-coloured sheet metal with wooden/graphite pencil insert, (Fig. 16) probably late 19th or early 20th century date, a farthing of George V (1910–1936), and a red painted Benson and Hedges cigarette tin probably of 1920s or 1930s date. Of most intrinsic interest are two fragments from a stamp constructed from lead alloy sheet with raised, probably soldered, design depicting (in reverse) the royal coat of arms (Fig. 16). It was probably 18th or 19th-century date and there are multiple small iron rivets through the base plate suggesting it was originally affixed to a wooden block.

Industrial residues

6.30. A very small volume of assorted probable industrial waste has not been further studied. Artefactual record: statements of potential

Pottery

6.31. Overall, the pottery assemblage is small and given the nature of the site most likely redeposited; as such it is of limited significance. The recording of the material is sufficient and the report presented here can be adapted for the excavation report to characterise the nature of the assemblage.

CBM

6.32. There is little point in further work on this collection itself, although it might be useful to see what the common 18th-century brick type is in the area. What does need to be done is to relate the brick types to the structures they are in or from which they can reasonably be thought to have come. Presumably, some will have been re-used. None of the items need to be kept, but a good photograph of a complete example of each type of brick (where possible) should be added to the catalogue, in addition to a clear close up of the fabric on a break.

Clay tobacco pipe

6.33. The assemblage is highly fragmented and in poor condition. As might be expected for a site where there was a high risk of explosion, it is a small group which is limited in its range and all dateable to the post-medieval/modern periods. They do not add to the understanding of the site chronology and are of limited archaeological significance. No further work is recommended.

Glass

6.34. The assemblage is small and in mixed condition. It may provide limited evidence for food consumption and/or rubbish disposal at the location. Given the nature of the site, however, it is unlikely that the assemblage is *in situ*. The assemblage is of limited archaeological significance and no further work is recommended, although a short summary of the assessment findings should be included in the publication.

Worked stone

6.35. The flint flake provides evidence of prehistoric activity on the site. A sentence on it should be included in the site publication.

6.36. The collection of millstone fragments are of interest given their role in the production processes used on the site. Geochemical analysis of two samples of the millstones would enable us to provenance them. This is needed because despite there being numerous research papers on English gunpowder mills, the millstones themselves are usually overlooked and their provenance rarely mentioned. Analysing the millstones would allow us to establish more about how the gunpowder mill there was organised and contribute to our wider understanding of English gunpowder mill procurement.

6.37. In addition, The Mills Archive Trust hold records on gunpowder mills and millstones including the Alan and Glenys Crocker collection, and research by Gordon Tucker and Owen Ward. Looking at these should provide further insights to the supply of

gunpowder millstones across southern England and to other local mills for comparison. Further work would therefore involve a visit to The Mills Archive Trust. A report will be written that incorporates the results of the geochemical analysis and research to give parallels with other gunpowder mills for which documenting of the millstones is available.

Leather

6.38. The leather has been catalogued and a summary has been provided to inform those writing the site narrative. They do not merit preservation and no further work is necessary.

Metal

6.39. The poor condition and late date of much of the assemblage limits its significance. However, more detailed recording of items that might have been associated with the Gunpowder Mill might be considered and a items of social historical or intrinsic interest should be offered to the local museum. As the mill produced powder for government contracts, further research might produce more information regarding the stamp.

Residues

6.40. No further work is recommended on this extremely small assemblage.

Biological record: factual data

6.41. No bulk soil samples were taken for the recovery of environmental remains and although a small number of samples were taken for additional recovery of artefacts, these have not been processed. However, a number of samples of wood were taken both on site and in the office for possible dendrochronology and species identification purposes. The wood had been preserved due to the depth of the archaeological features and waterlogged nature of parts of the site. The timbers retained have been wrapped in plastic to retain their moisture but are unlikely to be stable for long term preservation. The potential for preserving (with PEG) at least one of the wooden gear teeth if one is still in a suitable condition will be explored and photography and measured drawing should be used for a selection of the teeth. Any preserved example should be offered to the museum.

6.42. Items given registered artefact or sample numbers have been recorded on standard recording sheets which will be retained in the archive.

Type	Category	Count
Animal bone	Fragments	3
Samples	Wood - dendrochronology	5
Samples	Wood species Identification	11
Samples	Environmental	none
Samples	Other	19

Animal bone

6.43. Four fragments of animal bone weighing a total of 248g were recovered from two contexts. These included elements from sheep and pig. The pig lower front limb bone and a limb bone of a cattle-sized animal had been sawn to portion the meat, a practice frequently seen in post-medieval material.

Dendrochronology Samples

6.44. Sampling of timbers uncovered during the archaeological excavations was commissioned for the purposes of tree-ring dating. However, by virtue of the timber types, and the number of annual growth rings they had, almost all the exposed timbers were unsuitable for dendrochronology. A small number of samples were taken to the Nottingham Tree-ring Dating Laboratory for observations and comment on their growth. Three timbers were of some type of conifer, one was of elm, with the fifth timber being of oak. Only two of the conifer samples had sufficient number of rings for possible dendrochronological dating, but a date could not be obtained for either of them. The variety and type of timber found at this site is highly typical of late medieval/industrial contexts of southern and south-east England, especially at those with a complicated sequential history. The variation in the timber types, and its growth would suggest that whatever timber was immediately available, whatever its type and condition, was being used.

Wood species Identification samples

6.45. A series of 11 samples from timbers, beams, planks and cog/gears were studied for purposes of wood species identification. They were of elm, oak, cherry/blackthorn and an unidentified softwood types. The cog pieces (see example in the photographs below) were made from oak.



Plant macrofossil and charcoal

- 6.46. Due to the nature of the site and types of deposits no samples were taken for plant macrofossils or charcoal analysis.

Other samples

- 6.47. A number of other samples were taken from deposits either for purposes of finding further artefacts or because they appeared to be of a particularly dark nature which might have been related to fire, explosion or black powder. Because the likelihood of significant artefacts being recovered from these small samples is low and for health and safety reasons these have not been processed.

Biological record: statements of potential

Animal bone

- 6.48. This small group of material has no further potential for analysis. It has been fully recorded and requires no further work.

Dendrochronology samples

- 6.49. There is no further research potential for dendrochronological work. It is suggested that the assemblage found here represents an almost random collection of timbers, and that perhaps whatever timber was readily available was being used, and that over time, as structures or parts of buildings were altered or repaired, whatever timber was available was used for the purpose. No further work is recommended.

Wood species identification

- 6.50. No further work is suggested on the wood species identification samples.
- 6.51. It is suggested that the cog teeth should be recorded and offered to the museum.

Plant macrofossil and charcoal

- 6.52. No further work is recommended.

Other samples

- 6.53. No further work is recommended due to Health and Safety considerations and because the nature of the industrial activities and destructive episodes at the site is well documented, so the samples have little potential. Safe disposal is recommended before such samples can dry out.

7. SUMMARY STATEMENT OF POTENTIAL

- 7.1. The material assemblages from the site are almost all late post-medieval or Modern date and as would be expected due to the nature of the site. While some deposits may have been undisturbed, the finds would appear to suggest that (again to be expected due to the history of land-use and likely taphonomic processes on the site), not all were recovered *in situ*.
- 7.2. There is a limited range of material types with varied quality of preservation. A good quantity of partial mill stones was recovered or recorded and preserved at the site, and they present a good opportunity to provenance two samples of the millstones by geochemical analysis. This is an often overlooked aspect which would allow us to establish more about how the gunpowder mill was organised and its equipment was procured. By matching the various CBM types with their provenance on the site, further information about the detailed structural history of the site might be derived. Much of the large amount of metal recovered is in poor condition and will be difficult to identify, however a large turbine (left at the site for the Museum to collect) relates to the Corn Mill and large hand-forged nails and bolts may have been remnants from the earlier Gunpowder Mill buildings. Other items such as pottery and glass vessels, gold-coloured pencil *etc.* will be of local social-historical interest.
- 7.3. While attempts at dendrochronological dating were disappointing, the range of wood species used at the site is of interest as again it speaks to how the site was constructed and repaired.
- 7.4. The aims of the watching brief were to establish the character, level of survival, date, significance and extent of any archaeological remains or deposits surviving within the Site, which was successfully achieved. The overall presence, survival and potential of structural and industrial remains became clear during the process of machine excavation of overburden and controlled demolition. The remains were extensively recorded and the records will form part of the integrated archive. The overall presence, survival, condition, and potential of artefactual and ecofactual remains has also been successfully assessed.
- 7.5. Combination of the site record and further documentary research will allow for the production of a publication, which will be of local and at least regional significance as this a comparatively rare class of monument, although Surrey has more examples than many counties.

8. STORAGE AND CURATION

- 8.1. The archive is currently held at CA offices, Andover and Kemble, whilst post-excavation work proceeds. Bourne Hall Museum, Ewell, Epsom has agreed in principle to accept the archive upon completion of the project. CA will make arrangements with the Museum for the deposition of the site records and, subject to agreement with the legal landowners, those elements of the artefact collection that the museum wants to retain. The Museum of London has also asked to receive a copy of the final publication for their records. It is suggested that any remaining artefacts which are inherently unstable and / or of no further research potential or intrinsic merit should be safely disposed of.
- 8.2. The archive and artefacts from the excavation are currently held by CA at their offices in Kemble and Andover.
- 8.3. The archive will be prepared and deposited in accordance with *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives* (CIfA 2014; updated October 2020).

9. UPDATED AIMS AND OBJECTIVES

- 9.1. To fulfil the potential of the site data, the following updated objectives have been set out to provide a framework for the proposed further analysis:

Objective 1: Further understand and refine the site stratigraphy

- 9.2. Due to truncation and modern disturbance, plus repeated explosions, modifications, and changes in use of the buildings over time, there is a need to further refine our understanding of the preserved structural elements of the site and their function. While the majority of preserved foundations and structure appear to belong to the phase of gunpowder manufacture, sites of which are relatively rare, the later use of the site for the milling of corn should not be forgotten and needs further exploration.

Objective 2: Set the site within its local and regional geographical context

- 9.3. 'Gunpowder manufacturing sites are a comparatively rare class of monument with around 60 examples known nationally ...and all sites of gunpowder production which retain significant archaeological remains and survive well will normally be identified as nationally important' (Historic England 2021). Regionally, however there was a concentration of such sites, with 16 examples identified (Crocker and Crocker 1990; Crocker 2004 cited in Barber 2019). Surrey has a significant industrial history, with water power a key factor, for

example 'to drive the nationally important Chilworth gunpowder works ... in Surrey' (Bird 2006, 12). Twelve gunpowder mills were located on the Hogsmill River. Known for its watermills, the river was exploited due to its location near London, export and import trade links. It has been noted that the river helped gunpowder production for American Civil War of 1861-1865, (Talling 2020) so it is of interest that Site closed in c.1865 possibly due to a downturn in demand? Further documentary and comparative research will add to our understanding of the history and workings of this site. It may be possible, for example, to compare the site with other local mills such as the Ewell Gunpowder Works depicted on Roque's 1768 Map of Surrey (CgMs Heritage 2018, 19), or to otherwise set the site within the local industrial landscape.

Objective 3: Set the site within its economic / industrial historical context and particularly that of gunpowder manufacture

9.4. Regionally, the period of industrialisation from c. 1750 has long been identified as an area requiring further research (Bird, 2006, 67) and 'the production of gunpowder was an important industry in the region. It developed rapidly from the 16th century on, culminating in a number of later 19th to 20th-century chemical explosives works (Barber 2019, 10.2). Further comparative research utilising such sources as the national overview of 'both the gunpowder and subsequent chemical explosives industries (Cocroft 2000) which is an essential tool in our understanding of the industry's development and allows individual sites to be placed in a wider context' (Barber 2019, 10.2). Such work will contribute towards the objectives of the regional research agenda. 'Documentary and field survey/excavation on other gunpowder sites in the region is still needed. The relationship of the distribution of explosives sites to topography, communications, domestic occupation and defence structures needs study' (Barber 2019, 22.9). The site has links to John Smeaton and James Watt, nationally important figures in engineering design and manufacture, and these should be further explored.

Objective 3: Set the site within its local social history context

9.5. The curator of the local museum (Bourne Hall, Ewell) is extremely keen to take the archive, which contains items of local industrial and social interest. There has also been a significant amount of work undertaken on local history in the area, and the site can certainly contribute to the local interest and knowledge. Aspects such as the location within a former medieval deer park with royal connections, to the four generations of the Taylor family and the now demolished mansion located to the southeast of site will add depth to a sense of place and a broader historical setting for the site.

10. PUBLICATION

- 10.1. The results from the investigations of Old Mill site are of at least regional and probably national significance and merit publication. It is proposed that a full report is published in slim, stand-alone archaeological monograph to be published by Cotswold Archaeology.

Synopsis of proposed report (working title)

The Worcester Park Powder Mill (c.1720-1865)
Archaeological investigations of an industrial site at Old Malden Lane,
Worcester Park, Surrey, 2019-2020

Matt Nichol

Cover and contents	4 pages
	Words
Acknowledgements	300
Introduction	
Location, topography and geology	900
Project background	1500
Documentary History of the site	5000
Excavation Results	
Chronological discussion of the major phases and features of the site Gunpowder Mills, Corn Mill, etc.	6,000
<i>Elements of the site preserved in situ</i>	350
<i>Pottery (Pete Banks)</i>	500
<i>Metal (Ed McSloy and David Kenyon)</i>	600
<i>Stone (Ruth Shaffrey)</i>	2000
<i>Wood (Alison Arnold and Robert Howard; Sarah Cobain)</i>	600
<i>Leather (Quita Mould)</i>	750
<i>Other (Pete Banks)</i>	600
Discussion	
<i>Significance of the Mills</i>	1500
<i>Continuity and change on the site</i>	1500
<i>Local and social significance</i>	1000
Conclusion	500
Bibliography	1500
Appendices	3000
<i>Finds catalogues</i>	300
Total words	c. 30,000
Approximate pages @ 800 words/page	00
	c. 40 pages
Tables	
<i>Pottery</i>	1
<i>Wood species</i>	1

	<i>Stone</i>	2
Illustrations		
	Location of site	1
	Site plans with phasing	10
	Historic maps plans and elevations	10
	Historic plates, photographs etc	10
	Site photographs	25
	Finds	3
	Reconstruction	1
Total publication estimate		c. 100 pages

11. PROJECT TEAM

11.1. The analysis and publication programme will be quality assured by Martin Watt (Head of Publication). It will be managed by Karen Walker (Principal Post-Excavation Manager) who will contribute to the discussion as senior author and co-ordinate the work of the following personnel:

- **Matt Nichol (Senior/Project Officer: SPO):**
Principal author, post-excavation phasing, draft report preparation, research and archive
- **Peter Banks** editing of finds reports for publication
- **Ed McSloy**, metal & finds advice
- **Dan Bashford (Senior Illustrator: ILL)**
Production of all site plans, sections and artefact drawings (exc. pottery)
- **Jon Bennett ACIfA (Geomatics Officer: GO)**
GIS applications

11.2. Contributions by the following external consultants will be managed by the finds and project managers respectively.

- Ruth Shaffrey: worked stone
- David Kenyon: advice

12. TASK LIST

TASK	PERSONNEL	DURATION/ COST
Project Management	SPM	5
Stratigraphic Analysis	PO	7
Pottery	FO	0.5
CBM photographs	Ill	1.5
CBM spatial analysis	PO	1.5
Metal artefacts		
Further recording & reporting	Specialist	2
Worked stone		
Geochemical analysis	Specialist	FEE
Research & reporting	Specialist	FEE
Illustration	Ill	2
Conservation		
Wooden cog tooth (1)	Specialist	FEE
Documentary research	PO	5
Copyright permissions	PM	2
Preparation of publication report		
Abstract and introduction	PO	1
Excavation results	PO	5
Compilation of specialist reports, tables etc.	PO	3
Discussion, conclusions	PO	5
Illustrations	SI	10
Acknowledgements, bibliography	PO	2
Submission to external referees		
Editing	SPM	4
Revisions	PO	2
Copyediting, Typesetting	Specialist	FEE
Publication		
Printing	Specialist	FEE
Archive		
Research archive completion	AO	1
	FS	1
Deposition	FS	1

13. TIMETABLE

- 13.1. For a monograph publication project, CA would normally aim to have completed a publication draft within nine months of approval of the updated publication project design.

14. REFERENCES

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APPENDIX A: STRATIGRAPHIC ASSESSMENT

Matt Nichol

A total of 469 contexts were recorded during the current archaeological works, as detailed in the catalogue below. The archive also comprises a comprehensive digital photographic record (69 sheets of graphics register) plus hand drawn and digital survey. In addition, some 190 contexts were recorded during the evaluation phase (CA 2020a).

As demonstrated, there was some excellent preservation of below ground structural remains at the site and this allows for a strong correlation between structures and their original uses. There was also re-use and modification of some structures and there had been significant destruction caused by explosions and later landscaping and demolition works. There were significant volumes of deposits on the site, some of which seem likely to have suffered significant disturbance.

The general level of confidence in the site interpretation is considerably raised due to the documentary evidence available and for some structures, it is very high. There are, however, some deposits which merit further stratigraphic analysis (Objective 1).

Examples of these would be the apparently redeposited levelling, construction or perhaps buffer layers around the blast walls, and also, the blast walls themselves. For example, the surviving remains of Blast Wall 1.12 was likely to have been C-shaped in plan but its preservation was poor, and its interpretation requires further investigation. Further analysis is also needed to assist in the interpretation of the construction of South Vault 1.4.

trench	context	context type	Fill of	context comment	Context description	length	width	depth	spot date	feature label	prov. period
1	1000	Deposit		Modern tarmac	Mid grey tarmac	>55	>33.5	0.15	-		
1	1001	Surface		Floor surface	Mid brownish grey, coarse cement / CBM crush / gravel conglomerate, compact	5.02	4.07	0.11	-		
1	1002	Structure		Brick wall	Mid orangey red brick, shallow frog, English bond, mid grey sandy cement, 3-part wall	4.30 (SW face), 5.95 (SE face), 4.40 (NE face)	0.34	>0.50	-	Corn mill wall	
1	1003	Structure		Brick wall (access ?)	Mid orangey red brick, shallow frog, stretcher bond, mid greyish brown sandy cement, 4-part wall (square in plan)	1.02 (NE), 1.02 (SE), 1.02 (SW), 1.02 (NW)	0.11	0.83	-	South Vault 1.2, Powder Mill	
1	1004	Structure		Brick wall	Mid orangey red brick, shallow frog, English bond, mid yellowish brown sandy cement, 3-part wall (L I shape)	0.95 (NE), 1.55 (SE), 0.95 (SW)	0.34 - 0.40	0.47			
1	1005	Surface		Floor surface	Mid grey, cement / CBM crush / stone conglomerate, concreted	0.67	1.22	0.1	-		
1	1006	Deposit		Dumping	Dark greyish brown / black, mixed and mottled, sandy clayey silt, loose, charcoal flecks 25%, CBM crush / cement / mortar / stones / slag / slate	6.65	0.35	>0.35	-		
1	1007	Surface		Floor surface	Mid grey, cement / CMB crush / stone conglomerate, concreted	3.38	1.25	0.07 - 0.14	-		
1	1008	Surface		Floor surface	Mid grey, cement / CBM crush / stone conglomerate, concreted	2.03	1.36	0.08 - 0.10	-		
1	1009	Structure		Brick wall	Mid orangey red brick / purple brick, shallow frog, English bond, mid greyish brown sand cement	2.25 (NE), 1.09 (SE)	0.34	2.64	-		
1	1010	Structure		Brick wall	Mid orangey red brick, no frog / shallow frog, English bond, light yellowish white sand-lime mortar, 3-part wall	6.90 (NE), 7.35 (SE), 7.44 (SW)	0.35 - 0.70	1.6	-		
1	1011	Deposit		Rubble	Mid brownish red, mottled with light yellowish white, CBM crush / and-lime mortar, concreted	unknown	0.85	0.3	-		

1	1012	Structure		Brick wall	Mid brownish red brick, no frog, English bond, light yellowish white sand-lime mortar, 4-part wall (square in plan)	4 (NE), 6.05 (SE), 4 (SW)	0.34 - 0.56	1.86	-	South Vault 1.2, Powder Mill A	2
1	1013	Structure		Brick vault arch	Mid orangey red brick, no frog, English bond, light yellowish white sand-lime mortar, NW-SE, opens to NW	3.68	0.33	>2.85	3.05	South Vault 1.2, Powder Mill A	2
1	1014	Structure		Brick vault arch	Mid orangey red brick, no frog, English bond, light yellowish white sand-lime mortar, NW-SE, opens to NW	3.68	0.22	>2.85	3.71	South Vault 1.2, Powder Mill A	2
1	1015	Deposit		Redeposited clay	Mid brow / greyish brown, silty clay, compact, CBM fragments / lime flecks / stone / charcoal flecks	2.1	1.5	2.3	-		
1	1016	Deposit		Redeposited clay	Mid greyish brown / dark brownish grey, mottled, silty clay, compact, CBM fragments / glass / mortar / cement / stones	1.58	1.53	2.6	-		
1	1017	Structure		Brick wall	Mid orangey red brick, shallow frog / mid brownish red brick, no frog, English bond, mid brownish with sand-lime mortar / cement / fine mid yellow sand-lime mortar, NW-SE + 2 partition walls NE-SW	6.5 (NW-SE), 2.16 (2 NE-SW partitions)	0.23 - 0.47	2.53			
1	1018	Deposit		Backfill	Dark brownish grey, mottled, clayey silt, mod. compact, CBM crush / small stones / mortar	4	0.07	1.1	-		
1	1019	Surface		Cement render	Mid grey, cement	2.6	0.63	0.02	-		
1	1020	Surface		Floor surface	Mid orangey red brick, no frog, complete bricks / fragments, random bond, mid yellow coarse sand-lime mortar	2.54	>0.73	0.09	-		
1	1021	Structure		Brick wall	Mid brownish red / purple bricks, no frog, unclear bond, mid yellowish grey sandy cement, NW-SE	2.6	0.35	1.02	-		
1	1022	Structure		Flanged spigot	Cast iron, short tube, flanged edge	0.245	-	0.01 - 0.05	0.28 - 0.38		
1	1023	Structure		Brick wall	Mid orangey red brick, no frog, English bond, light yellowish white sand-lime mortar, NW-SE	0.9	0.33	1.32	-		

1	1024	Structure		Brick wall	Mid orangey red brick, no frog, English bond, light yellowish white sand-lime mortar, NW-SE	0.7	0.34	0.75	-		
1	1025	Structure		Brick / concrete block	Mid pinkish red / orange brick, no frog, stretcher bond, mid grey concreted cement / CBM crus / stone conglomerate	0.80 x 0.72	>0.55	0.38	-		
1	1026	Structure		Brick culvert	Mid brownish red brick, no frog, English bond, mid yellowish white coarse sand-lime mortar, NW-SE (curvilinear in plan)	13	3.52	1.8	2.8	Upper Culvert 1.5, Powder Mill A	2
1	1027	Timber		Beam	Horizontal Beam, NW-SE, irregular shape	0.71	0.11	0.09	-		
1	1028	Structure		Brick wall	Mid brownish red brick, no frog, stretcher bond, mid yellowish white coarse sand-lime mortar, NE-SW	3.43	0.35	>0.23	-	Upper Culvert 1.5, Powder Mill A	2
1	1029	Structure		Brick culvert	Mid brownish red brick, no frog, English bond, mid yellowish white coarse sand-lime mortar, NW-SE (curvilinear in plan)	1.03	>2.8	>0.64	-	Upper Culvert 1.5, Powder Mill A	2
1	1030	Structure		Brick wall	Mid brownish red brick, no frog, stretcher bond, mid yellowish white coarse sand-lime mortar, NE-SW	>3.20	0.38	>0.15	-	Upper Culvert 1.5, Powder Mill A	2
1	1031	Structure		Brick culvert	Mid brownish red brick, no frog, English bond, mid yellowish white coarse sand-lime mortar, NW-SE (curvilinear in plan)	2.7	>2.8	>0.64	-	Upper Culvert 1.5, Powder Mill A	2
1	1032	Structure		Brick wall	Mid brownish red / orangey red brick, no frog, English bond, mid yellow sand-lime mortar, NW-SE	5.56	0.33 - 0.79	1.81	-		
1	1033	Structure		Brick wall	Mid brownish red brick, no frog obvious, English bonding, NW/SE, mid yellow lime mortar	7.52	0.47	0.6	-		
1	1034	Structure		Brick wall	Mid brownish red brick, no frog obvious, English bond, NW, light greyish white, sand-lime mortar	0.9	0.69	1.9			
1	1035	Structure		Brick wall	Mid brownish red brick, no frog obvious, English bond, NW, light greyish white, sand-lime mortar	0.9	0.69	1.9			

1	1036	Structure		Brick wall	Mid brownish red brick, no frog obvious, English bond, NW, light greyish white, sand-lime mortar	0.9	0.69	1.9			
1	1037	Structure		Brick wall	Mid grey cement, floor Surface	0.88	0.4	0.93			
1	1038	Structure		Brick wall	Mid brownish red bricks, no frog obvious, English bond/English cross bond unclear crude SW face, light yellow sand-lime mortar, bleeding pointing, SW	5.05	0.73	1.1			
1	1039	Structure		Deposit	Mottled, mid greyish brown silty clay, compact with pieces of chalk, partially machine excavated	6.78	0.72	2			
1	1040	Structure		Brick wall	Mid brownish red/orangey red/purple brick, no frog obvious, roughly faced random bonding, NW/NE/SE with mid yellow sand-lime mortar	6.1	0.42	2			
1	1041	Structure		Brick wall	Mid brownish red brick, no frog faced English bond/English cross bond NE-SE-SW-NW, light yellow sand-lime mortar	5.95	0.4	0.1		North Vault 1.1 Powder Mill	2
1	1042	Structure		Brick wall	Mid brownish red brick, shallow frog on one bed, faced NE, English Bond, NE/SW, mid yellow sand-lime mortar flush pointing	4.4	0.34	0.5			
1	1043	Structure		Brick wall	Mid brownish red brick, no frog obvious, possibly English bond/English cross bond, NE, Light yellowish white sand-lime mortar flush pointing	1.6	0.21	0.26			
1	1044	Structure		Pillar	Mid grey, concreted cement and CBM crush	0.83	0.75	1.26			
1	1045	Structure		Pillar	Mid grey, concreted cement and CBM crush	0.85	0.71	1.26			
1	1046	Structure		Pillar	Mid brownish red brick pillar, mid greyish brown sandy cement	0.23	0.23	1.26			

1	1047	Structure		Brick wall	Mid brownish red brick, no frog squared finish regular square coursing English bond NW/Se mid yellowish white sand-lime mortar bleeding pointing	10.85	3.76	2.3			
1	1048	Deposit		Deposit	Dark brownish grey/black mottled, sandy silty, loose	6.6	3.38	1.2		South Vault 1.2, Powder Mill A	5
1	1049	Deposit		Deposit	Dark brownish grey/black mottled, sandy silty, friable	2.6	1.54	0.4			
1	1050	Deposit		Redeposited clay	Mid yellowish brown silty clay, compact with small stones	>9.00	>3.00	2			
1	1051	Structure		Brick wall arch	Mid brownish red brick no frog faced English bond opens to SE light yellowish white sand-lime mortar bleeding pointing	3.75	0.34	..15		North Vault 1.1 Powder Mill A	2
1	1052	Structure		Brick wall arch	Mid brownish red brick no frog squared finish rectangular square coursing possibly English bond NW/SE light yellowish white sand-lime mortar	3.75	0.22	0.1		North Vault 1.1 Powder Mill A	2
1	1053	Deposit		Deposit	Mid brownish yellow mottled, hard but loose and crumbly with small stones	3.5	1.6	0.15		North Vault 1.1 Powder Mill A	2
1	1054	Deposit		Deposit	Mid brownish grey mottled, clayey sandy silt/concrete, moderately compact with cob crush stones and mortar	0.8	0.8	0.15		North Vault 1.1 Powder Mill A	3
1	1055	Structure		Shaft opening	Mid brownish red brick no obvious frog, opening within vault arch 1051	0.82	0.7	0.15			
1	1056	Floor		Floor surface	Mid brownish red brick, no frog obvious laid on bed light yellow sand lime mortar	0.87	0.52	0.15			
1	1057	Floor		Floor surface	Mid brownish red brick, no frog obvious laid on bed light yellow sand lime mortar	0.62	0.29	0.15			
1	1058	Structure		Brick wall	Mid orangey red brick shallow frog possible English bond SE mid yellowish brown sandy cement	>3.10	0.47	0.36			

1	1059	Structure		Brick wall	Mid orangey/pinkish red brick shallow frog on one side face English cross bond NW mid yellowish brown sandy cement/mortar	>3.7	0.26	0.35			
1	1060	Deposit		Trackway	Mid yellow clayey gravel friable with bits of CBM	>3.36	unknown	0.4			
1	1061	Deposit		Trackway	Mid reddish brown sandy clay friable with CBM stone and charcoal flecks	>3.36	unknown	0.4			
1	1062	Deposit		Trackway	Mid yellowish brown gravelly clay moderately compact	2.1	unknown	0.54			
1	1063	Deposit		Levelling	Dark black silty gravel with 50% slag loose	0.76	unknown	0.64			
1	1064	Deposit		Trackway	Light brownish white degraded chalk and silty clay friable with charcoal flecks 5%	>3.36	unknown	0.45			
1	1065	Deposit		Bank material	Mid orangey brown silty clay moderately compact with CBM and chalk flecks	>1.65	unknown	0.58			
1	1066	Deposit		Deposit	Dark black clayey silt moderately compact with charcoal and CBM	>3	unknown	0.74			
1	1067	Deposit		Redeposited clay	Mid greyish brown, silty clay, compact with manganese inclusions	>7.35	>1.60	0.87			
1	1068	Deposit		Redeposited clay	Mid brown silty clay, compact with flecks of charcoal CBM and chalk	>3.71	>1.6	1.27			
1	1069	Deposit		Deposit	Dark brownish grey/black mottled clayey silt moderately compact with charcoal flecks, BCom and rooting	unknown	>1.6	1.55			
1	1070	Fill	1071	Foundation cut	Mid whitish grey mottled clayey sandy silt with mortar and crushed CBM	3.27	0.8	1.7			
1	1071	Cut		Foundation cut	Shape in plan unknown may correspond to [1010] vertical sides with straight sharp edges and uneven shall base running NW/SE	>3.27	>.80	1.54			
1	1072	Deposit		Deposit	Mid greenish grey silty clay compact, with charcoal flecks CBM mortar chalk and flint	unknown	>.80	1.73			
1	1073	Deposit		Deposit	Mid greyish brown silty clay moderately compact with chalk CM and rooting	unknown	>0.48	1.47			

1	1074	Fill	1075	Fill of (1075)	Mid greenish grey silty clay moderately compact with coarse sand manganese and flint	2.26	unknown	1.67				1
1	1075	Cut		Unknown	Uncertain shape with asymmetrical sides sloping gently on NW side and steeply on SE side, uneven base very undulating orientation unknown	2.26	unknown	0.26				1
1	1076	Deposit		Redeposited clay	Mid greyish brown silty clay, compact with flint and iron flecks	>3.80	>1.60	1.9				1
1	1077	Cut		Beam slot	Square in shape with sharp, 90 degree corners straight vertical sides with sharp edges no base, vertical slot	0.15	0.14	1.3				
1	1078	Cut		Beam slot	Linear with parallel sides, straight vertical sides with sharp edges, flat base running NW/SE	3.22	0.265	1.3				
1	1079	Floor		Brick layer	Mid brownish red brick cubes with no frog, probably hand-made and re-used, irregular size, fin mid yellow sand-lime mortar	>2.5	>.58	1.3				
1	1080	Timber		Beam	Horizontal Beam, NW/SE within slot [1078]	1.56	0.16	0.14				
1	1081	Floor		Floor between slots [1078] and [1083]	Mid brownish red brick, no frog no obvious bonding	1.05	0.64	1.3				
1	1082	Timber		Beam	Horizontal Beam NW/Se within slot [1083]	>0.85	0.23	1.3				
1	1083	Cut		Beam slot	Linear with parallel sides, straight vertical sides with sharp edges, flat base running NW/SE	>1.05	0.245	0.17				
1	1084	Structure		Pipe cylinder	Iron cylinder/pipe			3.05	0.68			
1	1085	Structure		Pipe cylinder	Cement/concrete conglomerate mid grey hard rough Surface			0.68	1.2			
1	1086	Structure		Surface	Sand cement mixed with CBM crush mid grey mottled with red, rough Surface	0.68	0.39	1.3				

1	1087	Floor		Floor of culvert (1026)	Mid brownish red brick no frog faced regular header face laid on bed no bonding material obvious	>0.55	2.04	1.3			
1	1088	Deposit		Dumping	Mid greyish brown clayey silt moderately compact with brick and stone fragments	2.95-3.05	2.75	3.8			
1	1089	Deposit		Dumping	Dark black clayey silt, very organic, loose	2.95	2.75	4			
1	1090	Structure		Brick wall water wheel pit	Mid orangey brown-red brick, no rog on most bricks, faced rough face SE mid yellow sand-lime mortar coarse	3.05	0.34	3.2		water wheel pit 1.13 Powder Mill A	2
1	1091	Structure		Brick wall water wheel pit	Mid orangey brown-red brick, no rog on most bricks, faced rough face NW mid yellow sand-lime mortar coarse	3.05	0.34	3.2		water wheel pit 1.13 Powder Mill A	2
1	1092	Structure		Brick wall	Mid orangey red brick no frog faced NE/SW	4.53	0.46-0.60	3.15			
1	1093	Structure		Brick wall	Mid brownish red/yellow brick/purple brick shallow frog on bricks, English cross bond NE/SW mid grey sand cement flush pointing	2.75	0.22	2.75			
1	1094	Structure		Brick wall	Mid brownish/purple brick no frog obvious faced SW, under water	2.75	0.44	3.65			
1	1095	Floor		Floor of barrel vault	Mid pinkish grey concreted cement with CBM crush and a smooth Surface	>2.50	3.05	3.52		North vault 1.1 Powder Mill A	3
1	1096	Structure		Brick wall	Mid orangey red brick, no frog faced SE mid yellow sand-lime mortar flush pointing	3.05	0.34	3.2			
1	1097	Deposit		Dumping	Dark black mottled orange clayey silt very organic loose/friable with charcoal and wood inclusions	3.05	0.75	3.2			
1	1098	Floor		Floor of barrel vault	Mid pinkish grey concreted cement with CBM crush and a smooth Surface	4.1	3.05	2.9		North vault 1.1 Powder Mill A	3
1	1099	Structure		Brick wall	Mid orangey red brick no frog obvious unclear bonding NW/SW/SE might grey lime mortar bleeding pointing	1.58	1.07	1.55			

1	1100	Structure		Brick wall	Mid orangey red brick no frog obvious unclear bonding NW/SW/SE might grey lime mortar bleeding pointing	0.92	0.94	1.55			
1	1101	Structure		Brick wall foundation	Mid orangey red/purple red brick no frog obvious, roughly faced, random bonding SE/SW mid yellow sand-lime mortar bleeding pointing	4.52	0.9	2.1		North vault 1.1 Powder Mill A	2
1	1102	Drain		Drainage pipe	Clay pipe running SE/NW	3.07	0.25	3.50			
1	1103	Structure		Brick wall	mid orangey red/purple brick and concreted cement and flint, faced to NE, roughly faced to SW, NE/SW mid yellowish sand-lime mortar	>0.90	1.48	3.3			
1	1104	Deposit		Backfill	Mid greyish yellow/brown silty clay moderately compact with gravel inclusions	>3.10	>0.65	0.5			
	1105	Structure		Brick wall	Mid pinkish red/mid yellow brick shallow frog on one bed, faced with irregular bonding on SW side mid greyish brown cement	2.75	0.22	1.7			
1	1106	Floor		Floor of culvert (1027)	Mid brownish red brick, no frog regular coursing bricks laid on bed, paving Surface, mid grey sand-lime mortar with flecks of lime	15.7	2.8	1.8			
1	1107	Floor		Floor of culvert (1026)	Mid brownish red brick no frog, roughly shaped floor Surface with white lime mortar	15.7	2.8	1.85			
1	1108	Deposit		Trample layer	Mid greyish brown clayey silt loose with CBM fragments	>2.05	2.8	2			
1	1109	Deposit		Redeposited clay	Mid greyish brown silty clay, compact with no obvious inclusions	>2.05	1.78	0.26			
1	1110	Deposit		Dumping	Dark brownish grey clayey silt loose with BCom flint and wood inclusions	>2.05	>3.50	0.06-0.26			
1	1111	Deposit		Dumping	Light greyish white chalk and clayey silt loose with no inclusions	>2.05	1.2	0.02-0.18			

1	1112	Deposit		Deposit	Dark grey/black clayey silt very organic friable with timber and wood fragments and charcoal	>2.05	>3.46	0.43			
1	1113	Cut		Foundation cut	curvilinear parallel sides, rounded corners, vertical straight sides with sharp edges, flat base running NW/SE	>2.05	0.36	0.18			
1	1114	Cut		Foundation cut	Curvilinear parallel sides, rounded corners, vertical straight sides with sharp edges, flat base running NW/SE	>2.05	0.36	0.06			
1	1115	Deposit		Redeposited clay	Mid greyish brown clay, compact with no obvious inclusions	>2.05	>0.74	0.7			
1	1116	Deposit		Bank material	Mid grey silty clay, compact with flecks of chalk CBM and charcoal	>2.05	>0.96	0.28			
1	1117	Deposit		Silting	Mid brownish grey clayey silt loose with fragments of CBM, stone and organic material	>2.05	2.8	0.1			
1	1118	Deposit		Silting	Dark black clayey silt loose with organic material and sand	>2.05	2.8	0.07			
1	1119	Deposit		Silting	Mid greyish brown, mottled clayey silt loose with CBM stone and organic inclusions	>3.60	2.68	0.18-0.46			
1	1120	Deposit		Bank material	Mid grey mottled silty clay, compact with inclusions of chalk, stone CBM and charcoal	>3.60	>0.90	0.05-0.22			
1	1121	Deposit		Bank material	Mid orangey brown silty clay, compact with flint, chalk charcoal and CBM inclusions	>3.60	>0.90	0.31			
1	1122	Deposit		Redeposited clay	Mid brownish grey silty clay with flecks of charcoal and manganese	>3.60	>0.70	0.11			
1	1123	Deposit		Bank material	Mid brown clay very compact with no inclusions	>3.60	>0.62	>1.16			
1	1124	Deposit		Dumping	Brownish grey mottled clayey silt moderately compact with charcoal CBM chalk and stones	>3.60	>0.60	0.72			
1	1125	Deposit		Bank material	Mid brown sandy clayey silt/silty clay moderately compact with stones	>3.60	>0.62	>0.82			

1	1126	Deposit		Trample layer	Mid brownish grey mottled silty clay/clayey silt, friable/loose with inclusions of CBM mortar chalk and charcoal	unknown	1.73	0.28			
1	1127	Structure		Brick wall	Mixed bricks English bonding with light yellowish white sand-lime mortar	4.1	0.45	1.9			
1	1128	Structure		Furnace	Brick lime mortar cement sand and stone cemented with lime mortar	>2.07	>1.4	0.2-0.45			
1	1129	Deposit		Redeposited clay	Mid brown clay compact	>4.28	0.7	0.75			
1	1130	Floor		Brick floor	Mid brownish red brick level surface with light white fine sand-lime mortar	>0.52	>0.30	1.4			
1	1131	Surface		Brick floor	Mid brownish red brick, no frog, faced, Surface, NE, mid yellow fine sand-lime mortar	1.12	>0.2	1.4			
1	1132	Structure		Organic	Mid grey, cement and CBM conglomerate roughly faced and aligned NW/Se	0.38	>0.34	1.2			
1	1133	Structure		Brick wall	Mid brownish red brick no frog, header bonding, paving of wall foundation, SE, mid yellow coarse sand-lime mortar flush pointing	unknown	0.69	0.09-0.17			
1	1134	Structure		Brick wall	Mid brownish red brick, no rog, header bonding, SE, mid yellow coarse sand-lime mortar, flush pointing	unknown	0.6	0.09-1.2			
1	1135	Cut		Cut of trench for buttress (1099)	Rectangular/sub rectangular in plan, uncertain corners, sides are straight with steep/vertical slope, flat base sloping to NE, running NW/SE	>1.58	0.92	0.78			
1	1136	Layer		Natural geology	Mid greyish brown with blue and yellow mottling clay compact with flint inclusions	n/a	n/a	n/a			
1	1137	Cut		Foundation cut	Possibly rectilinear in plan, uncertain corners, straight vertical SW sharp edges, flat base, aligned NW/SE and NE/SW	>4.52	1.52	1.2-2.36			

1	1138	Deposit		Redeposited clay	Mid brown silty clay, compact with no inclusions	4.9	>4.56	0.10-0.60			
1	1139	Fill		Backfill	Mottled brownish grey clayey silt and CBM rubble loose with no inclusions	0.88	0.32	3.46			
1	1140	Cut		Foundation cut	Possibly linear in plan, straight vertical side E with sharp edge, flat shape, running NW/SE	>0.88	0.7	0.44			
1	1141	Structure		Brick wall	Mid purple brick/pinkish red brick coarse material with small gravel inclusions, face with English bonding, NE coarse sand lime mortar light yellow with flush pointing	0.88	0.36-0.54	0.66			
1	1142	Cut		Foundation cut	Possibly rectilinear in plan, with straight slightly concave sides on the W, steep slope, sharp edge, flat base running NE/SW	unknown	1.6	1.16			
1	1143	Fill	1142	Backfill	Mottled mid greyish brown silty clay moderately compact with CBM inclusion	unknown	0.78	0.62			
1	1144	Drain		Drainage pipe	Clay pipe NW	1.39	0.2	0.19			
1	1145	Cut		Foundation cut	Possibly linear/rectilinear in plan, straight vertical sides with sharp edges, oriented new/se	>4.53	0.44	0.24			
1	1146	Deposit		Redeposited clay	Mid yellowish brown silty clay with some silty sand, moderately compact with CBM and metal inclusions	3.05	0.75	3.6			2
1	1147	Cut		Furnace	Elongated in plan, rounded/sharp-square corners, vertical sides with a flat base oriented NW/SE	2.07	1.4	0.2-0.45			
1	1148	Deposit		Furnace	Mid greyish black silt loose with charcoal slag and sandstone fragments	>0.70	>0.70	0.05			
1	1149	Structure		Brick wall	Mid orangey red brick, no frog obvious, crude coursing, unclear bonding faced on NE and NW sides mid yellow sand-lime mortar	0.57	0.28	3.5			
1	1150	Deposit		Silt trap	Dark black clayey silt loose with fragment of wood, very organic	3.50-4.20	2.8	1.8			

1	1151	Timber		Beam	Horizontal oriented NE/SW no tool marks obvious	>4.47	0.12-0.19	1.8			
1	1152	Timber		Beam	Horizontal oriented NE/SW no tool marks obvious	2.8	0.25	0.2			
1	1153	Structure		Brick wall	Mid orangey red/brownish red brick, no frog, faced, possible English bond, SE/NW	>1.6	0.35	1.1			
1	1154	Surface		Brick layer	Mid brownish red brick, no frog, faced, unclear/random bonding, NE, no bonding material obvious	1.11	0.51	1.8			
1	1155	Structure		Brick wall	Mid brownish red brick, no frog, faced, bonding unclear as flooded, NE/SW, mid yellow sand cement, weather pointing	>3.36	0.63	1.8			
1	1156	Structure		Brick wall	Mid brownish red brick, no frog, faced, unclear bonding as flooded, NW, mid yellow lime-sand mortar pointing unclear	2.8	0.77	1.8			
1	1157	Structure		Brick wall	Mid brownish red brick, faced, bonding unclear as flooded, NW, mid yellowish brown sand cement.	2.04	0.57	0.6			
1	1158	Structure		Brick wall	Mid brownish red brick, no frog, faced, bonding unclear a flooded, NW, possibly light white sand-lime mortar heavily weathered	1.1	0.29	1.8			
1	1159	Surface		Brick surface	Mid orangey red/brownish red brick uncertain coursing and random bonding no obvious bonding material	1.06	0.72	1.8			
1	1160	Deposit		Redeposited clay	Mid brownish grey mottled sandy silty clay moderately compact with inclusions of CBM, lime mortar sand and charcoal	0.84	>0.50	1.8			
1	1161	Structure		Brick wall	Mid brownish red brick, no rog obvious, reused, unfaced, very crude, random irregular bonding, SW, light with brown/yellow sand-lime mortar with flecks of lime, thick, uneven layers	4.02	1.02	>0.83			

1	1162	Deposit		Redeposited clay	Mid brown silty clay, compact with no obvious inclusions	6.05	1	1.1			
1	1163	Cut		Foundation cut	Linear in plan, straight vertical sides with sharp edges, flat base running NE/SW	6.05	1	0.22			
1	1164	Structure		Concrete wall	Mid pinkish grey mottled concrete coarse fragments of CBM and stone, SE/N	6.05	0.6-1	0.22			
1	1165	Floor		Floor surface	Mid orangey red/brownish red brick, no frog, mid grey limestone, white marble, regular coursing flat and levelled	3.4	1.8	0.45		South Vault 1.2, Powder Mill A	2
1	1166	Deposit		Deposit	Lightish brownish white with mud orangey red sand-lime mortar with brick and tile fragments	3	1.5	0.5			
1	1167	Deposit		Deposit	Lightish brownish white with mud orangey red sand-lime mortar with brick and tile fragments	3	1.4	0.5			
1	1168	Cut		Cut of silt trap	Possibly rectangular in plan, possibly sharp corners, possibly straight vertical sides, flat base, NW/SE	>2.56	2.8	0.5			
1	1169	Deposit		Deposit	Dark grey/black mottled with yellowish brown clayey silt moderately compact	4.13	3.06	3.2		North Vault 1.1 Powder Mill A	2
1	1170	Deposit		Deposit	Dark black, mottled with brownish grey clayey silt moderately compact with charcoal flecks and BCom fragments	1.2	0.65	1.5			
1	1171	Deposit		Backfill	Mottled dark brownish grey with patches of black and yellowish brown sandy clayey silt loose with fragments of CBM, timber and charcoal	3.06	1.33	3.4			2
1	1172	Timber		Beam	Horizontal, NW/SE	1.34	0.43	3.3		North vault 1.1 Powder Mill A	2
1	1173	Timber		Beam	Horizontal, NW/SE	1.08-1.27	0.28-0.33	3.3		North vault 1.1 Powder Mill A	2
1	1174	Structure		Brick wall	Mid brownish red brick, no rog, faced, unclear bonding, NW/Se mid yellow coarse sand-lime mortar 10-20mm thick	1.47	0.34	3		North vault 1.1 Powder Mill A	2

1	1175	Structure		Brick wall	Mid brownish red brick, no rog, faced, unclear bonding, NW/Se mid yellow coarse sand-lime mortar 10-20mm thick	1.47	0.34	3		North vault 1.1 Powder Mill A	2
1	1176	Structure		Brick wall	Mid brownish red brick, faced, unclear bonding, NW/Se, mid yellow sand-lime mortar	3.06	0.35	3		North vault 1.1 Powder Mill A	2
1	1177	Timber		Beam	Horizontal, NE/SW	0.42	0.17	3.3		North vault 1.1 Powder Mill A	2
1	1178	Timber		Plank	Horizontal NW/SE	0.52	0.06	3.25		North vault 1.1 Powder Mill A	2
1	1179	Timber		Plank	Horizontal NW/SE	0.55	0.07	3.25		North vault 1.1 Powder Mill A	2
1	1180	Deposit		Trample layer	Mottled dark grey/black sandy clayey silt, loose with charcoal flecks and fragments of CBM	3.06	0.77	3.35			2
1	1181	Deposit		Trample layer	Mid greyish brown mottled grey patches clayey silt friable/mid compact with fragments of CBM and charcoal flecks	3.06	1.23	3.25			2
1	1182	Deposit		Backfill	Mid brownish grey mottled sandy silt loose with CBM rubble, slate and stone	5.16	3.06	3.7			
1	1183	Deposit		Redeposited clay	Mid greyish brown silty clay. compact with small fragments of CBM chalk and metal	3.06	1.22	3.8		South Vault 1.2, Powder Mill A	2
1	1184	Structure		Brick wall	Mid orangey red/brownish red brick no frog, faced, unclear bonding, NW/SE, mid yellow fine sand-lime mortar	3.06	0.35	3.52		South Vault 1.2, Powder Mill A	2
1	1185	Structure		Brick wall	Mid orangey red brick, faced, English cross bond, NW/Se light white sand-lime mortar	1.98	0.34	3.7		South Vault 1.2, Powder Mill A	2
1	1186	Structure		Brick wall	Mid orangey red brick faced, unclear coursing, N/SE, mid yellow coarse sand-lime mortar	1.23	0.34	4.05			
1	1187	Structure		Brick wall	Mid orangey red brick faced, unclear coursing, N/SE, mid yellow sand-lime mortar	1.31	3.4	4.05		South Vault 1.2, Powder Mill A	2

1	1188	Structure		Brick wall	Mid orangey red brick/brownish red brick shallow frog some, faced, possibly English bonding, NW/SE mid yellow sand-lime mortar	3.06	0.34	3.55		South Vault 1.2, Powder Mill A	2
1	1189	Surface		Paving	Mid orangey red/brownish red paving tiles, square in shape, flat, light yellowish white mid yellow sand-lime mortar	1.34	0.88	3.95		South Vault 1.2, Powder Mill A	2
1	1190	Surface		Paving	Mid orangey red/brownish red paving tiles, square in shape, flat, light yellowish white mid yellow sand-lime mortar	1.18	0.54	4		South Vault 1.2, Powder Mill A	2
1	1191	Timber		Beam	Horizontal NW/SE	0.79	0.22	4.05			
1	1192	Timber		Beam	Horizontal NW/SE	0.79	0.22	4.05			
1	1193	Timber		Beam	Horizontal E/W	1.9	0.22	3.9		South Vault 1.2, Powder Mill A	2
1	1194	Timber		Beam	Horizontal N/S	1.22	0.19	3.9		South Vault 1.2, Powder Mill A	2
1	1195	Timber		Beam	Possible Beam, NW/SE poor preservation	0.36	0.08-0.1	0.02-0.08			
1	1196	Timber		Beam	Possible Beam, N/S poor preservation	0.52	0.09-0.11	3.9			
1	1197	Cut		Pit?	Irregular/semi oval in plan, rounded corners, NW/SE orientation	0.81	0.56	>0.06			
1	1198	Fill	1197	Fill	Mottled, mid dark brownish grey sandy silt with fragments of CBM, timber and charcoal flecks	0.81	0.56	>0.06			
1	1199	Deposit		Fill	Dark grey mottled sandy clayey silt friable with fragments of BCom timber and charcoal	0.9	0.48	4.05			
1	1200	Deposit		Deposit	Light yellowish white clayey silt, friable	0.76	0.15	4.05			
1	1201	Deposit		Deposit	Light yellowish white clayey silt, friable	0.78	0.27	4.05			
1	1202	Timber		Wedge	Vertical orientation, but collapsed	0.35	0.12	3.85			
1	1203	Structure		Mill stone	Mill stone fragment	0.64	0.24-0.80	3.85			

1	1204	Deposit		Levelling	Mid brownish yellow silty sand loose with flint inclusions	>2.77	>1.35	4.05		South Vault 1.2, Powder Mill A	2
1	1205	Timber		Beam	Horizontal NW/SE	>2.33	0.16	4.2			
1	1206	Timber		Beam	Horizontal NW/SE	2.53	0.2	4.2			
1	1207	Timber		Beam	Plank/Beam horizontal NE/SW	>0.65	0.17	4.2			
1	1208	Timber		Plank	Horizontal NE/SW	>0.72	0.08-0.15	4.2			
1	1209	Timber		Plank	Horizontal NE/SW	>0.74	0.17	4.2			
1	1210	Deposit		Redeposited clay	Dark bluish grey clayey silt friable with charcoal flecks	2.7	0.49	4.25			
1	1211	Timber		Post	Vertical NW/SE	>0.55	0.12	4.2			
1	1212	Structure		Brick wall	Mid brownish red brick, no frog, faced, NW, light white sand-lime mortar	5.39	0.56	2.35			
1	1213	Structure		Brick wall	Mid brownish red brick, no frog, faced, NW, light white sand-lime mortar	4.4	0.9	2.7			
1	1214	Deposit		Deposit	Dark grey/black silt friable/loose with flecks of charcoal and timber fragments	>0.80	>0.80	>0.10			
1	1215	Timber		Post	Vertical NE/SW	0.31	0.2	4.2			
1	1216	Timber		Post	Vertical NW/SE	>0.56	0.13	4.2			
1	1217	Timber		Post	Vertical NW/SE	>0.56	0.1	4.2			
1	1218	Cut		Foundation cut	Linear/curvilinear in plan, rounded corners, parallel vertical sides with sharp edges, flat base running NE/SW	unknown	0.62	0.36			
1	1219	Cut		Foundation cut	Linear/curvilinear in plan, rounded corners, parallel vertical sides with sharp edges, flat base running NE/SW	unknown	0.48	0.36			
1	1220	Cut		Foundation cut	Rectangular in plan, sharp corners, straight sharp sides, unknown base, NW/SE	0.05	0.4	>0.42			
1	1221	Cut		Foundation cut	Rectangular in plan, sharp corners, straight sharp sides, unknown base, NE/SW	0.013	0.1	>0.10			
1	1222	Timber		Plank	Horizontal NE/SW	1.50-1.55	0.25-0.35	1.4			

1	1223	Deposit		Deposit	Mid/dark yellowish brown sandy silt loose with timber BCom and metal fragments	2.15	0.22	3.85		South Vault 1.2, Powder Mill A	2
1	1224	Turbine		Turbine	Cast iron turbine	0.74	0.58	3.9			
1	1225	Timber		Beam	Horizontal NE/SW	0.94-1.75	0.35-0.40	3.3			
1	1226	Layer		Natural geology	Light blueish grey limestone solid	4	2.5	0.25			
1	1227	Layer		Natural geology	Mid greyish blue silty clay compact	4	2.5	unknown			
1	1228	Structure		Foundation layer	Mid orangey red brick no frogs, crude faced, irregular bonding, light to mid yellow sand-lime mortar	unknown	1.45	0.3			
1	1229	Deposit		Redeposited clay	Mid brownish grey sandy clayey silt moderately compact with CBM fragments and flecks of mortar	>1.06	0.72	1.8			
1	1500	Structure		Brick wall	Mid yellow/reddish brown brick no frog obvious, faced, possibly English cross bond, N/S light brown coarse sand cement	3.8	0.23	0.2			
1	1501	Structure		Concrete wall	Mid grey concrete with chunks of CBM faced and rendered internally E/W	>3.1	0.37	0.15			
1	1502	Structure		Brick wall	Mid orangey red brick, no frog, faced, possibly English bond, NE/NW, light yellowish white sand-lime mortar	0.63	0.34	0.5			
1	1503	Deposit		Backfill	Mid greyish yellow/brown silty clay moderately compact with gravel inclusions	>3.90	>3.40	uncertain			
1	1504	Structure		Brick culvert	Mid brownish red brick, no frog, faced, NE/SW, light yellow sand-lime mortar flush pointing and bleeding pointing	14.4	2.94	0.4			
1	1505	Deposit		Backfill	Mid brown/dark brownish black sandy silt and demolition rubble, loose	8.0-9.0	1.6	0.45			
1	1506	Structure		Brick wall	Mid orangey red brick, no frog, faced, possibly English bond, light yellowish white sand-lime mortar, flush pointing	0.64	0.34	0.63			

1	1507	Structure		Brick wall	Mid orangey red brick/brownish red brick, no frog, faced, Ne/SW, light yellow sand-lime mortar	7.48	0.33	0.35			
1	1508	Structure		Barrel vault	Mid brownish red brick, of rog, faced, possible English bonding, NW/SE, light yellow sand-lime mortar flush pointing	3.7	0.34	0.2			
1	1509	Structure		Barrel vault	Mid brownish red brick, of rog, faced, possible English bonding, NW/SE, light yellow sand-lime mortar flush pointing	3.7	0.23	0.25			
1	1510	Structure		Brick wall	Mixed brick no obvious frog faced random bonding mid grey sand cement bleeding pointing	0.95	0.23	0.4			
1	1511	Structure		Brick wall	Mid brownish red brick/orangey red brick no frog, faced, English bond, SE/N NE/SW light yellow sand-lime mortar, flush pointing	unknown	unknown	0.20-0.30			
1	1512	Deposit		Backfill	Mottled grey/red/black/white compact mix of lime CBM and mortar	3.35	2.15	0.25			
1	1513	Structure		Brick wall	Mid brownish red brick, faced, English bond, light yellowish white sand-lime mortar	4.9	0.39	0.9			
1	1514	Structure		Brick wall	Mid brownish red brick, faced, English bond, SE/NW light yellowish white sand-lime mortar	3.33	0.65	0.4			
1	1515	Deposit		Backfill	Mid/dark brownish grey clayey silt, loose with brick rubble and charcoal	>12.40	6.4	0.40-0.50			
1	1516	Structure		Brick wall	Mid yellow/purple brick crude and porous, faced, NW, mid grey-brown sand cement, flush pointing	1.21	0.23	0.35			
1	1517	Structure		Brick wall	Mid brownish red brick no frog, faced, possibly English bond, SE/NW, light yellow sand-lime mortar	3.7	0.71	0.20-0.30			
1	1518	Structure		Brick wall	Mid orangey red brick, faced, unknown bonding, NE/SW and NW/SE, light white sand-lime mortar	1	0.33	0.20-0.30			

1	1519	Structure		Brick wall	Mid brownish red brick, no frog, roughly faced, random bonding, light yellow sand-lime mortar, bleeding pointing	10.5	3.11	1.30-1.50			
1	1520	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond, light yellow sand-lime mortar	10	0.46	1.75			
1	1521	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond, light yellow sand-lime mortar	6.25	0.46	1.7			
1	1522	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond, light yellow sand-lime mortar	9.2	2.15	1.70-2.0			
1	1523	Structure		Brick wall	Mid brownish red brick, no frog, roughly faced, header bond, NW and NE, mid yellow sand-lime mortar bleeding pointing	1.3	0.58	1.65			
1	1524	Structure		Brick wall	Mid brownish red brick, no frog, roughly faced, random bond, NW and NE, mid yellow sand-lime mortar bleeding pointing	>3	0.24-0.87	2			
1	1525	Structure		Brick wall	Mid brownish red brick, no frog, roughly faced, NE and SE, mid yellow sand-lime mortar flush pointing	1.1	0.38	>0.73			
1	1526	Deposit		Natural geology	Mid brown silty clay, compact with small stones and flints	>7.6	>6.08	0.54			
1	1527	Structure		Brick wall	Mid pink/pinkish red/yellow brick shallow frog on 1 bed, porous and crude, faced, random bonding, NW and SE, mid greyish yellow sand cement bleeding pointing	2.2	0.24	0.6			
1	1528	Floor		Floor surface	Mid yellowish brown sand cement concrete with flint/stone inclusions	2.07	0.01-0.48	0.08			
1	1529	Structure		Brick wall	Mid pink/pinkish red brick, faced, random bonding, NW, mid greyish yellow sand cement with bleeding pointing	1.86	0.23	1.15			

1	1530	Structure		Brick wall	Mid pink/pinkish red/yellow brick, some with shallow frog, faced, header bond, SW and NE, NE and SE, mid grey sand cement	1.5	0.23	1.15			
1	1531	Deposit		Redeposited clay	Dark brownish grey clayey silt moderately compact with stone and flint inclusions	1.60-1.65	1.18	1.3			
1	1532	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond, Se/NW and NE/SW mid yellow sand lime mortar	4.55	0.74	0.90-1.55			
1	1533	Deposit		Redeposited clay	Mid greyish brown silty clay compact with small stones and flint	3.15	unknown	0.25-0.32			
1	1534	Cut		Foundation cut	Unclear outline, unclear corners, straight sided vertical sides, flattish bae aligned NW/SE	4.91	unknown	>0.50			
1	1535	Structure		Brick wall	Mid brownish red brick, no frog, unfaced, random bonding, NE, no bonding material	3.55	0.35-0.97	1.7			
1	1536	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond/English cross bond, Ne, mid yellow sand-lime mortar, flush pointing	>3.51	0.34-0.97	0.90-1.60			
1	1537	Deposit		Backfill	Mid brownish grey clayey silt moderately compact with bits of mortar	3.15	unknown	0.05			
1	1538	Structure		Brick wall	Mid brownish red brick, no frog, face damaged, English bond/English cross bond, SW, light yellowish white sand-lime mortar pointing unclear	4.9	0.57-0.62	1.5			
1	1539	Structure		Brick wall	Mid brownish red brick, no frog, faced, unclear bonding, SW, covered by render	unknown	1.47	1.5			
1	1540	Structure		Brick wall	Mid brownish red brick no frog, faced, possibly English cross bond, light white lime mortar flush pointing	1.53	0.35-0.47	1.40-1.55			
1	1541	Deposit		Backfill	Mid/dark brownish grey clayey silt, moderately compact	>15.20	4.2	1.5			

1	1542	Deposit		Explosion deposit	Dark black, silty clay, moderately compact with BCom fragments and charcoal flecks	14.7	4.2	2.4-2.5			
1	1543	Structure		Brick wall	Mid brownish red brick, no frog, faced, possibly English bond, NW and SE, light white sand-lime mortar extruded pointing	0.4	0.34	>0.57			
1	1544	Structure		Brick wall	Mid brownish red brick, no frog, roughly faced, random bonding, NE, mid yellow sand lime mortar bleeding pointing	>0.40	0.35	>0.65			
1	1545	Structure		Brick wall	Mid orangey red brick, no rog, roughly faced, header bond, NE/SW, mid yellow sand-lime mortar weathered	>1.2	0.35	0.55			
1	1546	Structure		Brick wall	Mid brownish grey cement and stone mid yellow coarse porous bricks, faced, stretcher bond, SW, weathered pointing	>0.70	0.3	0.7			
1	1547	Deposit		Organic	Dark black shin in places organic material, compact and rubbery when hot contains burnt wood and metal	3.35	0.50-1.60	0.02-0.06			
1	1548	Structure		Brick wall	Mid brownish red brick, no frog, faced, soldier course, light white lime mortar	10.6	3.06	0.08-0.13			
1	1549	Floor		Paving	Square tiles mid orangey red fine texture smooth surface, faced, regular spacing, lime mortar	8.6-12.5	2.94	0.35			
1	1550	Structure		Brick wall	Mid orangey red brick, no frog, mid yellowish grey cement, roughly faced, random bonding, SE, light grey fine cement	1.96-25.18	0.15-0.22	0.3			
1	1551	Floor		Paving	Mid brownish red brick, no frog, faced, lain on bed, SW, light white sand-lime mortar	1.92	0.67	1.4			
1	1552	Structure		Brick wall	Mid brownish red brick and roof tile, no frog, foundation, random bonding, light white sand-lime mortar	1.2-1.85	1.21	1.5			

1	1553	Floor		Paving	Mid brownish red brick, no frog, faced, stretcher/stack bond, floor paving, SW, mid yellowish white sand-lime mortar	>0.10	0.92	1.5			
1	1554	Structure		Brick wall	Mid orangey red brick, no rog, faced, NW and SE, light white sand lime mortar	1.24	0.33	1.4			
1	1555	Structure		Brick wall	Mid brownish red brick no frog, faced, header bonding, SE, no bonding material obvious	0.33	0.18	1.3			
1	1556	Cut		Beam slot	Linear in plan with straight parallel sharp edges and flat base running NW/SE	>2.38	0.32	0.16			
1	1557	Structure		Brick wall	Mid brownish red brick fragments no frog roughly faced, random bonding, light white sand-lime mortar	>1.50	>0.34	>0.78			
1	1558	Structure		Brick wall	Mid brownish red brick no rog faced possible English bond SW light white sand-lime mortar	1.6	0.47	1.45			
1	1559	Structure		Brick wall	Mid orangey red/mid yellow brick sand cement in thick layers, faced, possibly English bond, SW, light brownish white coarse sand cement	1.95	0.24	2			
1	1560	Deposit		Redeposited clay	Mid brown, silty clay, moderately compact with flint and stone inclusions	1.83	1.58	>0.5			
1	1561	Structure		Brick wall	Mid brownish red brick no rog obvious, face not preserved, unclear bonding, light yellowish white sand-lime mortar	1.25	0.62	0.09-0.60			
1	1562	Deposit		Redeposited clay	Mid brown, silty clay, compact	>0.48	>0.17	>0.50			
1	1563	Structure		Mill stone	Calcareous stone	2.5		2.3			
1	1564	Structure		Mill stone	Calcareous stone	2.5		2.3			
1	1565	Structure		Brick wall	Mid brownish red brick no frog obvious, faced, unclear bonding, NE and SW, light white sand-lime mortar	1.6	0.34	0.08			

1	1566	Structure		Brick wall	Mid brownish red brick no frog obvious faced, English bonding, NW and Se, light yellowish white sand lime mortar, bleeding pointing	2.3	2.15	1.9			
1	1567	Structure		Brick wall	Mid brownish/orangey red brick no frog, faced, stretcher bond, NW and SE, light yellowish white sand-lime mortar with bleeding pointing	4.35	>1.8	>0.5			
1	1568	Structure		Culvert	Light yellowish brown concrete with coarse sand and small stones	1.2	2	2			
1	1569	Deposit		Brick wall	Mid orangey red brick, shallow frog, faced, unclear bonding, NE and SW, light yellow sand cement	0.35	0.21	0.13			
1	1570	Structure		Brick wall	Mid yellow brick, shallow frog on bed, coarse and porous, faced, header bond, NW and SE, mid brownish grey sand cement, bleeding pointing	0.46	0.23	1.5			
1	1571	Structure		Brick wall	Mid yellow brick shallow frog on bed coarse and porous, faced, possibly header bonding, NW and SE, mid brownish grey sand cement bleeding pointing	0.6	0.23	1.5			
1	1572	Structure		Brick wall	Mid yellowing red brick shallow frog on bed, faced, random bonding, NE and SW, mid grey sand cement	3.85	0.35	0.75-1.40			
1	1573	Structure		Brick wall	Mid orangey red/yellow brick with shallow frog coarse and porous, faced, English cross bonding, NW and SE, mid brownish grey cement	>2.45	0.23	2			
1	1574	Structure		Brick wall	Mid orangey red/mid yellow brick, shallow frog on bed, coarse and porous material, faced, NE and SW mid brown sand cement weathered pointing	>1.85	0.23	2.3			
1	1575	Structure		Brick wall	Mid orangey/brownish red brick, faced, bonding unclear, area flooded	>2.20	0.22	unknown			

1	1576	Deposit		Backfill	Mid brownish grey silty clay, compact with CBM fragments	>2.2	>1.85	unknown			
1	1577	Deposit		Backfill	Dark black clayey silt loose with fragments of stone and CBM	>3	2.7	unknown			
1	1578	Deposit		Redeposited clay	Mid brownish grey silty clay, compact with fragments of CBM stone and slag	>2.45	0.01-2	unknown			
1	1579	Deposit		Redeposited clay	Mid brown/orangey brown silty clay, compact with natural flints	>1.95	2.19	>0.90			
1	1580	Cut		Foundation cut	NW/SE irregular side steep slope	unknown	>0.66	>0.68			
1	1581	Structure		Brick wall	Mid brownish red brick, no frog, faced, English cross bond, SE, mid yellowish grey sand-lime mortar flush pointing	3.03	0.64-0.90	1.74			
1	1582	Structure		Brick wall	Mid orangey/brownish red brick no frog, roughly faced, unclear bonding, SE, light yellow/yellowish white sand lime mortar	unknown	1.1	0.82			
1	1583	Structure		Brick wall	Mid orangey/brownish red brick, no frog, faced, unclear bonding, light yellow sand lime mortar weathered pointing	3.03	0.55	2.06			
1	1584	Cut		Foundation cut	Linear/rectilinear in plan, possibly sharp corners, vertical straight sides with sharp edges, flat base aligned NW/SE	4.9	0.54	1.13			
1	1585	Structure		Brick wall	Mid brownish red brick/orangey red brick no frog, faced, English bond, NE/SW, light yellowish white sand-lime mortar flush pointing	1.55	0.58	1.19			
1	1586	Deposit		Redeposited clay	Mid brown/bluish brown silty clay compact with chalk and lime inclusions	>2.03	>5.11	0.22-0.64			
1	1587	Deposit		Redeposited clay	Mid greyish brown silty clay, compact with no inclusions	unknown	10	0.1-0.25			
1	1588	Cut		Foundation cut	Vertical but not straight sharp sides, not bottomed, aligned NW/SE	unknown	>0.20	>0.73			

1	1589	Structure		Brick wall	Mid brownish red rick no frog mid yellowish brown cement poor facing random bonding mid yellowish-brown sand-lime mortar	2.8	0.71-0.97	1.88			
1	1590	Structure		Brick wall	Mid brownish red brick, no frog, mid brownish purple coarse brick with possible shallow frog, faced, unclear bonding, SE, mid yellowish grey sand-lime mortar weathered pointing	4.8	0.55-0.70	1.82			
1	1591	Structure		Brick wall	Mid brownish/orangey red brick, no frog, faced, unclear bonding, light white sand lime mortar	>0.37	0.42-0.94	1			
1	1592	Deposit		Levelling	Dark grey/black mottled clayey sandy silt friable with charcoal flecks and CBM fragments	unknown	>0.88	1.1			
1	1593	Deposit		Levelling	Dark black/mid yellowish brown silty sand loose with fragments of CBM chalk and lime	>0.30	0.26	0.92			
1	1594	Cut		Foundation cut	possibly linear, straight vertical sides with a flat base sloping to SE, possibly aligned NW/SE	unknown	>0.52	0.22			
1	1595	Fill	1594	Foundation cut	Mixed dark grey/light white mid brown sandy silt loose with charcoal flecks and CBM fragments	>0.40	0.62	0.9			
1	1596	Structure		Brick wall	Mid orangey red brick, no frog, roughly faced, SE, light yellowish white sand-lime mortar, bleeding pointing	>0.45	0.6	0.62			
1	1597	Structure		Brick wall	Mid orangey red brick roughly faced, header bonding, W, mid yellow sand-lime mortar	1.3	0.39	1.6			
1	1598	Deposit		Backfill	Dark grey/black mottled clayey silt friable/loose with CBM rubble and charcoal flakes	unknown	2.25	0.65-0.73			
1	1599	Cut		Foundation cut	Linear/curvilinear with straight steep sides and a flat base aligned NW/SE	>1.50	>3.25	>0.34			

1	1600	Fill	1599	Foundation cut	Mottled greyish brown silty clay moderately compact with sand-lime mortar and fragment of BCom and charcoal	<1.50	0.01-0.07	0.27			
1	1601	Deposit		Deposit	Mid grey sandy silt loose with charcoal flecks	3.05	.093	0.45			
1	1602	Structure		Brick wall	Mid brownish red/orangey red brick, faced, possibly English bond, NW/SE, light white sand-lime mortar	>1.95	0.44	2.4			
1	1603	Structure		Brick wall	Mid brownish red/orangey red brick, faced, possibly English bond, NW/SE, light white sand-lime mortar	>0.55	0.46	2.35			
1	1604	Structure		Brick wall	Mid brownish red brick, facing not exposed, bonding unclear, light white sand-lime mortar	>0.20	0.7	2.3			
1	1605	Structure		Brick wall	Mid brownish red brick, faced, bonding not clear, SE/NW, light white sand-lime mortar	>1.50	0.55	2.2			
1	1606	Structure		Concrete wall	Mid yellow concrete with pebbles, poured into frame, NW	>0.10	0.7	1.5			
1	1607	Deposit		Redeposited clay	Mottled mid greyish brown, silty clay, compact with inclusions of CBM, chalk, charcoal flecks and stone	0.93	1.34	0.5			
1	1608	Cut		Foundation cut	Uncertain shape in plan, uncertain corners, steep slightly concave sides, rounded base, aligned NW/SE	unknown	>1.6	1.3			
1	1609	Fill	1608	Foundation cut	Mottled dark brownish grey/black silty clay compact with charcoal flecks and pebbles	unknown	1.2	0.5			
1	1610	Fill	1608	Foundation cut	Mottled mid brownish grey silty clay compact with fragments of CBM	unknown	1.34	0.7			
1	1611	Structure		Brick wall	Mid orangey/pinkish red brick, faced, NW and NE, mid grey sand cement, bleeding pointing	0.92	0.72	1.49			
1	1612	Timber		Plank	Horizontal NW/SE	>0.74	>0.19	3.2			

1	1613	Structure		Brick wall	Orangey red brick, no frog, faced, NW and SE, bonding unclear, light white sand-lime mortar	3.05	0.33	3			
1	1614	Structure		Brick wall	Mid orangey red brick, faced, unclear bonding, NW and SE, light white sand lime mortar	0.12	0.33	3			
1	1615	Structure		Brick wall	Mid orangey red brick, faced, unclear bonding, NW and SE, light white sand lime mortar	0.37	0.33	3			
1	1616	Structure		Brick wall	Mid orangey red brick, faced, unclear bonding, NW and SE, light white sand lime mortar	0.18	0.33	3			
1	1617	Floor		Floor surface	Light grey cement concrete and mid brownish red brick, rough Surface, soldier coursing, mid grey sand cement between bricks	2.5	0.97-1.18	3.45			
1	1618	Timber		Plank	Horizontal NE/SW	>0.90	0.22	3.5			
1	1619	Timber		Beam	Horizontal NW/SE	1.12	0.12	3.5			
1	1620	Timber		Plank	Horizontal NE/SW	0.38	0.23	3.5			
1	1621	Timber		Beam	Horizontal NW/SE	0.72	0.17	3.5			
1	1622	Timber		Plank	Horizontal NE/SW	0.34	0.14	0.03			
1	1623	Timber		Plank	Horizontal NE/SW	0.33	0.14	0.02			
1	1624	Timber		Plank	Horizontal NE/SW	0.34	0.2	0.05			
1	1625	Structure		Brick wall	Mid orangey/brownish red brick, faced, uncertain bonding, NW/SE, mid yellowish white sand-lime mortar	0.3	0.33	3.5			
1	1626	Structure		Brick wall	Mid orangey red brick, no frog, faced, possibly English bond, NW and SE, mid yellowish white/grey sand-lime mortar	1.25	0.3	3.7			
1	1627	Timber		Plank	Horizontal NE/SW	>0.22	0.07	0.05			
1	1628	Structure		Mill stone	Mid grey limestone/Derbyshire grit	0.6	0.40-0.50	unknown			
1	1629	Deposit		Dumping	Dark brownish grey mottled clayey silt moderately compact with fragments of CBM, pebbles, charcoal flecks and metal	unknown	2.09	0.35-0.60			

1	1630	Timber		Beam	Diagonal NW/SE	>0.75	0.17	3.9		
1	1631	Deposit		Dumping	Mid grey mottled sandy clayey silt loose with CBM fragments and stones	3.4	0.95-1.10	0.12		
1	1632	Deposit		Deposit	Mid brownish grey clayey silt moderately compact	0.6	>0.1	0.04-0.16		
1	1633	Cut		Beam slot	Shape in plan unknown, corners unknown, straight steep sides, not bottomed	unknown	>0.28	>0.20		
1	1634	Fill	1633	Beam slot	Mid greyish brown silty clay compact	unknown	>0.18	>0.20		
1	1635	Timber		Beam	Horizontal, NE/SW	>2.61	0.12-0.16	0.11		
1	1636	Timber		Beam	Horizontal NW/SE	2.1	0.15	4.3		
1	1637	Timber		Beam	Horizontal E/W	>0.74	0.13	<0.15		
1	1638	Structure		Brick wall	Mid orangey red brownish red brick, faced, English bond, NW and SE, mid yellowish white sand lime mortar	1.03	0.43	4		
1	1639	Structure		Brick wall	Cement render, light yellowish brown, sand cement, compact	unknown	unknown	0.0015-0.002		
1	1640	Deposit		Deposit	Dark grey/black clayey sandy silt moderately compact with CBM fragments and charcoal	1.4	0.93	2.9		
1	1641	Timber		Plank	Horizontal NE/SW	1.43	0.22	3.3		
1	1642	Timber		Plank	Horizontal NE/SW	1.43	0.22	0.04		
1	1643	Timber		Plank	Horizontal NE/SW	1.43	0.24	0.05		
1	1644	Timber		Plank	Horizontal NE/SW	1.43	0.23	0.05		
1	1645	Timber		Beam	Horizontal	0.92	>0.08	3.4		
1	1646	Timber		Beam	Horizontal NW/SE	0.56	0.1	>0.08		
1	1647	Structure		Brick wall	Mid brownish red brick, some with shallow frog, faced, English bond, NW and SE, mid yellowish brown sand lime mortar, weather pointing	3.05	0.35	2.9		
1	1648	Structure		Brick wall	Mid brownish red brick, no frog, faced, English bond, NW and Se, light yellow sand-lime mortar	3.05	0.35	3		

1	1649	Deposit		Deposit	Dark black silt/sandy silt loose with charcoal flecks and CBM	3.05	0.90-1.23	3			
1	1650	Structure		Brick wall	Mid orangey/brownish red brick, no frog, faced, English bond, NE, mid yellow sand-lime mortar	5.88	0.49-0.57	2.6			
1	1651	Structure		Brick wall	Mid orangey/brownish red brick no frog with some mid brownish red roof tile, roughly faced crude, random bonding, light yellow/mid yellow sand-lime mortar	5.45	0.75	1.9			
1	1652	Structure		Brick wall	Mid orangey/brownish red brick no frog with some mid brownish red roof tile, roughly faced crude, random bonding, light yellow/mid yellow sand-lime mortar	1317	1319	3.4			
1	1653	Floor		Paving	Mid orangey red/brownish red thin brick no frog, regular spacing, no bonding material	1.15	1.13	3.4			
1	1654	Deposit		Deposit	Mid brownish grey mottled darker patches of grey black sandy silt loose with fragment of CBM and charcoal flecks	3.05	1.19-2.17	0.05-0.35			
1	1655	Structure		Brick wall	Mid orangey res brick shallow frog on some, faced, English cross bond, NW and SE, mid yellowish brown sand cement	0.9	0.35	3.05			
1	1656	Structure		Brick wall	Mid orangey red brick with shallow frog, faced, English bond. English cross bond, NW and SE, mid yellowish brown sand cements	1.52	0.36	3.15			
1	1657	Deposit		Deposit	Mid brownish grey mottled clayey silt moderately compact with fragments of glass and CBM	unknown	>0.73	unknown			
1	1658	Deposit		Deposit	Mid greyish brown silty clay moderately compact with fragments of pottery and CBM	1.15	>0.74	>0.10			
1	1659	Timber		Beam	Horizontal NW/SE	>0.53	0.16	4			

1	1660	Structure		Brick wall	Mid orangey red brick, no frog, faced, unclear bonding, NE and SW, mid yellow sand-lime mortar	0.62	0.38	4			
1	1661	Timber		Beam	Horizontal NW-SE	1.79	0.15	4.3			
1	1662	Timber		Beam	Horizontal NE-SW	>0.75	0.17	4.15			
1	1663	Deposit		Deposit	Mottled dark greyish brown silt loose	unknown	2.02	3.36			
1	1664	Structure		Brick wall	Mid brownish red brick, no frog, faced, unclear bonding, mid yellow sand-lime mortar	0.6	0.58	4.1			
1	1665	Deposit		Floor surface	Mottled mid greyish brown silty clay moderately compact with CB< and charcoal flecks	2.57	3.06	2.5			
1	1666	Deposit		Deposit	Mid brownish grey clayey silt loose	unknown	2.02	4.3			
1	1667	Cut		Foundation cut	Linear in plan with straight vertical sides and a flat base, aligned NE/SW	8.48	3.42	1.72			
1	1668	Fill	1667	Foundation cut	Mid brownish orange silty clay compact	2.4	0.08-0.48	1.72			
1	1669	Deposit		Deposit	Mid brown silty clay, compact with flints and small tones	>2.4	>0.26	>0.72			
1	1670	Floor		Paving	Mid orangey brown brick, faced, regular bonding, light yellow sand lime mortar	0.75-1.88	2.7	1.4			
1	1671	Structure		Brick wall	Mid brownish red brick and mid red roof tile, roughly faced crude, light white sand lime mortar bleeding pointing	3.6	2.7	1.45			
1	1672	Cut		Foundation cut	Rectilinear in plan, sharp corners, straight nearly vertical sides, flat base, aligned NW/SE and NE/SW	>5.88	unknown	0.98			
1	1673	Fill	1672	Foundation cut	Mid grey sandy silt loose with fragments of CBM	unknown	0.03	0.34			
1	1674	Deposit		Redeposited clay	Mid greyish brown silty clay compact	>8.48	>6.5	>0.94			
1	1675	Deposit		Deposit	Mid yellowish brown silty clay moderately compact	3.05	1.37-1.68	2.9			

1	1676	Structure		Brick wall	Mid brownish red brick some with shallow frog, faced, lowest course header bond with stretcher bond above, SW and SE, light brown sand cement	0.75	0.5	2.2			
1	1677	Timber		Beam	Horizontal NW/SE	0.96	0.15	0.12			
1	1678	Deposit		Deposit	Dark grey black silty clay moderately compact with charcoal flecks and CBM fragments	1.04	0.96	0.1			
1	1679	Timber		Beam	Horizontal NW/SE	3.11	0.24	4.4			
1	1680	Deposit		Redeposited clay	Mid brown silty clay, compact with smalls tones and flints	unknown	unknown	0.35			
1	1681	Fill	1667	Redeposited clay	Mid brown silty clay, compact with smalls tones and flints	>2.40	0.10-0.40	1.58			
1	1682	Deposit		Redeposited clay	Mid greyish brown silty clay, compact with small stones and flint	unknown	unknown	0.7			
1	1683	Timber		Beam	Horizontal NE/SW	unknown	0.18	unknown			
1	1684	Timber		Beam	Horizontal NE/SW	unknown	0.18	unknown			
1	1685	Deposit		Trample layer	Mid brownish grey clayey silt, moderately compact with fragments of CBM and charcoal flecks	6.08	0.8	0.18			
1	1686	Deposit		Redeposited clay	Mid greyish brown silty clay, moderately compact with smalls tones, flints and CBM	1.44	1.37	>0.40			
1	1687	Deposit		Redeposited clay	Mid brown silty clay, compact with smalls tones and flints	>11.4	>2	0.65-0.85			
1	1688	Deposit		Backfill	Dark grey/black clayey silt loose with charcoal flecks and CBM frags	>13	>2	0.45			
1	1689	Deposit		Backfill	Mid greyish brown mixed silt loose and coarse with CBM fragments	>13	>2	0.1-0.15			
1	1690	Deposit		Backfill	Did greyish brown mixed silt loose and coarse with CBM fragments	unknown	unknown	0.18-1			
1	1691	Deposit		Backfill	Dark grey/black silt/clayey silt loose with charcoal flecks and fragments of CBM	unknown	unknown	0.05-1			
1	1692	Deposit		Silting	Mid brownish grey silty clay	>15.50	>7.40	0.9-1.3			

1	1693	Deposit		Redeposited clay	Mid greyish brown mottled silty clay, compact with stones and flints	unknown	>2.4	1.1			
	2000	Layer		Modern	Tarmac	9	2				
	2001	Deposit		Modern made ground	Dumped deposits	9	2	0.1 – 0.4 thick			
	2002	Layer		Deposit	Dark Brown -grey clayey silt with modern CBM & gravel inclusions	9	2	0.2 thick			
	2003	Wall		Canal wall	Red brick wall bonded with lime mortar & faced with flint at base. Poorly preserved	2.0 plus	0.5	Height 1m+			
	2004	Layer		Natural geology?	Mid brown clay	2.0 plus	1.5m	unknown			
	3000	Deposit		Made ground	Dark brownish black	9	5	0.4			
	3001	Deposit		Made ground	Mid orangey brown silty clay	9	5	0.4			
	3002	Deposit		Made ground	Mid greyish brown silty clay	9	5	0.35			
	3003	Deposit		Made ground	Mid orangey brown silty clay	9	5	0.7			
	3004	Deposit		Made ground	Dark brownish black silty clay	9	5	0.5			
	3005	Deposit		Made ground	Mid orangey brown silty clay	9	5	0.65			
	3006	Deposit		Natural	Mid orangey brown clay with grey clay mottling	9	5	3m depth			
4	4000	Deposit		Modern	Mid/dark grey silt loose CBM modern litter.	27.8	16.8	0.15			
4	4001	Layer		Topsoil	Dark brownish grey silty sand, loose 10% small stones	27.8	16.8	0.14			
4	4002	Layer		Subsoil	Mid orangey brown silty clay, compact 5% stones and CBM	27.8	16.8	0.02+			
4	4003	Layer		Natural geology	Mid orangey brown silty clay, compact 5% stones	27.8	16.8	0.74+			
4	4004	Structure	4005	Brick wall	mid orangey brownish red brick, no frog, faced, light white sand lime mortar, flush pointing	2.95	0.45	0.46			
4	4005	Cut		foundation cut	recti-linear, sharp corners, straight vertical sides, flat base, aligned NW/SE and NE/SW	2.95	0.45	unknown			
4	4006	Structure	4054	wall	mid orangey brownish red brick with some coarse purple brick, shallow frog, faced, light white sand lime mortar, bleeding pointing	5.75	0.23	0.16			

4	4007	Deposit	4054	Foundation layer	mid greyish brown mottled silty clay, compact with stones CBM charcoal and mortar	5.75	0.23	0.16			
4	4008	Structure	4009	wall	mid brownish red brick, no frog, faced, light white sand lime mortar	1.35	0.46	0.15			
4	4009	Cut		Foundation cut	recti-linear, sharp corners, straight vertical sides, possibly flat, aligned NW/SE and NE/SW	1.35	0.46	0.15			
4	4010	Structure	4011	wall	mid brownish red brick, no frog, faced, light white sand lime mortar	0.62	0.065	0.11			
4	4011	Cut		Drainage cut?	Square, sharp corners, straight vertical sides, not exc.	0.7	0.7	unknown			
4	4012	Deposit	4011	Deposit	Mid grey-brown clayey silt friable flint CBM and mortar.	0.5	0.5	0.05			
4	4013	Structure		wall	mid orangey brownish red brick with some coarse purple brick, no frog, faced, light white sand lime mortar, flush pointing	1.24	0.23	0.32			
4	4014	Cut		Foundation cut	recti-linear, sharp corners, straight vertical sides, possibly flat, aligned NW/SE and NE/SW	3.25	0.23	unknown			
4	4015	Structure		wall	mid brownish red brick, no frog, faced, light white sand lime mortar	2	0.22	0.24			
4	4016	Structure	4017	Floor surface	mid brownish red orangey brick, shallow frog, faced, light white sand lime mortar	1.6	1.04	0.14			
4	4017	Cut		Foundation cut	Rectangular, sharp corners, straight vertical sides, not exc.	2	1.46	unknown			
4	4018	Structure	4019	wall	mid brownish red brick, some frog, faced, yellowish white sand lime mortar	0.53	0.5	0.13			
4	4019	Cut		Foundation cut	Square, sharp corners, straight sides, not exc.	0.53	0.5	unknown			
4	4020	Structure	4021	wall	mid orangey brownish red brick with some coarse purple brick, no frog, faced, light white sand lime mortar	2.98	0.8	0.1			
4	4021	Cut		Foundation cut	recti-linear, sharp corners, straight sides, not exc., aligned NW/SE and NE/SW	2.98	0.8	unknown			

4	4022	Structure	4023	wall	mid orangey brownish red brick with some coarse purple brick, no frog, faced, light white sand lime mortar	1.65	0.65	0.47			
4	4023	Cut		Foundation cut	linear, sharp corners, straight sides, not exc., aligned NE/SW	1.65	0.65	unknown			
4	4024	Structure	4025	wall	mid orangey brownish red brick, no frog, faced, light white sand lime mortar	0.9	0.23	0.3			
4	4025	Cut		Foundation cut	linear, sharp corners, straight sides, not exc., aligned NE/SW	0.9	0.23	unknown			
4	4026	Structure	4027	wall	mid orangey brownish red brick with some coarse purple brick, no frog, faced, light yellowish white sand lime mortar	1.04	0.7	0.27			
4	4027	Cut		Foundation cut	Rectangular, sharp corners, straight vertical sides, not exc.	1.04	0.7	unknown			
4	4028	Cut		Foundation cut	linear, straight sides, not exc., aligned NE/SW	7.6	0.8	unknown			
4	4029	Fill	4028	Fill	mid greyish brown silty clay, compact with stones CBM and flint	7.6	0.8	unknown			
4	4030	Structure	4031	wall	Mid grey stone slab x4 mid brownish red brick, no frog, faced, yellowish white sand lime mortar	1.15	0.39	0.06			
4	4031	Cut		Foundation cut	Rectangular, sharp corners, straight sides, not exc.	1.15	0.39	unknown			
4	4032	Structure	4033	wall	mid brownish red brick, no frog, possibly faced, mid yellow sand lime mortar	0.65	0.6	unknown			
4	4033	Cut		Foundation cut	Rectangular, sharp corners, not exc.	0.65	0.6	unknown			
4	4034	Structure		wall	mid orangey brownish red brick with some coarse purple brick, no frog, faced, light white sand lime mortar	25.6	0.45	0.7			
4	4035	Cut		Foundation cut	recti-linear, rounded and sharp corners, straight sides, not exc., aligned NW/SE and NE/SW	25.18	0.4	unknown			
4	4036	Structure		wall	Mid brownish purple brick course, shallow frog, faced, light yellow sand cement	4.88	0.9	0.98			
4	4037	Structure		wall	Light greyish white, concrete, rough faced	2.85	0.48	0.2			

4	4038	Structure	4039	wall	mid brownish red brick, no frog, faced, light white sand lime mortar, bleeding pointing	0.46	0.25	0.14			
4	4039	Cut		Foundation cut	mid brownish red brick, no frog, faced, light white sand lime mortar, bleeding pointing	0.46	0.46	unknown			
4	4040	Structure	4041	wall	mid brownish red brick, no frog, faced, light white sand lime mortar, bleeding pointing	0.45	0.44	0.23			
4	4041	Cut		Foundation cut	Square, sharp corners, straight sides, not exc.	0.45	0.44	unknown			
4	4042	Structure	4043	wall	mid brownish red brick, no frog, faced, mid yellowish white sand lime mortar	0.54	0.54	0.23			
4	4043	Cut		Trench Cut	Trench cut for drain. Square, sharp corners, vertical sides, unexcavated	>0.54	>0.54	unknown			
4	4044	Deposit	4043	Silting in drain	Mid brown sandy silt loose with 5% small stone, 5% mortar	0.33	0.33	0.05			
4	4045	Cut		Hearth/industrial burning device	sub-rectangular, shallow sides, aligned NW/SE, unexcavated	1.16	>0.7	>0.1			
4	4046	Deposit	4045	Hearth Lining	Light yellowish white sand-lime mortar and gravel, compact	1.16	0.18	unknown			
4	4047	Deposit	4045	Fill of hearth	Dark grey/black sandy silt, loose with 25% charcoal flecks, 10% brick	>0.45	0.98	0.03			
4	4048	Deposit	4051	Trackway Deposit	Light white chalk, compact with flint and >5% CBM fragment	>13	>5.70	0.18			
4	4049	Deposit	4051	Trackway Foundation deposit	Mid yellowish brown clayey gravel, friable	unknown	>5.76	0.18			
4	4050	Deposit	4051	Deposit associated with trackway	Mid orangey brown clayey silt, moderately compact with 10% flint, 5% CBM	unknown	>5.98	0.18			
4	4051	Cut		Trackway Cut	Curvilinear, straight gentle sides, flat base, aligned NNW/SSE	>13	>6.30	0.38			
4	4052	Cut		Trench	Linear, NW/SE aligned, unexcavated	>4.30	>0.72	unknown			

4	4053	Fill	4052	Fill of trench	Mid brownish grey silty clay, compact with 25% gravel/flint	>4.30	>0.72	unknown			
4	4054	Cut		Foundation cut	linear, straight sides, flat base, aligned NW/SE	>5.76	>0.23	unknown			
4	4055	Structure	4056	Brick wall	mid brownish red brick, no frog, faced, English bond, mid yellow sand-lime mortar, aligned NW/SE	>5.20	0.47	0.5			
4	4056	Cut		Foundation cut	linear, aligned NW/SE, unexcavated	>5.20	0.55	>0.20			
4	4057	Fill		Backfill	Mid brownish grey silty sandy clay, friable with CBM fragments	>5.20	0.08	>0.20			
4	4058	Surface		Cobbled surface/yard	river pebbles, dry stone floor surface	4.7	3.95	0.1			
4	4059	Deposit		Levelling deposit	mottled yellowish brown and grey silty sand, loose with chalk and charcoal flecks 10%, CBM fragments. Levelling beneath cobbles 4058	4.7	3.95	0.1			
4	4060	Deposit		Redeposited clay	mid greyish brown silty clay, compact with CBM and stone fragments 5-10%	>4.70	unknown	0.35			
4	4061	Cut		Foundation cut	linear, vertical sides, flat base, aligned NE/SW	unknown	1.5	0.55			
4	4062	Structure	4061	Brick Wall	mid orangey red brick, no frog, faced, mid yellow sand cement, aligned NE/SW	>4.30	0.23-0.70	0.36			
4	4063	Structure		Wall Foundation	Light whiteish grey crude concrete with frequent small pebbles and crushed CBM	>0.40	0.78	0.24			
4	4064	Structure	4078	Brick wall	mid brownish red brick, no frog, faced, mid yellow sand-lime mortar	unknown	0.4	0.18			
4	4065	Fill	4061	Backfill	mottled mid grey and yellow clayey silt, loose with mortar, charcoal 25%, CBM, Fe, glass, timber fragments	>4.30	0.43	0.35			
4	4066	Structure	4067	Brick wall	Mid pinkish red brick and slate, no frog, faced, header bond, mid yellow mortar, aligned NW/SE	>4.40	>0.29	>0.24			
4	4067	Cut		Foundation cut	linear, aligned NW/SE, unexcavated	>4.40	>0.59	unknown			
4	4068	Fill	4067	Backfill	Mid yellowish-brown sand, loose with stone and CBM crush 10%	>4.40	>0.30	unknown			

4	4069	Structure	4070	Brick wall	mid pinkish red brick, no frog, faced, header bond, mid yellow sand-lime mortar, aligned NW/SE	>3.5	0.35	>0.30			
4	4070	Cut		Foundation cut	linear, aligned NW/SE, unexcavated	>3.50	>0.70	unknown			
4	4071	Fill	4070	Backfill	Mid yellowish-brown sand, loose with stone and CBM crush 10%	>0.80	0.35	unknown			
4	4072	Structure	4074	Wall	Mid brownish red brick, no frog dark brownish purple brick, no frog, faced, English bond, mid yellow sand mortar, aligned NE/SW	3x5.4x3.34	0.34	>1.10			
4	4073	Structure	4074	Wall Foundation	Mid brownish red brick and roof tile, unfaced, mid whitish yellow sand-lime mortar, aligned NE/SW and NW/SE	3x5.4x3.34	0.44	0.25			
4	4074	Cut		Foundation cut	Rectilinear, vertical sides, base not seen, aligned SE/NW - SW/NE - NW/SE	3x5.4x3.34	0.69	0.32			
4	4075	Fill	4074	Backfill	Mid brownish grey clayey silt, moderately compact with fragments of CBM and chalk 5%	uncertain	0.35	0.28			
4	4076	Deposit		Destruction layer	Mid greyish brown silty clay and gravel, loose with CBM fragments 25%, mortar 5%	4.7	unknown	0.1			
4	4077	Fill	4080	Backfill	Mid brownish grey silty clay, compact with chalk 5%, stone 5%, charcoal 1%	>0.15	unknown	0.3			
4	4078	Cut		Foundation cut	linear, vertical sides, base not reached, aligned NE/SW	unknown	>0.40	>0.18			
4	4079	Structure	4080	Brick wall	Mid brownish red brick, shallow frog, faced, English bond, mid greenish grey sand cement, aligned NW/SE	6.35	0.34	>0.87			
4	4080	Cut		Foundation cut	linear, aligned NE/SW, unexcavated	>6.50	>0.34	>0.30			
4	4081	Structure	4082	Brick wall	Mid brownish red brick, no frog, faced, mid grey cement, aligned NE/SW	6.1	0.75	0.9			
4	4082	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	6.1	>0.75	unknown			
4	4083	Structure	4084	Brick wall	mid orangey red brick, no frog, face, English bond, grey sand-lime cement/mortar, aligned NE/SW	6.1	0.63	0.97			

4	4084	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	>6.1	>0.63	unknown			
4	4085	Structure	4086	Brick wall	Mid brownish red brick and roof tile, roughly faced, random bond, yellow sand-lime mortar, aligned NE/SW	6.4	0.9	>0.60			
4	4086	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	>6.40	>0.90	unknown			
4	4087	Structure	4088	Brick wall	Mid brownish red brick, no frog, faced, English bond, mid grey sand cement mortar, aligned NE/SW	2.42	0.43	0.97			
4	4088	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	2.42	>0.43	unknown			
4	4089	Structure		Wall	CBM and cement/concrete/mortar conglomerate, roughly faced, aligned NE/SW	0.43	0.4	0.18			
4	4090	Structure		Wall	CBM and cement/concrete/mortar conglomerate, roughly faced, aligned NE/SW	unknown	0.43	0.12			
4	4091	Deposit		Destruction layer	Mid greyish brown gravel and silty clay, loose with patches of yellow sand, CBM fragments 10%, chalk 10%, glass, pot 1%	unknown	unknown	0.4			
4	4092	Deposit		Backfill	Dark grey clayey silt, moderately compact with CBM 25%, various refuse (glass, pot, metal)	8	>5.0	>0.60			
4	4093	Deposit		Deconstruction layer	mid/dark brownish grey clayey silt, moderately compact with CBM 10%	6	2.4	0.5			
4	4094	Deposit		Deconstruction layer	mid/dark brownish grey clayey silt, moderately compact with CBM 10%	6	2.42	0.5			
4	4095	Structure	4096	Brick wall	Mid brownish red brick and tile, roughly faced, random bonding, mid yellowish white sand-lime mortar, aligned NE/SW	>5.10	0.9	0.9			
4	4096	Cut		Foundation cut	linear, straight sides, flat base, aligned NW/SE	>5.10	0.9	0.16			
4	4097	Structure	4098	Brick wall	Mid brownish red brick, no frog, face, light grey sand-lime mortar	>1.47	>0.30	>0.30			
4	4098	Cut		Foundation cut	Only partially exposed	>1.47	>0.30	unknown			
4	4099	Structure	4100	Brick wall	Mid brownish red brick, no frog, faced, mid yellowish grey mortar, aligned NE/SW	>0.90	0.73	>0.30			
4	4100	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	>0.90	0.73	unknown			

4	4101	Structure	4102	Brick wall	Mid purple coarse brick, no frog, faced, mid greyish yellow sand-lime mortar	0.37	0.3	>0.15			
4	4102	Cut		Foundation cut	Linear, NW/SE aligned, unexcavated	>0.37	>0.30	unknown			
4	4103	Fill	4096	Backfill	Mid brownish grey silty clay moderately compact	unknown	0.15	0.16			
4	4104	Surface		Cement Floor	Grey concrete conglomerate of CBM crush, stone and cement floor surface	5.35	5.25	0.2			
4	4105	Deposit		Rubble layer	Mid greyish brown clayey silt with gravel, loose with crushed CBM 50%	>1.50	unknown	0.15			
4	4106	Deposit		Sandy layer	Mid brownish yellow sand, loose with small stones 5%	>1.50	unknown	0.1			
4	4107	Deposit		Levelling deposit	Dark brownish grey clayey silt, loose with stone/CBM 25%	>1.50	unknown	0.25			
4	4108	Surface		Floor Foundation	CBM, cement and gravel conglomerate, roughly faced, NW/SW	>1.0	>1.0	0.15			
4	4109	Surface		Cement Floor	Mid grey cement conglomerate with 25% gravel, flat levelled surface	3.1	2.08	0.03			
4	4110	Fill	4061	Backfill	Mid/dark mottle grey clayey silt, loose with mortar, charcoal, CBM, glass, stone inclusions	unknown	0.6	0.45			
4	4111	Deposit		Redeposited Clay	Mid greyish brown silty clay, compact with flint 5%	unknown	unknown	0.55			
4	4112	Surface		Paving	Dark grey paving stone, machine made, regular squared finish, light grey lime mortar	4.7	>7.0	0.06			
4	4113	Surface		Paving	Granite setts, hand cut, regular squared finish	10.5	>4.50	0.07			
4	4114	Deposit		Levelling deposit	Mid brownish yellow silty sand, loose with gravel 25%	>2.0	>2.0	0.08			
4	4115	Deposit		CBM Rubble	Mid brownish red CBM crush, loose	>2.0	>2.0	0.12			
4	4116	Deposit		Levelling deposit	Mid brownish yellow silty sand, loose with gravel 10%	>2.0	unknown	0.05			
4	4117	Deposit		Redeposited Clay	Mid greyish brown silty clay, compact with flint 5%	>2.0	unknown	0.3			
4	4118	Deposit		Redeposited Clay	Mid greyish-brown silty clay, compact with flint 5%. Possibly levelling deposit	4	unknown	0.25			

4	4119	Deposit		Sandy Layer	Mid brownish yellow silty sand, loose with gravel 5-10%. Possibly levelling deposit	4	unknown	0.17			
4	4120	Deposit		Redeposited Clay	Mid greyish brown silty clay, compact with flint 5%	unknown	unknown	unknown			
4	4121	Deposit		Destruction Layer	Mottled mid greyish brown silty clay, loose with CBM fragments 25%, gravel 10%, glass/pot 1%	4	unknown	0.21			
4	4122	Deposit		Buried Topsoil	Mid brownish grey clayey silt, moderately compact with gravel 10%	>4.0	unknown	0.16			
4	4123	Deposit		Buried Topsoil	Mid brownish grey clayey silt, moderately compact with gravel 10%	4	unknown	0.05			
4	4124	Structure		Brick wall	Mid purple coarse brick with gravel inclusions, faced, English bond, linht grey sand mortar, aligned NE-SE-SW	0.46	0.46	>0.65			
4	4125	Structure		Concrete structure	Mid greyish cement and gravel conglomerate, roughly surfaced. Possible foot bridge	0.85	0.58	0.05			
5	500	Layer		Made ground	Mixed dark grey sandy clay with abundant modern debris. Deeper at N end of trench	16.40	1	1.20 – 0.30			
5	501	Layer		Natural?	Firm brown clay	16.40	1	1.20-3.5 +			
5	502	Structure		Modern wall	Wall	0.6	0.9				
5	503	Structure		Modern wall	wall	0.65	1				
5	504	Layer		Redeposited clay	Greyish brown clay with CBM inclusions			1.0 2.7			
5	505	Layer		Redeposited clay	Mid grey firm clay with occasional black fragments			1.8 - 2.70			

APPENDIX B: ROMAN, POST-MEDIEVAL AND MODERN POTTERY

By Pete Banks

Introduction and Methodology

A small assemblage of pottery was recorded from the excavation (67 sherds, 15,997g). The EVEs value for the assemblage is 16.05. The pottery was recovered from seven deposits. The bulk of the assemblage comprises post-medieval or modern pottery (65 sherds, 15,953g). A small group of Roman material was also recovered (2 sherds, 44g). This report provides a broad characterisation of the assemblage by period/ceramic tradition, with a general summary of fabrics, forms, decorations and depositional contexts.

Recording of the pottery assemblage was direct to an Access database. The pottery was examined by context, using a x10 binocular microscope and quantified according to sherd count and weight by fabric. The fabrics are described (Table B.1) in accordance with the Historic England guidelines (Barclay *et al.* 2016).

Roman

Range

Period 2 structure 1591 (fill 1952) produced two sherds (44g) of Roman pottery. The sherds represent an open bowl with an upright bevelled rim made in an unprovenanced colour-coated fabric (UNS CC). Although the rim is wheel finished the exterior surface of the vessel appears hand smoothed, an unusual feature for Roman pottery.

Post-medieval/Modern

Range

The most common post-medieval/modern wares were the British stonewares (BSW) (30 sherds, 13,843g). Due to their robust manufacture several complete vessels were recovered including six 'ginger beer' drinks bottles, a small inkpot, two large flagon style bottles, and a medium-sized straight-sided jar, which contained an unknown white/turquoise coloured substance which may be a copper compound of some variety (Period 2 structures 1047 (fill 1048) and 1540 (fills 1541 and 1542) and layers 1089 and 1663). These British stonewares

date to between the 17th and 19th/earlier 20th centuries, although the bottles and other represented vessels indicate dating late in this range. The origin of some of the stoneware vessels was indicated by stamps, recorded from two deposits. Period 2 structure 1540 (fill 1541) produced the base of a drinks bottle stamped with 'Doulton Lambeth'. The production of stonewares by Doulton in Lambeth is known to have taken place between the late 17th and early 20th centuries (Tyler 2005, 9), although again a 19th century or later date is likely for this vessel. A bottle base stamped with 'Field London, J. Bourne and Son, Patentees, Denby Potteries, Near Derby', derived from Period 2 deposit 1089. It is a product of the Denby, Derbyshire potteries well-known for the production of stonewares between the early 19th and 20th centuries (Bashford 2012, 191).

Also common were transfer printed earthenwares (TPE) accounting for 26% of the group by count. These tended to be highly fragmented and account for just 4% of the group by weight. Period 2 structure 1540 (fill 1541) produced four dinner plates and a sugar bowl or large cup (TPE). Eight sherds (678g) of refined white earthenware (REFW) were recorded. The base of a jar (REFW) stamped with 'Marling, Newcastle' was recovered from Period 2 layer 1663. Marling pottery was produced in Newcastle upon Tyne from 1817 onwards (Bell 2010). Period 2 structure 1540 (fill 1541) produced 6 sherds of porcelain (PORC), including a miniature jar (RA 511) approximately 35mm in height, a large, decorated rim sherd with a hollowed pipe rim. The latter has tentatively been identified as from a basin. The porcelain dates to between the 18th and 20th centuries, probably late in this range. A bowl (25g) with a beaded rim (PEW) and one sherd (91g) of glazed red earthenware (GRE) were also recovered from the excavation.

References

Bashford, J.L. 2012 *A commodity of good names: the branding of products c.1650-1900*
Unpublished University of York PhD thesis <http://etheses.whiterose.ac.uk/2754/>
(accessed 20/11/2020)

Bell, R.C. 2010 'Marling and other Tyneside pottery' Bloomsbury USA, Shire Library

Table B1: Description of pottery fabrics by period

Period	Fabric Description	Fabric Code	Count	% of Count	Weight (g)	% of Weight	EVEs
Roman	Un sourced colour-coated ware	UNS CC	2	2.985	44		0.17
Post-medieval/ modern	Glazed red earthenware	GRE	1	1.5	91	0.6	
	British stoneware	BSW	30	46.2	13843	86.8	13.21
	Doulton stoneware (Lambeth)	DOSW	1	1.5	55	0.3	
	Porcelain	PORC	6	9.2	304	1.9	0.35
	Pearlware	PEW	1	1.5	24	0.2	0.15
	Refined white earthenware	REFW	8	12.3	678	4.2	1.31
	Transfer printed earthenware	TPE	17	26.2	730	4.6	0.86
	Denby stoneware (Derbs)	DESW	1	1.5	228	1.4	
Grand Total			67		15997		16.05

APPENDIX C: CERAMIC BUILDING MATERIAL

By P. Davenport

Introduction

The collection consisted of several types of brick and several kinds of tiles. Most items had mortar adhering to one or more surfaces and some entries in the catalogue consisted of bricks still mortared together. The bricks were measured in imperial and the equivalent metric dimensions are to the nearest millimetre.

Range and variety

The brick types were:

Type A: Hand-made, frogless brick probably from a wooden mould and often with draw-wire marks on one bedding face, indicating removal of the surplus from the mould. The opposite side was often sanded. The bricks were fairly consistently 8½" x 4c" x 2½" (216mm x 105mm x 64mm). The clay showed interfaces where the clay pieces had been pushed into the mould. The fabric was a well mixed, consistent orange-red with no obvious inclusions other than a

very fine sand and the occasional, presumably accidental, small pebble. These bricks are probably of 18th century date.

Type B: Hand-made brick probably from a wooden mould but with a shallow hand-scooped frog of rounded profile. The fabric is not dissimilar from Type A but a somewhat darker, less orange, red. The bricks were typically 8³/₄" x 4" x 2³/₄" (222mm x 101mm x 70mm). These bricks may be of mid 19th century date.

Type B1: Similar to Type B but 9" x 4" x 2¹/₂", a rounded frog appears to exist but on the one example (Cat. 9) is obscured by mortar. However, the bricks have more irregular inclusions such as a lump of flint and a few, millimetre-scale, flint grits (perhaps 2-5%) There is also some brick grog. Possibly mid 19th century.

Type C: A flat brick, possibly a pavioir. 9" x 4¹/₂" x 1⁵/₈" (230mm x 114mm x 41mm). Fabric not seen in interior but superficially like A.

Type D: Flat brick similar to Type C, but thicker at 1³/₄" (45mm).

Type E: Fire brick (incomplete) with a hand-scooped frog. >9" x 4¹/₂" x 2³/₄" (>230mm x 114mm x 70mm). London stock brick, yellow in colour with filler of pieces of clinker 5-20mm and even larger. Later 18th-19th century?

Type F: Similar to Type B, but 9" x 4¹/₄" x 2e" (230mm x 108 x 67mm).

Type G: Similar to Type A but 9" (230mm) long and the fabric has an amount of brick grog, perhaps c. 5%.

The great majority of bricks, 60, are Type A, including the two combed examples (Cat. 36) and three that are slightly different (Cat. 11, and Cat. 48, where the fragments are assumed to approximate to two bricks). The fabric is the traditional type of brick for this area, probably of 18th century date. Indeed, all the brick fabrics are clearly local. Type E, the refractory brick is probably from the Wealden area where the standard yellow London stock bricks come from.

The next most numerous is Type B which is very similar fabric but with a hand-cut frog (22 examples including Cat. 9). This is probably mid-19th century in date as it is pre-industrialised in manufacturing technique but must post-date the introduction of frogs, which is generally dated to the mid-19th century. The other types occur as singles except for the flat bricks, almost certainly paviments, of which there are 12.

The usual roofing tile in this area until the mid 19th century was the flat clay tile, fixed to the laths with nails or wooden pegs, nibs tend to be a later introduction. Pantiles are not the traditional type in this area but three fragments are represented here. Two of them have nibs, suggesting a later 19th century or later date.

Catalogue

Number	Description	Type	Deposit	Deposit detail
1	Two bricks set in a pale grey-brown, lime mortar with unmixed lime specks <5mm. There is micro flowstone (calcite) formation within cracks in the mortar.	A	1520	Brick wall of culvert in English Bond
2	Seven identical bricks, wire draw marks on base set in a not dissimilar lime mortar to 1 but more greyish cream rather than white. Brick impressions in the mortar on one suggest it is part of a curving wall and others suggest at least three bricks wide.	C	1012	Brick wall in English Bond
3	Two similar bricks; whitewash on one header end of both. Mortar a hard, pale greyish-brown lime mortar with coarse (but not gritty) sand. The ends of each brick's bedding face has been chamfered and the increasing thickness of the mortar from one end to the other indicates these are voussoir bricks with the intrados painted.	B	1009	
4	Five bricks, mortar similar to 3. Wire draw marks on base. Splashes of lime or whitewash on header of one.	A	1014	Brick wall in English Bond
5	Two bricks. Similar mortar (but not much adhering) to 3. Wire drawn, and lack of mortar allows sand bedding to show.	A	1165	Floor
6	One brick similar mortar to 2, some mud staining. One end reduces to 2¼" and this may be a voussoir, otherwise as Type A.	A?	1650	Brick wall in English bond
7	Three bricks mortared together, side by side, in grey, either cement mortar or strong hydraulic lime mortar (header course). Brick fabric again a consistent well mixed sandy one with very few to no inclusions. One brick is slightly over-fired or burnt, possibly deliberate blackening of a header. Mortar covering obscures surface details but perhaps Type B as dimensions are 8¾" x 4" x 2e" (222mm x 101mm x 67mm). If the mortar were cement based, then this example would post-date c.1850.	B?	1182	Backfill deposit
8	Two bricks similar to 1-3 but, Fabric has at least one 2cm dia pebble and the brick has blown across it, weakening the brick so that it subsequently lost a corner. Other cracks radiate from it. White lime mortar similar to 1014.	A but slightly yellower in tone	1509	Barrel vault
9	Two courses of wall with fragments of two more above and below set in a hard, white, lime mortar very similar to 1.	B1	1513	Brick wall in English Bond
10	A flat brick, its size (9 x 4½ x 1e") indicates it is a special brick. It has traces of a hard grey mortar on all sides. The interior is not visible obscured but may be similar to Type A. See 27.	C	1653	Paving
11	One brick 8½ x 4¼ x 2d" covered in a soft white lime mortar which is more like that on Cat. 3, with many flecks of unmixed lime, 2-7mm. Fabric similar to Type B, but size and apparent lack of frog closer to A.	A?	1507	Brick wall
12	Two bricks almost completely enclosed in a bright white lime mortar, almost looks like pipe clay. It contains tiny black inclusions >1mm, possibly ground cinder or flint or detritus from lime burning. Fabric appears to be orange-red, size 8¾, x 4¼ x 2½".	Probably A from a different mould	1548	Brick wall
13	A brick set in a white, lime mortar.	A but with a	1508	Barrel vault

Number	Description	Type	Deposit	Deposit detail
		Pebble Inclusion - not deliberate		
14	A frogged brick with traces of a greyish-white lime mortar.	B	1656	Brick wall in English Bond
15	See 13, two more identical bricks.	B	1548	Brick wall
16	Two bricks in white lime mortar.	A	1504	Brick culvert
17	Two refractory bricks. They are mortared together with a hard fire cement and one brick is heavily burnt with many vesicles.	E	1559	Brick wall in English Bond
18	Hand-scooped frogged brick. Roughly hand-moulded.	F	1648	Brick wall in English Bond
19	Brick in pale greyish white mortar	A	1670	Paving
20		B	1655	Brick wall in English Cross Bond
21		B	1538	Brick wall in English Bond/ Cross Bond
22		B	1647	Brick wall in English Bond
23	No sign of a frog (one bedding face obscured by greyish-white lime mortar, similar to that on Cat. 14),. Very thick mortar joints $\frac{3}{4}$ to $1\frac{1}{4}$ ". 18th century? Type A fabric but $9 \times 4\frac{1}{4} \times 2\frac{3}{4}$ " (230mm x 108mm x 70mm)	A?	1511	Brick wall in English Bond
24	Two bricks. Wedge-shaped white lime mortar joints (up to 2cm) suggest soldiers in an arch. Wire drawn etc. Occasional large pebble visible in break.	A	1026	Brick culvert
25	Flat brick similar to 11, but no mortar.	C	1146	Deposit (not structure)
26	Four flat bricks with white mortar on all sides except top so possibly floor blocks. These are Fabric C but are thicker at $1\frac{3}{4}$ " (45mm) so Type D.	D	1106	Floor of culvert
27	Two bricks. One is Type A. The other Type G. The reduced width of the latter $3\frac{3}{4}$ " (95mm) may be due to rubbing as the face is worn away. Both have white lime mortar adhering.	A and G	1081	Floor
28	Burnt (over-fired) three-quarter brick and a half-brick, greyish-white lime mortar, probably Type A but the three-quarter brick was only $3\frac{3}{4}$ " wide (shrunk in kiln/clamp?).	A?	1020	
29	Late Victorian mass concrete lump, with broken brick aggregate, part of floor (surface surviving).		1098	Floor of barrel vault (floor of barrel-vaulted room?)
30	Fragments of three frogged bricks with very white lime mortar. A muddy brown mortar on edges may be remains of pointing.	B	1107	Floor of culvert 1026
31	Two bricks. Greyish white mortar similar to 2. Type A but $8\frac{1}{2} \times 4 \times 2$ ".	A	1092	Brick wall

Number	Description	Type	Deposit	Deposit detail
32	A flat brick, three quarter length similar to Cat. 28. Unlabelled but in box with ctx. 1101. Rest of the material is broken brick frags in grey white lime mortar with lime lumps. These are the usual unmixed pieces and also larger pieces of lime up to 35mm as if aggregate. Brick fabric appears to be Type A. One almost complete brick in this group is a very heavily burnt Type A. Some sort of wall core or crude mass concrete (limecrete).	A	1101	Brick wall
33	Two courses of heavily burnt bricks bonded in the greyish-white lime mortar.	A	1161	Brick wall
34	A chunk of mortared brick wall core or foundation, similar to 1161 but contains a whole flat brick as Cat. 35, which could be a facing. Other brick frags seem to be Type A.	A	1101	Brick wall
35	A fragment of floor consisting of 9" x 4¼" x 2¼" bricks laid on edge (on the mud substrate which is adhering) supporting a floor surface of flat bricks neatly laid on top, the whole thing in white lime mortar. The flat bricks are the Type D bricks as in 28, 35 and 37. The bricks on edge are obscured but could be Type A in fabric.	D / A	1106	Floor of culvert 1026
36	Two bricks of similar fabric to Type A, greyish white mortar, however one stretcher and one header face of each has fine vertical combing (1mm) and the opposite is very abraded. Metal mould? They are 8¾ and 9" long.	Similar to A	1041	Brick wall in English Bond/ Cross Bond
37	Frogged brick. Hard cinder mortar.	B	1058	Brick wall, poorly bonded
38	Two bricks.	A	1042	Brick wall in English Bond
39	Three bricks. Two are covered in very white lime mortar; the third has a greyish-white lime mortar on top and bottom and lime or whitewash traces on the stretcher faces.	A	1047	Brick wall in English Bond
40	A heavily burnt brick.	B	1021	Brick wall in poor bond
41	A half of a Type A brick with one stretcher face flaked away and the broken face reduced by heat. Hard grey-white lime mortar.	A	1089	Deposit (not structure)
42	Broken ridge tile in a hard, quarry tile-type fabric. Similar colour to type 1-3 bricks. Mid late 19th century or later.	Tile	1089	Deposit (not structure)
43	Three Type B bricks in a grey lime mortar and a fourth atypical brick >10" long, details obscured by dirty grey lime mortar. Also in this group a flat floor brick of Type C, compare to Cat. 11.	B and C	1182	Deposit (not structure)
44	Five complete bricks with pale grey-white lime mortar.	A	1052	Deposit (not structure)
45	Three 10½" square floor quarry tiles set in the very white lime mortar. Fabric a very clean orange-red fine sand inclusions but little else. The tiles appear to have formed part of a pier as they are mortared on both sides.	Tile	1549	Floor
46	A quarry tile 7½" square 1" thick, has chamfered sides to allow mould ejection, underside the top of the mould (very flat, unfinished).	Tile	1640	Deposit (not structure)
47	At least seven flat roof tiles with two nail holes, mostly round ones, one tile has square. One nearly complete tile gives 6" x 10". The tile with one square hole is 4¼" x 6d". These are post medieval to mid 19th century date. Typical for the area. There is one schist plaque with no holes, probably a roof tile and one incomplete (broken) cylinder which is not a ridge tile but it is unclear what. It could be a pipe.	Tile	1541	Deposit (not structure)

Number	Description	Type	Deposit	Deposit detail
48	Four fragments of brick: two have thicknesses of 2" and 2¼" the others have no faces left but one has a reduced core, unusual in this assemblage (but see Cat. 45). The fabric is similar to A but slightly lighter orange. These may be earlier in the assemblage.	A?	1070	Deposit (not structure)
49	A sherd of pantile more than 10" x more than 7", no edges survive. Pan tiles are apparently rare in this area. Possibly 18th-century or later revival.	Tile	1542	Explosion deposit
50	Large section of flat tile (in fact slightly bowed from the firing) similar to 51. No nail holes survive, and a small section of similar	Tile	1552	Brick wall, randomly bonded
51	Many large and small pieces of flat tile with and without nail holes, two pieces of pantile with a nib. The nib may suggest a later 19th century date, vernacular revival.	Tile	4093	Not in context register
52	Brick	B	1059	Brick wall

APPENDIX D: GLASS

By Pete Banks

Introduction and Methodology

The excavation produced 77 fragments of glass weighing 5740g. The assemblage was derived from eight deposits. The glass was recorded direct to an MS Access database (Table D1). The assemblage was examined by context and quantified according to fragment count and weight. The glass assemblage dates to post-medieval or modern period and in was in a mixed condition, with some complete vessel and other more broken-up fragments.

Post-medieval/Modern

Range

Period 2 structure 1047 (fill 1048) produced an alcoholic drinks bottle, a poison bottle, 'Cinzano' bottle and 'Pepsi Cola' bottle, the last of which most likely dates to the 1950s or 1960s. Three small bottles were recovered from Period 2 silt trap 1168 (fill 1169), these were probably ink or perfume containers. Two Bovril bottles, one small and one large, and a tall colourless glass bottle with a rubber plug imprinted with the word 'Hammerton', possibly the name of a drinks manufacturer, were recorded from Period 2 structure 1514 (fill 1515). Both are likely to date to the 19th or 20th centuries. A large crenulated rim bowl with etched lozenge decoration around the circumference was recorded together with a small blue glass bottle of unknown function from Period 2 structure 1540 (fill 1541). A bottle of 'Galloways Celebrated Cough Syrup - The Great London Remedy' and a sealed opaque glass bottle, still containing an unknown liquid, were derived from Period 2 layer 1663. The former would have contained a tincture in production during the 19th and 20th centuries.

Table D1: Summary catalogue of glass

Context	Description	Count	Weight (g)	Date	Comments	RA No.
1048	Brown Bottle Glass	2	704	PM/MOD	Corked alcohol drinks bottle x 1, poison bottle x 1	
1048	Transparent Bottle Glass	2	1179	1950+	Cinzano bottle x 1, Pepsi Cola bottle x 1	
1089	Opaque Bottle Glass	1	21	PM/MOD	Tall necked bottle rim x 1 Probable drinks related	
1169	Green Bottle Glass	3	89	PM/MOD		
1169	Transparent Bottle Glass	8	51	PM/MOD	Rectangular Ink bottle x 1	
1169	Opaque Blue Bottle Glass	7	59	PM/MOD		
1169	Green Bottle Glass	1	92	PM/MOD	Rectangular Ink bottle x 1	
1169	Opaque Blue Bottle Glass	1	51	PM/MOD	Small perfume or ink bottle x 1	
1169	Transparent Window Glass	28	228	PM/MOD		537
1169	Green Bottle Glass	12	417	PM/MOD	Heavily degraded	583
1515	Brown Bottle Glass	2	435	C19-C20	Small and large Bovril bottle x 2	
1515	Transparent Bottle Glass	2	1229	C19-C20	Hammerton ?Brewery drinks bottle x 1 (Rubber plug 'Hammerton BHB' stamp, Water jug/vase x 1	
1541	Transparent Vessel Glass	2	113	MOD	Engraved glass bowl rim x 1 crenulated rim and engraved Ionzenes	
1541	Blue Bottle Glass	1	95	PM/MOD	Small liquid bottle x 1	
1542	Transparent Bottle Glass	1	20	PM/MOD	Small Cylindrical Bottle x 1	539
1563	Green Bottle Glass	2	12	PM/MOD	Poss knapped glass to form pointed awl	1563
1663	Transparent Bottle Glass	1	167	C19-C20	Galloways Celebrated Cough Syrup - The Great London Remedy' Embossed bottle x 1	
1663	Opaque Bottle Glass	1	778	PM/MOD	Glass bottle containing unknown liquid x 1 Corked	

APPENDIX E: CLAY TOBACCO PIPE

by Peter Banks

Introduction

Two fragments (6g) of post-medieval or modern clay tobacco pipe are recorded from one deposit. The material was scanned by context and quantified by count and weight. The assemblage was fragmented and in moderately poor condition.

Post-medieval/modern

Two undiagnostic stem fragments were recovered from Period 2 structure 1540 (fill 1541). In the absence of dateable indicators such as bowl form or makers' marks, the clay pipe can only broadly be dated to the late 16th to late 19th centuries.

APPENDIX F: LITHICS

By Jacky Sommerville

A single, undiagnostic but probably prehistoric, worked flint flake (14g) was retrieved from fill 1074 of cut 1075, which produced no other finds.

APPENDIX G: WORKED STONE

By Ruth Shaffrey

A total of 48 pieces of stone were either removed from site for analysis or recorded on site and sampled. Most of these (38 fragments from 32 items) are millstones, but there are items of structural stone too (Table G1). Details of these have been entered into a Microsoft Excel spreadsheet which can be found in the project archive. At the request of the Local Planning Authority (LPA) archaeological advisor and the Archaeological Officer for Surrey County Council, Nigel Randall, information on context and provisional lithology have been included below (Table G2), though this may be subject to revision during the analysis phase.

Table G1: Summary of worked stone object types

Function	Number
Ashlar	3
Boulder	1
Flooring	4
Millstone	38
Rod	1
Roofing	1
Slab	1

Most of the millstones are fragmentary and it is not always possible to determine whether the fragments are from upper or lower stones. However, eight fragments of the lower millstones (bedstones) are present. One of these (Ra. 512/513) survived in two halves and measures 2.5m diameter x 0.48m thick. It is likely that the other bedstone fragments were from similar sized stones. They were identified as bedstones either by the presence of a particularly large central perforation or by the presence of wear on one of the flat surfaces. There is vertical tooling on the circumference of the bedstones, as well as small circular sockets in some places, possibly for the attachment of mortar.

Four fragments could be positively identified as upper millstones (edge runners) by the presence of wear on the circumference. One of the edge runners measures at least 0.9m diameter but most of these fragments are too small for dimensions to be established. Documentary evidence suggests that the edge runners were 1.5m to 2.10m in diameter (Wilson 1963, 49).

The millstones for the gunpowder mill are made of limestone, which was common in gunpowder mills because the silica in the sandstone millstones of grain-processing mills was more likely to cause a spark (Tucker 1987, 171). The millstones from Worcester Park are of two variants of black limestone with recrystallized calcite crystals. One of these is denser and blacker than the other but both types were used for edge runners and for bedstones. The rock is superficially similar to Black Rock limestone from the Mendips, but the precise provenance is uncertain at present. Other possible sources are Derbyshire and Namur in Belgium, both known to be sources of gunpowder millstones. Of these, Namur seems probable since gunpowder millstones from Namur were widely transported, including to the Barcarena Gunpowder Factory in Portugal and to Goa in India (Quintela *et al.* 2006, 128; Ambekar *et al.* 2015). Geochemical/petrographical analysis would be required to determine the provenance

of the millstones and documentary records for the mill might indicate where the millstones were purchased from.

In addition to the gunpowder millstones, there are fragments of two sandstone discs (Ra. 637, Ra. 510). The original dimensions of Ra. 637 could not be reconstructed but Ra. 510 measures 500mm diameter by 90mm thick and is perforated with a square eye of 50mm. Its form and size is typical of grindstones, but it demonstrates no wear to the circumference and retains the original tooling. If it were a grindstone, then it was never used. Alternatively, it could be a small millstone associated with a phase of corn grinding at the site. It would be very small for this use, but it is hinted at by wear to one of the faces.

Building stone from the site includes ashlar blocks of Reigate stone from wall 1012 and of oolitic limestone from destruction deposit 1169. Flooring slabs in floor surface 1165 are of white limestone from a number of possible sources (Ra. 446, 547), and Purbeck limestone (Ra. 544, 545). A single black limestone rod was recovered from destruction deposit 1169 (Ra. 525). A single fragment of slate roofing was found in backfill 1541.

References

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- Tucker, D. G. 1987 Millstone Making in England, *Industrial Archaeology Review* IX, **2**, 167–88
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Table G2: Provisional summary of context and lithology

context	SF No	No	No-Obj.	Sample	Lithology	Function
1006	522	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone?
1012		1	1		Reigate stone	Ashlar
1012		1	1		Reigate stone	Ashlar
1017	549	1	1		Limestone?	Slab
1165	546	1	1		Limestone	Flooring
1165	547	1	1		Limestone	Flooring
1165	544	1	1		Purbeck limestone	Flooring
1165	545	1	1		Purbeck limestone	Flooring
1169		1	1		Black limestone, type 1	Millstone
1169	527	1	1	Yes (46)	Black limestone, type 1	Millstone
1169	530	1	1	Yes (45)	Black limestone, type 1	Millstone
1169	528	1	0		Grey/black limestone with frequent calcite crystals, type 2	Millstone
1169	529	1	1	Yes (47)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1169	531	1	1	No	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1169		1	1		Oolitic limestone	Ashlar
1169	525	1	1		Limestone	Rod
1170	543	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone
1182		1	1			Unworked
1182		1	1		Black limestone, type 1	Millstone
1182		1	1		Black limestone, type 1	Millstone
1182		5	1		Black limestone, type 1	Millstone
1182	636	1	1	Yes (24)	Black limestone, type 1	Millstone
1182	638	1	1	Yes (23)	Black limestone, type 1	Millstone
1182	639	1	1	Yes (25)	Black limestone, type 1	Millstone
1182	599	1	1	Yes (60)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1182	635	1	1	Yes (43)	Grey/black limestone with frequent calcite crystals, type 2	Millstone

1182	640	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone
1182	637	1	1	Yes (44)	Sandstone. Medium grained well sorted beige micaceous sandstone	Millstone
1541	510	1	1		Sandstone. Medium grained well sorted beige micaceous sandstone	Millstone
1541		1	1		Slate	Roofing
1542	620	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	626	1	1	Yes (54)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	628	1	1	Yes (53)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	629	1	1	Yes (52)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	631	1	1	Yes (50)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	632	1	1	Yes (1542)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	633	1	1	Yes (55)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	634	1	1	Yes (57)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	641	1	1	Yes (48)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	623	1	1	Yes (51)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	624	1	1	Yes (49)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1542	625	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone
1563	512	1	1	Yes	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1564	513	1	0	Yes (58)	Grey/black limestone with frequent calcite crystals, type 2	Millstone
1628	621	1	1		Grey/black limestone with frequent calcite crystals, type 2	Millstone

APPENDIX H: LEATHER

Quita Mould

Methodology

The following assessment is based on examination of the wet leather on 29 October 2020; the leather had been recovered from the excavations in 2020. A basic record of the material has been made, noting all the diagnostic features present, measurement of relevant dimensions and species identification where possible, and is included in the catalogue below. The material is summarised below incorporating the contextual information available at present, recommendations for conservation are given (in the site archive) and the necessity for additional work is considered below.

All measurements are in millimetres (mm) + indicates a measurement of an incomplete item. Leather species were identified by hair follicle pattern using a low-powered magnification.

Condition of the material

The leather is wet and is currently packed in self-sealing polythene bags in an airtight plastic storage box. Two of three items had to be washed to allow examination. The leather is in good and robust condition.

Summary and dating

The remains of three shoes were recovered from Trench 1: a shoe heel (2 Ra. 535) and two boots (1 Ra. 500, 3 Ra. 514) of brass riveted construction. Riveted construction was used on inexpensive footwear from the middle of the 19th century through to the middle years of the 20th century. The choice of brass riveted footwear is not directly connected with the milling of gunpowder at this location. A certain style of footwear, 'magazine shoes', colloquially known as 'Waltham Abbeys', were worn by those manufacturing and working with explosives well into the 20th century (Dan Pascoe pers. comm. 28.06.2019) but the shoes from the Old Mill are both of common 19th century styles and are not 'magazine shoes'.

A low stacked leather heel (2 Ra. 535) was found in deposit 1169. A black polished leather upper (3 Ra. 514) from a left foot front-lacing ankle boot with six pairs of lace holes and three pairs of lace hooks was found in backfill 1541. This dress boot is of Balmoral style and dates to second half of the 19th or the early 20th century. A man's right foot front-lacing ankle boot

(1 Ra. 500) was found in dumping 1089. The boot, which laces through four pairs of lace holes, is a practical outdoor boot of a style variously known as a 'half boot', 'high-low' or a 'Blucher'. This was a style first used at the beginning of the 19th century (Swann 1982, 35–6) and continued into the early 20th century as the footwear worn by labourers. The square toe of this boot (1 Ra. 500) suggests it dates to the (mid) Victorian period rather than the 20th century. It (1 Ra. 500) may have been worn by a worker at the mill, the Balmoral boot (3 Ra. 514), which may, or may not, be contemporary with it, is not a labourer's boot but might have been worn by someone in the office involved with the mill's administration, its construction suggests it was not the choice of one of the more affluent classes.

A note on the phasing: No phasing was available for the leather bearing contexts when the assessment was undertaken. The working boot (1 Ra. 500) from dumping 1089 could potentially date to the later use of the Worcester Park Powder Mill, the Balmoral boot (3 Ra. 514) from backfill 1541 is more likely to date to the Worcester Park Flour Mill (c. 1874-c. 1891) Period 3.

Conservation

The leather cannot be stored wet indefinitely. Without conservation the leather will deteriorate and is potentially hazardous to health being liable to fungal and bacterial infection. The eventual repository of the leather should be consulted regarding their discard and retention policy for wet organic material. It is usual for this to follow that recommended in the SMA Guidelines and unlikely that they will accept wet leather. English Heritage Guidelines (2012) provides advice on the conservation options available. The leather could be allowed to air dry under controlled conditions (English Heritage 2012, 22; Historic England 2018) enabling it to be safely stored and retained as part of the archive. It is of no intrinsic value, however, and if it is of no significance for dating purposes, may be discarded providing good quality photographs of this material accompany the site archive.

Potential

The leather has been catalogued (7) and a summary (3) has been provided to inform those writing the site narrative. No further work is necessary.

References

Swann, J. 1982 *Shoes*. The Costume Accessories Series. London. B. T. Batsford Ltd

Basic record for the site archive (in context number order)

1 ***Leather front-lacing ankle boot, riveted construction, right foot, adult size***

Near complete ankle boot, heavily worn. **Bottom** with square toe, natural tread, medium waist and seat. The **sole** has the tread area worn away, and the waist area is moulded (convex). A single row of brass rivets runs around the edge, some iron shanks are present around the tread and across the upper waist marking the position of a half sole (now missing). The **midsole** is worn through toward the toe revealing the **insole**. **Low D-shaped stack leather heel**, c. 20mm high, worn down to the sole on the outer (lateral) side. The heel has iron nailing around the edge and across the straight breast. Sole length c. 260mm, toe width 50mm, tread width 88mm, waist width 55mm, seat width 68mm. Estimate insole length c. 250mm. Upper: vamp with a straight ended tongue (tab) and sloping lapped side seams. The vamp has a double vertical slash above the toe. One-piece quarters with four pairs of plain lace holes at the front opening (no eyelets or lace hole linings). The quarters have a straight top edge and stitching from a small counter at centre back (no counter present). Quarters Height at centre back c. 100mm. Upper leather 2.5mm thick, black, no grain pattern visible inside or out. Adult size, estimated Adult 5(38). Dumping 1089, Ra. 500

2 ***Leather stacked heel***

D-shaped, low heel with a straight breast, comprising five or possibly six lifts and a top piece with closely spaced brass rivets around the edge and four iron nails across the breast with at least one iron nail in the centre. The heel is approximately 1 inch high. The top layer of the heel is broken and irregular. Length 59mm, width 59mm, height max c. 25mm. Deposit 1169, Ra. 535

3 ***Leather front-lacing ankle boot (Balmoral), riveted construction, left foot, adult size***

Upper of ankle boot with shoe bottom missing. Complete inner **lining for quarters** area with a lasting margin with rivet holes. No stitching at the front or top edge, with the impression of a back seam at centre back. Grain side inward to the upper, flesh side to the foot. Leather sheep/goatskin? c. 1.5mm thick. Height at centre back c. 50mm. **Right quarter** with riveted lasting margin, machine stitched back seam 50mm high, lapped front seam and low, straight top edge with a double row of machine stitching to attach to the leg, **Left and right boot leg** with six pairs of lace holes with brass eyelets and three pairs of lacing hooks above, The lace hole and hooks have a lining. The lower edge, gently rounded at the front has a lapped seam, the top edge sloping upward to the front opening is also machine stitched. Upper leather black polished (grain outward but no grain pattern visible) 2mm thick, presumed calfskin. Total

Height 140mm (to the lasting margin). Adult size, woman/small man, estimated from quarters length. Backfill 1541, Ra. 514

APPENDIX I: METAL

David Kenyon

Background

On 16 November 2020 I attended Cotswold Archaeology Andover office to examine material recovered from the above excavation project. My brief was to determine whether any objects could be identified which were diagnostic of gunpowder processing on the site, which was known to have taken place in the 18th and 19th Centuries. This was based on my previous experience as a staff member at the Royal Gunpowder Mills Waltham Abbey, as well as wider knowledge of the archaeology of munitions production, explosives, and industrial archaeology. I examined c.60 larger items, mostly consisting of highly corroded iron, as well as several boxes of smaller objects of non-ferrous metals and other materials.

Observations

No items were present which could be diagnostically associated with gunpowder production. Most of the items consisted of large mechanical or structural components, which while possibly associated with the powder mill, could equally have derived from other activities on the site, including the later flour mill. However several items were present which were suggestive of an association;

Significant numbers of large hand-forged nails and bolts. It is possible that these were associated with the frangible timber sheds which were constructed to cover the gunpowder mill machinery.

A quantity of iron barrel bands. Production of gunpowder would typically require barrels for storage both of raw materials and finished powder, whereas these would not be typical of a flour mill. It is possible therefore that these originated from barrels associated with powder-making.

Non-ferrous metal objects. The assemblage included two rectangular pieces of sheet Cu alloy (RA 570 and RA571), and a fragment of thick lead sheet, perforated by rivets around its edge (RA506). While no specific function could be ascribed to these objects, their presence was noted as it was common to use non-ferrous metals for a variety of functions in the gunpowder-making process in order to avoid sparking. Cu-alloy tools, and lead and copper

linings for vessels have both been identified in similar contexts elsewhere. Thus again, these items are suggestive of powder-making.

Royal crest stamp. This item was contained in one of the boxes of smaller finds and consisted of two fragments of a stamp or brand for impressing an image of the royal coat of arms. Again, this item is not diagnostic of gunpowder-making, but it raises the possibility that materials were being produced on site which required marking in this way. As the Mill is known to have been supplying powder to government contracts it is possible that this stamp is associated with those contracts, however I am not aware of any similar objects used elsewhere.

Objects of metal: Selective catalogue

E. McSloy

Ra. 561 Pencil/pencil holder. Of thin, gold-coloured sheet metal with wooden/graphite pencil insert. The pencil holder body is finely striated for handling. Unmarked. Probably late 19th or early 20th centuries. Length (closed) 94mm; length (with pencil in place) 120mm; diam. 8mm. 'Explosion deposit' 1542.

Ra. 562 Two fragments from stamp constructed from lead alloy sheet with raised, probably soldered, design depicting (in reverse) the royal coat of arms. Only the unicorn (to right) and the legend DIEU ET MON DROIT (God and my right) in a scroll below, are present. There are multiple small iron rivets through the base plate suggesting it was originally affixed to a wooden block. Probably 18th or 19th century. The possible uses are discussed elsewhere (Kenyon, this report). Length (largest fragment) 115mm; depth 4mm. Deposit 1048.

Dep.1048 Cigarette tin. Benson and Hedges. Red painted with gold edging and BENSON and HEDGES SUPER VIRGINIA GIGARETTE. 'When only the best will do' in cursive script to lid interior'. Probably 1920s or 1930s. Deposit 1048.

Ra. 562 Copper alloy (probably brass) folded edging strip with 7 x rivets *in situ*. Stamped with 'RUNBAKEN MAGNET Co. Ltd. MANCHESTER' and 'PATENT'. The Runbaken company was established in 1908 and produced a range of electrical, automotive and measuring/calculating equipment to at least 1937. (https://www.gracesguide.co.uk/Runbaken_Products) Length 75mm; width 10mm. Backfill deposit 1541.

Ra. 563 Copper alloy (probably brass). Crudely formed sheet metal object; cut and hammered to shape. Approximately D-shaped and slightly dished (ashtray?). Length Backfill deposit 1541. Length 110mm; width 88mm; depth 12mm.

Coins

Ra. 518 Farthing of George V (1910–1936). Date is obscured by corrosion. Backfill layer 1515

References

Graces Guide to British Industrial History: http://www.gracesguide.co.uk/Rubaken_products [accessed 2.02.2021]

APPENDIX J: THE PALAEOENVIRONMENTAL EVIDENCE

Animal Bone

Clare Randall

Summary

Four fragments of animal bone weighing a total of 248g were recovered from two contexts. These included elements from sheep and pig. The pig lower front limb bone and a limb bone of a cattle-sized animal had been sawn to portion the meat, a practice frequently seen in post-medieval material.

The material

Four fragments of animal bone weighing a total of 248g from two contexts were presented for analysis. Analysis was carried out broadly in line with Baker and Worley (2019). The material was of an average condition of preservation; no taphonomic changes were noted.

Three of the four fragments were from domestic livestock; the fourth could not be conclusively identified to species or element but represents part of the long bone of a cattle-sized animal and is most likely part of the shaft of a cattle humerus. A sheep radius and sheep/goat rib were recovered from context 1682, and the cattle-sized bone and a pig femur fragment from context 1663.

The sheep radius was fused proximally, and unfused distally, consistent with an animal of 10-36 months; the pig femur was unfused proximally, indicating an animal of less than 42 months. Three out of the four fragments displayed modifications by cutting. The sheep/goat rib had a single heavy cut to the dorsal surface of the shaft indicating either skinning or portioning of the carcass. The pig femur had been sawn through the shaft, whilst the cattle-sized long bone had been sawn through the shaft in two locations in parallel cuts. Both actions are associated with portioning the carcass.

The use of sawing to portion meat does occur as early as the Romano-British period, but it is most frequently seen in post-medieval material.

Reference

Baker, P. and Worley, F. 2019. *Animal Bones and Archaeology Recovery to archive Historic England Handbooks for Archaeology*

Tree-ring dating

Alison Arnold and Robert Howard

The crucial elements to reliable tree-ring dating are, firstly, that individual samples should each have a sufficient number of rings to produce a time-unique growth pattern, and secondly, that the samples are of a type of wood for which there is reference data with which they can be cross-matched and therefore dated. It is also helpful if a number of 'same-phase' samples can be obtained as combining their growth-ring data together enhances the climatic signal of the group, and reduces the 'noise' (or non-climatic influence) of any one individual sample.

Currently, these limitations generally mean that individual oak samples should have no fewer than 50 rings. Single oak samples can on occasion be dated as individuals, but this usually requires them to have 100+ rings. In addition, other wood, such as pine, and on rare occasions, elm, can be dated, but this material usually requires a larger number of same-phase samples than does oak, and they must have higher numbers of growth rings, 80+ usually being the satisfactory minimum for pine.

Thus, tree-ring dating relies on a few simple, but quite fundamental, principles. Firstly, as is commonly known, trees grow by adding one, and, usually, only one, growth-ring to their

circumference each, and every, year. Each new annual growth-ring is added to the outside of the previous year's growth just below the bark. The width of this annual growth-ring is largely, though not exclusively, determined by the weather conditions during the growth period (roughly March–September). In general, good conditions produce wider rings and poor conditions produce narrower rings. Thus, over the lifetime of a tree, the annual growth-rings display a climatically influenced pattern. Furthermore, and importantly, all trees growing in the same area at the same time will be influenced by the same growing conditions and the annual growth-rings of all of them will respond in a similar, though not identical, way.

Secondly, because the weather over a certain number of consecutive years (the statistically reliable minimum calculated as being 54 years) is unique, so too is the growth-ring pattern of the tree. The pattern of a shorter period of growth, 20, 30, or even 40 consecutive years, might conceivably be repeated two or even three times in the last one thousand years, and is considered less reliable. A short pattern might also be repeated at different time periods in different parts of the country because of differences in regional micro-climates. It is less likely, however, that such problems would occur with the pattern of a longer period of growth, that is, anything in excess of 54 years or so. In essence, a short period of growth, anything less than 54 rings, is not reliable, and the longer the period of time under comparison the better.

Tree-ring dating relies on obtaining the growth pattern of trees from sample timbers of unknown date by measuring the width of the annual growth-rings. This is done to a tolerance of 1/100 of a millimetre. The growth patterns of these samples of unknown date are then compared with a series of reference patterns or chronologies, the date of each ring of which is known. When the growth-ring sequence of a sample 'cross-matches' repeatedly at the same date span against a series of different reference chronologies the sample can be said to be dated. The degree of cross-matching, that is the measure of similarity between sample and reference, is denoted by a 't-value'; the higher the value the greater the similarity. The greater the similarity the greater is the probability that the patterns of samples and references have been produced by growing under the same conditions at the same time.

However, rather than attempt to date each sample individually it is usual to first compare all the samples from a single building, or phase of a building, with one another, and attempt to cross-match each one with all the others from the same phase or building. When samples from the same phase do cross-match with each other they are combined at their matching positions to form what is known as a 'site chronology'. As with any set of data, this has the effect of reducing the anomalies of any one individual (brought about in the case of tree-rings

by some non-climatic influence) and enhances the overall climatic signal. As stated above, it is the climate that gives the growth pattern its distinctive pattern. The greater the number of samples in a site chronology the greater is the climatic signal of the group and the weaker is the non-climatic input of any one individual.

Furthermore, combining samples in this way to make a site chronology usually has the effect of increasing the time-span that is under comparison. As also mentioned above, the longer the period of growth under consideration, the greater the certainty of the cross-match. Any site chronology with less than about 55 rings is generally too short for reliable dating.

Having obtained a date for the site chronology as a whole, the date spans of the constituent individual samples can then be found, and from this, depending of the presence of sapwood and/or bark, the felling date of the trees represented may be calculated. The dates of the felling of the various timbers then give good reference points for the development of the site, building or structure under investigation.

Sampling

Sampling and analysis by tree-ring dating of the timbers uncovered during these archaeological excavations were commissioned by Cotswold Archaeology in the hope of determining dates for the beams, this providing some information on the absolute date of the original structures, and perhaps providing some information on the possible sequential development and history of the site.

Thus, an initial examination of the beams at the former Worcester Park Gunpowder Mill was made. This quickly revealed that not only were they of different types of wood, possible elm and/or ash, and possibly different types of pine, with only one oak timber being seen. However, almost all the timbers had too few rings for reliable dating and there were insufficient numbers of apparently same-phase timbers. As such, this is perhaps not unexpected in a structure or site which is known to have had a lengthy and complicated history, the gunpowder mill probably having undergone much alteration, repair and re-structuring. Although disappointing, this is not at all uncommon phenomenon in tree-ring analysis, with, nationally, approximately one site in three being unsuitable for tree-ring dating, and no samples being taken.

However, given the opportunity presented, a number of timbers were sliced with a handsaw to provide samples for formal species identification, these samples being retained by Cotswold

Archaeology. A smaller number of samples were also removed to the Nottingham Tree-ring Dating Laboratory for examination of their growth regime (Fig 3a–e). In each case, the beam identity code and context was recorded, the positions of the timbers also being recorded on plans and photographs.

The Nottingham Tree-ring Dating Laboratory would like to take this opportunity to thank Cotswold Archaeology for commissioning this programme of analysis, as well as to Matt Nichol and the archaeological team on site at the time for their considerable help with sampling.

Analysis

Each of the five samples obtained from the selected timbers at this site and returned to the Laboratory was prepared by sanding and polishing to more fully reveal their annual growth rings. This showed that there were different types of timber present, two types of hardwood (oak and elm) with the other samples possibly representing two different types of coniferous softwoods.

Table J1 lists the timber type for each sample and sets out the dimensions of the sample pieces and the number of rings each sample piece contains. The annual growth ring widths of all five samples were measured, this revealing that only two conifer sample, timbers 1643 (26) RA 642 and 1622 (28) RA 645 had sufficient number of rings for potential dating. Despite being compared to the full corpus of reference data for pine, there was no cross-matching and both these samples must remain undated. The other conifer timber, as well as the oak timber both had too few rings. The elm sample also had too few rings for dating, this problem being compounded by the very poor reference data base for elm.

For illustrative purposes the variations in the annual growth rings widths of the five samples are shown in Figure 4a–e. As represented by the five samples taken, the growth regime of the trees would appear to be somewhat variable.

The tree represented by sample 1643 (26) 642 would appear to have fairly standard growth for a conifer tree in being fairly narrow-ringed throughout its life (suggesting growth in an averagely dense area of woodland), though there are slight variations, with a band of narrower rings around years 110–130, then becoming wider than average in rings 130 onwards. Without some sapwood it is difficult to judge how much longer this tree might have gone on growing (the number of sapwood rings on conifer trees is in any case vary variable). However, allowing

for some missing rings to the centre of the tree, and an average number of sapwood rings, the tree was perhaps not less than 200 years old when felled.

The rings of the tree represented by sample 1622 (28) 645 on the other hand, do appear to be fairly wide for a conifer tree, this suggesting a more open aspect area of growth, the tree perhaps not being above 150 years of age when felled.

Similarly, the rings of the tree represented by sample 1624 (30) RA 647 also appear to be fairly wide for a conifer tree, although there are some narrower rings in the early years of growth. This again suggests open aspect area of growth. This tree too was perhaps no older than 150 years of age when felled, and it may have been less.

The rings of the tree represented by sample 1679 (35) RA 630, the sample of elm, are noticeably wider than those of the conifers, being particularly wide even for an elm. This might suggest that the tree grew in an open aspect woodland, and may even be from a hedgerow, or tree at the edge of a field. With only 33 extant rings, it is possible that the tree was less than 100 years of age when felled and may have been less.

The rings of the oak tree represented by sample 1222 (37) RA 651 are again particularly wide, again suggesting open aspect woodland or hedgerow growth. With only 22, and given the width of the extant rings, it is possible that the tree was less than 75 years of age when felled.

Conclusion

Whereas in a fairly standard single-phase structure of, say, even later post-medieval date in the regions outside the south and south-east, it might be expected that a homogenous groups of oak timbers would be found in any given structure (particularly a building), the timbers perhaps being sourced from a single woodland, the timbers found at the former gunpowder mill are much more varied.

The varied collection of timber types found at this site is typical of late post-medieval/early-to-late industrial sites which have had an extended history of development. This is particularly true of sites in southern and south eastern England, where and when oak becomes less readily available, and thus more expensive, and other types of timber are used instead, particularly pine; the supply/use of pine increases rapidly from the late eighteenth century. This phenomenon is particularly common in building construction, where pine becomes increasingly common after about 1750, and almost to the exclusion of oak after about 1800.

The same phenomenon is seen at the Worcester Park gunpowder mill. In addition, the growth regime of the timbers would suggest that fairly young trees were being used.

Together, these phenomena would suggest that the assemblage found here represent almost a random collection of timbers, and that perhaps whatever timber was readily available was being used, and that over time, as structures or parts of buildings were altered or repaired, whatever timber was available was used for the purpose.

Table J1: Details of dendrochronology samples

Timber/Context number	Species	Sample dimension	Total rings	Narrowest ring (mm)	Widest ring (mm)
OMOM20. Timber 1643 (26) RA 642	conifer	130 x 45	139	0.15	2.20
OMOM20. Timber 1622 (28) RA 645	conifer	140 x 45	84	0.22	3.07
OMOM20. Timber 1624 (30) RA 647	conifer	110 x 45	65	0.32	2.0
OMOM20. Timber 1679 (35) RA 630	elm	130 x 120	33	1.15	7.68
OMOM20. Timber 1222 (37) RA 651	oak	80 x 65	22	1.58	5.53

Wood Species ID samples

by Sarah Cobain

Table J2: Summary of wood species identification sample results by object type

	Elm	Oak	Cherry/blackthorn	Softwood unidentified	Totals
Timber	1	2			3
Beam	3	2	1		6
Plank				1	1
Cog/gear		1			1
Totals	4	5	1	1	11

Table J3: Wood species identification results

Context	Registered artefact number	Sample number	Species	On site interpretation
Timber 1172	Ra. 558	sample 41 – <i>Ulmus glabra</i>	elm	Timber

Timber 1193	Ra. 594	sample 40 – Quercus species	oak	Timber
Timber 1194	Ra. 595	sample 39 – Quercus species	oak	Timber
Timber 1206	Ra. 601	sample 42 – <i>Ulmus glabra</i>	elm	Horizontal beam
Timber 1619	Ra. 648	sample 31 – Prunus species	Cherry /blackthorn -type	Timber beam
Timber 1635	Ra. 643	sample 32 – Quercus species	Oak species oak	Timber beam
Timber 1636	Ra. 649	sample 33 – <i>Ulmus glabra</i>	elm	Timber beam
Timber 1640	Ra. 609	Quercus species	oak	Timber cog/ gear
Timber 1643	Ra. 642	sample 27 – pinus-type dried out not possible to ID	Softwood	Timber plank
Timber 1661	Ra. 650	sample 34 – Quercus species	oak	Timber beam
Timber 1679 NB. Timber 1679 = Ra. 659	Ra. 630	sample 36 – <i>Ulmus glabra</i>	elm	Timber beam

APPENDIX K: DETAILS OF PRESERVATION *IN SITU*

Summary

The following pages document the measures taken to preserve below ground archaeological structures at the site and are extracted from the Remediation Verification Report by Cognition Land and Water (March 2021).



COGNITION
LAND+WATER

REMEDIATION VERIFICATION REPORT

AT
THE OLD MILL ESTATE
OLD MALDEN LANE
WORCESTER PARK
KT4 7PX

FOR
TAYLOR WIMPEY SOUTH THAMES

Issue No	02 (Rev 1)
Project No.	0390
Date of Issue:	March 2021
Author:	Olivia Kayes / Andy O'Dea
Checked by:	Mark Hosking / Davis Skinner

1.	Client:	Taylor Wimpey South Thames
2.	Regulators:	Environment Agency and Epsom & Ewell Borough Council
3.	Consultants:	RSK

Disclaimer

COGNITION Land and Water Limited has prepared this Remediation Verification Report on the instruction of Taylor Wimpey South Thames (the Client). The report is for the sole specific use of the client and for the project as referred to herein. Copies may be passed to third parties only with the express written permission of COGNITION Land and Water and then no professional liability or warranty will be extended to such parties. COGNITION Land and Water accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned.

- Stabilisation of piling platforms (600mm)

Excavation levels and depth of excavation isopach levels are also presented on Drawing 0390_EN014_BH_A and 0390_EN015_BH_A (Appendix 1).

All obstructions found were broken out to COGNITION's contract level through the use of 360° excavators and hydraulic attachments. Where obstructions were found to extend below COGNITION's contract levels, the location of the obstruction was surveyed, recorded and provided to the client.

As the site had a surplus volume of soils there was a requirement to dispose of surplus arisings.

It should be noted that due to the presence of archaeology on the south boundary of the site, the depth of dig in a small portion of the private garden area was limited to the depth to encountered archaeological features and dictated by the archaeologist. Noting, the archeology pre-dates the use of asbestos at the site there is no risk of ACMs in these areas. In addition, the archaeological scope was adhered to; the protection of archology includes a barrier layer and installation of 300mm sand layer above the hard archaeological features.

3.5 STOCKPILE AND MATERIALS MANAGEMENT

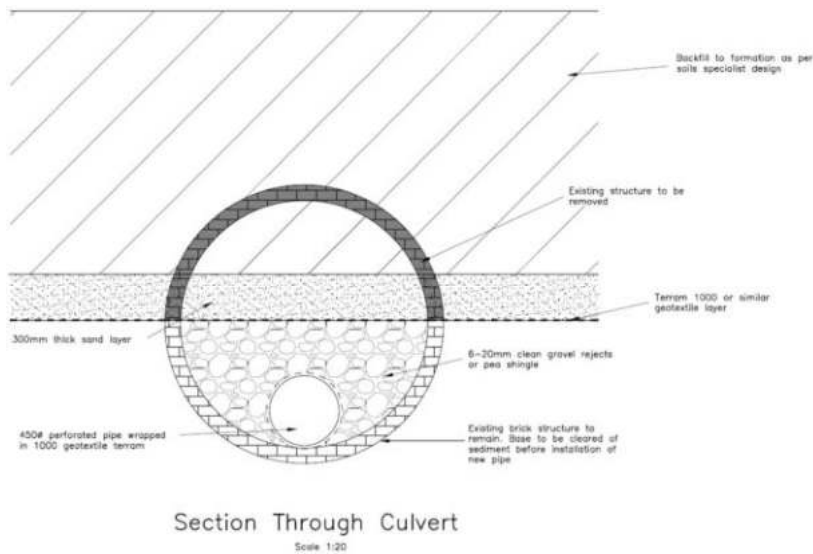
Stockpiles were dampened down where required in dry condition to prevent dust generation.

Due to the potential presence of asbestos, where required, stockpiles were also sheeted with weighed-down polythene and fenced off to prevent access with suitable signage erected to warn of potential ACM material. Stockpile records were maintained throughout the works using a Soil Audit System, which includes the source of the material, volume, processing location, placement location of materials and any analytical testing undertaken on each stockpile. The principal stockpile management occurred upon commencement of site works in which all legacy stockpiles were processed and backfilled into the central archaeological areas. Following that, all excavated soils were processed and backfilled at the source location, therefore, negating the need for stockpiling.

Detailed records of the stockpile management system are included in Appendix 11.

3.6 REMEDIATION OF HISTORICAL CULVERT AND CESS PIT

During archaeology investigations an approximately 1m diameter culvert was discovered.



Works to allow for the remediation and reuse of the culvert were carried out by **COGNITION** as follows:

- Installation of twin wall pipe as per client instruction
- Installation of high visibility terram layer
- Installation of 300mm thick sand later.

Photos of this installation are detailed in Appendix 6.

Works were also carried out by **COGNITION** in the decommissioning of a historical cess pit encountered. The position of the encountered cess pit was directly adjacent to the site boundary at the north. The position is detailed on Drawing 0390_EN009_BH_A (Appendix 1). As instructed the cess pit was saw-cut and broken down to below pile cap level (approx. 600mm). The cess pit was then backfilled with cement stabilised material, placed in accordance with the earthworks specification.

The cess pit portion directly on the boundary was not broken out, so that the fence directly above the feature was not compromised and no significant void would be left without any retaining feature on the boundary.

3.7 GEOTEXTILE

A geotextile marker layer with a 100mm overlap between sheets was placed in the following areas:

- In accordance with the variation in scope from the EHO; supply and install orange geotextile in private gardens 600mm below finished level (**COGNITION** Final level). The geotextile was to have visual warning marker for the potential for asbestos. Both the orange geotextile and warning tape to site above the 50mm concrete blinding. Photographs in Appendix 6 show placement of warning tape and geotextile marker layer. The marker layer will be inspected

again prior to placement of clean imported topsoil in garden areas and will be repaired or replaced if required. In addition, further warning tape will be placed above the geotextile layer (currently beneath the layer to hold it in place) prior to placement of garden soils.

- Supply and install orange geotextile in archaeological preservation areas. 300mm imported protective clean sand layer to be placed over geotextile over archaeological preservation area. The extent of archaeological areas are defined on Drawing 390_EN003_BH_A (Appendix 1).
- Geotextile was also placed on all pile mat layers beneath the wearing course in accordance with best practice.

The marker layer was weighted down with clean aggregate to avoid movement of the geotextile once placed.

3.8 BACKFILL

Material excavated, processed (if required) and re-used on-site were as follows:

1. Screened made ground and stockpiled materials – Class 1 and 2 (general granular and cohesive fill)
2. Cement stabilised made ground – Class 9 (stabilised materials)

Surfaces of excavations and areas were confirmed to be free from significant volumes of organic material, rubbish and standing water by the site manager and supervisor. Prior to backfill the area was proof rolled with a minimum of 1 pass with a padfoot or smooth drum roller (subject to material classification) to identify soft spots and/or loose soils. No soft spots were identified.

Soils were placed by mechanical excavator in layers to depths specified in Table 6/4 of the Highways Works Series 600. Processed soil selected for re-use was backfilled in accordance with a method-related specification and where required was modified using ordinary Portland cement (OPC) as the binder to control moisture. COGNITION compacted materials on site using a 13t smooth drum vibratory roller, which remained on site for the duration of the works. The number of passes for method compaction was carried out in accordance with Table 6/4 in accordance with the Highways Works Series 600.

Where suitable access for roller/compaction plant was not practicable material was dynamically compacted using mechanical means.



Central archaeology 03/09/2020



Central archaeology 03/09/2020



Central archaeology 03/09/2020



Central archaeology 03/09/2020



South archaeology 03/09/2020



South archaeology 03/09/2020



Central archaeology /culvert 03/09/2020



Central archaeology 03/09/2020



Central archaeology 03/09/2020



North archaeology, installation of terram and 300mm sand 21/09/2020



North archaeology, installation of terram and 300mm sand 21/09/2020



South archaeology 22/10/2020



South archaeology 22/10/2020



Central archaeology, installation of terram and 300mm sand 23/09/2020



Central archaeology, installation of terram and 300mm sand 23/09/2020



Central archaeology, installation of terram and 300mm sand 23/09/2020



Central archaeology/culvert, installation of terram and 300mm sand 23/09/2020



Central archaeology/culvert, installation of terram and 300mm sand and twin wall pipe as per client specification 29/09/2020



LABORATORY TEST REPORT
PARTICLE SIZE DISTRIBUTION - BS 1377: Part 2: 1990 - WET SIEVING

Project:	Former Homebase	Project No.:	ORD-47251/2
Client:	Cognition Land & Water Springfield House 23 Oaklands Drive Weybridge , KT13 9LZ	Lab Ref No.:	SA24113-1
		Date Received:	14/09/2020
		Date Tested:	17/08/2020
		Date Reported:	24/09/2020
		Material:	Orange Silty Sand with Gravel
Originator:	Rob Oxley	Specification:	N/A

Client Sample Ref : SS10

Supplier: Site Won

Location: Stockpile SUB01

Ticket No.: N/A

Date Sampled : 14/09/2020

Sample Type: Bulk

Sampled By: Client

Sampling Cert.: Received

Sample Preparation Method: Oven dried

Specification: SHW Series 600

SIEVE ANALYSIS		
Sieve size	% Passing	Specification
125mm	100	
90mm	100	
75mm	100	
37.5mm	98	
28mm	98	
20mm	95	
14mm	93	
10mm	90	
6.3mm	89	
5.0mm	88	
3.35mm	88	
2.0mm	87	
1.18mm	87	
600micron	83	
425micron	72	
300micron	57	
150micron	8	
63micron	3.0	

The stated result only relates to the item/location tested, this report shall not be reproduced except in full.
 Particle Size Distribution tested in accordance with BS1377: Part 2: 1990

Sample preparation by Cone and Quarter

Approved Signature
James Fisher Testing Services Ltd
Richard Lawry-Johns, Laboratory Team Leader

James Fisher Testing Services Limited, a company registered in England and Wales with registration number: 01182561

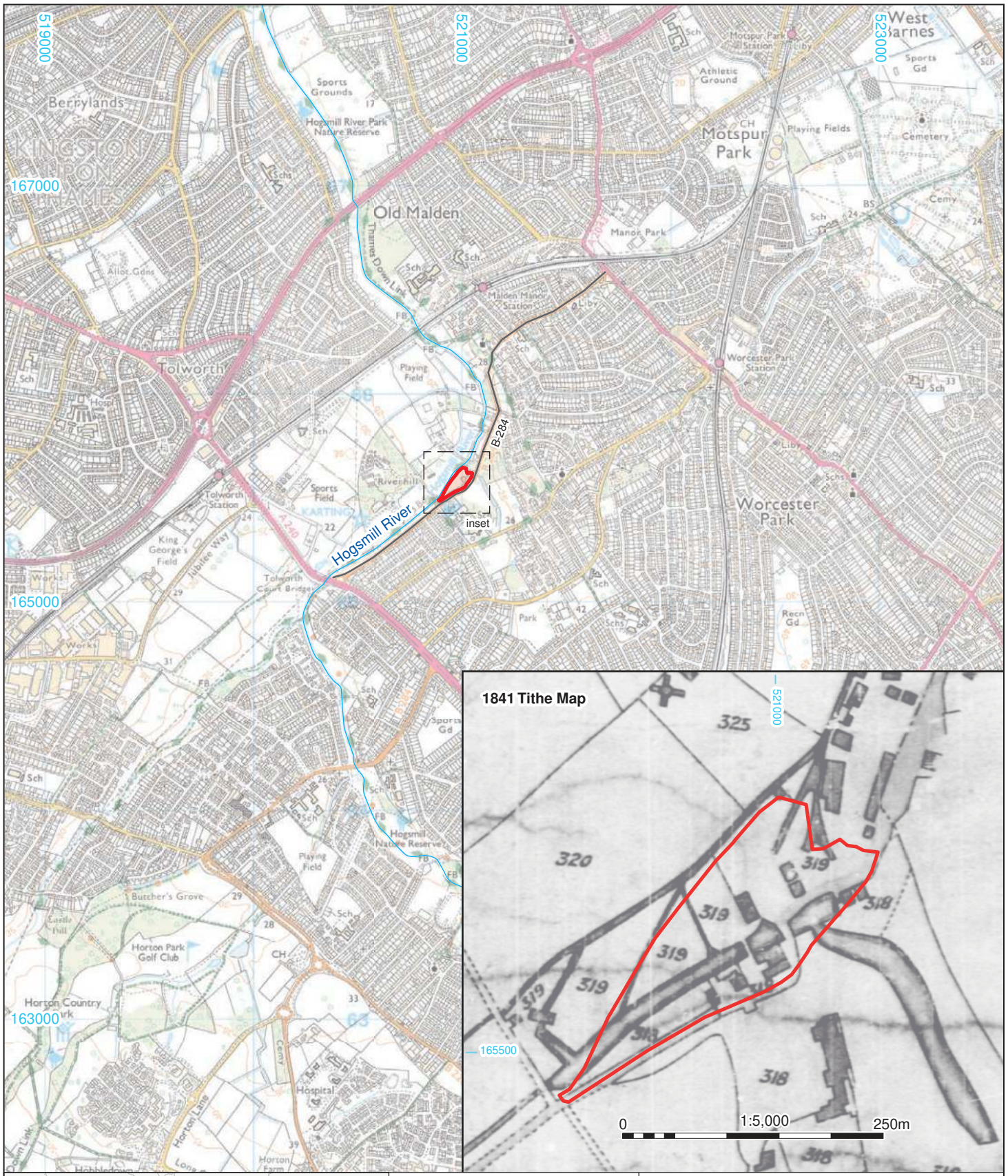
Registered office: Fisher House, PO Box 4, Barrow-in-Furness, Cumbria, LA14 1HR



APPENDIX L: OASIS REPORT FORM

PROJECT DETAILS	
Project name	Old Mill, Old Malden Lane Worcester Park, Surrey
Short description	<p>In 2020 Cotswold Archaeology (CA) undertook an archaeological watching brief in advance of the re-development of a brown field site at Old Mill, Old Malden Lane, Worcester Park, Surrey adjacent to the Hogsmill River. The project, was carried out intermittently between February and October, for Taylor Wimpey (South Thames) Ltd. It followed an archaeological trial trench evaluation undertaken by CA during November and December 2019 which had indicated the presence of the remains of buildings and structures associated with a documented gunpowder mill of which no evidence had remained on the surface. The Worcester Park Powder Mill (c.1720-1865) was depicted on 19th century maps and in illustrations by John Smeaton dated to c.1771. Evidence recorded at the site has been provisionally assigned to five phases of Late Post-medieval and modern activity. In Trench 1, two incorporating underdriven powder mills (assigned labels A & B) were found, their foundations recorded at a depth of up to 4.5m below ground level. Remains were also found of an elaborate water management culvert system, which would have powered an overshot waterwheel, that would have turned two pairs of large edge-runner millstones within each mill. In Trench 2 part of a former canal system was discovered. In Trench 4 further evidence for ancillary outbuildings and a yard were also revealed. One of these, Structure H, is comparable in plan to John Smeaton's design for a steam drying house of late 18th century date. No structures were found within Trenches 3 and 5, only a depth of deposits comprising made ground, and these trenches were not investigated further. No evidence for any earlier (for example medieval) activity at the site was identified. Shattered millstone fragments were recovered and possible be <i>in-situ</i> brick blast debris.</p> <p>The 'Worcester Park Corn Mill' was constructed at the Site in c.1874 and evidence for a corn mill at the site was confirmed. This included surviving coursing of walls, cement floors, and a re-use of the water management system associated with Powder Mill A and a 'Little Giant' turbine and penstock that can be dated to the late 19th century. Most of the later structural additions were found built upon the south barrel-vault of Powder Mill B.</p> <p>The lower elements of the two mill structures were left <i>in situ</i> following their controlled demolition down to development formation levels.</p>
Project dates	Stage 1 20 February - 24 March 2020, 10 June - 31 July 2020. Stage 2 05 - 21 October 2020. Stage 3 06.11.2020
Project type	Watching Brief
Previous work	<p>Desk-based Assessment: CgMs Heritage 2018 'Old Mill, Old Malden Lane, Worcester Lane, Worcester Park, Surrey, KT4 7QS: Archaeological Desk-Based Assessment'</p> <p>Geotechnical Survey: RSK 2018 <i>The Old Mill, Old Malden Lane, Worcester Park Geo-environmental site assessment</i> March 2018 unpublished document</p> <p>Trial trench evaluation: CA (Cotswold Archaeology) 2020a Old Mill, Old Malden Lane, Worcester Park, Surrey: Archaeological Evaluation. Report No. MK0110_1</p>
Future work	No more fieldwork but a report will be published.
PROJECT LOCATION	
Site location	Old Mill, Old Malden Lane, Worcester Park, Surrey
Study area (m ² /ha)	1.57ha

Site co-ordinates	522757 165701	
PROJECT CREATORS		
Name of organisation	Cotswold Archaeology	
Project brief originator	Cotswold Archaeology	
Project design (WSI) originator	Cotswold Archaeology	
Project Manager	Ray Kennedy	
Project Supervisor	Matt Nichol	
MONUMENT TYPE	Gunpowder Manufacturing site	
SIGNIFICANT FINDS	Remnants of Mill used to manufacture gunpowder. Gunpowder manufacturing sites are a comparatively rare class of monument with around 60 examples known nationally.	
PROJECT ARCHIVES	Intended final location of archive (museum/Accession no.)	Content
	Bourne Hall Museum, Ewell, Epsom	
Physical	Bourne Hall Museum, Ewell, Epsom	Ceramics, selected metalwork, etc.
Paper	Bourne Hall Museum, Ewell, Epsom	Context sheets, matrices etc
Digital	Bourne Hall Museum, Ewell, Epsom	Database, digital photos etc
BIBLIOGRAPHY		
Old Mill, Old Malden Lane, Worcester Park, Surrey Post-Excavation Assessment and Updated Project Design, CA Report: AN0222_1		



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PROJECT TITLE
Old Mill, Old Malden Lane,
Worcester Park, Surrey

FIGURE TITLE
Site location plan. Inset Long Ditton,
Surrey Tithe Map, 1841.

DRAWN BY EE **PROJECT NO.** AN0222 **FIGURE NO.**
CHECKED BY DJB **DATE** 12/01/2021
APPROVED BY KW **SCALE@A4** 1:25,000 / 1:5000 **1**



- ▭ Site boundary
- ▭ Excavated area
- ▭ Previous evaluation trench (CA 2019)
- ▭ Structure
- ▭ Surface
- ▭ Modern



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PROJECT TITLE
**Old Mill, Old Malden Lane,
 Worcester Park, Surrey**

FIGURE TITLE
Trench plan (post-evaluation)

DRAWN BY	EE	PROJECT NO.	AN0131	FIGURE NO.
CHECKED BY	DJB	DATE	29/01/2020	2
APPROVED BY	MH	SCALE@A3	1:750	



- Site boundary
- Excavated area
- Structure
- Surface
- Modern
- Deposit



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PROJECT TITLE
 Old Mill, Old Malden Lane,
 Worcester Park, Surrey

FIGURE TITLE
 Plan showing Trenches 1 – 5 with
 archaeological set number labels (1:400)

DRAWN BY	EE	PROJECT NO.	AN0131	FIGURE NO.
CHECKED BY	DJB	DATE	29/01/2020	3
APPROVED BY	MH	SCALE	A3 1:400	



Excavated area / evaluation trench

- (deposit/structure)
- Period 1 (Pre-dating c.1720)
Prehistoric to Late Post-Medieval
 - Period 2 (c.1720 - 1874)
Late Post-Medieval / Modern
 - Period 3 (c.1874 - 1891)
Modern
 - Period 5 (c.1935 to present)
Modern

- Other Period 2 structures
- Natural London Clay
- Explosion debris (1542)



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PROJECT TITLE
 Old Mill, Old Malden Lane,
 Worcester Park, Surrey

FIGURE TITLE
**Trench 1: Powder Mills A & B
 (phased plan) (1:150)**

DRAWN BY	EE	PROJECT NO.	AN0131	FIGURE NO.
CHECKED BY	DJB	DATE	29/01/2020	4
APPROVED BY	MH	SCALE@A3	1:150	



Powder Mill A & B and Furnace 1128 (drone view, towards north-east)



Powder Mill A & B and Furnace 1128 (oblique view south-west)



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PROJECT TITLE

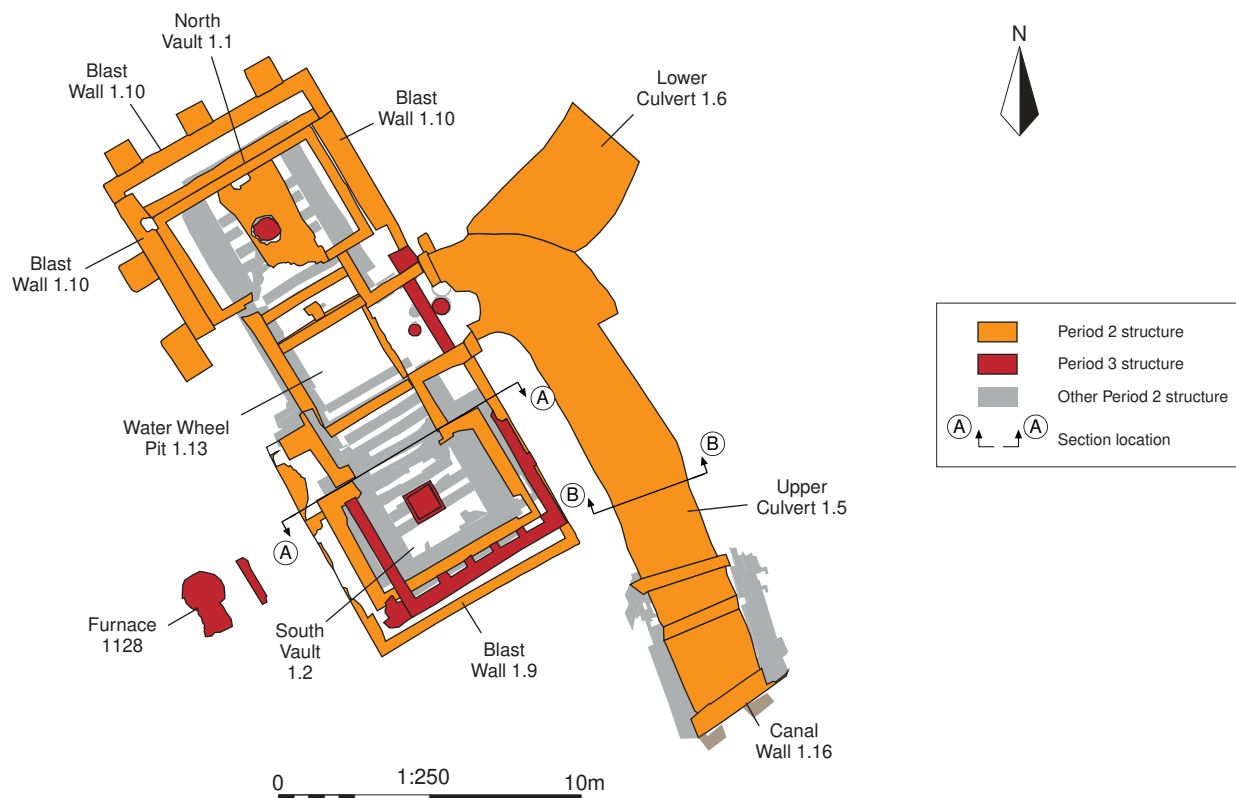
Old Mill, Old Malden Lane,
Worcester Park, Surrey

FIGURE TITLE

**Trench 1: Powder Mills A & B and
Furnace 1128 (view towards north-west
and south-west)**

DRAWN BY	EE	PROJECT NO.	AN0222	FIGURE NO.
CHECKED BY	DJB	DATE	15/07/2021	
APPROVED BY	KW	SCALE@A4	NA	5

**POWDER
MILL A**



Powder Mill A (drone view north-east)



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PROJECT TITLE

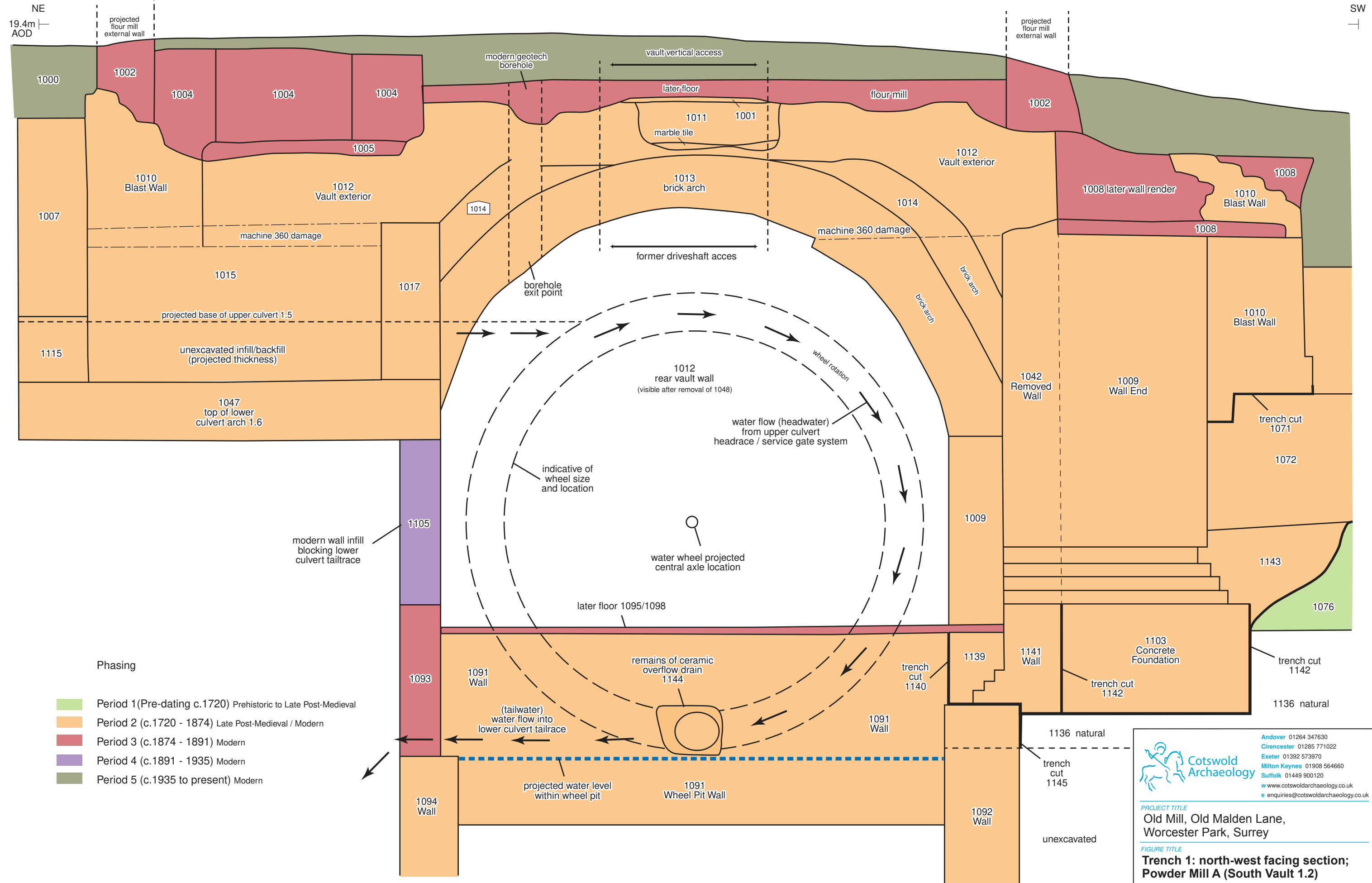
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FIGURE TITLE

**Powder Mill A: phased plan (1:250) and
 aerial photograph (view north-east)
 showing section locations**

DRAWN BY	EE	PROJECT NO.	AN0222	FIGURE NO.
CHECKED BY	DJB	DATE	17/07/2021	6
APPROVED BY	KW	SCALE@A4	1:250	

Section AA

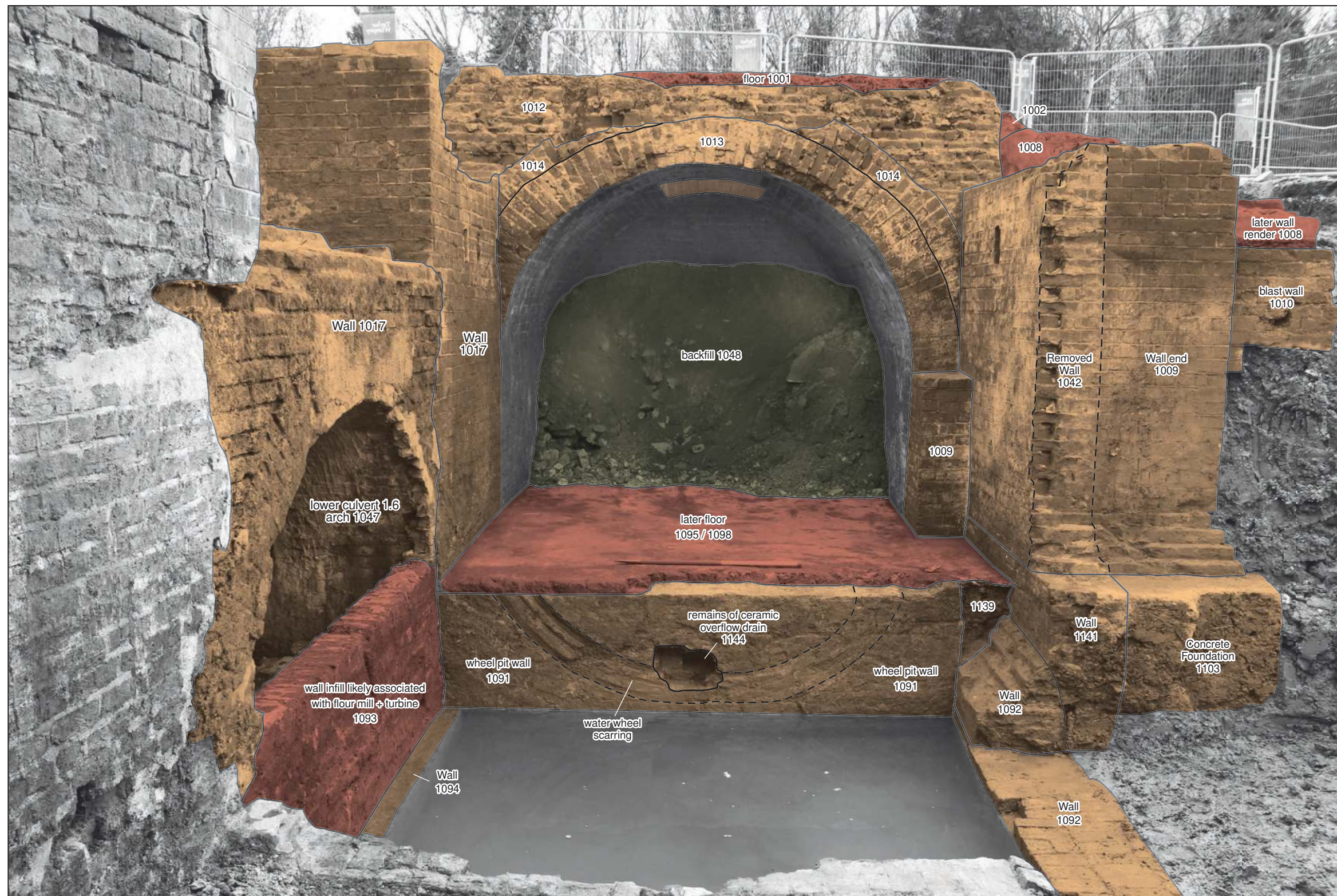


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PROJECT TITLE
 Old Mill, Old Malden Lane,
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FIGURE TITLE
**Trench 1: north-west facing section;
 Powder Mill A (South Vault 1.2)**

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CHECKED BY DJB **DATE** 15/07/2021 **7**
APPROVED BY KW **SCALE@A3** 1:20



- Period 2 (c.1720 - 1874) Late Post-Medieval / Modern
- Period 3 (c.1874 - 1891) Modern
- Period 5 (c.1935 to present) Modern


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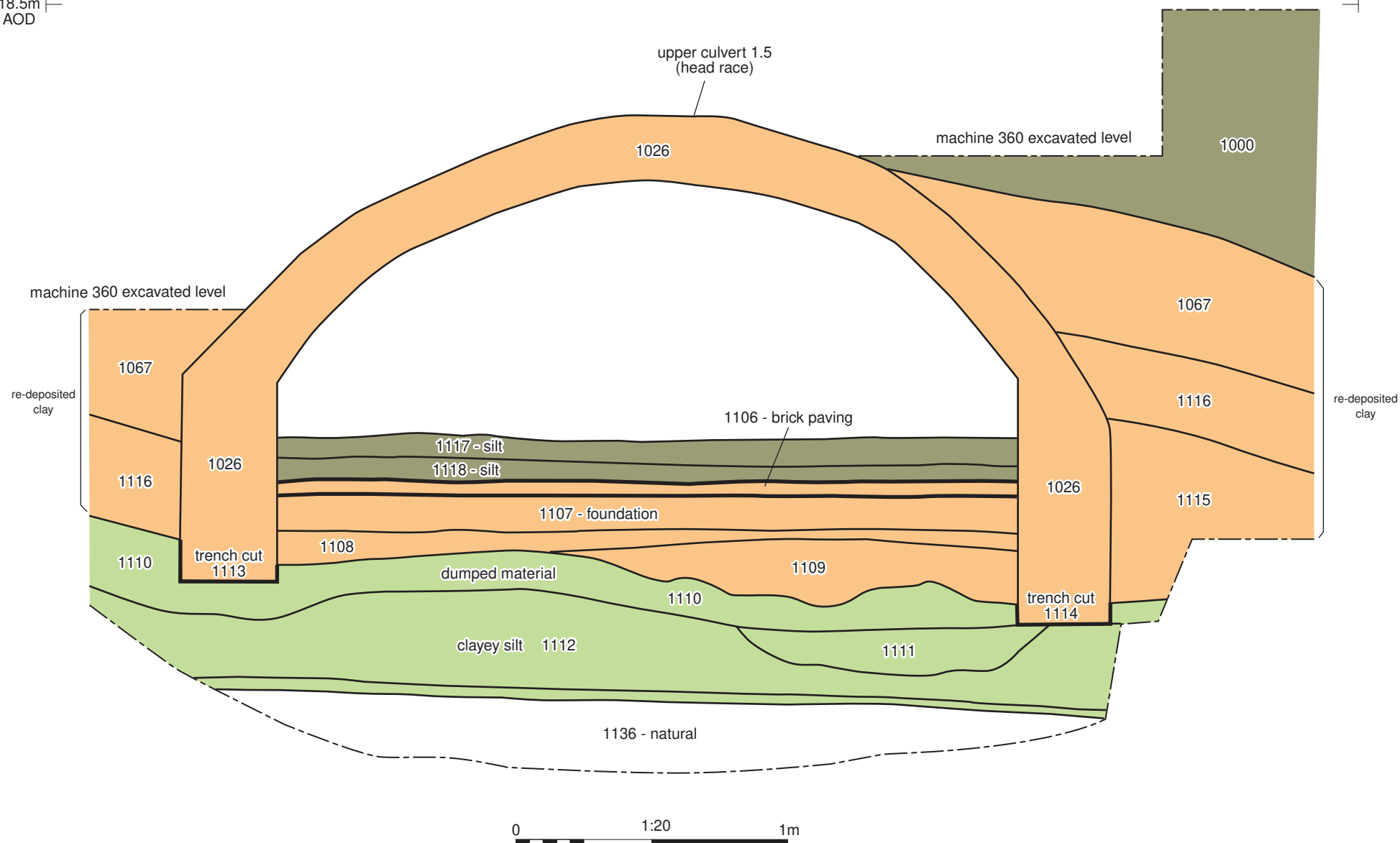
FIGURE TITLE
**Trench 1: north-west facing section;
 Powder Mill A (South Vault 1.2)**

<small>DRAWN BY</small> EE	<small>PROJECT NO.</small> AN0222	<small>FIGURE NO.</small>
<small>CHECKED BY</small> DJB	<small>DATE</small> 12/01/2021	8
<small>APPROVED BY</small> KW	<small>SCALE</small> @A3	<small>NA</small>

Section BB

SW
18.5m
AOD

NE



Powder Mill A (Upper Culvert 1.5), looking north-west (1m scale)

- Period 1 (Pre-dating c.1720) Prehistoric to Late Post-Medieval
- Period 2 (c.1720 - 1874) Late Post-Medieval / Modern
- Period 5 (c.1935 to present) Modern

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FIGURE TITLE
Trench 1: Powder Mill A (Upper Culvert 1.5), Section and Photograph

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 CHECKED BY DJB DATE 12/01/2021
 APPROVED BY KW SCALE@A3 1:20 **9**

**POWDER
MILL B**



Powder Mill B (view north-east)



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PROJECT TITLE

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FIGURE TITLE

**Trench 1 Powder Mill B phased plan
 and drone photograph, showing
 section locations**

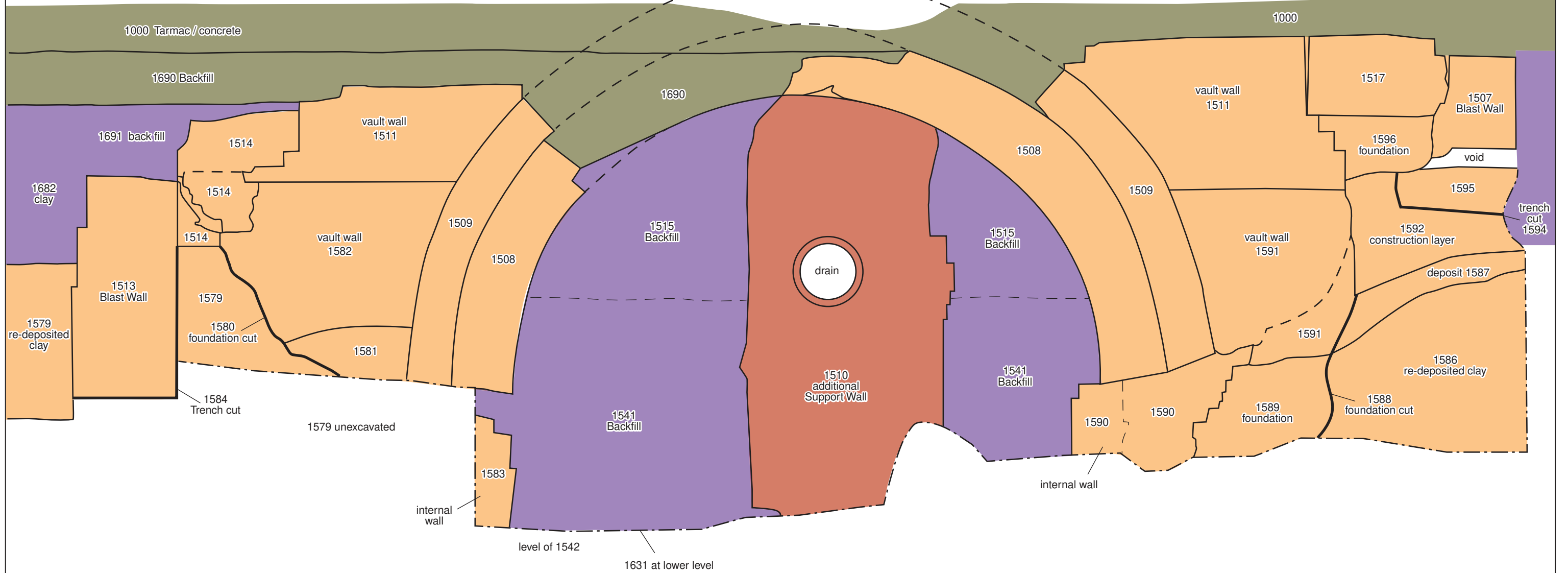
DRAWN BY	EE	PROJECT NO.	AN0222	FIGURE NO.
CHECKED BY	DJB	DATE	15/07/2021	10
APPROVED BY	KW	SCALE@A4	1:250	

Section CC

SW

20.0m
AOD

NE



- Period 2 (c.1720 - 1874) Late Post-Medieval / Modern
- Period 3 (c.1874 - 1891) Modern
- Period 4 (c.1891 - 1935) Modern
- Period 5 (c.1935 to present) Modern



Powder Mill B, vaults 1508 and 1509, looking north (1m scale)

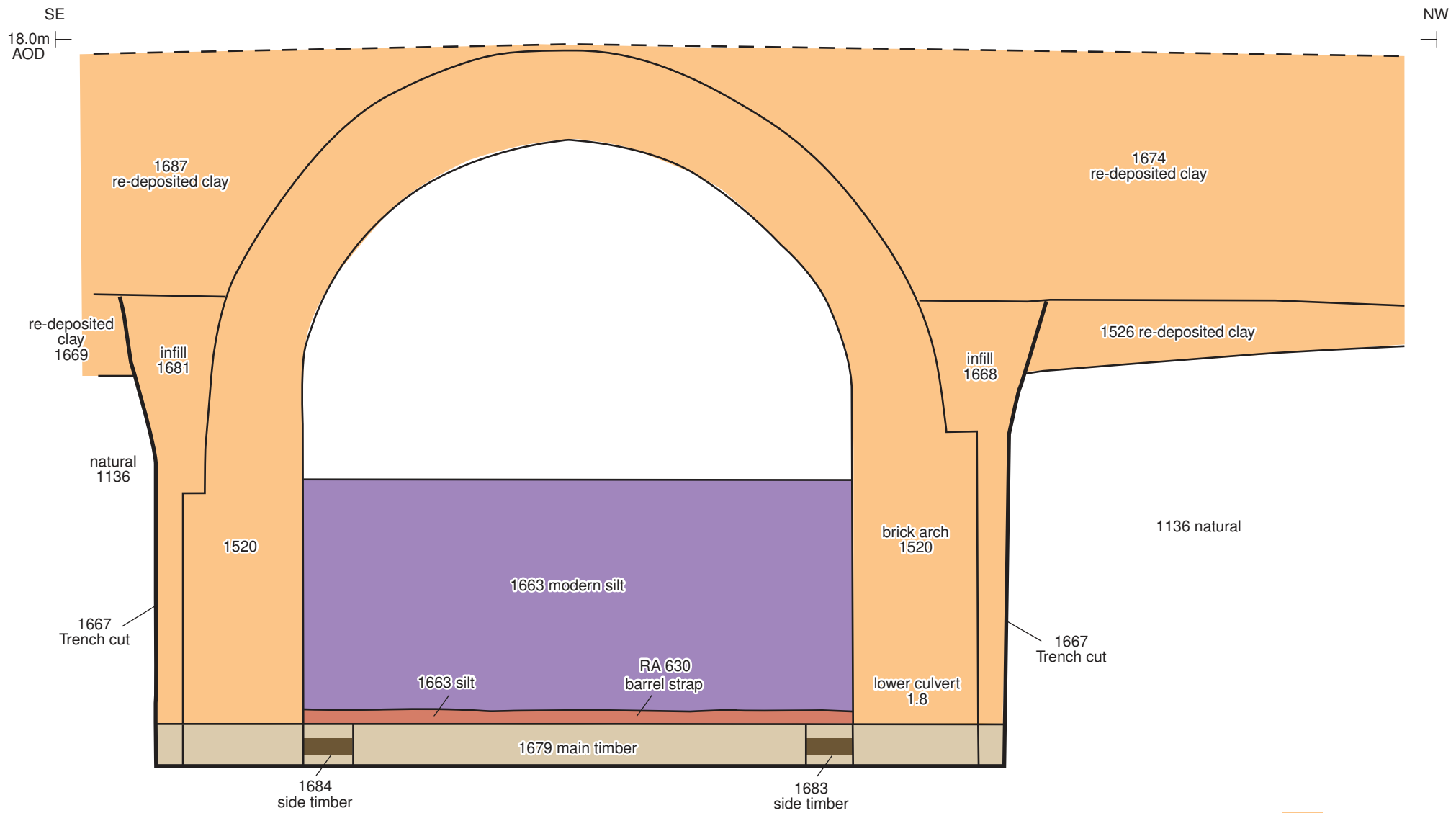
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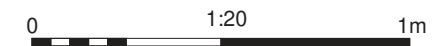
FIGURE TITLE
**Trench 1: north-east facing section:
 Powder Mill B and vaults 1508 and
 1509**

DRAWN BY	EE	PROJECT NO.	AN0222	FIGURE NO.
CHECKED BY	DJB	DATE	12/01/2021	11
APPROVED BY	KW	SCALE	@A3 1:20	

Section DD



- Period 2 (c.1720 - 1874) Late Post-Medieval / Modern
- Period 3 (c.1874 - 1891) Modern
- Period 4 (c.1891 - 1935) Modern
- main timber
- tenons of side timbers



Culvert 1520, looking north (1m scale)



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FIGURE TITLE
Trench 1: culvert 1520 south-east facing section; Powder Mill B (Lower Culvert 1.8)

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Trench 4: Cobbled Surface D (Period 2), looking south-east (2 x 1m scale)



General view of millstones RA512 & RA513 (Period 2), Powder Mill B, looking (looking north-west)



View of Powder Mill B with millstones RA512 & RA513 and explosion debris 1542 removed, looking north-east (1m scale)



View north-west towards South Vault 1.2 (Powder Mill A), (Period 2). Blast Wall 1.9 (Period 2) and later Corn Mill remains (Period 3) have been removed


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FIGURE TITLE
Photographs

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Drone photograph of eastern half of the site with the City of London skyline visible on the horizon



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FIGURE TITLE

Drone photograph

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10cms



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FIGURE TITLE

Pottery from the site

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APPROVED BY	KW	SCALE@A4	NA	15

dep. 1048



0 1:1 50mm

RA561



0 1:1 50mm



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FIGURE TITLE
Metal objects

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