



Elsecar Beam Engine Boiler House: Stage 2 Archaeological Investigations

ArcHeritage 2020

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ArcHeritage Campo House, 54 Campo Lane, Sheffield, S1 2EG

Phone: +44 (0)114 2728884 Fax: +44 (0)114 3279793
archeritage@yorkat.co.uk www.archeritage.co.uk



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NON-TECHNICAL SUMMARY

A second stage of archaeological investigations was undertaken at the site of a boiler house associated with the Scheduled Newcomen-type atmospheric beam engine at Elsecar Heritage Centre, South Yorkshire (SK 38700 99972, NHLE 1004790). The investigations followed on from an exploratory test-pit evaluation in May 2019, and comprised the excavations of three trenches in July 2019. These were located to investigate the ends of the two boiler cavities and the adjacent stoking cellar. The investigations were undertaken to inform proposed conservation works at the site, in line with a project design produced by Great Place Wentworth and Elsecar, and Elsecar Heritage Action Zone, and with Scheduled Monument Consent from Historic England. The works formed part of a community art and archaeology project designed to engage members of the local community and school children with the remains at the engine house and the wider story of Elsecar. A total of 34 volunteers and 45 school children participated in the archaeological excavation and associated workshops, and the dig had over 350 visitors over 12 days.

The results of the investigations suggest that the square-plan boiler house dates to the mid-19th century, its final layout perhaps being an extension to a smaller structure shown in 1859. This in turn was a replacement of a longer, narrower building, possibly housing a wagon boiler, for which no evidence was found during the excavation. The square-plan boiler house housed two fixed, cylindrical, externally-fired boilers set into brick-built cavities within the ground, supported on the brickwork and at the top by iron brackets. The fire grates and ash pits were accessed from a stoking cellar to the west, which was open to the main boiler house and probably accessed via a staircase at the northwest corner of the engine house. A coal chute in the western wall provided fuel for the fires directly into the cellar.

Due to the confines of the trenches and the presence of contaminated material in the backfills, it was not possible to reach the base of the structures in any of the trenches. However, the investigations did provide useful evidence for the nature of construction of the boiler house, the dates of some elements of the structure, and the likely nature of the boilers. This supports the very limited documentary evidence available and adds to the interpretation of the boiler house remains, an important adjunct to the Scheduled beam engine. Documentary sources indicate that the boilers were removed in the late 1930s, and the archaeological evidence suggests that they were cut into pieces *in situ* before removal as scrap, resulting in very limited damage to the surface and below-ground structure of the boiler house.

1 INTRODUCTION

This report presents the results of the second stage of archaeological investigations at the site of a boiler house associated with the Elsecar Newcomen-type atmospheric beam engine at Elsecar Heritage Centre, South Yorkshire. The investigations comprised the excavation of three evaluation trenches to investigate targeted areas of the boiler house, based on the results of previous trial pits (ArcHeritage 2019) and geophysical survey (Linford, Linford and Payne 2017). The investigations were undertaken in association with proposed conservation works at the site. The atmospheric beam engine is a Scheduled Monument (NHLE 1004790), and the works were undertaken in line with a project design (Roberts & Clement 2019) and Scheduled Monument Consent. ArcHeritage were commissioned by Great Place Wentworth and Elsecar, and Elsecar Heritage Action Zone to undertake the works.

The investigations formed part of a community art and archaeology project designed to engage members of the local community and school children with the history of the engine house. A total of 34 volunteers participated in the archaeological excavation (183 participant hours), as well as 45 school children who took part in the excavation, geophysical survey and photogrammetry. Training workshops on photogrammetry and finds drawing were also provided as part of the project. Over 350 visitors were recorded during the two weeks of the excavation.

2 SITE LOCATION, GEOLOGY & TOPOGRAPHY

The site, centred on NGR SK 38700 99972, forms part of Elsecar Heritage Centre, a visitor attraction under the care of Barnsley Museums. It is located at the southeast side of Elsecar, c.6 miles south of Barnsley, and is bounded to the west by Distillery Side (Figure 1). The area of investigation is approximately 40m square, and comprises the site of a former boiler house adjacent to the north side of the late 18th-century Newcomen-type atmospheric beam engine (Figure 2). The engine was installed to pump water out of the Elsecar New Colliery mine workings, and the compound containing the engine and boiler house site also encompasses two mine shafts and a brick-built electrical pumping station that replaced the beam engine in the 1920s.

The boiler house was levelled in the mid-20th century, but brickwork and stone blocks visible on the ground surface indicated the position of former walls and floor surfaces. Much of this area was covered with deteriorating concrete prior to the archaeological test pitting undertaken in May 2019. A small brick-built shed stands on the concrete at the northeast corner of the site.

The site is generally level, and is bordered to the north, east and west by brick-built boundary walls, parts of which are likely to have formed the outer walls of the boiler house. The underlying geology is Pennine Middle Coal Measures mudstone, sandstone and siltstone.

3 AIMS & METHODOLOGY

3.1 Aims

The core aims for the stage 2 archaeological investigations were to:

- Excavate targeted areas of the former boiler house as a community excavation;
- Establish the depth of the former floor surfaces/foundation levels for the boilers and stoking area;
- Establish whether any buried features or deposits remain relating to the boilers and their operation, and ensure these were fully recorded;
- Establish whether any evidence survives for earlier boiler configurations or structures (including changes to the boilers, or boiler house, over time);
- Enable local people, including visitors, families and young people (including school groups) to find out about the site and respond to it in creative and imaginative ways, including answering some of the research questions that emerged through community consultation; and to
- Inform the approach for managing the site in future (including interpretation and protection from weathering and erosion).

Some of the most popular research questions identified through community consultation, that could be addressed through the excavation, were:

- What materials were used to make the boiler house?
- What did the boilers look like?
- When and why were the boilers removed?
- How did the boilers connect to the engine?
- How did they get water into the boilers?

Other research questions that would require further documentary research include:

- Who designed the boilers, and when?
- Who were the workers?
- Who operated the pumping engine (and how many people did it need)?
- What did people think about the engine when it was first built?
- Where are the boilers now?

3.2 Methodology

The methodology is summarised from the Project Design (Roberts & Clement 2019). The full details are contained in Appendix 4.

3.2.1 Initial recording

The concrete across the site had been removed prior to the test pitting exercise in May 2019. Before commencing excavation of the trial trenches, plans were made of cut or chamfered bricks lying at the north, west and south edges of the boiler cavities. These were identified during the test pitting, and were interpreted as bricks specially cut and laid to surround the curved side of the boilers. As some were loose and considered to be at risk of loss during the works, they were planned to scale (see Figure 10), numbered with chalk to correspond with the

plans and lifted for storage at Elsecar Heritage Centre. These will be re-laid during conservation works.

Digital photogrammetric recording was also undertaken of the top of the wall between the boilers (feature 106), to provide a record of the impressions of bricks in the mortar surfacing, where the upper layer of bricks had been lost. This was undertaken using a digital camera with a minimum of 10MP resolution, with the photographs subsequently processed using Agisoft Metashape software to produce scaled, rectified 3D images.

3.2.2 Trial trench excavation

Three trenches were excavated, with agreement from Historic England. The rationale for the location of each trench is stated in Table 1, and the trench locations are shown on Figure 2. All excavation was undertaken by hand, using trowels, mattocks, and shovels. The excavation was undertaken by volunteers, assisted and supervised by professional archaeologists.

Table 1: Trench rationale

Trench ID	Dimensions	Rationale
1	3.8 x 1.8m	To investigate the stoking cellar at the west side of the boiler house, and any features within the walls relating to boiler operation. [Note: originally 2 x 1.8m, extended after consultation with Historic England.]
2	2.25 x 2.1m	To investigate the western end of the northern boiler cavity, including the construction of the side walls and any features within the western end wall.
3	2 x 2m	To investigate the eastern end of the southern boiler cavity, including any features associated with flues leading to the chimney.

Given the expected depth of deposits within the boiler house suggested by the earlier test pitting and probing, the trenches were stepped down as the work progressed to prevent the risk of collapse of the sides and to provide easier access. During the excavation, Trench 1 was extended further to the north than originally planned, as the original working area was insufficient to reach the desired depth. This was discussed and agreed with Historic England advisors prior to the extension.

The trenches and all features were recorded using a mixture of hand drawing and digital photogrammetric methods. Plans were drawn at a scale of 1:20 and sections at 1:10. Features were assigned unique context numbers and described on pro forma record sheets. As many of the structures had been assigned context numbers during the test pit evaluation (ArcHeritage 2019), the trial trench evaluation used the context numbers originally assigned and continued the numbering system, therefore providing a single coherent paper archive for both stages of the project. Record photographs were taken of all features and overviews of the trenches, using 35mm black and white film, supplemented with digital photography.

Finds were collected, sorted and processed on site. All of the finds recovered came from backfill deposits within the boiler house structure. No deposits suitable for soil sampling were encountered during the evaluation.

Asbestos was known to be present on site in low levels, predominantly chrysotile cement products. Following consultation from specialist asbestos advisors and Health and Safety staff, safe working practices and reporting procedures were established. This included the wearing of masks and gloves whilst excavating in the vicinity of known asbestos, the bagging and reporting of asbestos products by members of staff with asbestos awareness training, the storage of such double-bagged and labelled material in a designated area for removal and disposal by specialist asbestos advisors. Where unexpected asbestos was encountered, work ceased and the specialist advisors were consulted. Work only recommenced when the area was pronounced to be safe. School children were not allowed to work within areas where asbestos was known to be present, and volunteers were not required to work in such areas.

4 ARCHAEOLOGICAL & HISTORICAL BACKGROUND

This summary of the archaeological background draws on the project brief (Clement and Roberts 2019) and a desk-based assessment of the Newcomen Engine site undertaken in 2011 (May and Sheppard 2011).

The Newcomen-type beam engine was constructed in association with the development of Elsecar New Colliery. This was the first deep colliery in Elsecar, sunk to the Barnsley Seam at a depth of approximately 120 feet below ground, substantially deeper than previous coal extraction in the area and deeper than the drainage levels (soughs) that removed water from the earlier workings. The colliery was developed by the landowner, Earl Fitzwilliam, and formed part of a planned interconnected industrial development within the village, including the adjacent ironworks and New Yard workshops that later became the National Coal Board Workshops (now Elsecar Heritage Centre), the construction of a dedicated branch of the Dearne and Dove canal, and purpose-built workers' housing.

The beam engine was constructed to pump water from the new mine workings. Documentary sources indicate that it was first used in 1795 and it continued to be used for the next 128 years, working up to 12 hours a day. At its peak, it could raise 600 gallons of water per minute. In 1801, the original 42 inch bore cylinder was replaced with a 48 inch version, and in 1836 a cast iron beam supplanted the earlier wooden one.

Though the engine has been subject to detailed research and restoration in recent years, the nature of the boiler provision is poorly understood. There are no recorded details of its original boiler, though the Wentworth Muniments have a receipt for some of the original engine parts that includes a 'steam pan, large' (Clayton 1964, 100). Early Newcomen engines had 'haystack' boilers, with a circular plan. These were usually positioned below the cylinder of the engine in early examples, but by the later 18th century, when the Elsecar engine was built, external placement of the boilers was more common (Bick 1999). Long 'wagon' boilers were also being used by this date at some sites.

The earliest plan of the Elsecar engine dates to 1849 and shows a long, narrow building to the north of the engine house, which could have housed a wagon-type boiler. This configuration had changed by 1859, when a shorter, wider boiler house was depicted on the plan of the current investigation area (Figure 3). Georeferencing of the historic maps suggests that the boiler house depicted in 1859 was shorter north-south than the building shown on maps from 1867 to 1930 (Figure 3). It is possible this is an issue with georeferencing accuracy and

differences in surveying accuracy between the different historic maps, but some other details depicted on the 1859 also vary from the later maps, including a structure adjoining the east side of the engine house. This would suggest that the boiler house was extended northwards between 1859 and 1892, possibly by 1867 (the latter map being difficult to georeference), and this may have been associated with another change to the boiler provision. The 1859 map suggests that the chimney from the earlier boiler house was retained and reused in the later building. This was of stone construction similar to, and possibly contemporary with the engine house (Plate 1). A stump of the chimney base still survives on site.

A description of the engine in 1918 stated that:

'the original boilers were of the haystack or beehive pattern. The two present boilers are 22 feet by 7 feet. No tubes or flues are fitted, and they are fired externally. The working pressure is from 1½ to 2½ pounds per square inch' (Newbould 1918, 183).

The source of Newbould's assertion that haystack ('haycock') boilers were originally used is uncertain, and no explicit references to these have been found in recent documentary research. A section drawing also dated 1918, though of uncertain derivation, shows the layout of the boilers (Figure 4), each aligned east-west and set into cavities that extend below the current ground surface. The section and Newbould's description of the boilers as externally fired, with no tubes or flues fitted, suggests that these were not the more efficient Lancashire boilers, which contain internal furnaces set into tubes running the length of the boiler tanks. A printed question in Newbould's article compared the Elsecar boilers to the Lancashire boilers used at the engine at Westfield Colliery, Rawmarsh, which might in part account for the greater coal consumption at Elsecar (Newbould 1918, 189). The section drawing indicates fire boxes set into the cavities below the Elsecar boilers. The section drawing shows an M-shaped roof over the boiler house with two pitches aligned east-west, which corresponds with the fragment of the boiler roof visible on a photograph from 1918 (Plate 2).

The Newcomen engine at Elsecar was used until electric pumps were installed in 1923, but the engine remained on standby until 1930. It was briefly put back into use in 1928 when the electrical pumps flooded, and the engine was subsequently operated on an occasional basis for demonstration purposes and to keep it in working order. The boilers had been removed, but steam was piped into a receiver on the site, reportedly from the Elsecar Workshops (now the Heritage Centre). Anecdotal evidence states that the engine was last steam-operated in 1953 (AC/81C). Documentary evidence suggests that the 1850s boiler house was demolished in 1938-39, with the boilers being scrapped (NCB 1297/14/3).

A watching brief carried out in 2015 during groundworks associated with the restoration of the engine recorded a number of features within and close to the area of the boiler house, demonstrating a high potential for the survival of further archaeological remains within the boiler house footprint (Wessex Archaeology 2015). A geophysical survey undertaken by Historic England in 2016 within the boiler house area showed a number of linear features interpreted as walls or structures relating to the boilers surviving below the concrete to a depth of 2.15m (Linford, Linford and Payne 2017).

Two test pits were excavated in May 2019, in association with removal of the deteriorated concrete surfacing. One was targeted in the northern boiler cavity, the other in the probable

stoking cellar to the west. Both demonstrated good survival of walls extending down into the cellar and boiler cavity, and revealed a square hole in the wall at the western end of the boiler cavity. Evidence for possible alteration of the structure was also seen in this wall, as a straight joint. The test pits were excavated to a depth of c.0.85m, and probing in the base of the test pits indicated at least 1.5m depth of fill within the boiler cavity and cellar (ArcHeritage 2019).

5 EVALUATION RESULTS

The evaluation trenching was undertaken between the 15th and 29th July 2019, to coincide with the Festival of Archaeology, as well as to allow for school visits during the last week of term and for family volunteers during the summer holiday. An overall plan of the site is presented in Figure 2, showing the trench locations and context numbers.

The boiler house structure occupies the eastern two-thirds of the site and is roughly square in plan, 8.9m east-west by 8.86m north-south and lying immediately north of the beam engine building (Plate 3). It comprises two east-west aligned rectangular cavities sunk into the ground, in which the boilers would have sat with only the upper third accessible above-ground. The cavities are 6.95m long by 2m wide at the current ground level (22½ x 6½ feet), surrounded by red-brick surfacing that would have formed a working floor within the boiler house, allowing access to the upper part of the boilers and the steam valves.

It is likely that the current east and north boundary walls of the site were outer walls of the boiler house building, the south edge probably formed by the the north wall of the engine house. The north and east boundary walls are constructed of red bricks, largely in the English Garden Wall 3:1 bond. The eastern boundary wall was at least partially, and possibly entirely rebuilt during the conservation works on the engine house in 2014 (Wessex Archaeology 2015), though it appears to have been rebuilt in line with its original bonding pattern. Observations made during the reduction of the wall recorded frogged bricks with 'James Smith & Co Skyers Spring' and 'Skiers Spring Hoyland' stamps. A metal pipe extending through the base of this wall may be associated with the boiler house, possibly a water supply. The wall has an east-west return at its southern end that butts up against the east wall of the stone-built square chimney stack for the boiler house. There is red brick patching near the base of the eastern face of the chimney on its eastern side, possibly infill of a former stoking hole used to warm the chimney before use and/or for cleaning the interior.

The northern boundary wall has three narrow brick buttresses that likely formed the support for roof beams crossing the building on a north-south alignment. The buttresses line up with infilled beam slots in the north wall of the beam engine building, as well as with gaps in the brick surfacing between the boiler cavities that may have held pad-stones for roof support columns. Three stones reused as edging for the former concrete surface at the southern end of Trench 1 (context 113) may have been the pad-stones.

To the immediate west of the main boiler house structure is a rectangular cellar, aligned north-south. This is interpreted as a stoking cellar, where the fire-boxes below the boilers would have been tended and ash raked out. The stoking cellar is 1.8m wide internally, and is visible in plan for a length of 4.94m, though the cellar clearly extended further south towards the beam engine building. The southern part of the cellar was covered by modern concrete in an area that did not form part of the evaluation site. A former stairwell is present to the immediate

north of the beam engine building, with an iron banister set into the stonework of its north wall, though the steps have been removed. It is likely that this stairwell was the access to the stoking cellar, which would give a length of at least 8.90m for the cellar. The location of the entrance to the main part of the boiler house is uncertain; there is no clear evidence for a doorway or threshold within the surfacing. There was internal access through the engine house, where a large window now infills a former opening below a wide brick arch; but it is not clear whether there was another external entrance in the eastern wall, possibly in the area of the modern brick shed at the northeast corner.

The western boundary of the site is a red-brick wall constructed in a similar style to the north and east walls, aligned northeast-southwest.

5.1 Trench 1 (stoking cellar)

Trench 1 was located at the southern end of the visible extent of the stoking cellar (Figure 5). A setting of a single row of reused stones and bricks (context 113) running at a diagonal angle along the southern edge of the trench was clearly a late feature and was removed during excavation for safety reasons. The stones were retained on site, as these may have been re-purposed pad-stones originally used as the base of columns supporting the boiler house roof (Plate 7). The trench expanded on Test Pit 2 from the earlier evaluation (ArcHeritage 2019), and was initially 2m long, covering the full 1.8m width of the cellar. The trench was later extended to 3.8m in length, to expose features in the side walls and create a series of steps allowing greater depth to be achieved at the southern end of the trench. The final depth of the southern end of the trench was 2.12m below ground level (51.25m above Ordnance Datum).

The trench exposed the east and west side walls of the cellar, the eastern wall (126) being the interface between the cellar and the boiler cavities (Plate 5). This red-brick wall is capped by a layer of dressed sandstone slabs (104), several of which have small holes in their upper surface indicative of removed railings. The slabs and railings suggest that the working floor of the boiler house was open on its western side, with railings placed to prevent workers falling into the adjacent cellar. The slabs are 0.13m thick, 0.40m wide and vary between 0.6-0.9m in length. The stones are laid on a thick layer of dark grey cement mortar forming the boundary with wall 126, with some fragments of slate laid horizontally below or within the mortar.

Eastern wall 126 was exposed to a depth of 1.35m (Figure 6). It is entirely constructed of red bricks with uniform sizes of 22 x 11 x 8cm, bonded with a black ash mortar. The bond is similar to English Garden Wall bond in the upper seven courses, but below this appears to be more mixed and largely in stretcher courses. Traces of white plaster or limewash are visible on the wall. Two stoking holes were partially revealed in the trench, one accessing each boiler cavity. These are located 0.79m below the top of the structure (including stone slab layer 104), and were topped by a thin iron lintel surmounted by a row of edge-set bricks, with bull-nose bricks at the sides of the entrances. Neither stoke hole could be fully exposed within the trench, so their full width and depth are uncertain. The southern hole was exposed to a width of 0.92m and depth of 0.75m, with the northern hole visible to a depth of 0.48m and width of 0.96m. To the rear (east) side of the southern stoking hole, the back of the boiler cavity could be seen, with stepped courses of bricks forming the upper side of the entrance on the west side (Plate 6). The presence of fibrous chrysotile asbestos in the fill precluded further excavation of the interior of the stoke hole.

Above the stoking holes are smaller square holes extending through the wall into the boiler cavities, apparently for pipes, perhaps connected to gauges or instrumentation. Two holes are set in a vertical alignment above each stoking hole. The arrangement of the pipe holes differs somewhat for each boiler setting. For the southern cavity, the pipe holes are directly above the northern end of the stoking hole, the upper hole 0.12m wide x 0.13m high, set just below the thick mortar deposit forming a bedding for stones 104. The lower pipe hole is slightly larger, 0.13 x 0.15m high, set 0.24m below the upper hole and 0.20m above the stoking hole. To the north, the pipe holes are set more centrally to the northern boiler cavity, just under 0.5m north of the southern edge of the stoke hole entrance. These pipe holes are also different in size, 0.12 x 0.21m at the top and 0.12 x 0.19m at the bottom, the latter still containing a length of 5cm (2 inch) diameter iron pipe. The northern holes are set at a similar height to the southern holes, though the extra depth means that the upper hole cuts through the mortar below 104.

The western wall of the stoking cellar is constructed in three sections, contexts 112, 127 and 128 (Figure 5). All three elements are constructed of red brick of similar dimensions (22 x 11 x 8cm). The northern end (112) was observed to a depth of 0.70m, and appears to run up to the northern boundary wall, for a length of 2.81m. The upper course is laid as headers, and extends above the modern concrete surfacing, but does not survive for the full length. Below this, the visible coursing is mostly laid as stretchers, with occasional headers included. At the southern end of this section is a single column of stretcher-laid bricks (127), separated from 112 by a thick grey cement-mortar bonding (Plate 7). The brick courses are slightly offset vertically from those of walls 112 and 127, and the feature appears to be an insertion. The bonding to wall 128 to the south is less distinct but there is a clear straight joint at their junction.

Wall 128 at the southern end is similar in style to wall 112, but the upper courses are different and again slightly offset vertically. The upper three courses are arranged (from top down) as stretcher, header, edge-on header, over three stretcher courses then rows of more intermixed stretcher and header bricks. The bricks of the lower courses have notably more eroded faces than the upper courses, with traces of limewash or plaster. The variations in coursing of the upper sections of walls 112 and 128 makes it difficult to ascertain if this was originally a single wall bisected by the insertion of 127, with rebuilding of the upper section of at least one wall, or if they are of different construction phases relating to alterations to the boiler house. The latter explanation seems more likely, wall 112 perhaps relating to the extension of the boiler house after 1859.

Wall 128 was exposed to a depth of 2.12m, with a coal chute visible at the southern edge of the elevation. This has a substantial sandstone lintel, 0.30m tall, the top of which was 0.95m from the ground surface (Plate 8). The exit to the chute is 0.50m tall, with bullnose bricks at the sides and a narrow iron sill at the base, which was at 1.77m down, 51.59m aOD. The sill was slightly raked to direct the coal into the stoking area. The chute may have been associated with a coal storage area to the west. The coal chute only partially exposed and extended to the south of the trench, so its full width was not ascertained. A cast iron plate was visible at the rear of the coal chute, and it is possible that this would have been connected to a pulley, allowing the chute to be opened from above.

The base of the cellar was not reached within the trench, due to health and safety issues including limitations of space within the trench, concerns over the stability of the north and

south sides, and the presence of chrysotile asbestos within the fill. The cellar had been backfilled with a mixed deposit including large cement rubble blocks, bricks, stone and general demolition material in a dark grey brown clay silt matrix. This deposit also contained fragments of chrysotile cement sheeting. It is uncertain whether the material within the fill relates to the demolition of the upstanding elements of the boiler house or was brought in from elsewhere. There were some differences in the infill material throughout the trench, with the cement blocks being particularly concentrated towards the southern end.

5.2 Trench 2 (northern boiler cavity)

Trench 2 expanded on Test Pit 1 from the first phase of evaluation, and investigated the western end of the northern boiler cavity. It spanned the cavity at a width of 2.08m. The full length of the trench was 2.20m, with stepping down from the southeast corner to narrower sondages 0.74m wide at the western side and 0.5m wide at the northern side (Figure 5).

The western end of the cavity is bounded by wall 123, which forms part of the same wall as structure 126 that faces into the stoking cellar, though the two are different in character and coursing (Plate 9). The wall is topped by a surface of a single layer of red bricks laid on their narrow edges (105), that runs north-south parallel with and immediately east of stone slab layer 104. Surface 105 forms part of the working floor area within the boiler house, which would have allowed access to the top of the boilers for maintenance purposes. The surface continues along the northern (107) and southern (106) sides of the boiler cavity, overlying walls 124 and 129 respectively. As with stone slabs 103, the brick surfacing is separated from the underlying walls by a thick mortar layer overlying or incorporating horizontally-laid slate pieces, perhaps inserted to form a rudimentary damp- or heat-proof course. Several bricks were removed from the eastern edge of surface 105 and northern edge of 107 after being planned and labelled, to prevent them being accidentally dislodged during the excavation (Figure 10).

Wall 123 was exposed to a depth of 1.40m (15 courses), and a width of 2.20m within the boiler cavity (Figure 7). It is constructed of a mixture of red bricks and firebricks, the latter predominantly in the lower courses. The upper nine courses are laid alternately as all stretchers and all headers, with the courses below being a more irregular mixed bond. Most of the fifth to seventh courses are built of firebricks (20-23 x 7 x 11cm), and further down these are present more intermittently. The two pipe holes in this wall, also seen in wall 126, proved to be central to the cavity. The face of the wall is generally somewhat uneven, with some courses projecting slightly; this may indicate that as the wall was to be concealed by the boiler, less care was taken with aligning the bricks than is evident on the walls facing into the stoking cellar. Two header bricks to the north of the lower pipe hole have vertical grooves incised in their faces; it is unclear if this relates to fixtures within the boiler cavity or indicates the reuse of bricks.

A wide gap is present in wall 123 below the eleventh course down (1.16m from the top of surface 105), with the bricks behind being stepped back towards the entrance to the stoking hole in the face of wall 126 (Plate 10). No iron lintel is present on the interior of the cavity, and there is no evidence of any means of support for the top of the stokehole. Many of the bricks overlying this gap are loose, and some may have fallen out of the wall (from the 12th row), as there were a number of firebricks in the backfill immediately adjacent to the wall at this point. A tree root running through the stoke hole might have contributed to this damage. It is possible that the top of the stoking hole was originally at 1.33m down, substantially lower than the lintel

within the stoking cellar (0.79m down). One of the firebricks from the fill was stamped 'SMITH'; another had thick section of corroded iron attached to its surface, which could have been the remnants of a removed lintel. Another similarly sized piece of cast iron plate found in the fill was also potentially part of a lintel (see Appendix 3.4, plate 9). The form of the stoke hole within the boiler cavity corresponds with that seen through the entrance of the stoke hole in the southern cavity. Chrysotile material within the fill of the stoke hole prevented further excavation, so its base and further details of its construction could not be determined. It is possible that an iron lintel may have been removed for scrap during the decommissioning of the boiler house, but this is uncertain.

The northern and southern side walls of the cavity (124 and 129) are similar to each other in construction style, with the upper eleven courses being alternate header and stretcher layers, and a more irregular bond of mixed headers and stretchers further down (Figure 6). The topmost course in each wall steps out into the cavity with the underside chamfered; these appear to have been constructed around the curving side of the boiler, to help prevent heat loss. A similar feature was visible in the brick surfacing above on the northern side (107), where the chamfered bricks were temporarily removed after planning to avoid damage or loss during excavation. These chamfered bricks are missing from surface 106, perhaps lost during removal of the boilers. The two courses below the chamfered bricks in walls 124 and 129 are also stepped out, but to a lesser degree than the upper course, and these are not chamfered.

At the top of both walls 124 and 129 are iron fixtures, each set into the top course at 1.02m to the east of the west end wall of the cavity (Plate 11). These are thick iron brackets, 20cm across, 34cm long and 5cm thick, set vertically and extending slightly above the top of the wall to the top of the thick mortar layer underlying the brick surface. The faces of the brackets are slightly curved and laid against the face of the walls, with a central strut extending back into the wall to secure them in place. The bracket on wall 129 has four bolt fittings in its face, while that on wall 124 has a piece of iron sheet still bolted on, cut off to each side. It is assumed that these brackets were used to secure the boiler within the cavity, with the fragment of iron sheeting presumably being part of the boiler, left *in situ* during its removal. This, and the survival of the chamfered bricks on the north side of the cavity, suggest that the boiler was cut into pieces within the cavity and removed in sections, presumably for scrap. The brickwork around the brackets is irregular and a length of iron bar is below that in wall 129, suggesting that these were inserted at some point, possibly in association with replacement of the boiler. A further bracket is visible along wall 129 to the east of the trench (see Figure 2).

There are notable differences in the construction at the base of walls 124 and 129. On the south side, wall 129 is stepped out towards the base of the trench, from the 13th to the 16th courses down (1.26-1.52m below surface 106), with the 17th to 19th courses being vertical from the stepped out edge (Plate 12). These courses included a mixture of firebricks and red brick, with the stepped courses arranged in a stretcher bond but the lowest courses being a mixture of stretchers and headers. The brick surfaces in the steps are eroded and heat affected, and it is assumed that this structure was intended to support the curved base of the boiler. Many bricks in the four courses above the steps are also badly eroded, from 0.92m below the ground level.

Wall 124 on the north side does not have the integral stepped out structure at the base, but a separate firebrick structure (125) is located at a similar height, butting against the inner face of

the wall (Plate 11). This is slightly stepped and possibly partly chamfered, though extreme heat-erosion of the bricks makes it difficult to ascertain its original shape. It is built predominantly of firebricks and occasional red bricks, in a random bond. A sandy mortar deposit is present between and occasionally over the bricks. Structure 125 does not extend up to wall 123, its western end being 0.5m to the east. The west end was also stepped, but it was unclear whether this was due to severe heat damage or a deliberate feature. It is again assumed that structure 125 was intended to support the underside of the boiler. The difference between the two sides may relate to alterations to the boiler cavity associated with replacing the boilers and repairs to the structure. The lower courses of 124 have severe erosion to the faces of the bricks, from a depth of 0.77m below the ground surface, particularly in the area closer to the stoking hole.

Further evidence for alterations to the boiler house are visible in wall 124, with the lower courses being tied into wall 123 at the west, but the upper six courses butting against 123. The seventh course down steps out slightly from the courses above. This suggests that at least part of the upper section of the wall has been rebuilt, possibly in association with replacement of the boiler. Southern wall 129 is tied into 123 all the way down.

The boiler cavity had been backfilled with a mixed deposit (102), largely of a dark grey-brown gritty silt with rubble inclusions, including bricks, sandstone fragments, roof slates, coal and clinker. Near the top was a thin lens of orange gritty sand, apparently with a high iron content, but lenses were harder to distinguish further down. Artefacts, including pottery, glass, metal objects, electrical wire and light bulbs were found within 102, with a particular concentration of artefacts noted in the southwest corner. The deposit had notable differences to that backfilling the stoking cellar (103), including a lack of chrysotile cement sheeting fragments, though fibrous chrysotile material was present in the fill at the base of excavation. The base of the backfill deposit was not reached within the trench, exposed to a depth of 1.60m.

5.3 Trench 3 (southern boiler cavity)

Trench 3 was located across the eastern end of the southern boiler cavity, measuring 2.3m north to south and 2m east to west (Figure 8). The cavity is bounded on the north by wall 121, which forms the southern side of a structure dividing the boiler cavities, represented on the north side by wall 129. This would have been overlain by brick surface 106, but this has been truncated within the area of the trench, possibly in association with the construction of the mid-20th-century shed in the northeast corner of the boiler house. The eastern side of the cavity is formed by wall 119, overlain by brick surface 109 and large sandstone blocks 122, and the south side comprises wall 120 and surface 114. The internal width of the cavity is 1.98m. The trench was only partially excavated due to fibrous chrysotile material encountered in the fill, so the maximum depth of excavation was 53.11m aOD, 70cm below the top of surface 114.

The north and south side walls of the cavity are very similar to each other in construction details, though these differ from those observed in the northern boiler cavity (Trench 2), despite wall 121 being essentially the south side of 129. Walls 120 and 121 each have an upper course of header-laid bricks, over a course of bricks set header-on on their narrower edge, and a further header course (Figure 9). The lower three courses visible are laid alternately as all stretchers and all headers, with the lowest header course set back 3.5cm from the courses above (Plates 13 and 14). There is no evidence for chamfered bricks in the upper row, or for progressively stepped courses at the top of the wall, as was present in Trench 2, though several

chamfered bricks were present further west at the north edge of surface 114, and were planned and removed for safe keeping (Figure 10). The second course down of bricks set on their narrow edges also differs to walls 124 and 129, which have a stretcher course at this level. A row of four bricks in the fifth course down of wall 120 each have two vertical grooves in their faces, identical to two bricks seen in wall 123. No such bricks are seen in the exposed area of wall 120, and it is uncertain whether they were related to boiler infrastructure or are evidence for the reuse of bricks in the construction of the boiler settings.

Both walls 120 and 121 have been disturbed at their eastern end, near the junction with wall 119. The upper two courses of bricks have been removed from a 94cm long section of the inner face of 121, with the area backfilled with the upper fill of the cavity (115). As mentioned above, the brick surface and its associated thick mortar deposit have also been removed in this area, and at the edge of the trench wall 121 is overlain by the concrete pad for the modern brick shed. A similar but less extensive area of damage is present in the south wall, 120, measuring a maximum of 65cm wide and with the same two courses missing, although a few bricks survive at the junction with wall 119. It is possible that this damage was caused during removal of the boilers and associated infrastructure, such as support brackets, though this is uncertain.

The eastern wall of the cavity, 119, and overlying surface 109/122, contain features that may be associated with the fitting of the boiler. The five courses of wall 119 exposed in the excavation are constructed similarly to those within Trench 2, with alternate header and stretcher courses, although some stretchers are present within the header courses. The face of the wall on the interior of the cavity is cut back in the centre by a width of one brick, forming a central recess 36cm wide (Plate 15). A vertical groove was carved into the bricks in the centre of this recess, lining up with a notch cut into the face of the sandstone slab set into the surface immediately above (122). The two slabs at this end of the surface were arranged and cut to fit the recess in the bricks below. It is possible that a vertical pipe or fitting associated with the boiler was set into the vertical groove. A further outer row of bricks (130) was set against the face of the wall, tied into the junctions with walls 120 and 121, that at the northern end stepping downward to the south into the boiler cavity, that to the south being a single row stepping down to the north. These were bonded to the face of wall 119 by a thick layer of mortar. The construction suggests that at least the upper courses of walls 120 and 121, along with the tied-in 130, were constructed after wall 119, possibly indicating an episode of rebuilding.

The bricks within surfaces 109 and 114 are frogged, with stamps reading 'James Smith & Co. Skyers Spring Nr Barnsley'. These are quite tightly dateable (see Appendix 3.5), and suggest that the surfaces were constructed, or re-laid, in the last two decades of the 19th century. It is possible that the boilers were replaced at this time, perhaps in association with extension of the boiler house, with the walls of the boiler cavities altered or reconstructed.

There are notable differences in the fills of the southern cavity in comparison to that to the north, as seen in Trench 2. The upper fill (115) was a very similar grey-brown gritty silt with rubble to 102, but was only 0.43m deep. Below this a homogenous fine-grained, compact yellow-orange clay silt deposit (116) covered the cavity, with shrinkage cracks in the surface (Plate 16). There are narrow, regular gaps between the edge of this deposit and the faces of the walls, perhaps suggesting that the deposit shrunk or dried after deposition. This was partially excavated at the eastern end of the trench, and proved to be 0.20-0.24m thick, though it

should be noted that a similar deposit was seen through the stoke hole entrance into the southern cavity from Trench 1, suggesting that at the southern end it either continues deeper, or occurs in more than one band. In Trench 3, it overlay a grey-black soft gritty deposit (118), only partially seen as this contained significant quantities of fibrous chrysotile material. This was covered with soil and left *in situ*, but prevented further excavation within this trench.

6 DISCUSSION

The archaeological investigations undertaken in 2019 demonstrated a good survival of structural remains at the Elsecar Newcomen-type engine boiler house. Due to a series of health and safety concerns, it was not possible to reach the base of any of the structures within the trenches, but significant details of the nature of the boiler house, stoking cellar and boiler cavities were revealed.

The cellar area to the west of the main boiler house contained two stoking holes, one accessing each boiler cavity, and two holes for pipes running into the boiler cavities were present for each, possibly for water gauges. The stoking holes are likely to have also accessed ash pits below the fire bars. No evidence for fire doors covering the stoking holes was seen during the excavation. There does not appear to have been any access to the boilers themselves from the stoking cellar. Cylindrical boilers with internal tubes would protrude through end wall of the cavity so that the internal fires and flues were accessible. This supports the documentary evidence stating that these were tubeless, externally fired boilers (Newbould 1918, 183). Externally-fired cylindrical boilers commonly had curved ends, at least to a radius equal to the diameter of the shell (Peabody & Miller 1912, 7). Though less efficient than tubeless boilers, these could be used where fuel was very cheap, as was the case at the Elsecar Colliery.

A coal chute was present in the western wall of the cellar to facilitate stoking the fires below the boilers. This extends west of the cellar and it is likely that a coal store was located in the vicinity of the current western boundary, possibly associated with the stone-built structure recorded during a watching brief on concrete removal to the west of the engine house in 2014 (Wessex Archaeology 2015). The 1890 OS map shows railway lines running into the site adjacent to the boiler house, which may have been used to provide the coal supply.

The stoking cellar is narrow, only 1.8m wide, which would have been quite restrictive for workers shovelling coal into the fire pits. The floor of the cellar lies more than 2.12m below the current ground surface, which was the base of excavation at the southern end of Trench 1. There is no evidence for a ceiling to the cellar, and remains of fittings for railings in the adjacent stone block surfacing (104) suggest that it was open to the main working floor of the boiler house. This would allow ventilation to the cellar, which would assist in preventing heat exhaustion for stokers (Peabody & Miller 1912, 138). Wall 112/127/128 on the western side of the cellar is likely to have extended upwards to form the western wall of the boiler house complex. This wall shows evidence for alterations and additions, with differences in construction to either side of a brick column (127). It is difficult to be certain as to the nature of alterations to this wall, but historic mapping suggests that this may be associated with a northward extension to the boiler house between 1859 and 1892. As no clear differences are visible in the eastern wall of the cellar (126), if the boiler house was extended, this could indicate that the wall into the boiler cavities was completely rebuilt at this time, presumably in

association with the cavities themselves. The length of wall 112 (2.81m) is very similar to the length of the extension suggested between the 1859 and 1892 maps (c.2.85m).

The southern and northern boiler cavities investigated in Trenches 2 and 3 revealed some differences in the construction details of the side walls, and also differences between the adjoining east wall of the stoking cellar and west wall of the northern cavity. The latter differences may be partially to do with the fact that the cellar wall was designed to be seen, whilst the cavity interiors would have been constructed with less care. The side and end walls all appear to be double thickness, and may have an air gap in the centre to reduce the heat transfer (Peabody and Miller 1912). There is no evidence for lintels above the interior of the stoking hole within the cavities, whereas iron lintels were present on the stoking cellar side. The walls of the cavities were designed to fit around the boiler, with stepped-out sections at the top and bottom to surround the curved sides of the boiler. This would improve the heat retention within the cavity, increasing the efficiency of the boilers and preventing cold air from affecting the pressure. The nature of the stepped-out walls at the base of the northern cavity are different on each side; the steps in southern wall dividing the two boilers are tied into and part of the wall, but on the north wall they are a separate structure abutting the wall. This, and other differences in brickwork, suggests that alterations were carried out to the structure, perhaps associated with changing the boilers, which are likely to have had a relatively short life.

Slightly curved, thick metal fixtures were present in the northern cavity, one at either side of Trench 2, and the top of a further fixture was noted set into the dividing wall further to the east, outside the area of excavation. It was expected that similar fittings would be present in Trench 3, but none were found within the area of excavation. It is possible that these may have been present near the east end of the cavity, where both side walls had been heavily disturbed and the upper sections of the wall lost. One of the fixtures in Trench 2 has pieces of metal sheet still attached to it. These fixtures appear to be brackets supported on the side walls and used to secure the boiler in place, with the sheet fragments on the north side presumably part of the boiler that could not be detached from the bracket during its removal. Peabody and Miller (1912, 244-245) state that three sets of brackets would be used for a boiler 18 feet long, suggesting that a third set of brackets would have been present towards the eastern end of the cavity, now covered by the modern shed. The front brackets would rest directly on the brickwork, with the others resting on iron rollers to provide for expansion of the boilers.

Though the fire grate and ash pits were not reached in the excavation, Peabody and Miller (1912, 136-137) state that externally-fired boilers typically had at least two feet (0.6m) between the top of the fire grate and the base of the boiler shell, to allow for complete combustion of the gases from the fuel with hot air drawn through the flue. However, examples with 12 to 14 inches space between the fire-bars and the base of the boiler have been recorded (Graham 1860). Given the stepped out bricks in the side walls, the base of the boilers is likely to have been at around the level of the base of excavation in Trench 2, at 1.60m below the ground surface, suggesting a maximum depth of around 2.2m BGL for the fire pits. Fire grates stoked by hand would generally not be more than six feet (1.82m) long, enabling the stokers to easily add fuel and clean the grate.

The east end of the southern boiler cavity is somewhat different in layout to the west end, with a setting of stone slabs, fitted and notched to provide a central recess that is reflected in a

narrow groove in the brickwork below. There is also a stepped-out section of walling to the west of the back (east) wall of the cavity, to either side of the recess. This suggests that a vertical pipe ran down the centre of the cavity, connecting to the boiler. The nature of this pipe or fitting is currently uncertain. It may have been a water-feed pipe, or possibly connected to a water release mechanism. Due to the presence of asbestos, this area could only be partially excavated and it was not possible to investigate the nature of the connection between the flue and the adjacent chimney.

The two boiler cavities had surprising differences in the nature of the backfill, the northern cavity filled (to the base of excavation) largely with a mixed grey-brown gritty silt containing frequent building rubble and mixed rubbish, with some lenses of slightly different tipping material towards the top. The upper fill of the southern cavity was similar in nature, but was only 0.43m deep, overlying a compact layer of orange-brown clay silt, 0.20-0.24m thick. This in turn overlay a further gritty rubble deposit with a significant asbestos content, but the orange material was seen through the stoke hole to continue down the eastern side of the cavity. The reason for these differences in the fills is uncertain. It is possible that it represents two distinct episodes of backfilling, perhaps indicating that one of the boilers was decommissioned and removed prior to the other. Alternatively, it may simply mean that each cavity and the stoking cellar were backfilled separately, though at around the same time, using waste material from different sources. From the available evidence, it seems clear that the boilers were cut up *in situ* and removed in pieces for scrap, rather than being extracted whole for reuse elsewhere. Photographic evidence suggests that the chimney was reduced to its current height at around the time the boiler house was demolished.

Further investigations at the boiler house would have the potential to uncover the remains of the fire grate, ash pits and flues, the nature of the connection between the flues and the chimney. It is possible that the nature of the fittings at the east end of the southern cavity could also be further elucidated. Any further excavation would need to consider the chrysotile asbestos contamination of the backfill deposits and have an appropriate mitigation and management strategy in place.

7 CONCLUSIONS

The archaeological investigations at the boiler house for the Elsecar Newcomen-type atmospheric beam engine provided valuable insights into the nature of the latest phase boilers and their associated infrastructure, as well as evidence relating to their decommissioning and removal. The evidence suggests that the square-plan boiler house dates to the second half of the 19th century, its final layout perhaps being an extension to a smaller structure shown in 1859. This in turn was a replacement of a longer, narrower building, possibly housing a wagon boiler, for which no evidence was found during the excavation. The square-plan boiler house housed two fixed cylindrical externally-fired tubeless boilers set into brick-built cavities within the ground and supported at the top of the cavities by iron brackets. The fire grates and ash pits were accessed from a stoking cellar to the west, which was open to the main boiler house and probably accessed via a staircase at the northwest corner of the engine house. A coal chute in the western wall provided fuel for the fires directly into the cellar.

Due to the confines of the trenches and the presence of contaminated material in the backfills, it was not possible to reach the base of the structures in any of the trenches. However, the investigations did provide useful evidence for the nature of construction of the boiler house, the date of the some elements of the structure, and the likely nature of the boilers. This supports the very limited documentary evidence available and adds to the interpretation of the boiler house remains, an important adjunct to the Scheduled beam engine. Documentary sources indicate that the boilers were removed in the late 1930s, and the archaeological evidence suggests that they were cut into pieces *in situ* before removal as scrap, resulting in very limited damage to the surface and below-ground structure of the boiler house.

8 ACKNOWLEDGEMENTS

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Historic maps and documents

WWM Add. Dep. Map R208: Plan of Elsecar canal basin and railway line, 1849.*

NBC/460a: Map of land at Elsecar required from Earl Fitzwilliam by the Manchester, Liverpool and Sheffield railway, 1859. *

NCB 1297/14/3: South Yorkshire Mines Drainage Scheme 1929 & 1936: report for the year ending 31st December 1938 to the owners of mines in the South Yorkshire Mines Group.

WWM/MP/115R: Map with field numbers to correspond with cropping books, Brampton Bierlow, 1866-68. Sheffield Archives.

1850 OS 6 inch: 1 mile map sheet Yorkshire 283.

1892 OS 25 inch: 1 mile map sheet Yorkshire 283/5.

1957 OS 1:1250 map sheets SK 3899 NE and SE3800 SE.

AC/81C: Documents and correspondence relating to Elsecar Newcomen Engine, Barnsley Archives.

[*: Sheffield Archives reference correct as of 2011, possibly now transferred to Barnsley Archives.]

PLATES

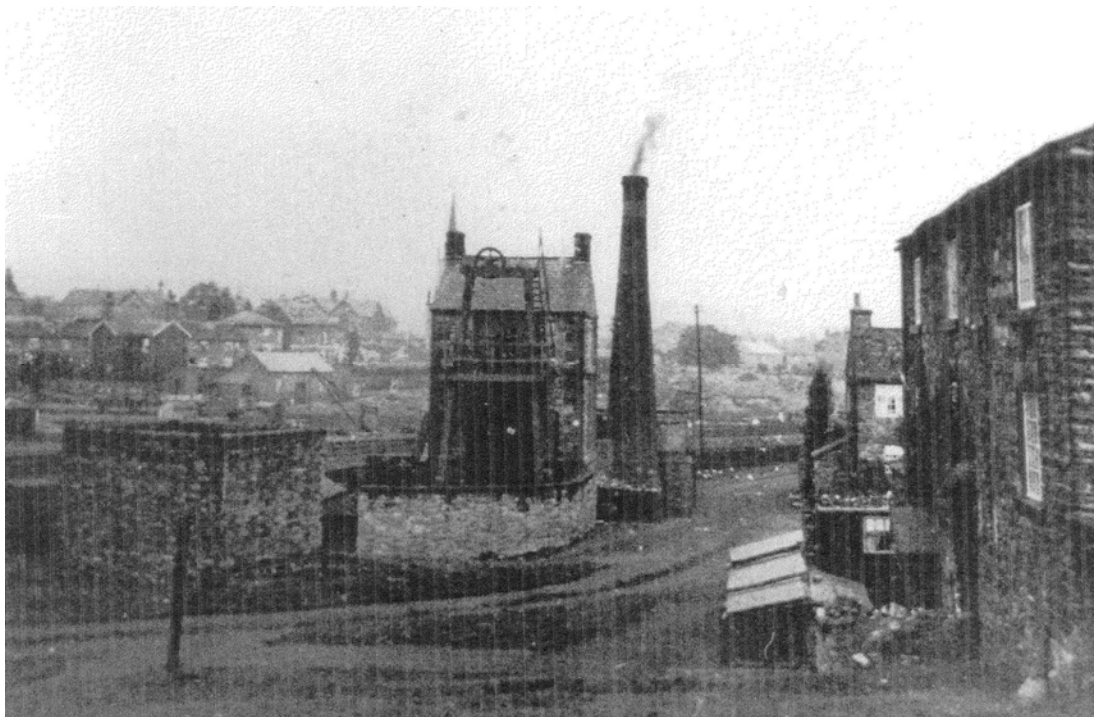


Plate 1: Undated photograph of the engine house with chimney and boiler house to the rear
(Above: Barnsley Archives, AC/81C; below: Newbould 1918, fig.15)

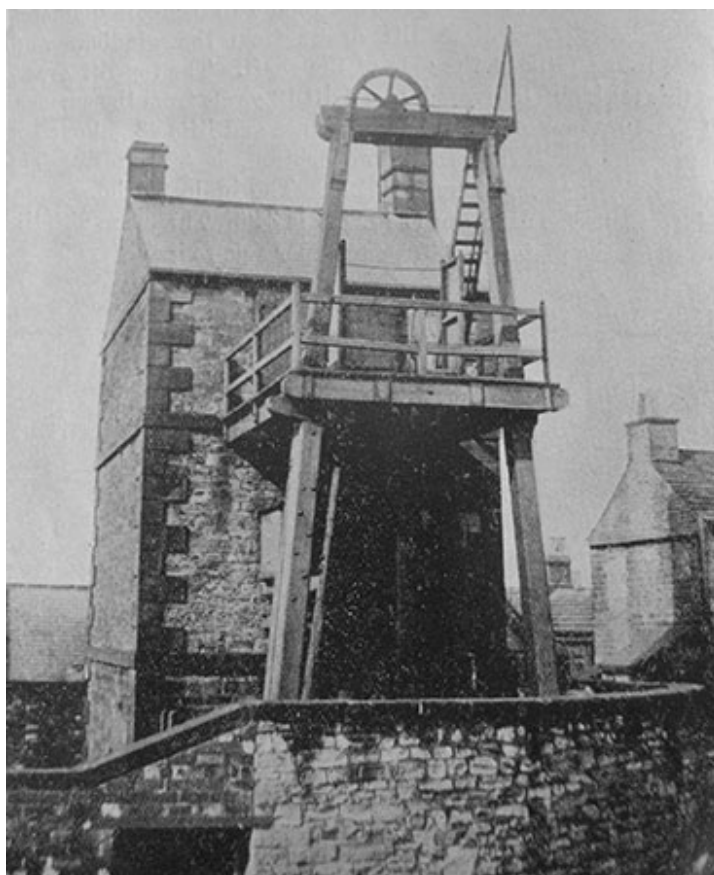


Plate 2: View of the engine house in 1918, with roof of the boiler house to rear left



Plate 3: View east across site, Trench 1 in foreground



Plate 4: Possible re-used padstones (structure 113), viewed facing west



Plate 5: Trench 1, wall 126 and stone blocks 104, viewed facing east
(scales in 50cm increments)



Plate 6: Detail of interior of southern stoking hole, wall 126, showing stepped bricks and infill



Plate 7: Trench 1, showing western wall 112/127/128, viewed facing southwest



Plate 8: Detail of coal chute in wall 128, viewed facing west
(scale in 10cm increments)



Plate 9: Trench 2, wall 123 viewed facing west
(scales in 50cm increments)



Plate 10: Detail of top of stoking hole in wall 123, viewed facing west



Plate 11: Trench 2, wall 124, viewed facing north, showing abutting structure 125 and boiler bracket
(scales in 50cm increments)



Plate 12: Detail of stepped out bricks at base of wall 129, viewed facing south



Plate 13: Trench 3, wall 120, viewed facing north, grooved bricks at lower right side
(scales in 50cm increments)



Plate 14: Trench 3, wall 121, viewed facing south



Plate 15: Trench 3, wall 119 and stone blocks 122, viewed facing east
(scales in 50cm increments)



Plate 16: Trench 3, surfaces 109 & 122 and backfills 115 over orange deposit 116, viewed facing northwest

FIGURES

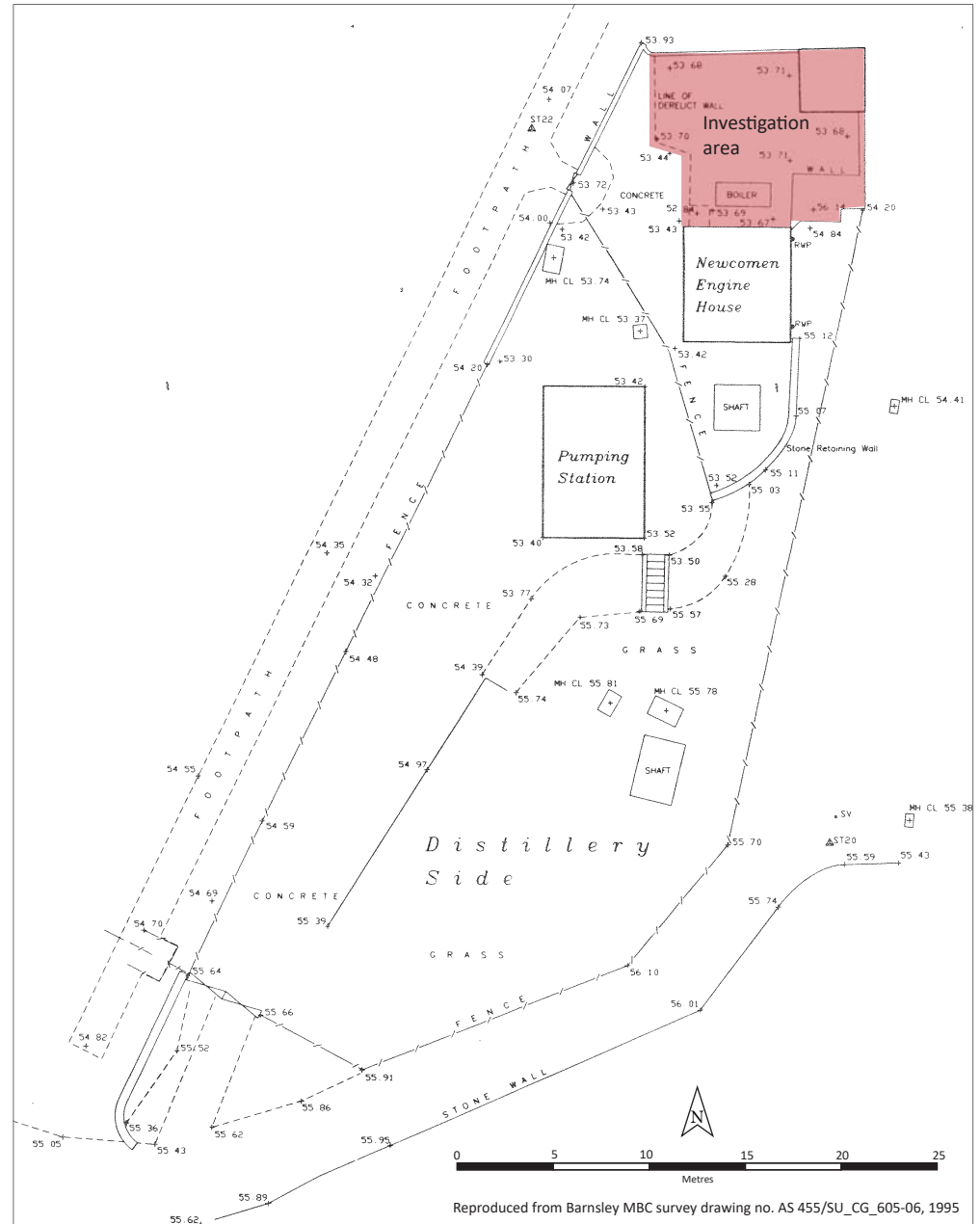
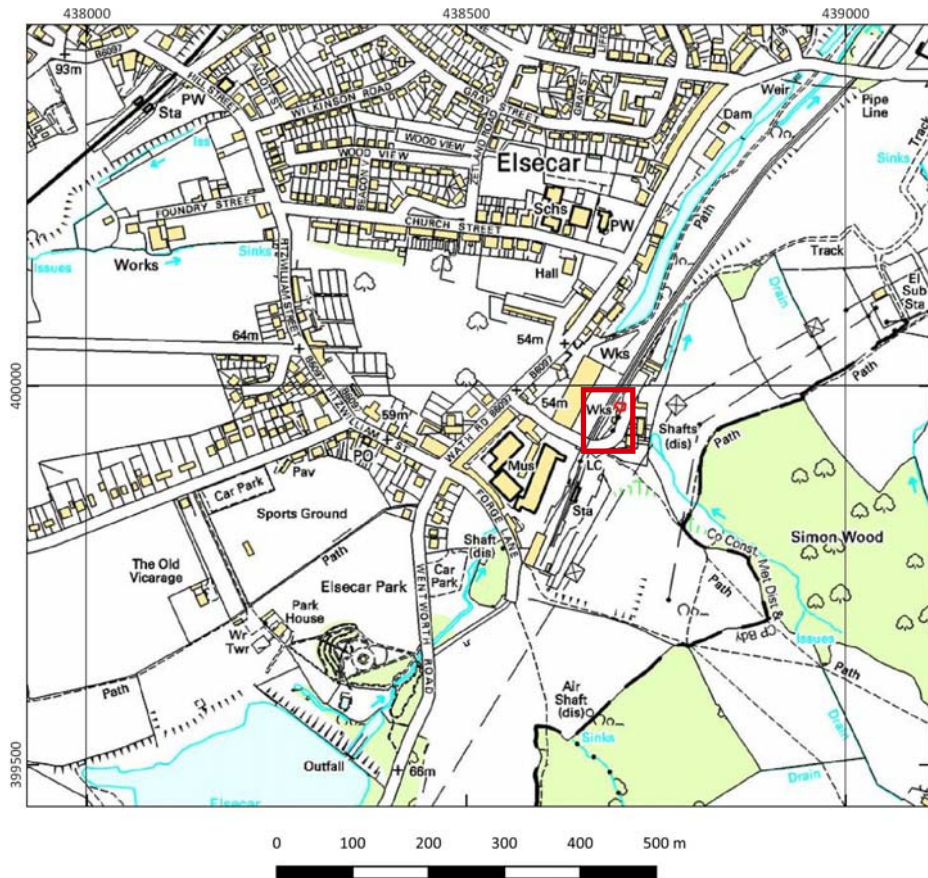


Figure 1: Site location

- Legend:
- Brick
 - Removed brick
 - Brick impression in mortar
 - Stone
 - Detail
 - Edge of excavation

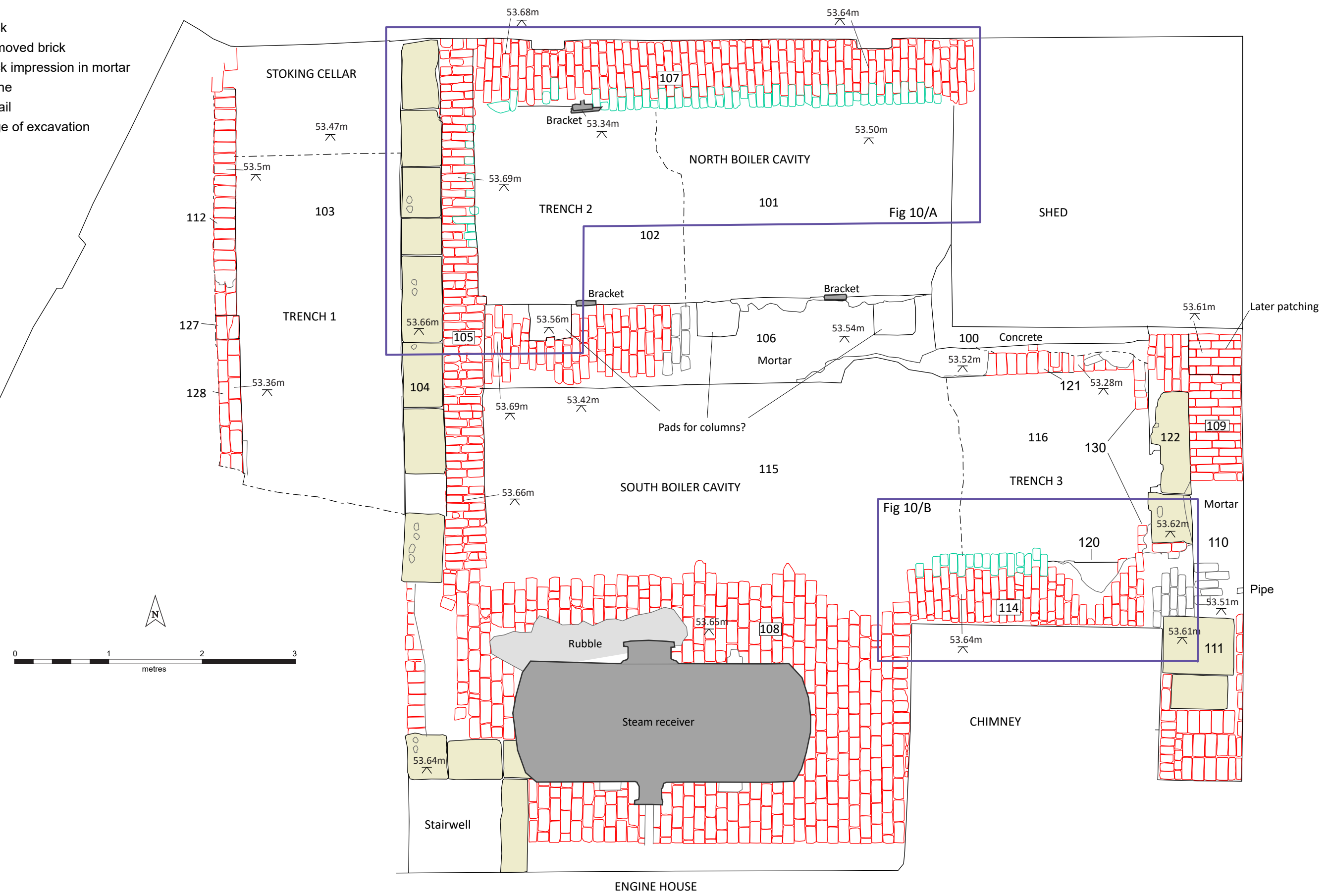
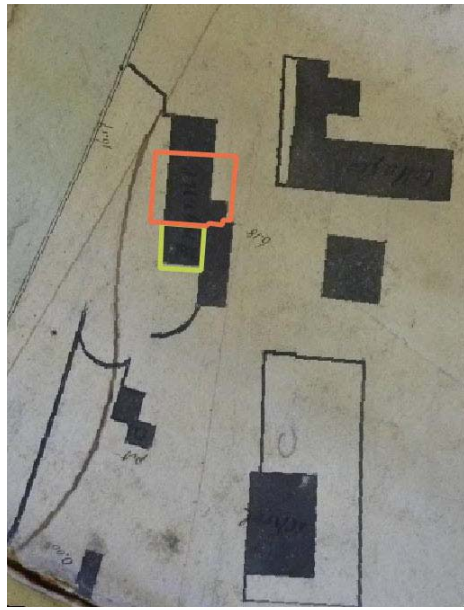


Figure 2: Overall site plan showing trench locations

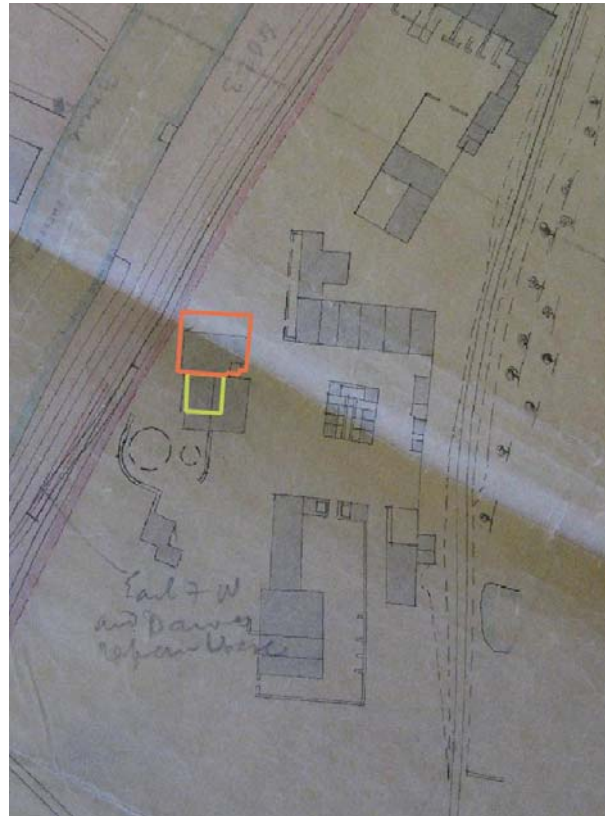
1849



WWM Add. Dep. Map R208

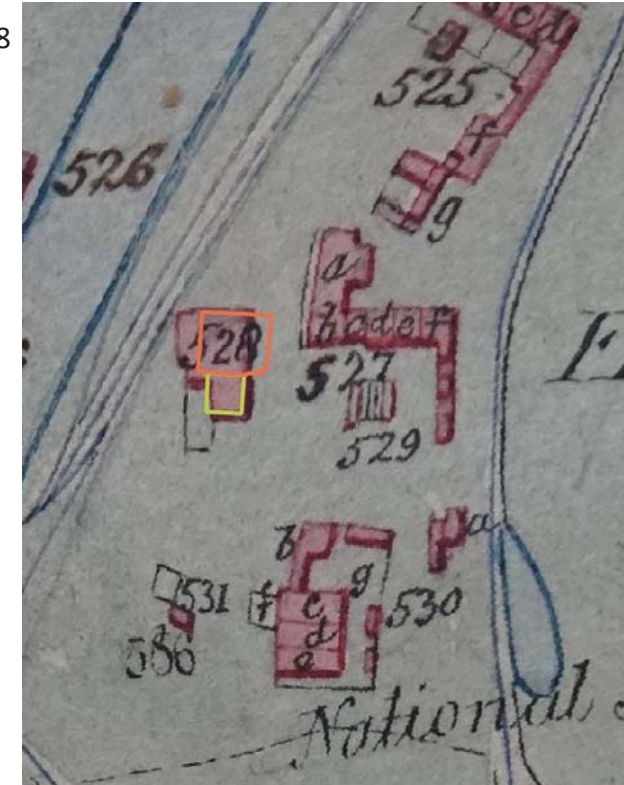
- Boiler house site location
- Engine house location

1859



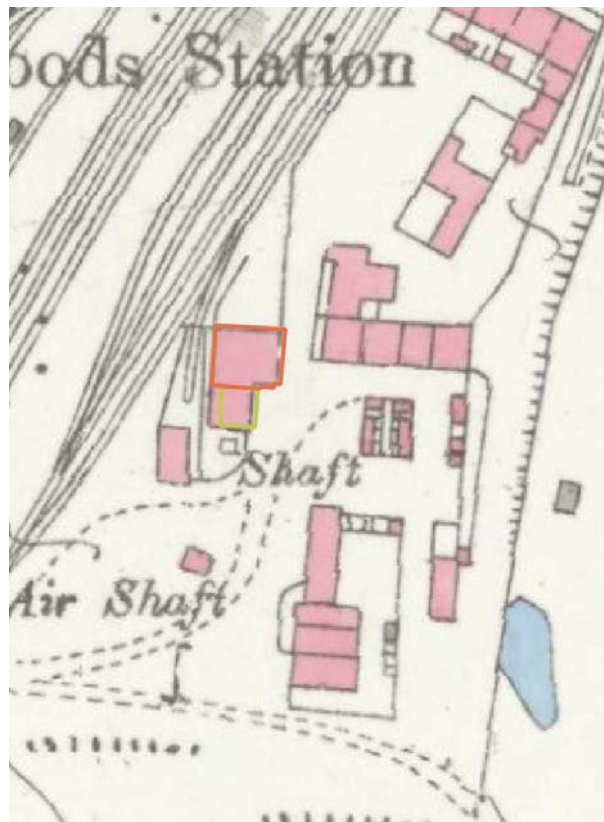
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1866-8



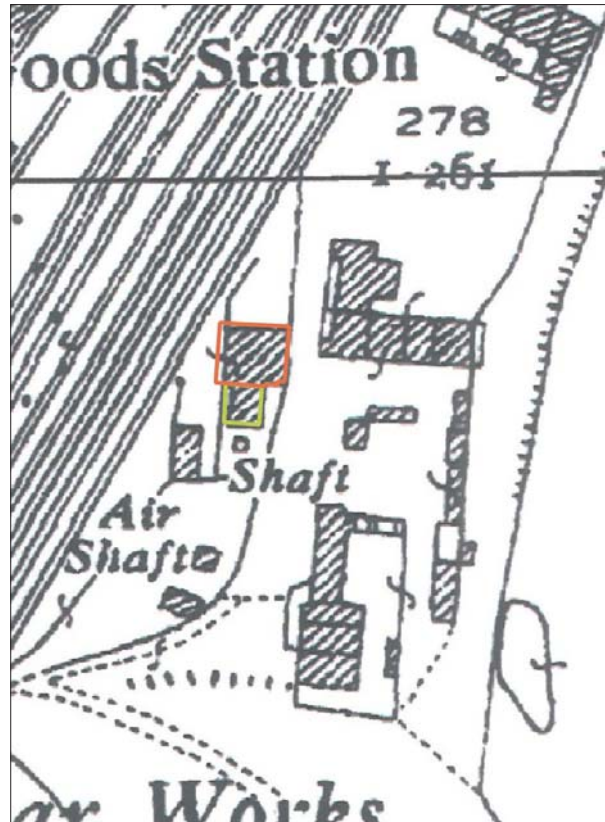
WWM/MP/115 R

1892



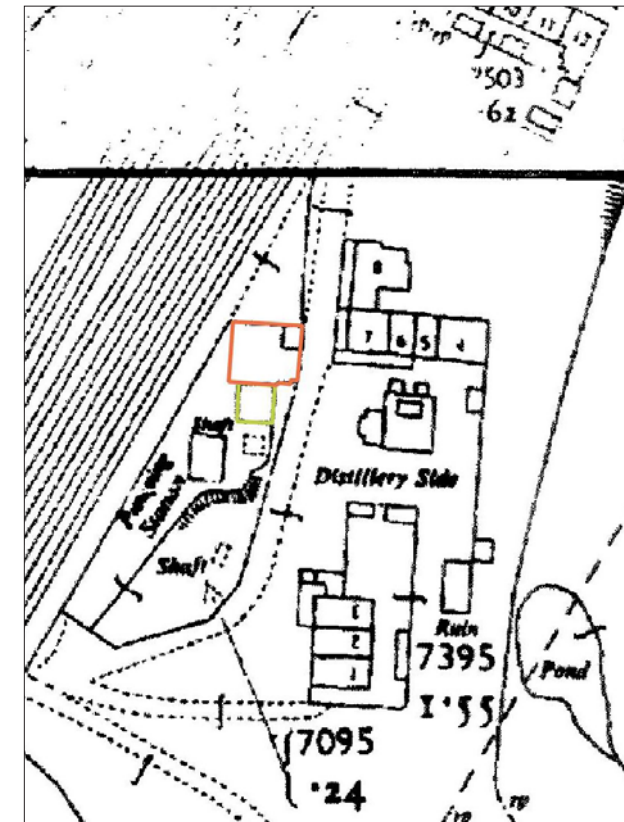
1892 OS 25 inch: 1 mile map

1930



1930 OS 25 inch: 1 mile map

1957



1957 OS 1:1250 map

Reproduced from Industrial Heritage Consulting Ltd. 2010, fig.5.

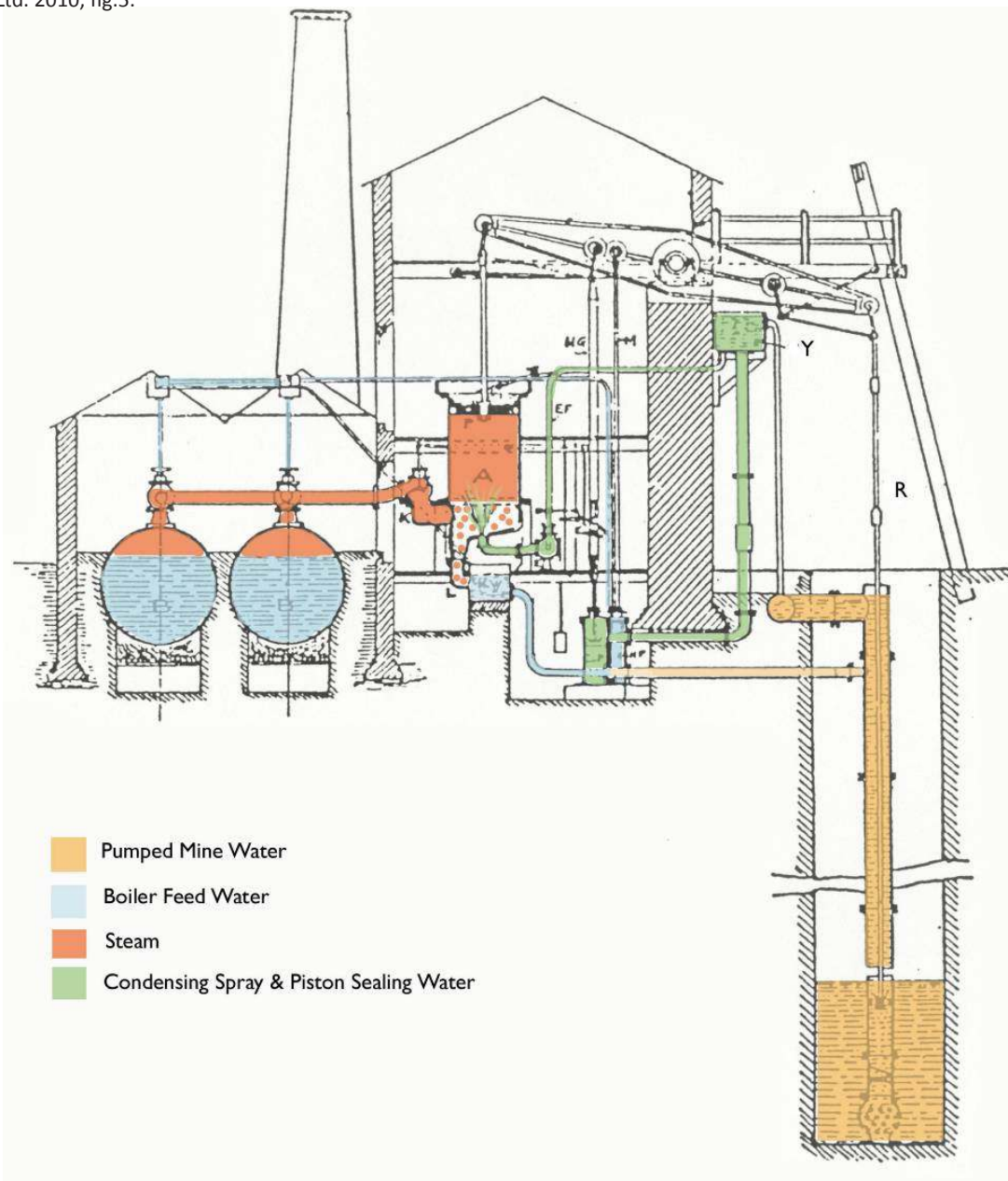


Figure 4: Section of the boiler house and engine house, c.1918

Legend:






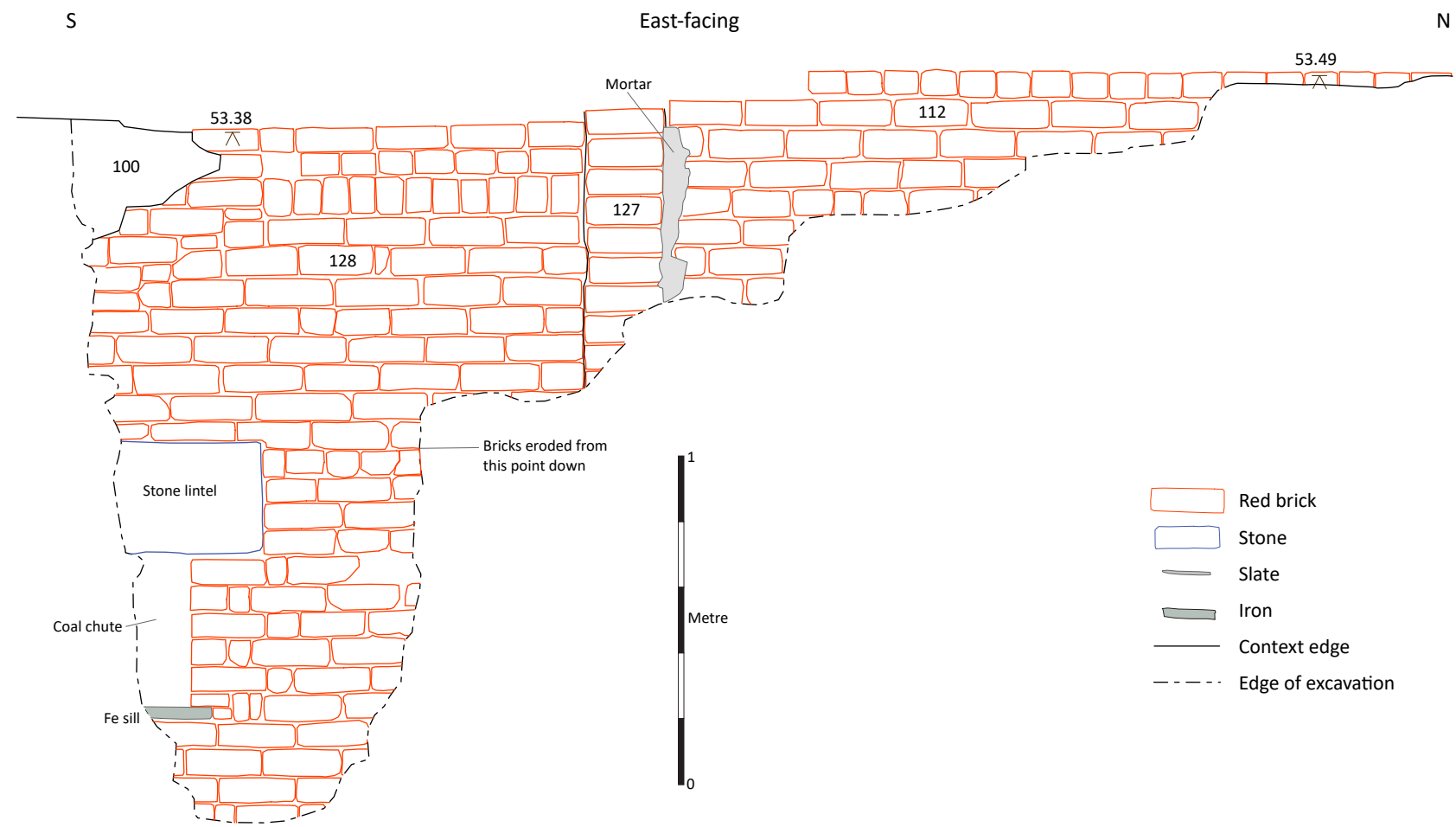
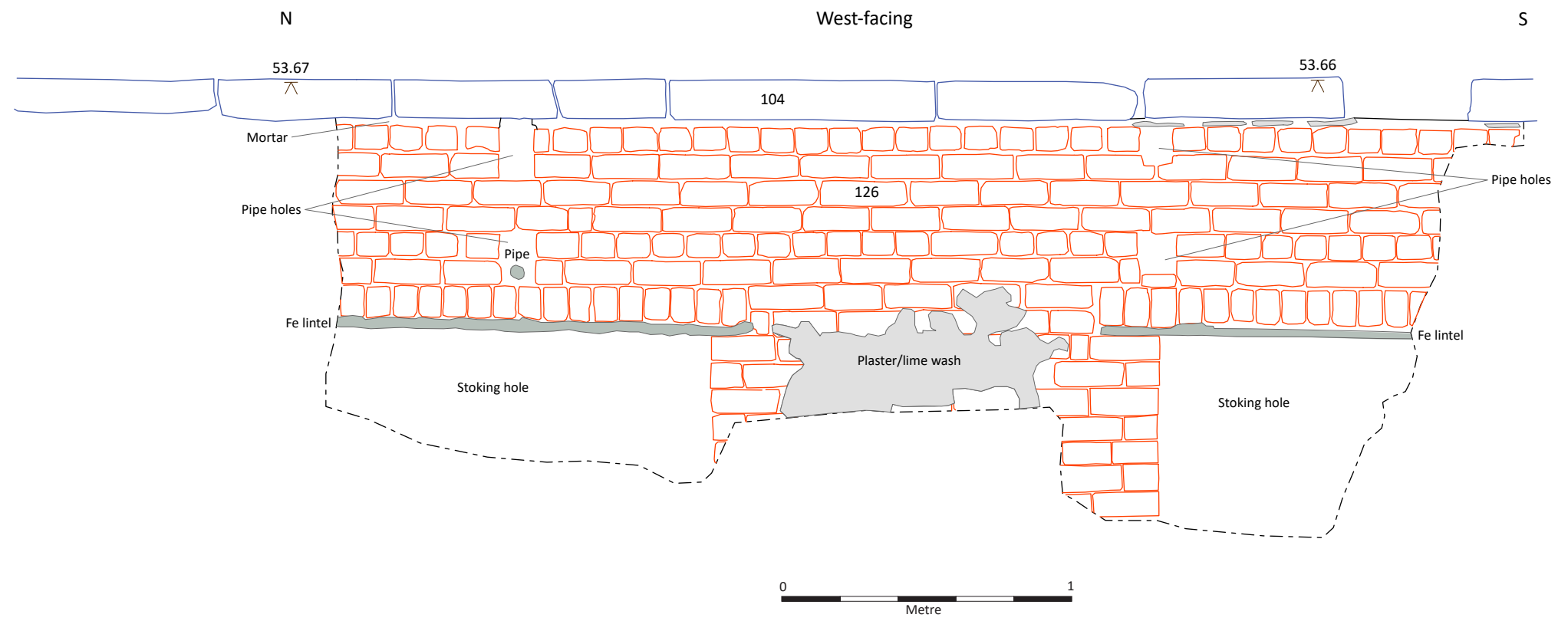
-  Brick
-  Brick impression in mortar
-  Stone
-  Detail
-  Metal

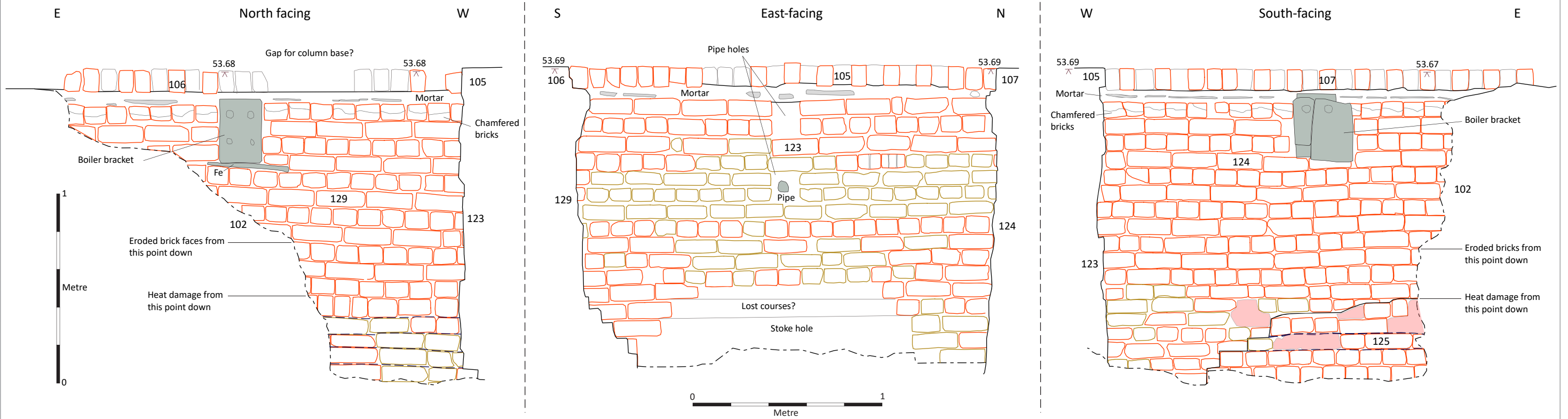


Figure 5: Plan of Trenches 1 & 2








- Red brick
- Stone
- Slate
- Iron
- Context edge
- Edge of excavation

- Red brick
- Firebrick
- Set-back brick
- Very degraded brick(s)
- Slate
- Iron
- Context edge
- Edge of excavation
- Step



Legend:

-  Brick
-  Brick impression in mortar
-  Stone
-  Detail
-  Edge of excavation

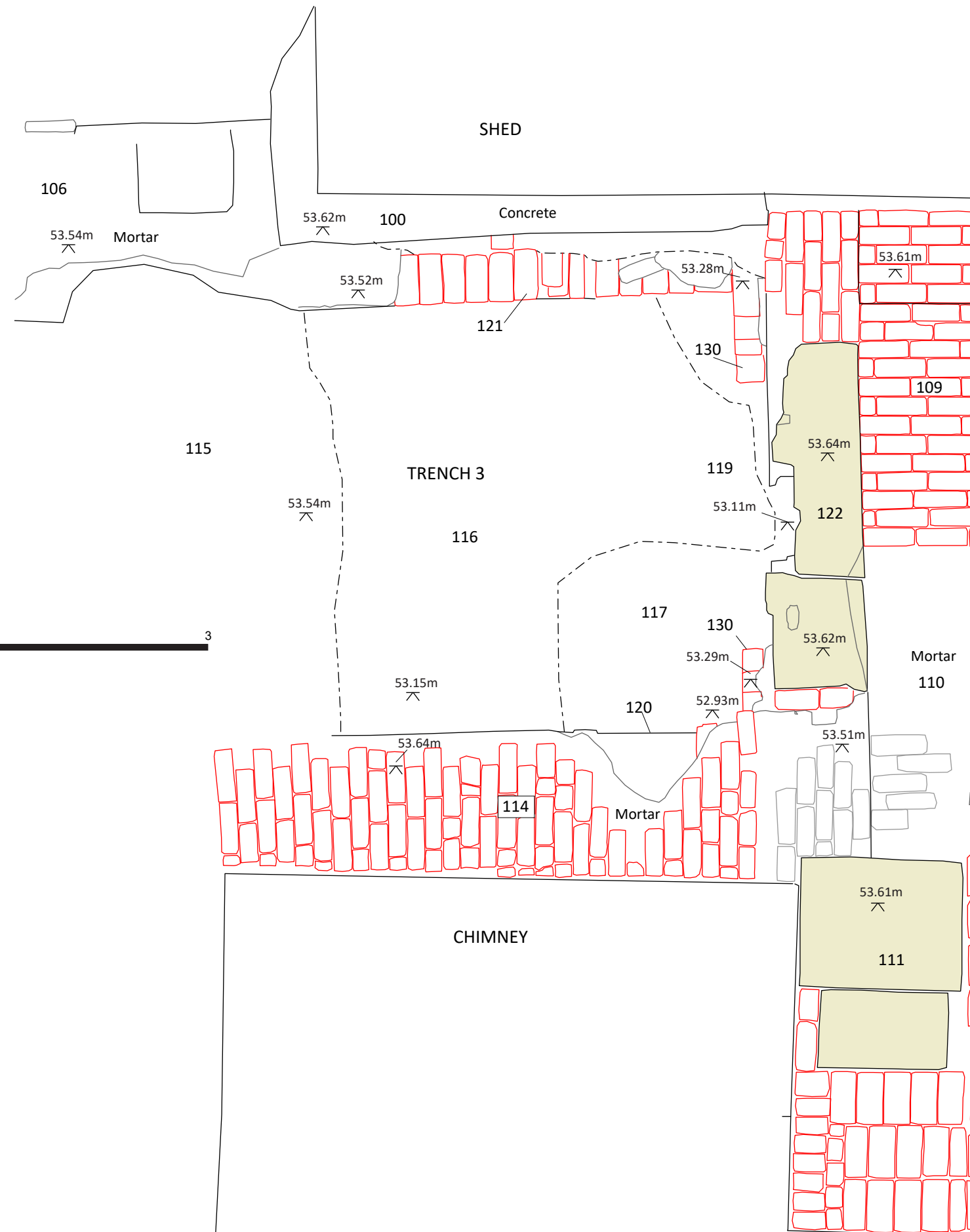
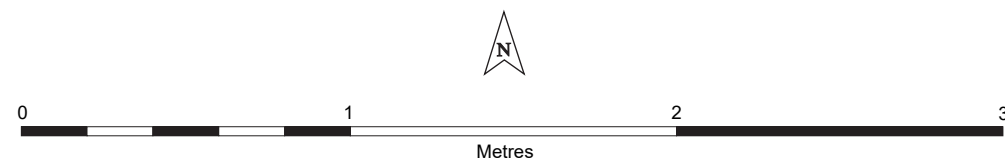
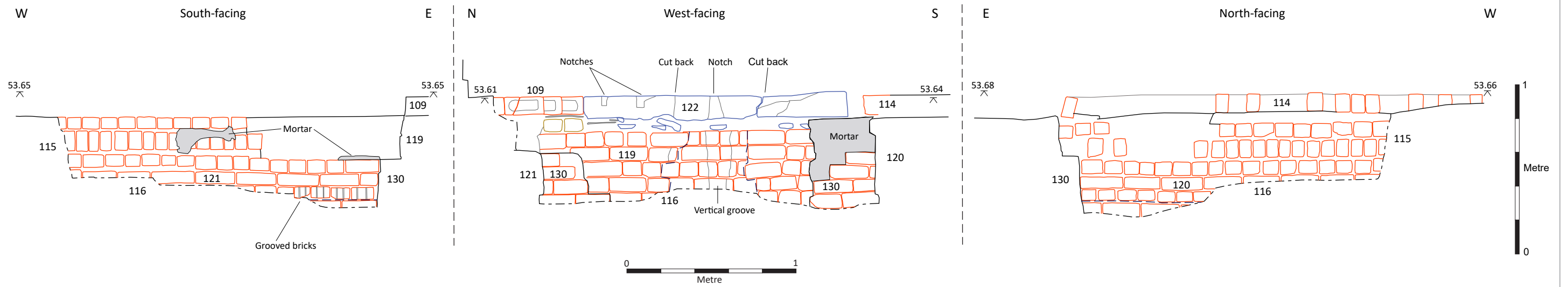
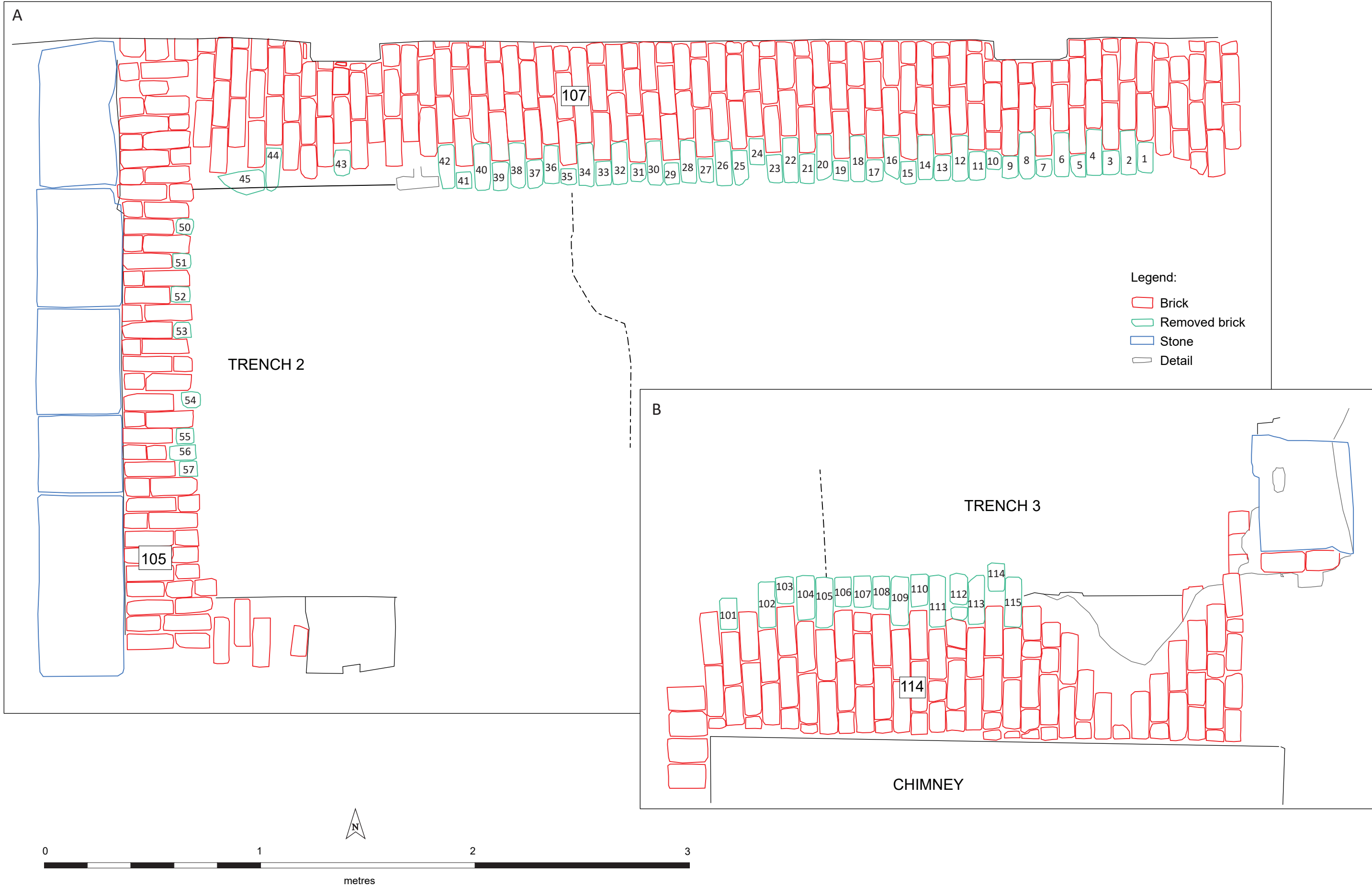


Figure 9: Plan of Trench 3

- Red brick
- Firebrick
- Set-back brick
- Stone
- Slate
- Context edge
- Edge of excavation
- Step





APPENDIX 1: INDEX TO ARCHIVE

Item	Quantity
Context register	2 sheets
Context sheets	34 sheets
Photo register	4 sheets
Digital photos	1 disc
Black and white negatives	2 sheets
Watching brief record sheets	1 sheet
Levels register	3 sheets
Bulk finds register	7 sheets
Drawing register	2 sheets
Field drawings	10 sheets
Project design	1 hard copy
Report	2 hard copies plus 1 on disc

APPENDIX 2: CONTEXT LIST

Note: context sequence for test pits (project 2073) continued for trial trenches (project 2169).

Context no	Description
100	Concrete surfacing
101	Black ashy soil made ground
102	Backfill of northern boiler cavity
103	Backfill of stoking cellar
104	Dressed stone surface overlying wall 126, east of the stoking cellar
105	Red brick surface overlying wall 123, east of the stoking cellar
106	Red brick surface overlying wall 121, between the boiler cavities
107	Red brick surface overlying wall 124, north of the northern boiler cavity
108	Brick surface at south side of boiler house, underlying the steam receiver
109	Red brick surface at east end of the boiler house
110	Grey mortar deposit underlying 109
111	Brick and stone flag surface between the chimney and east wall of the boiler house
112	Wall at the west side of the stoking cellar
113	Single course of re-used stone and brick at the south side of the stoking cellar
114	Red brick surface overlying wall 120, between the chimney and southern boiler cavity
115	Upper backfill layer within southern boiler cavity
116	Orange clay-silt backfill deposit below 115 in southern boiler cavity
117	VOID
118	Asbestos-rich backfill deposit below 116 in southern boiler cavity
119	Wall forming east end of the southern boiler cavity, below 109/110
120	Wall forming south end of the southern boiler cavity, below 114
121	Wall between the north and south boiler cavities, below 106 (south elevation)
122	Stone setting within surface 109 and at top of wall 119
123	Wall at west side of northern boiler cavity, below 105
124	Wall at north side of northern boiler cavity, below 107
125	Stepped out wall/boiler support abutting wall 124
126	Wall at east side of stoking cellar, below 104
127	Single skin brick infill between 112 and 128, west wall of stoking cellar
128	Southern continuation of wall 112 south of 127, west wall of stoking cellar
129	Wall between the north and south boiler cavities, below 106 (north elevation)
130	Single-skin wall abutting internal (west) side of east wall 119 of south boiler cavity

APPENDIX 3: ARTEFACT ASSESSMENTS

A3.1 Ceramics

By Richard Jackson

Introduction

The pottery assemblage recovered from the excavations at Elsecar Boiler House was examined by the author on 5th November 2019. The assemblage was assessed visually by context, and then subdivided into groups on the basis of fabric type and form. The individual sub-groups were weighed and counted, and the results are summarised in Table 2.

The assemblage comprised a total of 377 sherds and whole items with a total weight of 8021 grams from a total of four contexts.

Context 101

The pottery from context 101 consisted of 14 sherds with a combined weight of 217 grams. This group of pottery was a small collection of tablewares generally relating to the consumption of food and drink in domestic contexts, probably dating to the late 19th or early 20th century. The exceptions to this general trend were the fragments of Grey Stoneware bottle, which are not necessarily related to a solely domestic context for the consumption of liquids, and the ceramic electrical insulator component, which is more likely to originate from a nearby industrial use (Plate 1). The term 'electrical insulators' is a general one; although these are similar to examples in online sources, their specific area of use is currently unknown. The objects in question are also not entirely dissimilar to the insulators used for telegraph wires in the late 19th and early 20th century.

Context 102

The pottery from context 102 consisted of 175 sherds with a combined weight of 4498 grams, which was the largest quantity and weight of pottery recovered from a single context in this excavation.

Bone china tablewares and teawares were represented in this context in a similar proportion to their frequency within all the other contexts. The very small sherd size probably reflects a degree of secondary re-deposition, but could also be in part due to the brittle nature of bone china.

Also present were a selection of Brown Salt-Glazed Stoneware sherds representing vessels which are best characterised as 'kitchenware', probably related to the production and storage of foodstuffs within a domestic context. The over-fired fragments of stoneware are relatively unusual; they seem to have been useable before discard, and probably represent the thrifty use of a cheaper imperfect vessel. The same principle may be applied to explain the dish fragments with an unusually thin salt glaze. One lid in this fabric is pierced with narrow holes in a grid pattern, possibly to allow ventilation of a stored substance (Plate 2).

Grey Stoneware jars were present in relative abundance. These were usually purchased with foodstuffs, and retained for continued re-use afterwards. They were often used to contain jams and marmalades, and are widely considered to have been in use throughout the 19th century.

The stoneware bottle stamped 'J V Bellamy' is relatively unusual; a search of online resources yielded a single reference (regrettably to an Australian e-bay page) referring to a Victorian Shop token bearing the name of J V Bellamy as a 'Provision Merchant'. Tokens of this type were issued by workhouses as Poor Relief to allow the destitute to purchase food.

The remainder of the assemblage from context 102 consisted of various late 19th-century whitewares. One example of a hand-painted repeating pattern of green leaves is identical to sherds found recently in community archaeology excavations at Broad Ing Plantation, Tankersley (ArcHeritage report 2018/63), and therefore probably represents a ware which was locally available across this part of South Yorkshire in the 19th century (Plate 3).

The items described as 'electrical insulators' also present in context 101 were present in much greater abundance in context 102 (Plate 1).

Context 103

The pottery from context 103 consisted of 150 sherds with a combined weight of 1852 grams

This context contained a higher proportion of Coarse Earthenwares than the other contexts, which are likely to represent the domestic production and storage of foodstuffs. In most other respects the pottery from 103 is quite similar to the wares represented in context 102; Grey Stoneware jars, a smaller quantity of Bone China teawares. This context did contain a slightly higher proportion of whiteware, consisting of tablewares and teawares for the consumption of food and drinks in a domestic context, including Sponge-decorated whitewares and a smaller selection of refined Yellow Ware. This was the only excavated context to include a single sherd of Late Blackware, which is more typically found in 18th-century assemblages. Given the overwhelming quantity of 19th-century ceramic in this assemblage it is fair to assume that this single sherd is a residual inclusion from earlier activity at Elsecar.

One sherd of a Grey Stoneware flagon has part of an applied patch stamped 'IRIT MERCH/-SLEY' (Plate 4). Information from one of the antique dealers at Elsecar Heritage Centre suggests that the full inscription would read 'Dandison/Wine & Spirit Merchant/Barnsley/1 Gall[on]'.

Context 115

The pottery from context 115 consisted of 38 sherds with a combined weight of 1454 grams

The vast majority of the whitewares were too fragmentary to be of any diagnostic value, although the high degree of fragmentation and staining suggests the possibility that this material may represent secondary re-deposition of local refuse. The particularly small size of many of the fragments also suggests a fair degree of secondary re-deposition and re-compaction of the associated deposits.

The grey stoneware flagon is of a type used from the 19th century into the early 20th century, and was fairly ubiquitous across the country for the purchase and consumption of all manner of both alcoholic and non-alcoholic beverages. A similar example recently excavated by ArcHeritage on Radford Street, Sheffield bears the stern (and, most likely, unenforceable) warning 'anyone detaining or illegally using this bottle will be prosecuted. 1911'

The main items of interest from this context are currently of unknown function. Manufactured to a consistent size and profile from a stoneware fabric, it has been suggested that they served

as some kind of support for pipes, given their internal semi-cylindrical profile (Plate 5). Some have stamped serial numbers on the base.

Conclusion & Recommendations

The assemblage from excavations at Elsecar Boiler House is generally late 19th- to early 20th-century in origin. Definitively early 19th-century wares are notable by their absence, and the majority of the wares would appear to relate to the production, storage or consumption of food and drink in domestic contexts. The deposition of this material into the backfill contexts of the Elsecar Boiler House probably occurred as the result of opportunistic inclusion of stockpiled waste.

No further work is recommended on this assemblage and the only items considered worthy of retention as part of the Museum archive are the possible pipe support items of grey stoneware. The material is to be retained on site by Elsecar Heritage Centre as part of a teaching and handling collection, further community-led research into the function of the unusual Grey Stoneware items from contexts 102 and 115 would undoubtedly prove to be more fruitful than the limited results possible within a commercial framework.

References

Ceramic telegraph insulators: <<http://www.metismuseum.ca/resource.php/12962>> online resource, accessed 7/11/19

J V Bellamy shop token reference: <<https://www.ebay.com.au/itm/Victoria-Regina-J-V-Bellamy-Sheffield-Provision-Merchant-Token-myrefn7508B-/302984698034>> accessed 8/11/19

<<http://www.workhouses.org.uk/Sheffield/>> accessed 8/11/19

Table 2: Pottery catalogue

Context	Quantity	Type	Part	Form	Comments	Weight (g)
101	1	BCH	Rim-Base	Saucer	Plain	10
101	1	CEW	Body	u/d	Undiagnostic small sherd	5
101	4	GST	Body	Hollowware	Probably bottle fragments.	65
101	2	GST	Partials	Electrical insulators	See context 102, same form	100
101	1	WWE	Rim-Body	Cup	Gold lustre banding just below rim	10
101	1	WWE	Base	Dish or similar	No footrim	20
101	3	WWE	Body	Hollowware	3 small sherds, probably tablewares	5
101	1	WWE	Body	U/D	Unglazed	2
102	2	BCH	Rim-Base	Saucer	Plain	40
102	1	BCH	Rim-Body	Mug		10
102	2	BCH	Rim	Cup	Small rimsherds, lustre dec band on rim	2
102	1	BCH	Rim	Hollowware		5
102	1	BCH	Base	U/D	Small undiagnostic sherd	1
102	1	BSGSW	Rim	Bowl		65

Context	Quantity	Type	Part	Form	Comments	Weight (g)
102	3	BSGSW	Rim-Body	Lid	Lid is pierced with a needle-like tool multiple times in a grid pattern, 2cm spacing	240
102	1	BSGSW	Rim	Lid		10
102	1	BSGSW	Body	Hollowware		5
102	4	BSGSW	Body	Lid	Crinkling of interior surface & unusual large internal void suggests a highly overfired second.	135
102	1	BSGSW	Rim-Body	Dish	Flaring rim, clubbed edge. Very thin brown salt glaze	55
102	1	BSGSW	Body	Dish	Same profile as above, no joins. Very thin brown salt glaze	35
102	1	CEW	Rim	Pancheon		85
102	1	CEW	Body	Pancheon		80
102	8	GST	Rim-Body	Jar	"Marmalade"-type jars	470
102	17	GST	Body	Jar	"Marmalade"-type jars	165
102	3	GST	Base	Jar	"Marmalade"-type jars, includes 1 intact base; 9.4cm diameter. 1 95% intact, 7.5cm diameter	335
102	1	GST	Base	Bottle	80% intact. Stamped "J V BELLAMY" around edge of base	120
102	9	GST	Body	Flagon or cistern		225
102	1	GST	Neck	Flagon or cistern	Short thick neck, as would be sealed by a stopper. 5.5cm diameter, aperture is 2.2cm diameter	140
102	1	GST	Misc	Misc	Unusual stoneware item, see context 115. Partial fragment, full examples in 115	60
102	3	SPONGE	1 rim, 2 body	U/ID		5
102	6	TPWW	Rim-Body	Plate	5 all same pattern; TP in green, Broseley . 1 TP blue, 'willow' pattern	125
102	9	TPWW	Body	8 Flatware, 1 Hollowware	4 same green Broseley TP. Remainder TP in blue or brown	65
102	3	TPWW	Base	Dishes, plates	Blue TP	40
102	2	WWE	Rim-Body	Jar		55
102	1	WWE	Rim-Body	Cup	Thinly potted, flaring rim	20
102	9	WWE	Rims	Plate	2 moulded with repeating flower relief pattern, 3 with lustre band dec	70
102	1	WWE	Rim	Mug/Cup		5

Context	Quantity	Type	Part	Form	Comments	Weight (g)
102	17	WWE	Body	Hollowware	Mostly small undiagnostic sherds, 1 sherd poss jar or jug, 1 sherd poss bowl	110
102	1	WWE	Base	Jar	Plain	55
102	1	WWE	Base	Cup	Plain	15
102	7	WWE	Base	Flatware	Plain; small undiagnostic sherds	50
102	1	WWE	Rim	Bowl	Blue slip banded dec	5
102	1	WWE	Rim	Mug	Thin faded green suspension glaze ext, probably applied onglaze	15
102	2	WWE	Body	Hollowware	1 green suspension glaze banded dec, 1 yellow suspension glaze wash	10
102	1	WWE	Base-Body	Jug	Blue slip banded dec, broken handle attachment. Splayed footrim	50
102	1	WWE	Base	Mixing bowl	Pale brown slipcoat ext. Kitchenware	25
102	1	WWE	Base	Eggcup	Mottled green suspension glaze wash ext	5
102	23	WWE	1 intact base, 20 body, 2 rims, 1 base	Misc	Unglazed whiteware, at least 2 vessels represented although the majority of the body sherds probably match to the intact base. A straight-sided vessel of unknown function.	410
102	3	WWE	1 rim-base, 1 base, 1 rim	Bowl	Distinctive hand-painted decoration in thick dark green slip; a repeating pattern of green leaves in vines. Very similar to other examples in nearby excavations seen by the author.	130
102	1	Misc	Handle	u/id	Probably whiteware; sherd is very burnt.	5
102	20	GST	Various fragments	Electrical insulators	1x2 joins. Solid cylindrical items with slightly convex profile. Central screw-threaded hole, in many cases appears to have been plugged with mortar perhaps to secure something in place. At least 5 individual items represented, all identical	945
103	1	CEW	Rim	Pancheon	Black lead suspension glaze	50
103	1	CEW	Rim-Body	Pancheon		35
103	8	CEW	Body	Pancheon	6 black glaze, 2 clear glaze	395
103	1	CEW	Body-Base	Pancheon		95
103	1	CEW	Handle	?Cistern		55

Context	Quantity	Type	Part	Form	Comments	Weight (g)
103	1	CEW	Body	Bowl	Fine-grained hard orange body, rare small inclusions. Cream glaze.	20
103	3	BCH	Body	Hollowware	Probably teacups	15
103	1	BCH	Handle	Teacup		5
103	1	BCH	Rim	Saucer	Polychrome TP dec onglaze, probably early 20th century	3
103	2	BCH	Body	Hollowware	Undiagnostic	4
103	1	BSGSW	Rim	Hollowware		35
103	7	BSGSW	Body	Hollowware	At least one bowl represented	85
103	1	FLOW	Base	Flatware		10
103	2	FLOW	Body	Hollowware		10
103	5	GST	Rim	Jar	1x2 joins. 'Marmalade' type jars	75
103	3	GST	Body	Jar	'Marmalade' type jars	35
103	2	GST	Body-Base	Jar	'Marmalade' type jars	110
103	2	GST	Base	Jar	'Marmalade' type jars	20
103	1	GST	Base	Bottle	50% intact base	70
103	9	GST	Body	Flagon	Flagon or similar large hollowware vessel. 1 body sherd has partial applied patch stamped "-IRIT MERCH-/ -SLEY-"	140
103	1	LBLACK	Body	Hollowware	Globular profile of vessel, large mug or jug. Partial glaze ext., full glaze internal. Hard dark red fabric, rare small granular inclusions	25
103	1	SPONGE	Handle	Teacup	Blue sponge dec	3
103	3	SPONGE	Body	Hollowware	1 pink sponge dec, 2 blue sponge dec.	5
103	1	SPONGE	Base	Hollowware		5
103	6	TPWW	Rims	Flatware	Blue transfer printed dec, Broseley style pattern.	85
103	1	TPWW	Rims	Hollowware		3
103	7	TPWW	Body	Flatware		20
103	8	TPWW	Body	Hollowware		25
103	17	TPWW	Base	Flatware	Triangular stilt marks on 1 base sherd.	65
103	1	TPWW	Handle	Tureen		10
103	1	TPWW	Body	Hollowware	TP in black, neatly clobbered in blue, green and pink	2
103	3	WWE	Rim	Flatware		15
103	1	WWE	Rim	Serving dish	Lustre dec on edge	10
103	1	WWE	Rim-Base	Side plate		15

Context	Quantity	Type	Part	Form	Comments	Weight (g)
103	11	WWE	Body	Hollowware	Mostly undiagnostic. 1x2 joins; teacup. Thicker vessels, maybe serving dishes	70
103	7	WWE	Base	Hollowware	1x2 joins; teacup	30
103	1	WWE	Body	Hollowware	Hand-painted suspension glaze in pink & black	10
103	1	WWE	Rim	Bowl	Serving bowl. Hand-painted rim decoration in blue	5
103	1	WWE	Rim	Hollowware	Blue banded slip dec. Bowls or similar	10
103	5	WWE	Body	Hollowware	Blue banded slip dec. Bowls or similar	15
103	2	WWE	Base	Flatware	Unglazed- possible that the glaze has been detached. Badly fired.	15
103	1	WWE	Base	Hollowware	Unglazed- possible that the glaze has been detached. Badly fired.	3
103	1	WWE	Base	Hollowware	Pink glaze internal. Seems likely that the rest has flaked off. Badly made	4
103	3	WWE	Body	Hollowware	One possible teapot sherd. Dark brown suspension glazes	40
103	1	WWE	Base	Flatware	Brown suspension glaze int & ext.	5
103	2	YWE	Rim	Dishes		5
103	1	YWE	Rim-Body	Bowl		20
103	7	YWE	Body	Hollowware		55
103	1	YWE	Body-Base	Bowl	No footrim, probably kitchenware	10
115	3	BCH	1 base, rim, body	Hollowware	Teawares or similar.	5
115	1	BCH	Body	Hollowware	Matte finish, possibly similar to Parian ware although very thinly potted. Impressed lettering, although unreadable due to the small size of the sherd.	2
115	1	BSGSW	Body	Hollowware	Probably bottle	15
115	3	CEW	1 rim, 2 body	Pancheon or similar		325
115	4	GST	Body	Jar or similar	Probably jar, possibly flagon sherds.	70
115	1	GST	Body	Flagon	Flagon shoulder, brown oxide wash from neck to shoulder. Partial onglaze printing in black; "-RN WHEN EMPTY", assumed to mean 'return when empty to redeem deposit' or similar.	125

Context	Quantity	Type	Part	Form	Comments	Weight (g)
115	2	GST	Rim-Body	Jar	Wide-necked jar with shoulder. 1x2 joins. Brown oxide wash from rim to shoulder.	435
115	4	GST	See comments	See comments	Unusual stoneware items- 2 intact, 1x2 joins to form identical intact item, 1 partial fragment. Same as the grey stoneware item from context 102. U-profile segments 45mm long, 73mm wide at top, 40mm high. Stamped serial numbers on base. Precise function unknown.	395
115	2	TPWW	Base	Flatware	Spalled & crazed.	20
115	1	TPWW	Body	Hollowware	Brown TP onglaze	10
115	1	TPWW	Handle	Tureen or teapot	Moulded. TP in blue	10
115	6	WWE	Body	Hollowware	2 blue slip banded dec, 1 green suspension glaze wash, 2 TP in pink	15
115	1	WWE	Rim	Hollowware	Onglaze blue dec, very faded	2
115	6	WWE	Body	Hollowware	Plain undiagnostic sherds	15
115	1	WWE	Rim	Bowl	Plain	5
115	1	WWE	Whole	Sphere	Unglazed whiteware body 15mm diameter	5

Key to fabric codes:

Code	Name
BCH	Bone China
BSGSW	Brown salt-glazed stoneware
CEW	Coarse earthenware
FLOW	Flow blue (sub-type of whiteware)
GST	Grey stoneware
LBLACK	Late blackware
SPONGE	Spongeware (sub-type of whiteware)
TPWW	Transfer-printed whiteware
WWE	Undecorated generic whiteware

Plates



Plate 1: Sample of ceramic insulator sherds from context 102, identical to those from 101



Plate 2: Pierced stoneware lid from context 102



Plate 3: Plate with hand-painted ivy leaf pattern from context 102



Plate 4: Dandison's Spirit Merchant flagon sherd from context 103



Plate 5: Stoneware objects, possibly pipe supports, from context 115

A3.2 Clay tobacco pipe

By Rowan May

A small group of 26 clay tobacco pipes was recovered during the investigations at the boiler house. One stem (context 101) was found during the test pitting phase (project 2073), the remaining 25 were from the trial trenches (project 2169). The catalogue is presented in Table 3. The clay pipe assemblage comprises stems, mostly plain, with four having partial or complete spurs, but no bowl pieces were recovered. One of the stems is in a brown clay with the remainder being the more common pale grey/white. Traces of green glaze were seen on one stem, which was presumably broken off close to the mouthpiece. One spur had small moulded circles to either side, probably part of the decoration on the bowl, which was missing.

Plain stems are difficult to date closely, but those recovered from the Elsecar investigations were of a fairly standard size, with the external diameter of the stems ranging between 5mm and 7mm and internal bore diameters of 1.6-1.8mm. This suggests that they date from the later 19th century or very early 20th century (Ayto 1994, 6). No further study is recommended for this assemblage and it is not recommended for retention as part of the site archive.

Table 3: Catalogue of clay tobacco pipes

Site code	Trench	Context	Count	Descriptions	Dimensions (mm)
2169	1	103	13	Stem fragments, mostly plain white, one with traces of green glaze, one with small grooved incisions towards the bowl end.	Lengths: 50; 41; 38; 36; 35; 32; 30 (2); <3 (4); stem diams: 5-7; bore diams: 1.6-1.8
2169	1	103	3	Stem fragments with spur or partial spur, all white in colour, one with trace of moulded circle decorations around the spur.	Lengths: 53; 33; 21; stem diams: 6-7; Bore diams: 1.6
2073	TP1	101	1	Small plain white stem fragment	Length 17; diam 7; bore diam 1.6
2169	2	101	2	Two stem fragments, white, one broken off close to junction with bowl	Dimensions: L 32 x D 6; L 21 x D 7; bore diams: 1.6
2169	2	102	4	Four plain white stem fragments, one with grey staining or burning.	Lengths: 55; 42; 30; 25; stem diams:6-7; bore diams 1.6
2169	3	115	3	Plain stem fragments, two white (one with grey staining or burning), and one reddish-brown with partial spur.	Lengths: 31; 23; 21; stem diams: 7; bore diams: 1.6

Reference

Ayto, E.G. 1994. *Clay Tobacco Pipes*. Shire Album 37. Shire Publications Ltd: Princes Risborough.

A3.3 Glass

By Rowan May

The investigations at the Elsecar Newcomen-type engine boiler house produced an assemblage of 219 fragments of glass, all from backfill deposits (see Table 4). The majority (145 fragments) was recovered from context 102, the backfill of the northern boiler cavity. Most of the glass from the site represents food and drink containers, mostly bottles and some jars or storage vessels, with a small number of fragments of window glass and possible decorative items.

The assemblage is all very fragmentary, with no complete or near complete vessels, which makes dating and interpretation difficult. Some complete rims and bases are present, including the base of at least one bottle probably produced by an automated machine, as well as several other examples with mould seams on the sides or base, and some with manufacturing codes. The automated machine bottle is likely to date to the 1920s or later, and this seems a likely date for the majority of the assemblage, which fits with the 1930s date for the removal of the boilers.

Only a few bottles with embossed labels were found within the site, and only one of these was complete. It is therefore difficult to ascertain what the contents of the bottles were, though beer, wine and mineral waters are likely to be represented. The majority of glass was clear, or tinged with blue or green, with only a few fragments of green or brown glass. Several embossed pieces had parts of a design associated with Mappin's Masbro' Old Brewery, representing at least four bottles with identical stamps, one in green and three clear glass (Plates 6 & 7). This brewery was registered in 1885, and changed its name to Mappin's Brewery Ltd in 1949. The brewery owned numerous pubs in South Yorkshire, including the Market Hotel on Wentworth Road, just outside the Elsecar Heritage Centre (*Brewerypedia*). It is possible that the pub was the source of the bottles, but it is unclear if they represent waste from the pub or from the workshops occupying the heritage centre at that date. Another probable brewery stamp is Whitworth's, with a shard having the name and the letters 'WA—' (Plate 6). This is probably the brewery of Whitworth, Son & Nephew, Wath on Dearne, who also owned a number of pubs in Elsecar, including three on Hill Street, one each on St Helen's Street and Wath Road, and the Ball Inn on Milton Road, Hoyland (*Brewerypedia*).

The only complete bottle stamp read 'FLETCHERS', on the side of a square-plan bottle, probably a Fletcher's Sauce bottle, the company registered in Shipley in 1907 (Plate 6). Fletcher's produced brown sauces at Shipley and had its own glass bottle manufacturing plant in Leeds, but moved to a purpose-built factory and bottling plant in Selby in 1915. The company was purchased by HP Sauce in 1947, but the name was retained until the 1980s (Farrell 2015). The style of the bottle and label suggest it dates to the earlier years of the company. One of the jars from the assemblage had a black deposit adhering to the inner surface. It is unclear whether this was a post-depositional accretion, but it is possible that the jar was reused to store paint, oil or something similar. One large, square base, at least 11.8cm on each side, from context 102 may be part of a battery jar or laboratory jar, though none of the upper body survives.

The few fragments of potentially decorative glass include very thin, curved, clear body fragments that appear too fine to be from bottles or drinking vessels. Some may be from light bulbs or lamp shades. Three fragments from context 102 that are certainly decorative are a

creamy opaque colour with trailed white 'rib' decorations, and could be from a vase or lamp shade.

No further study is recommended for this assemblage.

Table 4: Catalogue of glass artefacts

Site code	Trench	Context	Count	Descriptions	Dimensions
2073	TP2	103	1	One pale aqua-green bottle neck (half), with a deep flat rim.	28mm diameter
2073	TP2	103	1	Base fragment of a thick green circular profile bottle with push-up, probably a wine or beer bottle.	
2169	1	103	1	Aqua-blue body shard, possibly of a square/rectangular profile bottle, with embossed ribbed decoration and letters 'TAKEN' over '-OUS' (possibly 'dangerous?').	
2169	1	103	3	Thin, clear window glass fragments.	2mm thick
2169	1	103	1	Clear window glass fragment crossed by green paint line.	3mm thick
2169	1	103	1	Thick clear flat glass fragment, possibly window.	6mm thick
2169	1	103	1	Body fragment of a cobalt blue bottle (probably quite large)	6mm thick
2169	1	103	1	Pale aqua-blue bottle stopper, flat top.	22m diameter, 30mm long
2169	1	103	2	Two base shards of different aqua-blue square/rectangular profile bottles, one thinner.	
2169	1	103	1	One base shard of a clear, circular bottle or jar, bubbles in glass in push-up.	Approx. 45mm diameter
2169	1	103	2	Two adjoining shards forming the entire base of a clear circular bottle/jar, no mould seams, indistinct ripple pattern on base.	56mm diameter
2169	1	103	1	Body shard of a clear, possibly octagonal profile bottle, with small patch of embossed ribbed decoration.	
2169	1	103	1	Shoulder shard of a clear square/rectangular profile bottle.	
2169	1	103	1	Circular rim fragment from a clear bottle, with a collar below the lip and a side mould seam.	
2169	1	103	1	Slightly opaque, clear, bulbous bottle neck fragment.	
2169	1	103	2	Clear bottle shoulder fragments, from different bottles, rounded.	
2169	1	103	1	Clear/aqua-green bottle shoulder/neck shard, with tops of embossed letters 'SUF' or 'SUE'.	
2169	1	103	1	Aqua-green body shard of an octagonal profile bottle, italic letters 'FF' embossed on one side in quite large font.	
2169	1	103	8	Clear/aqua-green bottle body shards, from different bottles.	

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	1	103	1	Very thin whitish-clear body fragment, possibly from a lightbulb, lampshade or similar decorative item.	
2169	1	103	2	Very thin white flint glass body fragments, probably from decorative item such as a lampshade.	0.5mm thick
2169	1	103	1	Brown bottle body shard (probable wine or beer bottle).	
2169	1	103	2	Two similar bases of green rectangular profile bottles, broken, but probably not from the same bottle.	Larger is 45mm wide, the full dimensions of the other are not clear
2169	1	103	5	Body fragments of green bottles, some possibly from the same bottle, possibly for wine/beer.	
2169	1	103	1	Brownish green bottle neck fragment, possibly quite narrow.	
2169	3	115	1	Heavily patinated green bottle neck and rim, side mould seams, raised collar around outer edge just below lip. Wine or beer bottle, probably with a cork stopper.	External diameter 30mm, internal 20mm, 96mm long
2169	3	115	1	Narrow rod of clear glass, with broken ends.	3mm diameter, 36mm long
2169	3	115	4	Green bottle body shards, three a very bright green, the other darker brownish-green.	
2169	3	115	1	Flat clear glass, probably a window fragment.	3mm thick
2169	3	115	1	Pale green-brown bottle rim fragment, ribbed on the interior, flat finish on the exterior. Possibly had a rubber stopper.	
2169	3	115	4	Clear, very thin glass fragments, possibly from lightbulbs, lamps or decorative items.	
2169	3	115	1	Small, thin aqua-blue bottle body fragment.	
2169	3	115	1	Small aqua-green bottle body fragment.	
2169	3	115	1	Aqua-green base fragment of a rectangular/square profile bottle.	
2169	3	115	2	Clear bottle body fragments, from different vessels, one with bubbles in the glass.	
2169	3	115	1	Flattish clear body or base fragment from a square/rectangular profile bottle.	
2169	3	115	1	Narrow circular profile bottle neck fragment, thin clear glass.	Approx. 15mm external diameter
2169	3	115	1	Base and part of body of a small, clear, narrow oval-profile bottle (perfume-type).	Base: 40 x 20mm, height 42mm

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	3	115	1	Shoulder, neck and rim of a rectangular profile clear/aqua-green case bottle. Stumpy neck with a thin rim band, no screw thread.	Rim: 23mm external diameter, 13mm internal; shoulder: c.58 x 39mm, neck: 29mm high
2169	3	115	1	Body shard of a quite thick clear bottle, embossed letters 'CH' on one side, large '15' on other. (Possibly Schweppes?)	
2169	3	115	1	Clear bottle body shard, embossed letters 'PP'.	
2169	3	115	1	Thin clear body bottle shard, possibly hexagonal profile, embossed measurement marks on one side.	
2169	3	115	1	Aqua-blue/clear flattish bottle/jar body fragment, deeply embossed letters 'OX' (or XO') - possibly OXO, or Oxford.	
2169	3	115	1	Clear/aqua-green thick bottle body shard, embossed 'WHITWORTH' vertically and 'WA--' across the centre, possibly Whitworth, Son & Nephew, brewers of Wath on Dearne.	
2073	TP1	101	1	Clear shoulder fragment of a square-profile bottle, part of an embossed diagonal line design is visible.	
2169	2	101	1	Clear thick, possibly stippled flat glass fragment, possible window glass.	10mm thick
2169	2	101	1	Brown bottle neck & rim fragment.	
2169	2	101	1	Clear/aqua-blue body and shoulder fragment of a bottle, unclear if square or rounded, with indent just below the shoulder. Possibly from a soda bottle?	
2169	2	101	1	Thick aqua-blue bottle body fragment, embossed '-SONS'.	
2073	TP1	102	2	Aqua-green square/rectangular profile bottle bases.	One 30mm wide, at least 45mm long; the other at least 68 x 90mm.
2073	TP1	102	1	Clear bottle shoulder/neck fragment, quite thick glass.	
2073	TP1	102	3	Clear body fragments, probably from bottles.	
2073	TP1	102	1	Small, clear ?neck or base shard of narrow bottle/vial.	
2073	TP1	102	1	Very thin clear body fragment, possibly from a bottle or decorative item.	
2073	TP1	102	1	Aqua-blue body fragment, side of a rectangular profile bottle with recessed embossed panel, letters 'GR'.	

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	2	102	3	Clear circular bottle body fragments each with parts of the same embossed design - a horse and rider with whip jumping a gate in a circular panel, with banner around reading 'TRADE MARK' and letters 'N'S', 'MASBRO' & 'ROTH' around the outer edge. Original is 'Mappin's Masbro Old Brewery Rotherham' 'Trade mark' 'Not to be beaten'. These represent three separate bottles as parts of the design are repeated on each.	
2169	2	102	1	Green circular bottle body fragments, with parts of the same Mappin's of Masbro Brewery design as the clear bottles listed above. The shards join and are part of a single bottle.	
2169	2	102	1	Clear body and partial shoulder fragment of a square-profile bottle, recessed panel with embossed 'FLETCHERS' on one side.	Approx. 40mm wide
2169	2	102	1	Small clear bottle body fragment with illegible embossed design.	
2169	2	102	1	Large clear bottle body fragment with part of embossed design and letter 'T'.	
2169	2	102	2	Glass marbles, clear with mould seam, probably Codd-type bottle stoppers.	20mm diameter
2169	2	102	1	Aqua-green bottle stopper with flat circular top.	25mm diameter, 33mm long
2169	2	102	1	Greenish-brown bottle body fragment.	
2169	2	102	2	Patinated green bottle body/neck fragments, not joining but possibly from the same bottle.	
2169	2	102	2	Small green bottle body fragments.	
2169	2	102	1	Quite dark green tall bottle neck fragment with base of finish/rim and mould seam. Possible wine bottle.	
2169	2	102	3	Clear neck fragments from different bottles.	
2169	2	102	3	Clear and aqua-blue shoulder fragments of different square-profile bottles.	
2169	2	102	1	Clear shoulder fragment of a possibly octagonal profile bottle with vertical embossed rib along one corner.	
2169	2	102	1	Clear shoulder fragment of a round or oval profile bottle.	
2169	2	102	1	Clear shoulder/neck join of a small oval profile bottle or vial.	
2169	2	102	4	Slightly patinated clear circular bottle body fragments, quite thick glass, all very similar and possibly from the same bottle.	
2169	2	102	8	Clear circular bottle body fragments, fairly thin bodied, most similar.	

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	2	102	17	Miscellaneous clear/aqua-green circular bottle body fragments, two with mould seams.	
2169	2	102	1	Aqua-blue oval profile bottle body fragment.	
2169	2	102	1	Aqua-blue circular bottle body fragment.	
2169	2	102	9	Aqua-green and clear square profile bottle body fragments, miscellaneous and probably from different vessels.	
2169	2	102	2	Clear body fragments from square-profile bottles, very similar, one with embossed letters 'ER'.	
2169	2	102	4	Thick, clear flattish glass fragments, probably from square-profile bottles rather than window glass.	
2169	2	102	1	Clear, thick complete circular base of bottle or jar, mould seams visible across three edges, embossed '220' manufacturing number in centre of underside.	70mm diameter
2169	2	102	1	Clear partial base fragment of quite a narrow bottle, with a ragged, possible suction scar suggesting manufacture in an automatic machine (1920s+).	
2169	2	102	2	Adjoining base shards of a clear, circular bottle, quite thick, with embossed letters 'B' and 'L' near the edge. Incomplete.	
2169	2	102	1	Partial circular base fragment, clear, embossed cross (+) in centre, with 'J H & -' and '30-' on opposite sides (rest of inscription missing).	
2169	2	102	7	Miscellaneous clear circular bottle base fragments.	
2169	2	102	1	Small base fragment of a clear bottle, probably square profile with circular central depression, embossed dot in centre.	
2169	2	102	1	Partial clear base fragment, bottle shape unclear. Circular depression with embossed 'T' and part of a manufacturing number (unclear).	
2169	2	102	1	Adjoining aqua-blue base fragments of an oval-profile bottle (incomplete).	Approx 70 x 40mm
2169	2	102	2	Aqua blue base fragments from two different small rectangular-profile bottles (medicine or similar).	One is approx 57 x 31mm, the other is 26mm wide.
2169	2	102	2	Adjoining pieces of a complete square bottle base, clear, with circular indent on base. Embossed 'B & CO LD' around one side of the indent, '33' on the other.	57mm square

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	2	102	1	Large aqua-green square base, fairly thin, unclear if this is a bottle, or a large storage or laboratory jar. Very slight circular depression on the underside, slightly rippled or stippled surface. It feels like there are very faint embossed letters also around the edge of the depression but these are illegible.	Approx 115-118mm square
2169	2	102	1	Partial base of aqua-blue bottle or large jar, probably square profile with circular depression.	
2169	2	102	3	Clear flat fragments probably from bottle bases, with variations in thickness across the shards.	
2169	2	102	3	Clear bottle necks and rims, all very similar in shape, two complete, one partial. Deep flat lip above protruding collar, and mould seam on either side of neck. Internal screw thread, probably indicating rubber stopper.	Rim: 31mm external diameter, 20mm internal; neck and rim 56mm high.
2169	2	102	1	Clear bottle neck and rim, rounded lip and wide collar.	Rim: 25mm external diameter, 15mm internal; rim and neck 40mm high.
2169	2	102	1	Small clear bottle or vial neck and rim, flat lip, side mould seams.	Rim: 21mm external diameter, 11mm internal.
2169	2	102	3	Rim fragments from clear bottles, too fragmentary to assess sizes.	
2169	2	102	1	Green bottle rim shard with rounded lip and collar.	
2169	2	102	1	Rim and shoulder of thick-bodied clear vessel, possibly a jug as the rim is not completely circular. Flat rim down to shoulder.	
2169	2	102	1	Aqua-green rim of wide-mouthed bottle or narrow jar. Flat-sided rim.	42mm diameter
2169	2	102	1	Clear partial rim of wide-mouthed bottle or narrow jar. Flat-sided rim.	
2169	2	102	4	Three rim and one shoulder fragment of clear wide jar or container, all very similar though none joining. All have slightly stippled outer surface, with a short lip and stubby neck. The largest fragment has a black substance adhering to the inner surface, possibly paint; fragments of this are visible on the other shards but much less extensively.	
2169	2	102	1	Clear glass jar rim fragment, rounded lip with external groove below.	

Site code	Trench	Context	Count	Descriptions	Dimensions
2169	2	102	3	Fragments of decorative glass, slightly opaque in a yellow-white colour, with trailed white 'rib' decoration. Body shards of a lampshade, vase or similar item.	1.5mm thick
2169	2	102	1	Small shard of very thin flat glass, possibly part of a decorative piece but this is unclear.	1mm thick
2169	2	102	3	Curving body fragments of very thin clear glass, possibly decorative, or from a light bulb/lampshade.	0.5mm thick
2169	2	102	9	Flat clear glass, probably window fragments.	2mm thick
2169	2	102	1	Flat clear glass, probably a window fragment. Black paint-like substance accretion on surface.	2.5mm thick
2169	2	102	1	Flat, slightly whitish/opaque or patinated glass, possibly a window fragment.	1.5mm thick
2169	2	102	2	Clear, flat glass fragments, possibly window pieces.	3mm thick
2169	2	102	2	Clear, flat glass fragments, possibly window pieces.	5mm thick
2169	2	102	2	Thick clear flat glass fragments with ridged surface on one side, probable window.	7mm thick
TOTAL			219		

References

Brewerypedia: the database of the Brewery History Society, accessed November 2019. <breweryhistory.com/wiki/index.php?title=Main_Page>

Farrell, T. 2015. 'Plenty of bottle: Fletcher's Sauce of Selby'. *Let's Look Again* website, updated August 2015. <letslookagain.com/2015/08/fletchers-sauce-co-of-selby/>

Plates



Plate 6: Embossed 'Whitworth', 'Mappin's' and 'Fletchers' fragments



Plate 7: Complete Mappin's bottle, brought in by a visitor (scale 10cm increments)

A3.4 Metal and industrial residues

By Rowan May

The investigations at the Elsecar Newcomen-type engine boiler house (projects 2073 and 2169) recovered an assemblage of 232 metal artefacts, the majority (159) of iron or steel (Fe), with 54 copper (Cu) alloy items and 21 of lead (Pb) or unidentified white metals (Plate 8). In addition, 23 pieces of slag associated with metal manufacture were recorded, including blast furnace and tap slags. All the items were recovered from backfill deposits within either the boiler cavities or the stoking cellar, apart from one unstratified item of uncertain derivation. Much of the assemblage was recorded and discarded on site, with representative examples retained for further assessment. The catalogue of metal artefacts and slag is presented in Table 5 below.

The bulk of the Iron or steel artefacts are nails (around 40%), varying in shapes and sizes (from 1½ to 5 inches), with round or square heads. A few nuts, bolts and washers were also recovered. Most of these are likely to have been used for structural purposes. Two hinges were also recovered, along with iron bars and spikes of uncertain use, some probably broken nails or bolts, and one possibly the broken-off end of a file. Iron or steel wire represented 7% of the Fe assemblage. Some possible brackets were also recovered, perhaps used for attaching pipes, cables or gutters to walls. One quite large piece of thin, flat iron sheet was recovered from Trench 1, of uncertain purpose. It is too thin to be part a discarded part of one of the boilers. Two thicker plate fragments from the Trench 2 backfill may have been parts of a lintel over the stokehole (Plate 9). A single vessel base, heavily corroded, may have been part of a paint tin or similar container 7 inches in diameter. There were also numerous small fragments of indeterminate Fe plate or sheet, some of which may have been part of the vessel.

The copper alloy artefacts again included many nails, smaller than the bulk of the iron nails, most around 1½ inches (40mm) long. Several of these from Trench 3 were found embedded in fragments of wooden batons, again suggesting that these were structural, perhaps from roof timbers. Copper wires included several quite long lengths of electrical cable, 13mm in diameter, formed of multiple strands of wire wrapped in a fabric outer layer. A possible fuse case was also recovered (unstratified), and a small brass button. A series of lightbulb bases were also recovered, eleven fragments from Trench 2 and one from Trench 3, within the boiler cavities. These included bayonet and screw fittings (Plate 10). It is unclear whether these are demolition debris or the deposition of a dump of rubbish within the backfill, possibly from an electrician's workshop.

Slag from the assemblage includes blue-green banded blast furnace slags, glossy black tap slags and lightweight bubbly grey slag. These may derive from processes undertaken at the Elsecar Iron Works, prior to its conversion to workshops. The small quantities represented are suggestive of general background waste material incorporated into the backfill deposits.

The overall character of the assemblage is consistent with rubbish and demolition material deposited into the boiler cavities and stoking cellar when the building went out of use. It is not possible to ascertain whether any of the material came from the boiler house itself, or was brought in as backfill material from elsewhere, though it seems likely that at least some of the material derives from the demolition of the boiler house superstructure. No further analysis of the material is recommended.

Table 5: Catalogue of metal artefacts and slag

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2073	TP2	103	Copper alloy	1	Thin Cu alloy strip/bar, uncertain purpose	106 x 14 x 3mm
2169	1	103	Copper alloy	1	Cu alloy multistrand wire, possibly electrical wire	Length 1530
2169	1	103	Copper alloy	5	Cu alloy nails, square section, round head	Lengths: 39
2073	TP1	101	Copper alloy	2	Cu alloy nails, round head, square section	One 10mm diam, 40mm long; one 6mm diam, 34mm long
2073	TP1	102	Copper alloy	2	Copper wire fragments, bent	Diameter 2
2169	2	102	Copper alloy	1	Button	Diameter 24
2169	2	102	Copper alloy	1	Copper wire, multistrand cable, possibly electrical	Length 650
2169	2	102	Copper alloy	2	Copper wire, two joined multistrand cables, possibly electrical	Lengths: 180; 160
2169	2	102	Copper alloy	6	Fragments of copper wire, multistrand cables, possibly electrical	Lengths: 110; 120; 140; 150; 210; 240
2169	2	102	Copper alloy	1	Copper wire fragment, two pieces twisted together	Length 100
2169	2	102	Copper alloy	2	Copper wire: two pieces of multistrand cable with an end connector, the second piece of wire fed through the hole.	Lengths 2100; 200
2169	2	102	Copper alloy	2	Copper wire: two pieces of multistrand cable joined and wrapped with fabric.	Length 205
2169	2	102	Copper alloy	1	Copper wire with loops at ends	Length 240
2169	2	102	Copper alloy	1	Copper wire piece	Length 690
2169	2	102	Copper alloy	4	Cu alloy nails, square section, round head, broken	Lengths: 30; 40; 45; 60
2169	3	115	Copper alloy	6	Cu alloy nails, flat round heads, square section	3 x 10mm diam 40mm long, 3 x 8mm diam 40mm long
2169	3	115	Copper alloy/ wood	2	Fragmented wooden baton with two cu alloy nails through it. Possibly part of a roof structure.	Wood: 120mm long, 20mm wide and thick, nails 10mm diameter 40mm long.

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	3	115	Copper alloy/ wood	3	Pieces of wood each with a nail hammered through, two with copper alloy nails, one with iron nail	Cu alloy nails: 10mm diameter 40mm long; Fe nail: 50mm long (2 inch)
2169	3	115	Copper alloy	5	Fragments of copper wire, one with knotted join	Diameter 1.5mm
2169	3	115	Copper alloy	2	Cu alloy nails, flat round heads, square section	1 x 5mm diameter 40mm long; 1 x 7mm diameter 57mm long.
2169	3	115	Copper alloy	2	Two lengths of multistrand copper wire, probably electrical cables, wrapped in fabric	Diams: 13; lengths 115 & 175
2169	3	115	Copper alloy	1	Part of a cu alloy tube or pipe, one end bent round	Diameter 25; length 125
2169		Unstrat	Copper alloy	1	Cu alloy fuse case, with fixing attachments	33mm long, 13mm diam
2169	1	103	Lead	1	Pb pipe, screw thread	Length 318, diam 24
2169	1	103	Lead	1	Curved, flat Pb piece, probably part of a gasket.	Length 115, width 25
2169	1	103	Lead	1	Pb strap, both edges cut at an angle, with a possible nail hole.	Length 248, width 42
2169	2	102	Lead	2	Pieces of lead sheet	1 x length 228; 1 x length 90
2169	3	115	Lead	1	Curved, flat piece of lead (Pb), possibly part of a gasket.	35mm wide, 3mm thick, diam approx 115mm
2073	TP2	103	Iron	1	Circular Fe ring/washer or fitting.	35mm diam, 13mm wide, 4mm thick
2073	TP2	103	Iron	1	Fe bar end, half-rounded, possibly the end of a file? Broken.	24mm wide, 12mm thick, 61mm long
2073	TP2	103	Iron	1	Fe nail, round head, round section, broken	Length 111
2073	TP2	103	Iron	1	Fe nail, round head, round section, broken	Length 128 (5 inch)
2073	TP2	103	Iron	1	Fe nail, no head, round section, broken	Length 70
2073	TP2	103	Iron	1	Fe nail, round head, square section, broken	Length 50
2073	TP2	103	Iron	2	Pieces of Fe plate, slightly curved.	One = 180 x 50 x 20mm, the other = 62 x 40 x 2mm
2169	1	103	Iron	2	Two pieces of Fe wire, each bent at mid-point	Length 160
2169	1	103	Iron	3	Pieces of Fe wire	Lengths: 48; 101; 55

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	1	103	Iron	1	Fe pipe, screw thread	Length 245, diam 33
2169	1	103	Iron	3	Fe washers	Diameters: 1 x external 42, internal 18; 1 x external 53, internal 21; 1 x external 44, internal 20
2169	1	103	Iron	3	Fe spikes: 1 x square section, head turned over, wedge tip; 1 x square section, head turned over, tip missing; 1 x broken, square section, square head.	Lengths: 380; 180; 250
2169	1	103	Iron	3	Fe straps	All 22 wide, lengths 132, 109 & 195
2169	1	103	Iron	1	Fe strap with a fixing hole at either end.	Length 545, width 26, hole diameter 8
2169	1	103	Iron	2	Fe hooks, round section, one end with a screw thread, the other with a wedge up bent over like a hook and squashed flat.	Lengths: 120; 117
2169	1	103	Iron	1	Fe spike, round section? Square head? Broken	Length 101
2169	1	103	Iron	3	Fe bars, square section	Lengths: 240; 125; 102
2169	1	103	Iron	2	Fe bars, round section, nut at one end	Lengths: 408; 95
2169	1	103	Iron	1	Fe bar, round section, no head, broken	Length 120
2169	1	103	Iron	1	Fe bar, square section, possible nail fragment	Length 52
2169	1	103	Iron	1	Fe bar with bar attached	Length 70
2169	1	103	Iron	2	Fe bars, rectangular section, broken	Lengths: 195; 193
2169	1	103	Iron	1	Fe bar with square headed nut	Length 100
2169	1	103	Iron	1	Fe bar, bent and broken	Length 80
2169	1	103	Iron	3	Fe bars, no details visible	Lengths 68; 80; 180
2169	1	103	Iron	3	Fe bars, profile unclear, broken	Lengths: 70 (2); 124
2169	1	103	Iron	1	Fe bar, heavily encrusted	Length 107
2169	1	103	Iron	4	Fe nails, square section, broken.	Lengths: 79; 105; 51; 66
2169	1	103	Iron	1	Fe nail, square section, square head, broken	Length 91
2169	1	103	Iron	2	Fe nail, square section, wedge tip, square head	Lengths: 76; 71
2169	1	103	Iron	2	Fe nails, square section, no head, broken	Lengths: 53; 121

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	1	103	Iron	1	Fe nail attached to the tip of a wooden stake. Square section, square head.	Length 109
2169	1	103	Iron	16	Fe nails, round section, round head, broken.	Lengths: 34; 61; 62 (2); 77; 78; 80 (2); 81; 91; 95; 99; 106; 111; 130; 145
2169	1	103	Iron	1	Fat Fe nail, round section, round head, broken	Length 87, diameter 8
2169	1	103	Iron	1	Probable Fe nail with fragment of wood adhering, round section.	Length 63
2169	1	103	Iron	2	Fe nails, round section, square head, broken	Lengths: 104; 58
2169	1	103	Iron	1	Fe nail, square head, broken, section profile unclear	Length 63
2169	1	103	Iron	1	Fe nail, square head, bent at a right angle	Length 112
2169	1	103	Iron	4	Fe nail, round section, no head, broken	Lengths: 52; 63; 66; 80
2169	1	103	Iron	1	Fe nail, round head, broken	Length 32
2169	1	103	Iron	1	Fe nail, flat section, round head, broken	Length 34
2169	1	103	Iron	1	Fe nail bent into staple, round section, round head	Length 95
2169	1	103	Iron	1	Fe bolt with nut, round section.	Length 56
2169	1	103	Iron	1	Fe possible pipe bracket, broken	Length 50
2169	1	103	Iron	1	Fe bracket with two round-headed nails or screws attached.	Length 109
2169	1	103	Iron	1	Large piece of Fe plate, rectangular and thin	Length 420, width 360
2169	1	103	Iron	5	Fe fragments	Lengths: 40 (3); 43; 52
2073	TP1	102	Iron	1	Fe nail, round head, round section	Length 132 (5 inch)
2073	TP1	102	Iron	1	Fe nail, round head, round section, broken	Length 82
2169	2	102	Iron	2	Sections of thick cast iron plate, one attached to part of a firebrick; possibly fragments of lintel from the stoking hole, but this is unverified.	1 = 300 x 110 x 35; 1 = 220 x 80 x 40
2169	2	102	Iron	1	Fe hinge	Length 85
2169	2	102	Iron	1	Fe hinge with round-section nail attached	Length 330
2169	2	102	Iron	1	Fe washer	Diameter: external 55, internal 17
2169	2	102	Iron	1	Fe spike with T-shaped head, broken	Length 105

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	2	102	Iron	1	Fe spike, round section, square head, broken	Length 105
2169	2	102	Iron	1	Fe spike, square section, square head, broken	Length 165
2169	2	102	Iron	2	Fe spikes, square section, no head, broken	Lengths: 160; 165
2169	2	102	Iron	1	Bent Fe spike, square section, square head, broken	Length 150
2169	2	102	Iron	3	Fe spikes, no details clear, broken	Lengths: 120; 160 (2)
2169	2	102	Iron	2	Fe spike, square section, square head, with square section Fe nail rusted to it	Lengths: spike 250; nail 145
2169	2	102	Iron	1	Fe pipe in two pieces, broken	Length 201
2169	2	102	Iron	1	Fe bar, flat section	Length 205
2169	2	102	Iron	4	Fe bars, no details	Lengths: 110 (2); 140; 170
2169	2	102	Iron	2	Fe nails, round section, square head, broken	Lengths: 100; 60
2169	2	102	Iron	1	Fe nail, square section, square head, broken	Length 90
2169	2	102	Iron	1	Fe nail, square section, round head, broken	Length 85
2169	2	102	Iron	2	Fe nails, square section, no head, broken	Lengths: 60; 70
2169	2	102	Iron	2	Fe nails, no details visible, broken	Lengths: 120; 60
2169	2	102	Iron	3	Fe fragments, no details visible	Lengths: 60; 75; 105
2169	2	102	Iron	1	Fe strap, two parts joined with rivets	Length 370
2169	2	102	Iron	4	Fe straps, no details visible	Lengths: 30; 110; 130; 210
2169	2	102	Iron	3	Pieces of Fe sheet/plate	Lengths: 50 (2); 140
2169	2	102	Iron	2	Fe brackets, made from thin metal	Lengths: 65; 140
2169	2	102	Iron	2	Fragments of an Fe container?	Lengths: 50; 60
2169	3	115	Iron	4	Pieces of Fe wire, one now broken in two. Round section.	Approx 5mm diameter
2169	3	115	Iron	1	Fe nail, round head, round section	Length 113
2169	3	115	Iron	1	Fe nail, round head, square section, broken	Length 60
2169	3	115	Iron	1	Fe nail, square head, section unclear, broken	Length 60
2169	3	115	Iron	1	Fe nail, square section, no head, broken	Length 100
2169	3	115	Iron	1	Fe nail, round section, head unclear	Length 100
2169	3	115	Iron	1	Fe nail, bent, round head, section unclear, broken?	Length 70

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	3	115	Iron	1	Possible Fe nail, ?round head, round section, bent	Length 95
2169	3	115	Iron	1	Possible Fe nail, no head, round section, broken	Length 60
2169	3	115	Iron	1	Fe nail or wire fragment	Length 40
2169	3	115	Iron	1	Fe nail or wire fragment	Length 130
2169	3	115	Iron	1	Fe bar, flat section, flat end, broken	130 x 30 x 8
2169	3	115	Iron	1	Fe bolt and hexagonal nut. Bolt has round section shaft, rectangular flat head	Nut: 25 diam; Bolt: head 25 x 35 x 11, length (inc head) 65
2169	3	115	Iron	1	Fe bolt, square head	Head: 40mm, each side 20mm thick, length (inc head) 130mm
2169	3	115	Iron	2	Two curved/bent pieces of Fe strip with folded over, rounded edges, possibly part of collar fittings. Both have broken ends.	1 x 40 wide, 1.5 thick, 65 long; 1 x 28 wide, 1.5 thick, 75 long.
2169	3	115	Iron	1	Thin Fe circular base of a vessel, such as a paint tin, much corroded. Also multiple small fragments of Fe plate, at least some probably from the same vessel.	Diameter 175 (7 inches)
2073	TP2	103	Unknown	1	Large handle of unidentified white metal, heart-shaped terminals. Possibly for a bucket.	15mm wide, 8mm thick, max span of 280mm
2073	TP2	103	Unknown	1	Small circular ring of unidentified white metal, possible washer but seems too narrow.	17mm diameter, 3mm wide, 1.5mm thick
2169	2	102	Unknown	4	Light bulb bases, bayonet fitting	Diameters: 22
2169	2	102	Unknown	1	Light bulb base, screw fitting	Diameter 14
2169	2	102	Unknown	1	Part of a light bulb, no details visible	Not measured
2169	2	102	Unknown	5	Small fragments of light bulbs	Not measured
2169	2	102	Unknown	1	Metal object, possibly core from a battery	Length 180
2169	3	115	Unknown	1	Light bulb base, screw fitting	Diameter 23
2169	1	103	Slag	5	Pieces of blue-green striated blast furnace slag	Not measured
2169	1	103	Slag	2	Pieces of glossy black, rounded bubbly ?tap slag	Not measured
2169	1	103	Slag	1	Small piece of lead scrap, possibly lead slag?	Not measured
2169	1	103	Slag	1	Chunk of bubbly and lumpy ?tap slag	Not measured
2073	TP1	101	Slag	1	Fragment of glossy black tap slag	Not measured
2073	TP1	102	Slag	1	Fragment of bulbous tap slag	Not measured

Site code	Trench	Context	Material	Count	Description	Dimensions (mm)
2169	2	102	Slag	1	Blast furnace slag	Length: 35
2169	2	102	Slag	3	Fe slag, two piece heavily encrusted	Lengths: 95; 130; 160
2169	2	102	Slag	1	Small piece of greeny-blue blast furnace slag	Not measured
2169	3	115	Slag	1	Small dark brown glossy drip of tap slag	Not measured
2169	3	115	Slag	2	Pieces of possible tap slag	Not measured
2169	3	115	Slag	3	Very light bubbled slag or clinker pieces	Not measured
2169	3	115	Slag	1	Dark, metallic ?tap slag fragment	Not measured

	Retained
	One or more retained
	Discarded

Plates



Plate 8: All metal objects from context 103 (scale 10cm increments)



Plate 9: Possible fragment of cast iron lintel from context 102



Plate 10: Lightbulbs from context 102 (scale 10cm increments)

A3.5 Building material, bone, shell & miscellaneous items

By Rowan May & Glyn Davies

Animal bone and shell

A small assemblage of ten animal bones, four mollusc shells and one worked shell item were recovered during the investigations at the boiler house. The material was all from backfill deposits within Trench 1 (stoking cellar) and Trench 2 (northern boiler cavity). The catalogue of bone and shell finds is presented in Table 6.

The shell assemblage consists of two oyster shells, two fragments of mussel shells, and a small mother-of-pearl button. The oyster shells show no evidence of working and along with the mussels are likely to be food waste. The button may represent casual loss from clothing. The animal bones include cow, sheep and pig as well as one chicken leg bone and a small mammal bone, probably from a cat or dog. Most of the cattle bones show evidence for butchery, and the bulk of the animal bone assemblage is likely to represent food waste. Due to the small nature of the assemblage and its derivation from backfill deposits, no further analysis or retention is recommended.

Table 6: Animal bone and shell catalogue

Site code	Trench	Context	Count	Descriptions
2169	1	103	2	Oyster shells, unworked, 1 pitted with ?parasite holes.
2169	1	103	1	Mother-of-pearl button, with two holes. 11.5mm diameter, 1.5mm thick.
2169	1	103	1	Fragment of mussel shell.
2169	2	102	1	Mussel shell, broken at one end.
2169	1	103	2	Sheep ribs, no butchery marks, broken.
2169	1	103	1	Ulna, probably from a young pig, no obvious butchery marks.
2169	1	103	1	Longbone end probably from a young cow, sawn through (butchered).
2169	1	103	1	Cow-sized vertebra fragment with one chop mark.
2169	1	103	1	Humerus of a small mammal, cat or dog size, no butchery marks.
2169	2	101	1	Longbone fragment, possibly femur, probably from a yearling cow.
2169	2	102	1	Fragment of a cow pelvis, heavily butchered.
2169	2	102	1	Cow phalange (1st).
2169	2	102	1	Chicken/bird leg bone.

Building material and miscellaneous items

Building materials, including brick, stone and roofing slate, were common within the backfill materials in all test pits and trenches excavated during the boiler house investigations. The majority was not collected, and only samples of slate and tiles were retained. Bricks with stamped frogs were photographed on site, with samples set aside and stored at the heritage centre. Other miscellaneous finds not associated with building material included a hard rubber

bottle stopper, a small fragment of pink plastic sheet, part of a large battery and two fragments of wooden stakes. The catalogue of building and miscellaneous artefacts is present in Table 7.

The bottle stopper has a screw thread and is likely to be of Vulcanite, also known as Ebonite, with the embossed logo 'BYB' across the top, in a diamond. The logo probably refers to Bentley's Yorkshire Breweries, of Woodlesford, Leeds, registered in 1893 and acquired by Whitbread & Co in 1968 (Brewerypedia).

The pieces of blue-grey slate retained as a sample all have peg holes, varying in size and shape. These all derived from the backfill and are considered to be roofing slates, from demolition debris. It is not clear whether these were from the boiler house roof or elsewhere. As well as roofing slate, similar slates were found set into the upper levels of walls around the boiler house, underlying the thick mortar layer that provided a bedding for the brick and stone surfacing within the boiler house. These were left *in situ* as part of the structure, and it is postulated that they represented a form of damp- or heat-proof course.

Stamped bricks noted during the excavation included examples from a number of local brickworks. Stamped bricks definitely related to the boiler house structure, all from the floor surfacing, were stamped 'James Smith & Co, Skyers Spring, nr Barnsley' (Plate 11). The Smith & Co stamp has quite a narrow date range, with this company operating from 1878 to c.1900, before being taken over directly by the Earl Fitzwilliam. This date range would suggest that the surfacing within the boiler house had been relaid at some point towards the end of the 19th century, possibly in association with an extension to the boiler house between 1859 and 1892. Bricks stamped 'EF' (Earl Fitzwilliam), 'Skier's Spring Hoyland' and 'Hoyland Brick Co Ltd' may be later products from the same works and were all from backfill rather than the building. It is noted that a watching brief on the reduction of the east wall of the site, possibly the eastern wall of the boiler house, recorded both 'James Smith & Co' and 'Skiers Spring Hoyland' bricks (Wessex Archaeology 2015). A firebrick stamped 'SMITH' was recovered from the backfill of Trench 2. It is uncertain whether this was made at James Smith's brickworks, though this remains a possibility. It was also unclear whether this brick derived from the structure, possibly collapse of the courses above the stoking hole, or was part of a brought-in backfill deposit.

Two bricks stamped 'J.K. Brown' (with the N reversed) were recorded from backfill deposits (Plate 12). This brickworks was based at Milton, just northwest of Elsecar, and the only other recorded brick with this stamp was found in excavations at the nearby Milton Forge in 2018 (T. Roberts pers. comm.). Census information indicates that John Kaye Brown's brickworks operated from at least 1851 to 1871, perhaps up until his death in 1877. It was presumably a relatively small-scale enterprise, and Brown was also a pub landlord in 1851. At the other end of the production scale, bricks stamped 'MANVERS' from the Manvers Main Colliery Brickworks, Wath-on-Dearne, were also found in the backfill. This was one of the largest collieries in South Yorkshire, the brickworks was producing up to 120,000 bricks per week in the 1940s (Hill 2001).

Two tiles were recovered, one in an unusually heavy material with a partial rectangular inset stamped 'CALL-/ELEC-'. It is possibly that this was lain over an electrical cable run. The other is a terracotta tile, one of two found, each with a recessed pair of conjoining circles on one side. Several fragments of ceramic drainage pipe were also recovered from Trenches 1 and 2.

It is recommended that the stamped 'J K Brown' bricks, the 'SMITH' firebrick and representative samples of the 'James Smith and Co, Skyers Spring, nr Barnsley' bricks are retained with the site archive. None of the other building material is recommended for retention.

Table 7: Catalogue of miscellaneous artefacts

Material	Site code	Trench	Context	Count	Descriptions	Dimensions
Rubber	2169	2	102	1	Rubber bottle stopper with screw thread, embossed logo 'BYB' in diamond on upper surface (the Y larger than the Bs). Probably Bentley's Yorkshire Brewery.	30mm diameter, 32mm long
Plastic	2169	2	102	1	Small piece of thin pink plastic sheet. Not retained.	
Composite	2169	2	102	1	Thin strip of black composite material with gritty substance adhering to one surface. Rounded edges, one flat edge, the other end broken. Probably from a large battery.	50mm wide, 6mm thick, 96mm long
Slate	2169	2	102	4	Fragments of blue-grey roof slate, a sample of the numerous pieces found during excavation. All with peg holes.	Peg holes: 1 = 8mm diameter, 2 = 5mm diameter, 1 = 12 x 9mm.
Slate	2169	3	115	1	Fragment of blue-grey roofing slate with a peg hole, sample of the multiple pieces encountered during excavation.	Peg hole: 9 x 8mm
Tile	2073	TP1	103	1	Thick orange-red ?floor tile with a 'frog' on one side in the form of two interlocking circles, lines extending out to the corners. Pale paint or plaster adhering to the flat surface. Just over a quarter of the full tile present.	125mm long, 50m wide, 20mm thick
Tile	2169	1	103	1	Broken thin, heavy ?tile or thin brick, ceramic but possibly with some metal content? Rectangular inset 'frog' on one side, stamped 'CALL-' and 'ELEC-' (rest broken off). Possibly covered an electrical cable run?	114mm wide, 31mm thick, 118mm long (broken)
Pipe	2169	1	103	7	Fragments of salt-glazed sewer pipe, 485g.	
Pipe	2169	1	103	1	Unglazed coarse sewer pipe with internal sooting, 350g.	
Pipe	2169	2	102	1	Coarse earthenware sewer pipe fragment, 260g.	
Wood	2169	1	103	1	Tip of a wooden stake.	90mm long
Wood	2169	2	102	1	Wooden spike (not retained)	160mm long

Plates



Plate 11: Selection of bricks recovered during excavation



Plate 12: J.K. Brown brick and semi-circular brick from excavation

APPENDIX 4: PROJECT DESIGN

Newcomen Beam Engine Boiler House, Elsecar

Project design prepared for a Community Archaeology Project

Funded by Great Place Wentworth and Elsecar and Elsecar Heritage Action Zone

Supported by Heritage Lottery Fund, Arts Council Fund, Barnsley Metropolitan
Borough Council, Rotherham Borough Council and Historic England.

Compiled by Dr Tegwen Roberts and Megan Clement



Heritage Action Zones
Historic England

Elsecar Heritage Centre

Wath Road

Elsecar

Barnsley

S74 8HJ

Tel. 01226 773728

Facebook Great Place Wentworth and Elsecar

Twitter: @GreatPlaceWE @ElsecarHAZ



Purpose of this Document

This document has been prepared as a project design for the community excavation and investigation of the boiler house adjacent to the Newcomen Beam Engine House, prior to reinstatement of the capping. The work is being carried out as part of the Great Place Wentworth and Elsecar and the Elsecar Heritage Action Zone (HAZ). The work will be carried out in two stages. Stage 1 was completed in May 2019. The purpose of this document is to lay out the research questions and methodology for Stage 2.

Partners

Great Place Wentworth and Elsecar

Great Place Wentworth and Elsecar is a 3-year funded project supported by the Heritage Lottery and Arts Council England. The project is hosted by Barnsley Metropolitan Borough Council (BMBC), with support from Rotherham Metropolitan Borough Council and Wentworth Woodhouse Preservation Trust. The project is based at Elsecar Heritage Centre, part of Barnsley Museums. The remit of the project is to work with deprived communities within Rotherham and Barnsley to help instil pride, raise aspirations and work with young people using heritage, arts and culture to achieve this.

Elsecar Heritage Action Zone

The Elsecar Heritage Action Zone (HAZ) is a 3 year partnership project between Barnsley Museums and Historic England. The key aims of the Elsecar HAZ are; improve understanding of Elsecar's heritage and its significance, support the conservation and future protection of historic sites within the HAZ area, and encourage local people and community groups to get involved in shaping the future development of the village and wider HAZ area.

Elsecar Heritage Centre, Barnsley Museums

Elsecar was developed from the late 1700s onwards by the Earls Fitzwilliam as a model industrial village. Elsecar Heritage Centre sits within the impressive historic buildings of the former Elsecar workshops and ironworks. It is part of Barnsley Museums; with Wentworth Woodhouse, the stately home for the Fitzwilliam's, just over a mile away in Rotherham. The jewel in crown of the Heritage Centre today is the Newcomen Beam Engine, the oldest steam engine in the World to survive in its original location.

1. Introduction

- 1.1 This project design outlines the methodology, aims and objectives for stage 2 of a proposed two-stage archaeological investigation on the former boiler house of the Elsecar Newcomen Beam Engine (Scheduled Ancient Monument, List No1004790). The work carried out will be in accordance with this project design, advice from Historic England and the Chartered Institute for Archaeologists (CIfA) Codes of Conduct (2014) and all relevant standards and guidance.
- 1.2 The work will be aligned with chapters from Historic England's "Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment" (Drury and McPherson 2008). The three chapters most relevant are: Repair (2008, 52), Intervention to increase knowledge of the past (2008, 54) and Integrating conservation with other public interests (2008, 60). See appendix 3 for the justification statement.
- 1.3 The excavation will be carried out as part of the Festival of British Archaeology 2019. The main aim of the festival is provide opportunities for member of the public to engage in a variety of ways with archaeology and heritage. The theme for this year's festival is archaeo-tech. The Newcomen Engine is the oldest known steam engine in its original location in the World, so fits well into this theme. The Festival is also aiming to work with Heritage Action Zones, and much of the background work done on the Newcomen Engine has been carried out through the HAZ at Elsecar.
- 1.4 Stage 1 of the project was completed in May 2019. This consisted of the removal of the failing concrete surfacing across area of the former boiler house, cleaning to the top of the archaeological horizon, evaluating the visible structures and deposits (through the excavation of two small test pits) and recording. This work was supervised by an archaeological contractor. The boiler house area was recorded before and after the concrete removal, using photogrammetry and standard context sheets.
- 1.5 Stage 2 has been informed by the results of the archaeological evaluation at stage 1.
- 1.6 The Inspector of Ancient Monuments at Historic England, Neil Redfern, has been consulted about the approach to stage 2.
- 1.7 Once stage 2 is complete, Historic England will be consulted on the best approach, assessment and future protection of the monument. As a minimum, a breathable membrane will be installed with a new concrete surface on top (as per the current surfacing on site) no more than 6 months after the concrete removal, unless by prior agreement with Historic England. See also section 9.

1.8 As part of the planning for the project, in-depth consultation has been carried out with a wide range of stakeholders, including local schools, professional archaeologists (including the South Yorkshire Archaeology Service), interest groups, visitors, local residents and the general public. The consultation has included site visits, focus days and questionnaires to record what people want to know about the site. We have also carried out targeted consultation with local schools (secondary and primary) and the Barnsley and Rotherham Young Archaeologists Club, to plan the work, and to find out what creative activities they would like to participate in as part of the project. The results of this consultation have fundamentally shaped our thinking, and the planning for stage 2. More information is included in appendix 1.

2. Site Location and Description



(Figure 1) Site location

2.1 The site is part of Elsecar Heritage Centre, one of Barnsley Museums visitor attractions (Figure 1).

The site is owned by and under the care of Barnsley Museums, part of Barnsley Metropolitan Borough Council. The site is a small area adjacent to the Newcomen Beam Engine House (centred NGR SK 38702 99974) (Figure 2). This is approximately 6 miles south of Barnsley town centre. The site lies on the western side of Distillery Side.

2.2 The site is a small area, approximately 40m square, which is located to the north of the Elsecar Newcomen Beam Engine. It is thought to be the location of the former boiler house(s) related to the running of the engine.



(Figure 2) Location of Newcomen Beam Engine House and Boiler House

3. Topography and underlying Geology

3.1 At the start of the work the site was covered in a layer of 20th century concrete, which was in poor and deteriorating condition. The concrete needed to be replaced in order to evaluate and protect any surviving archaeology below. Undertaking this essential conservation work also offers a unique opportunity to work with the local community to find out more about this nationally significant heritage site.

3.2 Underlying the concrete was a layer of mixed, soil-based infill. There are several hard surfaces and linear structure comprising of brick and stone. These are described in more detail in section 4 below.

3.3 The geology of the local area is a mixture of middle coal measures and sandstone (British Geological Survey).

4. Archaeological and Historical Background

4.1 The Elsecar Newcomen engine was installed in the mid-1790s, as part of the development of the Elsecar New Colliery by the landowner, the Earl Fitzwilliam. The new colliery was part of a new, planned industrial development at Elsecar. The colliery site was adjacent to the intended basin of the new Elsecar branch of the Dearne and Dove canal, which was approved by an Act of Parliament in 1793 and completed to Elsecar by 1796. It was also adjacent to the site of the new Elsecar Ironworks, which was also founded in 1795, and the two sites were closely connected.

4.2 Elsecar New Colliery was the first deep colliery to be sunk in Elsecar. It was sunk to the Barnsley Seam, approximately 120ft below ground. The Newcomen engine was required to drain water from the mine, as the new colliery was deeper than the underground soughs (deep drainage levels) that had been used to drain earlier collieries in the area (Clayton, 1964; May 2011). The engine was first used in 1795 and continued to be used for up to 12 hours a day for the next 128 years. At its peak it could raise 600 gallons of water per minute (ibid).

4.3 The Elsecar Newcomen Engine has been subject to detailed research in recent years, but little is currently known about its boiler provision. It is possible that it had an original haystack boiler, but there is currently only circumstantial evidence for this, and there are questions over whether the original boiler was internal or external.

4.4 The first known historic plans/maps of the site date from the 1840s. These plans suggest that, at this time, the boiler was probably a large, waggon-type boiler housed in a long rectangular boiler house, orientated north-south, immediately to the north of the engine house (ArcHeritage, 2011). This boiler configuration appears to have changed in the 1850s, when a shorter, wider boiler house was created, probably to house two cylindrical boilers with an east-west orientation (ibid). A report and cross section drawing from 1918 shows the boiler house in this configuration, with two egg-ended boilers in situ.

4.5 The latest boiler house was demolished in the late 1930s. A steam receiver was installed on the site at some point after this to allow the engine to be operated for occasional demonstrations, with steam being brought in from the nearby workshops (ArcHeritage, 2011).

4.6 A desk-based assessment was carried out by ArcHeritage in 2011, covering the whole area of the scheduled monument (including the boiler house, engine house, later pump house and environs).

4.7 A watching brief was carried out by Wessex Archaeology on groundworks undertaken as part of the HLF-funded Newcomen restoration project in 2015. They recorded a number of features within, and close to, the area of the boiler house, demonstrating that there is high potential for further archaeological remains to survive within the footprint of the boiler house (Wessex Archaeology, 2015).

4.8 In 2016, Historic England carried out a geophysical survey to the North of the engine house, on the boiler house site. Their results showed a number of linear features – interpreted as walls or

structures relating to the boilers – surviving below the concrete to a depth of up to 2.15m (Linford, Linford and Payne, 2017).

4.9 In May 2019 an archaeological evaluation (stage 1) was carried out after the removal of a layer of 20th century concrete. This identified good subsurface survival of structures relating to the former boiler house, including a number of substantial brick and stone walls in good and stable condition, with the exception of some of the brick surfacing which is eroding at the edges. The areas around the structures are filled with a relatively fine, soil and rubble based fill, which appears to have been carefully and deliberately laid down before the concrete was poured. A number of features were also identified in a wall in one of the test pits, thought to show the interface between one of the boilers and the stoking area. For more information please see ArcHeritage report (May, 2019).

5. Aims

5.1 The core aims for the archaeological investigations in Stage 2 are:

- Excavate targeted areas of the former boiler house as a community excavation, to coincide with the Festival of British Archaeology in July 2019
- Establish the depth of the former floor surfaces/foundation levels for the boilers and the stoking area
- Establish whether any buried features or deposits remain relating to the boilers and their operation – including ash pits, stoke holes, pipework and fittings, flues and masonry, and ensure these are fully recorded
- Establish whether any evidence survives for earlier boiler configurations or structures (including changes to the boilers, or boiler house, over time)
- Enable local people, including visitors, families and young people (including school groups) to find out about the site and respond to it in creative and imaginative ways – including answering some of the research questions that have emerged through the community consultation (see below)
- Inform the approach for managing the site in future (including interpretation and protection from weathering and erosion)

As outlined in section 3, as part of the planning for Stage 2, we have undertaken in-depth community consultation, including asking people what they want to know about the site. One of the aims of stage 2 is to try and answer some of these questions, and to share these with visitors and the general public.

Some of the most popular questions that have emerged during the consultation are:

- What materials were used to make the boiler house?
- What did the boilers look like?
- Where are the boilers now?
- When and why were the boilers removed?
- How did the boilers connect to the engine?
- How did they get the water into the boilers?
- Who were the workers?
- Who designed the boilers, and when?
- Who operated the pump (and how many people did it need)?
- What did people think about the engine when it was first built?

Some of these questions are unlikely to be answered through the excavation, but could potentially be answered through further archive and documentary research.

6. Public and volunteer involvement

6.1 Due to the size of the area being excavated, there will only be a limited number of volunteer places available. We will offer six places for members of the public on the dig, in half day slots (morning and afternoon). The excavation will run during the week, Monday to Friday, from July 15th to July 26th. There will be no excavation at the weekend, but there will be a public open day, including updates on the excavation, on Saturday 20th July, and public tours and demonstrations of the Newcomen Engine on Sunday 21st July. The public tours will be run by Barnsley Museums' staff.

6.2 The site is part of the Elsecar Heritage Centre, and the excavation is likely to attract a lot of interest from visitors and the general public. The archaeological contractor should allow time to talk to members of the public, although Great Place and HAZ project staff will also be on site to minimise disruption to the excavation.

6.2 There will also be a number of creative and archaeological workshops run by different artists and specialists. These will run alongside and draw inspiration from the main excavation, and will aim to involve visitors and families, as well as targeted groups of young people. Some of these workshops will take place within the Newcomen compound, and others may include a visit to the excavation. The archaeological contractors should allow time to speak to the workshop

leaders about the archaeology, and to explain to workshop attendees what is happening and what has been found. For details of the creative workshops please see appendix 1.

7. Methodology

- 7.1 This part of the document outlines what will be expected of the archaeological contractors commissioned to support the project. Stage 2 will comprise a community/volunteer based archaeological excavation managed by a professional archaeological contractor.
- 7.2 Before excavation starts, the surviving mortar overlying wall 106 (which runs between the two former boilers) should be planned and recorded, to preserve any surviving evidence of bricks and any other masonry that once sat on top. This may be used to inform future reinstatement of the wall top/brick floor surface.
- 7.3 Before excavation starts, the cut/shaped bricks along both sides of the area (which are assumed to have been shaped to sit on top of a curved boiler) should be carefully numbered, planned and removed into safe storage. The intention is to reinstate these as part of future conservation/consolidation work, however they are currently in poor condition and likely to be damaged by activity on site. The numbering should be done in such a way as to enable the bricks to be put back exactly as found.
- 7.4 Once the planning is complete, two trenches will be excavated within the area of the boiler house. The target locations are the west end of the northerly boiler pit, and the south end of the former stoking area (see Figure 1). The trench locations have been agreed based on the findings of the archaeological evaluation (stage 1) and in discussion Historic England. A third trench may potentially be excavated at the other end of the site, adjacent to the chimney base, if the first two trenches are completed. This will depend on progress during the dig, and will be evaluated and discussed on site with the contractor during the first week of the excavation. Priority should be given to completing and recording trenches 1 and 2.
- 7.3 The excavation will be undertaken by volunteers, supervised by the archaeological contractor. Due to the size of the site, it is recognised that there will only be a limited number of spaces on the dig at any one time. The days will be split into two half-day slots, and six volunteer places will be advertised for each half day slot. The excavation will run during the week, Monday to Friday, 9.30am-4.30pm. The dig will be advertised as suitable for children aged 14 or over, with adult supervision. A small number of local school groups (who have already been engaged with

the project) will also be invited to visit the excavation for half a day at a time. This will be discussed with the contractor in advance of the work commencing.

7.3 The excavation must be carried out using hand tools only. No mechanical tools are permitted.

7.4 The contractor will carry out sufficient safety checks (CAT scan etc.) before work commences, to satisfy themselves and BMBC that no services, including but not limited to; electrical cables, gas pipes and sewer/water pipes, will be disrupted during the excavation.

7.4 Due to the likely depth of the archaeology, the trenches will be stepped. The whole area of the trench should be excavated by hand, and stepped down as the work progresses. The evaluation (stage 1) suggests that the visible structures on site are in a good and stable condition; but this will need to be monitored. At this stage it is not envisaged that shoring will be required; however, this should again be monitored by the archaeological contractor as the excavation progresses. Any concerns must be raised as soon as possible with the Great Place and HAZ staff.

7.4 All archaeological features will be drawn, following standard conventions. Plans should be drawn at a minimum of 1:20 and sections at a minimum of 1:10.

7.5 A standardised pro forma record sheet will be used to record all archaeological contexts and soil horizons. Each context will be described in full on each sheet in accordance with accepted context recording conventions. Each context will be given a unique number and a register of numbers will be kept. Each of these records will be checked after completion.

7.6 All archaeological features/deposits will be photographed. A combination of working shots and post-excavation shots should also be taken during the excavation, including general and more detailed views. The photographic record will comprise 35mm format back and white film. Digital photography may be used in addition, but will not form any part of the formal site archive. All site photography will adhere to accepted archaeological photographic recording guidelines.

8. Dissemination

8.1 It is expected that the archaeological contractor will provide a grey literature report following the completion of Stage 2. The contractor will also be responsible for depositing the primary site archive with Barnsley Museums and Archives, providing a digital copy and hard copy of the report to the South Yorkshire Archaeology Service and uploading a copy of the report to OASIS.

9. Reinstatement

9.1 The archaeological contractor will not be expected to carry out any reinstatement work, unless any parts of the excavation need to be back-filled for safety reasons. At the end of the excavation the site should be left tidy and safe, to the satisfaction of Barnsley Museums' staff.

9.2 Once stage 2 is complete, Historic England will be consulted on any proposed future work and the best approach for ongoing and future protection of the monument. As a minimum the site will be covered with a breathable membrane/weed barrier (teram or similar) which in turn will be covered with an inert ballast/hard core, such as sand or pebbles. If no work is planned after the end of stage 2, a more permanent solution may be required. As a minimum this will comprise a new concrete surface, unless a suitable alternative is agreed with Historic England. Reinstatement will be completed within 6 months of the end of stage 1, unless by prior agreement with Historic England.

10. Health and Safety

10.1 Health and safety issues will take priority over archaeological matters and everybody on site must comply with relevant Health and Safety Legislation.

10.2 A risk assessment will be produced by the archaeological contract commissioned for the work and provided to Great Place and HAZ prior to work starting.

10.3 The site is part of the Elsecar Heritage Centre, and the excavation is likely to attract a lot of interest from visitors and the general public. The site is usually open to the public, although the boiler house area is fenced off from the main compound. We are keen that as many people as possible are able to engage with the archaeology, and we are also keen to maintain access to the Newcomen Engine wherever possible during the excavation. This should be factored into the risk assessment and discussed in advance with the Great Place and HAZ project staff.

10.4 A small amount of asbestos was identified during the evaluation (stage 1). This has been tested, and soil samples have also been taken from across the site (focussing on the proposed trench locations). All of the soil samples tested negative for asbestos fibres. The material recovered from test pit 2 was confirmed to be asbestos cement sheeting. This appeared to be confined to a single deposit within the test pit and at this stage it is considered to be low risk, but if any more is found it needs to be reported and assessed. A small amount of pink asbestos insulation/lagging was also identified part way along one of the walls (feature 106). The

asbestos survey recommended that this part of the site should be covered and left undisturbed. A temporary cover will be installed by Barnsley Council before the excavation begins.

10.5 Due to the presence of asbestos on the site, there will need to be an asbestos trained/asbestos aware member of staff present at all times, and appropriate PPE (gloves and P3 masks) must be provided. Any further cement-based asbestos sheeting that is found should be bagged (if considered safe to do so) and then reported immediately to the HAZ project officer, who will arrange for it to be collected, tested and safely disposed of. If any other suspected asbestos is uncovered this must be reported immediately to the HAZ project officer and work must stop in that part of the site until the area has been assessed and a safe way forward agreed.

10.6 The archaeological contractor should provide all PPE, tools and any additional archaeological equipment required by the volunteers (e.g. gloves and trowels). Members of staff must wear Hi-Visibility jackets and appropriate footwear.

10.7 The compound within which the Newcomen Engine and the Boiler House are located is locked overnight and there is 24 hour security on site. However, the archaeological site should be appropriately secured outside of work hours to ensure that no damage occurs when members of staff are not on site. It may be necessary to cover the trenches overnight. It may also be necessary to install temporary signage e.g. to warn visitors of potential trip hazards. This should be discussed with Great Place and HAZ project staff in advance of work starting.

10.8 Welfare can be found within the Heritage Centre where there are toilets and hand washing facilities. There is a small, covered, brick shelter on the boiler house site, which can also be used if needed. Alternatively there are larger areas within the visitor centre and BMBC on site offices which can be used to provide hot drinks and indoor sessions in adverse weather conditions. This should be discussed with Great Place and HAZ staff before the excavation commences.

10.9 A skip will be provided for removal of all spoil from the excavation. This will be organised by Great Place/HAZ project staff.

11. Timetabling and staffing

11.1 The dig will take place between 15th July – 26th July, Mondays-Fridays. In order to maximise public engagement and visibility the contractor should aim to finish on site with the community volunteers at the end of Friday 26th and allow an additional day the week after (week starting



July 29th) to clear up and shut down. Please also include an option for excavating on Saturday 20th July (this will be dependent on whether there is enough interest from volunteers).

11.2 We would like to offer two half-day training days for invited school groups on photogrammetry and 3D recording during the first week of the dig (to be led by the chosen archaeological contractor). One of these workshops will be on Thursday July 18th. The date of the second workshop is still to be confirmed. Please allow for at least one additional member of staff to be on site to lead the workshop on these days. Support will also be provided by HAZ and Great Place staff.

11.2 Please provide a list of the staff who will undertake the work, their roles and a copy of their current CV detailing previous experience of work with school and community groups. It is expected that the staff will be experienced and knowledgeable in archaeological investigation, particularly in regards to industrial archaeology, and community outreach. It is expected that the same members of staff are present for the whole length of the project.

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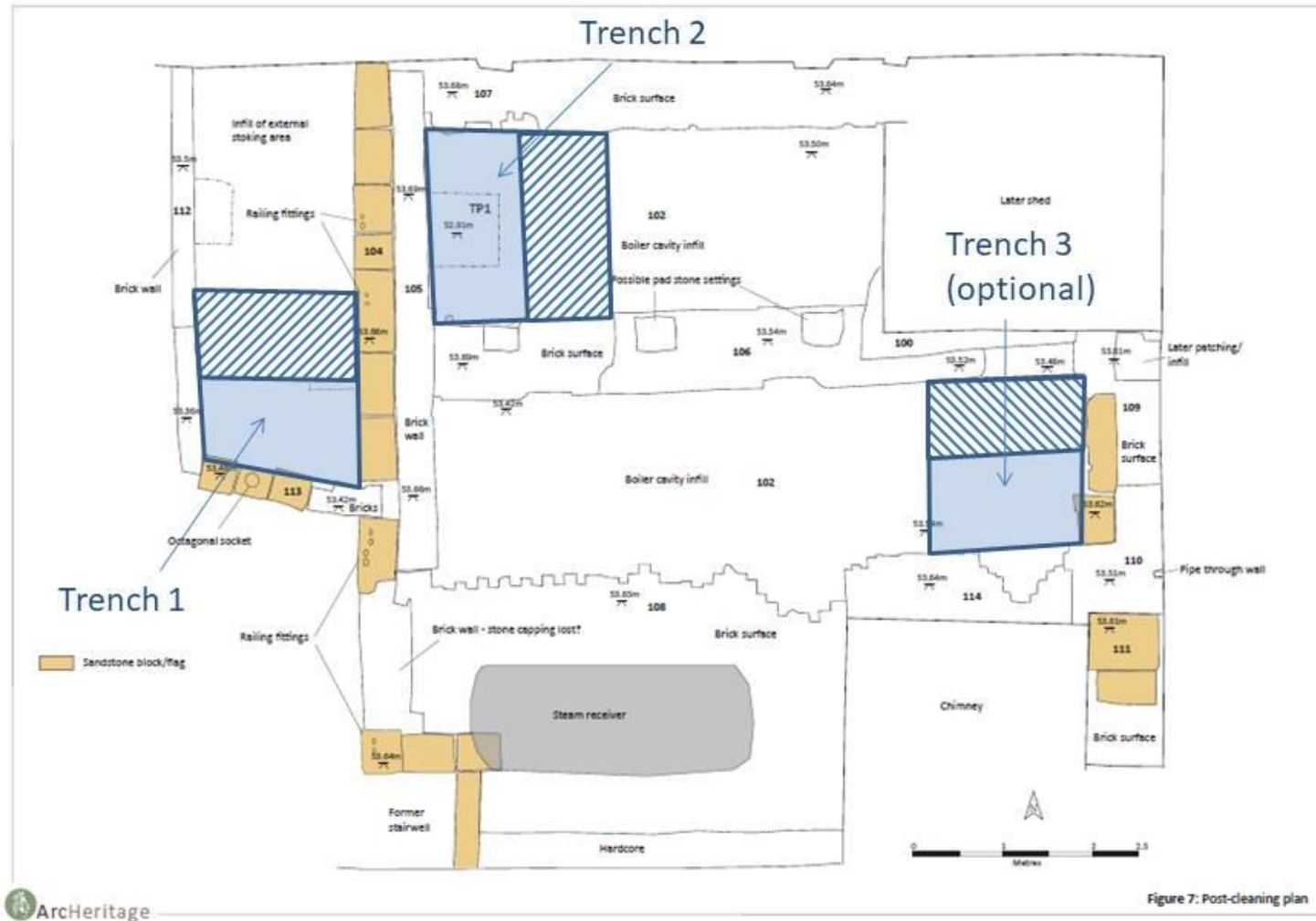
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Figure 1 – proposed trench locations



Location of proposed trenches (based on site plan from stage 1 evaluation) with stepped areas hatched.

ArcHeritage

54 Campo Lane, Sheffield, S1 2EG

tel: +44 (0)114 2728884

email: archeritage@yorkat.co.uk

www.archeritage.co.uk

