

---

## 10 INDUSTRIAL SITES, *by M Cressey, R Strachan and I Suddaby*

---

### 10.1 Introduction

Two 19th-century industrial sites were located and excavated as part of this project (illus 2.1). The former estate brick and tile works at Smeaton (NGR: NT 3693 6743) and the engine house associated with Fuffet coal pit, Cousland (NGR: NT 3693 6743) were excavated between October 1994 and March 1995.

### 10.2 General historical background

The expansion of coal extraction in East Lothian stimulated widespread economic changes leading to the development of numerous local ancillary industries which relied heavily on a regular supply of fuel. By the late 18th century these included salt makers, brewers, smiths, lime manufacturers and brickmakers. The first half of the 19th century witnessed an ever-increasing demand for coal brought about by the use of steam power and the huge demand of an expanding domestic market (Whatley 1994). Local industrial developments ran parallel alongside large-scale land improvement and innovations in farming techniques. The spread of the new ‘under-drainage’ techniques stimulated the adoption and wider use of ceramic drainage tiles and pipes (also called ‘tiles’ (Fenton 1976; Douglas & Oglethorpe 1993)). Earlier drainage techniques had been crude, usually in the form of ditches or simple trenches containing stones or brushwood and box drains that were usually capped with stone.

Estate brickyards arose in great number throughout the mid 19th century owing to the increasing demand for bricks, and importantly, drainage tiles and pipes. By the 1840s land drainage programmes were common, owing to the removal of the tile tax in 1839 and Peel’s Land Drainage Act of 1846. In 1839 the new Tweeddale Patent Drain Tile and Brick Company offered a new tile-making machine under licence to any Scottish estate where the consumption of tiles was sufficient to justify the capital outlay entailed in building drying sheds and kilns. Further legislation allowed Scottish landowners to raise capital for land improvement (Fenton 1976).

### 10.3 Smeaton brick and tile works, *by M Cressey*

#### 10.3.1 Introduction

Smeaton brick and tile works was situated at the foot of a fluvioglacial terrace that slopes to the north-east away from the modern dwelling of Newfarm (illus

2.1). Clay was excavated from the base of the terrace and processed for brick and tile manufacture.

The brick and tile works are first recorded on an engineer’s plan dating to *c* 1840 (NAS RHP23122) depicting subterranean splint coal deposits. The site is also shown on the 1854 Ordnance Survey first edition, 6 inches to the mile, map. This shows the brickworks and a tram road that linked the site to Smeaton colliery approximately 500m to the south. Aerial photography (RCAHMS, A69191, 1984; illus 8.2) provides further evidence for the overall layout of the brickworks. The cropmarks show the two kilns, with enclosure walls and the position of their respective drying sheds. The latter appear as four-aisled arrangements aligned east–west. Commonly these were timber-built, with shelving arranged in bays and enclosed by louvre shutters (Hammond 1977). Documentary evidence for the works is considered below (Section 10.3.3).

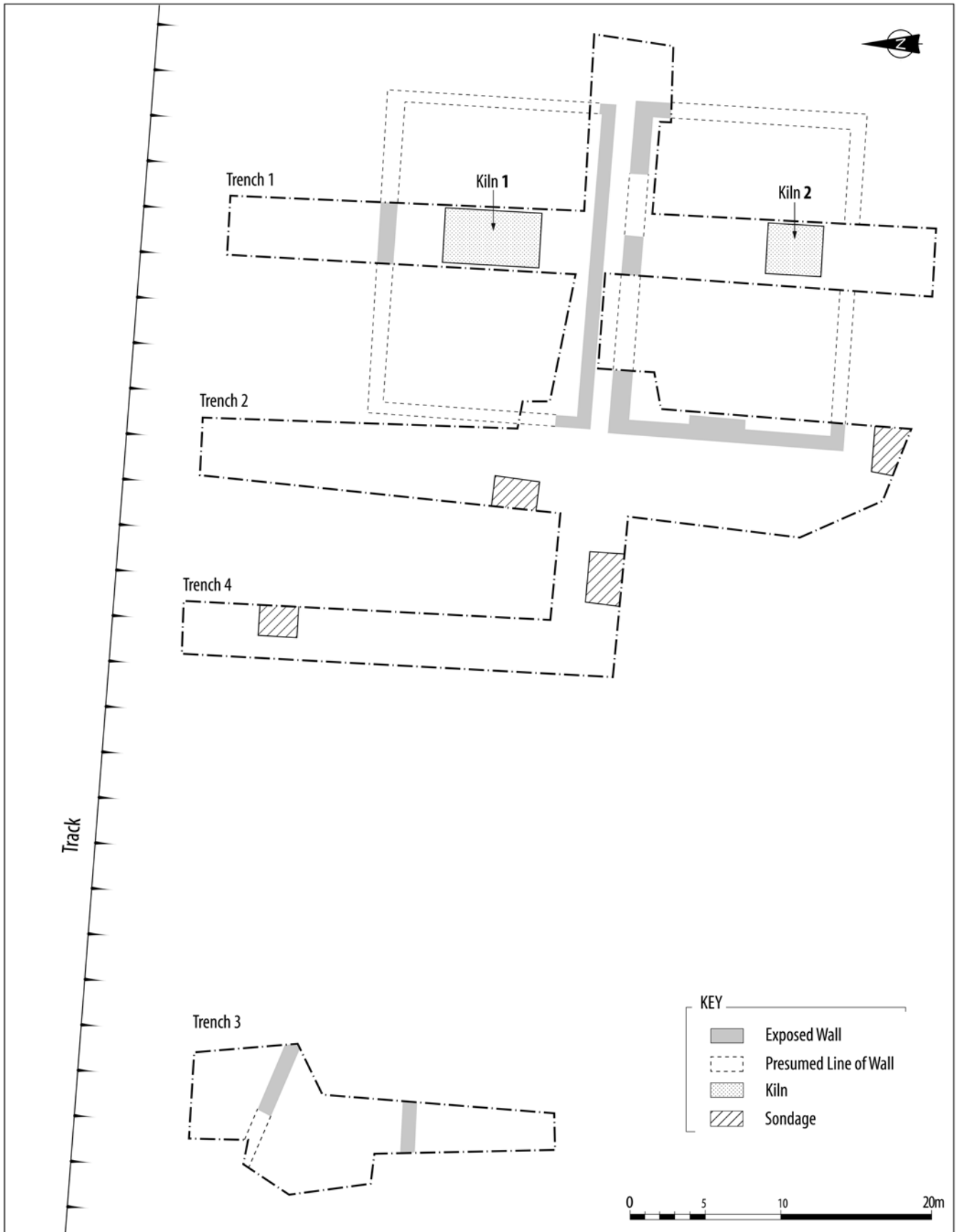
#### 10.3.2 Aims and methodology

At the outset of this work, two aims were proposed: (a) to define the type, location and surviving remains of the kilns in operation; and (b) to determine the range of products that were produced. Although many upstanding and documented brickworks in Scotland have been extensively surveyed and recorded by the Scottish Industrial Archaeological Survey 1977–85 (Douglas & Oglethorpe 1993), archaeological investigations of early brickworks such as the type encountered at Smeaton have been lacking.

The archaeological remains of kiln 1 and kiln 2 were located in Trenches 1 and 2 and in a transecting trench opened to link the two. Trench 3 was placed to investigate a feature, observed on an aerial photograph, which was thought to be related to coal mining, clay milling, coal storage or some other ancillary process connected with the brick and tile manufacture. Trench 4, to the west of Trench 2, was placed to identify any other building remains such as milling sheds or machine shops, but contained no structural remains. Generally the preservation of the site was good, but in some parts the structures had been severely disturbed when the site was levelled.

#### 10.3.3 The Smeaton brick and tile works, *by F Oliver*

Smeaton brick and tile works was described by the Ordnance Survey of 1854 (RH4/23) as ‘an extensive



Illus 10.1 Smeaton brick and tile works: trench location plan

brick and tile works on the lands of Smeaton'. The necessary raw material, clay, was in close proximity: 'an extensive bed of clay is found in the alluvial formation at Newfarm, and on the town-common near Gallowshall, where both bricks and drain-tiles are made. At the former place the bluish clay, seven feet thick, is seen lying beneath laminated sand, and passing into a reddish pebbly or stony clay, seventeen feet thick, which rests on sandstone' (*NSA Vol 1 1845*, 457).

Thanks to the *New Statistical Account*, the entry for Dalkeith being written in November 1844, we know exactly when this enterprise was opened: 'The brickfield at the north-eastern extremity of the parish was begun to be wrought in 1837: it yields an ample supply of bricks and tiles, which are formed with astonishing rapidity by a very ingenious machine, contrived by the present Marquis of Tweeddale' (*NSA*, Dalkeith, 501).

Tweeddale had invented his machine just the year before, in 1836. Since Tweeddale's lands were in Haddingtonshire, he was a near neighbour of the Buccleuchs and, as both families had a long-standing interest in agricultural improvement, it is hardly surprising that Buccleuch ordered one of the new machines more or less immediately, especially as it was reputed to be capable of producing up to 10,000 tiles per day. We know that the original patent was for a steam-powered machine which 'employed two leather-covered cylinders to compress the clay to the required thickness and width. The slab was carried over another cylinder to bend it to the curved form of a drainage tile, and then through a series of vertical rollers and hoops to further refine its shape. Finally, the clay was halted and cut into tile lengths by a wire suspended above the machine' (*Watt 2002*, 48).

As indicated by the above description the main purpose of the machine, and we assume of the Smeaton works, was the production of drainage tiles. This was not exclusively so, as there is evidence that bricks and other articles such as paving, flue covers, etc were produced (see GD224/ 552/2). It was, however, the high demand for clay tiles in order to promote the further drainage of agricultural land that provided the impetus both to Tweeddale's invention and Buccleuch's decision to build his works at Smeaton.

It is generally held that the development of machinery in the brick industry was held back by the excise tax imposed between 1784 and 1850. Since the tax was levied on all bricks produced whether or not they were actually usable, producers stuck to hand methods rather than experiment with costly machinery, which was bound to create large numbers of dud bricks before the process was perfected. Drainage tiles, however, were exempt from the duties as early as 1794, and it was the demand from the agrarian sector which led to the invention of various machines which could manufacture clay tiles in rural locations. Extrusion machines, which created shaped tiles in a single operation, became the most popular with landown-

ers. Tweeddale's was such a machine, as was that of John Ainslie, a Scottish farmer. In an interesting twist on mechanical development, both were criticised for being too large and being dependent upon steam; both responded by adaptations which made them suitable for manual operation. Smaller, hand-powered versions were what the landowner most needed; they were relatively inexpensive and more reliable (*Watt 2002*, 50).

The 19th-century authority on brickmaking, Dobson, explained the need of the agricultural community in making drain tiles a 'home manufacture'. 'What is wanted is a good and cheap method of making drain tiles without much plant and without erecting an expensive kiln, as the works will not be required after sufficient tiles have been made to supply the immediate neighbourhood' (*Dobson 1850*, pt 1, 45; see also *Watt 2002*, 50).

It would appear that this was just the sort of works that existed at Smeaton. The *New Statistical Account* promoted the system of the Duke of Buccleuch as a model to be emulated. Drainage was 'the groundwork of all improvement in farming', but was a significant cost to the individual farmer. However, having built his 'extensive manufactory' Buccleuch provided the drainage tiles to his tenants 'free of cost'. It is not clear just how 'free' this system was, as we are told also that 'the tenant drives the materials, and pays interest for the outlay at the rate of five per cent per annum'. While the leases on the Dalkeith farms at this time were only 14 years, which would elsewhere be seen as too short, this was justified on the grounds that 'the most expensive operation, that of draining, is originally performed at the cost of the landlord' (*NSA*, Dalkeith, 56-7).

The location of the brick and tile works at Newfarm made perfect sense, as it was almost literally on top of a clay pit which provided the basic raw material and was adjacent to the Smeaton colliery. The mix of agrarian and industrial activity in this immediate area is particularly well illustrated in two maps: the first OS map of 1854 and an estate map of 1860. Together these reveal the steadying of Newfarm, where the workers were housed, the arable field which was part of Smeaton Farm, the clay pits, the sand pit, the coal works, the brick and tile works and the railway (*Ordnance Survey, first edition, 1854*; RHP 9563). The Edinburgh-Dalkeith railway, opened in 1831 and originally operated by horses, was intended for the carriage of 'coal and other minerals, farm produce, manure, etc' (*NSA*, Dalkeith, 512). Shortly after, a three-mile section was built by the Duke of Buccleuch to service his coal mines. When the Edinburgh-Dalkeith railway was purchased by the North British railway company in 1845, this branch line, known as the 'Dalkeith Tramway', continued to be operated privately by the Buccleuch estate. While one section went to the Cowden pit, the main line ran to the Dalkeith colliery, and later sidings were added at the Elmfield ironworks and the Smeaton brick and tile works (*Hajdicki 1993*, 5).

The demand for the final product from the brick

and tile works was Buccleuch's own desire further to improve his estates and their agricultural output. While of local significance, the Smeaton works was relatively small-scale, despite the description of it as 'extensive'. The best overview we have of its significance is an entry in the 1871 census enumerator schedule against the name of one Kenneth McKenzie, who was living in a three-roomed house at Newfarm. Under occupation it was stated that McKenzie was 'manager of brickwork employing 12 labourers, 7 boys and 5 women'. This hardly compares to the largest brick and tile manufacturer in Scotland, the Garnkirk Fire-Clay Company, which was located in six acres of ground six miles to the east of Glasgow and employed 300 men and boys (Bremner 1869, 399).

The census of 1871 marks the last occupational link between the inhabitants of Newfarm and the brick and tile works. Examination of the valuation rolls for Dalkeith supports the view that the works had closed by 1881. The valuation given to the works in 1855 was £150 and this rose to £304 in the 1860s before falling back to £150 in the 1870s; the last appearance of the works in the valuation rolls occurred in 1877/78. In the list of irrecoverable debts in the Dalkeith colliery ledgers for 1876 is a reference to £18 2s. against the 'Smeaton tile work' (GD224/536/230). Moreover, the only Ordnance Survey map on which the brick and tile works appears is the first edition of 1854; by the time of the second edition of 1894 it is no longer there. In addition, the railway lines to many of the nearby collieries and the brick and tile works had also stopped operating by the end of the century (Hajdicki 1993, 8). What the immediate cause of the closure was we do not know: possibly the clay deposits had been exhausted, cheaper products could be got from elsewhere, or the demand for drainage tiles had been met. Whatever the reason, the Smeaton brick and tile works had played its short, but not insignificant, role in the agricultural and industrial development of Dalkeith and the Buccleuch estates. In the absence of documentary evidence, we are led to assume that the fate of the structure uncovered in the excavation at Newfarm was linked to this brief burst of industrial activity, spanning perhaps no more than 40 years.

### 10.3.4 Excavation

The removal of the topsoil exposed widespread demolition layers consisting of ash, kiln debris, brick and drainage pipe fragments to a depth of 0.8m and covering some 95% of the area of the trench. The two square enclosures formed the lower courses of walls enclosing firing floors where coal was loaded into the kiln fire boxes. The firing-floors associated with kilns 1 and 2 (illus 10.2 and 10.3) had enclosing walls standing to a height of 0.8m with a width of between 0.5 and 0.65m and comprised mortared dressed sandstone.

### 10.3.5 Kiln 1

The base of kiln 1 (illus 10.2) consisted of bricks resting on a level bed of fire clay. The fire clay formed a capping layer over the kiln's primary foundations, which consisted of three courses of mortared sub-rectangular sandstone blocks that measured on average  $c 0.3 \times 0.4$ m. The sandstone blocks rested on grey-brown natural clay.

Two metres north of the kiln floor, three brick columns formed the remains of a line of flues at the base of the kiln's northern wall. The flues were constructed from blocks of dressed sandstone and were approximately 1m thick. The flue to the east was lined with seven courses of quality fire brick. The bricks were mortar bonded and one bore the stamped name of 'SMEATON' with the N in reverse (illus 10.5, No. 7), providing evidence for an earlier brick manufacture at the site, possibly the one mentioned in the *New Statistical Account*. The base of the flue had a brick hearth that measured  $0.57 \times 0.15$ m and rested directly on natural clay. The flues were abutted to the north by a brick firing floor that measured 2.73m from the flue columns to the enclosure wall (illus 10.1) towards the northern end of the trench.

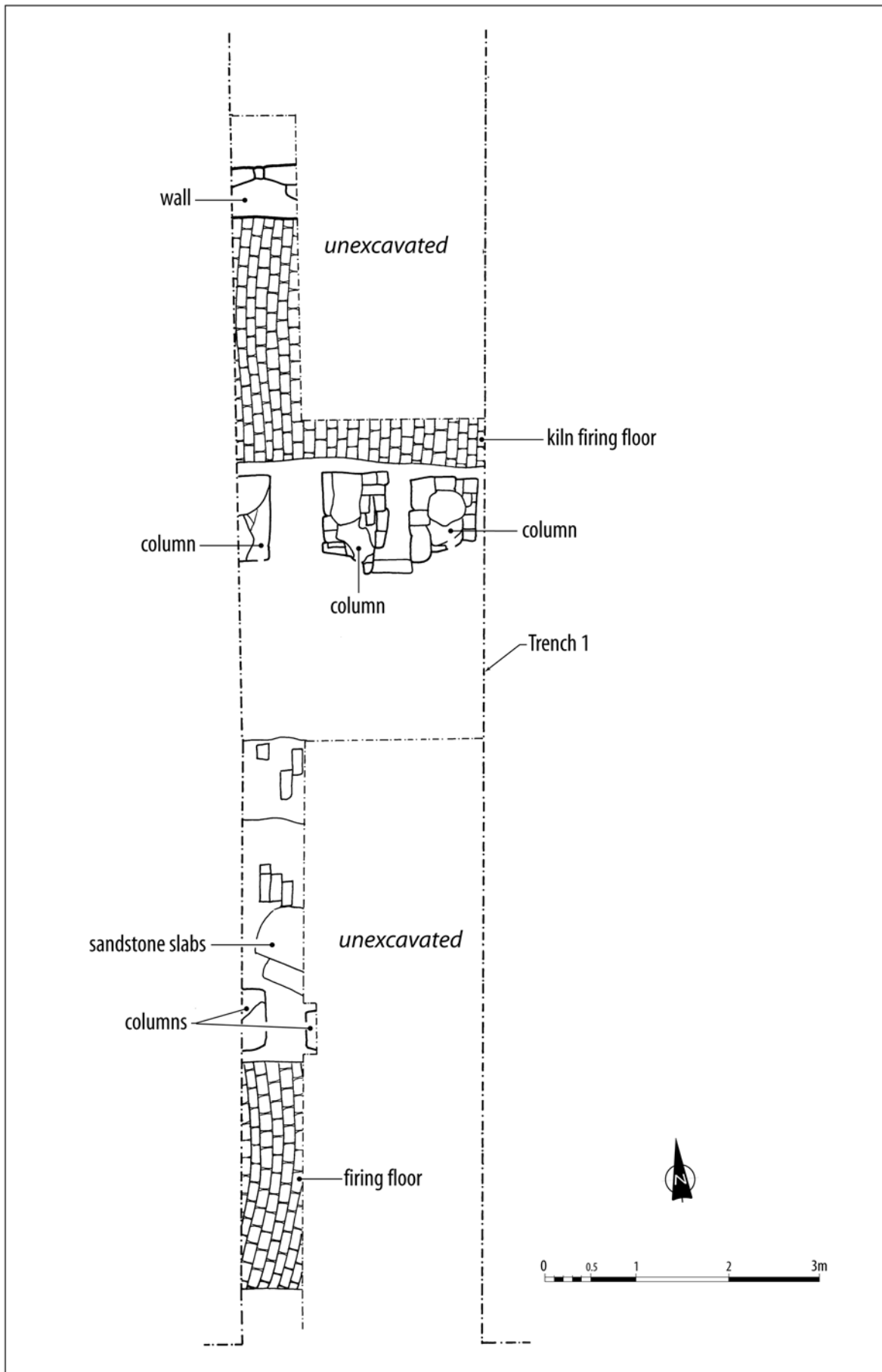
Two further columns were revealed in the trench that was placed to locate the southern half of kiln 1. The flue was seen to be of the same construction as that between the two eastern columns to the north, and comprised rough dressed sandstone lined with fire bricks. Although only partly recorded in section, its position confirms that the width of kiln 1 was 4.74m, based on the distance between the internal face of the juxtaposed flues. The flues on the southern side of the kiln rested on a brick-laid floor that ran 6m further south to meet the southern enclosure firing floor wall. This wall comprised roughly dressed mortar-bonded sandstone and stood to a height of 0.6m with a width of 0.53m. This wall rested on natural grey clay. No construction trenches could be identified on the southern side of this wall.

### 10.3.6 Kiln 2

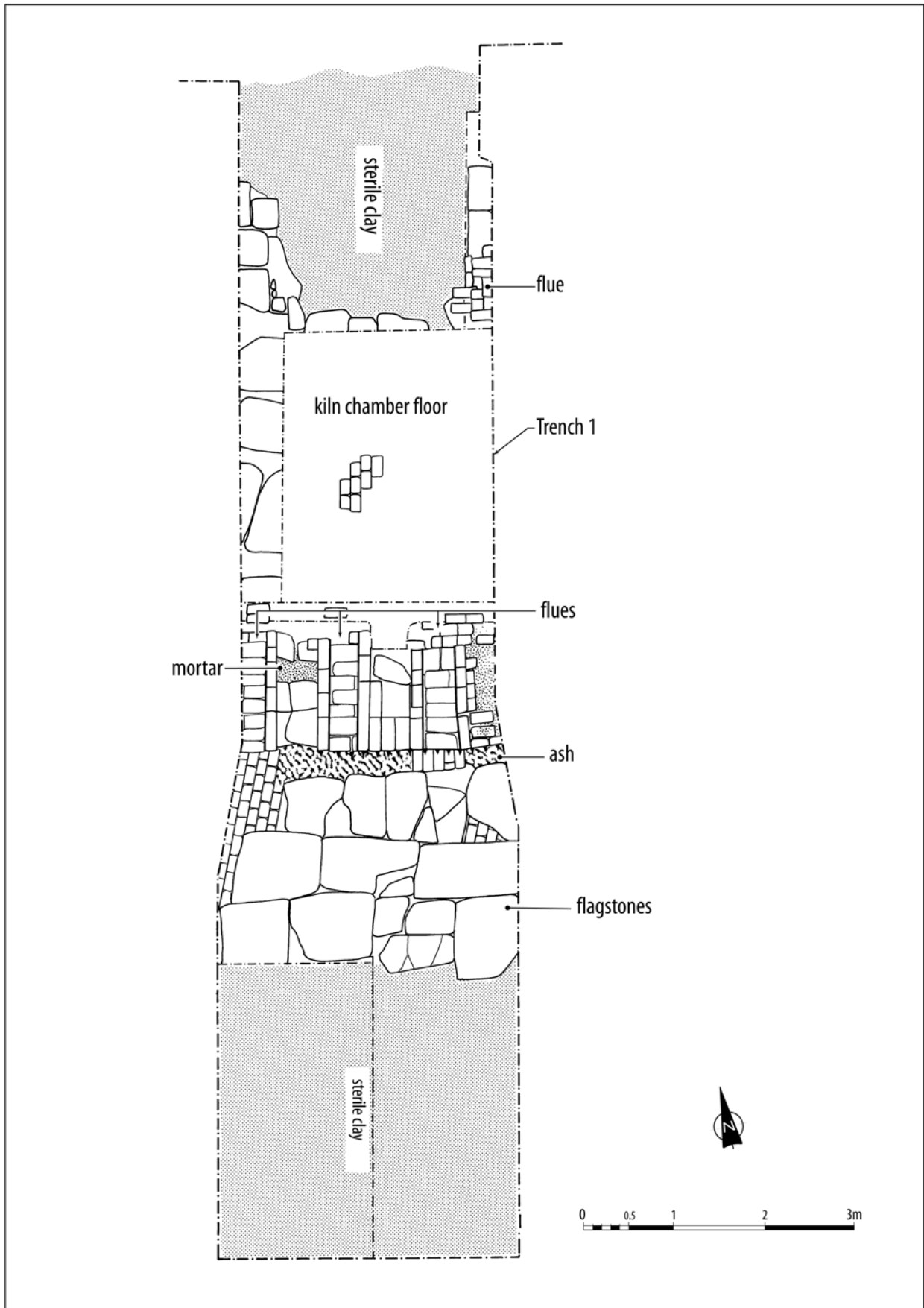
The distance between the southern enclosure wall of kiln 1 and the northern of kiln 2 was 0.88m and they were separated by natural undisturbed grey-brown clay (illus 10.1).

Kiln 2 (illus 10.3) was sealed by a loose brick rubble demolition layer to a depth of 0.65m. When this demolition layer was cleared the internal floor of the kiln was revealed. Six bricks were all that remained of the internal floor of this kiln. As with kiln 1, this floor was laid on a bed of refractory clay 0.1m thick. This layer sealed sub-angular blocks of mortared sandstone that formed the foundation of the kiln.

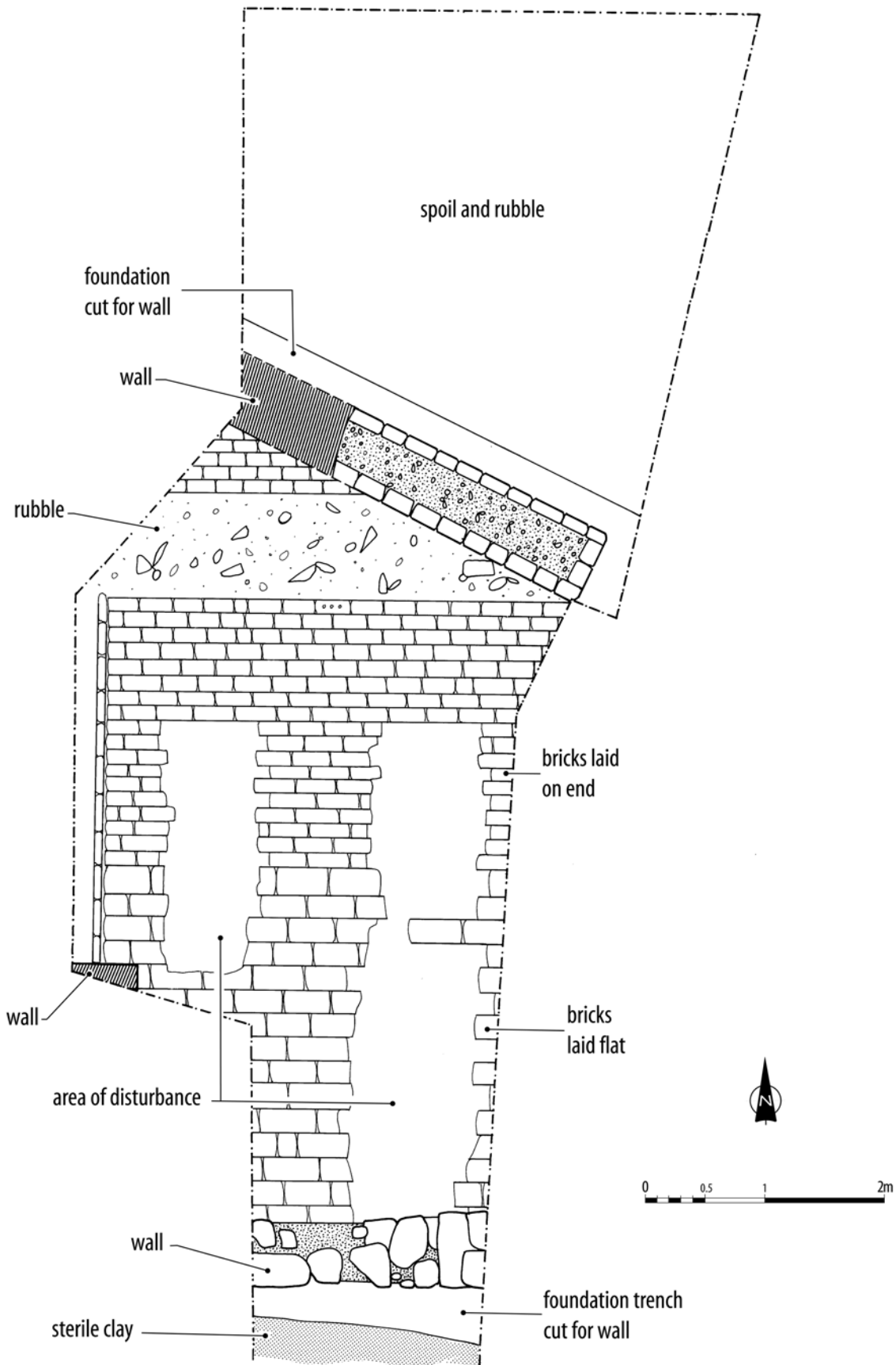
Although heavily disturbed by the demolition of the site, the remains of a flue were recorded in the eastern section. This was built entirely of brick and lacked the



Illus 10.2 Smeaton brick and tile works: plan of kiln 1



*Illus 10.3 Smeaton brick and tile works: plan of kiln 2*



*Illus 10.4 Smeaton brick and tile works: plan of Trench 3*

composite arrangement of sandstone and brick of the northern flue columns in kiln 1. The remains of the flue protruded from the section and rested on large dressed sandstone blocks measuring 0.5 × 0.15m. These were of a single course which in turn was mortared onto flagstones that formed the northern firing floor of the kiln. Although the floor was only partly exposed in section, its presence elsewhere confirmed that unlike kiln 1, kiln 2 had firing floors constructed from large sandstone flags. The corresponding southern flues were the best preserved on the whole site. These were constructed exclusively of red brick comprising three upstanding columns and equidistant hearths. The columns stood to a height of 1m. The rectangular ash-filled hearth bottoms comprised seven bricks and measured 1 × 0.3m. The hearths were on the same level as their associated firing floor and consisted of large rectangular and square sandstone flagstones, including laid red brick. The flagstones and bricks rested on natural clay.

Using the distance between the juxtaposed fireholes either side of the kiln, the internal width of the kiln is established as 3.2m. The exact length of the kiln cannot be established from the excavated evidence.

The kiln enclosure wall to the west (*illus 10.1*) was revealed in Trench 2, running on a north–south alignment.

### 10.3.7 Clay pits

A circular anomaly was identified on the aerial photograph towards the south of the site (*illus 8.2*). Excavation of this area resulted in the identification of a large deposit of blown brick and pipe wasters, confirming that the edge of the clay pit had been used as a dump. This collection provided a sample of the range of products that were being produced (*illus 10.5*). In addition, evaluation trenching in 2006 to the north of Old Dalkeith Colliery Road revealed what may be clay extraction pits which had also been backfilled with brick and pipe wasters.

### 10.3.8 Possible coal store

Trench 3 was placed to investigate a rectangular feature observed on the aerial photograph (*illus 10.1*). A large deposit of demolition rubble was removed to expose the upper surface of the walls (*illus 10.4*). The wall at the northern end of the trench was 0.65m wide with a length of 2.4m and stood to a height of 0.94m on a WNW–ESE alignment. It was composite in construction with seven courses of roughly dressed sandstone used to face its southern side, whilst the northern face of the wall was constructed of waster bricks. The other wall crossed the trench on an east–west alignment and stood to a height of 0.8m, with a width of 0.4m. It was constructed of mortar-bonded dressed sandstone and incorporated large square blocks and smaller sub-angular pieces. The demolition layer sealed a substantial layer of coal. Both the

demolition layer and the coal were confined between the two walls. The floor of this building comprised red brick in a Flemish style bond laid end on in a bed of clean yellow sand. The floor had recently been disturbed by a mechanical excavator undertaking gas pipeline evaluation work.

The limited amount of archaeological data recovered from this trench makes it difficult to establish precisely the function of this building, but given the amount of coal that was still in situ, and its proximity to the kilns, we have interpreted the building as a coal store.

### 10.3.9 The finds

A selection of the finds is shown in *illus 10.5* and they are catalogued below. Most of the bricks and drainage pipes drawn were recovered from waster dumps. The stamped brick was recovered in situ from a flue in kiln 1. Various other pieces of kiln fabric and a cast-iron arch support were also recovered from demolition deposits. Included in the inventory of finds are two common horseshoe or ‘mug’ tiles with an internal span of 250mm and 95mm respectively. Three drainage pipes with different internal dimensions, roofing tiles and both hand-made and mould-made bricks were recovered from demolition deposits and waster dumps. Flowerpot rims and base sherds were recovered from kiln 2.

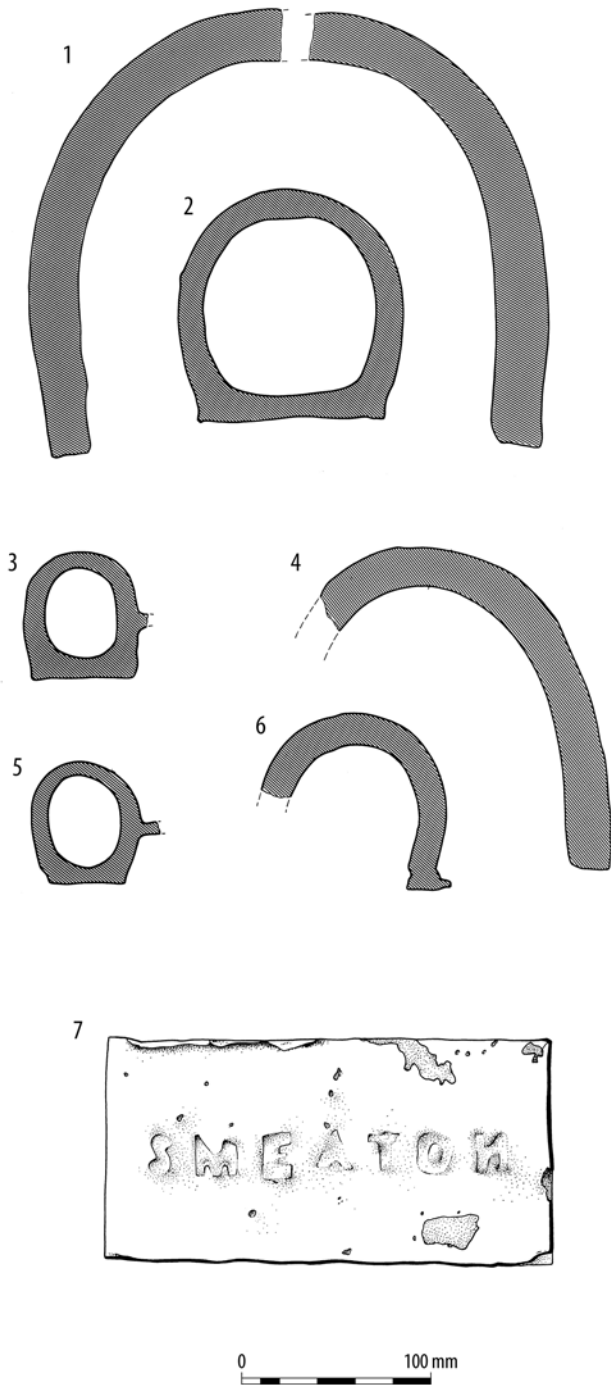
#### Illustrated (*illus 10.5*)

1. Large ‘mug’ drainage tile.  
This is a mould-made tile that is 370mm in length and 240mm high with an arch spanning 270mm.
2. Large drainage pipe (waster).  
This pipe is 370mm in length with a width of 117mm. The bore is sub-circular at 90 × 90mm standing on a flattened base that is 100mm wide.
3. Common drainage pipe.  
Machine-made drainage pipe measuring 350mm in length and 60mm in width. The internal bore is oval and measures 50 × 40mm. The base of the pipe is flat and measures 55mm.
4. Common drainage pipe.  
Machine-made drainage pipe measuring 360mm long and 60mm wide. The bore is oval and measures 50 × 43mm.
5. Intermediate sized ‘mug’ tile (fragment).  
The length of this object is unknown. The height and width are each 180mm.
6. Small ‘mug’ tile (fragment).  
The length of the tile is unknown but its height is 90mm, with a span estimated at 110mm.
7. Stamped brick recovered from a fire box in kiln 1.  
A machine-made brick of good quality fire-clay and stamped SMEATON on its widest face. The brick measures 240 × 125 × 75mm.

#### Not illustrated

8. Kiln furniture (spacers).  
Three items of hand-moulded clay, conical in shape, possibly used as spacers between the kiln products.





*Illus 10.5 Smeaton brick and tile works: tiles and brick. Sections of tiles: 1 large 'mug' tile; 2 large drainage pipe; 3-4 common drainage pipes; 5 intermediate sized 'mug' tile; 6 small 'mug' tile; 7 brick with SMEATON stamp*

9. Roof tile (dental ?), incomplete.  
A fragment of a dental-type roof tile with a peg hole at its centre and measuring 100mm wide and 15mm thick.
10. Cast-iron arch support.  
A recessed arching support made of cast iron 620mm in length.

11. Refractory kiln liner brick.  
This is a highly fired fire-clay voussoir brick with a square profile of 130 × 130mm. The length of this item is unknown.
12. Base sherds from two flowerpots.
13. Mould-made brick.  
A waster brick measuring 230 × 120 × 70mm.

#### 10.3.10 Discussion

Kilns are normally classified according to the direction of draught and their method of operation (Hammond 1977; Douglas & Oglethorpe 1993). The Smeaton kilns were of a type known as 'Scotch' kilns which were of the *intermittent* type that had to be filled, heated, cooled and emptied at each firing. These were one of the most common types of kiln in Scotland as they were relatively cheap to build and could be run on solid fuel. Parallels for the Smeaton kilns can be seen in an illustrated survey by Hammond (1977, 172, kilns 1 and 2). Normally, Scotch kilns were rectangular, with opposing flues, and had the capacity to produce about 40,000 bricks in each firing episode. The Smeaton brickworks would have operated on a seasonal basis (to limit the effects of frost damage on drying products) and were situated close to ready supplies of raw materials, such as clay, water and, importantly, coal.

The range of products being manufactured at Smeaton is not unique but is in keeping with many other estate brickyards that were established to meet the need of land improvement and associated activities. The occupiers of Newfarm on the same estate were experimenting with different land drainage techniques, and this may well account for the wide range of drainage pipes and tiles that were recovered at the site.

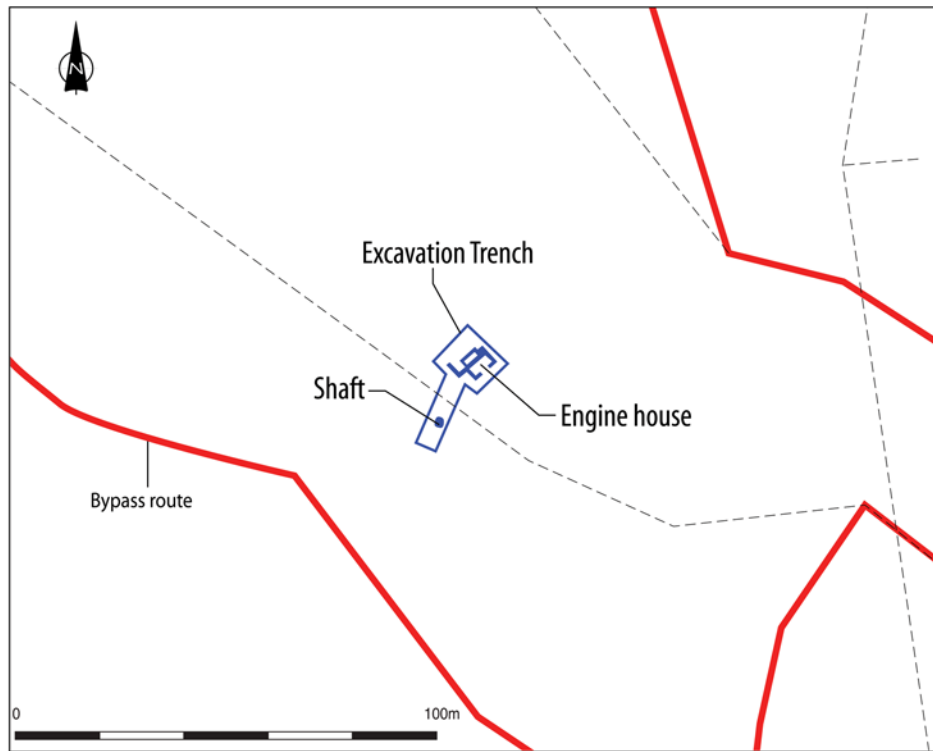
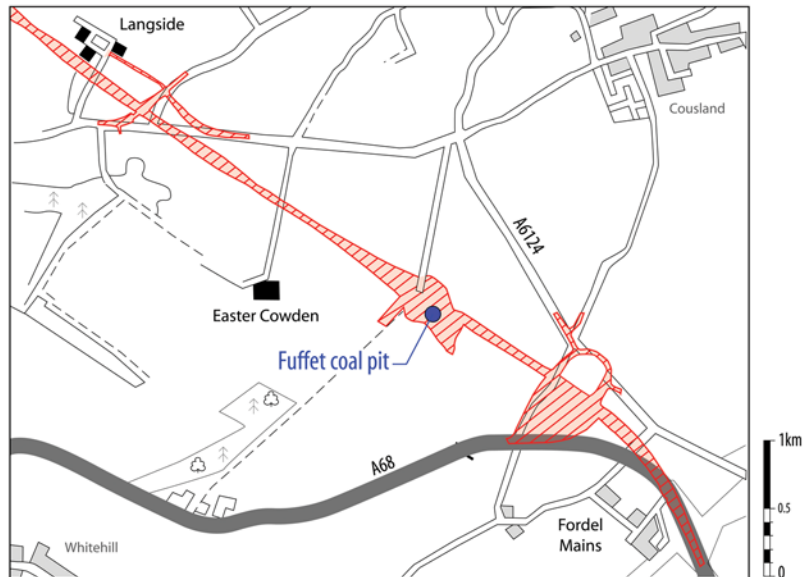
The works are typical of many early estate brickyards that emerged in the first half of the 19th century only to be phased out during the latter half of the century as the surrounding landscape was steadily improved. Brick manufacture became increasingly mechanised and industrialised by the turn of the century, which hurried the decline of the surviving, by then unprofitable, small-scale brick and tile works.

#### 10.4 Fuffet engine house

##### 10.4.1 Introduction

Fuffet engine house was located c 350m south of the A6124, south-east of Cousland and north of Fordel Mains Farm (illus 2.1 and 10.6). It was revetted into the northern slope of a V-shaped gorge, east of the Bellyford Burn. The burn appears to have been canalised – the land on either side of the burn consisting of an expanse of waterlogged wood, presumably associated with the mine workings and quarrying in the surrounding area.

Initial evaluation of the area identified two



*Illus 10.6 Fuffet coal pit: trench location plan*

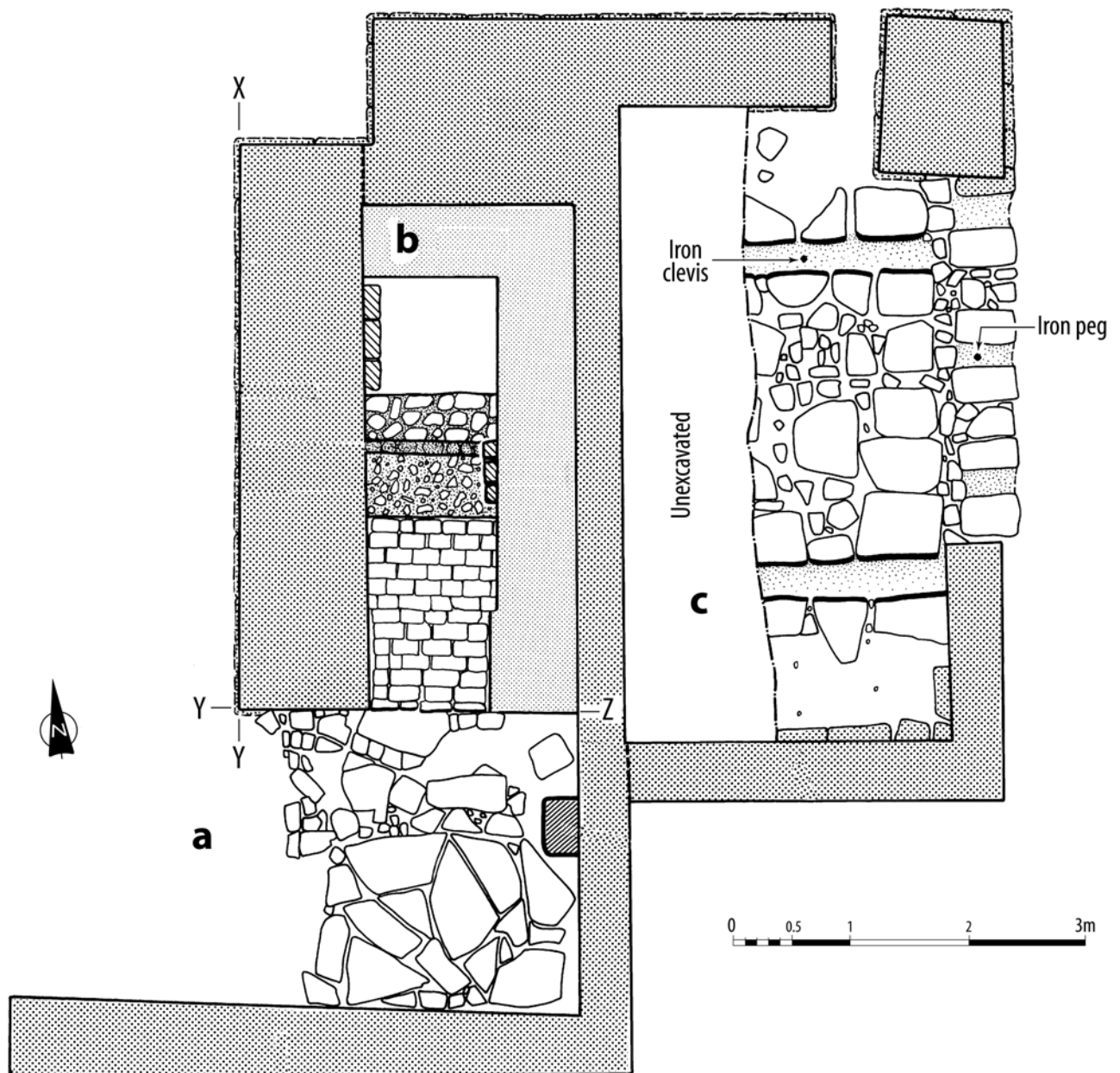
lengths of wall upstanding to 1.2m to 1.5m, located on the site of the engine house of Fuffet coal pit, present on the Ordnance Survey first edition 6" map (*Edinburghshire, sheet VII, 1854*). These walls were revetted into the hillside, overlain by industrial waste materials and were not visible on the ground surface.

Although the walls were located on the site of the engine house, the area is known locally as 'Potters' Brae' and was reputedly the site of clay extraction and possibly ceramic works, as the name implies (*Sinclair 1975, 179*). The purpose of further excava-

tion was therefore to identify and record the nature and extent of the building located during the evaluation, and to determine whether the building was related to the mine workings or was associated with manufacturing ceramics.

#### 10.4.2 Methods

A single rectangular trench was opened over the known extent of features identified during the evaluation. A strip trench *c* 4m wide was also extended



*Illus 10.7 Fuffet coal pit: plan of Fuffet engine house showing (a) coal depository; (b) boiler house; (c) engine compartment*

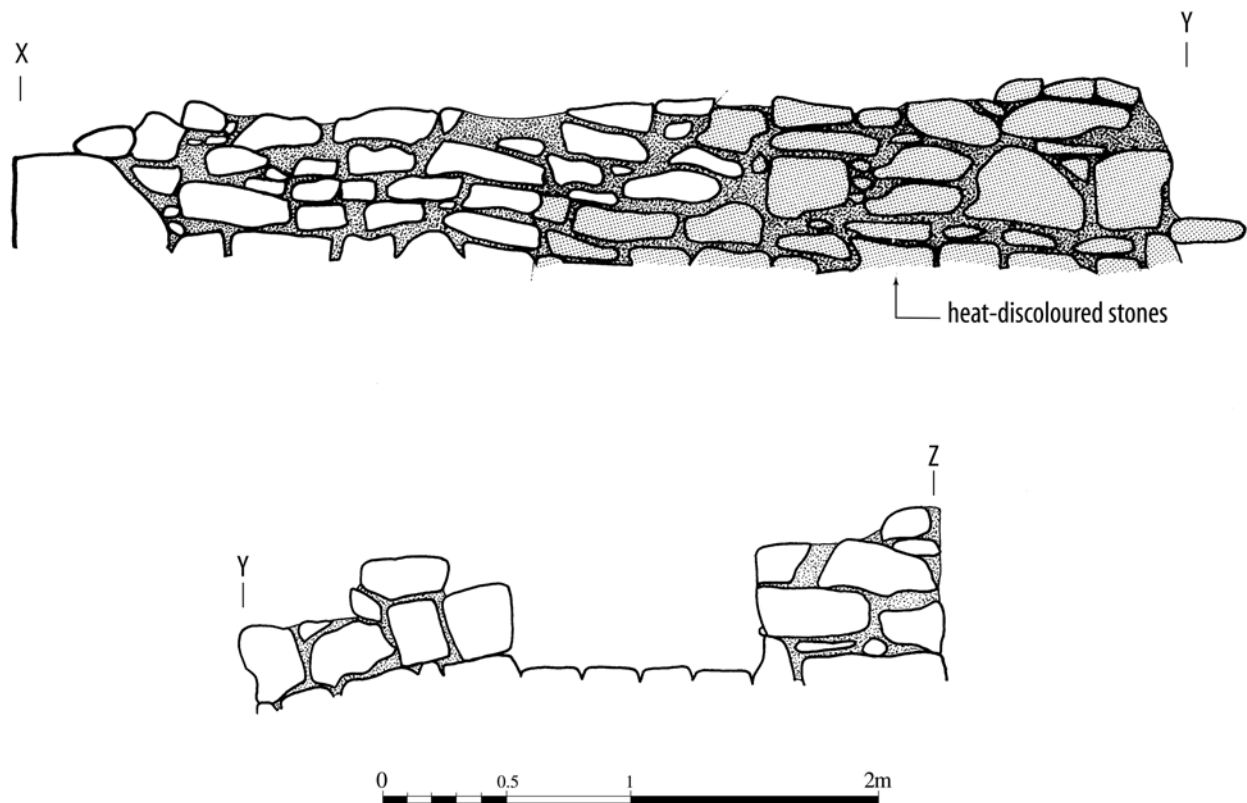
southwards from this trench across an oval depression, thought to be the plug for the shaft present on the Ordnance Survey first edition map (*Edinburghshire, sheet VII, 1854*). Neither this shaft nor any other remains associated with the engine house are depicted on the 1896 or 1909 Ordnance Survey second edition maps, indicating that they had been removed by late Victorian times.

#### 10.4.3 Archaeological results

The engine house was found to be buried beneath dump deposits of industrial waste material. The structure was built with walls of mortared stone,

upstanding to 1.2–1.5m high. The burial of the structure by industrial waste and the redeposition of most of the artefacts means that the artefact assemblage is largely secondary, and interpretation therefore relies on the structural and cartographic evidence. The structural elements appear to define three compartments (*illus 10.7*):

- a) a coal depository, which consisted of a bowl-shaped flagged floor enclosed on two sides by a revetting wall, and an entrance to the west;
- b) the boiler house, consisting of a rectilinear compartment with an internal unbonded wall, floating partitions, a possible fire-box, and a brick floor;



*Illus 10.8 Fuffet coal pit: sections: X–Y western elevation of boiler house wall; Y–Z southern elevation of boiler house entrance*

- c) the engine compartment, consisting of a rectangular compartment with a large opening in the eastern wall and a roughly flagged floor. Two channels and three rectangular slots were located within the floor, presumably for mounting the steam engine and/or fly-wheel.

The boiler house was rectangular in plan and orientated approximately north to south. An internal mortared, unbonded wall abutted the eastern and northern walls, and a mortared, unbonded partition/supporting wall further sub-divided the interior into two compartments. The southern compartment contained the base of a probable fire-box lined on the south and east by internal brick facings, and a bricked floor led from this to the stoking entrance (illus 10.8). The coal depository, which consisted of a bowl-shaped flagged floor enclosed by a revetting wall on the eastern and southern sides, was located to the south of, and adjacent to the stoking entrance.

The deposits located within the boiler house appeared largely to relate to this compartment's use, with individual layers of ash and coal fragments surviving in situ. The two unbonded partition/supporting walls located within the boiler house most likely represent the remains of supports for the boiler. This archaeological evidence suggests a separate hearth under a 'haystack' type boiler, which would have been of low pressure (J Mitchell, pers comm).

The internal unbonded wall within the boiler house appears to have acted as an insulator, protecting the western wall of the engine compartment from the intense heat created in firing the boiler. This was supported by the evidence of the external western wall of the boiler compartment, which showed signs of exposure to intense heat with associated stone discolouration and fracturing of the wall (see illus 10.8). Such discolouration and fracturing was also visible on the abutting (insulating) wall, but not on the western wall of the engine compartment.

The Engine House itself was located adjacent and east of the boiler house. This structure was rectangular in plan and orientated north to south, with a large opening in the eastern wall. The floor of the engine house was flagged with large roughly shaped blocks, apart from two channels running east to west in the northern and southern ends of the room which appear to represent the remains of foundation beds, presumably for mounting the steam engine. An iron clevis (securing device) was located within the northern channel, along with iron bolts located in situ in three square unflagged areas of the floor within the eastern opening. The clevis was probably connected to a timber beam (J Mitchell, pers comm). The iron bolts probably provide the best indication of engine size (Bick 1968). The engine installed would have been an early type of beam engine, either winding or pumping, but probably the latter (J Mitchell, pers comm).

The engine compartment and the coal depository both contained large dump deposits of industrial waste materials including coal ash and slag-like concretions, as well as rubble and broken tile, which appeared to have been deliberately used as a levelling deposit. The flagged floor of the coal depository would have been bowl-shaped to aid the shovelling of coal by keeping it away from the walls and letting it gravitate it towards the stoking entrance of the boiler compartment.

Discolouration and fracturing were noted on the northern face of part of the revetting wall of the coal depository which appear to have been caused by the continued dumping of red-hot ash from the boiler house.

The shaft entrance was located approximately 9m to the south, but was not excavated for safety reasons.

#### 10.4.4 The finds

The majority of the finds recovered were from the backfilled deposit burying the structure and cannot therefore be assigned to the structure itself. These consisted largely of broken tiles, nails, an iron plate and modern glazed pottery. A large quantity of slag and cinder was present, representing waste material from firing the boiler.

#### 10.4.5 Conclusion

The excavations have confirmed that the site was occupied by an engine house, not by the suggested ceramics works. The plan of the structure has been exposed and this has enabled interpretation of the types of machinery used, including the boiler, and suggested that power was probably obtained from a pumping, rather than winding, engine.

The Fuffet coal pit site appears to lie on the boundary between the land owned by the Duke of Buccleuch and the Marquis of Lothian, just falling into the ownership of the latter. It is therefore

possible that the pit belonged to the Lothian Coal Company, but had such a short lifespan that it was not documented. The archaeological evidence is thus all that survives of this example of small-scale industrial coal-working in East Lothian. It has shown that the structure was more complex than that shown on the Ordnance Survey first edition map, and has offered an opportunity to examine a site with a considerable degree of preservation that was hitherto thought to have been destroyed.

### *10.5 19th-century industrial landscapes*

This study has presented an opportunity to examine a series of sites of similar age and part of the same industrial landscape, although not all are directly related. In two cases the quality of preservation was considerably better than anticipated as the buildings had been buried under rubble during their demolition, thus preserving a considerable depth of structural evidence. The excavation of Smeaton and Fuffet therefore offers a cautionary note against discounting areas of potential industrial archaeological significance on the basis of desk-based assessments or field-walking studies.

One of the issues that sometimes arises in the planning of appropriate responses to such sites is how much information can be added to the record by excavation, as it is often assumed that 19th-century industrial features will have been well documented. In this case it proved hard to find many records that dealt directly with the sites. The excavation of the brick and tile works and the Newfarm Trench 1 building in particular produced in the former case a considerable amount of detail that desk-based research had not revealed and in the latter an unrecorded building. In all cases the excavations have shown a considerable amount of local expedience, for example in the insertion of the insulating wall in the boiler house, and in the rapid development of these industries, as shown by the evidence for two rapidly successive phases of works at Smeaton.