ARCHAEOLOGICAL INVESTIGATIONS AT THE LIGHTFOOT CENTRE, WHARRIER STREET, WALKER, NEWCASTLE-UPON-TYNE, TYNE AND WEAR

ASSESSMENT REPORT

DECEMBER 2011

PRE-CONSTRUCT ARCHAEOLOGY

Archaeological Investigations at the Lightfoot Centre, Wharrier Street, Walker, Newcastle, Tyne and Wear

Assessment Report

Central National Grid Reference: NZ 2871 6365

Site Code: LWS 11

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PART A: PROJECT SUMMARY

1. NON-TECHNICAL SUMMARY

1.1 Archaeological investigations were undertaken March-May 2011 by Pre-Construct Archaeology within the grounds of the Lightfoot Centre, Walker, Newcastle-upon-Tyne. The investigation area, central National Grid Reference NZ 2860 6366, comprised an outdoor athletics track and field and adjacent sports pitches in the southern part of the Lightfoot Centre, a leisure centre complex. The work was undertaken as part of the planning process associated with a re-development scheme known as the 'Heart of Walker' project.

1.2 The Lightfoot Centre had particular archaeological potential for industrial era remains, since the site was occupied from the second half of the 19th century by St. Anthony's Brickworks, of which relatively little was known prior to the work. This part of Walker was becoming increasingly industrialised at this time and the vicinity of the site was already being exploited for brick manufacture when the brickworks was built. Following re-development around *c.* 1900, the brickworks continued in operation, before being demolished in the 1940s. The archaeological remains of the brickworks comprise a regionally significant part of the industrial era heritage resource for Tyneside. For earlier archaeological eras, particularly the medieval period, the site also had some archaeological potential.

1.3 An initial archaeological evaluation, undertaken in March 2011, comprised five trial trenches (Trenches 1-5). No archaeological features, deposits or structures proven as pre-dating the modern era were encountered in Trenches 1, 3 and 5, the result of which indicated that parts of the site had been subject to considerable disturbance, probably due to clay extraction for brick manufacture. Two trenches, however, recorded archaeological remains of significance, the first being Trench 4, located in the central eastern part of the site, which revealed fairly well-preserved structural remains, including brick walls and floor surfaces, of the two phases of St. Anthony's Brickworks. The second was Trench 2, located in the south-western part of the site. In the central part of this trench a ditch of probable early post-medieval date was exposed, with, to the west, a NW-SE aligned ditch, interpreted as the trackside ditch of a colliery timber waggonway. Probable trackbed material, incorporating a possible rail impression, was also recorded. This hitherto unknown waggonway was probably related to High Pit of Byker Colliery and was of likely operational in the late 18th and possibly early 19th century. The archaeological remains in both Trenches 2 and 4 remains were of sufficient archaeological significance to require further exposure, examination and recording.

1.4 As a result of the evaluation, two open areas were investigated, with this work taking place from late March to early May 2011. Area A, covering *c.* 1,300m^2, extended evaluation Trench 4 in order to further investigate the structural remains of St. Anthony's Brickworks. Area B was far smaller, only *c.* 66m^2 in size, and this extended the western end of evaluation Trench 2, in order to further investigate the colliery waggonway.

1.5 Natural geological material, comprising glacially deposited brownish yellow silty clay, was exposed as the basal deposit in three of the five evaluation trenches and in parts of both excavation areas. Overlying natural clay was a developed soil associated with agricultural use of the land and assigned a broad medieval to early post-medieval period of origin. Two phases of a north-south aligned field boundary ditch were recorded in evaluation Trench 2; the later ditch produced dating evidence indicating that it went out of use in the 17th century.

1.6 The colliery waggonway ran on a NW-SE alignment across Area B. The majority of the track had been truncated by later landscaping activity, and the waggonway survived largely as a pair of parallel trackside ditches filled with coal waste. Parts of four poorly preserved timber sleeper impressions were recorded, with tentative evidence of associated wooden dowels for securing rails. The location and alignment of the waggonway suggested that it was associated with High Pit of Byker Colliery, a working probably earlier known as Restoration Pit of St. Anthony's Colliery, and it would have continued southwards to coal staithes on the Tyne at Low Walker. St. Anthony's Colliery is known to have been working by 1769, and the waggonway is therefore likely to have been operational during the late 18th century, possibly into the early 19th century.

1.7 The earliest deposits recorded in Area A provided evidence of brick manufacture at the site, probably using brick clamps in the earlier part of the 19th century, prior to construction of St. Anthony's Brickworks. Of the subsequent brickworks building, built between *c.* 1858 and *c.* 1898, the north-westernmost portion survived. The truncated remains of the western external wall and a series of external structures, probably coal chutes, were exposed, but the main surviving element of the original brickworks was a rectangular room, measuring *c.* 15m x 9m, filled with parallel north-south aligned walls forming flue channels beneath the floor of what was probably a heated drying chamber, employing waste heat from a nearby kiln or boiler to dry newly formed but unfired bricks, prior to firing. An external brick surface, for an associated yard, and also probably a road shown on historic mapping, was also exposed.

1.8 The easternmost portion of Area A was occupied by the surviving north-westernmost corner of the footprint of the re-built brickworks, constructed between *c.* 1898 and *c.* 1907. Again, parts of the truncated remains of the external walls to the west and north survived, along with a west-east aligned row of brick piers representing an internal partition. To the south of this were the partial remains of two phases of internal concrete floor, adjacent to what was probably an internal wall line. There was no evidence of the function of any of these areas; this part of the building could, for example, have been associated with brick moulding, and would therefore have contained machinery, of which no trace remains. Evidence of external drainage associated with the re-built brickworks was also recorded.

1.9 The uppermost strata recorded across the site represent modern era infilling of clay extraction pits, as well as landscaping and ground levelling, much of it likely associated with construction of the Lightfoot Centre and its open area facilities in the 1960s.

1.10 This Assessment Report is divided into three parts. Part A, the Project Summary, begins with an introduction to the site, describing its location, geology and topography, as well summarising the planning and archaeological background to the project. The aims and objectives of the work are then set out, followed by full descriptions of the archaeological methodologies employed during both the fieldwork and the subsequent post-excavation work. This part concludes with an illustrated summary of the recorded archaeological remains, allocated to a series of phases of activity.

1.11 Part B, the Data Assessment, quantifies the written, graphic and photographic elements of the Site Archive and contains specialist assessments of all categories of artefactual evidence, with recommendations for any further work in each case. This part then sets out an archaeological summary discussion before summarising the potential for further analysis of all elements of the collected project data.

1.12 Part C of the report contains acknowledgements and references. There are five appendices to the report, the fourth being a selection of photographs from the fieldwork and the fifth being the Specification for the evaluation phase of work.

2. INTRODUCTION

2.1 General Background

2.1.1 This report details the methodology and results of a programme of archaeological investigations undertaken by Pre-Construct Archaeology Limited (PCA) between 1 March and 6 May 2011 at the Lightfoot Centre, Wharrier Street, Walker, Newcastle-upon-Tyne. The central National Grid Reference for the site is NZ 2871 6365 (Figure 1).

2.1.2 The archaeological project was commissioned by Sir Robert McAlpine Limited (SRM) as part of the 'Heart of Walker' re-development scheme. This will merge two existing primary schools into a single new primary school (run by the Newcastle Diocesan Education Board (Church of England)) and will include, amongst other proposals, refurbishment of the local leisure centre, the Lightfoot Centre, which includes an outdoor athletics track and field and adjacent sports pitches. The scheme is being developed by Aura, Newcastle City Council's private sector partner, and SRM is the Principal Contractor.

2.1.3 The archaeological project was undertaken as a condition of planning permission, on the recommendation of the Tyne and Wear Specialist Conservation Team (TWSCT), part of the Historic Environment Section of Newcastle City Council. The site is located in an area of archaeological sensitivity with historic mapping indicating that the area now taken up by the leisure centre sports pitches was occupied from the second half of the 19th century by St. Anthony's Brickworks, of which two phases are known. The archaeological remains of this manufactory comprise a regionally significant part of Tyneside's industrial era heritage resource. For earlier archaeological eras, particularly the medieval period, the site also had some archaeological potential.

2.1.4 The archaeological potential of the site was first established by an archaeological desk-based assessment (DBA), undertaken in 2008.[1] Of the project herein described, the first stage of archaeological fieldwork was a trial trenching evaluation, undertaken by PCA between 1-18 March 2011, which targeted the athletics track and field and adjacent sports pitches.[2] The evaluation was carried out according to a Specification prepared by the Tyne and Wear Archaeology Officer (TWAO), a member of the TWSCT.[3]

2.1.5 The evaluation comprised the investigation of five trial trenches (Trenches 1-5) (Figure 2). No archaeological features, deposits or structures proven as pre-dating the modern era were encountered in Trenches 1, 3 and 5, which indicated that parts of the site had been subject to considerable disturbance, probably due to clay quarrying for brickmaking. Trench 2, located on the athletics field in south-western part of the site, recorded a NW-SE aligned ditch, interpreted as the trackside ditch of a colliery waggonway, with probable trackbed material also exposed. The waggonway, of probable late 18th to early 19th century date, likely served Restoration Pit of St. Anthony's Colliery, running southwards to staithes on the Tyne. Trench 4, located on the astroturfed sports pitches in the central eastern part of the site, recorded fairly well-preserved structural remains, including brick walls and concrete floor surfaces, of the two known phases of St. Anthony's Brickworks.

[1] TWM Archaeology 2008.
[2] The findings of the evaluation phase of work have been incorporated into this document.
[3] TWSCT 2010. This is included as Appendix 5 to this report.

2.1.6 The archaeological remains found in both evaluation Trenches 2 and 4 were of sufficient archaeological significance to require further exposure, examination and recording. Accordingly, investigation of open areas adjacent to both trenches was required by the TWSCT and, with the re-development scheme imminent, all parties agreed that this further work should be undertaken immediately following on from the evaluation fieldwork. Excavation Area A, designed to extend Trench 4 to the north and south, measured *c.* 54m x 24m (1,300m^2), while excavation Area B, designed to extend Trench 2 to the west, measured *c.* 11m x 6m (66m^2). The excavation areas were investigated 21 March-6 May 2011.

2.1.7 The archaeological project herein described was designed according to the guidelines set out in *Management of Research Projects in the Historic Environment* (MoRPHE).[4] In line with MoRPHE guidelines, this Assessment Report sets out a formal review of the data collected during the fieldwork. At the time of writing, the Site Archive, comprising written, drawn, and photographic records and all artefactual material recovered during the investigations, is housed at the Northern Office of PCA, Unit N19a Tursdale Business Park, Durham, DH6 5PG. When complete, the Site Archive will be deposited with Tyne and Wear Museums and Archives at Arbeia, South Shields, Tyne and Wear, under the site code LWS 11.

2.1.8 The Online Access to the Index of Archaeological Investigations (OASIS) reference number for the project is: preconst1-111170.

2.2 Site Location and Description

2.2.1 Walker is an eastern suburb of Newcastle, located *c.* 3km from the city centre, occupying an elevated plateau overlooking a sharp bend in the Tyne (Figure 1). With the exception of early coal mining activity, the area was largely agricultural until the mid 19th century, when the riverside area developed rapidly at the heart of the Tyneside shipbuilding industry. From the mid 18th century onwards, Walker Colliery, the core elements of which lay *c.* 1km north-east of the Heart of Walker re-development area, was very much the focus of the industrial township. Since the 1930s, Walker has become subsumed into the urban sprawl of Newcastle, and now forms a core element of the east end of the city. The Heart of Walker re-development area is located within St. Anthony's, the southernmost part of Walker, which was originally part of Byker, the neighbouring area to the west (Figure 1).

2.2.2 The Heart of Walker re-development area covers a total of *c.* 21ha on the south-east side of the junction of Wharrier Street and St. Anthony's Road. The Lightfoot Centre is a leisure centre complex occupying the north-western portion of the overall re-development area and covering *c.* 6.3ha (Figure 1). Centred at National Grid Reference NZ 2860 6366, this comprised the area of archaeological investigation (Figure 2). It is accessed from Wharrier Street to the north and is bounded to the west by properties on St. Anthony's Road and to the south by housing on Lancefield Road. To the east lies housing on Chalfont Road and the continuation of Lancefield Road and also a care home on Wharrier Street.

[4] English Heritage 2006.

Figure 1
Site Location
1:20,000 at A4

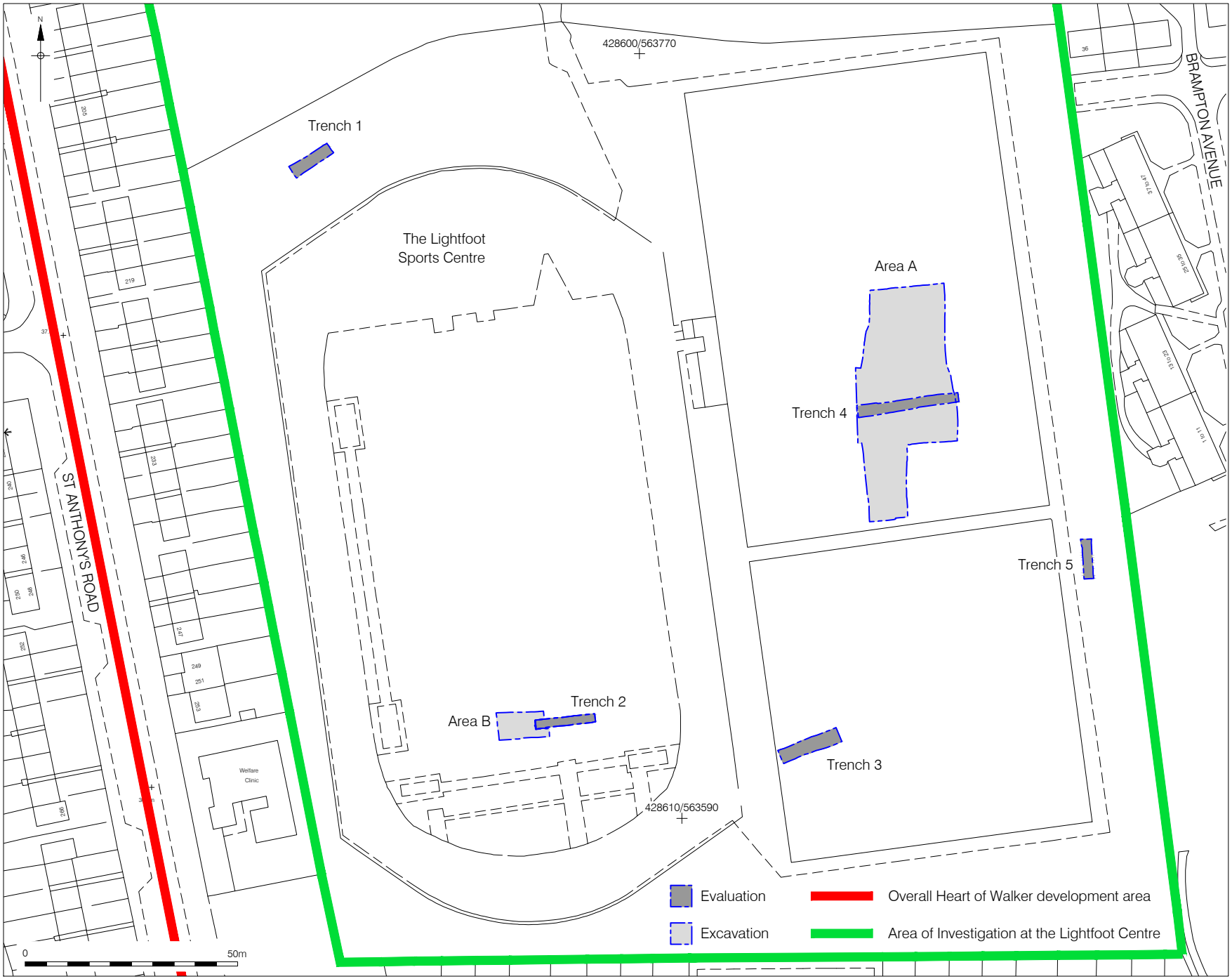


Figure 2
Evaluation Trench and Excavation Area Location
1:1,250 at A4

2.2.3 The main building of the leisure centre lies at the entrance to the complex with a main car park on its eastern side and, south of this, a large open area occupied by an athletics track and field and adjacent sports pitches, out of use at the time of the work herein described. The running track in the western part of the area had a grassed interior field and, to the east, the sports pitches were surfaced with astroturf. The margins of the outdoor sports facilities were landscaped grassed areas.

2.3 Geology and Topography

2.3.1 The site lies in the valley of the River Tyne, *c.* 0.7km north of the present northern edge of the river, although the varying course of the river means that it bounds the Walker area to the south and east. The solid geology of this part of Tyneside is formed by the Pennine Middle Coal Measures of the Upper Carboniferous. In general, bedrock of the area comprises a succession of shales and sandstones riddled with numerous coal seams, while the sandstone bed which specifically underlies the Walker area is the Seventy Fathom Post of the Middle Coal Measures.[5] The drift geology of this area is characterised by an often relatively thin mantle of glacial debris, deposited by the ice sheets that covered the area during the last glacial period. In the specific location of the site, the glacial material generally comprises the Pelaw Clay Member, represented by variously coloured silty clays containing well dispersed, but locally abundant, pebbles and cobbles and commonly calcareous concretions.

2.3.2 As Wharrier Street runs west-east to the north of the site, its surface lies at *c.* 36m OD. Across the wider area, ground level falls away to the south and east towards the main geographical feature in the vicinity, the River Tyne. This is represented by a slight fall in ground level across the overall Lightfoot Centre complex, although the essentially level form of the athletics track/sports pitch area in which the archaeological work was undertaken likely reflects modern era landscaping. Ground level beyond the northern edge of the athletics track was *c.* 35.60m OD, while on the southern edge of the athletics track, *c.* 175m to the south, ground level was *c.* 35.50m OD and *c.* 200m to the south-east, on the south-eastern corner of the southernmost sports pitch, ground level was *c.* 34.80m OD. Ground level on the landscaped margins of the athletics track/sports pitch area was, for example, *c.* 37.50m OD to the north, at evaluation Trench 1, and *c.* 34.90m OD to the east, at evaluation Trench 5 (Figure 2).

2.4 Planning Background

2.4.1 The Heart of Walker re-development scheme forms part of the overall Walker Riverside regeneration programme which began in 2005. It is is supported by a Supplementary Planning Document adopted by Newcastle City Council in 2009. The Heart of Walker re-development area is bounded by St. Anthony's Road, Wharrier Street, Brampton Avenue and Walker Road, but also takes in some land south of Walker Road, including the site of St. Anthony's Church of England Primary School. The scheme proposals include the merger of two existing primary schools, Wharrier Street and St. Anthony's, to create a new Central Walker Church of England Primary School, refurbishment to the local leisure centre, the Lightfoot Centre, improved community facilities as part of a new community hub, improvements to roads and open space, new housing developments and a new supermarket.

[5] Geological information from the *British Geological Survey* website.

2.4.2 The new Central Walker Church of England Primary School is to be located in the south-eastern part of the existing athletics track/sports pitches area of the Lightfoot Centre. Associated works are required, such as new vehicular access to the school and the creation of a variety of new sports pitches, these extending to the north-west of the new school across the remainder of the existing athletics track/sports pitches area. A planning application for the new school and refurbishment of the Lightfoot Centre pitches was submitted in January 2011.

2.4.3 The archaeological project was undertaken as part of the planning process for the re-development scheme at the request of the TWAO, a member of the Historic Environment Section of Newcastle City Council, the body which manages archaeological development control in the city. The City Council's policies towards archaeology are based on guidance given by national government now set out in *Planning Policy Statement 5: Planning for the Historic Environment* (PPS5),[6] supported by guidance in an accompanying document, the *Historic Environment Planning Practice Guide*. In addition, the City Council has various policies within its Local Development Framework (LDF) concerning archaeology and cultural heritage. The LDF will replace the currently adopted Unitary Development Plan (UDP), from which a number of policies have been saved. Policies of particular relevance are:

> *C4.2 WHERE A PROPOSAL MAY AFFECT A SITE OR AREA OF ARCHAEOLOGICAL INTEREST, THE DEVELOPER WILL BE REQUIRED TO SUBMIT AN APPOPRIATE ASSESSMENT OF ITS POTENTIAL IMPACT UPON THE ARCHAEOLOGICAL REMAINS AND WHERE NECESSARY UNDERTAKE AN ARCHAEOLOGICAL FIELD EVALUATION.*
>
> *C4.3 WHERE ASSESSMENT AND EVALUATION HAVE ESTABLISHED THAT PROPOSED DEVELOPMENT WILL ADVERSELY AFFECT A SITE OR AREA OF ARCHAEOLOGICAL INTEREST, DEVELOPERS WILL BE REQUIRED TO PRESERVE ARCHAEOLOGICAL REMAINS IN SITU UNLESS THIS IS CLEARLY INAPPROPRIATE OR THE DESTRUCTION OF THE REMAINS IS DEMONSTRABLY UNAVOIDABLE, IN WHICH CASE A PROGRAMME OF ARCHAEOLOGICAL WORKS SHALL BE SUBMITTED TO AND AGREED WITH THE COUNCIL BEFORE THE START OF DEVELOPMENT.*

2.4.4 A phased programme of archaeological work has been undertaken in association with the Hearty of Walker re-development scheme. In December 2008, an archaeological DBA was compiled to establish the archaeological and cultural heritage potential of the proposed re-development area. The DBA concluded that the south-eastern part of the Lightfoot Centre complex was occupied in the 19th century by St. Anthony's Brickworks, of which is relatively little is known. Around the brickworks buildings were extensive clay quarries to supply the main raw material for brick manufacture. To the south was a brick field which predated St. Anthony's Brickworks and, further south still, a pottery manufactory was first established at St. Anthony's in 1780.

[6] Department for Communities and Local Government 2010.

2.4.5 In October 2010, the TWAO compiled a Specification for an archaeological evaluation at the Lightfoot Centre. The main area of interest to be targeted by the work was the site of the former brickworks, with the potential for archaeological remains of earlier eras to be determined beyond areas affected by 19th century clay quarrying. The evaluation comprised the investigation of five trenches, although a variation to the number and locations of the trenches from those shown in the Specification was agreed in advance with the TWAO.

2.4.6 Evaluation Trenches 1, 3 and 5 recorded no archaeological remains of note. Trench 4, located in the central eastern part of the site, recorded fairly well-preserved structural remains, including brick walls and floor surfaces, of St. Anthony's Brickworks. Trench 2, located in the south-western part of the site, recorded remains thought to represent a colliery waggonway likely associated with Restoration Pit of St. Anthony's Colliery and of probable late 18th to early 19th century date.

2.4.7 The archaeological remains in both Trenches 2 and 4 remains were considered to be of sufficient importance that they required further exposure, examination and recording ahead of the re-development scheme. Accordingly, a programme of further work was agreed with the TWAO in order to mitigate the impact of the development on the archaeological resource, specifically the regionally significant industrial era remains of St. Anthony's Brickworks and the locally significant industrial era remains of a colliery waggonway. This work took place immediately following on from the evaluation fieldwork, with the agreement of all parties.

2.5 Archaeological and Historical Background

The archaeological desk-based assessment undertaken in 2008 has been used as the basis of the following summary. The desk-based assessment should be consulted for Tyne and Wear Historic Environment Record numbers. The research and writing of those responsible is gratefully acknowledged. Other information has been added from a variety of sources, as required.

2.5.1 There is little direct evidence of prehistoric activity in the immediate vicinity of the site. Excavations at Shields Road, Byker, *c.* 2.4 km to the north-west, produced evidence of pre-historic occupation, while pollen samples from that site suggested a largely treeless, agricultural landscape.

2.5.2 There is no known evidence of activity in the Romano-British period for the site itself, which is located *c*. 1.5 km south of the line of Hadrian's Wall, within a loop in the Tyne that would have been effectively enclosed by the river and the Wall. It is possible that this area was a Roman military controlled zone to the south of Hadrian's Wall.

2.5.3 There is no known evidence of activity in the medieval period for the site or in its immediate vicinity. The medieval village of Walker lay *c.* 0.5 km to the north of the site, but the settlement limits would not have extended as far south as the site, although the area adjacent to the settlement nucleus would have been used for growing crops and pasturing livestock.

2.5.4 The place-name Walker is believed to derive from 'wall–kjerr', the 'kjerr' element of Old Norse origin and cognate with 'carr', meaning marsh or fenland *i.e.* referring to marshy land by Hadrian's Wall. Byker, immediately to the west, contains the kjerr/carr element as well, which might suggest that the whole area within the loop of the Tyne was wetland, and therefore possibly unsuitable for settlement, and even agriculture, until sufficient management was implemented to reclaim the land.

2.5.5 The earliest historical reference to Walker is in 1242, when it was part of the barony of Merlay of Morpeth. The estate was leased to Adam Baret in the 13th century and in the 14th century it came into the ownership of the Fenwick family, who held it until 1692. Although St. Anthony's is now considered the southernmost element of the Walker area of Newcastle, it was historically a parish of Byker township, to the west. The first historical reference to Byker occurs in 1299 when the boundary between Newcastle and Byker was set at Pandon Burn.

2.5.6 In 1780, St. Anthony's Pottery was established to the south of the site by Joseph Sewell and an associate, Mr. Donkin. The manufactory produced lead glazed earthenwares, creamwares and pearlwares, several examples of which are held in museum collections. Also established in the vicinity in the 18th century were St. Anthony's Colliery and Walker Colliery, both won prior to 1770. St. Anthony's Colliery, founded in 1769, comprised three pits, Farewell Pit, Nightingale Pit and Restoration Pit. The closest pit to the site was Restoration Pit, which lay immediately to the west of the northern part of the site, at National Grid Reference NZ 2836 6381.[7] This is thought to be the same working named on the 1st edition Ordnance Survey map of 1858 as 'High Pit' of Byker Colliery.

2.5.7 John Gibson's 1788 plan showing the locations and depths of pits in the south Northumberland and Durham coalfield, as well as the routes and lengths of waggonways, shows a waggonway running south-eastwards from 'Byker St. Anthony's', joining a way that ran from 'Endeavour Pit' of Walker Hill Colliery (known to be operating by 1784) to the north. The waggonway then ran southwards to staithes on the Tyne at St. Anthony's. This waggonway possibly runs through the site, although the map is difficult to relate precisely to modern mapping due to its small (one inch to one mile) scale.

2.5.8 William Casson's 1801 plan (and amended editions up to 1805), showing collieries, waggonways and staithes on Tyneside and Wearside, depicts a waggonway in approximately the same location as the one previously mentioned, in the vicinity of the site, but originating much further north at 'Heaton Main' and bypassing 'St. Anthony's' to the east. Again, however, the small scale of the plan makes it difficult to relate to modern mapping. Lambert's plan of 1807 showing collieries on the rivers Tyne and Wear shows probably the same route. It is worthy of note that the routes of timber colliery waggonways were subject to continual change, due to changes in wayleave agreements and redundancy due to changing patterns of coal extraction, therefore many routes were temporary and are thus poorly recorded historically.

2.5.9 Although Thomas Bell's 1843 map showing the part of the Tyne and Wear coal district in County Durham is chiefly concerned with land south of the Tyne, it does depict some detail of pits and waggonways north of the river but does not show the waggonway route in the vicinity of the site. Bell's 1850 map of the coal mining districts of the Tyne, Wear and Tees also does not show the waggonway route in the vicinity of the site or indeed name any pit in Byker or St. Anthony's; Bell's maps are generally considered the most detailed mapping prior to the 1st edition Ordnance Survey map. The 1st edition, produced in 1858, shows 'Byker High Pit' to the north-west of the site, with what appears to be a road running through the site, roughly west-east, with one zig-zag, then turning southwards to run down to St. Anthony's Pottery.

[7] Grid reference from the *Durham Mining Museum* website.

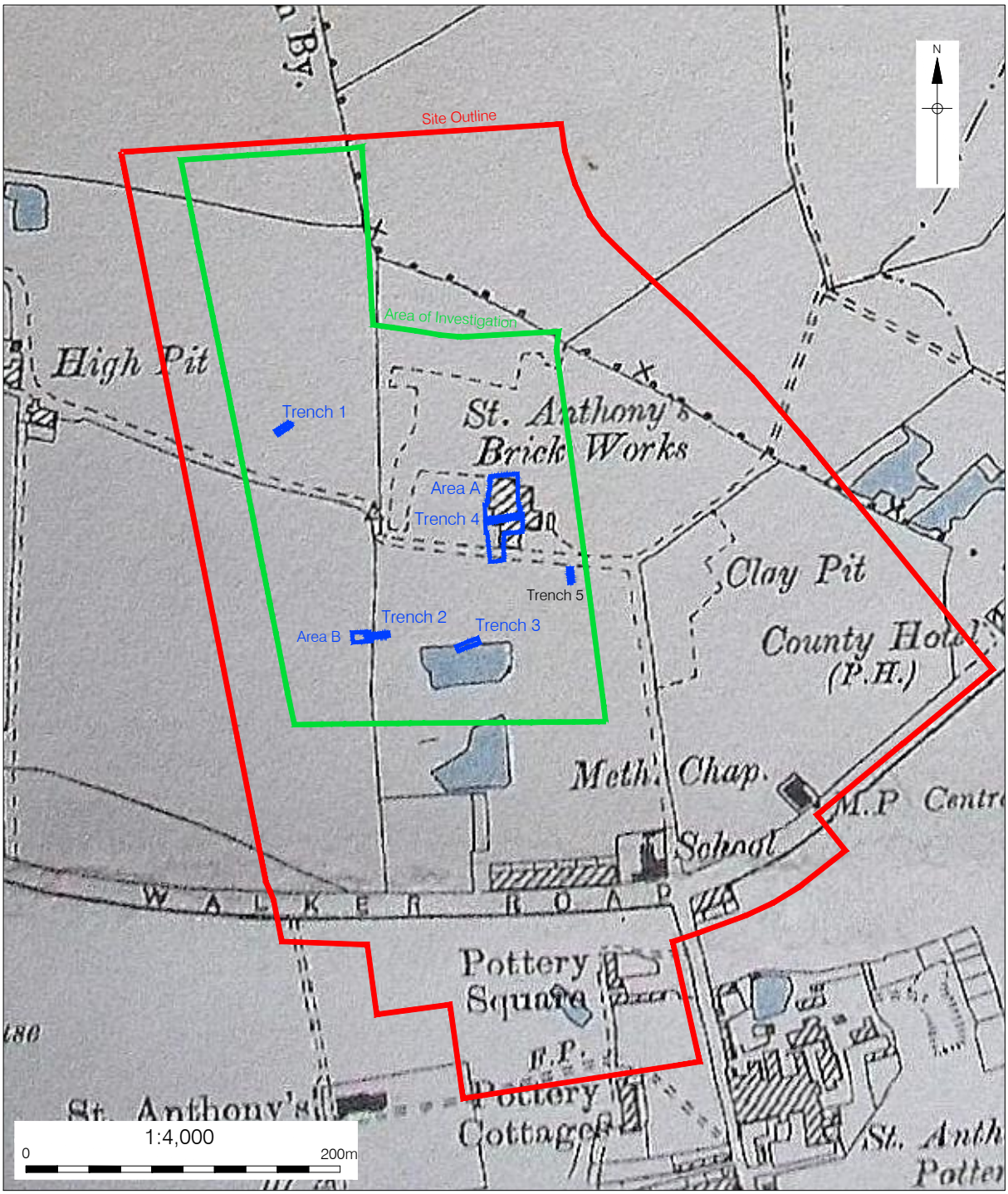
2.5.10 Brick manufacture was certainly being undertaken in the immediate vicinity of the site in the mid 19th century. The 1st edition Ordnance Survey map depicts a 'Brick Field' immediately adjacent to the south-eastern corner of the site. No associated buildings are shown, rather what appears to be a cluster of large clay extraction pits (to the north-west of the main group is one probable extraction quarry lying within the site), suggesting that the method of brick manufacture was the traditional one of tempering and pugging the clay, then moulding and hacking the bricks in the open, and firing carried in single burn 'clamp's. This method of hand-moulded brick manufacture did not require a permanent kiln or ancillary structures, and was common until the mid 19th century, even persisting into the late 19th/early 20th century in some areas.[8]

2.5.11 The 2nd edition Ordnance Survey map of 1898 shows a building annotated as 'St. Anthony's Brick Works' on the north side of the route running eastwards from Byker High Pit (Figure 3). The 1st edition had depicted this area – lying within the central eastern part of the site – as undeveloped, presumably agricultural, land. The brickfield to the south of the road is no longer marked, and presumably had been abandoned in favour of the permanent facility, although two large water-filled clay pits remain to the west of where the earlier quarries had been located. This edition also shows the limits of an extensive 'Clay Pit' mostly north and east of the brickworks building, suggesting that the manufactory had been in operation for some time by the date the survey was carried out. The precise date at which the brickworks was established is uncertain, but the mapping indicates a broad date between 1858 and 1898, with, as mentioned, the extensive quarrying shown on the 1898 map perhaps suggesting a foundation date in the first half of this 40 year span.

2.5.12 The 3rd edition Ordnance Survey map of 1919 shows a brickworks building still present, although the ground plan of the building had changed considerably following what was evidently a complete re-build of the works. The map also shows an expansion of the area of clay quarrying, particularly to the south-east and possibly to the south of the works. The new building is shown on a 1:500 scale edition of the Ordnance Survey map from 1907, an important document which shows the works and surroundings in detail, including a chimney attached to the south-western corner of the south-eastern wing of the building (Figure 4). The 1907 map shows a tramway leaving the south-eastern corner of the works and running roughly south-eastwards in a cutting, crossed at one point by a foot bridge then continuing across the existing clay pit. This was likely used for the transport of finished bricks, but possibly also for the import of raw materials. Exhausted quarries are shown to the north and south-west of the building and the former quarry pit shown to the south-west on the 2nd edition is depicted as a marsh. Two separate buildings are depicted on the north side of the main building, these possibly external furnaces firing kilns within the main building.

2.5.13 The plan of the brickworks as shown on the 1907 map remains essentially unchanged on the 1919 edition, and then the 1940 edition, of the Ordnance Survey map. The brickworks does not appear on the 1951 edition, indicating that the works ceased production and was demolished within this approximate ten year period. It is possible that bomb damage to the Walker riverside area during the Second World War affected the brickworks, although it may be that advances in the technology of building materials in the post-War period, and a subsequent drop in demand for bricks, led to closure of the works.

[8] Palmer and Neaverson 1994.



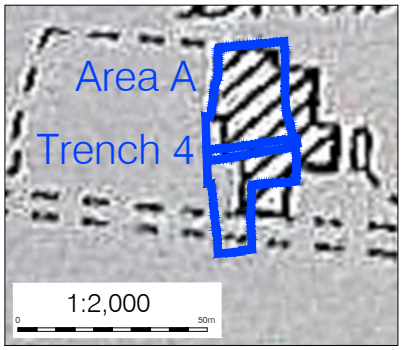


Figure 3
Ordnance Survey, 2nd Edition, 1898
1:4,000 & 1,2000 at A4

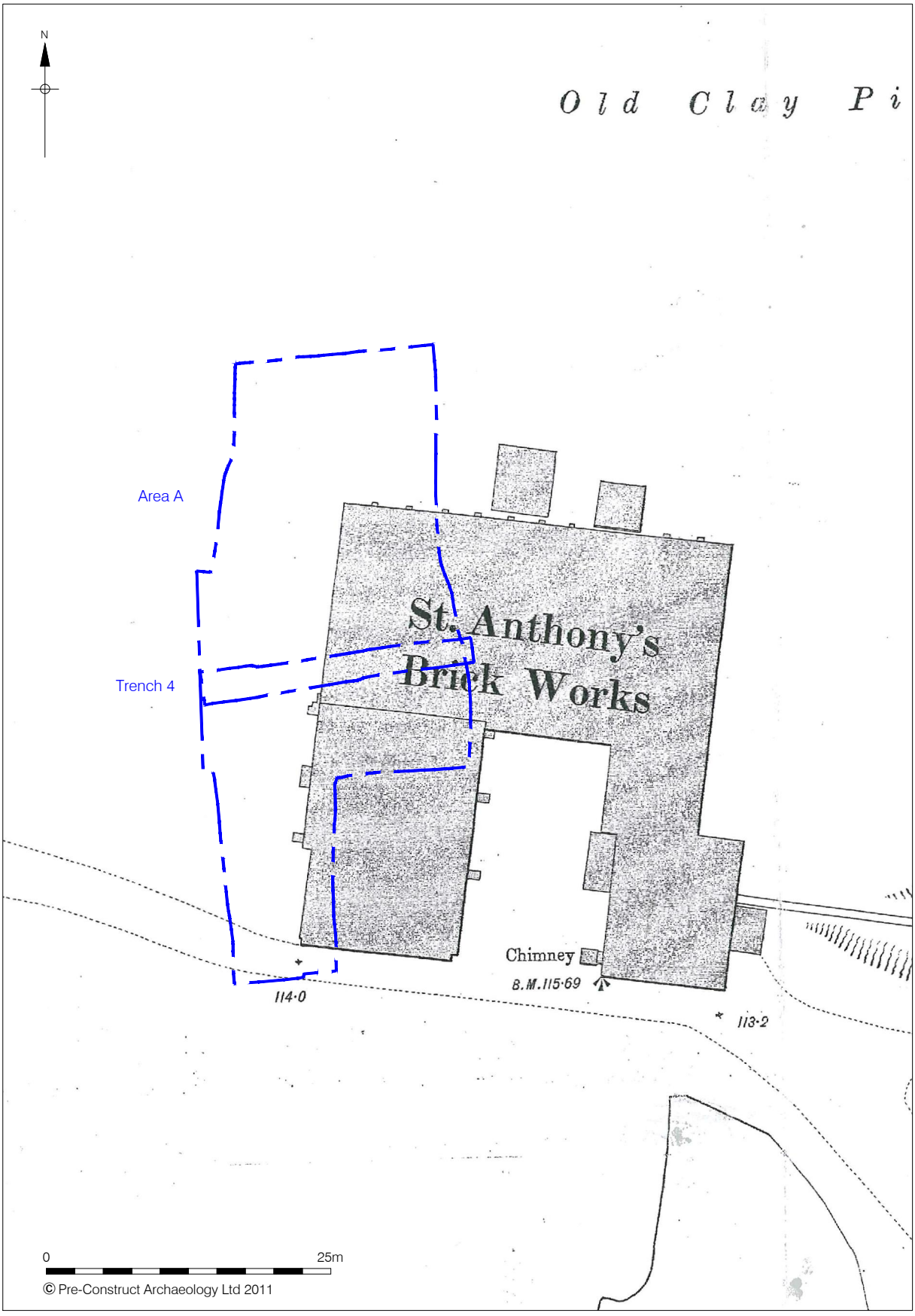


Figure 4
Ordnance Survey, 1907
1:500 at A4

2.5.14 The only other significant modern era activity at the site was the construction, completed 1965, of the Lightfoot Centre, and the associated groundworks connected with the creation of the athletics track and field and the adjacent sports pitches, these across the area formerly occupied by St. Anthony's Brickworks.

3. PROJECT AIMS AND RESEARCH OBJECTIVES

3.1 Project Aims

3.1.1 The project is 'threat-led' since the re-development scheme has the potential to disturb or destroy important sub-surface archaeological remains. These remains comprise heritage assets, as introduced in Paragraph 5 of PPS5 and defined in Annex 2 of the PPS as '*A building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. Heritage assets are the valued components of the historic environment. They include designated heritage assets and assets identified by the local planning authority during the process of decision-making or through the plan-making process (including local listing)'.*

3.1.2 Thus, for the purposes of national policy, PPS5 merges all heritage assets which are designated under any legislation (for example, World Heritage Sites, Scheduled Monuments, Listed Buildings), into one category of designated heritage assets, while the 18th/19th century industrial era archaeological remains at the site herein described fall into the lesser, but none the less important, category of undesignated heritage assets.

3.1.3 Therefore, the broad aim of the project was to record the heritage assets of the re-development site prior to their destruction by construction groundworks.

3.1.4 Additional aims of the project were:

- to compile a Site Archive consisting of all site and project documentary and photographic records, as well as all artefactual and paleoenvironmental material recovered.
- to compile a report that contains an assessment of the nature and significance of all data categories, stratigraphic, artefactual, *etc.*

3.2 Research Objectives

3.2.1 The project was considered to have good potential to make a significant contribution to existing archaeological knowledge of the Walker area in general, and the St. Anthony's locality in particular, specifically with regard to its 18th-19th century industrial heritage. Specific research objectives to be addressed by the project were formulated with reference to the existing archaeological research framework for the North-East: *Shared Visions: The North-East Regional Research Framework for the Historic Environment* (NERRF),[9] which highlights the importance of research as a vital element of development-led archaeological work.

[9] Petts and Gerrard 2006.

3.2.2 The NERRF identifies the following key priorities within the research agenda for the post-medieval (PM) and modern (MO) periods which are of direct relevance to the project:

- 'PMii – Industrialisation' observes: '*Further research is required on wagon ways, including the extent of deployment of cuttings and embankments and their forms of construction, and a better understanding of acceptable gradients with and against the load'.*
- 'MOi – Industry' states: '*Other industries requiring major surveys of extant remains include quarrying, the brick and tile industry, and light industries (for example, light engineering, manufacturing, etc.)'.*

4. ARCHAEOLOGICAL METHODOLOGIES

4.1 Fieldwork

4.1.1 Fieldwork at the Lightfoot Centre was undertaken 1 March-6 May 2011. The evaluation phase took place 1-18 March and the follow-up excavation phase took place 21 March-6 May. All fieldwork was undertaken in accordance with the relevant standard and guidance documents of the Institute for Archaeologists (IfA).[10] PCA is an IfA-Registered Organisation. The Specification for the evaluation set out the research aims and objectives of the project and, in a series of detailed method statements for project execution, described the techniques and approaches to be employed to achieve those aims and objectives. The Specification suggested the locations and dimensions of five trenches (Appendix 5). Following site inspection, some variations were suggested by PCA and an amended trench layout (Figure 2) was agreed with the TWAO.

4.1.2 The evaluation comprised the investigation of five trial trenches (Trenches 1-5). Trench 1 measured *c.* 10m x *c.* 3m at ground level and was located on a landscaped grassed mound to the north of the athletics track. It was a judgement trench, sited in an area thought to have been unaffected by industrial era clay quarrying, to test for pre-industrial era archaeological remains. Trench 2 measured *c.* 16m x *c.* 2m at ground level and was located towards the southern end of the athletics field within the running track, targeting a land boundary depicted on the 2nd edition Ordnance Survey map and also to test for pre-industrial era archaeological remains. Trench 3 measured *c.* 15m x *c.* 3m at ground level and was located on the western side of the southernmost astroturf pitch, targeting a feature probably associated with the 19th century brickfield. Trench 4 measured *c.* 24m x *c.* 3m at ground level and was located on an astroturf pitch in the central eastern part of the site, targeting the brickworks building depicted on the 2nd edition Ordnance Survey map. Trench 5 measured *c.* 10m x *c.* 3m at ground level and was located on a landscaped bank skirting the eastern boundary of the site, targeting a possible road from Byker High Pit, as depicted on the 1st and 2nd edition Ordnance Survey maps.

4.1.3 Excavation Area A measured up to *c.* 54m x up to *c.* 24m (*c.* 1,300m^2) and was located to the north and south of evaluation Trench 4. It was designed, following the evaluation results, in order to further investigate structural remains of St. Anthony's Brickworks, as recorded in Trench 4. Excavation Area B measured *c.* 11m x *c.* 6m (*c.* 66m^2) and was located at the western end of evaluation Trench 2. It was designed, following the evaluation results, in order to further investigate remains of a possible colliery waggonway identified in Trench 2.

4.1.4 Along Trenches 3 and 4, and subsequently across Area A, the existing astroturf surface and underlying tarmac, was stripped by a 360° tracked excavator using a toothed bucket. Overburden was then removed by machine, using a toothless ditching bucket, down to the first archaeologically sensitive deposits, or the natural sub-stratum, or to the maximum safe depth of excavation. All work was undertaken under direct archaeological supervision. Along Trenches 1, 2 and 5, and subsequently across Area B, the turf/topsoil and underlying overburden was removed by the machine, using a toothless ditching bucket, down to the first archaeologically sensitive deposits, or the natural sub-stratum, or to the maximum safe depth of excavation. Again, all work was undertaken under direct archaeological supervision.

[10] IfA 2008a and 2008b.

4.1.5 Across Area A, project formation level – *i.e.* the maximum depth of ground disturbance required for the re-development - was *c.* 0.80m below existing ground level. Therefore, to the north and east, machine clearance of overburden exposed structural remains only up to the point at which those remains lay at project formation level and beyond which they would not be threatened by the re-development groundworks. To the east, exposure of structural remains effectively ceased at the point at which they appeared to have been destroyed by later activity. In Area B, machine clearance of overburden was continued until the full width of the colliery waggonway was revealed.

4.1.6 All trenches and areas were cleaned using appropriate hand tools. Structural remains, deposits and features were subsequently excavated and recorded, as appropriate, using a single context recording system utilising *pro forma* context and masonry recording sheets. Plans were drawn at 1:20 and sections at 1:10.

4.1.7 A photographic record of the investigations was compiled using SLR cameras loaded with 35mm monochrome print and colour slide film, illustrating in both detail and general context the principal features and finds discovered. The photographic record also included 'working shots' to illustrate more generally the nature of the archaeological operation mounted. All record photographs included a legible graduated metric scale. Digital photography was used to supplement the film record.

4.1.8 Three Temporary Bench Marks (TBMs) were established on the site using existing survey data: The TBMs had values of 36.28m OD, 35.54m OD and 35.01mOD. The height of all principal strata and features were calculated relative to Ordnance Datum and indicated on the appropriate plans and sections.

4.2 Post-excavation

4.2.1 The stratigraphic data generated by the project is represented by the written, drawn and photographic records. A total of 316 archaeological contexts were defined during the course of the investigations (Appendix B). The contents of the paper and photographic elements of the Site Archive are quantified in Section 6. Post-excavation work involved checking and collating site records, grouping contexts and phasing the stratigraphic data (Appendix A). A written summary of the archaeological sequence was then compiled, as described below in Section 5.

4.2.2 Artefactual material from the investigations comprised small assemblages of pottery, clay tobacco pipe and ceramic building material. For each category of material an assessment report has been produced including a basic quantification of the material and a statement of its potential for further analysis. The results are given in Sections 7-9. No other categories of inorganic artefactual material were represented.

4.2.3 The palaeoenvironmental sampling strategy of the project was to recover bulk samples where appropriate, from well-dated (where possible), stratified deposits covering the main periods or phases of occupation and the range of feature types represented, with specific reference to the objectives of the investigations. To this end, no appropriate deposits were encountered and therefore no bulk samples were recovered. No other biological material was recovered.

4.2.4 None of the material recovered during the investigations required specialist stabilisation or an assessment of its potential for conservation research.

4.2.5 The complete Site Archive, in this case comprising the written, drawn and photographic records (including all material generated electronically during post-excavation) and part of the artefactual assemblage, will be packaged for long term curation. From the artefactual assemblage, only the brick samples have been recommended for retention as part of the Site Archive, as the majority of the artefactual material is considered to be of low significance and unworthy of retention.

4.2.6 In preparing the Site Archive for deposition, all relevant standards and guidelines documents referenced in the Archaeological Archives Forum guidelines document[11] will be adhered to, in particular a well-established United Kingdom Institute for Conservation (UKIC) document[12] and a recent IfA publication.[13] The depositional requirements of the body to which the Site Archive will be ultimately transferred will be met in full. At the time of writing this will be the Tyne and Wear Museums and Archives, Arbeia, South Shields.

[11] Brown 2007.
[12] Walker, UKIC 1990.
[13] IfA 2008c.

5. RESULTS: THE ARCHAEOLOGICAL SEQUENCE

During the investigations, separate stratigraphic entities were assigned unique and individual 'context' numbers, which are indicated in the following text as, for example, [1001]. The sequence of numbering for excavation Area A began at [1000], and that for Area B at [2000]. During the evaluation phase of work, context numbers were assigned in Trench 1 beginning at [100], in Trench 2 beginning at [200], etc. Area A encompassed evaluation Trench 4 and some numbers assigned to structural remains during the evaluation phase continued to be used in the main phase of work. The archaeological sequence is described by placing stratigraphic sequences within broad phases, assigned on a site-wide basis in this case. An attempt has been made to add interpretation to the data, and correlate these phases with recognised historical and geological periods.

5.1 Phase 1: Natural Sub-stratum

5.1.1 Phase 1 represents natural geological material exposed as the basal deposit in three of the five evaluation trenches and in parts of both excavation areas.

5.1.2 The natural sub-stratum comprised firm, light to mid brownish yellow silty clay, [102], [203]=[230], [407], [1139], [2030], with occasional inclusions of fine and medium pebbles and sub-angular sandstone fragments. These deposits represent the drift geology of this part of the Tyne Valley, the material having been glacially deposited.

5.1.3 In Trench 2/Area B, in the south-western part of the site, natural clay, layer [203] (=[230]=[2030]), was recorded at a maximum height of 35.06m OD (Figure 11, Section 2), while in Trench 4, in the central eastern portion of the site, the same deposit, layer [407], was recorded at a maximum height of 33.84m OD (Figure 12, Section 4). In the central western part of Area A, what appeared to be a heavily heat-affected area of natural clay, layer [1139], was exposed in a rectangular area below modern disturbance (Figure 7). Its maximum recorded height was 33.91m OD. Natural clay could not be safely reached in evaluation Trenches 3 or 5, due to the thickness of modern overburden. Towards the eastern end of Trench 1, this sited on a landscaped mound in the north-western part of the site (Figure 10, Section 1), the earliest deposit encountered, layer [102], was recorded at a maximum height of 36.93m OD. This deposit appeared to be undisturbed natural clay, although it was not possible to verify this by further machine excavation due to Health and Safety considerations.

5.2 Phase 2: Medieval/Early Post-Medieval

5.2.1 Phase 2a: Medieval/Early Post-Medieval Developed Soil

5.2.1.1 Phase 2a represents evidence of the earliest human activity recorded during the investigations, being of broad medieval/early post-medieval date. Elements of probably the same developed soil horizon recorded in Trench 2/Area B and Trench 4/Area A likely represent agricultural use of the site from the medieval period, continuing into the post-medieval period.

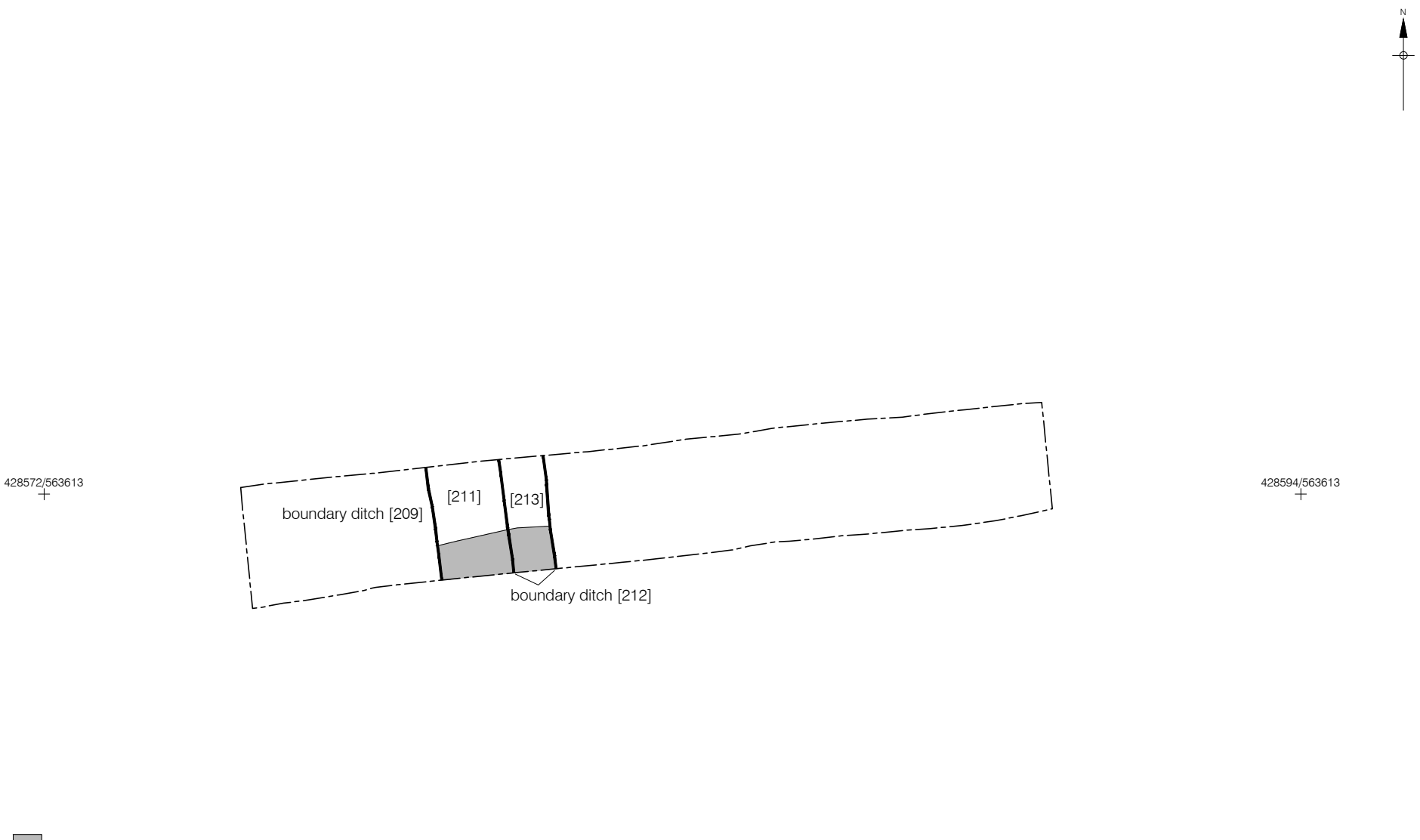


Figure 5
Trench 2
Phase 2 (Medieval/Post-Medieval)
1:100 at A4

5.2.1.2 Recorded in section in the eastern part of evaluation Trench 2 was a silty clay layer, [229], up to 0.16m thick (Figure 11, Section 2). Overlying natural clay and recorded at a maximum height of 35.04m OD, this has been interpreted as a developed soil associated with agricultural use of the land. Although it produced no dateable finds, it can be reasonably assigned a broad medieval to early post-medieval period of origin. In the south-western part of Area B, probably the same deposit was recorded in plan, as layer [2001]. This was recorded at a maximum height of 35.09m OD.

5.2.1.3 Recorded in section at the western end of Trench 4 was a clayey silt layer, [428], (Figure 12, Section 4). The maximum height recorded for the deposit, which was at least 0.23m thick, was 34.24m OD. Probably the same deposit was recorded, as layer [414], in a hand-excavated sondage in the central part of the trench. Probably the same developed soil as seen in Trench 2/Area B and these deposits likely represent agricultural use of the land in the broad medieval/early post-medieval period. Further east in Trench 4, and recorded only in section, was a layer, [406], of firm mid brownish grey clayey silt, becoming mid brownish pink in colour to the west, with frequent flecks of charcoal and fragments of mudstone. Up to 0.14m thick, this deposit overlay natural clay and was recorded at a maximum height of 33.88m OD (Figure 12, Section 4). Although considered to have been heat affected by later activity (Phase 4) to the west, this deposit probably represents part of the same developed soil horizon as described.

5.2.2 Phase 2b: Early Post-Medieval Field Boundary

5.2.2.1 Approximately 4m from the western end of Trench 2, where no developed soil survived, the natural sub-stratum was cut into by a linear north-south aligned ditch, [209], recorded at maximum height of 35.0m OD (Figure 5). The lower part of the ditch was very narrow, with a flat base, with near vertical lower sides, becoming more gently sloping in the upper portion of the feature. In section it was 0.80m wide and had a maximum depth of *c.* 0.70m (Figure 11, Section 2; Plate 1). Its primary fill, [210], comprised firm, mixed orange/light grey silty clay, 0.35m thick. Its upper fill, [211], comprised firm, mid grey silty clay, up to 0.25m thick. No finds were recovered from either deposit. The ditch has been interpreted as representing a long-lived field boundary of probable early post-medieval origin, which survived into the 19th century, to be depicted on the earliest Ordnance Survey maps (Figure 3 shows the 2nd edition).

5.2.2.2 To the east, ditch [209] was slightly truncated by another ditch, [212], running on the same north-south alignment (Figure 5). Where recorded in section, this feature had a maximum width of *c.* 1.50m, although would have originally been wider, itself being truncated by a later feature to the east. It was *c.* 0.85m deep and had steep sides and a concave base (Figure 11, Section 2; Plate 1). Its fill, [213], comprised firm, mixed brownish grey/yellow silty clay, from which three sherds of pottery and part of a clay tobacco pipe bowl were recovered. The pottery comprised three sherds of a probably imported Low Countries vessel of late 16th or 17th century date, while the clay pipe was of later 17th century date. The ditch was interpreted as a secondary phase of the long-lived field boundary, initially represented by ditch [209].

5.3 Phase 3: Late 18th Century Colliery Waggonway

5.3.1 Phase 3 represents activity relating to the construction and use of a colliery waggonway, first recorded at the western end of evaluation Trench 2 (Figure 6). At this location, a linear NW-SE aligned ditch, [204], was recorded cutting through a silty clay layer, [238], which overlay the primary phase of the Phase 2b field boundary, but for the most part directly overlay (probably horizontally truncated) natural clay (Figure 11, Section 2). Layer [238], up to *c.* 0.35m thick and recorded at a maximum height of 35.44m OD, has been interpreted as dumped tracked material for the waggonway, possibly the re-deposited earlier soil horizon.

5.3.2 The aforementioned ditch, [204], was *c.* 0.50m deep, as recorded in section in Trench 2, and at least 1.20m wide (recorded in section at an oblique angle to its alignment) (Figure 11, Section 2). It was recorded at a maximum height of 35.40m OD and its fill, [205], comprised loose coal fines. When exposed in the evaluation trench, the feature was interpreted as the eastern trackside ditch for a waggonway running on a SE-NW alignment.

5.3.3 With Trench 2 expanded to the west as Area B, the full width of the waggonway, assigned group number [2037], was exposed (Figure 6). In the open area, the eastern trackside ditch, [2013] (=[204]), had a maximum width of *c.* 2.20m (Figure 11, Section 7; Plate 2). Its primary fill, [2012], comprised compact coal fines with patches of mid yellowish brown silt. This deposit yielded a relatively large ceramic assemblage of 35 pottery sherds, all red earthenwares broadly dateable to the 18th/19th century and including sherds from at least four different bowls, along with a fragment of clay tobacco pipe of 17th/18th century date. A probable re-cut, [2011], was recorded in section, this 0.65m wide with a fill, [2010], which comprised compact dark grey silt and coal fines, with occasional patches of yellowish clay and fragments of clinker. This re-cut was most probably a localised feature, rather than an extensive re-cut of the whole boundary. To the west, the trackbed material was recorded as deposit [2029] (=[238]).

5.3.4 The western trackside ditch, [2015], seen only in Area B, had a maximum surviving width of *c.* 1.30m and a maximum surviving depth of 0.20m, where excavated (Figure 11, Section 7). In the excavated portion, four fills, [2024], [2023], [2014] and [2022], were recorded, all comprising silty clay with coal inclusions or simply coal fines with ash or silt. Fill [2014] yielded ten sherds of pottery, the majority red earthenwares broadly dateable to the 18th/19th century, as well as two small sherds of later 18th or 19th century whitewares. Recorded at a maximum height of *c.* 35.25m OD, it is likely that this feature had suffered horizontal truncation during modern era landscaping activity. The distance between the inner edges of the trackside ditches, the corridor occupied by the track, was *c.* 4m. On the western side of this ditch, and probably pre-dating it, was an angled gully, [2019] (Figure 6). Its surviving portion was very shallow, only *c.* 50mm deep, and it was up to 0.33m wide (Figure 11, Section 10). Its fill, [2018], comprised compact coal fines. The purpose of this unusual feature is unclear; it may have been related to setting out of the waggonway wayleave.

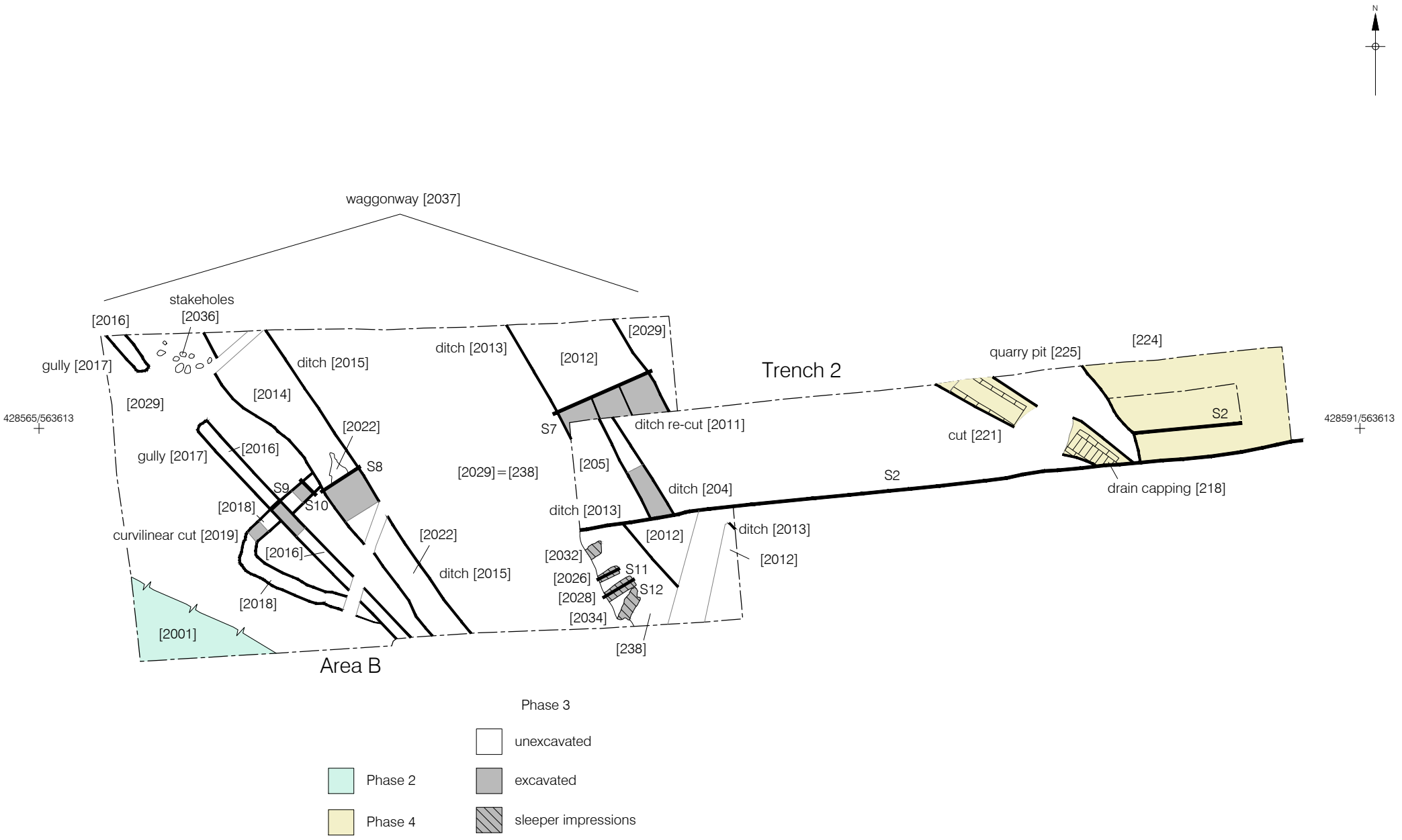


Figure 6
Trench 2 and Area B
Phases 2 - 4 (Medieval/Post-Medieval), 18th & 19th Century
1:100 at A4

5.3.5 Very little evidence of the waggonway track itself survived, again due to later horizontal truncation. In the south-eastern corner of Area B, the remains of four partial sleeper impressions, [2026], [2028], [2032], [2034] were recorded (Figure 6 and Figure 11, Sections 11 and 12). Due to modern truncation, the surviving impressions represented only the north-easternmost ends of the sleepers, with a maximum recorded length of *c.* 0.65m. The widths of the impressions varied between 0.14m and 0.24m and the maximum depth was 30mm. The fills, [2025], [2027], [2031], [2033], respectively, comprised compact coal fines.

5.3.6 The two central impressions, [2026] and [2028], contained the extremely fragmentary remains of what appeared to be heavily decayed wooden dowels, *c*. 30mm in diameter, within their fills. Such dowels would likely have attached a rail to the sleepers. The average distance between the centres of the sleeper impressions was *c*. 0.40m, suggesting that the track represented by the sleeper impressions may have been a main way, on which the sleepers would have been relatively close together. The position of the surviving sleeper impressions, close to the inner edge of the eastern trackside ditch, suggests that the waggonway was double-tracked, with a bye-way on the west side of the main way. Although no evidence of a second track survived, there was theoretically enough space for it between the ditches.

5.3.7 Approximately 0.50m to the west of the western trackside ditch and running roughly parallel to it, was a shallow *c.* 0.25m wide gully, [2017] (Figure 6). This had vertical sides and a flat base and the surviving portion was just 65mm deep, where excavated (Figure 11, Section 9). Its fill, [2016], comprised compact dark grey silt and coal fines. This feature was probably associated with the waggonway, although its precise function was unclear. It is likely that it had suffered the same horizontal truncation that had affected the western ditch and track, and would therefore have been originally somewhat deeper. The gully could represent a fenceline defining the wayleave of the waggonway, and preventing access to the track, whilst the ditches themselves may have been primarily for drainage.

5.3.8 Possible additional evidence of measures to prevent access to the track was recorded in the north-western corner of Area B, where a group of stakeholes, [2036], was recorded on the western lip of the trackside ditch (Figure 6). The stakeholes had an average diameter of *c.* 100mm and their composite fills, [2035], comprised compact dark grey silt and coal fines. The features possibly represented a rough fence or hurdle to prevent access to the trackway.

5.3.9 It is likely that the waggonway first revealed in evaluation Trench 2, and then further exposed in excavation Area B, was originally associated with Restoration Pit, part of St. Anthony's Colliery, founded *c.* 1769. This working, thought to have been located only *c.* 200m to the north-west of the site, and possibly the waggonway itself, are depicted on Gibson’s map of 1788. By the time of the 1st edition Ordnance Survey map of 1858, probably the same working was named ‘Byker High Pit’. However, with no waggonway depicted either in use or abandoned on that map (or on coalfield maps drawn by Bell between 1843 and 1850), it appears that the route had fallen into disuse before that date.

5.4 Phase 4: 19th-20th Century St. Anthony's Brickworks

Phase 4 covers evidence of brickmaking activity at the site from the mid 19th century through to the mid 20th century. This activity, recorded only in Trench 4 and Area A, has been divided into four sub-phases:

- Phase 4a: probable early-mid 19th century brickmaking, pre-dating the building of St. Anthony's Brickworks
- Phase 4b: Mid-late 19th century St. Anthony's Brickworks (built between 1858 and 1898)
- Phase 4c: Alterations to St. Anthony's Brickworks
- Phase 4d: Late 19th/early 20th century re-build of St. Anthony's Brickworks

5.4.1 Phase 4a: Early-mid 19th century brickmaking activity, pre-dating the building of St. Anthony's Brickworks

5.4.1.1 Phase 4a represents evidence of probable early-mid 19th-century brickmaking activity pre-dating the construction of St. Anthony's Brickworks, which occurred between 1858 and 1898. Manufacture likely took place in brick clamps, where a temporary construction of unfired bricks was raised over a level burnt brick floor with integral channels containing the fuel, usually crushed coke, wood or charcoal, to drive firing.

5.4.1.2 A group of thirteen deposits recorded within the south-eastern portion of Area A have been interpreted as representing possible brick production at the site, prior to the establishment of the permanent manufactory building. The earliest of these, layer [1057], comprised compact brownish red ash with fragmented burnt sandstone throughout, recorded at a maximum height of 34.03m OD in section at the southern limit of excavation (Figure 12, Section 6). This was overlain by a similarly distinctive brownish red clayey ash layer, [1056], which was exposed in plan across an extensive area at least 12m north-south by 15m west-east, meeting the limit of excavation to the east and south and underlying later strata to the west and north. Recorded at a maximum height of 34.09m OD its maximum recorded thickness was *c.* 0.10m. Possibly related was a reddish brown clayey sand deposit, [1069], this exposed across a small area adjacent to the eastern limit of excavation but continuing beneath later remains in all other directions.

5.4.1.3 Along much of its northern extent, extensive clayey ash deposit [1056] was directly overlain by a distinctive layer, [1068], predominantly comprising compact black ash. This was exposed across a linear area measuring at least 12m west-east by up to *c.* 2.10m north-south and was recorded at a maximum height of 34.02m OD (Plate 3). This deposit was notable for the presence of a fairly regular, although patchy, network of light to mid reddish brown burnt clay throughout. On this basis this area has been interpreted as representing the location of a brick clamp pre-dating the St. Anthony's Brickworks building and potentially of early-mid 19th century date.

5.4.1.4 A sequential group of deposits was recorded in section at the southern limit of excavation. It comprised eight variously coloured layers, [1048], [1049], [1050], [1051], [1052], [1053], [1054] and [1055], all consisting of compact ash or ashy sand or clay (Figure 12, Section 6). The earliest, layer [1055], overlay the previously described extensive layer [1056]. As a group these deposits had a combined maximum thickness of *c.* 0.35m and their maximum recorded height was *c.* 34.40m OD. Another sandy ash deposit, layer [1058], was recorded in section, also overlying layer [1056], further west at the southern limit of excavation, and this was probably related. Collectively, these deposits have been interpret as representing waste material associated with early brick manufacture, possibly derived from either the dismantling or post-firing process of a brick clamp.

5.4.2 Phase 4b: 19th Century St. Anthony's Brickworks

5.4.2.1 Phase 4b represents evidence of the original build of St. Anthony's Brickworks in the mid-late 19th century. The excavated remains appear to comprise the surviving north-westernmost portion of the manufactory built between 1858 and 1898 and as depicted on the 2nd edition Ordnance Survey map of 1898 (Figure 3).

5.4.2.2 The majority of the western external boundary wall of the first brickworks was revealed, along with traces of the internal layout in the western central part of the building, although by far the best preserved element was the surviving part of what has been interpreted as an internal drying chamber occupying the north-westernmost portion of the building. The remains of a brick surface were also recorded on the west side of the building in the southernmost portion of Area A; this is likely to have been an external yard and also probably a roadway depicted on the 2nd edition Ordnance Survey map of 1898.

Initial ground consolidation/levelling deposits

5.4.2.3 A group of dump deposits recorded in Area A, layers, [1083], [1093], [1109]=[1140] and [1124], have been interpreted as representing material probably laid down for ground levelling and consolidation ahead of construction of the brickworks building. Potentially the earliest of these deposits, clayey silt layer [1124], was exposed as the basal deposit within the central portion of Area A, across an area measuring *c.* 15.50m north-south by *c.* 3.50m east-west. Overlying this deposit, and also internal to the building footprint, were layers [1083] and [1093], respectively, these exposed for a maximum combined distance of *c.* 19m north-south by *c.* 14.50m east-west. To the east, layer [1083] comprised firm mid reddish brown silty clay, evidently a heat-affected deposit, while, to the west, layer [1093] was a loose, mixed deposit of silt, ash and sand. Deposit [1083] is presumed to have been heat-affected by brick production within the building itself.

5.4.2.4 Throughout the western margin of Area A, and continuing into its narrowest southernmost portion, the basal deposits to be recorded, layers [1109] and [1140], comprised distinctive dark grey to black silty clay, ash and coal fines. Lying external to the brickworks building footprint, these layers were recorded across a combined area measuring *c.* 47m north-south by up to *c.* 10.50m east-west, at a maximum height of 34.60m OD.

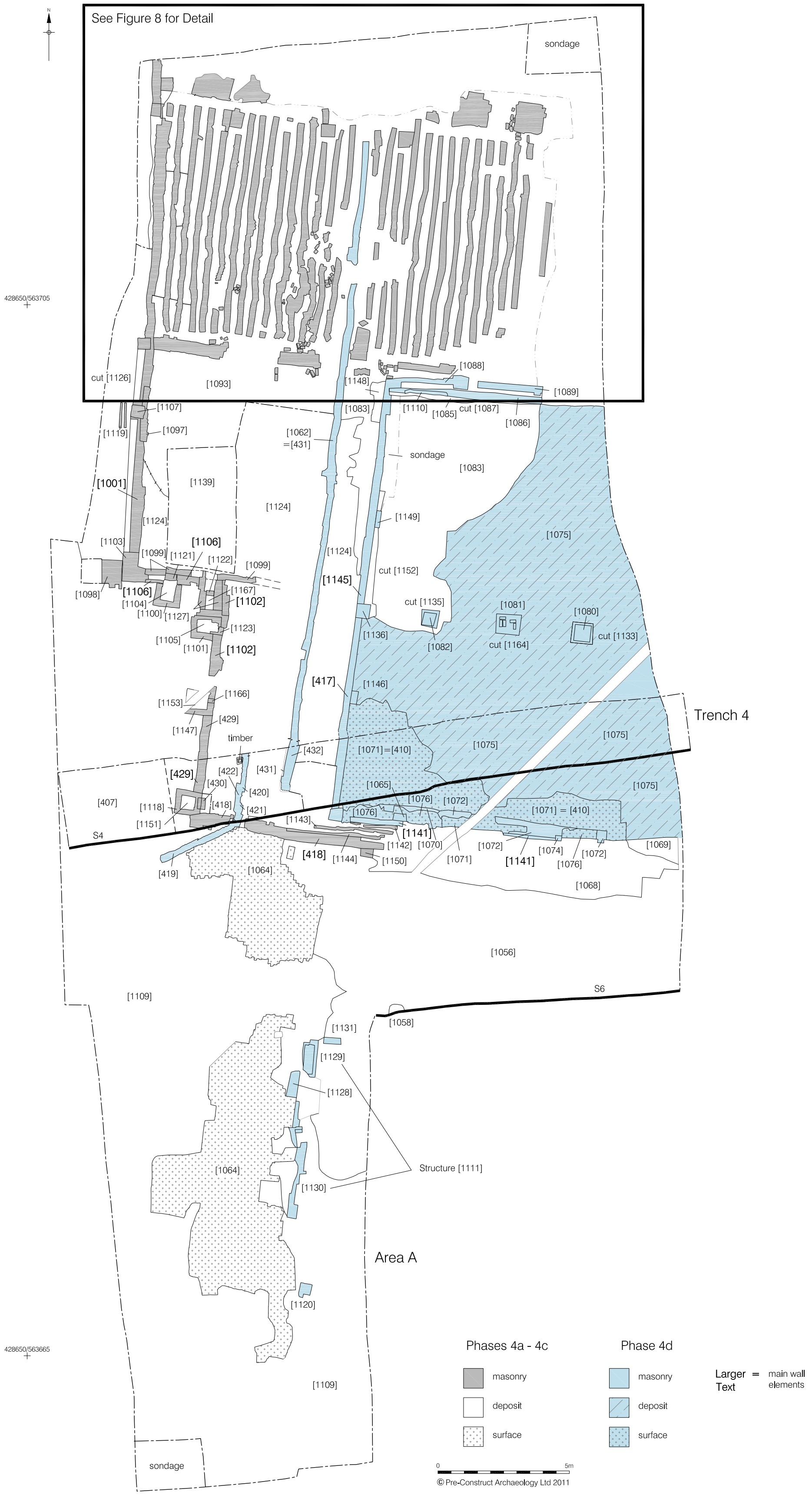


Figure 7
Trench 4 and Area 4 Phase 4 (Mid 19th - Early 20th Century)
1:125 at A2

Figure 8
North End of Area A,
Brickworks Drying Chamber
Phase 4 (19th Century)
1:75 at A4

5.4.2.5 All structural remains interpreted as being associated with the two main build phases (Phases 4b and 4d) of the brickworks were recorded either cutting into or overlying the deposits described above, which, as mentioned, have been interpreted as representing ground levelling and consolidation activity undertaken ahead of construction of the first brickworks building between 1858 and 1898.

External walls - and associated elements - of the original brickworks

5.4.2.6 Correlation of historic map evidence with the archaeological remains recorded in Area A indicates that only the westernmost part, particularly the north-westernmost portion, of the original build of the brickworks survived. The map evidence, specifically the 2nd edition Ordnance Survey map (Figure 3), indicates that the western external wall of the original brickworks had a staggered form with two sections aligned roughly west-east. The excavated remains confirmed this form (Figure 7), recording two main lengths of north-south aligned brick wall, [1001] (Plate 5) and [1102] (recorded as wall [429] in evaluation Trench 2), with an additional north-south aligned element, brick wall [1162], recorded in the north-westernmost corner of Area A. The main west-east aligned elements of the western external wall were represented by wall [1106] (along with an internal element, wall [1099]) (Plate 6) and wall [418], which are discussed in due course.

5.4.2.7 Wall [1162], the northernmost portion of the western external wall, was uniformly 0.38m wide and was recorded for a distance of *c.* 2.15m north-south, meeting the limit of excavation to the north (Figures 7 and 8). This indicates that the original brickworks building extended further to the north than this limit, as discussed in greater detail in due course. To the south, wall [1162] had been cut through by a Phase 4c pier base, [1031]. Beyond this intrusion, the western wall continued, with a slight shift in line to the east, as wall [1001], which was recorded for a distance of *c.* 16.0m north-south. Constructed using pressed wire-cut common brick (average size 220mm x 110mm x 70mm) and bonded with brittle sandy mortar, the wall was up to 0.40m wide and survived to a maximum height of 0.37m in up to three courses of brick, including a lower header course and two stretcher courses. Its broad construction cut, [1126], was backfilled by a clayey silt deposit, [1125]. To the west of wall [1001] was a short length of a north-south aligned brick structure, [1119], measuring 0.95m north-south by 0.27m wide. Comprising two parallel rows of pressed wire-cut common brick (average size 220mm x 110mm x 75mm) in stretcher bond, the structure was probably an external drainage feature. To the south, wall [1001] met a substantial L-shaped corner buttress, [1103], probably part of the same original build. Constructed using pressed wire-cut common brick (average size 240mm x 120mm x 80mm) in predominantly stretcher bond and bonded with brittle sandy mortar, this measured 1.02m north-south by 0.88m east-west and was at least 0.53m high.

5.4.2.8 East of corner buttress [1103] was the first west-east aligned section of the western external wall of the building. The structural remains here were relatively complex (Figure 7; Plate 6); the main element being a double-skinned wall with external structures related no doubt to the function of the building. The double-skin wall comprised parallel west-east aligned walls [1106] and [1099], both of which were interrupted.

5.4.2.9 Wall [1099] was an internal element, 0.24m wide and with a total recorded length of *c.* 4.40m. It was constructed using pressed wire-cut common brick (average size 240mm x 110mm x 75mm) with just one course surviving, in header bond. Its easternmost section continued eastwards, beyond the line of the adjacent section of north-south external wall, [1102], for a distance of *c.* 1.20m, indicating that this portion formed part of an internal dividing wall; it had been demolished at its easternmost extent. Wall [1106] was the external element, running parallel to wall [1099]. Again interrupted, its total recorded length was 2.40m and it was up to 0.35m wide, constructed using the same bricks as wall [1099].

5.4.2.10 The structures external to the wall line formed by west-east aligned walls [1099] and [1106], were two rectangular brick structures, [1127] and [1100] (Figure 7; Plate 6). Similarly constructed using pressed wire-cut common bricks (average size 240mm x 120mm x 80mm), bonded with brittle sandy mortar, the walls of both were 0.24m thick. It appeared that although both had originally opened into the interior of the building, internal blocking had subsequently taken place. Structure [1100] enclosed an interruption in external wall [1106] and measured 1.05m east-west by 0.88m north-south (internal area 0.92m^2) and survived to height of 0.44m in four courses of stretcher bond brickwork. To the east, structure [1127] abutted the eastern extent of external wall [1106] while also enclosing an interruption in internal wall [1099], measuring 1.52m north-south by 0.86m east-west (internal area 1.30m^2); up to three random courses survived, to a maximum height of 0.28m. The precise function of these external elements to the building is uncertain, but given their form and location they probably most likely represent coal chutes.

5.4.2.11 Extending southwards from wall [1099] was wall [1102], recorded initially in evaluation Trench 4 as wall [429] (Figure 7), this the next section of the western external wall of the original building. It was recorded for a distance of *c.* 8.30m and was up to 0.35m wide. Constructed with pressed wire-cut common brick (average size 225mm x 105mm x 75mm), it was bonded with brittle, mid to dark grey sandy mortar. At its southern extent the wall survived to a maximum height of 0.35m in four courses, with the remainder surviving as just one to two courses.

5.4.2.12 Three square and rectangular brick structures, [1101], [1118] and [1147], were recorded external to wall [1102], all enclosing interruptions in the wall line and, therefore, also probably representing coal chutes (Figure 7). All three structures were similarly constructed using pressed wire-cut common brick (average size 220mm x 110mm x 80mm) laid in stretcher bond, forming walls up to 0.24m thick. As with the similar structures previously described there was evidence to indicate that all three structures had originally opened to the interior of the building, but had been subsequently blocked. The northernmost structure, [1101], measured 1.0m north-south by 1.10m east-west (internal area of 1.10m^2); this abutted the south side of the previously described structure [1127], which occupied the external angle in the western external wall of the brickworks building. Approximately 2m to the south was structure [1147], which only partially survived, measuring 0.90m north-south by 0.80m (internal area *c*. 0.72m^2). Another *c.* 3m to the south was structure, [1118], which was bonded into wall [1102] and measured 0.92m north-south by 0.75m east-west (internal area *c*. 0.69m^2).

5.4.2.13 Extending eastwards from the south-eastern corner of structure [1118] and bonded into that structure was the final east-west aligned section of the western wall of the brickworks building, wall [418]. This was recorded for a length of 7.45m and was up to 0.50m wide at its western extent. It was constructed using pressed wire-cut common brick (average size 220mm x 110mm x 80mm) bonded with hard grey sandy mortar, with just a single course surviving for much of its length, although up to three courses survived along its easternmost portion, to a maximum height of *c.* 0.28m. At its eastern extent the wall directly overlay Phase 4a deposit [1068].

5.4.2.14 As previously mentioned, wall [1162], the northernmost element of the western external wall, met the northern limit of excavation of Area A, indicating that the original brickworks building extended slightly further north than this limit, which is broadly confirmed by the 1898 Ordnance Survey map. However, the northernmost part of the investigation area had suffered considerable later disturbance, as well being badly affected by groundwater ingress, and it is considered probable that the exposed remains represent the northernmost surviving evidence of the structure. A short length of west-east aligned wall, [1000], abutted and extended eastwards from wall [1162], and to the east of this were five seemingly discrete areas of very poorly preserved brickwork, [1159], [1160], [1161], [1163] and [1165] (Figure 8). However, as discussed, none of these remains are thought to represent the northern boundary wall of the brickworks. A length of 0.45m of wall [1000] survived and it was 0.50m wide, constructed using pressed wire-cut common brick (average size 240mm x 120mm x 65m), bonded with soft lime mortar. To the east, it appeared to have been destroyed by later disturbance and it is assumed to relate to an internal division within the building, although probably close to the external wall.

5.4.2.15 Notwithstanding the aforementioned difficulties of exposing and recording archaeological remains in the northernmost part of Area A, the preferred interpretation of the previously mentioned areas of poorly preserved brickwork east of wall [1000] is that, given their recorded form, they probably represent a series of discrete structures lying within the building, rather than a continuation of the wall line represented by wall [1000]. Of the group, the easternmost two, structures [1160] and [1161], displayed the best level of survival. Both were constructed using pressed wire-cut common brick (average size 240mm x 120mm x 75mm), with just one course exposed. Both appeared to be of roughly square form; structure [1160] measured 1.40m west-east by 1.30m north-south and structure [1161] measured 1.10m west-east by 1.12m north-south. Due to the poor level of survival of these remains, it is difficult to interpret their function with any degree of certainty. However, the group of structures as a whole appeared to define the northern limit of the brick drying chamber, to be discussed in due course, and the preferred interpretation is that they represent the footings of one or more structural elements closely related to the chamber, possibly chimneys or air vents.

Brick drying chamber

5.4.2.16 The majority of the northern portion of Area A was occupied by the well-preserved remains of one of the principal functional elements of the original brickworks building, a large internal space interpreted as a heated drying chamber for bricks. The surviving portion of this chamber occupied a rectangular area extending *c.* 15m west-east by *c.* 10.50m north-south bounded to the west by wall [1001], to the north by the aforementioned arrangement of possible footings, and to the south by an intermittent west-east aligned wall, [1003] (Figures 7 and 8; Plates 9 and 10). To the east, it did not survive, presumably having been demolished in the 20th century, so that the eastern limit of excavation of Area A was established *c.* 2.20m beyond its easternmost surviving element.

5.4.2.17 The southern limit of the drying chamber was defined by an interrupted west-east orientated wall, [1003], which to the west abutted the western external wall, [1001], and was recorded for a total length of *c.* 11.50m (Figure 8; Plates 11 and 12)). Up to 0.50m wide, it survived to a maximum height of *c.* 0.20m, in two courses. The lowermost surviving course comprised predominantly distinctive large pressed wire-cut bricks (average size 400mm x 240mm x 110mm) and standard pressed wire-cut common brick (average size 230mm x 105mm x 70mm) as edge set headers along the northern elevation. The second course, which survived only towards the eastern and western extents of the wall, was laid in stretcher bond. Lying between the two easternmost sections of wall [1003] and running on a slightly more southerly west-east line was a short length of wall, [1158], measuring 0.60m long by 0.26m wide. Just one course of edge set headers survived of this structure, which probably relates to an opening allowing access to the drying chamber.

5.4.2.18 The surviving internal structural elements of the drying chamber comprised a total of 29 similarly constructed parallel north-south aligned brick walls, [1002], [1004]-[1030] and [1036] (Figure 8; Plates 9-12). These are interpreted as representing sub-floor flue channels underlying the heated drying chamber. Warm air – heated by waste heat probably from the firing kilns or possibly boilers - would have been drawn along these flues under the drying chamber floor and then discharged via air vents or chimneys.

5.4.2.19 The flue walls (summarised in Table 5.1) were roughly equally spaced, *c.* 0.20-0.30m apart, the notable exception being the easternmost two walls, [1036] and [1002] which were *c.* 0.70m apart. This, however, was most likely result of a Phase 5 intrusion, drainage feature [1092], which had evidently removed a complete wall. The flue walls were mostly built from pressed wire-cut common brick (average size 230mm x 110mm x 75mm), with occasional firebricks (Plates 11 and 12). The stamps of four different makers' were recorded on bricks within the flue walls, including one from Coxlodge Colliery brickworks and another from the Haninngton works at Swalwell, all broadly dateable to the second half of the 19th century.

5.4.2.20 Many of the bricks within the flue walls were in poor condition, some highly fragmented, this evidently the result of exposure to high temperatures. While this may in part have occurred *in situ*, the preferred interpretation is that over-fired waste bricks from the brickworks were used in the construction of the flue walls. The maximum surviving length for any flue wall was *c.* 8.95m (wall [1022]) and the walls were generally *c.* 0.24m wide. The maximum surviving height was *c.* 0.40m (wall [1013]), where five dry bonded courses, laid in irregular header and stretcher bonds, survived. The maximum height recorded on any of the drying chamber flue walls was 34.05m OD. In general, and apart from the lack of bonding material, the walls appeared to have been poorly constructed so that some parts had a slightly sinuous form, and there were also several collapsed or missing sections, most notable in the central part of the chamber. The northernmost portions of 15 of the flue walls, [1004]-[1008], [1010]–[1012], [1020], [1023], [1024], [1028]–[1030] and [1036], were notable for their more robust construction, in each case this being a rectangular structural element, *c.* 0.48m in length constructed using firebricks laid in stretcher bond, bonded with sandy mortar.

Wall no.	Length (m)	Height (m)	Max. no. of surviving courses	Stamped bricks
1002	2.80	0.16	2	-
1004	3.40	0.12	1	-
1005	8.60	0.24	3	Hannington
1006	8.55	0.24	3	-
1007	8.50	0.18	3	Coxlodge
1008	8.45	0.20	3	Coxlodge
1009	7.55	0.22	2	-
1010	8.40	0.20	4	Coxlodge
1011	8.32	0.20	4	TSB, Coxlodge
1012	8.35	0.34	4	TSB, Hannington
1013	8.42	0.39	5	-
1014	8.24	0.20	3	-
1015	8.52	0.15	2	TSB
1016	8.84	0.15	2	-
1017	8.14	0.19	3	-
1018	8.30	0.10	1	-
1019	1.78	0.20	3	Hannington
1020	7.30	0.21	3	Hannington
1021	7.44	0.15	2	-
1022	8.94	0.20	3	-
1023	8.42	0.21	3	Coxlodge, Hannington
1024	8.44	0.29	3	Coxlodge
1025	8.30	0.32	4	-
1026	8.08	0.36	4	Lister
1027	7.90	0.35	4	-
1028	7.66	0.32	3	-
1029	7.30	0.29	3	-
1030	7.35	0.29	3	-
1036	6.30	0.29	3	-

Table 5.1. Summary of flue walls in the heated drying chamber

Other internal structural elements

5.4.2.21 A group of three parallel, narrow east-west orientated walls, [1142], [1143] and [1144], was recorded immediately to the north of aforementioned west-east wall [418] (Figure 7). The southernmost of these, wall [1144], abutted wall [418] to the south, indicating that it, and therefore the arrangement of parallel walls collectively, was likely to be either a contemporary or a later structural addition. With a surviving length of *c.* 3.90m, wall [1144] was the most extensive of the walls, although all three were of similar rudimentary construction, comprising a single skin of brickwork formed using dry bonded pressed wire-cut common brick (average size 220mm x 110mm x 75mm) and surviving no more than three courses high, to a maximum height of 0.23m. The broad similarity of this arrangement of walls to the flue walls within the main drying chamber to the north, suggests that a similar structure was located in this part of the brickworks. The area to the north was occupied by the surviving remains of the Phase 4d re-build of the brickworks, which had removed further evidence of this arrangement of walls.

5.4.2.22 No evidence of the internal floor surfaces of the original brickworks was recorded in Area A or Trench 4. It is assumed that the original floors, which were probably brick or otherwise compacted stone or other material to form hardstanding, lay above the level of horizontal truncation that the area suffered in the 20th century. The basal deposit exposed across the majority of the internal area of the original building comprised the aforementioned material, interpreted as having been dumped in ahead of construction.

External brick surface

5.4.2.23 The remains of a substantial brick surface, [1064], were recorded in the southernmost portion of Area A, lying entirely to the south of the original extent of Trench 4. Two areas of the surface survived, the southernmost measured *c.* 12.75m north-south by *c.* 6.75m west-east (Figure 7; Plate 7) and the northernmost measured *c.* 5.20m north-south by *c.* 4.60m west-east (Figure 7; Plate 8), giving a combined distance of up to *c.* 20.20m north-south by *c.* 4.80m west-east. The maximum recorded height on the surface was 34.63m OD. To the north, the northern area abutted west-east wall, [418], part of the western external wall of the original brickworks. To the east, the southern area evidently pre-dated remains interpreted as representing the west wall of the re-build of the brickworks (Phase 4d).

5.4.2.24 The surface comprised bed laid bricks, with no bonding material, using predominantly pressed wire-cut common bricks (average size 230mm x 115mm x 75mm), broadly dateable to the late 19th century, with occasional firebricks. Across the southern area of the surface the bricks were highly degraded, probably through wear (Plate 7). The surface has been interpreted as the surviving remains of an external yard for the original brickworks and, to the south, an access road running roughly west-east and adjacent to the original brickworks, which would explain the higher degree of wear on the southern area of surface. The surface was probably retained for use when the brickworks was re-built, as discussed below.

5.4.2.25 Towards the eastern end of evaluation Trench 2, a NW-SE aligned brick drain, [222], was recorded. Its construction cut, [221], was 0.60m in width, with vertical sides; against which had been constructed dry-bonded side walls, [219], using pressed wire-cut common bricks (average size 230mm x 110mm x 75mm), laid in stretcher bond. The drain was capped with bed-laid bricks, [218], identical to those used for the side walls. The backfill, [217], of the construction cut comprised mixed dark grey/light yellowish brown silt and clay. The fill, [220], of the drain itself comprised soft, black clayey silt. The bricks comprising drain [222] are broadly of late 19th century date and the feature likely dates to the period when St. Anthony's Brickworks was in operation.

5.4.3 Phase 4c: Use of and Alterations to the Original Brickworks

5.4.3.1 A group of four square brick piers, [1031], [1032], [1033] and [1034], were recorded in a roughly west-east alignment in the northernmost exposed part of the drying chamber. Interruptions in three of the flue walls of the chamber indicated that piers [1032]-[1034] post-dated the flue wall arrangement, while, to the west, pier [1031] had evidently been added to the external western wall at the southern end of wall [1162] (this could suggest that wall [1162] - and therefore also possibly wall [1000] - may represent an addition to the north end of the original brickworks, although this is uncertain).

5.4.3.2 Two other piers, [1156] and [1157], were recorded at the southern extent of the drying chamber and these are likely to have had a similar function. Pier [1156] had been incorporated into the western external wall, [1001], at its junction with the southern wall, [1003], of the drying chamber, while pier [1157] had been incorporated into the central portion of the same wall, [1003]. All the piers were similarly constructed using pressed wire-cut common brick (average size 240mm x 120mm x 70mm) with a sandy mortar bonding. They measured up to 0.50m west-east by up to 0.60m north-south and the maximum surviving height of any pier was 0.18m. Collectively these piers have been interpreted as structural additions to the drying chamber.

5.4.3.3 A thin layer of mixed grey ash, [1094], up to *c.* 40mm thick, was recorded between the westernmost of the flue walls of the drying chamber and survived only patchily between the remainder. This material has been interpreted as deriving from usage of the drying chamber.

5.4.3.4 Other recorded structural elements have been interpreted as probable additions to the original brickworks building. A possible re-built portion of western external wall [1001] was recorded as wall [1097]. Mostly built with pressed wire-cut common brick, it included a firebrick made at the Lintz Colliery brickworks probably during the late 19th century. A brick and concrete pier or buttress, [1107], may have been added to the exterior of the wall at the same time (Plate 5). This measured *c.* 0.50m^2 and survived to a height of 0.16m. A substantial square brick buttress, [1098], was recorded abutting and west of the aforementioned L-shaped corner buttress, [1103], in the western external wall. Constructed using pressed wire-cut common brick (average size 240mm x 120mm x 80mm) this measured *c.* 0.80m west-east by *c.* 0.95m north-south and survived in four courses to a height of *c.* 0.35m. A rectangular brick buttress, [1150], was recorded abutting and south of wall [418]; measuring *c.* 0.50m west-east by *c.* 0.40m north-south it was 0.20m high, in two courses.

5.4.3.5 The aforementioned group of putative brick coal chutes associated with the western external wall of the building were blocked at some point, presumably signalling their disuse. All the blocking elements, [1121], [1123], [430], [1122] and [1166], comprised pressed wire-cut common brick (average size 220mm x 120mm x 80mm). Following blocking, the structures were backfilled with generally loose ash deposits, [1104], [1105], [1151], [1167] and [1153], respectively.

5.4.4 Phase 4d: Late 19th/Early 20th Century Re-build of the Brickworks

5.4.4.1 Phase 4d relates to the re-building of the brickworks between 1898 and 1907, as demonstrated by successive editions of the Ordnance Survey map of these dates (Figures 3 and 4). The new building footprint evidently overlay the south-eastern portion of the original building but extended further to the east. Map evidence indicates that it had a courtyard plan, open to the south. With survival of structural remains remains decreasing to the east across Area A, it appeared that very little of this second structure survived; in fact the surviving remains comprised just the north-westernmost corner of the re-build, exposed in the central eastern portion of Area A, and fragmentary sections of the western external wall, exposed towards the eastern limit of excavation in the southernmost part of Area A.

Ground preparation

5.4.4.2 An extensive dump deposit, [1095], comprising mid brownish grey silty clay, was machine- and hand-excavated across the extent of the drying chamber of the Phase 4b brickworks in the north-western portion of Area A. Up to *c.* 0.35m thick, this deposit contained frequent inclusions of broken pantile, this material either derived from the demolition of a building or waste from a tileworks in the vicinity; if the former, it is uncertain whether the building in question was either of the brickworks which occupied the site. This dumped material likely represents infilling and ground levelling following demolition of the original brickworks ahead of construction of the new structure in the very late 19th or early 20th century.

External walls

5.4.4.3 The surviving portion of the north wall of the re-built brickworks comprised two sections of roughly west-east aligned walls, [1088] and [1089], with a combined length of *c.* 6m (Figure 7). The interruption in the line of the wall is thought to have been a deliberately placed aperture, *c.* 0.30m wide. Of the easternmost portion, wall [1089], a length of *c.* 2.50m survived, as just one header course. The westernmost element, wall [1088], was recorded for a distance of *c.* 3.20m. For the most part this wall was up to 0.50m wide and survived to a height of 0.18m, in two courses, the upper course in stretcher bond. At its eastern end the brickwork formed a rectangular pier *c.* 0.60m west-east by *c.* 0.45m north-south, this fully integrated into the wall rather than a separate element. Both walls were constructed using pressed wire-cut common brick (average size 240mm x 120mm x 70mm), mortar bonded.

5.4.4.4 At its western end, wall [1088] had a right angle return and then ran roughly north-south, as wall [1145], the western external wall of the re-built brickworks, for *c.* 8.50m meeting a square brick pier, [1136], measuring *c.* 0.50m square. This pier formed the easternmost element of a row of such structures, as discussed in due course, which evidently represented and internal subdivision. Beyond pier [1136] the western external wall continued southwards, as wall [417], as first recorded in evaluation Trench 4, for a length of *c.* 7.70m (Figure 7). In total, therefore, the surviving length of the western external wall was *c.* 16.80m; it was up to 0.34m wide and survived to a maximum height of 0.23m, in three courses of pressed wire-cut common brick (average size 240mm x 110mm x 75mm) bonded with soft sandy mortar. The bricks are broadly of late 19th to early 20th century date. A broad construction cut, [1152], was visible in places along its exposed length. Abutting the internal elevation were two rectangular brick buttresses, [1146] and [1149], up to *c.* 0.50m north-south by *c.* 0.25m west-east, also constructed using common brick (240mm x 120mm x 75mm). These would have added structural stability to the western external wall.

5.4.4.5 In the southernmost part of Area A, in an area to the east which had seen extensive disturbance, making definite interpretation of the exposed remains problematic, the remains of what may have been the southernmost element of the western wall of re-built building were recorded, as composite structure [1111], the main elements being several highly disturbed sections of wall or footing, [1128], [1129] and [1130] (Figure 7). These were recorded for a combined length of *c.* 6.80m north-south and the maximum width of any element was 0.58m. Walls [1129] and [1130] were constructed using pressed wire-cut common brick (average size 220mm x 110mm x 80mm) and survived to maximum height of 0.17m, in up to three courses, while wall [1128] comprised concrete and thus likely represents a footing.

5.4.4.6 On the basis of their location and alignment, these remains have collectively been assigned to Phase 4d, as they probably represent part of the western external wall of the re-built brickworks. Two possibly related brick structures were also recorded, firstly, to the north, wall [1131], which may in fact have been the surviving portion of an internal west-east wall, and secondly, to the south, pier [1120], which measured 0.44m west-east by 0.40m north-south, again constructed using common brick (240mm x 120mm x 80mm) (Figure 7).

Internal structural elements

5.4.4.7 To the east of the southernmost extent of wall [417] was an intermittent roughly west-east aligned wall, [1141], which survived in extremely fragmentary condition but was recorded for a total distance of 8.10m (Figure 7; Plate 14). It survived to a height of 0.20m, in two courses of pressed wire-cut common brick (average size 220mm x 120mm x 70mm). These were laid in header and stretcher bond in the westernmost and easternmost portions of the wall, respectively, so that it was effectively just a single-brick skin and thus certainly an internal sub-division. Two buttresses or piers, [1065] and [1074], were recorded in association with wall [1141]. The first, buttress [1065], lay to the west, abutting the north side of wall [1141] and measuring 0.52m west-east by 0.24m north-south. It was probably added to provide greater structural stability. At the eastern extent of the wall was the second, buttress [1074], measuring *c.* 0.50m square. This may represent the location of an aperture, probably a doorway, in the line of the wall. Both buttresses or piers were similarly constructed using common brick (average size 120mm x 120mm x 70mm).

5.4.4.8 Located immediately to the south of and running parallel with northern external wall [1088]/[1089] was a concrete foundation, [1086], with a narrow construction cut, [1087], on its south side (Figure 7). The foundation extended *c.* 5.70m west-east, with the fragmentary remains of a brick wall, [1110], just 1.62m in length and 0.12m wide, survived upon it, as just one course of degraded bricks in stretcher bond. To the east, the foundation had been destroyed and to the west it appeared to have been built into wall [1145], as an addition, so that it ran close to and parallel with the line of wall [1088]/[1089]. This structure presumably represents an internal structural element or alternatively could represent the remains of an internal drain/culvert.

5.4.4.9 A substantial concrete surface, [1071] (recorded as surface [410] in evaluation Trench 4), was recorded abutting western external wall [417] and probable southern internal wall [1141] (Figure 7; Plates 13 and 14). It survived across an area measuring *c.* 10.70m west-east by up to *c.* 4.30m north-south and was recorded at a maximum height of 34.01m OD. It overlay a compact sandy clay deposit, [1075], containing frequent fragments of brick and tile (Figure 7; Plate 13). This deposit, extending up to *c.* 16.40m west-east by *c.* 11.25m north-south and broadly contained within the limits of the re-built brickworks building, has been interpreted as a formation consolidation/levelling deposit laid down prior to the pouring of the concrete surface, indicating that the surface would have probably extended across the whole internal area of at least the portion of the building which lay within the excavation area.

5.4.4.10 Overlying concrete surface [1071] and abutting west-east internal wall [1141] were the poorly defined remains of a structure, [1072], recorded for a length of *c.* 6.40m west-east and up to 0.56m wide. It comprised common bricks and brick fragments set within concrete. Difficult to characterise because of its poor survival, this structure has tentatively been interpreted as representing the remains of an internal wall upon the concrete surface, possibly being a more substantial replacement for the aforementioned sub-dividing wall [1141].

5.4.4.11 Surviving parts of a later internal concrete surface, [1076], were recorded north of the west-east line of wall [1141], with a combined extent of *c.* 9.60m west-east by up to *c.* 0.60m north-south (Figure 7; Plate 14). Up to 60mm thick, this surface overlay a compact brick rubble make-up deposit, [1070]. Again, due to the poor level of survival, surface [1076] is difficult to interpret conclusively; it may have originally formed part of a more extensive surface, possibly a complete replacement of surface [1071] within this internal portion of the building, or it may have been a more limited structure lying internal to the west-east sub-division, and possibly associated with the aforementioned structure [1072].

5.4.4.12 Further evidence of sub-division within the surviving north-westernmost portion of the re-built brickworks was represented by the remains of three square brick piers, [1080], [1081], [1082], located in line to the east of the aforementioned pier [1136], which in that case was integral to the western external wall of the building. Each pier had a narrow construction cut, [1133], [1164] and [1135], respectively, and the structures themselves were at 2-2.50m intervals. The best preserved of the three structures was the easternmost, pier [1080] (Figure 7; Plate 13). This measured 0.60m^2, constructed in mortar bonded pressed wire-cut common brick (average size 240mm x 120mm x 70mm) with just two courses exposed. While providing internal sub-division to some extent in this part of the building, the main purpose of these structures is likely to have been as supporting piers for the roof structure.

External structural elements

5.4.4.13 A substantial rectangular brick structure, [1035], was recorded external to the north-western corner of the re-built brickworks building (Figure 7). It occupied a broad construction cut, [1060], backfilled with a dark greenish grey silty clay deposit, [1059]. The structure had been constructed using pressed wire-cut common brick (average size 230mm x 120mm x 75mm), mortar bonded, and measured *c.* 1.15m north-south by up to *c.* 0.70m west-east, surviving to a height of 0.26m, in four courses. The function of this plinth-like structure is unclear but it may represent a pier base. To the west it appeared to have been truncated by culvert [1062], discussed below, although given that its own construction post-dated at least one of the flue walls of the Phase 4b drying chamber, it has been assigned to Phase 4d.

5.4.4.14 A group of structures recorded to the west of the western external wall of the re-built brickworks building have been interpreted as representing probably associated drainage features (Figure 7). The most substantial was a roughly north-south aligned, culvert, [1062], located *c.* 1.50m west of and running parallel to the western external wall. It was traced for a total length of *c.* 24.70m north-south and was up to *c.* 0.50m wide. The south end of the structure terminated *c.* 1m north of the west-east aligned portion of the external wall of the building. A narrow construction cut, [1063], was recorded, into which brick side walls had been built, dry bonded, with the walls just *c.* 0.10m apart. The walls, of which three courses survived, comprised pressed wire-cut common brick (average size 240mm x 120mm x 70mm) with occasional firebricks, laid in stretcher bond, and the structure was capped with distinctive large pressed bricks (*e.g.* 400mm x 240mm x 120mm, although with considerable variation).

5.4.4.15 Located *c.* 1.50m to the west of culvert [1062], was another brick culvert, [419], this an angled structure with a total length of *c.* 6.0m and *c.* 0.25m wide. To the north, it was not exposed beyond the line of evaluation Trench 4. The northernmost portion of this structure as exposed ran roughly north-south parallel to culvert [1062], before turning to run on a roughly NE-SW alignment. It had been constructed within a narrow construction cut, [425], with brick packing, [422], recorded within the central portion. Wire-cut common bricks had been used for the side walls, [420], with a capping, [421], comprising a combination of common bricks and firebricks, including damaged voussoir brick, probably made *c.* 1870 at Lister's Yard, Scotswood. The construction cut for this culvert had been cut through external wall [418] of the Phase 4b version of the brickworks, therefore the structure can be confidently assigned to Phase 4d. An upright timber exposed adjacent to its western side in the evaluation trench was probably related.

5.4.4.16 A short length of a possible north-south aligned drain, [1148], was recorded immediately west of the north-western corner of the re-built brickworks building. Badly disturbed, the exposed portion was *c.* 1.50m in length, north-south, by up to *c.* 0.45m wide and comprised two parallel rows of common brick (240mm x 120mm x 70mm) laid in stretcher bond.

5.4.4.17 In evaluation Trench 2, brick drain [222], interpreted as being of broadly similar date as the original brickworks building, was overlain by a deposit [202], up to 0.27m thick, of firm dark grey clayey silt. This deposit was truncated at the eastern end of the trench by a steep sided feature, [225], that ran across the width of the trench continuing beyond the limits of excavation to the east, north and south. Up to *c.* 1.35m deep within the limits of the evaluation trench, this feature has been interpreted as the edge of a clay quarry pit, possibly associated with extraction of raw materials during the lifetime of the re-built brickworks building.

5.5 Phase 5: Modern

5.5.1 Phase 5 represents activity on the site post-dating the closure of the brickworks in the 1940s and broadly attributed to the modern era. This activity relates largely to demolition of the brickworks buildings and subsequent landscaping, undertaken when the Lightfoot Centre was constructed in the 1960s. A summary of modern era remains is set out below, with an emphasis on remains recorded in the evaluation trenches to give a fuller picture of uppermost strata across the site. Appendix A shows stratigraphic relationships in all five evaluation trenches and Areas A and B. Appendix B catalogues all recorded remains in summary fashion. Full details of deposits, features and structures can be found in the Site Archive.

5.5.2 Overlying extensive dump deposit [1095] in the extreme north-western corner of the brickworks drying chamber a 50mm thick coarse ash and clinker deposit, [1096], probably represents modern levelling.

5.5.3 In evaluation Trench 1, the natural sub-stratum, [102], was overlain in the extreme northernmost portion of the trench by a silty clay layer, [104], up to *c.* 0.90m thick. This underlay a silty sand deposit, [103], up to *c.* 0.25m thick, which was restricted to the northernmost portion of the trench but extended to the south-eastern limit of excavation, where it was seen to overlay the natural sub-stratum directly (Figure 10, Section 1).

5.5.4 The bulk of the overburden recorded in Trench 1 comprised a mixed clayey silt layer, [101] (Figure 10, Section 1). Averaging *c.* 1.20m in thickness, this contained much modern era material including fragments of concrete, brick and tile, and occasional pieces of textile and metal objects, none of which were retained. All three deposits, [104], [103] and [101], were interpreted as being associated with modern landscaping of the site, probably at the time of the construction of the Lightfoot Centre in the 1960s. The uppermost of the dumped landscaping deposits was overlain by a layer, [100], up to 0.35m thick, of modern topsoil and turf. This was recorded at a maximum height of 37.65m OD, reflecting the elevated nature of the portion of the site in which this trench was situated, this being a landscaped bund skirting the north side of the athletics track.

5.5.5 In evaluation Trench 2, the backfills of Phase 4d clay extraction pit [225], recorded towards the eastern end of the trench, have been attributed to the modern era. It is considered likely that, following closure and demolition of the brickworks in the 1940s, the remains of related workings in the vicinity would have been infilled and levelled. The silty clay primary fill, [226], of the extraction pit was up to 0.45m thick and this was overlain by four further fills, [224], [223], [228] and [227], of various compositions (Figure 11, Section 2).

5.5.6 In the central part of evaluation Trench 2, a broad drainage ditch, [206], was recorded running on the same alignment as, and to immediate east of, the earlier (Phase 2) field boundary. The feature was *c.* 1.20m wide and *c.* 0.90m deep (Figure 11, Section 2). Its mixed primary fill, [207], was restricted to the western side of the feature, possibly suggesting that the feature had been re-cut for the insertion of a ceramic field drain along the base of the ditch. If an earlier element had existed it may well have been of post-medieval rather than modern origin.

5.5.7 Overlying the field drain was the main, secondary fill, [208], which comprised silty clay and coal fines. A dump deposit, [231] was recorded in section throughout Trench 2, cut through by two field drains, [233] and [235], with a probably contemporary third field drain, [237] further to the west. A mixed dump deposit, [201] sealed these drainage features and was itself cut through by another field drain, [242], which was sealed by topsoil, [200], this forming the existing surface of the athletics field and recorded at a maximum height of 35.88m OD.

5.5.8 All deposits recorded in evaluation Trench 3 have been assigned a modern era date and the majority have been interpreted as backfills of a substantial, roughly rectangular, water-filled feature depicted on the Ordnance Survey 2nd edition map. This trench appeared to be located within the limits of this feature, probably a former clay extraction pit associated with early-mid 19th century brickmaking at St. Anthony's. The earliest deposit recorded in Trench 3 was a mixed ash and silt dump deposit, [317]. This deposit, which yielded a sherd of bone china, was recorded at a maximum height of 33.47m OD, *c.* 1.95m below existing ground level. The variously composed overlying fill deposits were [316], [315], [314], [309], [312], [308]=[311] and [307]=[310], all interpreted as backfills of the former quarry pit (Figure 10, Section 3). Layer [314] evidently formed a ground surface, at least temporarily, as it had been cut into by a shallow steep-sided pit, [320], with a loose ashy fill, [313]. A field drain, [319], recorded as cutting through backfill [312], may in fact have been a later intrusion.

5.5.9 The uppermost pit backfill, [310]=[307], was overlain by an ashy make-up layer, [306], for a layer of geotextile, presumably dating from the construction of the sports pitches. In the north-eastern half of the trench, the geotextile was cut through by a redundant service trench, [305], housing a plastic water pipe, [304]. This was sealed by the stone make-up layer, [302], for the 0.10m thick tarmac surface, [301], recorded at a maximum height of 35.45m OD, which underlay the astroturf of the existing sports pitch, although this had been removed in the area of this trench.

5.5.10 An extensive clayey silt dump layer, [404], up to *c.* 0.50m thick, was recorded in section in the eastern part of Trench 4 (Figure 12, Section 4). Sealing a field drain, [409], this had evidently been laid down following closure and demolition of the re-built brickworks. It was overlain by a silty ash levelling layer, [403,] for a layer of geotextile, equivalent to that recorded in Trench 3 and again presumably dating from the construction of the sports pitches. This was sealed by a stone make-up layer, [402], which underlay a 70mm thick tarmac surface, [401], below the astroturf surface, [400], of the existing sports pitch, recorded at a maximum height of 35.08m OD.

5.5.11 All deposits recorded in evaluation Trench 5 have been assigned a modern era date. The earliest recorded deposit, layer [501], was confined to the south end of the trench (Figure 10, Section 5). It was more than 0.35m thick and comprised compact silty gravel, with inclusions of brick and tile. Recorded at a maximum height of 34.03m OD, it fell away to the north and continued below the basal limit of excavation at a depth of *c.* 1.60m below the existing ground surface. It is unclear whether this deposit was derived from modern landscaping of the margin of the sports pitches or represented infilling of a former clay extraction pit, although the former is the preferred interpretation.

5.5.12 Overlying layer [501] a series of dumped landscaping deposits, [502], [503], [505], [506], [504], [507], [509] and [508], of various composition were recorded in section. Silty ash layer [506] appeared to have been cut through by a service trench, [511], housing an iron pipe, although it was not precisely clear at what level this had been cut from. The uppermost deposit was topsoil, [510], this forming the existing surface of the landscaped margin of the sports pitches and recorded at a maximum height of 35.02m OD.

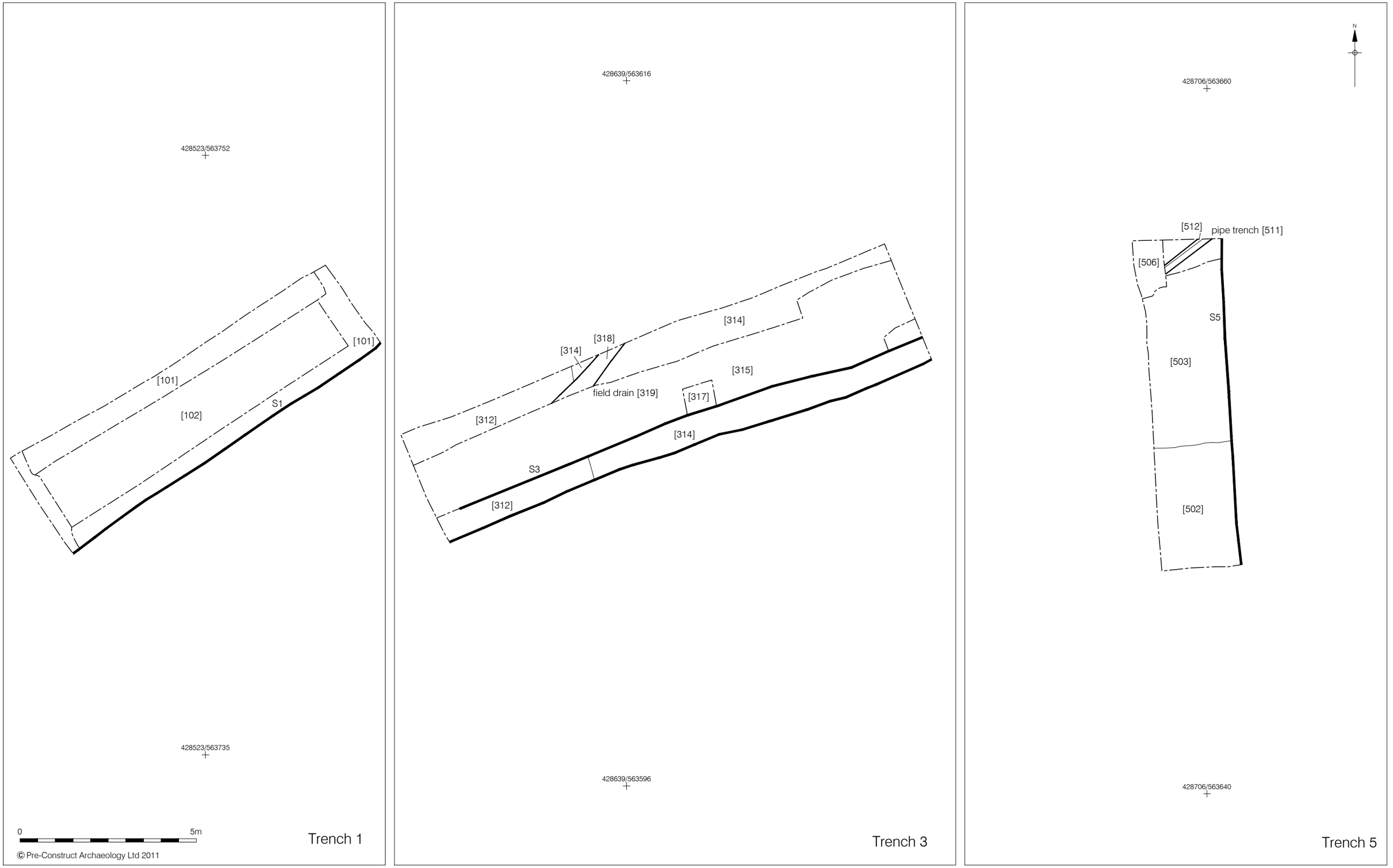
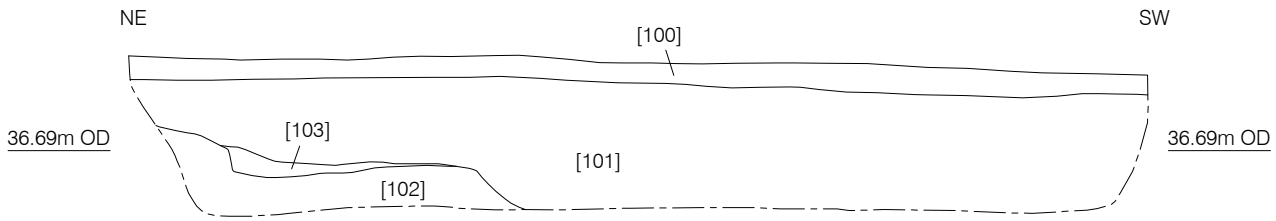
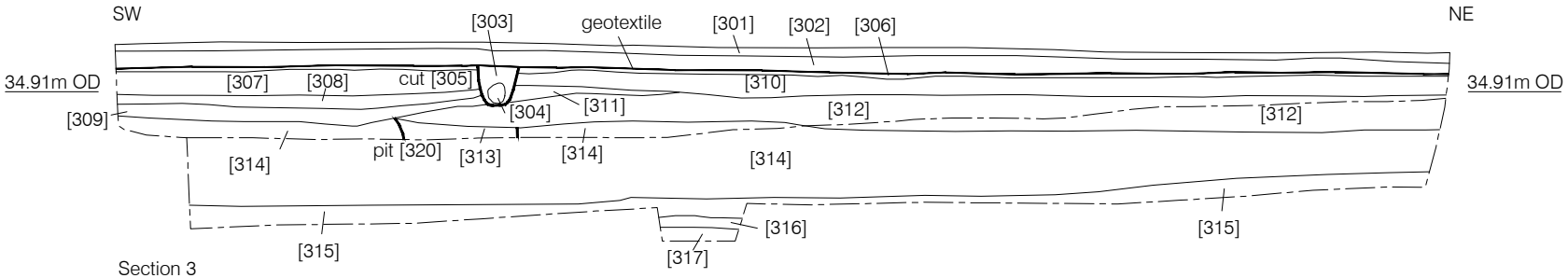


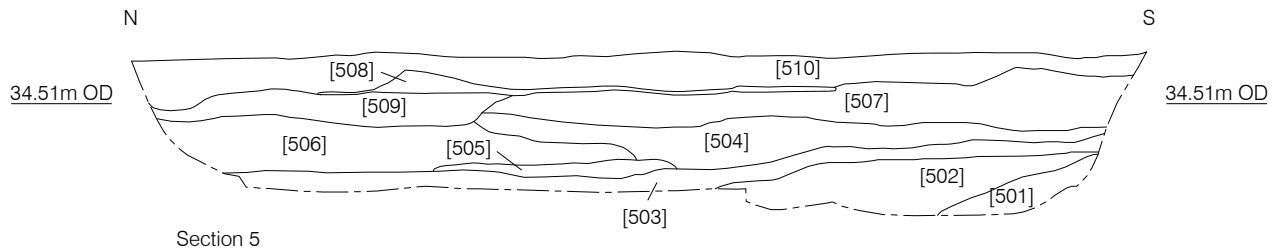
Figure 9
Plan of Trenches 1, 3 & 5
1:100 at A3



Section 1
Trench 1
Northwest Facing



Section 3
Trench 3
Northwest Facing



Section 5
Trench 5
West Facing

0 2.5m

Figure 10
Sections 1, 3 & 5
1:75 at A4

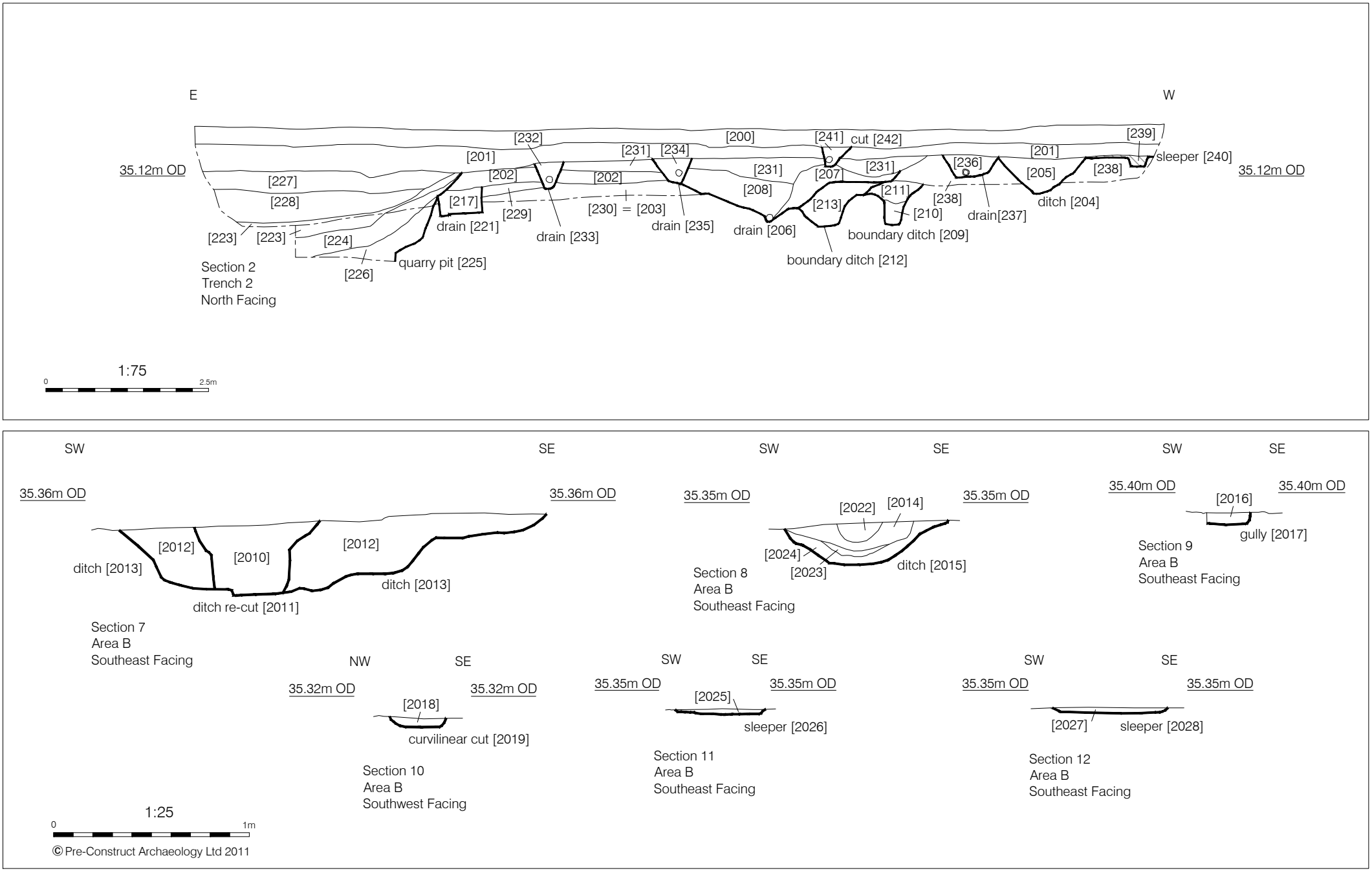
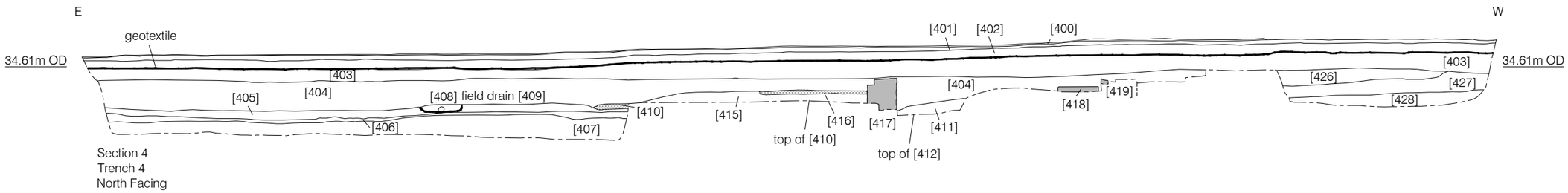


Figure 11
Sections from Trench 2 & Area B
1:75 and 1:25 at A4



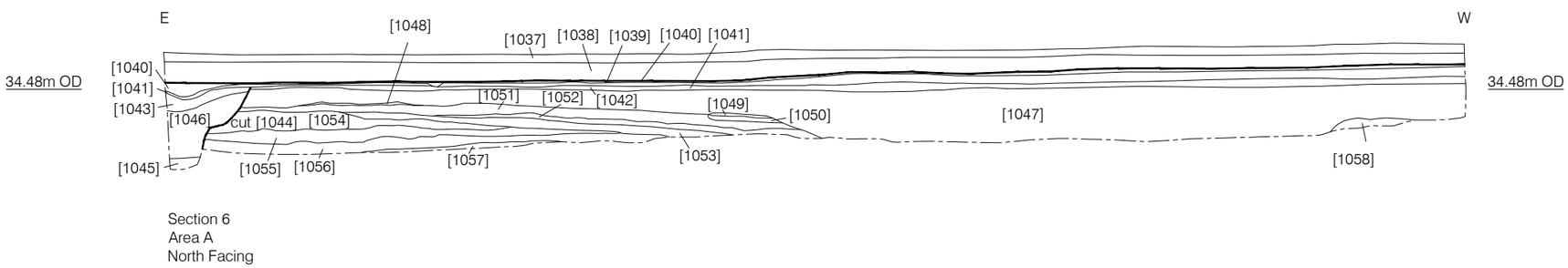


Figure 12
Sections from Trench 4 and Area A
1:75 and 1:50 at A3

PART B: DATA ASSESSMENT

6. STRATIGRAPHIC DATA

6.1 Paper Records

6.1.1 The paper element of the Site Archive is as follows:

Item	*No.*	*Sheets*
Context register	2	9
Context/Masonry sheets	316	316
Section register	2	2
Section drawings	12	29
Plan register	1	2
Plans	7	68

Table 6.1. Contents of the paper archive

6.2 Photographic Records

6.2.1 The photographic element of the Site Archive is as follows:

Item	*No.*	*Sheets*
Monochrome print registers	3	3
Monochrome prints	54	8
Colour slide registers	53	4
Colour slides	53	4
Digital photograph registers	1	2
Digital photographs	64	N/A (on CD)

Table 6.2. Contents of the photographic archive

6.3 Site Archive

6.3.1 The complete Site Archive, including the paper and photographic records, is currently housed at the PCA North Office.

6.3.2 The Site Archive will eventually be deposited with Tyne and Wear Museums and Archives, Arbeia, South Shields for permanent storage and the detailed requirements of the repository will be met prior to deposition.

7. POTTERY *(Jenny Vaughan)*

7.1 Introduction

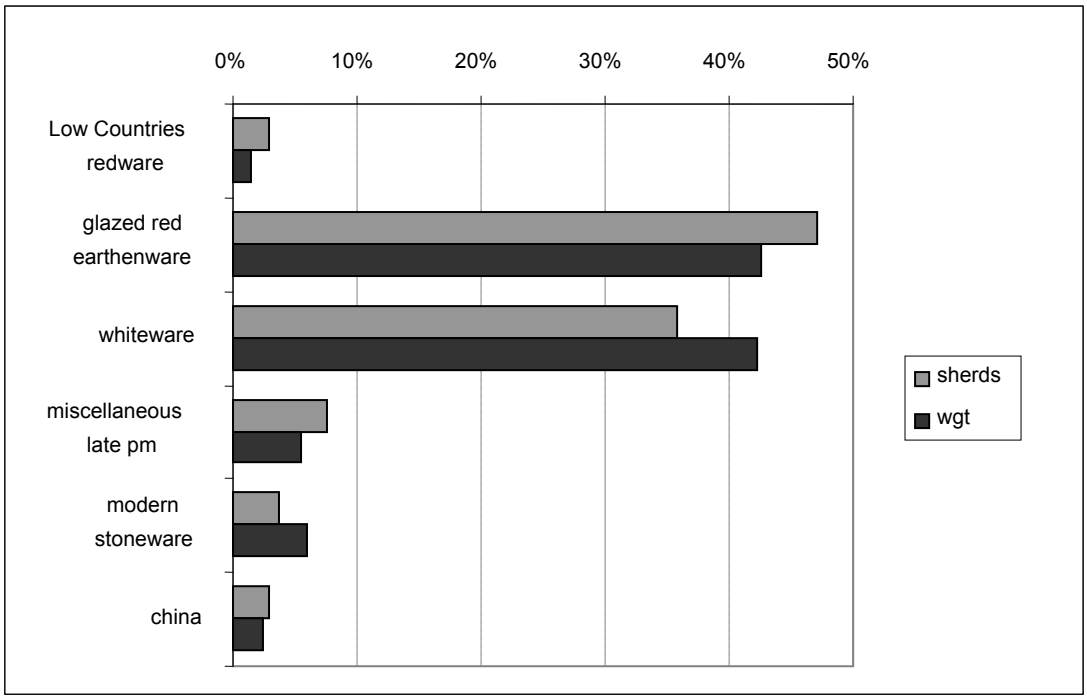
7.1.1 A small assemblage of 106 sherds of pottery weighing 1.84kg was recovered from the Lightfoot Centre site. Most of the material was of 19th century date, with the remainder early 20th century and three joining sherds of late 16th or 17th century date.

7.2 Methodology

7.2.1 The assemblage was catalogued by type in a MS Access table, recording counts and weights per context and noting form sherds where present.

7.3 Range and Variety

7.3.1 The assemblage is summarised in the chart below. The accompanying catalogue (Appendix 3) should be consulted for full details.



7.3.2 As is usually the case on 19th century sites, the two main pottery types present are glazed red earthenware and white glazed whitewares. The unusually high proportion by weight of the latter is due to the presence of a complete white earthenware vessel of jam jar type. There was also a complete, though very chipped, small shallow jar probably for paste of some kind. The rest of this group were probably table wares but many fragments were too small to identify vessels. Six of the fragments were biscuit-fired including a small ring base with transfer printed decoration including three figures in a boat. One other fragment had a partial maker's mark '...WOOD STEPNEY PO...' identified as J. Wood Stepney Pottery. This dates the piece to after 1872 when John Wood took over this manufactory.[14]

[14] Bell and Gill 1973, 14.

7.3.3 Red earthenware sherds were mainly from bowls with internal slip coat almost all of which had brown mottling on the slip coating. Most of the rims present were the common flanged form but there was one plain upright rim and another was rolled. There were a few black-glazed sherds and one plain brown glazed.

7.3.4 Other late post-medieval ceramics present included a few sherds of stoneware jars, china and brown-glazed buff coloured earthenware. The accompanying catalogue should be consulted for full details.

7.3.5 The early post-medieval material mentioned above was three sherds of a red earthenware dish. It had a collared rim and an internal slip coating which stopped at the rim flange. The glaze over the slipped area was a bright 'apple' green, over the rest brown. The form and surface treatment is typical of Low Countries vessels imported into this country in the late 16th/17th centuries.[15]

7.4 Discussion and Potential

7.4.1 This assemblage is small and fragmented and, apart from the three sherds mentioned above, of broadly 19th century date. Red earthenwares (the contemporary name was 'brownwares') are manufactured locally from the early part of the 18th century through to the 20th century. As yet there are no well stratified sequences which might clarify any changes through time in these local wares. However, one context here produced exclusively red earthenware ([2012]), and a related context ([2014]) only two small fragments of white earthenware. It is possible that these contexts are 18th or very early 19th century. Context [217] produced only two fragments of red earthenware but might also be this date. The rest of the 19th century assemblage appears to be much later. The imported redware indicates a late 16th/17th century date for the feature from which it comes.

7.4.2 The assemblage is too small to have any potential for further analysis.

[15] Jennings 1981, 90 and Fig. 35.

8. CLAY TOBACCO PIPES *(Jenny Vaughan)*

8.1 Introduction

8.1.1 A small group of seven fragments of clay tobacco pipe was recovered. Four of these were plain stems and one was a moulded stem. There was one complete bowl of mid to late 17th century date and one stem with bowl fragment, probably of the same date range.

8.2 Range and Variety

8.2.1 The assemblage is summarised in the table below.

Context	*Object*	*Count*	*Bore (mm)*	*Detail*	*Date*
213	bowl	1	7	Tyneside Type 6 bowl with spur[16]	1650-80
412	stem	1	5	Small fragment of stem	18th/19th c.
1095	bowl fragment	1	7	With small round base	17th c.
1095	stem	1	6	Lozenge cross-section with moulded section perhaps representing a rope wound spirally round the stem	19th c.?
1095	stem	2	5	-	18th/19th c.
2012	stem	1	7	-	17th/18th c.

Table 8.1. Clay pipe assemblage

8.2 Discussion and Potential

8.2.1 The clay pipe assemblage is a very small group and, apart from confirming an early date for context [213], is of no particular interest. There is, therefore, no requirement for any further analysis.

[16] Edwards 1988.

9. BRICKS AND RELATED FINDS *(John Nolan)*

9.1 Introduction

9.1.1 Eleven samples of whole bricks were submitted for examination. Of these, six were firebricks and the remainder common or house bricks. Two other items were recovered, one fragment of tile, and one fragment of a kiln stilt. The assemblage is summarised in Table 9.1 below.

9.2 Methodology

9.2.1 The bricks were measured and length, width and thickness recorded in millimetres. Fabric and colour was assessed visually and described, and form and maker's marks were recorded and identified (where possible) from published sources. The recorded data was entered into a basic catalogue which formed the basis of this assessment.

9.3 Range and Variety of Material

9.3.1 All the firebricks carried maker's stamps. Two (contexts [1024] and [1005]) were marked 'HANNINGTON', one of which (context [1024]) was a side-wedge from an arch. These might have been made by Hannington and Company of Swalwell who operated from 1850-1906.[17] A. J. Hannington is also recorded working at Byker in 1869, but not, however, as a firebrick maker.[18] Another firebrick was marked 'LINTZ', a product of Lintz Colliery Brickworks, which are recorded as working between 1868 and 1924.[19] One (context [421]) had a partly defaced stamp '...BSON'], probably made by W.C. Robson at Lister's Yard, Scotswood, working 1869-1872.[20] The remaining two firebrick stamps were 'COXLODGE' and 'TSB'. The former was made at Coxlodge Colliery's Jubilee Mine firebrick works, working between 1873 and 1929.[21] The latter may be a product of T. Smith's Clarence Brickworks, at Billingham, working 1855-1906.[22] Neither of these two marks is recorded in Davison.

9.3.2 The five house or common brick samples were all of similar form, pressed and wire-cut, and none had frogs.

9.3.3 In addition to the bricks, a small piece of a white earthenware kiln stilt was recovered from context [1095] and a fragment of red roof tile was recovered from context [2012].

9.4 Discussion and Potential

9.4.1 The known dates of working for the firebrick makers whose stamps are described above span the mid-1850s to the late 1920s. The common or house bricks are of a form which is broadly datable to *c.* 1860 onwards. Collectively, these dates are broadly compatible with the known dates of the two phases of brickworks at the site. Map evidence indicates that the original brickworks building was constructed in the second half of the 19th century, to be replaced by the second building between 1898 and 1907, with this demolished by the late 1940s.

[17] Davison 1986, 131.
[18] *ibid.*, 64.
[19] *ibid.*, 171.
[20] *ibid.*, 84.
[21] *ibid.*, 68.
[22] *ibid.*, 242.

9.4.2 The ‘ROBSON’ brick (context [421]) and one common brick (context [218]), were recovered from drain structures, at least one of which was associated with the re-built brickworks. The possible presence of a Billingham product is, if confirmed, of some interest in that is demonstrates late 19th century marketing distribution patterns for firebricks.

9.4.3 The assemblage has little potential for further study, though it would be desirable to confirm the tentative identification of the ‘TSB’ stamp as being a Billingham manufacturer. It is recommended that examples of each brick is retained as part of the Site Archive, or offered to the Tyne and Wear Archaeology Officer for inclusion in the regional brick reference collection.

Context	Type	No.	Length (mm)	Width (mm)	Thickness (mm)	Maker	Notes	Date
218	Common	1	233	109	76		Complete. Pressed and wire-cut, plain. Mid red, hard, some distortion/cracking during firing. Some thin, pale yellow wash on all faces.	l.19th-e.20th c.
417	Common	1	243	107	74		Complete. Pressed and wire-cut, plain. Mid-red with occasional sandstone grit inclusions. Some distortion/bulging and cracking during firing. Thin pale yellow was on some faces.	l.19th-e.20th c.
421	Firebrick	1	225	74-108	63	..BSON	Damaged end-wedge voussoir from an arch. Discoloured red/yellow/orange from heat. Some mortar traces on all faces. Impressed stamp. Probably made by W.C. Robson at Lister's Yard, Scotswood 1869-1872 (Davison 1986, 84).	l.19th c.
1005	Firebrick	1	231	115	59	HANNINGTON	Complete. Fire-reddened exterior. Traces of mortar on both bedding and one header face, where it is partly vitrified. impressed stamp in rectangular frame.	l.19th-e.20th c.
1010	Firebrick	1	230	110	80	COXLODGE	Complete. Orange yellow exterior. Impressed stamp in rectangular frame. Firebrick Works, Jubilee Mine, Coxlodge Colliery 1873-1929 (Davison 1986, 68).	l.19th-e.20th c.
1012	Firebrick	1	234	111	66	TSB	Complete. Yellow/buff gritty fabric, discoloured externally by heat. Possibly by T. Smith, Clarence Brickworks, Billingham 1855-1906 (Davison 1986, 242).	l.19th-e.20th c.
1024	Firebrick	1	228	103	37-60	HANNINGTON	Complete side wedge from an arch. Sooted and spalled on the 'face' to the soffit of the arch. Hannington, Swalwell 1850-1906 (Davison 1986, 131).	l.19th-e.20th c.
1025	Common	1	245	115	74		Complete. Pressed and wire-cut, plain. Mid-red, hard, with occasional sandstone grit inclusions. Some distortion/bulging and cracking during firing.	l.19th-e.20th c.
1025	Common	1	233	115	73		Complete. Pressed and wire-cut, plain. Mid-red, hard, with occasional sandstone grit inclusions. Some distortion/bulging and cracking during firing.	l.19th-e.20th c.
1064	Common	1	228	116	75		Complete. Pressed and wire-cut, plain. Mid-dark red, hard, some distortion/cracking during firing. Some thin, pale yellow wash on all faces.	l.19th-e.20th c.
1097	Firebrick	1	240	113	68	LINTZ	Complete. Pale yellow gritty fabric, fire-reddened externally, mortar on all faces vitrified in places. Impressed stamp in rectangular frame. Lintz Colliery brickworks 1868-1924 (Davison 1986, 171).	l.19th-e.20th c.

Table 9.1. Brick assemblage

10. SUMMARY DISCUSSION OF THE ARCHAEOLOGICAL FINDINGS

10.1 Phase 1: Natural Sub-stratum

10.1.1 The natural clay sub-stratum encountered at the site represents the drift geology of this part of the Tyne Valley, the material being of glacial origin.

10.1.2 In Trench 2/Area B, in the south-western part of the site, natural clay was recorded at a maximum height of 35.06m OD, while in Trench 4/Area A, in the central eastern portion of the site, it was recorded at a maximum height 33.82m OD. These values reflect a fall in natural ground level to the east across the site. Due to the thickness of modern overburden natural clay could not be safely reached in evaluation Trenches 3 or 5, this no doubt the result of infilling of former clay extraction pits. Natural clay was possibly reached at the eastern end of Trench 1, sited on a landscaped mound in the north-western part of the site, although this could not be verified safely.

10.2 Phase 2: Medieval and Post-Medieval Developed Soil/Field Boundary

10.2.1 The earliest evidence for human activity recorded during the investigations was represented by a soil horizon, likely developed by agricultural use of the area, probably during the medieval and post-medieval periods. Up to 0.16m thick in evaluation Trench 2, a similar deposit was also recorded in Trench 4. The site lay relatively close to the medieval settlements of Byker and Walker, both first recorded historically in the 13th century.

10.2.2 Two phases of a north-south aligned ditch recorded in evaluation Trench 2 probably represent an ancient field boundary. Although the earlier version produced no dating evidence, it could conceivably be of medieval origin, while the later version yielded three sherds of pottery probably from an imported Low Countries vessel of late 16th or 17th century date and part of a clay tobacco pipe bowl of later 17th century date. The earliest Ordnance Survey mapping of the area demonstrates that this field boundary survived into the 19th century and what was effectively a third version of the boundary, in which a field drain had been laid, dates to the 19th century or later. Such a long-lived boundary indicates that the ancient layout of fields in the area remained substantially unchanged from the medieval period until the industrial era. It is likely that much of Walker was used for agriculture from the medieval period onwards, until industrial era development saw practically all open land developed in a relatively short space of time.

10.3 Phase 3: Late 18th-Century Waggonway

10.3.1 The Phase 3 colliery waggonway recorded in Trench 2/Area B ran on a NW-SE alignment across the south-western part of the site. Gibson's map of 1788 depicts a waggonway in this vicinity, running south-eastwards from 'Byker St. Anthony's', although its exact location is impossible to determine due to the small scale of the map. The same route is probably depicted on mapping produced by William Casson in the first decade of the 19th century. St. Anthony's Colliery was founded in 1769 and comprised three workings, Farewell Pit, Nightingale Pit and Restoration Pit. The closest of these to the site was Restoration Pit, situated to the north-west, at the location where 'Byker High Pit' is shown on the Ordnance Survey 1st edition map of 1858.

10.3.2 The waggonway serving St. Anthony's Colliery on Gibson's map was a branch route of a way that ran from Endeavour Pit, Walker Hill, which was certainly operating by 1784. The waggonway continued southwards to St. Anthony's staithes on the Tyne. By the early 19th century, timber waggonways, although still in use in the North-East region, were being replaced by routes with iron rails. Map evidence indicates that by this date the way serving St. Anthony's Colliery was also serving workings further north, including Heaton Main. No waggonway is depicted either in use or abandoned on the Ordnance Survey 1st edition of 1858 (or on mapping drawn by Bell between 1843 and 1850), therefore it appears that the route had fallen into disuse before that date.

10.3.3 Only a single waggonway track was identified in Area B, although the width of the trackway between the internal edges of the trackside ditches was theoretically enough to have accommodated a double way. Later horizontal truncation of the trackway had removed much of the evidence for actual track. The earliest waggonway routes in the North-East coalfields were single track, with passing loops to allow movement in both directions.[23] Although some of the less intensively used routes continued to be built in this way throughout the 18th century, by the mid-18th century the North-East waggonways comprised a two-track system, with a main way for carrying full chaldrons from the pit, and a bye-way for the return of the empty chaldrons.

10.3.4 Early waggonways were built with tracks of wooden construction with flat wooden rails attached to regularly spaced sleepers. At this site, the only elements of the track to survive were very shallow impressions, up to *c.* 0.65m long, of the north-eastern ends of four sleepers. Elsewhere truncation had removed the associated trackway ballast. The surviving sleeper impressions were slightly irregular in plan, suggesting that untrimmed branches had been used for the sleepers. The heavily decayed remains of what may have been dowels for attaching rails to the sleepers were noted within two sleeper fills.

10.3.5 Archaeological investigations of other wooden waggonways have shown that this construction method is commonly seen on waggonways of the late 18th/early 19th century; roughly-trimmed oak branches were used for sleepers at Lambton D Pit near Sunderland,[24] Rainton Bridge, Houghton-le-Spring[25] and Harraton Outside, Washington.[26] Before the introduction of iron rails, the purpose of sleepers was primarily to ensure that the rails maintained the required gauge, rather than to take the weight of the vehicles as with modern sleepers, so often the branches were only squared at their ends leaving their centres untrimmed. The length of sleepers was to some extent dependant on the width of the gauge, but the average size for sleepers in North-East waggonways was 6ft in length and 4 to 8in. square, but on average 6in. square. Unlike modern railways, where the sleepers are twice the length of the gauge of the track, on 18th-century waggonways sleeper lengths were rarely more than one and a half times the gauge.

[23] The majority of the technical information regarding waggonways synthesised into this discussion is taken from Lewis 1970.
[24] Ayris *et al*. 1998.
[25] Glover 2005.
[26] PCA 2010b.

10.3.6 As mentioned, all the sleeper impressions recorded at this site were truncated to the south-west. The width of the impressions varied between 0.14m to 0.26m (5½in. to 10in.). The distance between the sleepers was on average 0.42m (1ft 4½in.). On double tracked waggonways, the main ways were more solidly built than the bye ways and generally had their sleepers set at 1ft 6in. centres, sometimes at 2ft. The fact that this waggonway was constructed with closely-set sleepers suggests that either it was the main way, designed to take full wagons, or that it was a single track line.

10.3.7 Comparative evidence suggests that waggonway sleepers in this period were *c.* 2m in length, on average. If this were the case at this site, there would have been insufficient distance between the trackside ditches to accommodate a bye way, suggesting that the waggonway was more likely of single track construction. As there was no surviving timber, it was not possible to determine the type of wood used for construction of the track. However, a late 18-century description of waggonway construction describes how oak branches were typically used for sleepers[27] and of the excavated examples of waggonways in the region, those with surviving timbers had sleepers made of oak, such as at Lambton D Pit and Harraton Outside.

10.3.8 The gauge of the waggonway at this site could not be determined due to later truncation of the remains. The known gauge range for North-East waggonways ranges from 1.22m (4ft) to 1.52m (5ft). This measurement is comparable to the gauge of the waggonway recorded at Lambton D Pit and the second phase of waggonway at Harraton Outside. Again there was no surviving rail timber to determine what type of wood had been used. Oak was the preferred wood for the rails on early single tracks due to its strength, and it was common for main ways to be built with oak rails and bye way rails with fir or ash.

10.3.9 Ballast, usually comprising crushed coal, ash and stones was packed around the sleepers and under the rails and this was essential to the functioning of the waggonways as this material bore the weight of the vehicles transmitted through the rails and sleepers. At this site, the ballast had been removed almost completely by later truncation, surviving only in the sleeper impressions and probably redeposited within the fills of the trackside ditches. What evidence there was suggested that the ballast comprised coal fines, which is typical of waggonways of late 18th/early 19th century date.

10.3.10 The wayleave of the waggonway was defined by ditches to the north-east and south-west. The purpose of the ditches would have been to define the wayleave, to provide drainage for the track and to restrict access to the track by both people and animals, where the waggonway ran through pastureland. The ditches at this site had suffered some horizontal truncation, particularly that to the south-west of the track. The maximum depth of the north-eastern ditch, where minimum truncation had taken place, was *c.* 1.15m. Examples of similar ditched wayleaves have been excavated, notably at Rainton Bridge. The material excavated from the trackside ditches at this site produced an interesting assemblage of pottery, with one deposit yielding exclusively red earthenware and another similar material along with two small fragments of whiteware. This dating evidence indicates that the ditches were infilled during the 18th or very early 19th century.

[27] Jars 1765, in Lewis 1970.

10.3.11 A shallow - although once again probably horizontally truncated - linear feature running alongside the south-western ditch may be evidence of a continuous fence line. Stakeholes recorded at one location on the lip of the ditch could represent evidence of a localised rough fence or hurdle. The construction of such barriers was necessary not only to prevent animals and people from accessing the track, but also to mark out the limits of wayleaves, and hedges or fencelines were built from the earliest days of wooden waggonways. At Rainton Bridge, the waggonways were bounded either by fencelines built with closely set stakes, or widely spaced substantial postholes.

10.4 Phase 4: 19th-Century Brick Manufacturing

10.4.1 Phase 4a comprised evidence recorded in the eastern part of Area A of possible early-mid 19th century brickmaking activity, pre-dating construction of St. Anthony's Brickworks. The 1st edition Ordnance Survey map of 1858 depicts a 'Brick Field' and series of large open clay pits some distance to the south of Area A, but there is no reason to suppose that early brickmaking was not also conducted at the site. Manufacture likely took place in brick clamps, a method of brick manufacture whereby bricks are fired in a temporary stack (the clamp), which is dismantled after firing. A level burnt brick floor with integral channels contained the fuel, usually crushed coke, wood or charcoal, to drive firing. A linear spread of compact ash, with possible brick impressions throughout, represented the probable location of such a clamp.[28]

10.4.2 Phase 4b represents evidence of the original build of St. Anthony's Brickworks. The excavated remains appear to comprise the surviving north-westernmost portion of the manufactory built after 1858, as depicted on the 2nd edition Ordnance Survey map of 1898. Remains of the western external wall with a series of associated external structures, probably coal chutes, were recorded. The northern external wall probably lay just beyond the northern limit of excavation although this area had been considerably disturbed by later activity. The main surviving element was a rectangular room in the north-westernmost portion of the works, in which a series of parallel north-south aligned walls had been built at sub-floor level. In order to place the recorded remains of St. Anthony's in context, an overview of mechanised brick manufacture in Britain from the mid 19th century is required.

10.4.3 The mechanisation of brickmaking in the mid 19th century coincided with the abolition of the tax on bricks which had been in place since 1784. The overall result was a vast increase in brick production in rapidly industrialising areas like Tyneside, aided by the introduction of new machinery which enabled the harder clays of the area to be used. St. Anthony's Brickworks, as depicted on the Ordnance Survey 1st edition map of 1858, comprised one large building of rectilinear polygon form, with a smaller rectangular building on its eastern side. This is relatively unusual in that most brickworks of the period comprised a complex of distinct structures, each with a specific purpose in the brick manufacturing process. Here though it seems that most if not all the elements required for brick manufacture were contained within one structure, with no external kilns; the smaller building may even have been simply a works office or even an outhouse. The works presumably provided bricks for local housing as Walker developed rapidly in the second half of the 19th century, but the nearby river would also have provided good transport links for moving produce further afield, if required.

[28] The technical information regarding brick manufactory synthesised into this discussion is taken from Dobson 1850, Hammond 1977, Brunskill 1990, Palmer and Neaverson 1994 and Jones 1996.

10.4.4 Although many variations in layout are documented for brickworks of the mid-late 19th century, all sites required the same essential elements: a source of raw clay; a processing area for tempering the clay, *i.e.* kneading, removing stones and, in areas where this was required, adding water to achieve the correct consistency, a process which by the 19th century was undertaken almost everywhere in a 'pug mill'; an area to house the brick-forming machinery; a drying area, often a large shed, for drying out the unfired 'green' bricks; the actual kiln or kilns for firing.

10.4.5 Across the North-East the natural boulder clay sub-stratum was opencast mined, by hand until the introduction of the steam shovel after 1879, to produce the main raw material for brickmaking. Some 19th century brickworks used pulverised shale, a waste product of deep mining in some areas, in place of or in addition to clay, but it is uncertain whether or not this took place at St. Anthony's. The Ordnance Survey 2nd edition map of 1898 depicts an extensive opencast mine on the northern and eastern sides of the works, with an additional 'Clay Pit' to the south-east, within the angle of a road junction. The eastern part of evaluation Trench 2 recorded what was likely the edge of a clay pit depicted on both the 1st and 2nd editions of the Ordnance Survey map (on the later edition it is a large water-filled feature).

10.4.6 Historic map evidence indicates that the first St. Anthony's Brickworks was skirted to the south by a trackway or road which ran roughly north-westwards to High Pit of Byker Colliery, indicating that the pit and brickworks were closely associated. Recorded on the the west side of the original brickworks building in Area A were two areas of a brick surface. The northernmost was likely an external yard adjacent to the manufactory, while the southern area displayed evidence of much wear suggesting that the historic mapping does indeed depict a surfaced road.

10.4.7 Although manual labour was used to temper the raw clay in earlier manufactories, a horse-driven pug mill is likely to have been in place when St. Anthony's first opened, while later, almost certainly in the second building, steam power was more likely employed. Given that the bricks used in construction of the original building at St. Anthony's were extruded or 'wire-cut', a process which came into use in the mid 19th century, it is probable that the process of forming the bricks in the works was relatively mechanised. In the wire-cut process, tempered clay was fed into a machine and forced through a die until a green brick of the necessary dimensions could be cut off using a taut wire. In early examples of such machinery, called 'stupids', clay from a hopper was forced into a chamber, with a piston then pushing sufficient clay for a single brick though the die, and the clay was then cut off by wire. In later examples, a continuous supply of clay was fed into the machine by an Archimedes screw and the extruded clay was fed along a bed of rollers on a table on which a set of wires cut off a batch of bricks at a time. Steam driven extrusion machinery had a set of overhead wire cutters which could produce around ten bricks in just a few minutes.

10.4.8 Shortly after the wire-cut process was invented and came into use, the more versatile pressing process was mechanised. In this, tempered clay was forced into a mould and then mechanically pressed to fit the mould exactly, the advantage being that the clay could be pressed several times until the desired density was obtained and the brick ended up more or less perfectly formed. The mould could be designed to produce a frog (although none at this site had frogs) and the manufacturer's name and/or trade mark could be impressed along with the frog. In less mechanised works, simple hand-operated presses were also used to finish off and make more uniform bricks which had been previously moulded by hand. Hand moulding was an expert skill which was effectively replaced in all but the most rural locations in Britain by mechanisation.

10.4.9 Drying out newly formed green bricks was an essential part of the overall manufacturing process. Raw clay generally contains too much water to be fired without drying out as the bricks simply break apart under high temperature as the water turns to steam. In early brickmaking, drying was achieved simply by laying wet bricks out in the open on their sides, but this is a time consuming process. Early structures to facilitate the process were basic sheds, often just a roof on legs, although fairly large structures were needed. At St. Anthony's it seems that a designated drying chamber was incorporated into the works, rather than being housed in a separate structure, and the green bricks were probably laid on racks and bathed for a few days in hot air, this derived from waste heat from the kilns or boilers (British brickworks only appear to have applied team power on any scale after the 1880s) which was redirected through the chamber via sub-floor flues and drawn with the aid of a chimney. It is considered most likely that the structural remains recorded in the northernmost part of Area A represent such a drying chamber; it covered an area of at least *c.* 15m west-east by *c.* 10.50m north-south.

10.4.10 Once dried, green bricks were stacked on brick barrows and taken to the kilns and stacked by hand to be fired. Stacking was skilled job and it was important to have layers of previously fired bricks within the stack as this ensured that the heat was evenly distributed in the kiln. No real clues were found to suggest which type of kiln was used at St. Anthony's, although the rectilinear polygon form of the original building perhaps suggests that it housed a rectangular kiln, although this is not certain. The earliest brick kiln structures were updraught kilns of the type generally known as the 'Scotch kiln'. This was typically a roughly rectangular open topped building with wide doorways at each ends. In the lowermost side walls was a series of arched firing chambers made in firebrick, if available. Such a kiln typically took about a week to complete a cycle (load, burn, cool and unload), and most examples could contain up to 50,000 bricks, depending on the skill of the stackers. It was common practice to only use such a kiln once per month. One variation from the Scotch kiln, introduced in the North-East and therefore potentially the structure used at St. Anthony's, was the 'Newcastle kiln', a rectangular closed kiln used for firing both common and firebricks. It was a horizontal-draught kiln with fireholes at one end, flues running under the floor to a back chimney, and was capable of reaching very high temperatures. A 'double Newcastle kiln' had fireholes at both ends and a central flue leading to the chimney.

10.4.11 Downdraught kilns were also used for brick firing from the early 19th century and these used fuel more efficiently than updraught or horizontal kilns. The typical form of these was circular on plan with fireholes formed in the perimeter brick wall and a saucer-domed brick roof. Although sometimes incorporated into larger buildings, these were typically distinct structures of 'beehive' appearance. On the basis of the map evidence, it would seem unlikely that they existed at St. Anthony's. There are, however, examples of rectangular downdraught kilns with barrel-vaulted roofs which offered far greater capacity than beehive kilns.

10.4.12 The main failing with all these structures was that they were intermittent in operation, requiring to be loaded, fired and then cooled, a process taking several days. An increasing demand for bricks in the later 19th century prompted a growing need for a kiln which could be used continuously, in order to increase productivity. The second half of the 19th century saw the development of the 'Hoffman kiln', patented in England in 1859 by Humphrey Chamberlin. This allowed continuous operation and in comparison to earlier types was more economical in fuel consumption and also reduced the duration of the production cycle by heat exchange, with an important development being that waste heat from cooling bricks was used to dry green bricks before firing.

10.4.13 The earliest Hoffman kilns examples were circular, although through time they became an elongated oval in plan, with a central chimney, and a rectangular version was designed in 1870. Typical Hoffman kilns had approximately 12-18 internal chambers, separated by movable partitions or ducts, in which bricks were placed, fired and unloaded in a continuous sequence. Coal was fed through holes in the roof and ignited by circulating hot gases passing thorough the chambers in turn on their way to the chimney. Hot gases were first passed though chambers containing green bricks, to dry them. At the same time, cool incoming combustion air was fed into chambers containing previously fired bricks to cool them prior to unloading. The incoming air therefore picked up heat from the fired brick so that it was essentially preheated as it entered the firing chambers. Such a structure could have been used at St. Anthony's, perhaps most likely in the second building built between 1898 and 1907. Other continuous kilns were introduced however, almost all of which were rectangular on plan, including the transverse arch, rectangular continuous kiln, which was invented *c.* 1890, and the 'Belgian kiln', which first appeared in 1891. Examples of the latter are known in the North-East, for example Lilley Brickworks at Rowlands Gill, Gateshead, which opened in 1901, around the time that St. Anthony's was re-built, is known to have had a Belgian kiln. A later development of the continuous kiln was the 'tunnel kiln'.

10.5 Phase 5: Modern

10.5.1 The uppermost strata recorded at all locations investigated at the site represent modern era infilling of 19th and probably 20th century clay extraction pits, as well as landscaping and ground levelling, much of it likely associated with construction of the Lightfoot Centre and its associated open area sports facilities in the 1960s.

11. SUMMARY OF POTENTIAL FOR FURTHER ANALYSIS

11.1 The archaeological investigations at the Lightfoot Centre recorded a hitherto unknown colliery waggonway of probable 18th century date. This likely ran from Restoration Pit of St. Anthony's Colliery (later Byker High Pit) to staithes on the River Tyne. Although these archaeological remains are of significance, because of their truncated nature within the excavated area and the fact that no *in situ* timber of the track survived, it is considered that no further analytical work is necessary on the archaeological data associated with the waggonway remains. The remains should, however, be mentioned in summary fashion in any academic publication on the overall project, with the findings placed in a broader archaeological context.

11.2 The archaeological investigations also uncovered structural remains associated with St. Anthony's Brickworks, the earliest remains comprising the north-westernmost portion of a manufactory built between 1858 and 1898. The main element was a large internal area interpreted as a drying chamber for unfired bricks, an essential component of brick manufacture. The north-westernmost corner of a later manufactory, built between 1898 and 1907 evidently following demolition of the earlier works, was also exposed.

11.3 Detailed archaeological examination of such manufactories is rare in Tyne and Wear, therefore the archaeological data associated with the brickworks is of high significance, to the extent that the findings require further analysis and publication of a final report in an academic outlet, such as *Industrial Archaeology Review*, to form a permanent record of the investigations. A key component of further analysis will be documentary research, firstly into the little known St. Anthony's works and, secondly, to provide comparison with other excavated and documented examples of brickworks of the period across the region and beyond, with particular emphasis on technological aspects of brick manufacture as represented by the recorded remains.

11.4 The specialist assessments of the artefactual assemblages recovered from the investigations have all concluded that no further analytical work is warranted on the material. A summary of each category of material is required, however, to form part of the final publication paper.

PART C: REFERENCES AND ACKNOWLEDGEMENTS

12. REFERENCES

Bibliography

Ayris, I., Nolan, J., and Durkin, A. 1998. 'The Archaeological Excavation of Wooden Waggonway Remains at Lambton D Pit, Sunderland', *Industrial Archaeology Review*, Volume XX, 5-21.

Bell, R.C. and Gill, M.A.V., 1973. *The Potteries of Tyneside*, Northern History Booklet No. 32, Frank Graham.

Brown, D.H. 2007. *Archaeological Archives. A guide to best practice in creation, compilation transfer and curation,* Archaeological Archives Forum.

Brunskill, R.W. 1990. *Brick Building in Britain*, Victor Gollancz Limited.

Davison P. J. 1986. *Brickworks of the North-East*. Gateshead Public Library.

Department for Communities and Local Government 2010. *Planning Policy Statement 5, 'Planning for the Historic Environment'*, HMSO.

Dobson, E., 1850. *A Rudimentary Treatise on the Manufacture of Bricks and Tiles*, John Weale.

Edwards, L., 1988. 'Seventeenth and Eighteenth Century Tyneside Tobacco Pipe Makers and Tobacconists', *The Archaeology of the Clay Tobacco Pipe* (ed. Davey, P.), Chapter XI, BAR British Series 192.

English Heritage, 2006. *Management of Research Projects in the Historic Environment*, English Heritage.

Glover, G., 2005. 'Rainton Bridge South Waggonway', *Industrial Archaeology Review*, Volume XXVII, 235-244.

Hammond, M.D.P., 1977. 'Brick Kilns an Illustrated Survey', *Industrial Archaeology Review*, Volume 1, No. 2, 171-179.

Institute for Archaeologists, 2008a. *Standard and guidance for archaeological field evaluation*, IfA.

Institute for Archaeologists, 2008b. *Standard and guidance for archaeological excavation,* IfA.

Institute for Archaeologists, 2008c. *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives,* IfA.

Jennings, S.V. *et al.*, 1981. *Eighteen Centuries of Pottery from Norwich,* East Anglian Archaeology Report No. 13, The Norwich Survey Centre of East Anglian Studies.

Jones, W., 1996. *Dictionary of Industrial Archaeology*, Sutton Publishing Limited.

Lewis, M.J.T. 1970. *Early Wooden Railways*, Routledge and Kegan Paul.

Palmer, M. and Neaverson, P., 1994. *Industry in the Landscape 1700-1900*, Routledge.

Parsons, J.E., 1964. 'The Archaeology of the Clay Tobacco Pipe in North-East England', *Archaeologia Aeliana* Series 4, XLII, 231-254.

PCA, 2010. *An Archaeological Excavation at the Former Goodyear Dunlop Tyre Factory Site, Wear Industrial Estate, Birtley Road, Washington, Tyne and Wear*, PCA unpublished.

Petts, D. and Gerrard, C., 2006. *Shared Visions*: *The North-East Regional Research Framework for the Historical Environment*, English Heritage, Durham County Council and Durham University.

Tyne and Wear Museums Archaeology, 2008. '*Heart of Walker' Regeneration Area, Walker, Newcastle-upon-Tyne, Archaeological Desk-based Assessment*, TWM Archaeology unpublished.

Tyne and Wear Specialist Conservation Team, 2010. *Specification for Preliminary Archaeological Evaluation at Heart of Walker Regeneration Area, Walker, Newcastle-upon-Tyne,* TWSCT unpublished.

Walker, K., 1990. *Guidelines for the Preparation of Excavation Archives for Long-term Storage,* Archaeology Section, United Kingdom Institute for Conservation.

Online Sources

British Geological Survey website, at http://*www.bgs.ac.uk*

Sitelines, the Tyne and Wear Historic Environment Record website, at *http://www.twsitelines.info/*

SINE (Structural Images of the North-East) website, at *http://sine.ncl.ac.uk/*

Maps Consulted (other than Ordnance Survey maps)

Gibson (John) 1788. '*Plan of the collieries on the Tyne and Wear also Blyth, Bedlington and Hartley, with the country 11 miles around Newcastle....giving depths of pits, length of waggonways and amounts of keel dues on the Tyne and at Sunderland'*.

Lambert (John) 1807. '*Plan of the Rivers Tyne and Wear with the collieries, waggon-ways and staiths, thereon and the principal roads and villages....*'.

Casson (William Casson) 1801-1805. A series of coal royalty plans including '*River Tyne and Wear from Tynemouth Bar to Bywell and from Sunderland to Chester Deen, with lands collieries, waggonways and staiths'*.

Bell (John Thomas William Bell) 1843. '*Plan of part of the Tyne and Wear coal districts in the county of Durham, being the second of a series of plans of the great northern coal field....*'.

Bell (John Thomas William Bell) 1850. '*Map of the great northern coalfield, in the counties of Northumberland and Durham. Including the whole of the coal mining districts of the Tyne, Wear and Tees, and those of Hartlepool, Seaham, Hartley, Blyth and Warkworth'*.

13. ACKNOWLEDGEMENTS AND CREDITS

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PCA Credits

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Report: Robin Taylor-Wilson with contributions by Aaron Goode and Alan Telford

Illustrations: Jennifer Simonson

Other Credits

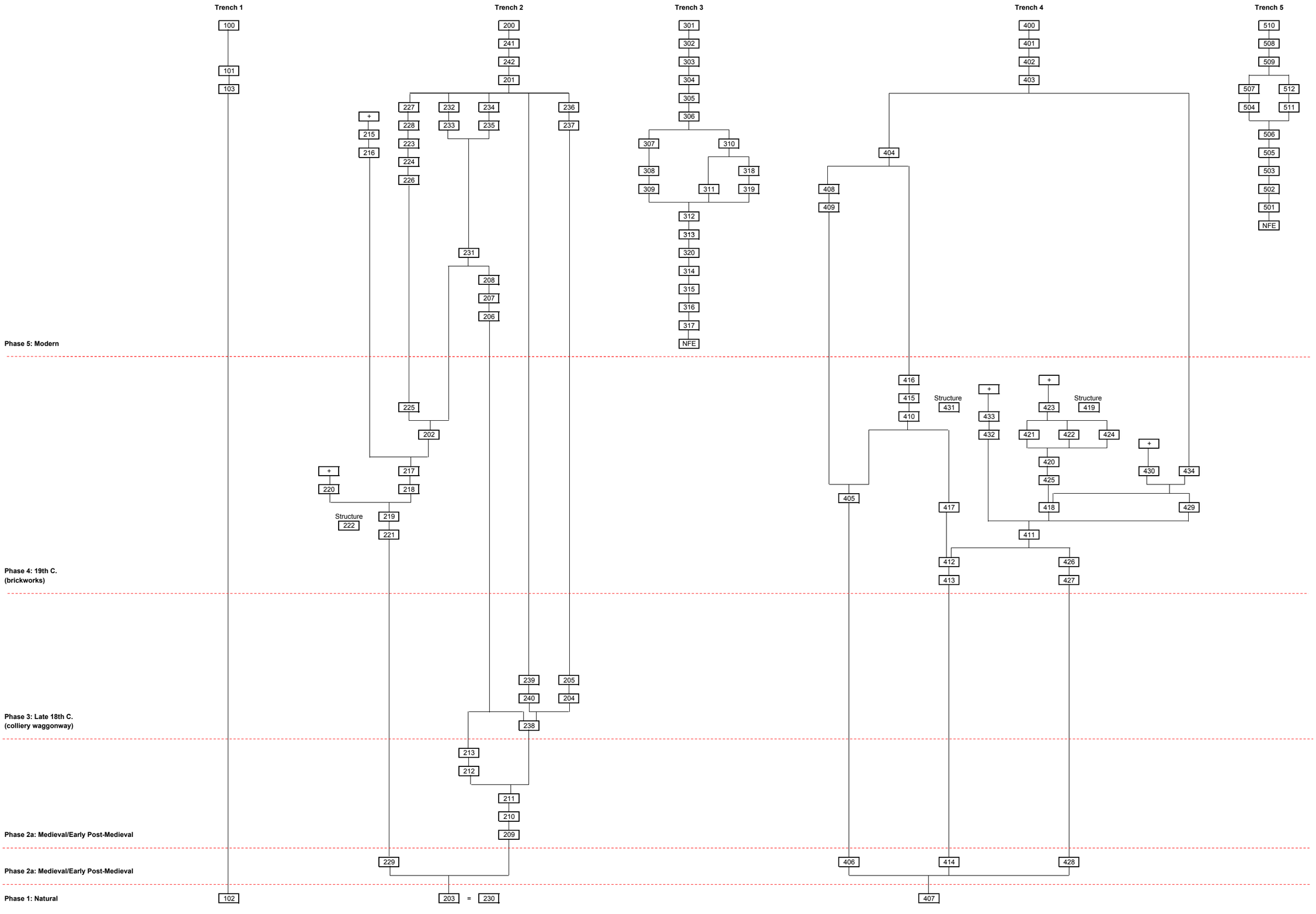
Pottery and clay tobacco pipes: Jenny Vaughan (Northern Counties Archaeological Services)

Bricks and other finds: John Nolan (Northern Counties Archaeological Services)

APPENDIX 1

STRATIGRAPHIC MATRICES

LWS 11: STRATIGRAPHIC MATRICES (EVALUATION TRENCHES)



LWS 11: AREA A STRATIGRAPHIC MATRIX

Phase 5: Modern

Phase 4d: Late 19th to Early 20th C.
(rebuilt St. Anthony's Brickworks)

Phase 4c: Mid to Late 19th C.
(alterations to the brickworks)

Phase 4b: Mid to Late 19th C.
(original St. Anthony's Brickworks)

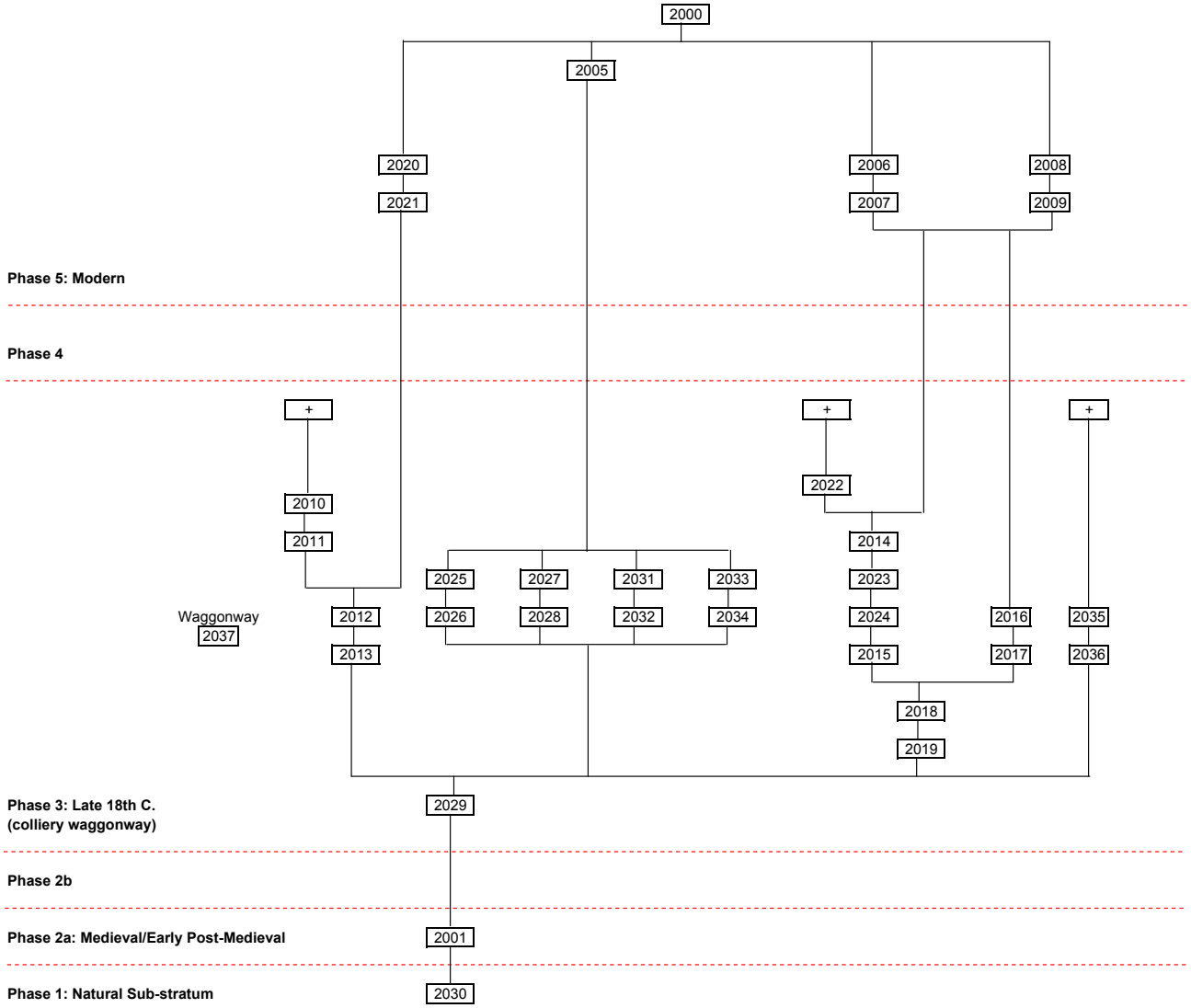
Phase 4a: Early to Mid 19th C.
(possible early brickmaking activity)

Phase 3: Late 18th C.

Phase 2: Medieval/Early Post-Medieval

Phase 1: Natural Sub-stratum

LWS 11: AREA B STRATIGRAPHIC MATRIX



APPENDIX 2

CONTEXT INDEX

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
100	T1	5	Deposit	Layer	Turf and topsoil
101	T1	5	Deposit	Layer	Make-up/landscaping dump
102	T1	1	Deposit	Layer	Natural sub-stratum
103	T1	5	Deposit	Layer	Make-up/landscaping dump
200	T2	5	Deposit	Layer	Turf and topsoil
201	T2	5	Deposit	Layer	Make-up/landscaping dump
202	T2	4	Deposit	Layer	Make-up/landscaping dump
203	T2	1	Deposit	Layer	Natural sub-stratum = [230]
204	T2	3	Cut	Linear	Trackside ditch of waggonway
205	T2	3	Deposit	Fill	Fill of ditch [204]
206	T2	5	Cut	Linear	Field drain trench
207	T2	5	Deposit	Fill	Backfill of drain trench [206]
208	T2	5	Deposit	Fill	Backfill of drain trench [206]
209	T2	2	Cut	Linear	Field boundary ditch
210	T2	2	Deposit	Fill	Fill of ditch [209]
211	T2	2	Deposit	Fill	Fill of ditch [209]
212	T2	2	Cut	Linear	Field boundary ditch
213	T2	2	Deposit	Fill	Fill of ditch [212]
214	VOID				
215	T2	5	Deposit	Fill	Fill of feature [216]
216	T2	5	Cut	Discrete	Post-pit?
217	T2	4	Deposit	Fill	Fill of construction trench [221]
218	T2	4	Masonry	Structure	Capping of drain [222]
219	T2	4	Masonry	Structure	Side walls of drain [222]
220	T2	4	Deposit	Fill	Infill of drain [222]
221	T2	4	Cut	Linear	Construction trench for drain [222]
222	T2	4	Group no.	Structure no.	Brick built drain
223	T2	5	Deposit	Fill	Fill of quarry pit [225]
224	T2	5	Deposit	Fill	Fill of quarry pit [225]
225	T2	4	Cut	Discrete	Clay quarry pit
226	T2	5	Deposit	Fill	Fill of quarry pit [225]
227	T2	5	Deposit	Fill	Fill of quarry pit [225]
228	T2	5	Deposit	Fill	Fill of quarry pit [225]
229	T2	2	Deposit	Layer	Developed soil
230	T2	1	Deposit	Layer	Natural sub-stratum = [203]
231	T2	5	Deposit	Layer	Levelling dump
232	T2	5	Deposit	Fill	Backfill of drain trench [233]
233	T2	5	Cut	Linear	Field drain trench
234	T2	5	Deposit	Fill	Backfill of drain trench [235]
235	T2	5	Cut	Linear	Field drain trench
236	T2	5	Deposit	Fill	Backfill of drain trench [237]
237	T2	5	Cut	Linear	Field drain trench
238	T2	3	Deposit	Layer	Dump layer/spread, forming waggonway track-bed
239	T2	3	Deposit	Fill	Fill of feature [240]
240	T2	3	Cut	Discrete	Rail/sleeper impression?
241	T2	5	Deposit	Fill	Backfill of drain trench [242]
242	T2	5	Cut	Linear	Field drain trench
301	T3	5	Deposit	Surface	Tarmac surface treatment
302	T3	5	Deposit	Layer	Make-up for tarmac [301]
303	T3	5	Deposit	Fill	Backfill of drain trench [305]
304	T3	5	Other	Pipe	Pipe within drain trench [305]
305	T3	5	Cut	Linear	Field drain trench
306	T3	5	Deposit	Layer	Make-up/landscaping dump
307	T3	5	Deposit	Layer	Make-up/landscaping dump
308	T3	5	Deposit	Layer	Make-up/landscaping dump
309	T3	5	Deposit	Layer	Make-up/landscaping dump
310	T3	5	Deposit	Layer	Make-up/landscaping dump
311	T3	5	Deposit	Layer	Make-up/landscaping dump
312	T3	5	Deposit	Layer	Make-up/landscaping dump
313	T3	5	Deposit	Layer	Fill of pit? [320]
314	T3	5	Deposit	Layer	Make-up/landscaping dump
315	T3	5	Deposit	Layer	Make-up/landscaping dump
316	T3	5	Deposit	Layer	Make-up/landscaping dump
317	T3	5	Deposit	Layer	Make-up/landscaping dump
318	T3	5	Deposit	Fill	Backfill of drain trench [319]
319	T3	5	Cut	Linear	Field drain trench
320	T3	5	Cut	Discrete	Pit?

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
400	T4	5	Other	Surface	Astroturf
401	T4	5	Deposit	Surface	Tarmac surface treatment
402	T4	5	Deposit	Layer	Make-up for tarmac [401]
403	T4	5	Deposit	Layer	Make-up/landscaping dump
404	T4	5	Deposit	Layer	Make-up/landscaping dump
405	T4	4	Deposit	Layer	Make-up for concrete floor [410]
406	T4	2	Deposit	Layer	Heat affected developed soil
407	T4	1	Deposit	Layer	Natural sub-stratum
408	T4	5	Deposit	Fill	Backfill of drain trench [409]
409	T4	5	Cut	Linear	Field drain trench
410	T4	4	Deposit	Surface	Concrete floor surface = [1071]
411	T4	4	Deposit	Layer	Dump layer/spread
412	T4	4	Deposit	Layer	Dump layer/spread
413	T4	4	Deposit	Layer	Dump layer/spread
414	T4	2	Deposit	Layer	Developed soil
415	T4	4	Deposit	Layer	Make-up for concrete [416] = [1075]
416	T4	4	Deposit	Surface	Concrete floor surface
417	T4	4	Masonry	Structure	N-S aligned brick wall; internal partition
418	T4	4b	Masonry	Structure	E-W aligned brick wall; external?
419	T4	4d	Group no.	Structure no.	Brick drain
420	T4	4d	Masonry	Structure	Side walls of brick drain [419]
421	T4	4d	Masonry	Structure	Capping of brick drain [419]
422	T4	4d	Masonry	Structure	Packing for brick drain [419]
423	T4	4d	Deposit	Fill	Infill of brick drain [419]
424	T4	4d	Deposit	Fill	Backfill of construction trench [425]
425	T4	4d	Cut	Linear	Construction trench for drain [419]
426	T4	4	Deposit	Layer	Dump layer/spread
427	T4	4	Deposit	Layer	Dump layer/spread
428	T4	2	Deposit	Layer	Developed soil
429	T4	4b	Masonry	Structure	N-S aligned brick wall = [1102]
430	T4	4	Masonry	Structure	Brickwork blocking; part of structure [434]
431	T4	4	Group no.	Structure no.	Brick drain = [1062]
432	T4	4	Masonry	Structure	Side walls of brick drain [431]
433	T4	4	Masonry	Structure	Capping of brick drain [431]
434	T4	4	Masonry	Structure	Rectangular structure between walls [418] and [429]
501	T5	5	Deposit	Layer	Make-up/landscaping dump
502	T5	5	Deposit	Layer	Make-up/landscaping dump
503	T5	5	Deposit	Layer	Make-up/landscaping dump
504	T5	5	Deposit	Layer	Make-up/landscaping dump
505	T5	5	Deposit	Layer	Make-up/landscaping dump
506	T5	5	Deposit	Layer	Make-up/landscaping dump
507	T5	5	Deposit	Layer	Make-up/landscaping dump
508	T5	5	Deposit	Layer	Make-up/landscaping dump
509	T5	5	Deposit	Layer	Make-up/landscaping dump
510	T5	5	Deposit	Layer	Turf and topsoil
511	T5	5	Cut	Linear	Pipe trench
512	T5	5	Deposit	Fill	Backfill of pipe trench [511], incorporates iron pipe

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
1000	A	4b	Masonry	Structure	Stub of W-E aligned wall
1001	A	4b	Masonry	Structure	Western external wall, N-S aligned element
1002	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1003	A	4b	Masonry	Structure	W-E aligned internal wall
1004	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1005	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1006	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1007	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1008	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1009	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1010	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1011	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1012	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1013	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1014	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1015	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1016	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1017	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1018	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1019	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1020	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1021	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1022	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1023	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1024	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1025	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1026	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1027	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1028	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1029	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1030	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1031	A	4c	Masonry	Structure	Brick pier at S end of wall [1162]
1032	A	4c	Masonry	Structure	Brick pier within drying chamber
1033	A	4c	Masonry	Structure	Brick pier within drying chamber
1034	A	4c	Masonry	Structure	Brick pier within drying chamber
1035	A	4d	Masonry	Structure	Brick structure within drying chamber
1036	A	4b	Masonry	Structure	N-S aligned flue wall within drying chamber
1037	A	5	Deposit	Surface	Tarmac surface treatment
1038	A	5	Deposit	Layer	Make-up for tarmac [1037]
1039	A	5	Other	Membrane	Geotextile membrane
1040	A	5	Deposit	Layer	Make-up/landscaping dump
1041	A	5	Deposit	Layer	Make-up/landscaping dump
1042	A	5	Deposit	Layer	Make-up/landscaping dump
1043	A	5	Deposit	Fill	Fill of pipe trench [1044]
1044	A	5	Cut	Linear	Pipe trench
1045	A	5	Deposit	Fill	Fill of pipe trench [1044] (= [1066])
1046	A	5	Deposit	Fill	Fill of pipe trench [1044] (= [1067])
1047	A	5	Deposit	Layer	Make-up/landscaping dump
1048	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1049	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1050	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1051	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1052	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1053	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1054	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1055	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1056	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1057	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1058	A	4a	Deposit	Layer	Levelling deposit
1059	A	4d	Deposit	Fill	Backfill of construction cut [1060]
1060	A	4d	Cut	Discrete	Construction cut for structure [1035]
1061	A	4d	Deposit	Fill	Fill of drain [1063]
1062	A	4d	Group no.	Structure no.	Brick built drain = [431]
1063	A	4d	Cut	Linear	Construction cut for drain [1062]
1064	A	4b	Masonry	Surface	Brick yard surface
1065	A	4d	Masonry	Structure	Brick buttress abutting north elevation of wall [1141]
1066	A	5	Deposit	Fill	Fill of pipe trench [1044] (= [1045])

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
1067	A	5	Deposit	Fill	Fill of pipe trench [1044] (= [1067])
1068	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1069	A	4a	Deposit	Layer	Deposit derived from early brick manufacture?
1070	A	4d	Deposit	Layer	Make-up for concrete [1076]
1071	A	4d	Deposit	Surface	Concrete floor surface = [410]
1072	A	4d	Masonry	Structure	W-E aligned internal wall
1073	A	4d	Deposit	Layer	Levelling deposit
1074	A	4d	Masonry	Structure	Brick buttress abutting eastern end of wall [1141]
1075	A	4d	Deposit	Layer	Make-up for surface [1071]
1076	A	4d	Deposit	Surface	Concrete floor surface = [416]
1077	A	5	Cut	Linear	Field drain trench
1078	A	5	Deposit	Fill	Backfill of drain trench [1077]
1079	A	5	Other	Pipe	Ceramic pipe within drain trench [1077]
1080	A	4d	Masonry	Structure	Brick pier, part of W-E aligned internal partition
1081	A	4d	Masonry	Structure	Brick pier, part of W-E aligned internal partition
1082	A	4d	Masonry	Structure	Brick pier, part of W-E aligned internal partition
1083	A	4b	Deposit	Layer	Levelling deposit
1084	A	5	Deposit	Layer	Levelling deposit
1085	A	4d	Deposit	Fill	Backfill of construction cut [1087]
1086	A	4d	Deposit	Structure	Concrete wall foundation
1087	A	4d	Cut	Linear	Construction cut for wall [1110]
1088	A	4d	Masonry	Structure	Northern external wall
1089	A	4d	Masonry	Structure	Northern external wall
1090	A	5	Deposit	Fill	Backfill of construction cut [1092]
1091	A	5	Masonry	Structure	Brick drain
1092	A	5	Cut	Linear	Construction cut for drain [1091]
1093	A	4b	Deposit	Layer	Levelling deposit
1094	A	4c	Deposit	Fill	Primary infill of flues of drying chamber
1095	A	4d	Deposit	Fill	Secondary backfill of flues of drying chamber
1096	A	5	Deposit	Fill	Levelling deposit
1097	A	4c	Masonry	Structure	Addition to western external wall [1001]
1098	A	4c	Masonry	Structure	Brick buttress against pier [1103]
1099	A	4b	Masonry	Structure	W-E aligned part of western external wall, with internal element
1100	A	4b	Masonry	Structure	Rectangular brick structure, possible coal chute?
1101	A	4b	Masonry	Structure	Rectangular brick structure, possible coal chute?
1102	A	4b	Masonry	Structure	Western external wall, N-S aligned element
1103	A	4b	Masonry	Structure	Brick pier in corner of western external wall
1104	A	4c	Deposit	Fill	Backfill of structure [1100]
1105	A	4c	Deposit	Fill	Backfill of structure [1101]
1106	A	4b	Masonry	Structure	W-E aligned element of western external wall
1107	A	4c	Deposit	Structure	Concrete pier, associated with wall addition [1097]
1108	A	5	Deposit	Structure	Concrete, possible machine base
1109	A	4b	Deposit	Layer	Levelling deposit = [1140]
1110	A	4d	Masonry	Structure	W-E aligned internal brick wall
1111	A	4d	Group no.	Structure no.	Elements of western external wall; comprises [1128], [1129], [1130]
1112	A	5	Deposit	Fill	Backfill of field drain [1113]
1113	A	5	Cut	Linear	Field drain
1114	A	5	Deposit	Fill	Backfill of contruction cut [1116]
1115	A	5	Masonry	Structure	Brick inspection chamber
1116	A	5	Cut	Discrete	Construction cut for structure [1115]
1117	A	5	Other	Pipe	Plastic water pipe
1118	A	4b	Masonry	Structure	Rectangular brick structure, possible coal chute? = [434]
1119	A	4b	Masonry	Structure	Brick built drain
1120	A	4d	Masonry	Structure	Rectangular brick structure, possible pier
1121	A	4c	Masonry	Structure	Brick blocking of Structure [1100]
1122	A	4c	Masonry	Structure	Brick blocking of Structure [1127]
1123	A	4c	Masonry	Structure	Brick blocking of Structure [1101]
1124	A	4b	Deposit	Layer	Levelling deposit
1125	A	4b	Deposit	Fill	Fill of construction cut [1126]
1126	A	4b	Cut	Linear	Construction cut for wall [1001]
1127	A	4b	Masonry	Structure	Rectangular structure on north side of Structure [1101]
1128	A	4d	Masonry	Structure	Western external wall?, N-S aligned element; part of Structure [1111]
1129	A	4d	Masonry	Structure	Western external wall?, N-S aligned element; part of Structure [1111]
1130	A	4d	Masonry	Structure	Western external wall?, N-S aligned element; part of Structure [1111]
1131	A	4d	Masonry	Structure	W-E aligned internal wall?
1132	A	4d	Deposit	Fill	Backfill of construction cut [1133]
1133	A	4d	Cut	Discrete	Construction cut for pier [1080]

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
1134	A	4d	Deposit	Fill	Backfill of construction cut [1135]
1135	A	4d	Cut	Discrete	Construction cut for pier [1082]
1136	A	4d	Masonry	Structure	Brick pier within western external wall
1137	A	5	Deposit	Fill	Fill of pit [1138]
1138	A	5	Cut	Discrete	Intrusion, probable geotechnical pit
1139	A	1	Deposit	Layer	Natural sub-stratum
1140	A	4b	Deposit	Layer	Levelling deposit = [1109]
1141	A	4d	Masonry	Structure	W-E aligned internal wall
1142	A	4b	Masonry	Structure	W-E aligned wall, part of a drying chamber?
1143	A	4b	Masonry	Structure	W-E aligned wall, part of a drying chamber?
1144	A	4b	Masonry	Structure	W-E aligned wall, part of a drying chamber?
1145	A	4d	Masonry	Structure	Western external wall, N-S aligned element
1146	A	4d	Masonry	Structure	Brick buttress, abutting wall [1148]
1147	A	4b	Masonry	Structure	Rectangular brick structure, possible coal chute?
1148	A	4d	Masonry	Structure	Probable brick drain
1149	A	4d	Masonry	Structure	Brick buttress, abutting wall [1145]
1150	A	4b	Masonry	Structure	Brick buttress, abutting wall [418]
1151	A	4c	Deposit	Fill	Backfill of Structure [1118]
1152	A	4d	Cut	Linear	Construction cut for wall [1145]
1153	A	4c	Deposit	Fill	Backfill of Structure [1147]
1154	A	5	Deposit	Fill	Backfill of drain trench [1155]
1155	A	5	Cut	Linear	Field drain trench
1156	A	4b	Masonry	Structure	Brick buttress, abutting wall [1001]
1157	A	4b	Masonry	Structure	Brick buttress, abutting wall [1003]
1158	A	4b	Masonry	Structure	W-E aligned internal wall
1159	A	4b	Masonry	Structure	Brick structure
1160	A	4b	Masonry	Structure	Brick structure
1161	A	4b	Masonry	Structure	Brick structure
1162	A	4b	Masonry	Structure	Western external wall, N-S aligned element
1163	A	4b	Masonry	Structure	Brick ?pier
1164	A	4d	Cut	Discrete	Construction cut for pier [1081]
1165	A	4b	Masonry	Structure	Brick structure
1166	A	4c	Masonry	Structure	Brick blocking of Structure [1147]
1167	A	4c	Deposit	Fill	Backfill of Structure [1127]

LWS11: CONTEXT INDEX

Context	*Area*	*Phase*	*Type 1*	*Type 2*	*Interpretation*
2000	B	5	Deposit	Layer	Modern turf and topsoil = [200]
2001	B	2	Deposit	Layer	Developed soil = [229]
2002	VOID				
2003	VOID				
2004	VOID				
2005	B	5	Deposit	Layer	Make-up/landscaping dump
2006	B	5	Deposit	Fill	Fill of drain trench [2007]; incorporates drain pipes
2007	B	5	Cut	Linear	Field drain trench
2008	B	5	Deposit	Fill	Backfill of drain trench [2009]; incorporates drain pipes
2009	B	5	Cut	Linear	Field drain trench
2010	B	3	Deposit	Fill	Fill of ditch 2011]
2011	B	3	Cut	Linear	Re-cut of trackside ditch [2013], possibly = [204]
2012	B	3	Deposit	Fill	Fill of ditch [2013]
2013	B	3	Cut	Linear	Trackside ditch, east of waggonway [2037]
2014	B	3	Deposit	Fill	Fill of ditch [2015]
2015	B	3	Cut	Linear	Trackside ditch, west of waggonway [2037]
2016	B	3	Deposit	Fill	Fill of gully [2017]
2017	B	3	Cut	Linear	Gully, west of ditch [2015]
2018	B	3	Deposit	Fill	Fill of feature [2019]
2019	B	3	Cut	Curvilinear	Curving 'slot', possibly associated with waggonway [2037]
2020	B	5	Deposit	Fill	Backfill of drain trench [2021]
2021	B	5	Cut	Linear	Field drain trench = [237]
2022	B	3	Deposit	Fill	Fill of ditch [2015]
2023	B	3	Deposit	Fill	Fill of ditch [2015]
2024	B	3	Deposit	Fill	Fill of ditch [2015]
2025	B	3	Deposit	Fill	Fill of feature [2026]
2026	B	3	Cut	Discrete	Sleeper impression
2027	B	3	Deposit	Fill	Fill of feature [2028]
2028	B	3	Cut	Discrete	Sleeper impression
2029	B	3	Deposit	Layer	Dump layer/spread, forming waggonway track-bed, =[238]
2030	B	1	Deposit	Layer	Natural sub stratum = [203] & [230]
2031	B	3	Deposit	Fill	Fill of feature [2032]
2032	B	3	Cut	Discrete	Sleeper impression
2033	B	3	Deposit	Fill	Fill of feature [2034]
2034	B	3	Cut	Discrete	Sleeper impression
2035	B	3	Deposit	Fill	All fills of stakehole group [2036]
2036	B	3	Cut	Discrete	Group no. for stakeholes
2037	B	3	Group no.	Structure no.	Waggonway

APPENDIX 3

POTTERY CATALOGUE

LWS 11: POTTERY CATALOGUE

Context	Type	Fabric No.	Sherd Count	Wt. (g)	Comments
213	lcr slip	20	3	26	Collared rim of dish with slip coated interior ending at rim flange, light green gl
217	lgresl	32	1	14	
217	blgre	32	1	8	
220	wglw	33	1	420	Complete jar - preserve type
224	ref black gl	34	1	7	Refined black glazed ware with painted dec
224	china	36	1	8	Thin sliver of profile of saucer
224	refww tp	33	1	18	Plate rim with brown printing
224	refww	33	1	5	
224	brown gl	34	2	49	Two bases (one ring, one recessed) in brown gl buff fabric
224	lgresl	32	1	33	Rolled bowl rim
224	stonew	35	1	8	Rim of small brown gl jar
315	refww tp	33	1	10	Marked ‘John Wood, Stepney’
315	refww tp	33	2	27	
315	lgresl	32	2	44	Blue tinged glaze on the slip. Bowl rim
315	stonew	35	2	75	Pale grey fabric. Rim of ridged jam jar
315	refww	33	2	44	Ring base biscuit fired
317	china	36	1	31	Transf print in purple
411	lgresl	32	1	21	
412	refww tp	33	3	3	Two are same ves, other is black printed
412	refww	33	1	2	With painted line
413	refww	33	3	29	
413	lgresl	32	1	10	Everted bowl rim, mottled
1095	refww tp	33	1	19	Biscuit fired - small ring base black printed design with three figures in a boat
1095	stone china?	33	10	43	Very hard white body - not translucent
1095	refww	33	2	34	Two biscuit bases - one ?flatware, one ?jar with inturned sides
1095	wglw	33	1	79	Complete, but chipped, small paste type jar
1095	lgre	32	1	89	Thick
1095	brown gl	34	3	29	Brown gl buff fabric, slightly recessed base
1095	stonew	35	1	26	Storage jar, partly brown washed with moulded beaded band
1095	china	36	1	5	
1095	refww	33	3	12	
1095	refww tp	33	2	10	Two transfer printed rims, one burnt
1095	refww dec	33	2	8	One with blue band, other blue dec but too small to identify type
1095	yellow gl	34	1	12	Late post-med earthenware
2012	lgresl	32	19	374	Sherds of at least three bowls with flanged rims and brown (iron/manganese) mottling. Also ring base
2012	lgresl	32	14	126	Bowl with simple rim and brown mottling
2012	blgre	32	2	11	Glazed int and ext
2014	blgre	32	5	34	
2014	black gl	34	1	3	Reduced fabric
2014	wglw	33	1	6	Base of ?jar
2014	lgresl	32	2	20	Rim
2014	refww	33	1	8	Biscuit fired

Fabric no.	Type	Abbreviations used/notes
20	Low Countries redware	lcr
32	Later red earthenwares - 18th/19th c.	lgre (later glazed red earthenware), ..sl (with slip coat), blgre (black ..), ungre (unglazed), gre = possibly earlier type
33	Glazed whitewares - late 18th/19th c.	Refined whitewares: refww, ..tp (transfer printed), dec (with decoration), wglw – white glazed whiteware (not tableware)
34	Miscellaneous late post-medieval	Various
35	Utilitarian stoneware - 19th c.	stonew
36	China	

Note: dec and gl are used elsewhere (*e.g.* in comments) with same meaning

Other abbreviations used:

ext external, exterior
frags fragments
gl glazed inside and out
int internal, interior
ves vessel

APPENDIX 4

PHOTOGRAPHIC PLATES

Plate 1. Trench 2, Phase 2b ditches [209] and [212], looking south *(1m scale)*

Plate 2. Area B, Phase 3 waggonway ditch [2013], looking north-west *(1m scale)*

Plate 3. Area A, Phase 4a deposit [1068] (centre), Phase 4d structures (right) *(2m and 1m scales)*

Plate 4. Area A, working shot showing hand-cleaning of the brickworks

Plate 5. Area A, Phase 4 brickworks western external wall, [1001], looking south *(2m and 1m scales)*

Plate 6. Area A, Phase 4b brickworks western external wall and associated structures, [1100], *etc.*, looking south *(1m scale)*

Plate 7. Area A, Phase 4b brick surface [1064] (southern part), looking north *(2m and 1m scales)*

Plate 8. Area A, working shot Phase 4b brick surface [1064] (northern part), looking east

Plate 9. Area A, Phase 4b brickworks drying chamber, looking west *(2m scale)*

Plate 10. Area A, Phase 4b brickworks drying chamber, looking east *(2m scale)*

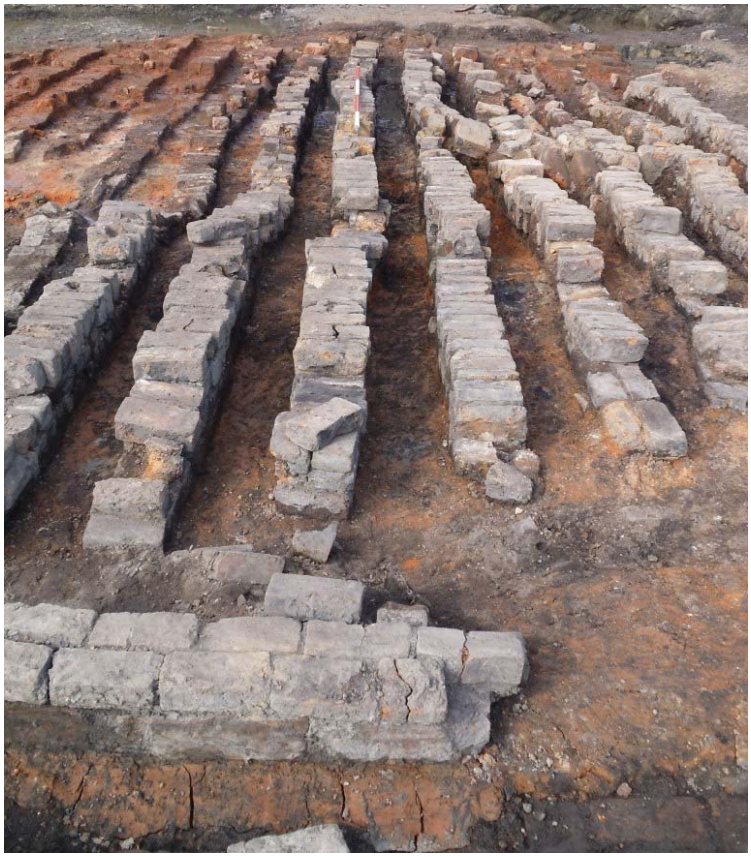


Plate 11. Area A, Phase 4b brickworks drying chamber, eastern part, looking north *(2m scale)*

Plate 12. Area A, Phase 4b brickworks drying chamber, eastern part, looking north Area A, Phase 4b brickworks drying chamber, flue detail, looking east *(1m scale)*

Plate 13. Area A, Phase 4d make-up deposit [1075] and piers [1080], *etc*., looking west *(2m & 1m scales)*

Plate 14. Area A, Phase 4d successive concrete surfaces [1071] and [1075], detail, looking south *(1m scale)*

APPENDIX 5

SPECIFICATION (FOR THE EVALUATION)

Tyne and Wear Specialist Conservation Team

Specification for Preliminary Archaeological Evaluation at Heart of Walker Regeneration Area, Walker, Newcastle upon Tyne

Planning Application: pre-application

Author:

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Date: 8 October 2010

County Archaeologist's Reference Number: MON6739

The Tyne and Wear Specialist Conservation Team is the curatorial service for archaeology, industrial archaeology and historic buildings throughout the Tyne and Wear districts. It helps and advises Newcastle, Gateshead, North Tyneside, South Tyneside and Sunderland Councils to carry out their statutory duties to care for the precious historic environment of Tyneside and Wearside. The Team can be found at the Strategic Housing, Planning and Transportation Division of the Environment & Regeneration Directorate of

Newcastle City Council

Introduction

Site grid reference: NZ 2858 6370

Proposed option 4A involves replacing the running track at the Lightfoot Sports Centre with ten 5-a-side pitches and a full size playing pitch. The existing pitches to the immediate east will be replaced with a 5-a-side and two 7-a-side pitches which would be served by a car park. Some of the housing would be demolished.

An archaeological desk based assessment was produced in December 2008 (Tyne and Wear Museums). The report concludes that in the Victorian period the site was occupied by St. Anthony's Brickworks and Pottery Square of St. Anthony's Pottery. A large proportion of the site was quarried for clay to support these industries. Outside the areas of quarrying, archaeological remains of earlier periods could survive.

The site lies 1.5km south of Hadrian's Wall and 500m south of Walker medieval village.

HER 4279 St Anthony's Brickworks
Shown on OS first edition. The brickworks survived until at least 1940.

HER 4194 St Anthony's Pottery
St. Anthony's Square is shown on the first edition and renamed Pottery Square on the second edition. The buildings were probably either small outbuildings to the main pottery works to the east, or worker's housing.

The pottery at St. Anthony's was established in 1780, possibly built by Thomas Lewins. James King & Co who were also interested in several glass works, were probably the first lessees and potters. In May 1784 the pottery was damaged by fire. In 1786 James King was bankrupt. In 1787 Chatto and Griffith took over the lease, but William Chatto was bankrupt by 1795. William Huntley took over. In 1800 the pottery changed hands again, taken over by Foster and Cutter. St Anthony's Pottery was bought by Joseph Sewell from Foster and Cutter around 1821. He made earthenware, creamware, queen's ware and gold, silver and pink lustreware, pierced wicker baskets and filigree plates. Sewell had a flourishing trade with the continent, principally in pink lustreware jugs. The firm's successors were Sewell and Donkin (from 1821) and Sewell and Company (from 1853). They also made transfer-printed wares, doll's tea sets. Creamware tea and coffee sets, printed with black or red Danish motifs, such as buildings in Copenhagen or Elsinore, scenes or portraits, were exported to the continent. When the company closed in 1878 some of the stock was bought by J. Wood of the Stepney Pottery (HER 5280).

The appointed archaeologist must familiarise themselves with the results of previous archaeological work on the site before starting work.

In accordance with PPS5 and UDP Policy C4.2 a programme of archaeological evaluation is required (4 trenches).

Research Aims and Objectives

The evaluation report should make reference to Regional and Thematic Research Frameworks.

'Shared Visions: The North-East Regional Research Framework for the Historic Environment' by David Petts with Christopher Gerrard, 2006 notes the importance of research as a vital element of development-led archaeological work. It sets out key research priorities for all periods of the past allowing commercial contractors to demonstrate how their fieldwork relates to wider regional and national priorities for the study of archaeology and the historic environment. The aim of NERRF is to ensure that all fieldwork is carried out in a secure research context and that commercial contractors ensure that their investigations ask the right questions.

See http://www.algao.org.uk/Association/England/Regions/ResFwks.htm

'Frontiers of Knowledge' edited by Matthew FA Symonds and David JP Mason 2010 is the Research Framework for Hadrian's Wall, part of the Frontiers of the Roman Empire World Heritage Site. The aim of the publication is to assess the existing knowledge base for our understanding of the monument, to identify and prioritise key themes for future research and to set out a strategy and action plan by which the initial set of objectives might be achieved.

Ideally and where possible the evaluation should cross-reference its aims and objectives to national priorities, defined in SHAPE (Strategic Frameworks for Historic Environment Activities and Programmes in English Heritage), and the English Heritage Research Agenda 2005-2010.

Where appropriate note any similar nationwide projects using ADS, internet search engines, ALSF website, HEEP website, OASIS, NMR excavation index.

All staff on site must understand the project aims and methodologies.

Methods statement

4 evaluation trenches are needed to inform the Planning Authority of the character, nature, date, depth, degree of survival of archaeological deposits on this site. The excavation must be carried out by a suitably qualified and experienced archaeological organisation. The work will record and environmentally sample any archaeological deposits of importance found on the plot. The purpose of this brief is to obtain tenders for this work. The report must be the definitive record for deposition in the Tyne and Wear HER, and it must contain recommendations for any further archaeological work needed on this site.

The commissioning client needs to be aware that the purpose of the preliminary evaluation is merely to ascertain if archaeological remains survive on this site and if they do, to determine their broad date, nature and function. Where archaeological remains are found in the preliminary trenches, and if these remains are at threat by the proposed development, further archaeological excavation and or a watching brief will be required before and during development work.

All staff employed by the Archaeological Contractor shall be professional field archaeologists with appropriate skills and experience to undertake work to the highest professional standards.

The work will be undertaken according to English Heritage Guidelines - Managing Archaeological Projects 2nd Edition ('MAP2') 1991 (www.english-h.gov.uk/guidance/map2/index.htm) and Management of Research Projects in the Historic Environment (MoRPHE) – The MoRPHE Project Managers' Guide, Project Planning Notes and Technical Guides 2006 (www.english-heritage.org.uk/publications).

The work will be undertaken according to MoRPHE Project Planning Notes 2006 - PPN3 – Archaeological Excavation and PPN6 – Development of Procedural standards and guidelines for the historic environment.

All work must be carried out in compliance with the codes of practice of the Institute of Field Archaeologists and must follow the IFA Standard and Guidance for Archaeological Field Evaluations, Excavation or Watching Briefs as appropriate. www.archaeologists.net

Notification

The County Archaeologist needs to know when archaeological fieldwork is taking place in Tyne and Wear so that he can inform the local planning authority and can visit the site to monitor the work in progress. The Archaeological Contractor must therefore inform the County Archaeologist of the start and end dates of the Evaluation. He must also keep the County Archaeologist informed as to progress on the site. The CA must be informed of the degree of archaeological survival and of any significant finds. The Client will give the County Archaeologist reasonable access to the development to undertake monitoring.

PROJECT INITIATION

PROJECT DESIGN

Because this is a detailed specification, the County Archaeologist does **not** require a Project Design from the appointed archaeologist. The appointed archaeologist is expected comply with the requirements of this specification.

HEALTH AND SAFETY AND RISK ASSESSMENT

A health and safety statement and risk assessment, identifying potential risks in a risk log (see template in appendix 2 of The MoRPHE Project Manager's Guide) and specifying suitable countermeasures and contingencies, is required to be submitted to the commissioning client.

The Client may wish to see copies of the Archaeological Contractor's Health and Safety Policies.

The Archaeological Contractor must maintain a Site Diary for the benefit of the Client, detailing the nature of work undertaken on a day by day basis, with full details of Site Staff present, duration of time on site, etc. and contact with third parties.

The Management of Research Projects in the Historic Environment (MoRPHE) – The MoRPHE Project Managers' Guide 2006 contains general guidance on Risk management (section 2.3.2, Appendix 2).

Risk assessments must be produced in line with legislative requirements (for example the Health and Safety at Work Act 1974, the Management of Health and Safety at Work Regulations 1999, the Control of Substances Hazardous to Health (COSHH) Regulations 2002 and the Personal Protective Equipment at Work Regulations 2002) and best practice e.g. as set out in the FAME (Federation of Archaeological Managers & Employers) formerly SCAUM (Standing Conference on Archaeological Unit Managers) Health and Safety Manual
www.famearchaeology.co.uk
www.scaum.org/uk

The Risk Assessment will identify what PPE (hard hats, glasses/goggles, steel toe cap and instep boots, gloves, high-viz clothing etc) is required.

Other potentially applicable legislation:

Working at Heights Regulations 2005, Manual Handling 1992

'Safe use of ladders and stepladders: An employers' guide' HSE Books 2005

Some archaeological work (such as those that last more than 30 days or involve more than 500 person days) may be deemed notifiable projects under C.D.M Regulations 1994 (amended 2007). Where C.D.M Regs apply, the HSE must be notified. A CDM Co-ordinator and principal contractor must be appointed. The CDM-C will produce a Health and Safety file. The PC will prepare the Construction Phase Plan. The HSE website includes a Power Point presentation on CDM training.

Detailed information on hazards and how to carry out a risk assessment can be obtained from the Health and Safety Executive (www.hse.gov.uk) and the local authority health and safety department.

Specific guidance for land contamination and archaeology can be obtained from the Institute for Archaeologists (www.archaeologists.net), the Construction Industry Research and Information Association (www.contaminated-land.org) and the Association of Geotechnical and Geoenvironmental Specialists (www.ags.org.uk).

See also Environment Agency, 2005 "Guidance on Assessing the Risk Posed by Land Contamination and its Remediation on Archaeological Resource Management".

The Archaeological Contractor must be able to provide written proof that the necessary levels of Insurance Cover are in place.

The Archaeological Contractor must detail measures taken to ensure the safe conduct of excavations, and must consult with the client's structural engineers concerning working in close proximity to the foundations of the surrounding buildings.

Excavation trenches should:

- Be protected from vehicles and guarded off for pedestrians
- not have steep sides or must be shored
- have good access and egress

The archaeologists must not work near overhead power lines.

Underground services can be easily damaged during excavation work. If proper precautions are not taken, it is all too easy for workers to hit these services resulting in a risk of

- heat, flame and molten metal from electric cables
- escaping gas from gas pipes
- flooding of the excavation when a water pipe is damaged
- interruption of services

Excavation work in the public highway, kerbside or pavement can only be undertaken by those with a Street Works certificate of competence. Before the excavation takes place the person supervising the digging must have been given service plans and be trained in how to read them. All persons involved in the excavation must know about safe digging practice and emergency procedures. A locator must be used to trace the line of any pipe or cable or to confirm that there are no pipes or cables in the way. The ground will be marked accordingly. There must be an emergency plan to deal with damage to cables and pipes.

PROJECT EXECUTION

1) Archaeological evaluation

The trenches are shown on the accompanying plan. The dimensions of the trenches are

TR1 2m x 15m
TR2 2m x 20m
TR3 2m x 15m
TR4 2m x 20m on site of St. Anthony's Brickworks on second edition map. This trench is within the existing pitches so can only be excavated when the pitches are no longer in use.

in plan **at base**.

Trench locations can be adjusted to avoid services or for practical or safety purposes.

Trenches can be widened if feasible in order to step the sides to reach depths over 1.2m where necessary, otherwise shoring will be required.

Trenches must avoid known services.

Trenches must stay a safe distance away from pylons and overhead power lines.

The commissioning client will advise of any ecological or biodiversity issues which need to be taken into consideration.

The trenches will avoid trees and tree roots.

The commissioning client will advise of any protected trees which must be avoided by the evaluation. Damage to trees covered by a Tree Protection Order carries a substantial fine.

Trench positions should be accurately surveyed prior to excavation and tied in to the national grid.

The trenches should be excavated to the depth of natural subsoil if this can be reached safely.

Tasks

Hand excavation, recording and environmental sampling (as stipulated below) of deposits down to the depth specified above.

Any modern overburden or levelling material can be machined-off using a wide toothless ditching bucket under strict archaeological supervision and the remaining deposits are to be excavated by hand.

All faces of the trench that require examination or recording will be cleaned.

Excavation is to be carried out with a view to avoid damage to any archaeological features which appear to worthy of preservation in-situ.

Excavation is to be carried out by single context planning and recorded on *pro forma* context sheets. Features over 0.5 m in diameter can be half sectioned.

Environmental sampling (and where relevant scientific dating) are compulsory parts of the evaluation exercise. All tenders will give a price for the assessment, full analysis, report production and publication per environmental and scientific dating sample as a contingency.

Samples will be taken of bricks from any brick-built structures. The dimensions of the bricks and the type of bonding must be recorded.

Scientific investigations should be undertaken in a manner consistent with “The Management of Archaeological Projects”, English Heritage 1991 and with “Archaeological Science at PPG16 Interventions: Best Practice for Curators and Commissioning Archaeologists”, English Heritage, 2003. Advice on the sampling strategy for environmental samples and samples for scientific dating etc. must be

sought from Jacqui Huntley, English Heritage Regional Advisor for Archaeological Science (jacqui.huntley@english-heritage.org.uk or 07713 400387) **before** the evaluation begins. See Appendix 1 for more information.

See Appendix 2 for guidance on procedures relating to human remains.

See Appendix 4 for guidance on Treasure Act procedures.

The spoil can be kept close-by and rapidly backfilled into the trenches at the conclusion of this work.

Recording

A full written, drawn (accurate scale plans, elevations and section drawings) and photographic record (of all contexts in **either** black and white print and colour transparency **or** with a digital camera) will be made. All images must include a clearly visible graduated metric scale.

All photographs forming part of the record should be in sharp focus, with an appropriate depth of field. They should be adequately exposed in good natural light or, where necessary, sufficiently well-lit by artificial means.

Use of digital cameras

Use a camera of 5 megapixels or more.

For maximum flexibility digital Single Lens Reflex cameras offer the best solution for power users. 6 megapixels should be considered a minimum requirement.

When photographing with digital SLR cameras, there is often a magnifying effect due to smaller sensor sizes.

If the JPEG (Joint Photographic Experts Group) setting is used, set the camera for the largest image size with least compression. The JPEG format discards information in order to reduce file size. If the image is later manipulated, the quality will degrade each time you save the file.

For maximum quality, **the preferred option** is that the RAW (camera-specific) setting is used. This allows all the information that the camera is capable of producing to be saved. Because all of the camera data is preserved, post processing can include colour temperature, contrast and exposure compensation adjustments at the time of conversion to TIFF (Tagged Interchangeable File Format), thereby retaining maximum photographic quality.

The RAW images must be converted to TIFF before they are deposited with the HER and TWAS because special software from the camera manufacturer is needed to open RAW files.

Uncompressed formats such as TIFF are preferred by most archives that accept digital data.

Post photography processing:

The submitted digital images must be ‘finished’, ready to be archived.

Post photography processing workflow for RAW images:

1 Download images
2 Edit out unwanted shots & rotate
3 Batch re-number
4 Batch caption
5 Batch convert to TIFF
6 Edit in Photoshop or similar
7 Save ready to burn to CD
8 Burn to CD
9 Dispatch

Batch caption – the image files should be named to reflect their content, preferably incorporating the site or building name. Consistent file naming strategies should be used. It is good practice not to use spaces, commas or full stops. For advice, go to http://ads.ahds.ac.uk/project/userinfo/deposit.html#filenaming . In order to find images at a future date and for copyright the site or building name, photographer's name and/or archaeological unit etc must be embedded in the picture file. The date can be appended from the EXIF data. Metadata recording this information must be supplied with the image files. A list of images, their content and their file names should be supplied with the image files on the CDs.

Batch conversion to TIFF – any white balance adjustments such as 'daylight' or 'shade' be required then this can be done as part of the conversion process. Ensure that any sharpening settings are set to zero.

Edit in 'Imaging' software such as Photoshop – tonal adjustments (colour, contrast) can be made. Rotate images where necessary, crop them to take out borders, clean the images to remove post-capture irregularities and dust. Check for sensor dust at 100% across the whole image.

Save ready for deposit – convert to TIFF and save. Retain the best colour information possible – at least 24 bit.

If the JPEG setting has been used and the image has been manipulated in any way it should be saved as a TIFF to prevent further image degradation through JPEGing.

Burn to CD – the NMR recommends using Gold CDs. Use an archive quality disk such as MaM-E gold. Gold disks have a lower burn speed than consumer disks.

Disks should be written to the 'Single Session ISO9660 – Joliet Extensions' standard and not UDF/Direct CD. This ensures maximum compatibility with current and future systems.

Images should be placed in the root directory not in a folder.

The CD will be placed in a plastic case which is labelled with the site name, year and name of archaeological contractor.

For more guidance on digital photography:

Digital Imaging Guidelines by Ian Leonard, Digital Archive Officer, English Heritage 22 September 2005)

Understanding Historic Buildings – A guide to good recording practice, English Heritage, 2006

Duncan H. Brown, 2007, "Archaeological Archives – A guide to best practice in creation, compilation, transfer and curation"

IFA, Guidance on the use and preservation of digital photographs

FISH (Forum on Information Standards in Heritage), September 2006 v.1, A Six Step Guide to Digital Preservation, FISH Fact Sheet No. 1

Visual Arts Data Service and Technical Advisory Service for Images, Creating Digital Resources for the Visual Arts: Standards and Good Practice http://vads.ahds.ac.uk/guides/creating_guide/contents.html

AHDS Guides to Good Practice – Julian Richards and Damian Robinson (eds), Digital Archives from Excavation and Fieldwork: Guide to Good Practice, Second Edition

Printing the images:

In view of the currently unproven archival performance of digital data it is always desirable to create hard copies of images on paper of archival quality.

A selection of the images will be printed in the finished report for the HER at high quality on photo quality paper, two images per A4 page.

When preparing files for printing, a resolution of 300dpi at the required output size is appropriate.

A full set of images will also be professionally printed in black and white and colour for submission as part of the site archive.

Use processing companies that print photos to high specifications. Commercial, automatic processing techniques do not meet archival standards and must not be used.

All prints for the archive must be marked on the back with the project identifier (e.g. site code) and image number.

Store prints in acid-free paper enclosures or polyester sleeves (labelled with image number)

Include an index of all photographs, in the form of running lists of image numbers

The index should record the image number, title and subject, date the picture was taken and who took it

The print sleeves and index will either be bound into the paper report or put in an A4 ringbinder which is labelled with the site name, year and archaeological unit on its spine.

Plans and drawings

The finished report must include a plan and section of each trench (even where no archaeological remains are recorded) plus plans and sections through excavated archaeological features.

The plans will include at least two site grid points and will show section line end points.

The plans will depict building material (i.e. brick and stone) where a complex of structures has been found.

Where there is a complex of interlocking multi-phased structures, a phasing plan will also be included.

There will be elevation drawings of any standing structures such as walls.

Pro-forma context sheets will be used.

All deposits and the base of the trench will be levelled. Levels will be expressed as metres above Ordnance Datum.

Stratigraphy shall be recorded even when no archaeological features have been recognised.

A 'Harris' matrix will be compiled where stratified deposits are recorded.

2) Post-excavation and report production

Finds Processing and Storage

The Archaeological Contractor will process and catalogue the finds in accordance with Museum and Galleries Commissions Guidelines (1992) and the UKIC Conservation Guidelines, and arrange for the long term disposal of the objects on behalf of the Client. A catalogue of finds and a record of discard policies, will be lodged with the finds for ease of curation.

Finds shall be recorded and processed in accordance with the IFA Guidelines for Finds Work

Finds will be assessed by an experienced finds specialist.

See 'Investigative Conservation. Guidelines on how the detailed examination of artefacts from archaeological sites can shed light on their manufacture and use', English Heritage, 2008.

Human and animal bone assemblages should be assessed by a recognised specialist (see Appendices 2 and 3 for more information).

Industrial slag and metal working debris will be assessed by a specialist.

Assessment should include x-radiography of all iron objects (after initial screening to exclude recent debris) and a selection of non-ferrous artefacts (including all coins). Refer to "Guidelines on the x-radiography of archaeological metalwork, English Heritage, 2006.

Brick dimensions will be measured and a note made of the bonding material.

If necessary, pottery sherds and bricks should be recommended for Thermo-luminescence dating. See 'Luminensence Dating: guidelines on using luminescence dating in archaeology', English Heritage, 2008.

Inductively-coupled plasma spectroscopy (ICPS) and thin sectioning can be used to establish the chemical composition of clay fabric (pottery), which helps to locate production sites and identify the products of known sites.

Finds processing, storage and conservation methods must be broadly in line with current practice, as exemplified by the IFA "Standard and guidance for the collection, documentation, conservation and research of archaeological materials", 2001. Finds should be appropriately packaged and stored under optimum conditions, as detailed in the RESCUE/UKIC publication "First Aid for Finds" (Watkinson and Neal 1998). Proposals for ultimate storage of finds should follow the UKIC publication "Guidelines for the Preparation of Excavation Archives for Long-term Storage" (Walker 1990). Details of methodologies may be requested from the Archaeological Contractor.

Other useful guidance – "A Strategy for the Care and Investigation of Finds", English Heritage, 2003, "Finds and Conservation Training Package", English Heritage, 2003.

All objects must be stored in appropriate materials and conditions to ensure minimal deterioration. Advice can be sought from Jacqui Huntley of English Heritage (07713 400387) where necessary.

PRODUCTS

The report

1. The Archaeological Contractor must produce an interim report of 200 words minimum, **two weeks after the completion of the field-work**, for the Client and the Planning Authority, with a copy for information to the County Archaeologist. This will contain the recommendations for any further work needed on site.

2. The production of Site Archives and Finds Analysis will be undertaken according to English Heritage Guidelines - Managing Archaeological Projects 2nd Edition ('MAP2') 1991 and Management of Research Projects in the Historic Environment (MoRPHE) 2006.

3. A full archive report or post-excavation assessment, with the following features should be produced **within six months of the completion of the field-work**. All drawn work should be to publication standard. The report must include:

* Location plans of trenches and grid reference of site
* Site narrative – interpretative, structural and stratigraphic history of the site
* Plans showing major features and deposit spreads, by phase, and section locations
* Sections of the two main trench axes and through excavated features with levels
* Elevation drawings of any walls etc. revealed during the excavation
* Artefact reports – full text, descriptions and illustrations of finds

* Tables and matrices summarising feature and artefact sequences.
* Archive descriptions of contexts, grouped by phase (not for publication)
* Deposit sequence summary (for publication/deposition)
* Colour photographs of trenches and of archaeological features and finds
* Laboratory reports and summaries of dating and environmental data, with collection methodology.
* A consideration of the results of the field-work within the wider research context (ref. NERRF).
* Recommendations for further work on site, or further analysis of finds or environmental samples
* Copy of this specification

4. One bound and collated copy of the report needs to be submitted:

- for deposition in the County HER at the address on the first page.

Four digital copies (pdf of the report on CD) must be submitted:

- one for the commissioning client
- one for the planning authority (Newcastle City Council)
- one for deposition in the County HER at the address below. This CD will also include all of the digital images as TIFFs and the accompanying metadata.

PLEASE DO NOT ATTACH THE HER'S CD TO THE PAPER REPORT AS THEY ARE STORED SEPARATELY

The report and CD for the HER must be sent by the archaeological consultant or their client directly to the address below. If the report is sent via the planning department, every page of the report will be stamped with the planning application number which ruins the illustrations. The HER is also often sent a photocopy instead of a bound colour original which is unacceptable.

Publication

If significant archaeological features are found during the evaluation, the results may also warrant publication in a suitable archaeological journal. The tender should therefore include an estimated figure for the production of a short report of, for example 20 pages, in a journal such as Archaeologia Aeliana, the Arbeia Journal, Industrial Archaeology Review or Durham Archaeological Journal. This is merely to give the commissioning client an indication of potential costs.

Before preparing a paper for publication, the archaeological contractor must discuss the scope, length and suitable journal with the County Archaeologist.

Archive Preparation and Dissemination

The archive should be a record of every aspect of an archaeological project – the aims and methods, information and objects collected, results of analysis, research, interpretation and publication. It must be as complete as possible, including all relevant documents, records, data and objects {Brown, 2007, 1}.

The site archive (records and materials recovered) should be prepared in accordance with Managing Archaeological Projects, Second Edition, 5.4 and appendix 3 (HBMC 1991), MoRPHE Project Planning Notes 2006 PPN3 – Archaeological Excavation, "Archaeological documentary archives" IFA Paper No. 1, "Archaeological Archives – creation, preparation, transfer and curation" Archaeological Archives Forum etc., Guidelines for the Preparation of Excavation Archives for Long Term Storage (UKIC 1990) and "Archaeological Archives – A guide to best practice in creation, compilation, transfer and curation" by Duncan H. Brown, Archaeological Archives Forum, July 2007.

Documentary Archive

The documentary archive comprises all records made during the archaeological project, including those in hard copy and digital form.

This should include written records, indexing, ordering, quantification and checking for consistency of all original context sheets, object records, bulk find records, sample records, skeleton records, photographic records (including negatives, prints, transparencies and x-radiographs), drawing records, drawings, level books, site note-books, spot-dating records and conservation records, publication drafts, published work, publication drawings and photographs etc.

A summary account of the context record, prepared by the supervising archaeologist, should be included.

All paper-based material must at all times be stored in conditions that minimise the risk of damage, deterioration, loss or theft.

Do not fold documents

Do not use self-adhesive labels or adhesive or tape of any kind

High quality paper (low-acid) and permanent writing materials must be used.

Original drawings on film must be made with a hard pencil, at least 4H.

Do not ink over original pencil drawings.

Use polyester based film for drawings (lasts longer than plastic).

Store documents in acid-free, dust-proof cardboard boxes

Store documents flat

All documents must be marked with the project identifier (e.g. site code) and/or the museum accession number.

All types of record must use a consistent terminology and format.

Use non-metal fastenings, and packaging and binding materials that ensure the longevity of documents.

Copies of reports and appropriate drafts, with associated illustrative material, must be submitted for inclusion with the archive.

Material Archive

The material archive comprises all objects (artefacts, building materials or environmental remains) and associated samples of contextual materials or objects.

All artefacts and ecofacts retained from the site must be packed in appropriate materials.

All finds must be cleaned as appropriate to ensure their long-term survival

All metal objects retained with the archive must be recorded by x-radiograph (except gold or lead alloys or lead alloys with a high lead content and objects too thick to be x-rayed effectively e.t.c.)

The archive should include all environmental remains recovered from samples or by hand, all vertebrae remains not used for destructive analysis, environmental remains extracted from specialist samples (such as pollen preparations in silicone oil).

All finds must be marked or labelled with the project and context identifiers and where relevant the small-finds number

Use tie-on rot-proof labels where necessary

Bulk finds of the same material type, from the same context, may be packed together in stable paper or polythene bags

Mark all bags on the outside with site and context identifiers and the material type and include a polyethylene label marked with the same information

Use permanent ink on bags and labels

Sensitive finds must be supported, where appropriate, on inert plastic foam or acid-free tissue paper. It is not advisable to wrap objects in tissue as the unwrapping could cause damage.

The archive will be placed in a suitable form in the appropriate museum (typically the Museum of Antiquities for Newcastle (stores in Bedson Building and at Team Valley) and Tyne and Wear Museums for the rest of Tyne and Wear (check with these institutions) with the landowner's permission. Contact Andrew Parkin at the Museum of Antiquities (0191 2228996) and Alex Croom at Tyne and Wear Museums (0191 4544093).

A letter will be sent to the County Archaeology Officer within six months of the report having been submitted, confirming where the archive has been deposited.

Digital Archive

Copy of the report on CD as a pdf plus all of the digital images as TIFFs.

See MoRPHE Technical Guide 1 – Digital Archiving & Digital Dissemination 2006.

Archaeology Data Service
The digital archive including the image files can, if the appointed archaeologist and commissioning client choose to, be deposited with the ADS (The Archaeology Data Service) which archives, disseminates and catalogues high quality digital resources of long-term interest to archaeologists. The ADS will evaluate datasets before accepting them to maintain rigorous standards (see the ADS Collections Policy). The ADS charge a fee for digital archiving of development-led projects. For this reason deposition of the images with the ADS is optional.

Archaeology Data Service
Department of Archaeology
University of York
King's Manor
York
YO1 7EP
01904 433 954 Web: http://ads.ahds.ac.uk

SIGNPOSTING

OASIS

The Tyne and Wear County Archaeologist supports the Online Access to the Index of Archaeological Investigations (OASIS) project. This project aims to provide an online index/access to the large and growing body of archaeological grey literature, created as a result of developer-funded fieldwork.

The archaeological contractor is therefore required to register with OASIS and to complete the online OASIS form for their evaluation at http://www.oasis.ac.uk/. Please ensure that tenders for this work takes into account the time needed to complete the form.

Once the OASIS record has been completed and signed off by the HER and NMR the information will be incorporated into the English Heritage Excavation Index, hosted online by the Archaeology Data Service.

The ultimate aim of OASIS is for an online virtual library of grey literature to be built up, linked to the index. The unit therefore has the option of uploading their grey literature report as part of their OASIS record, as a Microsoft Word document, rich text format, pdf or html format. The grey literature report will only be mounted by the ADS if both the unit and the HER give their agreement. The grey literature report will be made available through a library catalogue facility.

Please ensure that you and your client understand this procedure. If you choose to upload your grey literature report please ensure that your client agrees to this in writing to the HER at the address below.

For general enquiries about the OASIS project aims and the use of the form please contact: Mark Barratt at the National Monuments Record (tel. 01793 414600 or oasis@english-heritage.org.uk). For enquiries of a technical nature please contact: Catherine Hardman at the Archaeology Data Service (tel. 01904 433954 or oasis@ads.ahds.ac.uk). Or contact the Tyne and Wear Archaeology Officer at the address below.

The tender

Tenders for the work should contain the following:-

1. Brief details of the staff employed and their relevant experience
2. Details of any sub-contractors employed
3. A quotation of cost, broken down into the following categories:-
   * Costs for the excavation, incl. sub-headings of staff costs on a person-day basis, transport, materials, and plant etc.
   * Post-excavation costs, incl. storage materials
   * Cost of Environmental analysis and scientific dating per sample
   * Estimated cost for full publication of results in an archaeological journal
   * Overheads
4. An indication of the required notification period (from agreement to start date) for the field-work; the duration of fieldwork and the expected date for completion of the post-excavation work (a maximum of 6 months after completion of the fieldwork)

Monitoring

The Archaeological Contractor will inform the County Archaeologist of the start and end dates of the excavation to enable the CA to monitor the work in progress.

Should important archaeological deposits be encountered, the County Archaeologist must be informed. If further archaeological evaluation is required on this site, then the archaeological contractor must submit a written scheme of investigation for approval by the CA before extending the size of the trenches.

APPENDICES

1 Environmental Sampling, Scientific Analysis and Scientific Dating

This is a compulsory part of the evaluation exercise.

Advice on the sampling strategy for environmental samples and samples for scientific dating etc. must be sought from Jacqui Huntley, English Heritage Regional Advisor for Archaeological Science (07713 400387) **before** the evaluation begins. The sampling strategy should include a reasoned justification for selection of deposits for sampling.

Scientific investigations should be undertaken in a manner consistent with “The Management of Archaeological Projects”, English Heritage 1991 and with “Archaeological Science at PPG16 Interventions: Best Practice for Curators and Commissioning Archaeologists”, English Heritage, 2004. See also ‘Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post excavation, English Heritage, 2002.

English Heritage guidance documents on archaeological science can be downloaded as pdf files from www.helm.org.uk or www.English-Heritage.org.uk > Learning and Resources > Publications > Free Publications.

See also the Environmental Archaeology Bibliography (EAB):
http://ads.ahds.ac.uk/catalogue/specColl/eab_eh_2004/

and the NMR sciences thesaurus:

http://thesaurus.english-heritage.org.uk/thesaurus.asp?thes_no=560

There must be full specialist liaison throughout the project – this need not necessarily be face-to-face.

Sampling should be demonstrated to be both fit for purpose and in-line with the aims and objectives of the project.

The choice of material for assessment should be demonstrated as adequate to address the objectives.

Evaluations and assessment of scientific material should provide clear statements of their potential and significance in addition to descriptive records. These statements should relate to the original objectives but may also lead to new or modified objectives.

Post excavation analysis and interpretation requires sufficient information exchange and discussion to enable scientific specialists to interpret their material within the established intellectual framework.

Archaeological and scientific analyses should be integrated as fully as possible. It is not acceptable to leave the scientific analyses simply as appendices.
Archive reports should include full data from all specialist materials. All reports, including any publications, must present sufficient primary data to support the conclusions drawn.

{From ’10 principles of good practice in archaeological science’ by English Heritage 2010}.

Types of sample

Flotation samples are used to recover charred and mineral-replaced plant remains, small bones, industrial residues etc. Such samples should be whole earth, 40-60 litres or 100% of small features. The flot mesh size should be 0.25-0.3mm. The residue sieve size should be 0.5-1mm. The flot and <2mm residue should be sorted under the microscope. >2mm residues can be sorted by eye.

Coarse-sieved samples are used to recover small bones (such as bird and fish), bone fragments, molluscs and small finds (beads, pottery, coins etc). Such samples should be 100 or more litres, wet or dry sieved, minimum mesh 2mm. Specialist advice is recommended.

Other types of sample are monoliths, specialist, cores and small spot. These are taken for specific reasons and need specialists.

Aims and objectives

Aims of environmental sampling – to determine the abundance/concentration of the material within the features and how well the material is preserved, to characterise the resource (the site) and each phase, to determine the significance of the material and its group value, what crop processing activities took place on the site? What does this tell us about the nature of the site? Is there any evidence for changes in the farming practice through time? How did people use this landscape? Can we place certain activities at certain locations within the site? Function and date of individual features such as pits, hearths etc. Are the charred assemblages the result of ritual deposition or rubbish? Is the charcoal the result of domestic or industrial fuel?

Deposits should be sampled for retrieval and assessment of the preservation conditions and potential for analysis of biological remains (English Heritage 2002). Flotation samples and samples taken for coarse-mesh sieving from dry deposits should be processed at the time of fieldwork wherever possible. Sieving recovers fish, amphibian, small bird and mammal bone, small parts of adult mammals and young infused bones which may be under-represented otherwise. However it is noted that sticky clay soils in this region make sieving difficult. Discuss the potential for sieving with Regional Advisor for Archaeological Science.

Environmental samples (bulk soil samples of 30-40 litres volume) will be collected by the excavator from suitable (i.e. uncontaminated) deposits. It is suggested that a large number of samples be collected during evaluation from which a selection of the most suitable (uncontaminated) can be processed. All tenders will give a price for the assessment, full analysis, report production and publication per sample.

The full 30-40 litre sample must be assessed by the laboratory, not just a small sub-sample.

The following information should be provided with the environmental samples to be processed – brief account of nature and history of the site, aims and objectives of the project, summary of archaeological results, context types and stratigraphic relationships, phase and dating information, sampling and processing methods, sample locations, preservation conditions, residuality/contamination etc.

Laboratory processing of samples shall only be undertaken if deposits are found to be reasonably well dated, or linked to recognisable features and from contexts the derivation of which can be understood with a degree of confidence.

A range of features, and all phases of activity, need to be sampled for charred plant remains and charcoal. Aceramic features should not be avoided as the plant

remains from these features may help to date them. Deep features should be sampled in spits to pick up changes over time. Part or all of each of the contexts should be processed. In general samples should be processed in their entirety. All flots should be scanned, and some of the residues.

Scientific Dating

Deposits will be assessed for their potential for radiocarbon, archaeomagnetic and Optically Stimulated Luminescence dating.

See 'Archaeomagnetic Dating: Guidelines on producing and interpreting archaeomagnetic dates', English Heritage, 2006 and

'Luminescence Dating: guidelines on using luminescence dating in archaeology', English Heritage, 2008.

Timbers will be assessed for their potential for dendrochronology dating. Sampling should follow procedures in "Dendrochronology: guidelines on producing and interpreting dendrochronological dates", Hillam, 1998.

All tenders will quote the price of these techniques per sample.

Pollen

Pollen samples can be taken from features such as lakes, ponds, palaeochannels, estuaries, saltmarshes, mires, alluvium and colluvium, and from waterlogged layers in wells, ditches and latrines etc. Substances such as honey, beer or food residues can be detected in vessels. Activities such as threshing, crop processing and the retting of flax can be identified. When taken on site, pollen samples should overlap. Your regional science advisor can advise on the type of corer or auger which would be most appropriate for your site. Samples need to be wrapped in clingfilm and kept dark and cool. Make a description of the sediments in which the pollen was found, and send this with the sample to be assessed.

Forams and diatoms

Coastal or estuary sites (even those which are now well drained) are suitable for sampling for foraminifera. Diatoms can also be found on marine sites, but also in urban settings (sewers, wells, drains, ditches etc). They only survive in waterlogged conditions. These aquatic microfossils are used as proxy indicators of the former aquatic ecological conditions on site, changes in sea levels and temperature, salinity, PH and pollution. Forams are taken from cores, monolith tins or bulk samples. Diatoms are cut from monolith tins or cores or taken as spot samples.

Insects

Insects, which are useful as palaeoenvironmental indicators, survive best in waterlogged deposits such as palaeochannels and wells. They can provide information on climate change and landscape reconstruction as some species are adapted to particular temperatures, habitats or even particular trees. Certain

insects can indicate the function of a feature or building (eg. Weevils, which were introduced by the Romans, often indicate granary sites, parasites will indicate the presence of particular animals such as sheep or horse, latrine flies survive in the mineral deposits in latrines, or in the daub of medieval buildings etc). Samples need to be sealed (eg. in a plastic box).

Industrial Activity

Where there is evidence for industrial activity, macroscopic technological residues should be collected by hand. Separate samples should be collected for micro-slags (hammer-scale and spherical droplets). Guidance should be sought from the English Heritage Regional Science Adviser on the sampling strategy for metalworking features and advice on cleaning and packaging. Specialist on-site advice must be sought on identification of metalworking features. Slag and metal working debris must be assessed by a specialist. Scientific analysis (such as x-ray fluorescence, chemical analysis, metallography or scanning electron microscope) of slag can provide information on the melting temperature, chemical composition (is it iron, zinc, copper etc), microstructure (the type and shape of the crystals), physical properties (the hardness or viscosity), isotopic composition (strontium_87 or strontium_88 etc) and mineralogical composition.

See “Archaeomagnetic dating”, English Heritage, 2006

“Guidelines on the X-radiography of archaeological metalwork”, English Heritage, 2006.

Historical Metallurgy Society, 2008, “Metals and metalworking: a research framework for archaeometallurgy”.

Centre for Archaeology Guidelines on ‘Archaeometallurgy’ 2001.

‘Science for Historic Industries: Guidelines for the investigation of 17th to 19th century industries’, English Heritage, 2006.

Buried soils and sediments

Buried soils and sediment sequences should be inspected and recorded on site by a recognised geoarchaeologist. Procedures and techniques in the English Heritage document “Environmental Archaeology”, 2002 and “Geoarchaeology”, 2004 should be followed.

See also ‘Geoarchaeology. Using earth sciences to understand the archaeological record’, English Heritage, 2007.

Wood

Sampling strategies for wooden structures should follow the methodologies presented in “Waterlogged wood. Guidelines on the recording, sampling, conservation and curation of waterlogged wood” R. Brunning, 1996. If timbers are likely to be present on your site, contact a wood specialist beforehand. Pre-excavation planning – determine questions to ask, agree on a sampling strategy, allocate reasonable time and budget. Soil samples should be taken of the

sediments surrounding the timber. Keep the timbers wet! Record them asap on-site – plan, photograph, record the size and orientation of the wood (radial, tangential,transverse), any toolmarks, joints, presence of bark, insect damage, recent breaks, and if another piece of wood was on top of or below the piece sampled. Both vertical and horizontal positioning of wattling must be recorded. Wood samples can provide information on woodland management such as medieval coppicing, type of taxa (native or foreign), conversion technology (how the wood was turned into planks), building techniques and type of tools used.

Suitable samples should be submitted for dendrochronological dating. See English Heritage guidelines, 2004, "Dendrochronology".

Leather and organic materials

Waterlogged organic materials should be dealt with following recommendations in "Guidelines for the care of waterlogged archaeological leather", English Heritage and Archaeological Leather Group 1995.

Glass

As glass-making furnaces are above ground structures, they rarely survive. However sample residues can produce glass fragments which define glass working even though no traces of furnaces survive.
Excavations at Whitby Abbey recovered glassworking waste from preliminary sampling. Targeted bulk sampling in subsequent years recovered more evidence for glass working. Raw glass, twisted rods of glass and a possible glass inlay for an illustrated book were found. Similar glass rods were found at St. Gregory's Minster at Kirkdale, North Yorkshire.

Analysis can find out where glass was imported from (a lot of Roman glass came from Alexandria).

Analysis of the composition of glass can show varying additives and salt composition. At Whitby Abbey the varying salt composition in glass throughout the Early Medieval period reflected climate change.

Is the glass made from recycled glass waste or raw materials?

Is there evidence of glass blowing?

English Heritage has guidance forthcoming in 2010.

2 Animal Bone

Animal bone can explore themes such as hunting and fowling, fishing, plant use, trade network, seasonality, diet, butchery, animal husbandry, food procurement, age structures, farrowing areas, species ratios, local environment.

Domestic animal bone was used in prehistoric and Roman cremation rituals.

Post medieval cattle bones – small cow bones invariably represent animals which produced high quality buttermilk for cheese. Big 'improved' cattle with large bones

were produced for large quantities of meat and poorer quality milk. Large and small cattle bones are often found together on post medieval sites, usually with less of the small bones.

Animal bone assemblages should be assessed by a recognised specialist.

The specialist will need to know a brief account of the nature and history of the site, an account of the purpose, methods (details of sampling) for recovery of animal bones, and the main aims and results of the excavation, details of any specific questions that the excavator wants the animal bone specialist to consider, information about other relevant finds from the excavation (e.g. bone tools, fishing equipment, weaving equipment), specific information about each context that has produced significant quantities of animal bone (recovery method, phase, context type, position in relation to major structures, contamination by more recent material, some indication of the amount of bone (by weight or by container size). See “Ancient Monuments Laboratory Advisory Note, “Assessment of animal bone collections from excavations”, Sebastian Payne, 1991and “The Assessment of a collection of animal bones”, S. Davis, n.d., Ancient Monuments Laboratory.

Fish bone

Because fish bones are so small, particularly freshwater and estuarine species, they are often only recovered in large bulk samples. Samples must always be sieved.

Roman agenda – did the Romans eat fish? Were they sourced locally or imported? Use of fish as a sauce (garum).
Excavations at Bridge Street, Chester showed that in the Roman period fish was eaten and was both locally sourced and imported (mullet and Spanish mackerel).
Medieval and post medieval agenda – evidence for the deep sea fishing ‘revolution’, size-biased collections, replacement or supplement of freshwater and estuarine fish in the diet by deep sea fish.

Tere was some herring exploitation in the early medieval period. Christian fasting from around 970 allowed fish to be eaten on Fridays which led to a huge demand for fish. There was an increase in marine fishing, fish trade and fish consumption (cod, haddock, ling, herring etc) around 1000 AD. Middens provide evidence of commercial fishing. There was a decline in freshwater fish (cyprinid or carp, salmon, smelt, eel, pike) from the eleventh century.

Smoking fish is a recent practice. They were previously air dried and salted.

Newcastle was a major port. Samples should be sieved to retrieve fish and bird bones along with small parts of other animal skeletons and young infused bones.

A crane bone was recovered from excavations at Tuthill Stairs, Newcastle – a rare find.

Herring bones are so small that they can only be retrieved by 2mm sieving.

Clay soils are difficult to sieve, hot water can help.

Acidic soils mean poor preservation of bone.

See English Heritage 2002, "Environmental Archaeology – a guide to the theory and practice of methods from sampling and recovery to post excavation", Centre of Archaeology Guideline 1.

Isotope analysis can determine where the fish were coming from – North Sea, Scandinavia, Newfoundland, Iceland etc.

There is an excellent reference collection of fish bone at York.

Fish bones should be archived to museums for future dating and isotope analysis where this is not undertaken as part of the post-excavation process.

www.fishlab.org

3 Human Remains

Human remains must be treated with care, dignity and respect.

Excavators must comply with the relevant legislation (essentially the Burial Act 1857) and local environmental health concerns. If found, human remains must be left in-situ, covered and protected. The archaeological contractor will be responsible for informing the police, coroner, local Environmental Health department and the County Archaeologist. If it is agreed that removal of the remains is essential, the archaeological contractor will apply for a licence from the Home Office and their regulations must be complied with.

The excavation area must be shielded from public view with screens.

The excavation of human remains is a delicate and time consuming operation. The process can take one or two days per skeleton. If the skeleton cannot be excavated all in one day cover it with plastic sheeting overnight to prevent it from drying out. The remains should be excavated as completely as possible to give the bioarchaeologist the maximum amount of data.

A bioarchaeologist should be employed for any burial excavation from the start of the project.

A basic diagram of a skeleton should be available on site for staff to consult (such as that in Abrahams et al, 2008, McMinn's the human skeleton).

Once the top of a skeleton is reached, excavation will be undertaken using delicate tools such as paintbrushes, teaspoons, dental equipment and plasterers' leaves.

Recover all teeth, hand and foot bones.

Excavate the pubic symphysis of the pelvis with care as it is needed for age estimation of adults.

The ends of the ribs that meet the sternum are useful for age estimation of adults.

There will be a possibility that gall, bladder and kidney stones may survive. Sesamoid bones may be present in the hands and feet, calcified cartilages in the neck, on the ribs and on the hyoid bone in the neck.

Foetal bones may be present in the abdominal area of female skeletons.

The bones should be shaded from strong sunlight so they do not dry out and crack.

Bones should be drawn at 1:10 using a planning frame. Manual and digital photographs should be taken with a scale and a magnetic north arrow clearly visible. 3D recording using an EDM may be undertaken.

Site inspection by a recognised osteologist is desirable for isolated burials and essential for cemeteries. The remains will be recorded in-situ and subsequently lifted, washed in water (without additives). They will be marked and packed to standards compatible with “Excavation and post-excavation treatment of cremated and inhumed human remains”, McKinley and Roberts, 1993. After excavation, the remains will be subject to specialist assessment.

Analysis of the osteological material should take place according to published guidelines “Human Remains from Archaeological Sites, Guidelines for producing assessment documents and analytical reports, English Heritage, 2002.

Some of the potential benefits from the study of human skeletons – demography, growth profiles, patterns of disease, genetic relationships, activity patterns, diet, burial practices, human evolution. New scientific techniques available include DNA and stable isotope analyses.

Diseases which yield ancient DNA – leprosy, syphilis, tuberculosis, mycobacterium bovis (animal form of TB passed to humans when they shared a living space from Neolithic period onwards).

Cremation destroys the crown of the tooth so it cannot be dated (the closure of the cranium vault can be used in adults for dating instead). Cremation also fragments bone, distorts it due to lack of water, shrinks the bone, causes microstructural alteration and destroys organic components (so DNA analysis not possible).

The final placing of the remains after scientific study and analysis will be agreed beforehand.

Health & Safety associated with human remains:

Micro-organisms that might cause harm to humans are extremely unlikely to survive beyond about 100 Years.

More recent remains could be more hazardous to health as they may be in sealed lead coffins.

The possible risks of contracting disease from excavated human remains are highly negligible but could include the virus smallpox, tetanus and anthrax spores,

the bacterial infection leptospirosis and the fungal disease mycoses (a problem in dry dusty soils and in crypts).

Excavators should be up-to-date with tetanus inoculations.

Anthrax can come from materials derived from animals – coffin pads, pillows or coffin packing.

Working with human remains may cause psychological stress (see J. Thompson, 1998, Bodies, minds and human remains, in M. Cox (ed) 1998, Grave concerns: Death and Burial in England 1700-1850, pp 197-201).

There is a danger of lead poisoning arising from high levels of lead in the atmosphere generated by lead coffins (see H. Needleman, 2004, Lead poisoning in Annual Review of Medicine, 55, pp. 209-22).

Normal hygiene measures should be undertaken – washing hands, wearing masks and gloves. Heavily soiled clothing should be burned at an HSE approved site.

Further guidance is available in:

"Guidance for best practice for treatment of human remains excavated from Christian burial grounds in England", The Church of England and English Heritage, 2005 (www.english-heritage.org.uk/upload/pdf/16602_HumanRemains1.pdf)

"Church Archaeology: its care and management", Council for the Care of Churches, 1999

Charlotte A. Roberts, 2009, 'Human Remains in archaeology: a handbook', CBA Practical Handbooks in Archaeology No. 19

The Advisory Panel on the Archaeology of Christian burials in England can provide free well-informed advice with consideration of relevant religious, ethical, legal, archaeological and scientific issues. Panel's website:
http://www.britarch.ac.uk/churches/humanremains/index.html
or email the secretary simon.mays@english-heritage.org.uk

4 Treasure

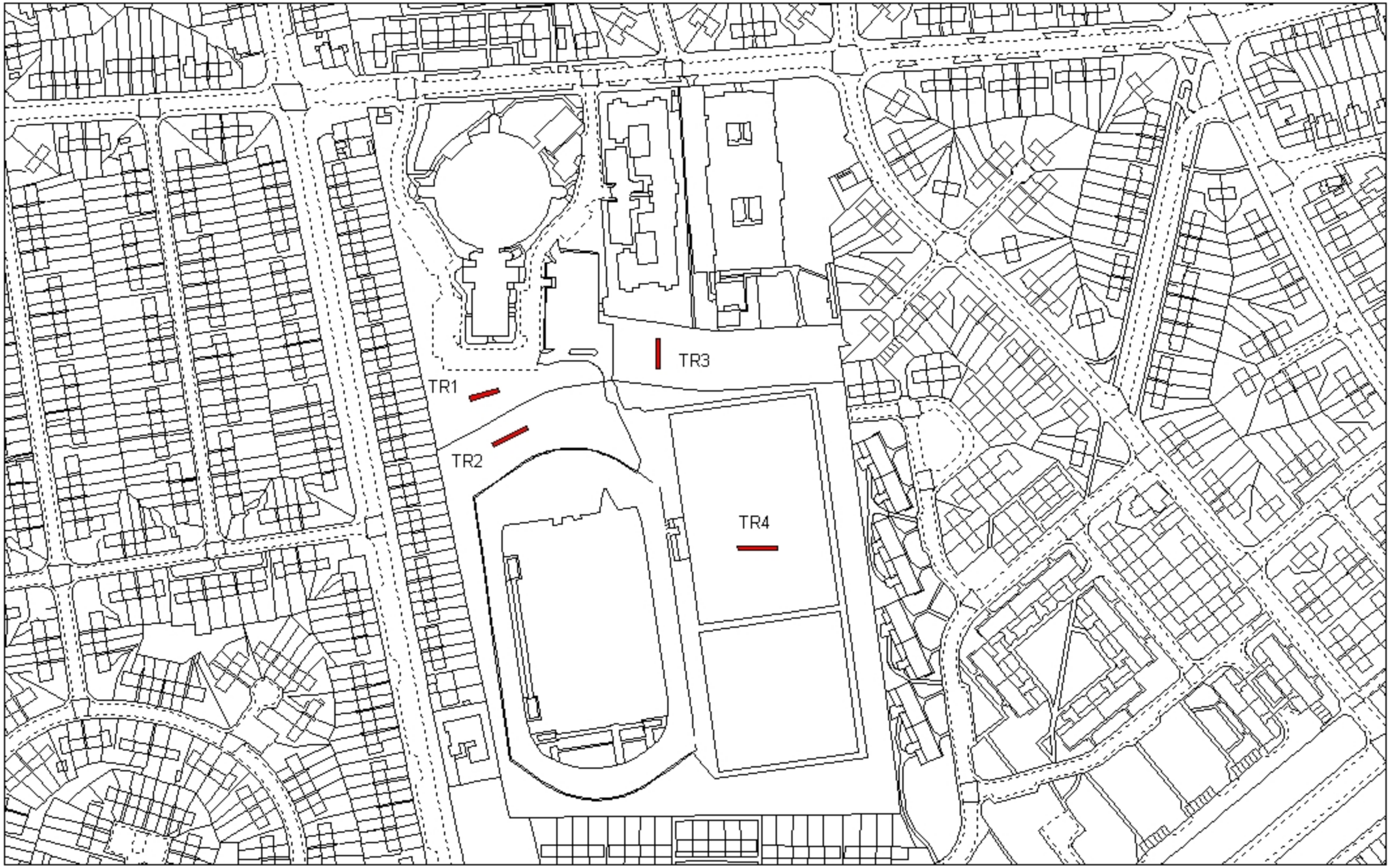
Defined as:

- Any metallic object, other than a coin, provided that at least 10% by weight of metal is precious metal and that is at least 300 years old when found
- Any group of two or more metallic objects of any composition of prehistoric date that come from the same find
- All coins from the same find provided that they are at least 300 years old when found, but if the coins contain less than 10% gold or silver there must be at least ten
- Any object, whatever it is made of, that is found in the same place as, or had previously been together with, another object that is Treasure
- Any object that would previously have been treasure trove, but does not fall within the specific categories given above. Only objects that are less than 300 years old, that are made substantially of gold or silver, that have been

deliberately hidden with the intention of recovery and whose owners or heirs are unknown will come into this category

If anything is found which could be Treasure, under the Treasure Act 1996, it is a legal requirement to report it to the local coroner within 14 days of discovery. The Archaeological Contractor must comply with the procedures set out in The Treasure Act 1996. Any treasure must be reported to the coroner and to The Portable Antiquities Scheme Finds Liaison Officer, Rob Collins (0191 2225076 or Robert.Collins@newcastle.ac.uk) who can provide guidance on the Treasure Act procedures.

If you need this information in another format or language, please contact Jennifer Morrison, Archaeology Officer.



Heart of Walker

Suggested location of trenches

1:2,500

P C A

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