JUNCTION OF HINDPOOL ROAD AND CORNMILL CROSSING, BARROW-IN-FURNESS, CUMBRIA

Archaeological Watching Brief
(Iron Foundry)

Client: Positive Location Properties Ltd
Planning Ap. Ref.: 6/05/1530
NGR: SD 1955 6905

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Non-Technical Summary

Following a planning application for the construction of a warehouse and retail unit with associated car parking and landscaping on a large area adjoining Hindpool Road and Cornmill Crossing, Barrow-in-Furness, a programme of archaeological investigation was requested by the Cumbria County Council Historic Environment Service (CCCHES). This initially comprised a desk-based assessment and site visit, which was completed in March 2006, and identified a number of sites of archaeological interest within the proposed development area, including a former gasworks and iron foundry. In addition to the desk-based assessment a watching brief was carried out on geotechnical test pitting which revealed below ground remains were present in the areas of the foundry and gasworks. Recording of the remaining standing buildings on the foundry site was carried out and the requirements for a watching brief on ground works within the iron foundry and gasworks sites agreed. The work involved monitoring the removal of floor slabs from existing structures, location and removal of below ground foundations and structures, monitoring of more geotechnical test pits, and the subsequent bulk stripping of contaminated ground. The work was carried out from 23rd April to 30th May 2007.

Both the gasworks and iron foundry complexes were established in the 1860s. The gasworks was purchased by the Corporation of Barrow-in-Furness in 1869, but was found to be inadequate to meet demand by 1879, when a new gas holder was constructed. The iron foundry was established by Waddington and Longbottom before later becoming Waddington and Sons. It specialised in both iron and brass castings, particularly those required by Barrow's rapidly developing ship yards, but also made water pipes for the growing town.

The majority of the surviving foundations of the iron foundry were based around Cornmill Crossing. Beneath the concrete floor slabs evidence of three individual buildings and areas of metal working were discovered. An underground flue was also discovered, as were three interesting collections of buried cast iron and slag presumably relating to phases of demolition. In total, four phases of activity were identified; the original foundry buildings, re-development after a fire in 1906, further demolition in 1938/9, and late 20th century re-use of the foundry buildings for other purposes.

The gasworks site revealed two buried buildings, the first of which was original and had a large basement containing a flue as well as tanks that may relate to the nearby railway siding. The second building was later and had a concrete floor slab and a huge foundation base adjacent. Two phases were identified - the original buildings and re-development occurring between 1873 and 1891.

Acknowledgements

Greenlane Archaeology would like to thank Positive Locations Properties Ltd, and Tony Clowes in particular, for commissioning and supporting the project. Further thanks are also due to the staff of Demolition Services Ltd and Celtic Technologies Ltd.

The watching brief was carried out by Sam Whitehead who also wrote the report and produced the illustrations. The project was managed by Jo Dawson, who also edited the report and assessed the finds.

1. Introduction

1.1 Circumstances of the Project

1.1.1 A planning application (6/05/1530) was made by Positive Location Properties Ltd to construct a warehouse and retail unit with associated car parking and landscaping on land at the junction of Hindpool Road and Cornmill Crossing, Barrow-in-Furness (SD 1955 6905). After a recommendation by Cumbria County Council Historic Environment Service (CCCHES), Barrow Borough Council placed a condition on the planning consent requiring a scheme of archaeological investigation to be undertaken. The first phase of this work was an archaeological desk-based assessment, which was completed in March 2006 (Greenlane Archaeology 2006), and subsequent phases of work included a watching brief of initial geotechnical test pits (Greenlane Archaeology 2007), an excavation (Greenlane Archaeology forthcoming b), and a building recording (Greenlane Archaeology forthcoming a). The project design for the iron foundry watching brief was produced by Greenlane Archaeology (*Appendix 1*), and following the acceptance of this the watching brief was undertaken from 23rd April to the 30th May 2007.

1.2 Location, Geology, and Topography

1.2.1 The proposed development area is situated on the north-east edge of Barrow-in-Furness' industrial area and docklands (Fig 1). It is positioned between the north-east side of the Devonshire Dock and Hindpool Road (part of the A5087) and is less than 10m above sea level (Ordnance Survey 2002; Fig 2). The landscape has been extensively altered by continuous building since at least the mid 19th century and part of the proposed development area is land that was reclaimed during the construction of the docks (Latham 1991, 26). The solid geology of the area is likely to comprise a mix of Mercia mudstones and red sandstones of the Triassic period (Moseley (ed) 1978, plate 1). This is likely to be covered by a thick glacially-derived till (Countryside Commission 1998, 27), which will have been affected by alluvial activity and in places layers of peat and marine clay have been recorded at a significant depth below the surface (Kendall 1900). The later industrial development of the area will, however, have significantly affected these deposits.

1.3 Site History

1.3.1 The background history of the site is intended to inform the results of the iron foundry watching brief. More specific information regarding structures, buildings and sites within the proposed development area is also presented in order to understand them in more detail. The information used to produce the site history is taken from the previous desk-based assessment report (Greenlane Archaeology 2006) and additional research carried out as part of the building recording (Greenlane Archaeology forthcoming a).

1.3.2 Several early maps of the site were examined as part of the original desk-based assessment (see Plates 1-4), ranging from a county plan of the late 18th century to Ordnance Survey maps of the 20th century. These revealed that, as with much of Barrow, the area was not developed until the mid to late 19th century. Prior to this date it was situated between the villages of Barrow and Hindpool, and there were only a few farm buildings in the general vicinity. A large part of the site was directly on the shore and part was initially used as a patent slip. The whole area was,

however, gradually reclaimed from the sea during the late 1850s by the tipping of ballast to form part of the docks that were developing alongside the growing town of Barrow-in-Furness.

1.3.3 By the 1870s the site had been transformed and was home to a number of industries, many of which remained in operation into the early to mid 20th century. The map regression demonstrated that five separate businesses are known to have been situated within the proposed development area, a shipyard, a gasworks, a foundry, a steam corn mill, and a rope walk. Two of these are discussed individually and in more detail below, as they relate most directly to the watching brief.

1.3.4 ***Foundry:*** the foundry, known as the 'Hindpool Foundry', was one of several such complexes that sprung up during the industrialisation of Hindpool in the late 19th century (Melville 1956, 21). The company was established in 1860 by Waddington and Longbottom (The Acme Tone Engraving Company Limited 1900, 45), although the foundry was apparently not operational until 1863 (Richardson 1881, 94). There are several contemporary accounts of the foundry from various stages in its history; the company began as iron founders but soon expanded into engineering (particularly for shipping), brass founding and a variety of related activities (*ibid*). It is said that they '*Supplied most of cast iron bollards and fairleads etc for vessels built in ship yards in Ironworks Road, as well as much smithwork and, later, steam winches, capstans, etc. even for Messrs Vickers and other works throughout the country*' (Melville *c*1984).

1.3.5 There are few details of other products during their early period, although they are said to have supplied a 6hp engine for the Devonshire brewery on the opposite side of Hindpool Road, which was built by William Gradwell in *c*1879 (Richardson 1881, 101). A description from 1872 states that the moulding shop had '*recently been considerably extended*' (Leach 1872, 84), and gives a relatively detailed description of the buildings present, listing four steel cranes, one of which was made at the foundry, a smaller moulding shop adjoining the larger one, two cupola furnaces for melting iron (with a third under construction), as well as various overhead cranes and hoists in the yard (*ibid*). In addition, there was a brass foundry with two furnaces, on the ground floor of which was a fitting shop (although this was about to be converted into another foundry for the moulding of pipes and the fitting department moved into another new building). Near to the fitting shop was the smithy and shoeing forge, which contained eight hearths enhanced by fans, and within the yard was a three storey grinding mill powered by a 12hp steam engine used for producing the casting loam, which also drove a circular saw and machinery for cutting and punching iron on the ground floor (*op cit*, 85). The first floor was used for preparing patterns for pipes, and was where the new fitting shop was situated (which housed a variety of lathes, drilling machines, other machinery, and the necessary benches), while the second was occupied by the joiners' and pattern makers' workshops (*ibid*).

1.3.6 It is evident that by 1900 the site had undergone several changes (The Acme Tone Engraving Company Limited 1900, 45; Plate 7), although the exact details of these are not known (Plate 6 shows some of the cranes and buildings adjoining the boundary wall at around this date). On 21st November 1906 (although Trescatheric and Barker mistakenly state that it was 1909 (1990, 22)) the foundry was severely damaged by a fire, which gutted the fitting and pattern shops (Anon 1906; Myers 2000, 32; Plates 8-9). The business survived, however, and some of the machinery was said to be reusable, although the damage was estimated to be £3000-£4000 (Anon 1906). After the fire the foundry was quickly returned to working order, and managed to remain in operation until 1921-2, at which point the depression led to a

catastrophic loss of orders, which is said to have led to the closure of the business (Melville *c*1984).

1.3.7 There is only one recorded order from this period; for water pipes for a local church (CRO(B) BPR 27A/P/10/2 1923). A brief examination of the directories demonstrates that it remained in existence until at least 1935, however (Greenlane Archaeology 2006, 13-14), and it is not clear exactly what date it closed. It is evident from an aerial photograph taken in 1939 that a considerable number of the buildings on the site had been demolished by this date, however (Plate 10). During the Second World War the remaining buildings were requisitioned (in October 1940) by the War Department, and there is some correspondence regarding the subsequent claims for compensation (CRO(B) BDB 17/Box 19 1941-1943). A schedule compiled at the time lists the foundry as including workshops, stores, offices, and a yard, and a schedule of condition on entry compiled August 8th 1940 describes the buildings as follows:

'*Externally: Fences + Boundary Walls – brick, Walls – brick, Drainage – main, Roof – glass + slate, Paintwork – poor, Timber – sound, Structural – in poor order.*

Internally: Structural – in poor order, Decoration – nil, Ceilings – nil, Walls – sound, Floors – office floor, good, Woodwork – sound, Sanitary fittings – unexamined' (*ibid*).

1.3.8 A rent of £100 *per annum* was offer by way of compensation at the start of 1941, which was rejected but then only increased to £150, due to '*the condition of the premises at the time, & the fact that they had remained derelict for some years*' (*ibid*). This fits the evidence of the photograph from 1939 and suggests that, although trading, Waddington and Sons were not making much use of the site at this time. It is also stated in the correspondence with the War Department that the site was damaged by enemy action on 4th April 1941, and it is counter-claimed that Waddington and Sons had deliberately tried to exempt themselves from the part of the requisition agreement that required them to maintain the building (*ibid*). The buildings were possibly considered for use by Unilever Limited in July 1943, as they were looking for factory premises as part of the War effort, but there is no evidence that Waddington and Sons' site was taken on. Negotiations between Waddington and Sons and the War Department were apparently not fully resolved even after the de-requisitioning notice was issued on 24th April 1945 (*ibid*).

1.3.9 Most recently the remaining buildings have been used for a variety of storage and business purposes, while modern buildings have been added on the north-west side of the site (Plate 5). One of the main companies to use it was a fruit and vegetable merchants, AE Docker and Sons, who had direct vehicular access to the site via the old rail sidings and their own garage for the maintenance of delivery lorries and company cars (Howard Quayle pers comm.).

1.3.10 Planning applications lodged between 1949 and 1995 demonstrate that AE Docker and Sons made a considerable number of alterations to the building, although it was not possible to access the details of all of these.

1.3.11 ***Gasworks:*** the gasworks were established by a limited liability company in 1862 (Mannex and Co 1882, 22) or possibly 1861 (Baker 2005, 16; Baker 2006, 48), and according to a near contemporary source were '*supplied with the most recent and improved appliances for the manufacture of gas*' (Mannex and Co 1882, 22). Whether the works were built at this date is not certain, and this would conflict to some degree with the date that the dock was developed and the nearby shipyard went out of use (Latham 1991, 26). By 1869 they had been purchased by the Corporation of Barrow-in-Furness and despite having a large capacity the increase in

the town's population meant that in 1879 an additional gasholder was constructed at Ormsgill (Mannex and Co 1882, 22).

1.3.12 The original gasworks buildings were apparently built using bricks from the North Lancashire Brick and Tile Works of Andrew Woodhouse, also in Hindpool (Leach 1872, 77), but contemporary details supply little further information about the site. A brief examination of the directories also provides little information prior to the 20th century (Greenlane Archaeology 2006, 14-15). The references in the directories stop in the 1920s, although it is not clear whether the site went out of use at this time. There are also references to a 'Gasworks House' during the 1920s and 1930s, which is also situated on the same part of Hindpool Road, although it is not clear what relationship, if any, this had to the gasworks themselves. The aerial photograph of the site from 1939 (Plate 10) shows that the large block of buildings along the south-east side of the site had been demolished by this date, and by 1985 modern buildings had been constructed on the north-west side of the site (Plate 5). These have most recently been used by Transco (Envirocheck 2005).

2. Methodology

2.1 Watching Brief

2.1.1 ***Introduction:*** the watching brief can be divided into three distinct blocks, for each of which a slightly different methodology was employed. The site work that was observed involved the removal of floor slabs and underground structures/foundations by Demolition Services Ltd (DSL) and the location and subsequent removal of contaminated ground by Celtic Technologies in association with DSL.

2.1.2 ***Areas A and A1:*** after the demolition of the remaining foundry buildings, a watching brief was carried out on the removal of the floor slabs and any foundations beneath. After the floor slab was removed, Area A1 was roughly machine cleaned with a bladed bucket in order to reveal the locations of any buried brickwork, concrete, tanks etc. Any archaeological features were quickly planned at 1:100 using the foundry's south-eastern boundary along Cornmill Crossing as a baseline; they were then removed with a toothed bucket. All structural features and deposits present were recorded using Greenlane *pro forma* record sheets. In addition black and white print and colour digital photographs were taken of the general area and individual features. The remaining area of the site as far north-east as the SITA building was also incorporated into this block of work (Area A) although a toothed bucket was used outside of the region shown as Area A1. The toothed bucket was used to probe for foundations before digging them out. While far from ideal this methodology was employed for speed, the area had been test-pitted by this time, remains were rare, and there was a lot of intrusions/truncation. Any substantial foundations or finds such as groups 1-3 (see Figs 2 and 3) were located and recorded photographically and by measured sketches.

2.1.3 ***Test Pitting:*** a program of geotechnical test pits was devised by Celtic Technologies to ascertain the regions and degrees of pollution on the site as a whole, the results of which could then be used to target areas requiring remediation. The numbers of the pits used in this study were those allocated by Celtic Technologies; they tried to ensure that there was a pit within every 15m by 15m square of the site. Each machine-excavated pit was monitored by an archaeologist and rapidly recorded before being backfilled and the next started. At the very minimum each pit was photographed and located on a plan of the site. The recording comprised brief notes on the depths of deposits and natural ground, and sketch sections were made where any substantial structures were found. In certain cases (such as test pit 7) the pit was left open long enough for more a detailed recording and better location to be gained, although in practice this left less time to record the subsequent pit. In some cases the pits were too deep or unstable to enter safely, and in the case of pits 2-5 pollution was a restricting factor. The main limitation of this exercise was undoubtedly the lack of time with which the pits had to be recorded; this was unavoidable to some extent as large holes left open would have required fencing and would have restricted access to certain areas of the site. The pits varied in shape and size as patches of pollution were chased out.

2.1.4 ***Areas B and C:*** these areas were between the current boundaries of the former foundry and gasworks buildings but used to be within the gasworks site (see Figs 2 and 3). This area was deemed contaminated on the results of the test pitting by Celtic Technologies and the ground had to be removed and treated under their supervision. The removal of this ground revealed earlier walls and foundations and afforded an opportunity for the production of plans at 1:100 utilising modern wall

bases as reference points. Black and white print and colour digital photographs were also taken of the subterranean building remains. The recording was limited to hand planning by the degree of pollution within the ground, and the speed with which the ground was being removed.

2.1.5 ***Finds and Samples:*** the finds were washed and naturally air-dried, and are catalogued in *Appendix 3*. The industrial residues sampled were examined by eye, and are described in *Appendix 3*.

2.1.6 ***Interpretation:*** building remains encountered during the watching brief were related to buildings shown on the Ordnance Survey map of 1891, which were numbered 101-5 for ease of reference (Fig 4). The remains are described and discussed with reference to these building numbers (*Sections 3 and 4, and Appendix 2*).

2.2 Archive

2.2.1 A comprehensive archive of the project has been produced in accordance with the project design, and current IFA and English Heritage guidelines (Ferguson and Murray n.d.; English Heritage 1991). The paper and digital archive and a copy of this report will be deposited in the Cumbria Record Office in Barrow-in-Furness (CRO(B)) on completion of the project. Three copies of this report will be deposited with the Cumbria Historic Environment Record, one with the client, and one will be retained by Greenlane Archaeology. In addition, a digital copy will be offered to the NMR and a record of the project will be made on the OASIS scheme, and digital copies will be supplied to Demolition Services Ltd and Celtic Technologies Ltd.

3. Results

3.1 Introduction

3.1.2 The foundry watching brief was carried out between 23rd April and 30th May 2007. Initially the results will be discussed as the three separate blocks mentioned in the methodology (*Section 2*). These results will then be brought together in *Section 4* and discussed with reference to the known site history as laid out in *Section 1.3*.

3.2 Areas A and A1

3.2.1 The observation and recording associated with the floor slab lifting and foundation removal was conducted from the 23rd April through to the 19th May 2007, and covered the whole of the iron foundry site from Cornmill Crossing in the south-east to the SITA building in the north-west (Area A). The recording of the machine reduced part of Area A took place on the 24th April (Area A1). In total, 33 contexts were recorded including the footprints of three separate buildings (Figs 2-6). Two of the buildings, 101 and 102, were also recorded as standing buildings before demolition (Greenlane Archaeology forthcoming a).

3.2.2 ***Building 101***: main walls ***419*** and ***422*** relate to the known footprint of the surviving foundry building before its demolition in April 2007; for wall ***420*** see Building 102 (*3.2.14*).

3.2.3 Wall ***419*** formed the south-west boundary of the foundry buildings along Cornmill Crossing, orientated north-west/south-east it measured 22.15m. The wall was 0.25 m wide and was constructed from reddish-orange unfrogged bricks marked 'WG' denoting their origin from the brickworks of William Gradwell in Barrow. These bricks were known to be in use in 1870-1871 as they were used during the first phase of the construction of the Cornmill site to the south-west (see Greenlane Archaeology forthcoming b).

3.2.4 Wall ***422*** was difficult to trace in places and appeared to run unbroken forming the south-east boundary of all the foundry buildings on Cornmill Crossing. In reality it comprised more than one wall; in relation to Building 101 its length was 9.15m, it was 0.37m wide, and was orientated south-west/north-east.

3.2.5 *Internal features*: within the footprint of Building 101 three further walls, two brick structures, and a deposit were recorded. Wall ***428*** just to the north-west has also been included here as it appears to be related.

3.2.6 Wall ***406*** was a short length of internal wall butted just south of the centre of the south-east wall, ***422***. Wall ***406*** shared the same orientation as the main walls ***419*** and ***420***, (north-west/south-east). It was 1.89m long, 0.40m wide, and was constructed from red unfrogged and unmarked bricks.

3.2.7 Wall ***405*** ran parallel to main wall ***420*** (north-west/south-east) and was 2.00m inside of it. This wall was 0.19m wide and a minimum of 2.16m long, although it did not appear to run the full length of the building.

3.2.8 Wall ***404*** ran down the centre of Building 101 and was evident for 4.02m. The exposed course consisted of a single row of headers and was 0.27m wide; again the bricks were unmarked and unfrogged and were reddish-orange. The bricks used in this construction were 0.23m x 0.11m x 0.08m and were bonded with a brownish mid-grey mortar containing dark-grey and white inclusions This wall did appear to

neatly divide the building and its course followed the boundary between deposits ***401*** and ***429***.

3.2.9 The square brick structure ***403*** was located in the centre of the projected line of wall ***404*** just to the north-west of the centre of Building 101 and its sides ran parallel with all the buildings walls. The structure had an internal measurement of 1.05m and an external measurement of 1.55m, the brickwork being 0.25m wide. The bricks used were a pinkish pale-mid orange and measured 0.23m x 0.11m x 0.08m, they were unfrogged, and bonded by a brownish mid-grey mortar with dark grey and white inclusions.

3.2.10 Brick surface ***402*** had one edge (south-west) that respected the orientation of this building (north-west-south-east); all the other sides were truncated so its original extent is unknown. It had a ragged sub-square shape, the bricks were orangey-red, unfrogged, and measured 0.225m x 0.08m x 0.06m.

3.2.11 Wall ***428*** was located at the north-west end of Building 101; it ran for at least 0.93m south-east/north-west before turning a right angle and running to the south-west for at least 3.30m. The remains were destroyed before any further recording could be completed.

3.2.12 Deposit ***429*** was confined to the south-west half of Building 101, between the outer wall ***419*** and the internal wall ***404***, covering approximately 80 square metres. It consisted of a thin layer of greyish mid-brown silty-sand with frequent pieces of brick rubble and crushed mortar which sat on top of the natural orange clay.

3.2.13 Deposit ***401*** was a very distinctive dark grey layer that was sampled (01) and consisted of a fine black silt containing very fine iron filings. This deposit covered the 80 square metres that formed the north-east half of Building 101, being contained by walls ***404***, ***420***, and ***428***.

3.2.14 ***Building 102***: main walls ***420***, ***421***, ***422***, and ***430*** relate to the known footprint of the surviving foundry building that was recently demolished (Greenlane Archaeology forthcoming a).

3.2.15 Wall ***420*** formed the south-west extent of Building 102, as well as the north-east extent of Building 101. Orientated north-west/south-east it was evident for 17.75m, was 0.40m wide, and constructed from reddish-orange unmarked and unfrogged bricks.

3.2.16 Wall ***421*** formed the north-east extent of Building 102; orientated north-west/south-east it measured 19.60m and was 0.40m wide. This length of wall ***421*** reflects the full length of Building 102 from walls ***422*** and ***430***; it was constructed from reddish-orange unmarked and unfrogged bricks.

3.2.17 Wall ***430*** was orientated north-east-south-west, was evident for 5.10m and was 0.20m wide and appeared to be a return of wall ***421***, forming the north-west end of Building 102.

3.2.18 Wall ***422***, as mentioned in *3.2.2*, was more than one wall, its length in relation to Building 102 was 12m and this is the full width of the building. Its orientation was north-east/south-west and it was 0.37m wide.

3.2.19 *Internal features*: within the footprint of Building 102 seven contexts were recorded: one internal wall, one brick structure, one negative cut feature with associated fill, one sampled deposit/layer, one concrete block with iron fittings, and a sandstone block with an iron fitting.

3.2.20 Wall ***424*** was parallel with the main north-east wall of the building (***421***), being 2.60m to the south-west. The wall was 18.70m long and 0.20m wide and appeared to run the full length of the building although its course was lost 0.90m from wall ***430*** to the north-west.

3.2.21 Brick structure ***423*** was an L-shaped wall that was at least 1.30m south-west/north-east before turning a right angle and running north-west for at least 0.60m. The structure comprised stretcher laid bricks hence its width of 0.13m; reddish-orange unfrogged bricks were used. The orientation of the brickwork respects that of Building 102's walls.

3.2.22 Cut ***408*** appeared to have two roughly parallel edges that were 0.75m apart; again these respected the general orientation of the building whose floor they were beneath (102). The feature was located in the narrow strip between walls ***424*** and ***421*** (see Plate 12). The north-west edge was very clear and crisp running for at least 1.20m south-west/north-east before turning a right angle to the north-west for 1.00m then returning to the north-east for a further 0.80m minimum. The south-east edge ran south-west/north-east for approximately 1.70m before turning sharply to the north-west for a further 0.80m. As there was no time to excavate this feature the nature of its edges and its depth remain unknown. The fill was a loose dark-grey sandy-silt ***407*** which was very distinctive against the yellow natural clay into which the feature was cut. The fill was sampled (sample 02) and comprised a gritty ash with pieces of clinker in a thin dark grey silt.

3.2.23 Deposit ***410*** was an amorphous spread covering approximately three square metres centred on sample 03 (Fig 5). The deposit consisted of metal waste, largely iron spirals that appear to represent waste from drilling, and smaller brass fragments. The brass pieces were generally about 10mm lengths of cut sheet that were 1mm thick or less and were generally slightly rolled over on themselves, almost tubular.

3.2.24 Concrete block ***409*** was rectangular, measuring a minimum of 1.10m south-west/north-east and 1.00m south-east/north-west; its orientation also respected the main walls of the building. The block contained grooves housing iron loops. Located at the north-west end of the block was an attached iron plate.

3.2.25 Sandstone block ***427*** was located mid-way along the south-west wall of Building 102 and shared the same orientation. The block measured 0.80m x 1.60m although the north-west end was machined away. The sandstone held an iron fitting near its eastern corner.

3.2.26 ***Building 103***: this building comprised two walls of different appearance that were in the rough location of a known building (see Figs 3 and 4).

3.2.27 Wall ***425*** appeared to butt the north-east wall of Building 102 (***421***), running perpendicular to this wall for 3.00m in a north-east direction before turning a right angle and continuing south-east for 0.90m where it stopped or was truncated. The wall was 0.30m thick and constructed from reddish-orange unfrogged bricks. This wall would give a width of 3.00m for Building 103.

3.2.28 Wall ***426*** comprised two sections that appeared to be separated by a doorway/entrance; the angles and orientations of this brickwork respected those of all the buildings so far described. The longest length of this wall was at least 3.40m (north-west/south-east) at which point it turned a right angle and continued south-west for 0.20m before the entrance was reached. The entrance was 1.10m across at which point the wall continued south-west for 0.70m then turned back to the north-

west for 0.90m; both north-west extents for this wall result in truncations. The wall was narrower than ***425*** being 0.20m thick.

3.2.29 ***Additional features in Area A1***: wall ***431*** continued north-west along the line of wall ***421***, its starting point being wall ***430***; this wall was recorded for 3.80m and was 0.40m wide.

3.2.30 Cut ***413*** was located approximately 2.00m to the north of Building 103 and was rectilinear. Only the western edge was evident, cut into an area of natural beach sand containing cockles (***411***). Once again this feature seemed to respect the same alignments found in all the walls and buildings in Area A. The cut measured 1.30m south-east to north-west before turning a right angle and continuing north-east for1.00m; it then continued north-east for a further 1.00m before curving to the north where it was truncated away. There was no time to excavate this feature but the fill associated was recorded. Fill ***412*** was a pale-mid pinkish-brown loose silty-sand, containing occasional sub-rounded gravels, blast furnace slag pieces and fragments of possible crucible (see *Appendix 3*). The fill was a minimum of 0.10m thick, 2.00m south-west/north-east and 3.00m north-west/south-east, being truncated to the north-east and south-east.

3.2.31 Deposit ***418*** was a roughly circular patch of sandy silt rich in iron oxide concretions. The diameter of the patch was approximately 2.00m across; no discernable cut was noted.

3.2.32 ***Features in Area A, outside Area A1***: stanchion/foundation ***442*** was located in the northern part of the foundry site (Fig 3) and was apparently unrelated to any of the modern/recent buildings on the site. This concrete structure was orientated north-west/south-east and was 5m x 2.5m and at least 3m deep. The structure appeared to surround a narrow brick-lined shaft that housed what appeared to be a stopcock or water supply point; this was sealed by two adjoining heavy triangular iron covers that formed a square shape that was seated snugly into the top of the shaft.

3.2.33 Wall ***443***: this was planned/located as it was being removed by a toothed bucket and photographs were taken; as such there is little definitive that can be said about it. It was orientated north-east/south-west (Fig 3), its length was a minimum of 5m (though apparently truncated at either end) and it was between 0.40m and 0.60m wide. The bricks used were reddish-orange and the mortar was hard and bluish pale-grey with white and grey flecks.

3.2.34 ***Group 1*** (Fig 2): this group consisted of four pieces. 'Base plate' ***414*** (see Plate 11) was made of cast iron that was 0.08m thick, 3.80m long, and 1.40m wide. On one side (upper side?) it had two parallel flanges 0.06m from each edge of the plate; these were elliptical and in profile rose 0.25m. The main body of the plate had eight holes through which iron ties or rods were housed; the largest hole was 0.055m in diameter. The underside of ***414*** appeared to be supported on bricks at either end, and one course of bricks was still attached to the metalwork. The central area of the underside was clean metal and apparently unsupported.

3.2.35 Brickwork ***416*** was a sub-square block measuring 1.50m x 1.20m x 1.00m thick; this came out of the ground from the same area as ***414*** and may well have been originally attached to the underside. The bricks were reddish-orange, unmarked and unfrogged, and measured typically 0.23m x 0.11m x 0.08m. Similar bricks were attached to the underside of ***414*** and they both had the same pale bluish-grey mortar with white and dark-grey flecks.

3.2.36 'Block' ***415*** (see Plate 13) appeared to be a large lump of cast iron slag that measured 1.50m x 1.10m x 0.50m thick. It appeared the iron had not all been molten, since under the surface (where broken) spirals of drilled metal waste could be identified. Two parallel linear indentations were also observed where the metal was molten and smooth, and there was an area where four wooden boards were pushed into the metal.

3.2.37 Piston ***417*** was constructed from steel and appeared quite modern. The main body of the piston was 2.10m in length and the projecting element was 1.00m in length. When first observed it was upright in the ground and extended. It is not thought that this piston is related to the other three objects in this group but was located in the same area.

3.2.38 ***Group 2***: this group comprised five crude blocks of cast iron slag. They were of various shapes and sizes and none had any attachments. This group appeared to have been buried deliberately.

3.2.39 ***Group 3***: this group comprised a variety of ironwork that probably related to the structure and function of the foundry. Included were four beams that were 3.60m in length, 0.22m wide, and 0.07m thick. Each beam had a central supporting 'spine' on one side that was elliptical in profile and a maximum of 0.13m deep. At either end of the beam was a single hole whose diameter was 0.55m and housed tie rods. In the centre of the ends of the beams were U-shaped recesses 0.10m in length. Two cast iron plates were also recovered (see Plate 14), the first of which was 0.70m square and 0.06m thick. A semi-circular loop projected from the centre of each side of the plate creating holes for tie rods that were 0.40m thick. The second plate was 0.72m x 0.68m and 0.04m thick. In the centre of this plate a flat-topped cylindrical projection rose 0.11m. Four cast iron T-shaped beams were also recorded, being 0.18m across the top of the 'T' and 0.30m downwards. These beams were all less than 2.00m in length although they may have been broken. The last noteworthy find from this cache of ironwork was an open ended box section tube that was 2.10m in length (see Plates 15 and 16). This piece tapered down from 1.10m wide and 0.70m high at one end to 0.85m wide and 0.50m high at the other. The thickness of the iron increased from 0.10m at the wider end to 0.15m at the narrower end. At the narrow end face one iron loop was located which presumably allowed the piece to be moved by a hook or a bar; it is not known if a similar hook existed on the other side of the aperture. Above the loop a broken fitting was apparent that remained as a circular scar. On the sides of the piece at the narrower end were two wedges; curving back from the face of that end they formed quarter circle profiles with flat ends and again looked as if they may have been for lifting or supporting the piece. Four rods were located on one of the wide sides, two towards one end and two towards the other; these were approximately 1.00m in length.

3.3 Test pits

3.3.1 The test pits (TP) were excavated on three separate days. TP12-25 were done on 30th April, pits 2-5 on 21st May, and pits 7-10 on 23rd May. Due to a lack of communication TP26 and 11 were not observed. Pits 1 and 6 were unnecessary due to the ground reduction shown as Area B (see 3.4.2). Seven of the 22 test pits contained walls/foundations: TP2-5, 7-8, and 15. The features revealed in TP7 and 15 are thought to relate to the iron foundry buildings, and the other five pits contain structures that are thought to relate to the gasworks. They are described below in the order in which they were excavated.

3.3.2 ***TP14***: this revealed a 0.40m thick layer of disturbed dark-grey silty ash/clinker containing occasional bricks and brick pieces. Below this layer orangey mid-brown clay was observed to a depth of 1.50m.

3.3.3 ***TP18***: a 0.60m thick layer of brown silty overburden containing occasional-moderate quantities of brick pieces overlay the sterile clay natural. The depth of the completed test pit was 1.40m.

3.3.4 ***TP22***: a 0.50m thick layer of mid greyish-brown overburden overlay sterile but possibly reworked/re-deposited orangey mid-brown clay natural. The depth of the test pit when completed was 1.50m. The overburden contained moderate quantities of bricks and brick fragments and occasional lenses of ashy and gravely clinker.

3.3.5 ***TP13***: a 0.70m thick layer of dark brownish-grey silty gravels containing moderate brick and slate fragments overlay the yellowish-orange clay natural. Once again the clay looked to be reworked or disturbed. The total depth of the pit when fully excavated was 1.50m.

3.3.6 ***TP17***: a 0.50m thick layer of disturbed brownish mid-grey silty gravels containing occasional brick pieces overlay the yellowish-orange natural clay. The test pit was excavated to a depth of 1.50m.

3.3.7 ***TP21***: a 0.20m thick layer of slightly silty brownish-yellow sand overlay the orange clay natural. The test pit was excavated to a depth of 1.50m.

3.3.8 ***TP25***: a sandy disturbed/re-deposited layer of natural containing occasional ash and clinker deposits was encountered to a depth of 0.60m. The orange clay natural was present below and excavated for a further 0.60m.

3.3.9 ***TP24***: this test pit revealed a layer of reworked/disturbed deposits on top of clay natural. The deposits were 0.50m-0.70m thick and contained lenses of dark-grey ash, bricks, and mid-brown sandy and gravely silts. The test pit was 1.20m deep.

3.3.10 ***TP23***: excavated to a depth of 1.40m, this pit contained an upper layer of re-deposited/disturbed natural clays. The upper layer was 0.40m thick and contained occasional brick pieces and grey silt lenses. Undisturbed orange clay natural was present below this.

3.3.11 ***TP19***: this test pit revealed a 0.50m thick layer of greyish mid-brown silty-sand and gravels with occasional brick and concrete pieces; this layer was reworked/disturbed. Undisturbed yellow clay natural was excavated for a further 1.00m below this.

3.3.12 ***TP15***: this pit contained a 0.20m thick layer of gravels/crush which overlay a 0.50m thick layer of greyish dark-brown sandy silt heavily infused with coal ash and containing occasional brick pieces. Natural clay was excavated for a further 1.30m below these deposits. A wall foundation was revealed in the north-east section of this pit, entering from the north-west corner it continued for 2.00m to the south-east before appearing to return to the north-east. The brickwork extended at least 1.00m below the gravel layer; the bricks appeared to be unfrogged and unmarked.

3.3.13 ***TP16***: a 1.00m thick layer of brownish dark-grey sandy-silty gravels containing moderate brick and concrete pieces overlay the clay natural. These mixed deposits appear to have been dumped in a large truncation of the natural clay layer.

3.3.14 ***TP20***: a 0.80m thick layer of reworked deposits sat directly on top of the clay natural. The deposits contained coal tar and were a greyish mid-brown colour; no brick or concrete fragments were observed. The pit was 1.40m deep.

3.3.15 ***TP12***: this pit contained a 1.50m thick layer of greyish mid-brown silty-sand within which were lenses of coal ash and re-deposited natural clay. Undisturbed clay natural was present below 1.50m.

3.3.16 ***TP2***: this elongated test pit was orientated north-west/south-east and revealed a large section of wall (***441***; see Fig 7) orientated north-north-east/south-south-west that was 0.95m wide and at least 5.00m in length and at least 1.00m deep. The southern end of this wall was not found and while the northern end terminated in the trench it is not known if this was its original extent. The wall was constructed from reddish-orange unfrogged bricks that were typically 0.23m x 0.11m x 0.08m. The brickwork was buried by a 0.20m thick layer of dark silt contaminated with hydrocarbons; natural was reached at 1.65m.

3.3.17 ***TP5***: a thick deposit of dark brownish-grey silty gravel was encountered down to approximately 1.00m; it contained gravels, ash/clinker and some lenses of re-deposited natural. Natural clays were encountered at 1.00m and at this level three large gas pipes were located running north-west/south-east-perpendicular to the trench orientation. In the south-west section of the trench a large brick structure was observed (***440***, see 3.4.13); it was at least 2.50m deep and wide and was mixture of rough brickwork and areas of broken bricks and sandstone bonded in a hard, pale bluish-grey mortar with white and black flecks. The bricks used were reddish-orange unfrogged and typically 0.23m x 0.11m x 0.08m.

3.3.18 ***TP4***: this pit/trench was approximately 4m x 1.80m and orientated north-west/south-east. The north-east section of the pit contained a layer of overburden/crush approximately 0.20m thick, beneath which there was a layer of loose demolition rubble that comprised frequent bricks and brick fragments in a greyish mid-brown sandy silt. The extent of the demolition rubble was from the midpoint of the section to the north-west end and it was approximately 0.50m thick. Underlying this demolition rubble was a wall face or part of a wall face that extended 1m from the midpoint of the section to the north-west; the wall was approximately 1m deep and made from reddish-orange bricks laid as stretchers. It was not evident if the wall was truncated at either end. Immediately to the south-west of the wall and under the crush two sandstone blocks formed a column that was 0.30m wide and 0.50m deep; this effectively sealed the demolition rubble that overlay the wall. More demolition rubble lay to the south-west of the sandstone, under which lay a concrete slab (***438***; see 3.4.11) at the same height as the wall top. Beneath the concrete slab, which continued to the south-west end of the section, was a loose mid-brown silty deposit. The south-east section also revealed the concrete slab under which a truncated wall was visible on the north-east side of the section. The wall seemed to run north-west/south-east, was a minimum of 0.40m wide, and its base was not reached at 2.00m. The south-west section revealed another wall face that was parallel to the one in the opposing section. The wall was orientated north-west/south-east and was 2.50m long, and located towards the north-west of the section. At both ends of the wall truncated returns were visible heading north-east; these were presumably lost while the pit was being excavated. Natural clay was visible beneath the wall at 1.90m. To the south-east of this wall a void seemed to exist that had been filled with loose bricks in a thin greyish dark-brown sandy silt matrix.

3.3.19 ***TP3***: approximately 4.00m x 1.60m in size, this test pit was orientated north-west/south-east, and was only excavated to depth of 1m before being backfilled due to its pollution levels. A wall face was noted in the north-east section that ran the full length of the test pit and was orientated north-west/south-east.

3.3.20 ***TP10***: this pit was 4m x 1.80m and orientated north-east/south-west. A layer of gravel 0.40m thick overlay clean natural clay, and the pit was excavated to a depth of 1.80m. The gravel was a bedding layer for the tarmac that was removed days earlier.

3.3.21 ***TP9***: this revealed the same configuration of deposits as TP10 and was excavated to a depth of 1.50m.

3.3.22 ***TP8***: this large pit measured approximately 6.50m x 3.50m and was excavated to a depth of 1.50m. The pit was not intended to be so large but the machine bucket caught a large concrete foundation which was immediately ripped from the ground. This concrete filled the southern half of the pit, it was sub-square, and didn't appear to have any regular edges. It was approximately 3m x 3m and 0.60m thick and comprised brick pieces in a pale-grey mortar. The northern half of the pit revealed a mixture of brick rubble, ash, and re-deposited natural extending down 1.10m until clean natural clay was encountered.

3.3.23 ***TP7-north-west section***: this pit was approximately 3m x 2m and orientated north-east/south-west and contained a brick built flue and three further brick walls/structures. The flue crossed perpendicularly across the south-west end of the trench, and its orientation was north-west/south-east. The height of the flue was not ascertained due to the quantity of brick rubble in the base of the trench. Its internal width was 1.00m and its external width 1.50m, and it had the appearance of an upside down 'U' shape. The flue body was constructed from yellow firebricks, a typical brick being slightly wedge shaped in section and measuring 0.23m x 0.11m x 0.05m-0.065m. One brick retrieved from the flue body was marked 'Gibbons. 6 Stourbridge' as well as a crossed triangle/six-pointed star design with a 'G' in the centre. The flue body was constructed from a double skin of the wedge shaped bricks laid in a stretcher bond, making it 0.25m thick. The north-west section of the pit had a square shaped brick facing/collar surrounding the flue body. The 'collar' was 0.50m higher than the flue body and 0.10m wider on the north-east side; to the south-west its extent was unclear. This structure was also constructed from yellow firebricks. Adjacent to the flue on its north-east side was a 0.70m wide column of clay which appeared natural but may well have been introduced as packing to support the structure. The clay was noticeably fire-reddened close to the flue bricks and was at least 1.50m in height. The top of the flue 'collar' and the clay were at the same level and were buried under a 0.50m layer of ashy gravely silt. To the north-east of the clay was a truncated wall which was 0.40m wide and at least 1.00m deep. As with the flue the wall was orientated north-west/south-east. The wall would appear to correspond with one in the north-east section of the pit that was running north-east/south-west and was constructed from the same brick and mortar types. It would seem that originally these two walls were one that turned a right angle in the north corner of this pit and formed the south-east corner of a separate structure/building. A distinctive and homogenous reddish dark-brown ashy silt at least 1m thick was found between these two wall stubs. The bricks used to construct this wall were a pale reddish-orange and the mortar was a pale grey colour with dark grey and was very hard.

3.2.24 ***TP7-south-east section***: the flue structure was present in the south-west corner of this section (see Plate 17). It lacked the surrounding 'collar' that was present in the opposing section but it did have a wall/structure butting against either side of it. Again, only the upper half of the aperture was visible due to brick rubble in the pit base. To the south-west six courses of fire-reddened yellow brick were visible, rising from the brick rubble to near the top of the flue body. The upper, lower, and

south-west extents of this north-east/south-west wall remain unknown, the observed area being approximately 0.50m high by 0.30m wide. The brickwork comprised alternating courses of headers and stretchers, and cut brick pieces were used to ensure it butted tightly against the flue body. To the north-east a section of north-east/south-west wall was evident running towards the flue body. It comprised yellow firebricks that were not particularly reddened and were laid in an English garden wall bond. It was not clear if these ran flush up to the flue as they were directly behind a heavily truncated red brick wall on the same orientation, which was 0.25m wide. Small wedges of yellow brick were observed against the flue body on this side and it seems likely that the yellow and red brick walls were part of the same structure and that it was joined to the flue body. The walls rose well beyond the top of the flue but were heavily truncated; their progress to the south-west beyond and above the flue remains unknown.

3.4 Areas B and C

3.4.1 ***Introduction:*** the removal of the contaminated ground in Areas B and C was observed from 25th May to 30th May. The structures recorded in these two areas relate to the former gasworks and not the iron foundry; it was originally thought that they were to the south-east of the gasworks site.

3.4.2 ***Area B***: a large basement room was revealed (see Fig 5) that was orientated north-east/south-west. The full 11.00m width of the room was revealed (north-west/south-east) and 12.00m of its length (north-east/south-west). Red brick walls were revealed on the north-west and south-east sides of the room, both of these were truncated down to less than 0.50m in height and their widths remain unknown. Along both sides of the room there was a shallow red brick-lined channel 0.20m deep and 2.30m wide that ran the full 12m of the room that was excavated. The channel along the north-west wall was subsequently pitted and revealed the brick lining to be one brick thick, beneath which was a 0.30m thick concrete slab which incorporated red brick pieces and sat on top of the natural clay.

3.4.3 A round-arched flue ran down the centre of the room for at least 10m from the south-east to the north-west where its progress was lost; in places it only survived as a scar in the underlying brickwork (Plate 18). The 2.00m long section of flue that was left standing in the centre of the room was 1.50m wide, 0.80m in height and constructed from a single course of edge set culvert bricks. These were firebricks, yellow in colour, and measured 0.235m x 0.11m x 0.056-0.073m. The section of flue that remained in the south-west section was two courses thick and had a slightly different shape being 1.50m wide and 0.50m in height. This section of flue had a brick structure built against its north-west side which consisted of a single brick width (0.11m) wall stub that projected 0.30m to the north-west where it had a vertical edge. This structure presumably acted as a support to protect the arch from collapsing outwards; it was at least 0.40m high. It is not known if a similar support existed on the south-east side of the flue.

3.4.4 A central supporting column of yellow firebricks ran down the centre of the flue; the bricks were laid one brick wide as stretchers. One of the bricks retrieved from this central column was marked ‘B GIBBONS JUNL / 6 LIMITED T / STOURBRIDGE’; it measured 0.23m x 0.11m x 0.07m. Between the flue and the channel on the south-east side of the building was a flat area of yellow firebricks that measured 2.50m in width by the 12m that were excavated. A similar area was evident on the north-west side of the flue which was 2.40m wide and contained three shallow channels running perpendicularly across it (north-west/south-east). The

channels were irregularly spaced, between 1.30m and 2.10m wide and between 0.05m and 0.010m deep. The channels possibly represent spaces between platforms that may have been bases for machinery as the brickwork was marginally thicker in these areas and quite heavily fire reddened.

3.4.5 ***Area C***: in total, 10 contexts were recorded in this area, including a floor slab, a concrete pile, and eight walls (Fig 6). It is thought that these contexts represent the remains of two separate buildings.

3.4.5 Wall ***432***: this U-shaped wall ran approximately 4m south-east/north-west, and turned north-east for 2m before returning 4m to the south-east again. The wall extended approximately 2m below ground, was constructed from reddish-orange bricks set in an English garden wall bond, and was 0.25m wide. The upper two courses on its north-east arm overhung by 0.10m to the south-west. The structure appeared to have a brick base but no wall on the south-east side. The structure appeared to form a tank, the fill of which was dark-grey and may have incorporated hydrocarbons (Plate 20).

3.4.6 Wall ***433***: butting the north-west corner of wall ***432*** this wall ran for 2m to the north-east before turning south-east for 3.60m. The wall was constructed in the same way as ***432*** and appeared to be another tank. The only difference was the addition of an enclosing wall on the south-east side (***434***) and the apparent lack of a base. The fill of this feature contained a mixture of dark grey silt polluted with hydrocarbons and re-deposited natural clays suggesting the original contents of the structure have been removed before it has been deliberately backfilled.

3.4.7 Wall ***434***: this wall was butted onto the south-east corner of ***432*** and ran south-west/north-east enclosing the possible tank structure formed by wall ***433***. The wall continued at least two meters beyond ***433*** possibly enclosing another tank. In total the wall was a minimum of 4m long, it was 0.25m wide and constructed from reddish-orange bricks in an English garden wall bond.

3.4.8 Wall ***435***: this wall was orientated north-west/south-east and was a minimum of 12m in length, neither end being located. The central part of this wall was truncated by the cut for a pipe trench that housed a ceramic pipe within a box shaped-structure made of concrete blocks. The wall was 0.40m–0.50m wide constructed from red brick and a pale bluish-grey mortar that contained white and grey flecks. The wall was close to and roughly parallel with wall ***437***.

3.4.9 Wall ***436***: this wall was orientated north-east/south-west, was 0.30m-0.40m wide, and a minimum of 2m long. It ran perpendicular to walls ***435*** and ***437*** and had the same alignment as the north-west ends of possible tanks ***432*** and ***433***.

3.4.10 Wall ***437***: was evident for approximately 10m and orientated north-west/south-east. As with wall ***435*** the central section of the wall was truncated by a modern pipe trench. The wall was substantial, 0.40m wide, and it marked the south-west end of the concrete floor slab ***438***. The south-east end of this wall had undoubtedly been truncated by the construction of the SITA building, whose north-west wall was located here until May 2007.

3.4.11 Floor slab ***438***: this slab was 13.60m in length (north-east/south-west), a minimum of 10.50m wide (north-west/south-east), and 0.15m thick (see Plate 19). The slab was constructed from mortar of a bluish pale-grey colour that incorporated pieces of red brick and was very similar to the concrete beneath the brick lining in the basement of Area B (see *3.4.2*). It seems likely that the full north-east/south-west length of the building was revealed, represented by wall ***439*** and ***437***. The south-east

side had been truncated by the construction of the SITA building and the eastern corner was also truncated; it was unclear if the north-west side had been truncated. The surface of the floor slab was covered in places by a viscous oily pitch or coal tar which led the machine driver to suggest it represented the base of a tank.

3.4.12 Wall ***439***: this wall was orientated north-west/south-east and was a minimum of 5m long. It formed the north-east end of room/Building 105 demarked by concrete slab ***438***; neither end of this wall was located. This wall was also adjacent to pile ***440*** which was to the north-east.

3.4.13 Feature ***440***: this pile or foundation was rectangular in shape and orientated north-west/south-east. It was at least 2.50m deep, its length was a minimum of 4m and its width (north-east/south-west) was 3.80m. The south-west extent of this feature remains unknown. In part it was brick built, while parts of it were made from concrete comprising bluish pale-grey mortar and red brick pieces.

4. Discussion

4.1 Introduction

4.1.1 The watching brief has revealed evidence of the gasworks and iron foundry buildings. As the two main industries were separated spatially they will be discussed individually with reference to their known histories. The location of the results of the watching brief in relation to features recorded on maps of the site is shown in Fig 7.

4.2 Iron foundry

4.2.1 The iron foundry became operational in the early 1860s, and the first Ordnance Survey map to depict it is the 1:2500 plan of 1873. The main change in the site layout occurs between the 1891 and 1913 Ordnance Survey maps and presumably relates to the destruction caused by a fire in 1906 (Phase 2). Documentary sources do give some insight into the types of processes that were occurring at the foundry and where possible these have been discussed in relation to the archaeology.

4.2.2 ***Phase 1***: the majority of the contexts discovered appear to relate to the original construction of the foundry (Phase 1) which includes buildings 101, 102, and 103 and incorporates the results from test pits 7 and 15.

4.2.3 *Building 101*: wall ***428*** to the north of Building 101 may well represent the outer wall of the outbuildings shown on the Ordnance Survey maps from 1873 through to 1938. Walls ***404***, ***405***, and ***406*** are internal walls within Building 101; these walls were not present prior to the buildings' demolition and are presumed to be early or original as they have subsequently been buried under a concrete floor slab. The brick surface ***402*** would also appear to have been part of an original brick floor. At some time prior to the concrete floor slab layers ***401*** and ***429*** have accumulated or been introduced to level the ground. The fact that these deposits are so different and so neatly divided suggests that they are contemporary with internal wall ***404*** which illustrates the likelihood of two different rooms within Building 101. Deposit ***401*** was a dark-grey silt, rich in iron filings and appears to be the direct product of iron and brass working. Deposit ***429*** had the appearance of a shallow demolition or construction deposit; this is confusing as there is no evidence for an earlier floor or any metal working. Brick feature ***402*** had the appearance of a drain and may well have served that purpose for both the two halves of Building 101.

4.2.3 *Building 102*: strictly speaking this building is marginally older than Building 101, whose walls butt this construction, but they appear together on the earliest maps of the site. All features within this building are considered to be from or around the construction phase with the exception of wall ***424***. Sandstone block ***427*** is built into the south-west wall of this building and would appear to be an original feature that had an iron fitting. Concrete block ***409*** was similar and was close to the north-east wall; this had four points of attachment and was presumably the base for some of the original metal working equipment. Wall ***423*** is hard to date but given its alignment and depth it seems likely to be an early or original feature of Building 102. Layer ***410*** was sampled and found to comprise of iron drilling waste and small clippings of sheet brass; this is possibly *in situ* metal working waste. Perhaps deposit ***401*** in the building next door represents the finer finishing work on the same products. Cut ***408*** remains a mystery without proper excavation; the fact that it respects the orientation of the building and contains ashy deposits suggests that it

may be related to the foundry. Deposit ***418*** contained iron oxides but no dating evidence was recovered. Context ***411*** represents the natural or re-deposited sand truncated by cut ***413.*** It contained cockle shells but also post-medieval pottery (*Appendix 3*). Without excavation and the stripping of a larger area it is impossible to say if this sand is natural or deposited to make up the ground level. Fill ***412*** contained several finds related to industrial processes (*Appendix 3*). The inclusions of possible crucible fragments and slag would suggest the feature is related to the foundry and pre-1913 when this area was covered over. Similarly deposit ***418*** looks like a dump of waste material from the foundry in an area that would have originally been a yard. The cut for deposit ***412*** appears to truncate the natural sand and presumably relates to a feature that was dug when this was a yard area i.e. before 1913.

4.2.4 *Building 103*: this consists of walls ***425*** and ***426*** and again is shown on the first maps of the site. These two walls look rather different but both fit within the footprint of a small building that was located in this area from at least 1873 to sometime between 1891 and 1913 when a larger building was constructed against the north-east side of Building 102.

4.2.5 *Features outside of machine reduced area*: wall ***443*** was very substantial and would appear to represent the south-east wall of the most northerly foundry building. This building is part of the original construction of the foundry.

4.2.6 *TP7*: this test pit revealed a flue that is located right next to the mapped position of the iron foundry chimney (see Fig 7) which was shown on all maps of the site. Whilst this flue may have been rebuilt there is nothing to suggest that it is not original. The direction of the flue was north-west/south-east and as the north-west extent was not reached it seems possible that the chimney was being shared by the gasworks and the foundry, especially as a similar flue was found in the basement of the building in Area B.

4.2.7 *TP15*: a wall foundation was revealed in the north-east section of this pit. Entering from the north-west corner it continued for 2.00m to the south-east before appearing to return to the north-east. The location of this wall would appear to relate it to the first phase of construction at the foundry, making it one of the central cluster of buildings shown on the 19th century maps, possibly the only one of these buildings that appears to survive through to the 1913 Ordnance Survey map.

4.2.8 ***Phase 2***: this phase relates to the period of re-building of the central area of the foundry after the fire in 1906. Maps referred to in this phasing are the Ordnance Survey 1891 and 1913.

4.2.9 Wall ***431*** in Area A1 (Fig 4) first appears on the Ordnance Survey map of 1913 at which time the central block of original foundry buildings has been replaced, with the new unit extending south-east to Cornmill Crossing. The wall butts the north corner of the original Building 102 and continues to the north-west.

4.2.10 *Group 1*: this collection of finds included a large cast iron 'baseplate', one of the brick foundations that may have supported it, a large lump of cast iron slag and a piston which will be dealt with in Phase 3. The location of these pieces is probably just outside of any of the original buildings on the 1873 map but is within a building on the 1891 map. This building was replaced by a much larger building by 1913 after the fire destroyed this part of the foundry so it seems likely that these pieces were buried after the fire destroyed the building in which they were housed. This would date the origin of these pieces to between 1873 and 1913. It is, however, also possible that they were buried after the newer building was demolished in 1938/9.

4.2.11 *Group 2*: the fact that these irregular lumps of cast iron appear to have been buried beneath one of the original buildings on the foundry site that was destroyed by a fire would also suggest that they date from Phase 2. When these pieces were excavated a noticeable cut was evident into a dark ashy layer. Since the fire in 1906 this area of the site was never actually built on again so it is also possible that these pieces were buried there at a later date.

4.2.12 ***Phase 3***: this phase is characterised by demolition and references the 1938 Ordnance Survey map, which was surveyed in 1931-2, and an aerial photograph from 1939 (after Thompson 2005, ref AFR6237; Plate 10). It may also relate to possible bomb damage received during World War II.

4.2.13 *Group 3*: many of the pieces in this group seem to be structural (see 3.2.38) and the result of demolition, however their location under the most northerly of the foundry buildings suggests that they were not buried until after 1932 when the building is still shown as standing. The building is not standing on an aerial photograph from 1939 (see Plate 10) and it seems that at this time a phase of demolition took place at which time these pieces of iron were buried.

4.2.14 ***Phase 4***: this phase incorporates the piston recovered from the same area as the group 1 buried objects. The piston was under the floor slab below one of the post 1913 foundry buildings. The building it was found beneath was most recently used as a bus depot and it is assumed that its function was related to that, perhaps as part of a pneumatic ramp.

4.2.15 Wall ***424*** (Fig 4) also dates from the period when the foundry buildings were being re-used. Wall ***424*** relates to a concrete plinth running just inside the wall of Building 102, added when this building was recently being used as a garage (see Greenlane Archaeology forthcoming a).

4.2.16 ***Undated***: the concrete stanchion found in the north of the foundry site appears to bear no correlation to any buildings past or present despite being one of the easiest features to accurately locate on the site plans. Its function, other than being a highly fortified stop cock, remains a mystery.

4.3 The Gasworks

4.3.1 Areas B and C as well as test pits 2-5 and 8 all contained foundations of former gasworks buildings. Two main buildings were identified, 104 and 105 (see Figs 3 and 7) as well as a section of brick-built flue and possible remnants of the smallest original gasholder. The two buildings recorded also reflect the two phases of building in this area: its original construction in the 1860s and work carried out sometime between 1873 and 1891. Written records concerning the gasworks are quite sparse, especially any information regarding the individual buildings and their function (see *1.3.9*) and add little to help interpret the archaeological remains discovered.

4.3.2 ***Phase 1***: the gasworks was built at roughly the same time as the foundry, in the early 1860s, and Phase 1 incorporates foundations that appear to relate to its original construction (see Figs 3 and 7). These include Areas B and C, test pits 2 and 8, and possibly walls ***432***, ***433***, and ***434***.

4.3.3 *Area B*: the large basement uncovered in this area correlates very well with the main building on the gasworks site (104) which may be part of the retort house. The floor of this large room was finished in fire resistant brick and contained a flue also made of firebricks. It appears that the full width of the basement area may have

been discovered but that the main side walls of this building have been lost and it is unclear what the flue is heading towards.

4.3.4 *Area C*: wall ***435*** would appear to be a very good fit with the north-east end of Building 104. It was a substantial wall and clearly parallel with wall ***437*** that would appear to form the south-west end of Building 105 (*see Phase 2, below*).

4.3.5 *TP2*: this test pit contained a substantial wall (***441***) whose orientation and location suggest that it is part of Building 104 and from Phase 1.

4.3.6 *TP8*: this substantial concrete foundation (see *3.2.22*) came from a highly disturbed area of the site. Strangely, no substantial buildings seem to have been located in this area; it appears to have been a covered area in 1913 and in 1931 two small buildings occupy the general area but the test pit seems to be located between them. It seems most likely that the concrete is a remnant of the gas holder that had been removed by 1891. It seems plausible that some of this may have remained behind if the area between the gasworks and foundry was not to be immediately developed.

4.3.7 Walls ***432***, ***433***, and ***434*** may fit into this phase. These structures appear to form tanks that are just to the north-east of the railway siding; this is still within the footprint of Building 105 on the 1873 Ordnance Survey map. Interestingly some outbuildings are shown in this general area on all the early Ordnance Survey maps so it is possible these were cellared and took or delivered coke or coal to the railway. Due to a lack of dating evidence, pollution in the trench, and the difficulties in accurately locating these features, it is very difficult to determine exactly where they fit into the development of the gasworks.

4.3.8 ***Phase 2***: between 1873 and 1891 a smaller gas holder was removed from Area C of the site and Building 105 expanded further north-eastward; the new space was further utilised by the addition of Building 104 to the north-east of 105.

4.3.9 *Area C*: wall ***435*** (*see Phase 1, above*) was clearly parallel with wall ***437*** that would appear to form the south-west end of Building 105.

4.3.10 Wall ***436*** is a good fit with the north-west edge of Building 105; very little of this wall was seen but its location may suggest that it would have formed the north-west edge of the concrete slab ***438***.

4.3.11 Floor slab ***438*** was an extremely good fit with the plan of Building 105 and the date of 1873-1891 for this element of the building seems almost certain. It is unfortunate that the more recent SITA building had truncated the entire south-east side of this slab and that the north-west side was just outside the limit of excavation.

4.3.12 Wall ***439*** would appear to form the north-east end of Building 105; it had a substantial nature and butted the concrete floor slab. It was also butted by pile ***440***.

4.3.13 Foundation ***440*** was 3.80m x 4.00m x 2.50m (minimum) thick; it would seem to correspond with the smaller building to the north-east of Building 105. The size of this foundation would suggest it is a base for something substantial such as a chimney. It is not evident from the Ordnance Survey maps that such a structure existed here and no photographs of this elevation can be found.

4.3.14 *TP3-5*: all these test pits bear out the results discovered when this area was eventually machine stripped. Test pit 5 contains the foundation block ***440***, test pit 4 appears to show the north-west edge of the floor slab ***438*** and possibly another external tank. The wall in test pit 3 does not seem to correlate with any found when the site was stripped and remains a mystery.

4.4 Conclusions

4.4.1 ***Gasworks***: documentary evidence concerning the structure and functions of the gasworks buildings in particular was sparse and added very little to the results of the fieldwork. Further research into the functions of gasworks buildings may help to interpret Building 104 but is beyond the remit of this project. The phasing of the gasworks site is reasonably secure and illustrates original construction in the 1860s followed by subsequent development between 1873 and 1891.

4.4.2 ***Hindpool Iron and brass foundry***: more detail was available concerning the structure and functioning of the iron foundry although it is quite difficult to interpret without a plan of the site naming the individual buildings. Given that the maps show the central part of the site was re-developed between 1891 and 1913 it is assumed that this was the area known to be destroyed by fire in 1906. Samples taken from buildings 101 and 102 would suggest that these were workshops and it is interesting that some brass was found in Building 102 as this seems to have been a relatively small part of the foundry's overall output. On top of this some interesting cast iron and slag pieces were discovered (see groups 1, 2 and 3). Four phases were represented by the archaeology; initial construction in the 1860s followed by rebuilding after fire damage in 1906, further demolition between 1931 and 1939, and re-use of the buildings in the later part of the 20th century.

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6. Illustrations

6.1 List of Figures

6.2 List of Plates

Appendix 1: Project Design

JUNCTION OF HINDPOOL ROAD AND CORNMILL CROSSING, BARROW-IN-FURNESS, CUMBRIA

Archaeological Watching Brief (Iron Foundry) Project Design

Client: Positive Location Properties Ltd

March 2007

Planning Application Ref. 6/05/1530

1. Introduction

1.1 Project Background

1.1.1 A planning application was submitted by Positive Location Properties Ltd (hereafter 'the client') for the construction of a warehouse, retail unit, car parking and landscaping on land at the junction of Hindpool Road and Cornmill Crossing, Barrow-in-Furness, Cumbria (Planning Application No. 6/05/1530; NGR SD 1955 6905). After a recommendation by Cumbria County Council Historic Environment Service (CCCHES), Barrow Borough Council placed a condition on the planning consent requiring a scheme of archaeological investigation to be undertaken. A brief for the investigation was produced by CCCHES, the first stage of which was to comprise a desk-based assessment, with the possibility of further work, particularly evaluation, being required following this. The desk-based assessment was carried out by Greenlane Archaeology (Greenlane Archaeology 2006), and it established that several industries were present on the site from the mid-19th century until the early 20th century, including a ship yard, steam corn mill, rope walk, gasworks and iron and brass foundry.

1.1.2 Following the desk-based assessment, a further programme of archaeological investigation and recording was recommended by CCCHES. This was to include examination of below-ground remains on the site and recording of standing buildings. The first phase of the examination of below-ground remains involved the monitoring of a series of trial pits excavated by Celtic Technologies. This watching brief was undertaken by Greenlane Archaeology during September 2006 (Greenlane Archaeology 2007a). Based on the results of the watching brief, CCCHES recommended the archaeological excavation of the corn mill, and a further archaeological watching brief on the below-ground remains of the iron foundry buildings.

1.1.3 The project design covers the watching brief to be carried out during ground works in the area of the iron foundry buildings, following the recording of the standing remains (Greenlane Archaeology forthcoming).

1.2 Greenlane Archaeology

1.2.1 Greenlane Archaeology is a private limited company based in Ulverston, Cumbria, and was established in 2005 (Company No. 05580819). Although a new company, its directors, Jo Dawson and Daniel Elsworth, have a combined total of over 14 years continuous professional experience working in commercial archaeology, principally in the north of England and Scotland. Greenlane Archaeology is committed to a high standard of work, and abides by the Institute of Field Archaeologists' (IFA) Code of Conduct. The watching brief will be carried out according to the Standards and Guidance of the Institute of Field Archaeologists (IFA 2001).

1.3 Project Staffing

1.3.1 The project will be managed by ***Jo Dawson (MA (Hons), AIFA)***. Since graduating from the University of Glasgow in 2000 with a joint honours degree in Archaeology and Mathematics, Jo has worked continuously in commercial archaeology. Her professional career started at Glasgow University Archaeological Research Division (GUARD), for whom she worked for six months, following which she worked for Headland Archaeology, in Edinburgh, for two years, and for Oxford Archaeology North, in Lancaster, for three years. During this time she has been involved in a range of different archaeological projects, and, over the past few years, has concentrated on desk-based assessments and environmental impact assessments, as well as finds reports. She has extensive experience of both planning and pre-planning projects, and has undertaken assessments of all sizes. She has managed several relevant recent projects, including all four previous phases of work at the Hindpool Road site.

1.3.2 The watching brief will be carried out by ***Daniel Elsworth (MA (Hons), AIFA)*** and ***Samuel Whitehead (BSc (Hons), MA)***. Daniel graduated from the University of Edinburgh in 1998 with an honours degree in Archaeology, and began working for the Lancaster University Archaeological Unit, which became Oxford Archaeology North (OA North) in 2001. Daniel ultimately became a project officer, and for over six and a half years worked on excavations and surveys, building investigations, desk-based assessments, and conservation and management plans. These have principally taken place in the North West, and Daniel has a particular interest in the archaeology of the area. Relevant recent projects include the previous watching brief and building recording at the Hindpool Road site. Sam graduated from the University of Liverpool in 1994 with an honours degree in Archaeology, and has more than seven years continuous professional experience in commercial archaeology, much of which was in a supervisory capacity. He has extensive experience of excavations, evaluations, and watching briefs, as well as report writing and illustration production.

1.3.3 All artefacts will be processed by Greenlane Archaeology, and it is envisaged that they will initially be assessed by Jo Dawson, who will fully assess any of post-medieval date. Finds of earlier date will be assessed by specialist sub-contractors as appropriate. CCCHES will be notified of any specialists who Greenlane Archaeology wishes to engage, before any specialist contracts are awarded, and the approval of CCCHES will be sought.

1.3.4 Environmental samples and faunal remains will be processed by Greenlane Archaeology. It is envisaged that charred plant remains will be assessed by Scott Timpany of Headland Archaeology Ltd, and faunal remains by Steve Rowland or Andy Bates, both at Oxford Archaeology North. CCCHES will be informed and their approval will be sought for these arrangements.

2. Objectives

2.1 Watching brief

2.1.1 To identify any surviving archaeological remains and to investigate and record any revealed archaeological remains or deposits.

2.2 Report

2.2.1 To produce a report detailing the results of the watching brief.

2.3 Archive

2.3.1 Produce a full archive of the results of the watching brief.

3. Methodology

3.1 Watching brief

3.1.1 The ground works in the area of the iron foundry buildings (Area 04 on Fig 11; Greenlane Archaeology 2006), including the removal of floors and foundations, are to be monitored, with one archaeologists on site and two when necessary (e.g. more than one machine to watch, dealing with large-scale or complex remains, surveying large areas).

3.1.2 The watching brief methodology will be as follows:

- The overburden will be removed by machine under supervision by staff from Greenlane Archaeology;
- All deposits of archaeological significance will be examined by hand if possible in a stratigraphic manner, using shovels, mattocks, or trowels as appropriate for the scale;
- The position of any features, such as ditches, pits, floors or walls, will be recorded and where necessary these will be investigated in order to establish their full extent, date, and relationship to any other features. If possible, negative features such as ditches or pits will be examined by sample excavation, typically half of a pit or similar feature and approximately 10% of a linear feature;
- All recording of features will include sketch plans and sections, and photographs in both 35mm black and white print and digital format. Where possible and practical, and where large areas of extant structure are revealed, additional recording will be carried out using a total station in order to give an accurate location. This can also be used on reflectorless mode, which will allow areas that are inaccessible due to health and safety concerns to be recorded;
- All deposits, drawings and photographs will be recorded on Greenlane Archaeology *pro forma* record sheets, as detailed in the company's excavation manual (Greenlane Archaeology 2007b);
- All finds will be recovered during the watching brief for further assessment as far as is practically and safely possible. Should significant amounts of finds be encountered an appropriate sampling strategy will be devised;

- All faunal remains will also be recovered by hand during the watching brief as far as is practically and safely possible, but where it is considered likely that there is potential for the bones of fish or small mammals to be present appropriate volumes of samples will be taken for sieving;
- Deposits that are considered likely to have preserved environmental remains will be sampled. Bulk samples of between 10 and 40 litres in volume, depending on the size and potential of the deposit, will be collected from stratified undisturbed deposits and will particularly target negative features (gullies, pits and ditches) and occupation deposits such as hearths and floors. An assessment of the environmental potential of the site will be undertaken through the examination of samples of suitable deposits by specialist sub-contractors (see *Section 1.3.4* above), who will examine the potential for further analysis. All samples will be processed using methods appropriate to the preservation conditions and the remains present;
- Any human remains discovered during the watching brief will be left *in situ*, and, if possible, covered. The CCCHES will be immediately informed as will the local coroner. Should it be considered necessary to remove the remains this will require a Home Office licence, under Section 25 of the Burial Act of 1857, which will be applied for should the need arise;
- Any objects defined as 'treasure' by the Treasure Act of 1996 (HMSO 1996) will be immediately reported to the local coroner and secured stored off-site, or covered and protected on site if immediate removal is not possible;

3.1.2 Should any significant archaeological deposits be encountered during the watching brief these will immediately be brought to the attention of the CCCHES so that the need for further work can be confirmed. Any additional work and ensuing costs will be agreed with the client and according to the requirements of the CCCHES, and subject to a variation to this project design.

3.2 Report

3.2.1 The results of the watching brief will be compiled into a report, which will include the following sections:

- A front cover including the appropriate national grid reference (NGR);
- A concise non-technical summary of results, including the date the project was undertaken and by whom;
- Acknowledgements;
- Project Background;
- Methodology, including a description of the work undertaken;
- Results of the watching brief including descriptions of any deposits identified, their extent, form and potential date, and an assessment of any finds or environmental remains recovered during the watching brief;
- Discussion of the results;
- Bibliography;
- Illustrations at appropriate scales including:

  - a site location plan related to the national grid;

  - a plan showing the location of the site in relation to nearby structures and the local landscape;

  - a plan showing the location of the ground works monitored;

  - plans and sections of the watching brief ground works, as appropriate, showing any features of archaeological interest;

  - photographs of the watching brief, including both detailed and general shots of features of archaeological interest and the ground works;

  - illustrations of individual artefacts as appropriate.

3.3 Publication and Archive

3.3.1 *Contingency:* if recommended by CCCHES, a post-excavation assessment will be carried out, in order to assess the need and scope of publication in a fuller manner. This will be subject to additional costs, and it will be the client's responsibility to cover any such costs (see costing document).

3.3.2 The archive, comprising the drawn, written, and photographic record of the watching brief, formed during the project, will be stored by Greenlane Archaeology until it is completed. Upon completion it will be deposited with the Cumbria Record Office in Barrow-in-Furness (CRO(B)). A copy will also be offered to the National Monuments Record (NMR). The archive will be compiled according to the standards and guidelines of the IFA (Ferguson and Murray n.d.), and in accordance with English Heritage guidelines (English Heritage 1991). In addition details of the project will be submitted to the Online AccesS to the Index of archaeological investigationS (OASIS) scheme. This is an internet-based project intended to improve the flow of information between contractors, local authority heritage managers and the general public.

3.3.3 A copy of the report will be deposited with the archive at the Cumbria Record Office in Barrow-in-Furness, one will be supplied to the client, and within two months of the completion of fieldwork, three copies will be provided for the Cumbria Historic Environment Record (HER). In addition, Greenlane Archaeology Ltd will retain one copy, and digital copies will be deposited with the NMR and OASIS scheme as required. Digital copies will also be supplied to the client's project manager, engineer, and demolition contractor.

3.3.4 The client will be encouraged to transfer ownership of the finds to a suitable museum. Any finds recovered during the watching brief will be offered to the Dock Museum in Barrow-in-Furness. If no suitable repository can be found the finds may have to be discarded, and in this case as full a record as possible would be made of them beforehand.

4. Work timetable

4.1 Greenlane Archaeology will be available to commence the project on **28th March 2007**, or at a date convenient to the client. It is envisaged that the project will take 15 person days to complete (excluding all post-excavation time and time on site), spread over the following tasks and including any necessary management time:

- ***Task 1***: archaeological watching brief – one or two people on site for as many days as necessary;
- ***Task 2***: post-excavation work on archaeological watching brief, including processing of finds and production of draft report and illustrations – 12 person days (excluding post-excavation finds and sample work);
- ***Task 3***: feedback, editing and production of final report, completion of archive - 3 person days.

5. Other matters

5.1 Access

5.1.1 Access to the site will be organised through co-ordination with the client and/or their agent(s).

5.2 Health and Safety

5.2.1 Greenlane Archaeology carries out risk assessments for all of its projects and abides by its internal health and safety policy and relevant legislation. Health and safety is always the foremost consideration in any decision-making process.

5.3 Insurance

5.3.1 Greenlane Archaeology has professional indemnity insurance to the value of **£250,000**. Details of this can be supplied if requested.

5.4 Environmental and Ethical Policy

5.4.1 Greenlane Archaeology has a strong commitment to environmentally- and ethically-sound working practices. Its office is supplied with 100% renewable energy by Good Energy, uses ethical telephone and internet services supplied by the Phone Co-op, is even decorated with organic paint, and has floors finished with recycled vinyl tiles. In addition, the company uses the services of The Co-operative Bank for ethical banking, Naturesave for environmentally-conscious insurance, and utilises public transport wherever possible. Greenlane Archaeology is also committed to using local businesses for services and materials, thus benefiting the local economy, reducing unnecessary transportation, and improving the sustainability of small and rural businesses.

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Appendix 2: Context List

Context	Type	Area, Building	Description	Interpretation
401	Layer	A, 101	Dark grey silt sample	Floor
402	Surface	A, 101	Brick surface	Floor
403	Structure	A, 101	Brick built drain/square structure	Drain
404	Wall	A, 101	Central dividing wall	Internal wall
405	Wall	A, 101	Internal wall	Internal wall
406	Wall	A, 101	Wall stub	Internal wall
407	Fill	A, 102	Dark silty fill	Unknown
408	Cut	A, 102	Angular cut near east wall	Unknown
409	Structure	A, 102	Concrete block with metal	Machine base
410	Layer	A, 102	Dark-grey silty layer with metal waste	Working layer
411	Deposit	A	Natural? Sand	Re-deposited natural
412	Fill	A	Fill	Fill of ***413***
413	Cut	A	Angular linear cut	Unknown
414	Structure	A	Cast iron 'baseplate'	Structural component of foundry
415	Slag	A	Large lump of molten iron/slag	Industrial waste
416	Structure	A	Large brick foundation	Associated with ***414***
417	Piston	A	Steel piston	Part of buildings modern function
418	Deposit	A	Iron rich deposit	Industrial waste
419	Wall	A, 101	South-west wall	Main wall
420	Wall	A, 102	South-west wall	Main wall
421	Wall	A, 102	North-east wall	Main wall
422	Wall	A, 101-3	South-east wall	Main wall
423	Wall	A, 102	Brickwork	Internal feature
424	Wall	A, 102	Internal wall	Internal wall
425	Wall	A, 103	North-west wall	Main wall
426	Wall	A, 103	South-east wall	Main wall
427	Structure	A, 102	Stone block	Machine base
428	Wall	A	Wall to north-west of Building 101	Shed
429	Layer	A, 101	Deposit in south-west half	Demolition
430	Wall	A, 102	Main wall	Main wall
431	Wall	A	Wall to north-west of Building 102	Main wall
432	Structure	C	Wall	Tank
433	Structure	C	Wall	Tank
434	Wall	C	Wall associated with ***433***	Part of tank
435	Wall	C, 104	North-west/south-east wall	Main wall
436	Wall	C, 104?	North-east/south-west wall	Main wall
437	Wall	C, 105	North-west/south-east wall at south	Main wall
438	Floor	C	Concrete slab	Floor
439	Wall	C, 105	North-west/south-east wall	Main wall
440	Structure	C	Brick and concrete north of Building 105	Foundation/pile
441	Wall	C	North-east/south-west wall in TP2	Main wall
442	Structure	A	Concrete stanchion	Foundation
443	Wall	A	North-east/south-west wall	Main wall

Appendix 3: Finds and Samples

Context	Find type	Quantity	Description	Date range
411	Pottery	2	Brown-glazed red earthenware hollowware, with yellow slip coating, probably a pancheon	Late 17th – early 20th century
411	Pottery	4	Blue sponge-printed white earthenware, probably all hollowware from a single vessel	19th – early 20th century
411	Pottery	1	White earthenware hollowware fragment	19th – 20th century
412	Cu alloy	3	Band (refitting fragments)	Not closely dateable
412	Industrial waste	5	Glassy black slag, blast furnace type?	Not closely dateable, but if from Barrow must be post-1859 when the first blast furnace was opened
412	Ceramic	27	Sandy fabric with iron concretions attached to outer surfaces, apparently forming fragments of large hollowware vessels, presumably crucibles	Not closely dateable

Sample	Context	Description	Interpretation
01	***401***	Fine black silt containing very fine iron filings	Finer finishing work on same products generating waste ***410***?
02	***407***	Gritty ash with pieces of clinker in a thin dark grey silt	Industrial residue
03	***410***	Metal waste, largely iron spirals that appear to represent waste from drilling, and smaller brass fragments. The brass pieces were generally about 10mm lengths of cut sheet that were 1mm thick or less and were generally slightly rolled over on themselves, almost tubular	*In situ* metal-working waste?

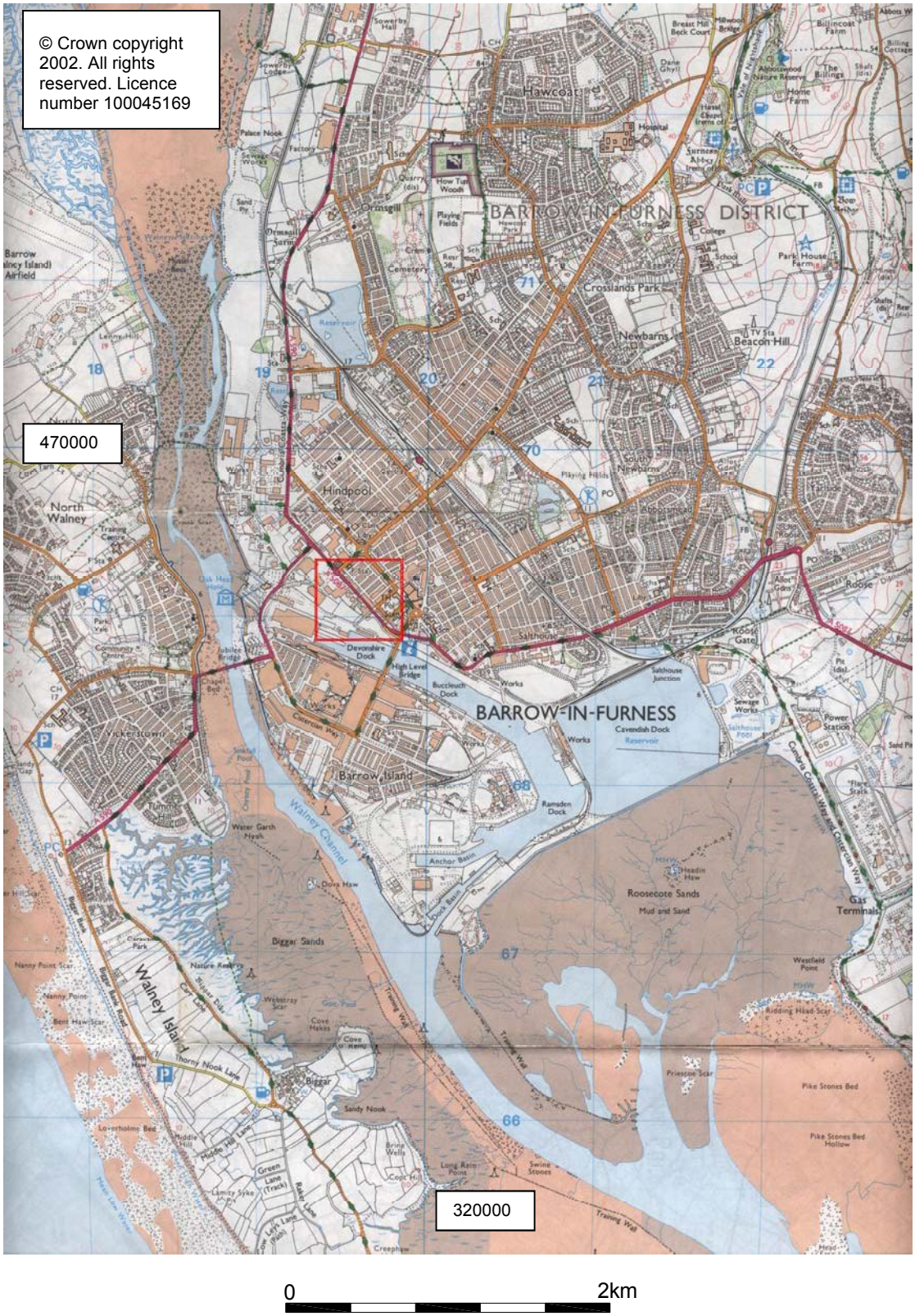


Figure 1: Site location in relation to Barrow-in-Furness

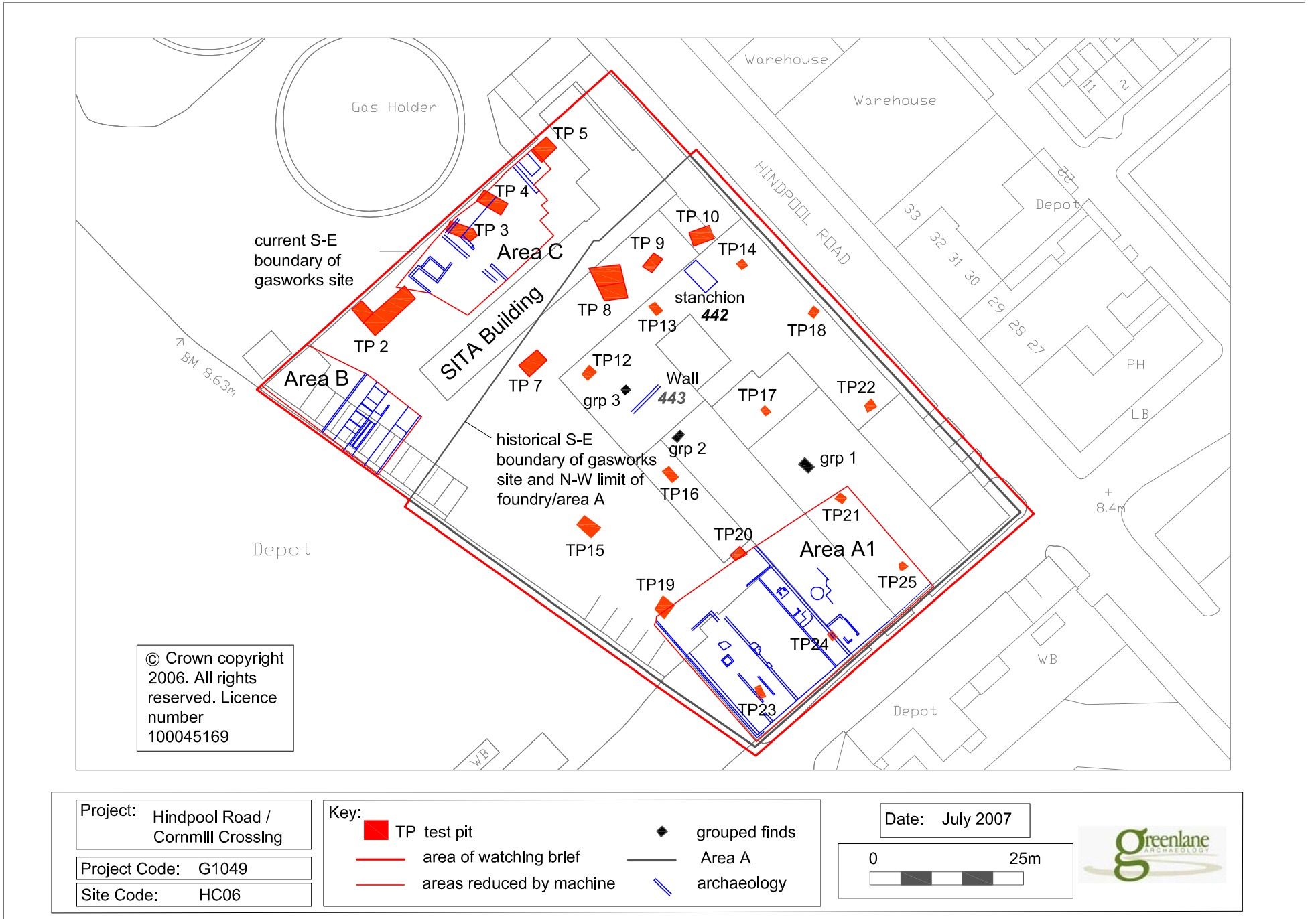
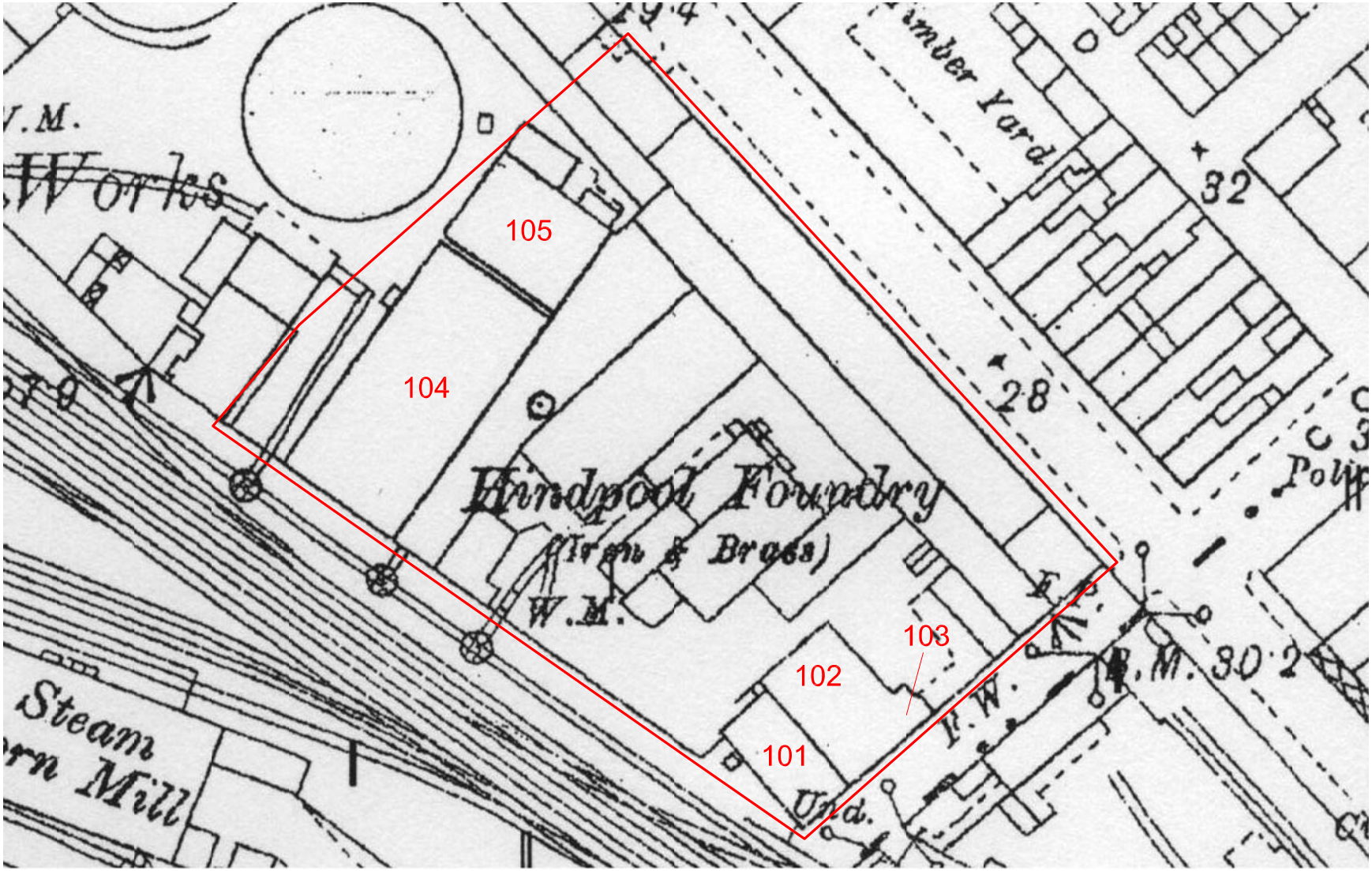


Figure 2: Location of areas of excavation and test pits on modern site plan



Project: Hindpool Road / Cornmill Crossing	Key: 100 — Building number	Date: July 2007	
Project Code: G1049	——— area of watching brief		
Site Code: HC06			

Figure 3: Numbers of buildings whose foundations were uncovered

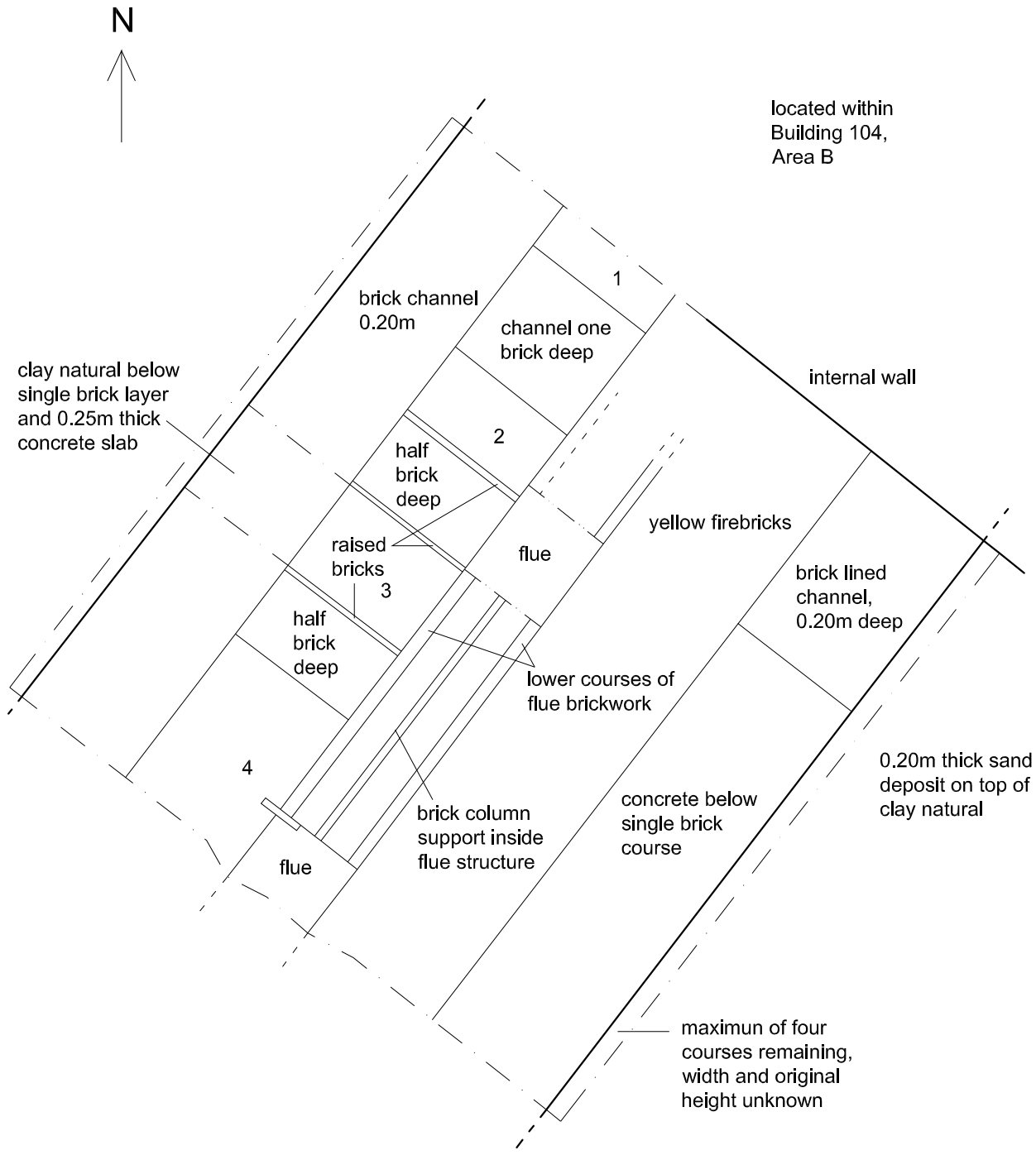
Project:	Hindpool Road / Cornmill Crossing
Project Code:	G1049
Site Code:	HC06
Date:	July 2007

Key:

- 404 context number
- iron
- extent uncertain
- concrete
- truncation
- sample
- main wall

0 8m

Figure 4: Area A1

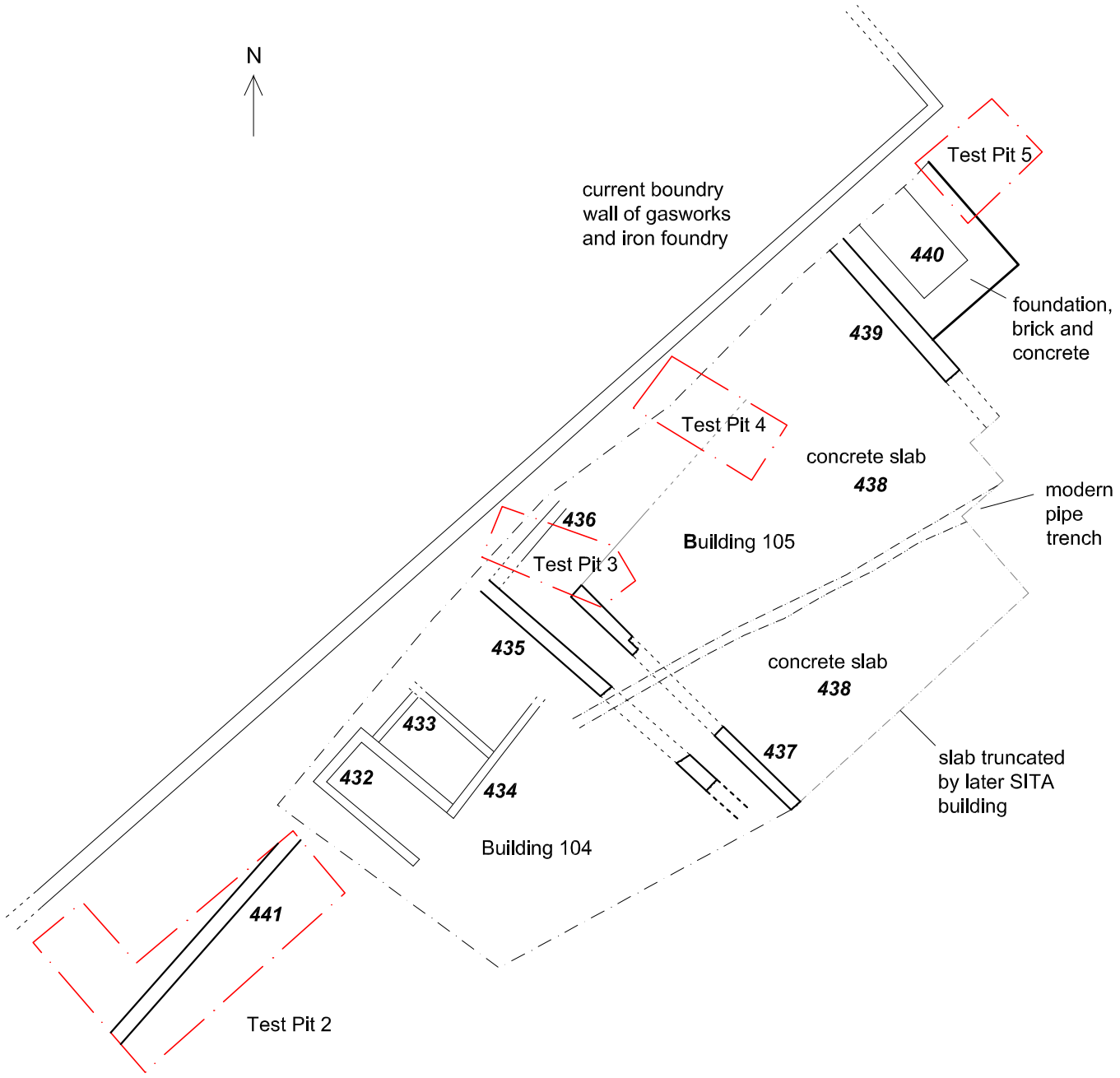


Project:	Hindpool Road / Cornmill Crossing
Project Code:	G1049
Site Code:	HC06
Date:	July 2007

Key:
1, 2, 3, 4 - machine bases?
wall — extent uncertain
concrete — truncation
limit of excavation

0 4m

Figure 5: Area B

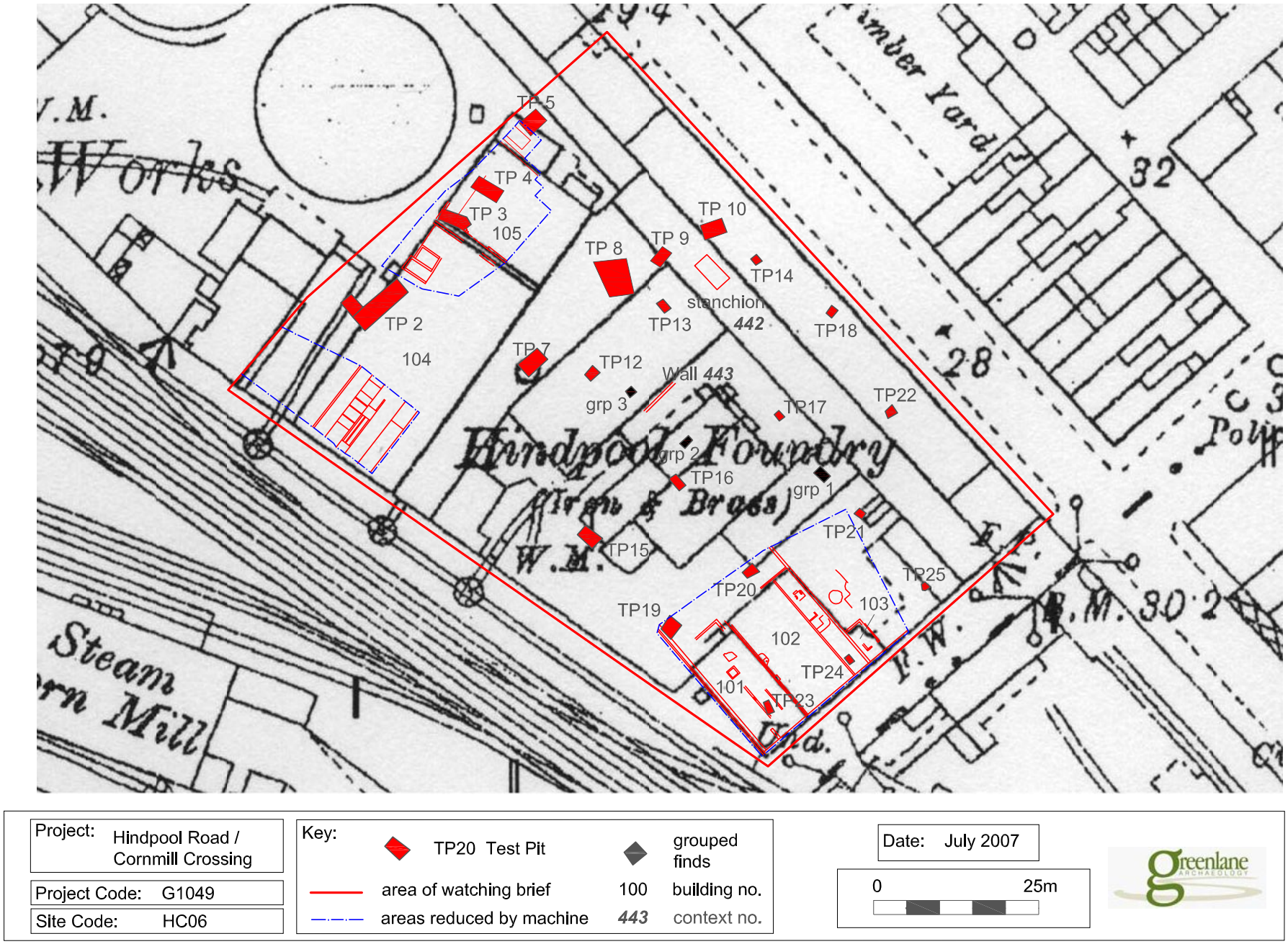


Project:	Hindpool Road / Cornmill Crossing
Project Code:	G1049
Site Code:	HC06
Date:	July 2007

Key:
- preliminary test pits
- wall
- extent uncertain
- concrete
- truncation
- limit of excavation

0 8m

Figure 6: Area C



Project:	Hindpool Road / Cornmill Crossing	Key:	
Project Code:	G1049		TP20 Test Pit
Site Code:	HC06		grouped finds
			area of watching brief
		100	building no.
			areas reduced by machine
		443	context no.

Date: July 2007

0 25m

Figure 7: Location of areas and test pits overlaid on to 1891 Ordnance Survey map

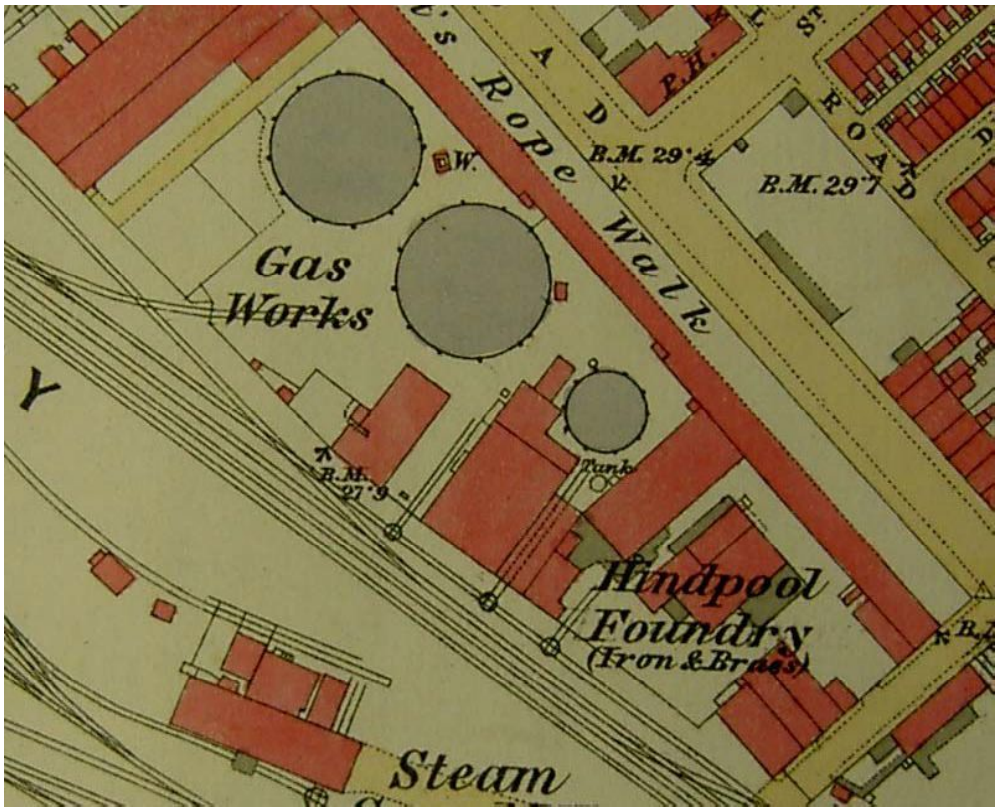


Plate 1: Part of the undated Ordnance Survey 1:2500 map (surveyed in 1873) showing the gasworks and iron foundry

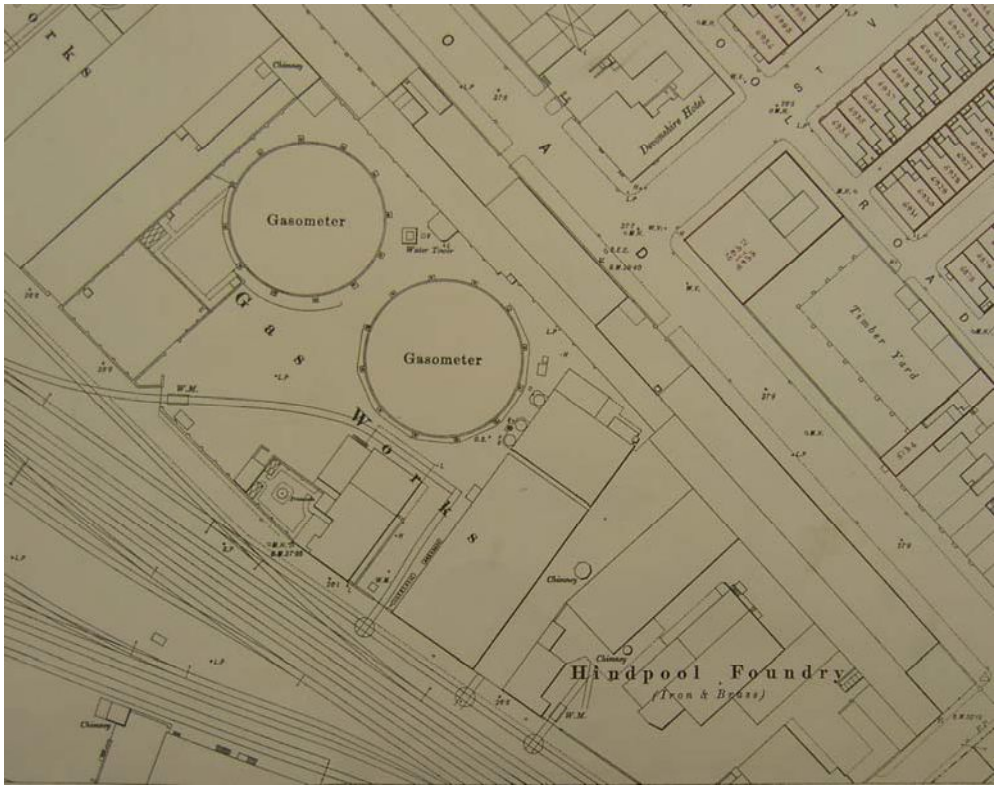


Plate 2: Part of the Ordnance Survey 1:500 plan of 1891 showing the gasworks and part of the foundry

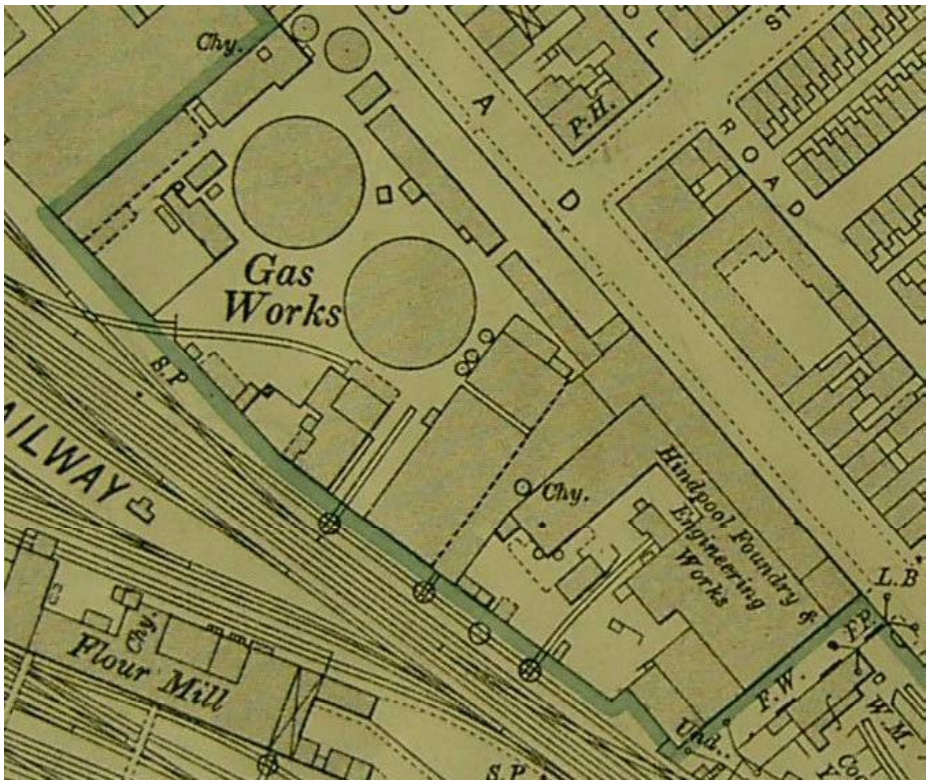


Plate 3: Part of the Ordnance Survey 1:2500 map of 1913 (revised in 1910-1911) showing the gasworks and iron foundry

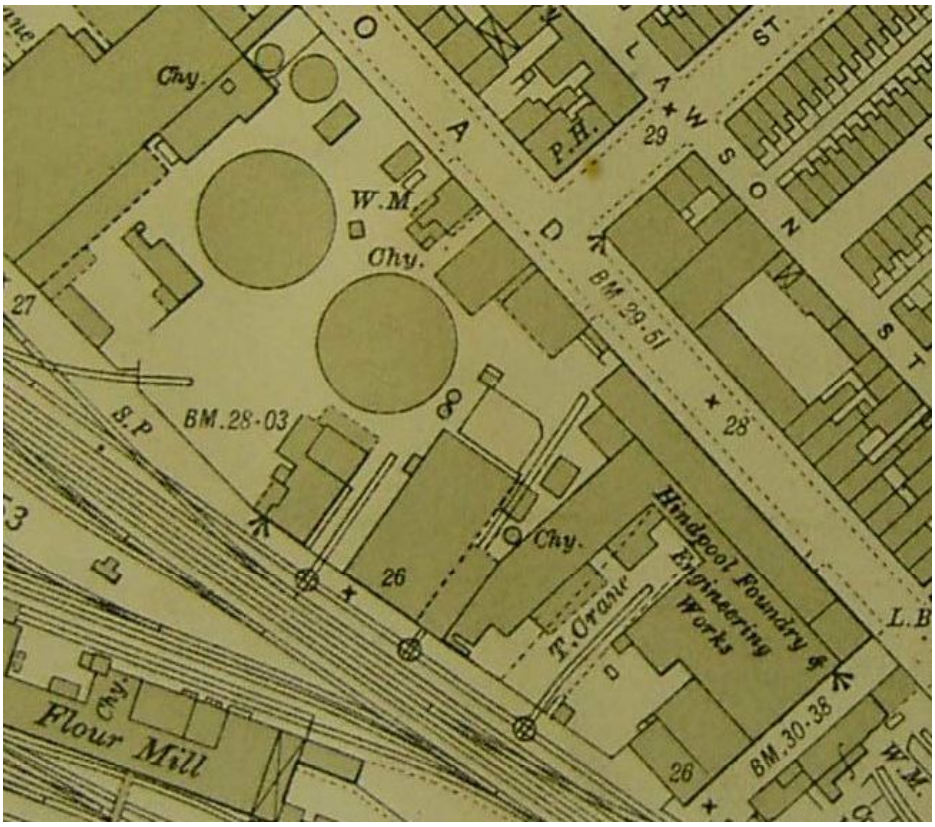


Plate 4: Part of the Ordnance Survey 1:2500 map of 1938 (revised in 1931-1932) showing the proposed development area

Plate 5: View of the gasworks in 1985 showing the extended gasholders and associated buildings (from Trescatheric 1992, 68)

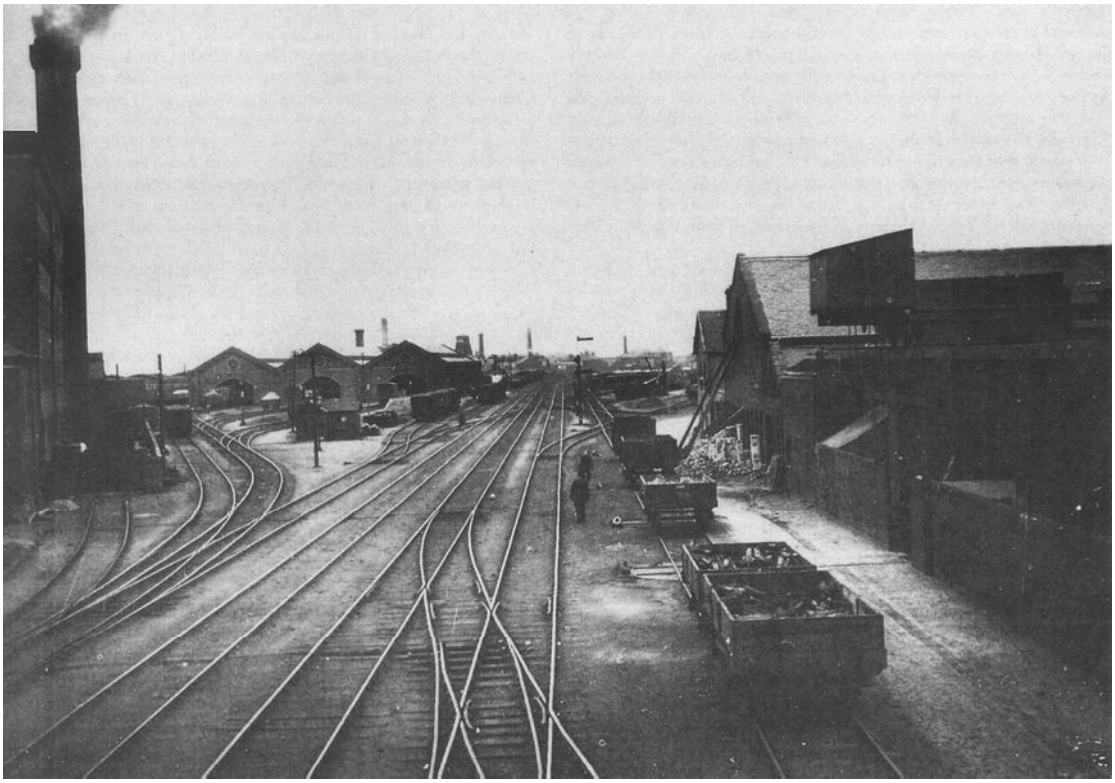


Plate 6: View of the south-west end of the iron foundry (right) and environs (from Norman 1994, 39)

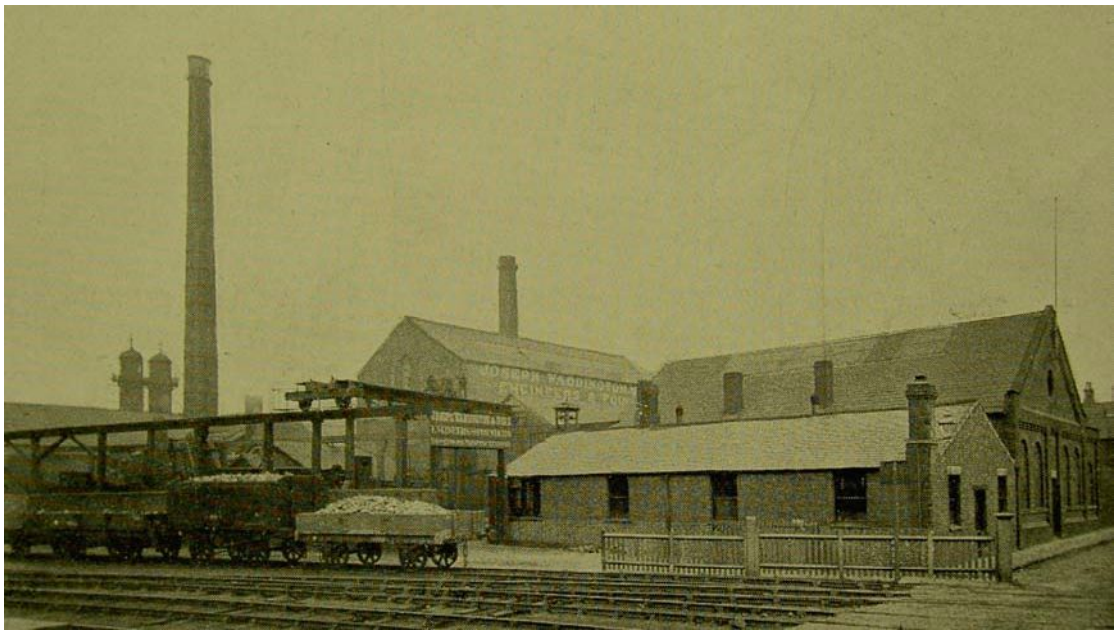


Plate 7: View of the iron foundry (from The Acme Tone Engravings Company Limited 1900, 45)

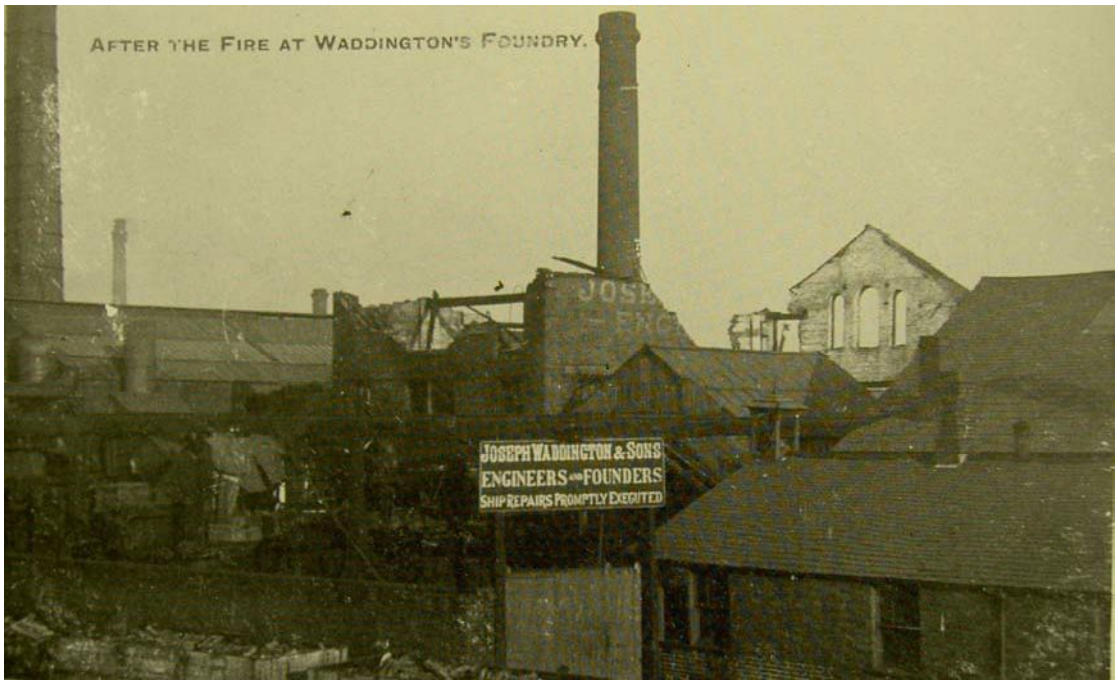


Plate 8: View of the foundry after the fire of 1906 (from Trescatheric and Barker 1990, 22)

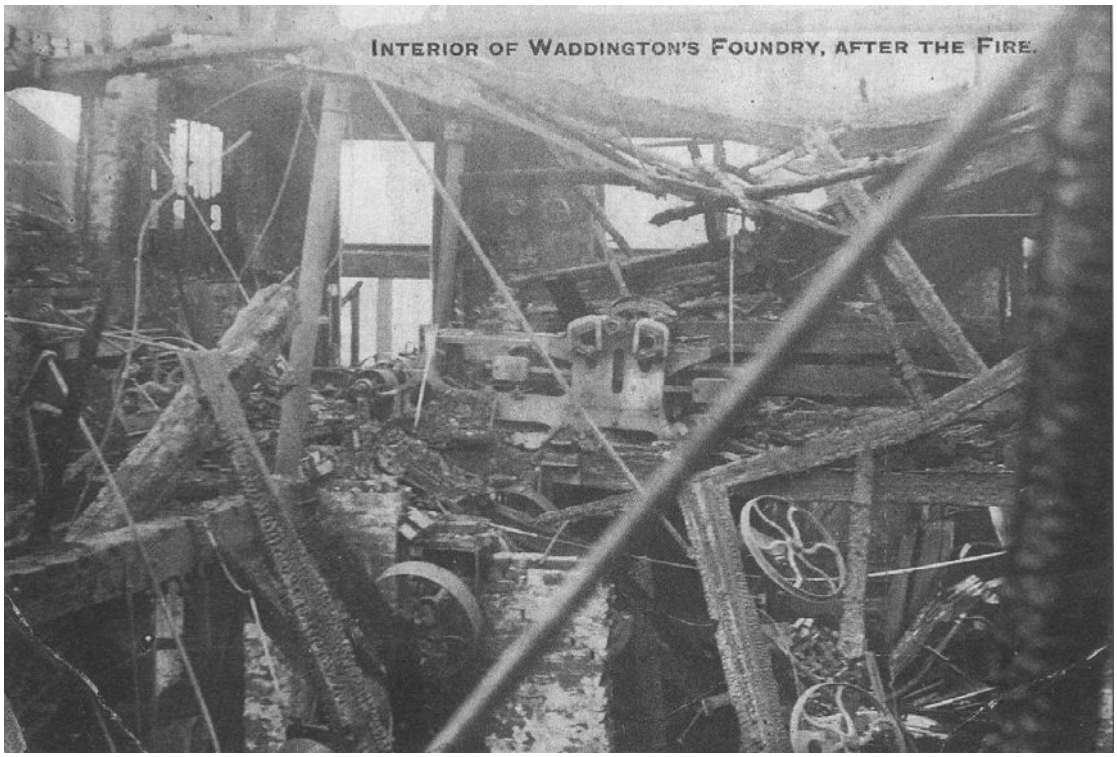


Plate 9: Detailed view of the foundry after the fire (from Myers 2000, 32)

Plate 10: Aerial view of the gasworks and foundry (from Thompson 2005, ref AFR6237)

Plate 11: 'Underside' of cast iron 'baseplate' ***414***

Plate 12: Cut ***408*** below Building 102 in Area A1

Plate 13: Part of iron slag block ***415***, from group 1

Plate 14: Structural components of the foundry, from group 3

Plate 15: Hollow piece, narrow end, from group 3

Plate 16: Hollow piece from Plate 15, wide end, after being used to break a concrete slab

Plate 17: Flue and other structures in test pit 7, looking south-east

Plate 18: Flue in basement of room 104, Area B looking south-west

Plate 19: Floor slab ***438*** of Building 105 in Area C looking north-west

Plate 20: Tanks in or associated with Building 104 looking west