Wessex Archaeology

Heanor Haulage, Langley Mill, Derbyshire

Archaeological Investigations

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Archaeological Investigations

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Summary

Wessex Archaeology was commissioned by Asda Stores Ltd to undertake a programme of archaeological investigations at the site of the former Vulcan Works at Langley Mill, Derbyshire ('the Site', NGR 445054 347210). The work was required in response to a planning condition (no. 24) attached to consent (ref. AVA/2009/0467) for a new Asda food-store including; office/workshop accommodation, a petrol filling station, complimentary community/retail units and car parking. The Site was latterly in use as a haulage yard and storage facility operated by Heanor Haulage.

The archaeological interest in the Site was identified in a Brief prepared by the Senior Archaeologist for Amber Valley Borough Council ('the curator') and encompassed extant and former buildings associated with the Vulcan (engineering) Works; the site of a Wesleyan Methodist chapel and Sunday School; and the site of two rows of terraced housing. A programme of historical research, building recording, archaeological evaluation trenching and mitigation excavations was undertaken in accordance with a Written Scheme of Investigation ('WSI'), prepared in response to the requirements of the Brief and approved by the curator. This report presents the results of the archaeological evaluation and mitigation excavations; the results of the historical research and building recording are presented in a separate report (Wessex Archaeology 2010b).

Archaeological preservation across the Site was generally good. Fifteen trenches were excavated to evaluate archaeological survival and mitigate the loss of remains in advance of development. Eleven trenches investigated the former Vulcan (engineering) Works; two investigated the site of the Methodist chapel, to the south-east of the Vulcan Works; and a further two were excavated on the site of former terraced housing along Bridge Street and Victoria Street, to the north of the Vulcan Works. Fieldwork was undertaken in a continuous programme between February and June 2010, concurrently with site clearance and preliminary groundworks.

The Vulcan Works

The Vulcan Iron Works was constructed by G R Turner in 1874, the company mainly concentrating on the production of railway rolling stock. The works significantly expanded in size during the late 19th and early 20th centuries, reflecting strong national and international demand for its products. The company continued to make world renowned railway stock until the 1960s. The Works was nationalised under British Steel in 1967 and sold to Redpath Dorman Long in 1970 for use in the development and construction of radio-controlled cranes. The Works closed in 1974.

Several discreet phases of development of the Vulcan Works were identified in the evaluation and mitigation trenches. The initial building constructed by G. R. Turner in 1874 seems to have been considerably shorter than the building shown on the first cartographic depiction of the Works in 1881 and constructed from brick in a pier and panel style, probably allowing air flow through the low walled sides, open to the north. Evidence of an entrance to the north-west side of the building was located, together with a substantial hot air flue and a structure that may have been the primary drive

engine location in the central portion of the building. Several machine bases and a press were uncovered and evidence for re-melting and forming of metals was found.

The pre-1881 northern extension of the factory was located, with at least two phases of presses and heavy lifting gear. Subsequent re-modelling of the central eastern portion of the factory between 1885 and 1900 involved the partial demolition of the eastern wall and the addition of a building which also contained machine bases and heavy lifting apparatus. Expansion of the factory continued and by 1900 the eastern wall of the original building was demolished and buildings containing a crane base and machinery re-used from the earlier phases were identified. The western wall appears to have remained intact but lines of stanchion bases within the range suggest a re-alignment of the roofing structure. The factory floor was re-laid using a concrete raft.

The Wesleyan Methodist chapel

The Wesleyan Methodist chapel was built prior to 1881. Cartographic evidence indicates that a Sunday school was appended to the north of the building by 1900 and an eastern extension in 1911. The excavations revealed the western, northern and eastern walls of the original chapel, including the eastern porch and entrance surface and internal brick floor supports. The addition of the Sunday school to the north of the chapel probably involved the partial demolition and relocation of the chapel's original apse. The brick floor support walls of the eastern extension were also identified. A small group of locally produced stoneware vessels, primarily inkwells, recovered from this part of the Site is of some interest.

The terraced houses

The terraced housing to the north was also built prior to 1881 and was probably demolished prior to 1966, when the Vulcan Works expanded into this part of the Site. At least four terraced houses uncovered to the south side of Bridge Street, at the northern end of the Site, appeared to have been built in pairs of differing sizes and methods. Front and back rooms were separated by stairways, which possibly contained sunken larders or pantries beneath them. At least two of the western houses contained evidence for brick flooring in the back rooms and evidence of fireplace support/chimney breast walling was uncovered throughout the rest. The houses to the south of Victoria Street were less well preserved due to severe truncation from expansion of the Works in the mid 20th century.

Archaeological potential

The results relating to the Vulcan Works are of local importance and the data from the excavations can greatly increase our understanding of the structural development and processes relating to the earlier phases of construction at the Vulcan Works. The results of the excavations on the Wesleyan Methodist chapel and the terraced housing are of lesser importance, but serve to provide a community contextual framework for the former Vulcan Works.

Archive and deposition

The project archive resulting from the excavation is currently stored at the Sheffield offices of Wessex Archaeology and will be deposited in due course with Derby Museum and Art Gallery under the Accession Number DRBYMU:2009.215.

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The project was managed for Wessex Archaeology by Oliver Jessop. The fieldwork was directed by Neil Dransfield, with the assistance of Mark Stenton, Justin Wiles, Sam Fairhead, Zac Nellist, James Thomson, Mike Hartwell, Chris Harrison, Ashley Tuck and Chris Swales (survey). This report was compiled by Neil Dransfield, with the assistance of Dr. Rod Mackenzie (archaeometallurgy) and Lorraine Mepham (finds). The illustrations were prepared by Chris Swales and Chris Breeden.

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Archaeological Investigations

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Asda Stores Ltd ('the client') to undertake a programme of archaeological investigations on the site of the former Vulcan (engineering) Works at Heanor Haulage, Langley Mill, Derbyshire ('the Site', NGR 445054 347210; **Figure 1**). The work was required in response to a planning condition (no. 24) attached to consent (ref. AVA/2009/0467) for a new Asda food-store and associated petrol filling station, community/retail units and car parking. The development proposals required the demolition of all the extant structures on the Site and alterations to the existing ground levels.

1.1.2 Planning condition no. 24 identified a high potential for survival of buried archaeology and fragmentary remains of historic buildings relating to the former Vulcan Works; a former Wesleyan Methodist chapel; and terraced housing. A project Specification (Amber Valley Borough Council 2010, **Appendix 5**) issued by the Senior Archaeologist for Amber Valley Borough Council ('the Curator') required a programme comprising documentary research, building recording and evaluation trenching, to be followed by mitigation excavations if appropriate.

1.1.3 Archaeological investigations were undertaken in accordance with a Written Scheme of Investigation ('WSI', Wessex Archaeology 2010a), prepared in response to the requirements of the Specification and approved by the Curator. Fieldwork was undertaken in a continuous programme between February and June 2010, concurrently with site clearance and preliminary groundworks.

1.1.4 Fifteen trenches were excavated; two to evaluate archaeological survival in accordance with the Specification and a further two to mitigate the loss of remains in advance of development. This report presents the results of the archaeological evaluation and mitigation excavations; an assessment of the potential of the archive; and proposals for further analysis and publication of the results, in accordance with the Specification and WSI. The results of the historical research and building recording are presented in a separate report (Wessex Archaeology 2010b).

1.2 Site description, topography and geology

1.2.1 The Site, centred on NGR 445054 347210, is bounded by Bridge Street to the north, Wesley Street to the south, Station Road to the east and the Midland Railway line to the west (**Figure 1**), covering an area of 3.37ha. The underlying geology comprises Carboniferous Middle Coal Measures. Geotechnical investigations indicate the depth of made ground to vary between 1m and 5m across the Site (Wessex Archaeology 2010a).

1.2.2 At the commencement of fieldwork the Site was occupied by standing buildings and open yards associated with the former Vulcan Works of G R Turner and the was in use as a haulage yard and storage facility operated by Heanor Haulage; site clearance and demolition of standing structures commenced from April 2010 in parallel with the archaeological evaluation.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 No known archaeological work has previously been undertaken on the Site.

2.1.2 An account of the history of Langley Mill and the development of the Site is presented as part of the results of the historical research and building recording (Wessex Archaeology 2010b) and summarised only here.

2.2 The Vulcan Works

2.2.1 The earliest available cartographic evidence, George Sanderson's 1835 'Map of Twenty Miles 'Round Mansfield', shows the Site crossed by several field boundaries, situated on the south-east facing slope at the southern end of a valley ridge between Bayley Brook and the Erewash River, just to the west of the small village of Langley Bridge. An enigmatic line on the map, to the immediate west of the site, appears to follow a similar north-south alignment of the later known railway line.

2.2.2 In 1874, G R Turner constructed the Vulcan Iron Works on the Site, following his departure from an earlier company set up in partnership with a Mr. Pender in premises to the north-west of the Site in 1868. Turner is described as a brass and iron founder in 1877. The company's first order was for 100 all-steel wheelbarrows, followed by an order for 50 railway wagons. Turner's subsequently concentrated largely on the production of railway rolling stock and was listed as carriage and wagon wheel manufacturers in Kelly's 1891 directory of Derbyshire (Wessex Archaeology 2010b).

2.2.3 The first depiction of the Vulcan Works on the 1881 Ordnance Survey (OS) map shows a long, thin north-south aligned building (building **B** on **Figure 2**), with ancillary buildings to the north of this. Other buildings are shown to the west of the main factory (**C** & **D** on **Figure 2**) and an internal rail network is shown connected to the main Midland Railway system.

2.2.4 Successive OS maps show the continual development of the Vulcan Iron Works during the late 19th and early-20th centuries. Previous buildings are expanded and developed with additional buildings linking and enveloping these. The company also appears to have taken over buildings at the southwest of the Site, which were originally shown as part of the Station Works on the 1881 OS map.

2.2.5 A valuation of the Works carried out in 1902 lists each shop, machine and major tool (Wessex Archaeology 2010b). The list identifies pattern shops and a moulder's foundry office, which suggest that some casting was taking place. The list also mentions three smiths' shops and a rolling mill, as well

as the necessary pump, engine and boiler houses. Unfortunately, the precise location of these is not identified in the list.

2.2.6 During the First World War, the Vulcan Iron Works expanded further whilst under the control of the War Office, constructing vehicles for the Engineering Corps. By the time of Kelly's 1925 directory, G.R. Turner was listed as manufacturers of railway rolling stock and mining machinery. The decline in demand for railway wagons led to the company being taken over in 1958/9 by the group United Steel Companies Ltd. Extensive modernisation took place during this period. The Works was subsequently nationalised and became part of British Steel in 1967. Redpath Dorman Long acquired the site in 1970 and it was used subsequently for development of the company's radio-controlled cranes. The Works closed in 1974 and the Site was bought by Heanor Haulage in 1996, continuing in use as a haulage yard and storage facility until early 2010.

2.3 The Wesleyan Methodist chapel

2.3.1 The construction date for the Methodist chapel on Wesley Street is unknown. It first appears on the 1881 OS map (**A** on **Figure 2**) and by the 1900 OS map a building marked as a Sunday school is shown abutting the northern wall of the chapel. In 1911 the chapel was extended to the east (Ripley & Heanor News 2000). The chapel was demolished in 2000 (Wessex Archaeology 2010b).

2.4 The terraced houses

2.4.1 The construction date for the housing situated to the north of the Vulcan Works is also unknown. The back-to-back housing along Bridge Street, with terraced houses along Victoria Terrace, first appears on the 1881 OS map, although Kelly's 1891 directory does not include listings for any properties on these streets.

2.4.2 Between 1916 and 1936, the housing along Victoria Street and a section along the south side of Bridge Street was demolished, making way for further expansion of the Vulcan Works. During the mid- 20th century the remaining back-to-back housing along the south side of Bridge Street, situated at the northeast corner of the Site, was also knocked down.

3 AIMS AND OBJECTIVES

3.1 Aims

3.1.1 The general aims of the project were:

- To enhance understanding of the development of the Site and its associated buildings (mainly the late 19th and early-20th century phases).
- To record as far as is reasonably possible the location, extent, date, character, condition, significance and quality of any surviving archaeological remains observed.

- To provide appropriate archaeological information to enable informed decisions to be made concerning the need for future mitigation works regarding the Site.

3.2 Objectives

3.2.1 The aims of the evaluation were developed in order to inform an appropriate mitigation strategy within the area affected by the proposed development. These are presented here with numbers added for ease of reference.

1. To assess the remains of any industrial buildings, or infrastructure features associated with the former G R Turner Ltd foundry complex.

2. To record as far as is reasonably possible the location, extent, date, character, condition, significance and quality of any surviving archaeological remains observed.

3. To determine or confirm the approximate date or date range of the remains, by means of artefactual, stratigraphic or other evidence.

4. To determine the condition, state of preservation and wider historic significance of the remains.

5. To collate all phases of investigation into an overall picture of the Site incorporating recommendations for further work.

4 METHODOLOGY

4.1 Archaeological trenching strategy

4.1.1 In accordance with the Specification, thirteen trial trenches were excavated at specified locations across the Site (**Figure 1**) to address the aims and objectives of the project. Two further trenches were excavated to mitigate the loss of remains prior to devotement. The size and rationale of all fifteen trenches are summarised below:

Trench	Size	Targeted features
1	2x10m	Located to assess the entrance, interior and external forecourt of the former Methodist chapel on Wesley Street
2	2x10m	Located to examine the interior of the former Methodist chapel and associated Sunday school on Wesley Street
3	5x10m	Located to examine the southern section of the former Vulcan Works building
4	5x10m	Located to examine the long linear workshop range parallel to the railway line
5	5x10m	Located within a former workshop building at the junction of the internal site railway network with the external network infrastructure
6	5x10m	Located across the northern part of the linear range

Trench	Size	Targeted features
		adjacent to the railway line
7	5x30m	Larger trench to examine the central section of the 'main' former Vulcan Works building
8	5x10m	Positioned to assess a former linear works range in the centre of the site
9	5x10m	Located to examine the north part of the former Vulcan Works building
10	5x10m	Located within one of the surviving historic buildings to assess its former function
11	5x10m	Positioned across one of the former works ranges within the northern part of the site
12	5x15m	Located to examine the former houses along Bridge Street
13	2x10m	Positioned to assess a row of houses along Victoria Street
14	17x24m	Located to the north of Trench 7 to examine the central section of the factory
15	10.5x15m	Located between Trenches 3 and 14 to examine the central section of the factory

4.2 Methods

4.2.1 The evaluation methodology is set out in the WSI (Wessex Archaeology 2010a) and is summarised below.

4.2.2 Machine excavation was undertaken using a toothless ditching bucket under the strict supervision of a suitably qualified and experienced archaeologist. This involved the removal of concrete and tarmac with underlying hardcore and industrial waste overburden.

4.2.3 Machine excavation was halted at the top of the first structural archaeological horizon, prior to hand cleaning, recording and targeted excavation. Sufficient excavation was undertaken to meet the objectives of the project. Where appropriate, small machine sondages were excavated to establish depth of made ground and archaeological sequences. These were located so as to minimize damage to present archaeological remains.

4.2.4 All archaeological contexts were recorded and the written, drawn and photographic record of all archaeological deposits and structures was made in accordance with current guidelines and best archaeological practice (English Heritage 1991, 2006; IfA 2008a & b). All archaeological features were related to the Ordnance Survey Datum.

4.2.5 Following completion of fieldwork the archive was prepared in accordance with Appendix 3 of Management of Archaeological Projects ('MAP 2', English Heritage 1991). The contents of the archive are summarised at **Appendix 1**. A copy of the OASIS form completed online for the below-ground archaeological element of the project is included at **Appendix 4**.

5 RESULTS

5.1 Introduction

5.1.1 This section presents a summary description of the natural deposits encountered and the archaeological features and deposits recorded. A detailed summary of the evaluation trench context information is listed in **Appendix 2**. The results from each trench are discussed individually and the results are summarised in Section 7 below. The individual trench locations are shown on **Figures 1 and 2**.

5.2 Trench 1

5.2.1 Trench 1, located to assess the eastern entrance, interior and external forecourt of the former Wesleyan Methodist chapel, revealed a series of parallel walls, aligned north-south, typically 1.52m (approximately 5') apart. These walls extended across the width of the trench (**Figure 3b**).

5.2.2 The results suggest that wall **0002** probably formed the original eastern wall of the Methodist chapel, together with an east-west return **0007** which may have formed the northern wall of the eastern entrance (**Figure 2, 'A'**). Both walls were considerably wider than those walls adjudged to be later and the brick sizes were both shorter and thicker. The direct relationship between the two walls was removed by later demolition cut **0003** (**Figure 3b**).

5.2.3 The area immediately surrounding the entrance to the east appears to have been made up of a 0.46m thick deposit of greyish brown gritty clay overlain by a compacted surface of sandy pea-grit (**0004**). Pottery recovered from deposit **0004** was produced at the nearby Langley Mill Pottery under the ownership of James Calvert (1865 and 1883) (see section 6.2 below). This date range would not be inconsistent with the construction of the chapel prior to 1880. The first cartographic evidence for the chapel dates from an 1881 OS map of the area (**Figure 2**). Deposit **0004** extended at least 3.36m to the east of the original chapel wall. Beyond 0004 to the east was a highly compacted surface of pinkish pea-grit within a clay matrix (**0012** and **0016**), interpreted as a compact yard surface leading up to the original eastern entrance.

5.2.4 Truncating these deposits was a series of five additional walls (**0001** (sitting on the natural and supported by brick rubble to the west of the original entrance); **0006** (robbed out); **0011, 0015** and **0019**; **Figure 3b**) interpreted as belonging to the eastern extension to the original chapel, which began construction in 1911 (Ripley and Heanor News 2000). The bricks in each wall were of the same dimensions (230mm x 110mm x 70mm) and from the regular spacing (approximately 1.52m/5') the walls are interpreted as probable floor supports within the eastern extension. A wall **0020** uncovered in the eastern section (**Figure 3b**) appeared to abut wall **0019** to its east; some 0.55m higher than the likely brick floor supports, wall **0020** is interpreted as a possible internal division within the extension.

5.3 Trench 2

5.3.1 Trench 2 was located to examine the interior of the former Methodist chapel and associated Sunday school, which was built prior to 1900. The results

here demonstrate that the northern elements of the Methodist chapel were demolished when the Sunday school was constructed.

5.3.2 The earliest archaeological remains within Trench 2 were probably parts of the external walling of the chapel **0034**, consisting of a substantial brick foundation aligned north-south with a return to the east at the northern end (**Figure 3a; Plate 1**). This probably formed the original north-western corner of the original chapel. Other brick walling elements uncovered within the chapel **0036**, **0037** and **0038** appeared to form a series of three cells measuring 1.5m (< 4') square and are interpreted as flooring supports: although these walls were slightly lower (c. 0.15m) than those uncovered in the eastern extension (Trench 1), mortar on top of the bricks suggests the level of the walls here would have originally been higher.

5.3.3 A red brick lined drain **0039**, which would have lain beneath the chapel floor, and levelling layers **0041** and **0040** within the chapel were also identified (**Figure 3a**).

5.3.4 Elements of the later Sunday school were uncovered in the northern half of the trench. A fragment of walling **0051** in the western section (**Figure 3c**) might have been related to the connection of the Sunday school to the existing elements of the chapel in 1911. This wall suffered from extensive truncation when the building was demolished. An east-west aligned red brick wall **0045** (**Figure 3a; Plate 1**) interpreted as the southern wall of the Sunday school appeared to align with a scar in the existing boundary wall of houses to the east of Trench 2.

5.3.5 Two drains **0046** and **0044**, levelling layers **0065** and **0049** and later internal (**0050**) and external (**0042**) surfaces were also uncovered; these will allow further analysis of construction technique and surface levels.

5.3.6 Although the 1881 (**Figure 2, 'A'**) and 1900 OS maps appear to show that the northern walling of the Methodist chapel may have contained an annexe, probably the vestry area, the results from Trench 2 have confirmed that a large supporting wall ran across the divide between the main building and the vestry. The results also suggest that the southern wall of the Sunday school was constructed within the old vestry, implying that this was moved or shortened when the Sunday school was added.

5.4 Trench 3

5.4.1 This evaluation trench was located to examine the most southerly accessible portion of the Vulcan engineering works (**Figure 2, 'B'**).

5.4.2 The earliest features revealed were a 2m long x 0.5m wide length of dark grey concrete **0188** and a contemporary 0.4m wide badly degraded timber **0187** running parallel to this (**Figure 4a**). These possibly related to some form of machine base below the later factory concrete floor **0180**, which covered the majority of the trench.

5.4.3 Features **0188** and **0187** were covered by an extensive deposit of clinker **0182**, which may have built up during the working life of the factory at this location. A metal bar recovered from this deposit (**Appendix 3, Table 3**) suggests that the rolling or forging of wrought iron was taking place within

the building. Overlying deposit **0182** a series of 2m square x 0.05m thick Fe plates **0184** (**Figure 4a**) may represent an attempt to re-consolidate the floor, or may have formed a base for a later machine.

5.4.4 A further floor consolidation **0183** appears to have been undertaken prior to the construction of a substantial concrete floor **0180** and stanchion base **0185/6** (**Figure 4a**). This stanchion appeared to align with several other stanchions uncovered in Trenches 7, 14 and 15 (see below). These features were partially removed by a substantial cut **0181**, possibly executed to remove extant machinery. The area contained a number of fills and levelling deposits **0190-3** beneath the modern tarmac **0189** covering the area (**Figure 4a and b**).

5.5 Trench 4

5.5.1 Trench 4 was located to assess the function of the long building shown on the 1881 map, bounding the west of the Site (**'C', Figure 2**). The natural here was a mixed yellow/grey gleyed sandy clay **0022**.

5.5.2 The results of the evaluation showed two parallel cuts **0023** and **0025** running north-south throughout most of the trench (**Figure 5a-c**). The two cuts were 1.3m (4'3") apart and were both 0.08m deep, interpreted as rail track supports which had been removed and subsequently filled by highly mixed coloured deposits of sandy clay **0024** and **0026**. Remnants of a single timber **0027** between the two tracks indicated the presence of a probable sleeper. The distance between the two rail supports could possibly accommodate the standard rail gauge of 4'8.5" passed under the 1846 Gauge Act. The 1881 map of the building (**Figure 2**) does not show a rail leaving this building: it is not until the 1900 OS map, which shows the expansion of this shed, that a rail is shown joining the main Midland Rail line from this location.

5.5.3 Above the former rails, the trench was filled by a series of deposits including a 0.14m thick deposit of black industrial waste **0028**, which may have come from working processes within the factory system. These were overlain by various hardcore levelling layers **0029** and **0030** and yard surfaces **0031** and **0032** (**Figure 5d**).

5.6 Trench 5

5.6.1 This trench was located within a former workshop building, at the junction of the internal site railway network with the external network infrastructure (**Figure 2**), to identify any structural elements and possible processes undertaken within the building shown on the 1900 OS map (Wessex Archaeology 2010b, Figure 2).

5.6.2 The lowest natural deposits, exposed in a sondage at the southern edge of the trench, were a mix of fine particular coal and clay **0370** overlain by a 0.12m thick layer of yellowish orange silty clay **0371**, which petered out towards the west of the trench (**Figure 6a and b**).

5.6.3 The natural deposits were overlain by a deposit of 'dirty' orange clay **0372**, which may have been re-deposited as a result of ground terracing involved with the extension of the Midland Railway to Langley Mill in 1847. Similar

deposits were uncovered within the Vulcan Works building area to the east of this location, where factory construction cuts appeared to have truncated this deposit (see Trenches 14 and 15 below).

5.6.4 To the western end of the trench were two deposits of possible alluvial clay **0388** and **0389**, which may have formed in slight hollows. The majority of the trench then appeared to be filled by a 0.45m thick layer of mixed clay **0382**, which petered out to the east, overlain by a 0.3m thick dump of what appeared to be burnt clay **0376**, similar to that of hand made brick fabric. Truncating deposit **0372** in the north-western corner of the trench was a substantial cut **0373** at least 2.2m long x at least 0.62m deep, interpreted as a possible clay extraction pit. This was filled by industrial waste **0374**, which implies that the pit was dug during industrial activity on site. This in turn was overlain by a 0.58m thick deposit of mixed clay **0375**, which may have been contemporary with **0382**. The entire area of the trench was then filled by a substantial (0.5m thick) layer of industrial clinker waste **0377** as a probable made ground layer.

5.6.5 The remains of two stanchion bases **0379** and **0381** (**Figures 6a and c**) probably relate to the open sided building at the north western corner of the Works shown on the 1900 OS map. The better preserved of these **0381** cut **0380** through layer **0377** and was constructed from a concretion of sandstone and mortar (**Figure 6c**). Also truncating layer **0377** was a large 1.2m wide cut **0383** filled by grey gravel **0384**, interpreted as a probable support for a rail line (**Figure 6b**). The modern rail extant in the surface was some 0.15m higher, cutting through modern hardcore **0392** and asphalt **0391**.

5.7 Trench 6

5.7.1 This trench was located to examine the building located in the north-western corner of the Site (**Figure 2, 'D'**), to determine any structural elements and possible processes undertaken within the building.

5.7.2 The natural geology within this trench consisted of a yellow silty clay **0570** overlain by a mixture of clay and coal powder **0571** at least 0.28m thick (**Figure 7a**). It is interesting to note that similar natural deposits lay within Trench 5 but that the sequence here is reversed, indicating either that the clay and coal powder mixtures represent a sequence of separate events or that the deposits formed an interdigitating sequence throughout the Site.

5.7.3 A natural tree throw-hole **0588** with grey clay bioturbatory fill **0589** was uncovered in the northern half of the trench (**Figure 7a**). The tree appears to have been up-rooted and the hole was immediately filled with a deposit of clinker **0590**, suggesting that the tree may have been removed as part of the Vulcan Works building programme (see below).

5.7.4 The earliest structure was likely to have been a cruciform brick stepped feature **0574** formed from light orange unfrogged machine made bricks (**Figure 7a; Plate 2**). The structure measured 1.07m x 0.72m x .26m deep at the base and was laid on a thin mortar deposit **0573** within a large 1.98m x 1.55m cut **0572** surrounded by a clay packing **0575** (**Figure 7a**). The structure did not appear to align with the orientation of other structures uncovered during the evaluation, but does appear to align well with the

southern wall of building **D** (**Figure 2**) shown dotted (possibly open-fronted?) on the 1881 OS map. The results of the historic building survey (Wessex Archaeology 2010b) suggest that part of the recess within the wall forming the western boundary of the Site (immediately west of Trench 5) may have formed the north western corner of building **D**: the results from this trench show that the southern frontage may have been made up of a series of brick pillars.

5.7.5 A (probably later) concrete stanchion base with a Fe stanchion **0577** consisting of two vertical H beams riveted together (**Figure 7a**) was uncovered to the west of **0574** and on a different alignment to it. The location of the stanchion appeared consistent with the centre line of the later, north-south oriented building shown extending from building **D** (**Figure 2**) on the 1990 OS map (Wessex Archaeology 2010b, Figure 2); this may have been one of the central roof support columns.

5.7.6 The last sequence within the trench appeared to be late (mid-20th century) in the Site's history and was probably contemporary with the later internal rail system within the factory. A weighbridge **0579**, **0580** and rail track **0582, 0583,** and **0584** were uncovered along the western edge of the trench (**Figure 7a**). The weighbridge was constructed from what appeared to be a single cast Fe squared box containing a recess and structural elements in the south eastern corner (**Figure 7b**). This structure was supported on a red brick wall **0579**. Within the upper surface of the south western corner was a cast moulding, into which was slid the rail **0584**. The rail itself was supported on six timber beams **0583** on a concrete raft **0582** (**Figure 7a**) with a clinker deposit **0585** poured within and around the structure, filling the remainder of the trench area. Another pair of rails to the east of **0584** was removed during mechanical excavation of the trench.

5.8 Trench 7

5.8.1 This trench was located to examine the central section of the 'main' former Vulcan Works building (**Figure 2, 'B'**). On initial machining this trench revealed a substantial concrete raft floor **0135**, which appeared to have re-utilised various structures from an earlier phase (**Figure 8a**). A small portion of this rafting was removed to assess these earlier structures (**Figure 8b**).

5.8.2 The earliest feature in this trench was a 3m long section of red brick walling **0175** aligned north-south. The bricks were unfrogged and possibly machine made, bonded by a fine sandy mortar. Incorporated within and butting against wall **0175** were two 3.25m long horizontally laid Fe H-beams **0171** and **0173** laid on edge perpendicular to it (**Figure 8b; Plate 3**). Beam **0171** appeared to have consisted of two H-beams, laid side by side, on a brick foundation **0177** above a mortar surface (**0178**). This beam appeared to be held together at the western end by two metal plates with an eye moulded into the upper plate **0170**. This was interpreted as a possible stopper and the two beams **0171** and **0173** as runners or guide rails, possibly for transporting material between the walling and the structures to the immediate west (see below). The area between the walling and the runners was backfilled by a deposit of clinker **0172**.

5.8.3 Deposit **0172** was truncated by a construction cut, possibly for a 2.5m long red brick wall **0147** containing a fixing bolt in its upper surface and a

possible machine footing **0179** bonded to this (**Figure 8b**). The cut was filled by a mid- reddish brown sandy silt **0158** onto which was laid badly degraded timbers **0145**, interpreted as possible motion dampeners. The purpose of the machinery is unknown, but it appears to have lain outside the eastern wall of the original Works, within a room uncovered in Trench 14 (Trench 14, wall 222, below). This addition is thought to have taken place between 1881 and 1900.

5.8.4 At the western end of the trench was a substantial pier and panel wall **0153**, 0.46m wide, containing at least two internal red brick piers (**Figure 8a**). This wall was abutted to the west by a fine white concrete **0154**, which appeared to act as support for a rail. The wall has initially been interpreted as belonging to a range of buildings to the immediate east of the 1900 Works; the rail can be seen in this location on OS maps from 1881 onwards.

5.8.5 A series of stanchion bases **0159**, **0166** and **0146** predated the modern concrete raft **0135**. The likely locations of two others (**Figure 8a**) were also observed. Voids **0148**, **0150** and **0156** within the concrete raft suggest that the stanchions were reused when the surface was put down. These voids were subsequently filled **0149**, **0151** and **0157** after the factory's demolition **0143** prior to the cutting of a modern cable trench **0139**, **0140** and deposition of various rubble and levelling layers **0152, 0136, 0176** (loose Fe plate) and **0137** laid below the modern asphalt surface (**0138**).

5.9 Trench 8

5.9.1 Trench 8 (**Figure 1**) was positioned to examine a linear works building present in the centre of the Site by 1900 (Wessex Archaeology 2010b, Figure 2). The trench was excavated to a depth exceeding 2m in order to locate the anticipated western building wall. No major structural remains were encountered. The trench was partially backfilled to allow safe recording to take place.

5.9.2 A substantial deposit **0055** of industrial waste dumps (probably deposited from west to east) was uncovered in the western end of the trench (**Figures 9a and b**). The deposits were at least 0.6m thick and were overlain by a 0.44m thick layer of clinker **0056**, which levelled the surface. The badly truncated remains of three roughly hewn sandstone slabs on a Fe plate **0067** overlay the flattened surface (**Figure 9a**). From its location in relation to the targeted building, it was not anticipated that this feature was structural. Overlying the feature were a blackened sandy deposit including clinker **0057** and an orangey pink soft hardcore **0058** measuring 0.5m thick. It seems likely that these deposits represent an attempt to consolidate the floor surface. The results from Trench 14 (see below) suggest that this made ground may have been laid between 1881 and 1900.

5.9.3 Truncating deposit **0058** was a modern electric cable trench **0059** measuring 4.4m long x 0.66m deep. A 0.06m thick layer of sand **0061** and overlying clinker **0062** covered the brick **0060** covered cable (**Figure 9a and b**). The cable trench was overlain by a 0.24m thick layer of industrial waste made ground **0063** beneath the modern grey concrete yard surface **0064**.

5.10 Trench 9

5.10.1 Trench 9 (**Figure 1**) was located towards the northern end of the former Vulcan Works building.

5.10.2 The initial sequence of deposits comprised natural clay **510** overlain by a 0.2m thick layer of re-deposited clay **511**, possibly related to terracing associated with the Midland Railway expansion in 1847. A 0.15m thick mixed layer of industrial waste and silt **513** was interpreted as an industrial waste spread from the first phase (1874) Works (**Figure 10b**).

5.10.3 Deposit **513** was truncated by the construction of two walls **516, 519** (**Figures 10a and b**) suggesting they were contemporaneous. Wall **519** has been interpreted as the northern wall belonging to the factory shown on the 1881 OS map. The wall was keyed into red brick column at its western end where wall **546** formed a return to the south. Wall **546** appeared to align with the western wall of the 1881 factory extension uncovered in Trenches 14 and 15.

5.10.4 The 1881 OS map of the Site (**Figure 2**) clearly shows a smaller building appended to the north of the factory. Walls **516** and **534** appear to align well with the northern and western exterior walls of this building whilst an internal division **533** within this room was also located (**Figure 10a; Plate 4**). The area between the walling appeared to have been filled by a 0.24m average thick deposit of light yellow clay **517** containing well sorted coal and clinker fragments (**Figure 10b**), interpreted as a levelling layer and possible floor surface for the 1881 factory.

5.10.5 A small truncated wall **548** (**Figure 10a**) was uncovered abutting the northern end of wall **546**. The coursing of the wall did not align correctly with wall **546**, suggesting it was a later addition. Wall **548** is interpreted as the extension to the western factory wall evident by 1900. A red brick lined drain **543** was located to the immediate west of this external wall. Two fragmentary, ephemeral walls **535** and **537** (**Figure 10a**) indicated possible further divisions within the northern room, abutted by a later concretion of mortar and CBM fragments **536**, which may have been a remnant floor surface. Several similar deposits (**520, 539** and **549**) containing a high proportion of industrial waste may indicate working spreads of material contemporary with the 1900 factory.

5.10.6 An unexcavated probable pit **540**, an enigmatic 0.55m deep linear cut **531** (**Figure 10a**) and a probable gas tap **522** (**Figure 10b**) may indicate the removal of structures and insertion of alternative power services prior to the building's demolition. Demolition cut **524** appeared as a horizontal truncation which appeared to level all the extant walling in a generally flat plane. This demolition has been tentatively assigned to the pre-mid 20th century. Cartographic evidence from 1916 shows considerable expansion to the work's eastern side; however, photographic evidence (Wessex Archaeology 2010b) shows that some of the earlier extant buildings were incorporated within the homogeneous structure first depicted on the 1916 OS map. This may imply that the structures associated with the late 19th century Works building may have initially been incorporated within this development. The fabric of the concrete itself appears modern, with none of the characteristics noted by the excavator to be typical to late 19th century

concrete. The demolition is likely to have been contemporary with the insertion of a large concrete machine base **545** and a stanchion **530** (**Figure 10a**) positioned centrally to the later stanchions uncovered in Trenches 14 and 15. A 0.06m thick layer of clinker **526** underlay the concrete raft **527** associated with the early 20th century development of the factory. A later reinforced concrete raft **528** directly overlay the earlier one. This rafting may have been associated with redevelopment of the site when United Steel took over the works in the late 1950s. This arrangement of concrete rafting was also seen in Trenches 3, 7, 14 and 15.

5.11 Trench 10

5.11.1 This trench was located within one of the surviving historic buildings (Wessex Archaeology 2010b, Building 01) to assess its former function. The results from the trench indicate that the building was a rail shed, possibly for wagon repair or finishing.

5.11.2 The earliest deposit in this trench was natural gleyed clay **0168**. This was overlain (**Figure 11b**) by a considerable depth of material in the form of a 0.72m thick deposit of small-medium coal fragments 0167; a 0.72m thick re-deposited natural **0164**, possibly from the Midland Railway terracing of 1847; and a 0.14m thick deposit of bluish grey sandy clay **0163** made ground surface.

5.11.3 A 0.32m thick layer of clinker and ash **0162** supported grey course particle cement **0161** which contained three rails **0165** of a standard railway gauge. The rails and previous concrete raft were overlain by the modern concrete surface **0160**.

5.12 Trench 11

5.12.1 This trench was located (**Figure 1**) to examine an east-west aligned building which first appeared on the 1900 OS map of the area along the northern boundary of the Vulcan Works plot.

5.12.2 A red brick wall **558** in the northern section of the trench (**Figures 12a and b**) was partially revealed along its length, measuring 0.87m high, with a brick pier measuring 0.47m long projecting out from the southern face of the wall by 0.24m. The bricks were unfrogged and hand made in appearance. No cut for the wall could be identified and it appeared to have been built directly on top of a 0.04m thick layer of compacted coal **550** laid on a sloping surface; this deposit may have been produced from waste from the Vulcan Works immediately to the east of the trench. The sloping surface beneath the wall was levelled periodically by a coarse sandy mortar **557** to keep the brick coursing level.

5.12.3 The wall was abutted by two layers of made ground **551** and **552**, culminating in a 0.12m thick layer of blackened sandy silt 553 with a highly compacted upper surface (**Figure 12b**), which may have acted as a floor or working surface. This layer was truncated by a semi-circular cut **554** measuring 0.6m x 0.33m x > 0.2m deep. Set within this was a rectangular post pipe **555** measuring 0.16m x 0.12m x (0.2m) which was packed around by a fine silty clay **556** (**Figure 12a**).

5.12.4 Following the demolition of the wall, the site was overlain by a 0.7m thick deposit of clinker, slag and ash **562**. A pinkish grey concrete column base **559**, similar to those uncovered in Trenches 3, 7, 9, 14 and 15, was uncovered in the western section within this deposit (**Figure 12a**). The trench sequence was overlain by two separate concrete rafts **560** and **561** respectively.

5.13 Trench 12

5.13.1 This trench was positioned (**Figure 1**) to examine terraced housing along the southern side of Bridge Street.

5.13.2 A series of four parallel red brick walls **0106, 0114, 0091** and **0093** was uncovered aligned NNE-SSW, extending across the full width of the trench (**Figure 13a**). The walls formed at least four separate terraced houses (here numbered 1-4 from west to east). An external blue brick paved surface **0105** abutted the western side of wall **0106**, probably within a covered passageway between this range of terraced houses and the block that would have been located further to the west. The bricks of the walling were unfrogged and appeared to be machine made. They were predominantly bonded by a light grey sandy mortar. Walls **0106, 0114** and **0093** were only one skin wide, whilst wall **0091** consisted of three skins in an alternating stretcher and header bond. The thinner walls may have been given structural support by small brick abutments (e.g. **0132** and **0133** on wall **0093** – **Figure 13a**). Alternatively, these may indicate the location of chimney breasts within the individual rooms. Houses 1 and 2 were 3.85m (12.62') wide whilst House 3 was 3.6m (11.81') wide.

5.13.3 Internal WNW-ESE aligned walled features within the houses were also uncovered, interpreted as individual room walls separated by a 0.9m wide gap which probably indicated the location of a stairway. House 1 had two single skin walls **0107** and **0108**. Between these walls was a red brick surface **0113** which was 0.63m lower than the surrounding brick floor surface (e.g. **0112**). This was interpreted as a possible sunken pantry located beneath the stairway. House 2 had similar walling **0117** and **0118**, which was not excavated. Structures in House 3 **0092** and House 4 **0129** appeared to follow the same alignment and width but differed in their construction design. House 3 was narrower than Houses 1 and 2; this may indicate differing builders or design. A possible chimney ash pit **0126** was also uncovered in House 3 (**Figure 13a**).

5.13.4 A sondage placed within House 3 (**Figures 13a and b**) identified the stratigraphic sequence for the construction of the houses. The construction cuts **0102** and **0104** for walls **0091** (House 2) and **0093** (House 3) both truncated the natural clay **0090**. A layer of grey clay **0089** was deposited prior to the construction of the stairway **0092** within House 3. The area between walls **0091, 0092** and **0093** was then made up by a series of deposits including clays (**0088, 0086, 0097**), industrial clinker (**0087**) and sandy silts (**0085, 0096, 0095**) prior to levelling deposits (**0084, 0094**) of gritty sand (**Figure 13b**). Similar deposits of gritty sand (**0109, 0110, 0111, 0120, 0119 and 0116**) (*Figure 13a*) appeared to form a level surface for the remnant red brick flooring **0112, 0113 and 0134** uncovered in Houses 1, 2 and 4.

5.13.5 House 3 was overlain by a demolition deposit of brick rubble **0098** prior to the hardcore levelling layer **0099** below the concrete modern car park surface **0100** which covered the trench.

5.14 Trench 13

5.14.1 Trench 13 was located to examine terraced housing to the south side of Victoria Street as depicted on the 1900 OS map of the area (**Figure 1**).

5.14.2 Two parallel walls **0070** and **0071** were aligned north-south and extended across the width of the trench (**Figure 14a**). **Wall 0071** was abutted by two single skin supports, **0072** to the east and **0073** to the west (**Figure 14a**). Wall **0070** truncated **0068** the natural light yellowish brown silty clay **0069**. The wall was constructed from what appeared to be hand made, unfrogged red brick. The eight extant courses were constructed in a stretcher bonded by a grey sandy lime mortar on a single stepped out brick foundation. The wall was abutted by a 0.5m thick deposit of greenish grey clay containing discreet dumps of clinker **0074** overlain by a 0.4m thick deposit of creamy clay and sand **0075**, containing large rounded stones and CBM fragments (**Figure 14b**). This deposit was interpreted as an early hardcore, which may have formed a levelling layer for the terraced house flooring. A 0.21m (average) thick deposit of clinker **0076** with a highly compacted upper surface overlay the hardcore and appeared to abut both of the walls.

5.14.3 The walls and deposits in the trench were then overlain by a 0.45m thick layer **0077** of clinker, ash, slag and silt made ground (**Figures 14a and b**) following the demolition of the houses. Cartographic evidence indicates that this took place between 1921 and 1938. Several concrete pads (**0078** and **0080**) and beams (**0079** and **0081**) (**Figures 14a and b**) probably relate to the expansion of the Works into this area, evident by 1966. Orange sand **0082** formed the bedding layer for the modern concrete surface **0083**.

5.15 Trench 14

5.15.1 Trench 14 was excavated to the north of Trench 7 up to the existing building in order to examine a wider portion of the central part of the Vulcan Works building (**Figure 1**). The excavations uncovered the factory's initial eastern and western external walls (**Figure 2, 'B'**).

5.15.2 The trench revealed that the initial walling associated with the factory was built in two distinct phases (see **243** below). The walling associated with the factory's initial construction in 1874 appears to have consisted of a west wall **244** and an east wall **245**, with an open end to the north. No evidence of a cross wall or significant disturbance indicating a subsequently removed wall between these walls was found (**Figure 15**). The walls were constructed from what appeared to be handmade, unfrogged red brick bonded by a light grey cement mortar. The two walls were constructed in a pier and panel method. The panels were 0.5m wide with 0.7m square piers along the uncovered lengths.

5.15.3 The two walls **244** and **245**, being truncated at the same upper level, were evidently built on a slope; the western wall **244** consisted of five courses on a three course stepped foundation, whilst the eastern wall **245** consisted of at least twelve courses. Although full excavation beyond the eastern wall was halted due to health and safety considerations relating to asbestos

uncovered in deposit **239** the difference in the ground level within the factory building and the probable ground level to the east was observed to be at least 1.3m.

5.15.4 The factory floor itself was made up of a 'dirty' yellow sandy clay containing fragments of coal interpreted as a re-deposited natural, possibly as a result of the Midland railway expansion in 1847. The difference in height suggests that considerable terracing was undertaken during the factory's construction. Alternatively, the dirty re-deposited natural could have been made up during the construction of the factory. This would imply that the eastern wall **245** may have acted as a terracing wall containing the made ground and, therefore, constructed prior to wall **244** which truncated this deposit. No similar cut for the eastern wall **245** could be discerned due to the extensive later activity along that section of walling.

5.15.5 The western wall **244** and **307/308** (**Figure 15**) appeared to incorporate an entrance to the building. The gap between walls **244** and **307/8** measured 2.7m. Elements of drainage **302-9** and **322** were uncovered below the floor level within the entrance way (**Figure 15**).

5.15.6 A number of structural elements were uncovered within the footprint of the first phase building (**Figure 15**). These consisted of: a U-shaped brick wall **314** and brick built machine base **316**; two sandstone blocks **290** and **291** containing recesses and fixing bolts in the upper surfaces; and a series of walls **349** and **329** with sandstone blocks **299** and **326-8**. The function of these machine bases is unclear. Deposits around the structures (**260, 292, 293, 294, 295, 311, 312, 313, 324** and **329** – **Figure 15**) were sampled for archaeometallurgical analysis (section 6.4 below) to try and determine structural function. The higher abundance of scale present in Sample 3 (**293**) may indicate that this was from an area where metal was being formed. This may suggest that sandstone blocks **290** and **291** may have been involved in that process and further consideration of their function and the wider process flow within the factory may be possible.

5.15.7 As discussed above, the initial factory appears to have seen two major phases of construction. The 1881 OS map (**Figure 2**) of the area suggests that this extension had taken place by that date. The second phase consisted of northern extensions to the east and west factory walls. The original western wall **244** was abutted by wall **232** and the original eastern wall **245** by **243** (**Figure 15**). The new walling was constructed from handmade, unfrogged bricks which were marginally smaller than those used in the first phase. The new walls were constructed in the same pier and panel method, but were narrower than the original walling. The panels measured 0.36m and the piers are 0.6m wide. Another indication of the differing phasing was the slight difference in coursing levels between the two walls (**Plate 5**).

5.15.8 Within the footprint of the second phase walling, towards the western wall **232** were three sandstone blocks **250, 251** and **252**, aligned north-south along the western boundary of the factory extension (**Figure 15**). Between these blocks were at least four separate courses of timbers **258**, each timber measuring 0.16m wide x 0.03m thick. The arrangement of blocks and timbers is similar to that of steam hammers excavated by the author, the two outer blocks **250** and **251** possibly relating to feet fixings and the central

block **252** and timbers **258** perhaps representing the anvil and percussion dampeners. The machine suggested here appears to be less substantial in design than otherwise similar structures seen by the excavator at Monks Bridge Forge (Dransfield 2008) and Kirkstall Forge in Leeds (Dransfield 2009), perhaps a steam press rather than a percussion hammer (Dr. Rod Mackenzie, pers. comm.). The close proximity of the machine to the western wall would seem to substantiate this interpretation. The structure was overlaid by various concrete surfaces probably relating to later factory flooring (see below).

5.15.9 A remnant brick floor **283** to the west of the pier in wall **243** (**Figure 15**) also belonged to the second phase building. Overlying **283** were two structures. Set within the factory on an east-west alignment was a large rectangular brick structure **271/3** measuring 5.7m long x 2.3m wide, which incorporated two central H-beams **277** resting on H-beam supports at either end (**275** and **276**) (**Figure 15, Plate 6**). Fixing bolts were located in the northern brick walling and a small sandstone block **274** was set centrally within the southern wall of **271** (**Figure 15**). It seems likely that machinery was held in position within the central part of the structure and H-beams **277** may have allowed the transportation of material along the length of the girder, possibly assisted by the central machine.

5.15.10 To the immediate east of this structure were two badly damaged pinkish gravel concrete blocks **281** and **289** and a concrete surface **282** poured between the upstanding structure **271** and the earlier wall **243** (**Figure 15, Plate 6**). It was clear from their construction that the two features were contemporary and the H-beam structure **277** appeared to align centrally between blocks **281** and **289**. It is possible that structures **281, 289** and **282** represent the location of a later press and that the structure to its immediate west was connected to the lifting and positioning of heavy materials in alignment between the two feet **281** and **289** to the location of an anvil placed on flooring **282**.

5.15.11 Abutting the first phase wall **245** at the south east corner of the trench was an east west aligned wall **222** at least 1.4m high, consisting of at least sixteen courses of brick (**Figure 15**). The wall was faced to the north, towards the location of the lower terraced area to the east of the factory building. The southern face may have been internal and the early structures uncovered within Trench 7 may well relate to this phase of the factory. The wall does not appear on the 1881 or 1884-5 OS maps of the area (**Figure 2**) but appears to be centrally located in the additional building shown to append the eastern factory wall on the 1900 OS map. This would imply that the walling here was constructed between 1885 and 1900.

5.15.12 By 1900 the eastern wall of the factory appears to have been partially demolished. A line of stanchions **354, 355, 237, 238** and **335** was built along the eastern factory wall, together with a substantial poured concrete block **230** measuring 4.1m x 3.4m x at least 1.1m high (**Figure 15**). The upper surface of this block contained a 1.6m diameter raised area in the centre with four fixing bolts close to the edge. Surrounding the raised plinth were four square blocks of four rectangular recesses, presumably to hold machine feet. This feature (**230**) is interpreted as a possible crane base, the location of which appears to fit within the northern part of the eastern

extension to the factory shown on the 1900 OS map. The subsequent void between the crane base and the lower terraced area between walls **245** and **222** was filled with a combination of brick rubble **239**, sand and gravel **342** which would have provided structural support for the stanchion **238** (**Figure 15**). The presence of asbestos within the deposit is not inconsistent with the date of the deposit (c. 1900).

5.15.13 It is unclear whether the western foundry wall was demolished at this time; OS maps of the area suggest this wall remained intact. A line of stanchions **264, 262, 353, 227, 226** and **335** some 1.75m to the east, parallel to the extant wall (**Figure 15**) suggests that some re-arrangement to the roofing may have taken place at this time.

5.15.14 Several truncated concrete pads (**320** etc), particularly around the steam press (**253, 254, 255** and **257**) probably related to the 1900 factory floor. Several badly truncated concrete blocks (**223, 265-7** and **317**) possibly indicate machine bases contemporary to the flooring (**Figure 15**).

5.15.15 The area was covered by a 0.2m thick layer of clinker and slag **247** prior to the mid 20th-century concrete floor surface **220**. Several voids truncating deposit **247** (e.g. **248, 297, 309** and **268**) (**Figure 15**) may indicate the removal of machines. Later concrete pads **346** and **350** within a brick walled shuttering **351** presumably indicate the location of further machine bases.

5.15.16 A modern electric cable **224** (also seen in Trench 7) traversed the area from north-west to south-east. Cut **221** (not shown on this level plan) which extended east to west across the northern quarter of the trench was a construction cut for the extant building occupied by Heanor Haulage to the north of the trench (Wessex Archaeology 2010b, Building 02).

5.16 Trench 15

5.16.1 This trench was located between Trenches 3 and 14 (over Trench 7) to tie together the results of the excavated areas (**Figure 1**). The trench was located within the walling of the initial Vulcan Works building as determined from Trench 14. The results from the excavation uncovered a number of structures, probably from the first phase of construction in 1874. For ease of reference these have been grouped here as A-D (**Figure 16**).

5.16.2 The first two structures (A and B) were probably related to the primary drive mechanism within the works. **Structure A** consisted of a rectangular brick building measuring 4.95m long x 2.9m wide, aligned east to west and probably abutting the western factory wall, which lay just beyond the limit of excavation (**Figure 16**).

5.16.3 Within the south east interior corner of Structure A was a smaller squared brick structure **414** measuring 2.2m x 1.7m (**Figure 16**). Evidence of a 0.02m wide fixing bolt within the wall suggested that this structure held some form of machinery above it. Towards the north western corner, a short section of walling **410** was abutted to the interior of the superstructure **409** (**Figure 16**). The internal space between **410**, the south face of **409** and the northern face of **414** formed a rectangular void measuring 4m x 0.48m, which was later filled by a post demolition mixture of clinker and rubble **415**.

Excavation within the void 2m to the south of this and its alignment to drive wheel **422** (below) suggests this void was a possible flywheel housing.

5.16.4 **Structure B** lay immediately to the south of Structure A and the two structures were bonded by a southern projection of wall **440** and a sloping brick surface **502** (see below). The main superstructure of Structure B consisted of a rectangular brick building creating a 1.38m wide surface within the northern walling (**Figure 16**). The external dimensions were the same as Structure A. It was likely that the walling created a flat upper surface and excavation revealed that the upper four courses of brick had been truncated on demolition (**Plate 7**). Set within this surface was the partial remains of a sloping concrete wheel housing **422** (**Figure 16; Plate 7**). Fixing bolts were located towards the corners of the structure and two voids, located centrally within the arc of the housing suggested the location of machine feet.

5.16.5 The 0.48m gap between Structure B and Structure A to the north created a void which measured the same width as the void in Structure A (above). The western edge of the void was denoted by the southern projection of wall **440** (**Figure 16**). Excavation at the eastern end of the void revealed a curved, sloping brick surface **502** which bonded the two structures. This was interpreted as the base of a wheel pit. The eastern end of the wheel pit was enclosed by a 0.56m high vertical wall **419** which extended along the eastern face of wall **413**. The centre of the void aligned with the central arc of **422**. The void was marginally longer than that within Structure A, measuring 4.85m.

5.16.6 The western elements of Structure B comprised a 1.44m x 0.84m wide flat brick structure **438** and a 0.84m long brick wall **439**, abutting the inner face of wall **436** (**Figure 16**). Two fixing bolts within structure **438** would have aligned with a wheel contained within **422**. It seems possible that a machine was located over structure **438** which may have held a subsidiary drive shaft that fed off a drive belt from the wheel in structure **422**.

5.16.7 Immediately to the south of Structure B was a substantial squared brick flue **427** measuring at least 8m long x >1m x 0.5m high (**Figures 16 and 17**) and topped by sheets of cast iron, with what appeared to be heavily heat affected ganister overlying these. Examination within the feature suggested that the flue extended from at least the eastern boundary wall **486** to where it was exposed in the trench. The flue was aligned ENE – WSW, dog-legging to align roughly E-W just to the south of Structure A (**Figure 16**). The surrounding soil **460** showed considerable heat discolouration closer to the structure itself (**Figure 17**). The flue was interpreted as a hot air flue. Unfortunately, the upper part of the flue adjacent to Structure A was damaged due to the insertion of later chimney (**450**) and drainage (**443**) cuts, as well as machine (**445, 462**) and stanchion (**407**) bases (**Figures 16 and 17**), so it is unclear if there was a vertical flue located here to power a boiler, which may have been located at the southern end of Structure B.

5.16.8 It seems likely that hot air from the flue **427** may have heated water in a vertical boiler and engine which may have been located on Structure B. This engine may have powered a drive shaft, turning the wheels located within structure **422** and the voids in Structures A and B.

5.16.9 Two other features were associated with the first phase construction. To the north-eastern corner of Trench 15 was a 2.85m x 1.7m wide brick surface **477** containing six 0.03m diameter fixing bolts set in voids within the surface (**Figure 16**). The south of the surface was contained within a rectangular walled surround **482** which was keyed into the eastern factory wall **486**. An oily swarf material **478** overlying the surface suggests that a machine (**Structure C**) was located here.

5.16.10 Overlying the position of the hot air flue **427**, abutting the eastern wall **486** of the factory were substantial timbers **489/490** which surrounded a rectangular concreted block with a raised central surface **491** (**Figure 16**). The structures were laid on a foundation of compacted clinker **488** and the structure (**Structure D**) was interpreted as a hammer or press. The centre of the structure was disturbed by cut **492**, presumably made to remove the possible anvil and the possible location of the southern foot was removed by the insertion of a 2.5m long block of concrete **469** abutting the eastern wall (**Figure 16**).

5.16.11 The wall **482** surrounding Structure C and the eastern factory wall **486** where then partially demolished. Two concrete machine footings **483** and **504** were incorporated into the extant demolished walls (**Figure 16**). These may relate to the structures uncovered in Trench 7 (above): early features 0171 and 0173 and wall 0175 may have lain immediately to the east of this location. It is possible that these structures were contained within the walling 222 uncovered in Trench 14 (see 5.15.11 above), which has been dated to between 1885 -1900.

5.16.12 A 9.5m long pipe trench **431** with manhole **470** truncated the walling associated with Structures A and B (**Figure 16**). It is possible that this pipe was associated with rectangular brick walled building **400** located in the north west corner of the trench.

5.16.13 Several other features were also uncovered. Four concrete pads **473, 417, 445** and **469** probably related to machinery following the initial phasing of the factory. A line of stanchion bases **403-407**, which probably date to the 1900 factory, align with those uncovered in Trenches 7 and 14 (**Figure 16**).

6 FINDS

6.1 Introduction

6.1.1 Finds were recovered in small quantities, some relating to the use of part of the Site as the Vulcan (engineering) Works, others representing more general domestic refuse. There is also a small group of stoneware pottery, including some wasters, which appear to derive from the Langley Mill pottery founded by James Calvert in 1865 on the opposite side of Wesley Street, to the south of the Site.

6.1.2 All of the finds recovered from the Site are demonstrably or probably of post-medieval date, and those that can be more closely dated all fall within the date range of late 19th to 20th century.

6.1.3 All finds have been quantified by material type within each context, and the results are presented in **Table 1** in **Appendix 3**.

6.2 Pottery

6.2.1 All of the pottery is post-medieval, and falls into three groups: stoneware vessels, including wasters; other vessels in various wares; electrical and other household fittings. All pottery has been quantified by ware type within each context, and totals by ware type are given in **Appendix 3, Table 2**.

Stoneware vessels

6.2.2 The largest proportion of the pottery assemblage is made up of stonewares, and these appear to comprise a group of waste production material; several definite wasters are included. A large number of these stoneware vessels were encountered on the Site, and the vessels recovered and discussed here comprise a sample of c. 10% of the total.

6.2.3 Most vessels are salt-glazed (mid to dark brown) although some have feldspathic' 'Bristol' glaze (beige to grey), and some combine the two. Eight vessel forms are represented by complete or nearly complete examples (types 1-8), and two more forms by more fragmentary pieces (types 9 and 10):

1. Small, squat, cylindrical ink bottles with conical neck and narrow rims; diameter of body 47-52mm; total height 46-51mm (most examples are missing at least part of the rim). Salt-glazed exterior. The most common form present (33 examples); the discarded portion of the total stoneware assemblage encountered on the Site consisted primarily of these vessels.
2. Taller cylindrical ink bottles, probably with similar rim/neck forms; only one example, with rim missing (diameter 36mm; surviving height 68mm). Salt-glazed exterior.
3. Small cylindrical ink bottle or polish pot with slightly concave neck and beaded rim; one example (diameter 32mm; height 42mm). Salt-glazed exterior.
4. Conical ink bottle with short neck and narrow rim; one example only (base diameter 54mm; height 64mm). External grey 'Bristol' (feldspathic) glaze.
5. Cylindrical ink bottle with slightly concave neck and expanded rim with pinched pouring lip; one example, rim/neck only. External grey feldspathic glaze.
6. Small, squat, cylindrical jar with external groove below rim (for lid attachment?); diameter 55-7mm; height 55mm. Salt-glazed exterior; internal grey feldspathic glaze. Eight examples.
7. Polish pot (or blacking bottle); cylindrical body, slightly concave neck and beaded rim; one example (diameter 50mm; height 97mm). Salt-glazed exterior.
8. Ginger beer bottle; cylindrical body with slightly concave neck and collared rim; one example only, 'waster' (rim/neck slumped over into top of body); diameter 66mm, height 119mm to shoulder. Salt-glazed exterior.
9. Large extract jar, cylindrical, with external groove below rim (for lid attachment); one example, diameter *c.* 120mm. External grey feldspathic glaze with yellow ochre dip over rim; decorative rouletted band below lid attachment groove. Other base sherds (diameter *c.* 180mm may derive from similar jars).

10. Possible extract jar, only two examples of rims sherds only; cylindrical body with beaded rim. Salt-glazed exterior.

6.2.4 The complete ginger beer bottle waster (type 8) from context **0043** (Trench 2) bears a customer's name (Townshend of Salford), and there is a second customer's mark, of Belle Vu[e] (unknown location) on a ginger beer bottle or polish pot base from context **0077** (Trench 13).

6.2.5 One bottle base from context **0004** (either a polish pot or ginger beer bottle) bears the stamp of James Calvert, 'Vitrified Stone Ware Manufacturer', at the North Shipley Pottery. The stamp is unfortunately faint on the right hand side and it cannot be determined whether it reads 'Langley Mills' (used from 1865 until at least 1870), or 'Langley Mill', a later variant used until 1878.

6.2.6 Although the source of the other vessels cannot be proved, it seems most likely that most if not all were also Langley Mill products. Five of the vessel forms can be paralleled within the utilitarian range produced by Calvert between 1865 and 1883 (types 1, 2, 6-8; Giblin and Giblin 2002, 11, 14), although production continued during the later partnership of Calvert and Lovatt (1883-95), when new art wares were introduced, and three forms appear amongst the range produced after Albert and John Lovatt took over the pottery in 1895 (types 3-5; Giblin and Giblin 2002, 77). Production of the utilitarian wares continued under Lovatt & Lovatt Ltd until 1930, and then under the ownership of James Oakes & Co. (1931-59; Giblin and Giblin 2002, 120), although still trading under the name of Lovatt's Potteries Limited.

6.2.7 A directly comparable range of forms was produced by the Fulham Pottery under Charles Bailey between 1864 and 1890 (Green 1999, figs. 138-9), and several appear in the illustrated catalogues of James Stiff & Sons of Lambeth, or Doulton & Watts, both from 1873 Green 1999, 361-8).

6.2.8 These vessel forms make up most of the groups found in contexts **0004** and **0194** (Trench 1), **0043** (Trench 2), and **0077** (Trench 13); other examples came from contexts **0048** (Trench 2), **0028** (Trench 4), **388** (Trench 5), **0162** and **0163** (Trench 10), **0084** and **0094** (Trench 12), and **442** (Trench 15). The possible later forms (types 3-5) were found only in context **0077**.

6.2.9 Three further stoneware sherds, all with feldspathic glaze, from other contexts (**375** and **418**), are of unknown form, but could also belong to this group of production waste. The only context that appears to be broadly contemporary with the period of production of these stonewares is context **0004**, the made ground and yard surface associated with the original Methodist chapel (on the 1881 OS map); this context contained the vessel bearing James Calvert's stamp (1865-78), and vessels of types 1, 2 and 6. Other contexts are all stratigraphically later and most represent post-demolition deposits.

Other Vessels

6.2.10 Other wares represented comprise coarse redwares, all from internally glazed bowls in various sizes, and a small range of factory-produced wares (bone china, pearlware, whiteware and yellow ware), largely in tea ware forms. While the redwares have a broader potential date range throughout

the post-medieval period, they are likely to be contemporary with the factory-produced wares, which date from the late 18th through to the 20th century; decorative treatments are common (transfer-printing, slip-banding, Mocha decoration) and do not help to narrow the date range. These sherds are likely to represent domestic refuse.

Fixtures and Fittings

6.2.11 Fragments of possible porcelain electrical fittings came from contexts **423** and **432**, and fragments of sanitary ware (part of a pipe junction with internal screw thread) from context **0149**.

6.3 Glass

6.3.1 All of the glass is of 19th or 20th century date, and includes both vessel and window glass. The vessel glass includes bottles – for wine, milk and other beverages – and one fragment from a decorative bowl. Several of the bottles are embossed, although only two have identifiable marks – that of SCWS [Scottish Co-operative Wholesale Society] Shieldhall, Pure Coffee Essence on a square green bottle of early/mid 20th century date from context **423**; and that of Blackwood & Co, London, on an octagonal ink bottle from context **0084**.

6.4 Potential and recommendations

6.4.1 The group of stoneware pottery production waste is of local and regional interest; the Langley Mill Pottery factory from which they probably originated was situated adjacent to the Site, but the distribution of products extended beyond the local area, as demonstrated by at least one customer's mark from further afield.

6.4.2 The potential of the stonewares to provide close dating for the various contexts in which they occur is limited; the forms are likely to have relatively lengthy currencies, and in only one context (chapel yard surface 0004) are they likely to have been deposited close to the actual period of production. Nevertheless, this small group warrants a brief publication note in order to illustrate the range of vessel forms recovered, and to set them within the context of stoneware manufacture of the late 19th century. Approximately 10% of the material has been retained and may provide a useful addition to material already published (Giblin and Giblin 2002) on the factory's wares.

6.4.3 Of the small quantities of other finds recovered from the Vulcan Works trenches the pottery, particularly the Langley Mill Pottery stonewares, can be cross referenced with similar stonewares uncovered within the terraced housing and the Methodist chapel; this may aid in refining the chronological sequence of the Site in relation to development of the wider community.

6.4.4 The pottery and the glass recovered from the terraced houses can all be categorised as incidental domestic refuse and is of little or no further potential. All relevant details of typology and possible date have been recorded in the project archive. These finds will be discarded prior to archive deposition, a policy that has been agreed with the recipient museum.

6.5 Archaeometallurgy (Dr Rod Mackenzie)

Introduction

6.5.1 The aim of this assessment has been to identify any diagnostic materials in the assemblage, and also highlight where further analysis of objects could add to existing knowledge of the site and processes carried out there.

6.5.2 A basic identification and catalogue of the material had been prepared by Wessex Archaeology prior to this assessment. As part of this assessment, a description and/or provisional identification of some items has been added to the existing catalogue table (**Appendix 3, Table 3**). It should be noted that, at this stage, no microscopic or chemical analysis has been carried out.

6.5.3 The assemblage consists of three types of material; metals, bulk slag and spot samples of fine 'industrial residues'. A brief overview and interpretation of each type of material is given below.

Overview of materials and interpretation

6.5.4 The ferrous metal objects in the assemblage are predominantly short (sub-1m) lengths of rolled or forged bar; most are round or rectangular in cross-section, although two pieces are hexagonal in section. The assemblage also contains a piece of ¼ inch thick rolled plate. Visual inspection suggests that the objects are made from wrought iron, mild steel and possibly higher carbon steel.

6.5.5 The assemblage also contains a small number of non-ferrous metal items. One small piece of copper alloy swarf was recovered, along with an unusual shaped piece of copper alloy sheet; possibly a tool of some type. Two items appear to be brass lighting fittings, and one of these is from a gas light.

6.5.6 The slag in the assemblage appears to consist of three distinct types; dense black-dark brown glassy slags, low density porous slag with coke inclusions, and un-diagnostic slag/conglomerates. The dense glassy slags and low density porous slags appear to relate to the smelting or re-melting of cast iron, either in blast furnaces or cupola (re-melting) furnaces. In the author's opinion, given the nature of the works, the slag is more likely to relate to the re-melting of iron in a cupola furnace.

6.5.7 All of the spot samples of industrial residues are composed of crushed coke, ash, soot and flakes of iron oxide scale. The latter is often referred to as 'flake hammerscale', although it is also produced when iron or steel is heated and exposed to air during hot rolling or pressing. With the exception of Sample 3, none of the samples contain enough scale to suggest that they were recovered from areas where hot iron or steel was being formed. The higher abundance of scale present in Sample 3 may indicate that it was from an area where metal was being formed. Given the predominantly 'cindery' nature of the samples, it seems likely that the material was deliberately deposited as flooring or backfill material.

Potential and recommendations

6.5.8 The metals in the assemblage suggest that the Works was using a range of metals, including wrought iron, steel and possibly brass. It is likely that at

least some of the ferrous metal bars recovered were stock material that was being incorporated into products being manufactured at the works. Metallurgical analysis of the pieces could identify the range of metals being used at the works, and whether the pieces were forged or rolled.

6.5.9 The relatively limited range of slag types present suggests that, if these were produced on-site, the Works had a cupola furnace for re-melting cast iron. At present, there is not enough evidence to link any of the metals found to the slag or other residues recovered. The majority of the slag in the assemblage appears to relate to one metallurgical process. Analysis of some pieces of slag would enable its production process to be identified, and its chemistry may provide information that could be used to investigate the possible 'in house' production of some of the metal bars recovered.

6.5.10 Although the assemblage offers some potential, further analysis of slag and metals from the late 19th to early 20th century is normally only justified where there is specific supporting historical or archaeological evidence, and/or if the materials themselves are metallurgically rare or unusual. In this case, the nature of the archaeological contexts of the assemblage means that most of it is of limited research potential and further metallurgical analysis is not, therefore, recommended.

7 DISCUSSION

7.1 Introduction

7.1.1 A total of fifteen trenches were excavated in the archaeological evaluation and mitigation phase of this project. Eleven trenches examined the former Vulcan (engineering) Works; two trenches examined the former Wesleyan Methodist chapel; and a further two trenches examined former terraced housing along Bridge Street and Victoria Street.

7.1.2 Very little is known about the former Vulcan Works in terms of its development and the range of processes carried out there. The results from the trenching have increased our knowledge considerably and combined with data from the Methodist chapel and terraced housing provide an insight into the Works and the surrounding community.

7.1.3 The following discussion outlines the archaeological potential of the results from each of the areas of investigation.

7.2 Vulcan Works

Summary

7.2.1 The results from the excavations have revealed a more complex history of development than the available cartographic evidence suggests. It is likely that the original factory building built by Turner in 1874 was considerably shorter than the building shown on the first OS map of the Site in 1880/1. The building's external walling was constructed in a pier and panel style, probably allowing air flow through the lower panel wall segments, and was likely to have been open ended to the north. A number of structures were identified within the northern part of the building that may have been

associated with the re-melting and forming of metal, including wrought iron, steel and possibly brass.

7.2.2 The central part of the building appears to have been primarily associated with the primary drive engine/s for the factory. A substantial hot air flue may have been associated with two large flywheels and secondary drive shafts that may have fed power throughout the factory. No evidence for the engine type was found, but analysis of the potential foundation surface and spatial positioning suggest some form of vertical steam boiler. A further press and machinery were also recovered in the central portion of the works.

7.2.3 Between the factory's initial construction in 1874 and the first cartographic evidence in 1880 the factory was extended to the north. Walling associated with the pre-1880 expansion of the factory was identified. Structures within this expansion suggest that the extended area of the factory was involved in the pressing of metals and that at least two phases of development had taken place.

7.2.4 Further development had taken place between 1881 and 1900 in the extension of the central, eastern portion of the works. This involved the partial demolition of the eastern wall and the construction of a substantial east west wall. This walling may have formed the northern wall of an ante-room containing machine bases and structures to allow the movement of heavy materials to them.

7.2.5 By 1900 this addition to the east was subsumed within further expansion at the factory. Two lines of sandstone column bases were constructed, the western line some 1.75m within the former western building wall and the eastern line along the former eastern wall. This suggests both that the former eastern wall was demolished and that the wall was extended further to the east in line with buildings shown on the 1900 OS map of the area. The western wall appeared to have remained standing, but the re-alignment of the column bases suggests a re-alignment of the roofing structure over the factory. The factory floor appeared to have been overlaid by a concrete surface, overlying most of the earlier internal structures, and several later machine bases were uncovered that probably date to this phase. It also appears that the lower terraced area to the east of the factory complex was in-filled with a considerable depth of industrial waste material prior to the construction of probably insubstantial sheds and the expansion of the internal rail infrastructure into this area.

7.2.6 Later concrete floor surfaces, possibly dating to the early-mid 20th century, appear to have incorporated and re-used the earlier stanchion bases. Several unidentified machine bases were also recorded. It may be possible to relate this phase of archaeology with both the standing building recording and the later archive material on the Works.

Archaeological Significance – Vulcan Works

7.2.7 The results from the Vulcan Works are considered to be of local importance. The railway wagons and mining equipment produced at the Works were sold nationally and the "chief office" headquarters were located in London by 1903. The Works were built and initially operated during a major period of British industrial and colonial expansion (1870 to 1900), eventually

leading to the British Empire covering one quarter of the world during this period (Scott-Bauman 1995).

7.2.8 Very little is known about the development of the Vulcan Works during the late 19th century. The data from the excavations can greatly increase our understanding of the structural development and the processes undertaken during the earlier phases of construction at the Vulcan Works.

7.3 The Wesleyan Methodist chapel

Summary

7.3.1 The excavation uncovered parts of the original Methodist chapel as shown on the 1881 OS map. Part of the chapel's external walling was revealed, forming the north-west corner of the building. A series of low internal brick walls forming small cells are likely to be internal floor supports. Part of the original eastern walling and entrance porch was also uncovered. The excavations revealed that the chapel and its foundation were both constructed from brick, which is not entirely clear from historic photographs of the eastern entrance. A contemporary yard and path surface, abutted the eastern entrance, the compacted deposits here containing stonewares produced at James Calvert's Langley Mill Pottery (1865 and 1883).

7.3.2 The southern wall of the Sunday school which was appended to the north of the original chapel was also uncovered. The results of the excavations here suggest that the additional works may have necessitated the removal and relocation of the chapel's original apse.

7.3.3 The chapel was extended to the east in 1911. Several low, thin walls which were probably floorboard supports were uncovered during the excavations.

Archaeological Significance – Wesleyan Methodist Chapel

7.3.4 The results of the excavations relating to the Methodist chapel are considered to be of minor local significance. However, they do provide a community contextual framework for the Vulcan Works and add to our knowledge of some of the structural elements and alterations made to the building.

7.4 The terraced houses

Summary

7.4.1 The excavations uncovered the partial remains of a number of houses that faced Bridge and Victoria Street. The results from the houses fronting Bridge Street, partially revealed front and back rooms with possible fireplace locations and remnant brick flooring. The rooms were divided by stairways between them. The stairways may have contained sunken pantries or larders beneath them. The excavations also revealed the construction methodology and suggest that individual pairs of houses were constructed to differing methodologies and dimensions.

7.4.2 The excavations of the houses fronting Victoria Street were rather less informative. Severe damage from the steel works during the early 20th century had damaged much of the archaeology relating to the houses. Only two walls with cross supports and possible remnant floor levelling deposits were uncovered.

Archaeological Significance – terraced houses

7.4.3 The results of the excavations relating to the terraced housing are considered to be of minor local significance only. Again, they provide a community contextual framework for the Vulcan Works and add to knowledge of housing construction techniques.

8 ARCHIVE DEPOSITION, STORAGE AND CURATION

8.1 Museum

8.1.1 The project archive resulting from the excavation is currently stored at the Sheffield offices of Wessex Archaeology and will be deposited in due course with **Derby Museum and Art Gallery**. The Museum has agreed in principle to accept the project archive on completion of the project, under the Accession Number **DRBYMU:2009.215**. Deposition of the finds with the Museum will only be carried out with the full agreement of the landowner.

8.1.2 A written agreement regarding the ownership and curation of the finds from the excavation will be reached with the Museum.

8.2 Conservation

8.2.1 No conservation requirements have been identified in respect of any of the materials recovered form the Site.

8.3 Storage

8.3.1 The finds are currently stored in perforated polythene bags in cardboard or airtight plastic boxes, ordered by material type, following nationally recommended guidelines (Walker 1990).

8.4 Discard policy

8.4.1 Wessex Archaeology follows the guidelines set out in Selection, Retention and Dispersal (Society of Museum Archaeologists 1993), which allows for the discard of selected artefact categories which are not considered to warrant any future analysis. In this instance, pottery and the glass categorised as incidental domestic refuse and of little or no further potential will be discarded prior to archive deposition (see 7.4.3 above). The discarding of any other artefacts will be carried out only with the complete agreement of Derby Museum and Art Gallery.

8.4.2 The discard of environmental remains and samples follows the guidelines laid out in Wessex Archaeology's Archive and Dispersal Policy for Environmental Remains and Samples. The archive policy conforms with nationally recommended guidelines (SMA 1993; 1995; English Heritage 2002) and is available upon request.

8.5 Archive

8.5.1 The complete site archive, which will include paper records, photographic records, graphics and artefacts, will be prepared following the standard conditions for the acceptance of excavated archaeological material by Derby Museum and Art Gallery, and in general following nationally

recommended guidelines (Walker 1990; SMA 1995; Richards and Robinson 2000; Brown 2007).

8.5.2 All archive elements are marked with site code 73610, and a full index has been prepared. The contents of the archive are summarised at **Appendix 1**.

8.6 Copyright

8.6.1 The full copyright of the written/illustrative archive relating to the Site will be retained by the Wessex Archaeology Ltd under the Copyright, Designs and Patents Act 1988 with all rights reserved. The recipient Museum, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use shall be non-profitmaking and conforms to the Copyright and Related Rights Regulations 2003.

8.6.2 This report, and the archive generally, may contain material that is non-Wessex Archaeology copyright (e.g. Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which we are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the Copyright, Designs and Patents Act 1988 with regard to multiple copying and electronic dissemination of the report.

8.7 Security Copy

8.7.1 In line with current best practice, on completion of the project a security copy of the paper records will be prepared, in the form of microfilm. The master jackets and one diazo copy of the microfilm will be submitted to the National Monuments Record (English Heritage), a second diazo copy will be deposited with the paper records, and a third diazo copy will be retained by Wessex Archaeology.

9 BIBLIOGRAPHY

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10 APPENDIX 1: ARCHIVE INDEX

File No.	NAR Cat.	Details	Format	No. Sheets
1	-	Index to Archive	A4	1
1	A	Client Report	A4	77
1	A	3 x W.S.I.	A4	49
1	B	TBM Heights	A4	1
1	B	Day Book (photocopy)	A4	18
1	B	Context Register	A4	19
1	B	Context Records	A4	457
1	B	Graphics Register	A4	5
1	B	Site Graphics	A4	22
1	B	Site Graphics	A3	29
1	B	Object Register	A4	1
1	B	Sample register	A4	1
1	D	Photographic Register	A4	37
1	D	Colour Slides	35mm	299
1	D	Colour Slide Discs	CD	13
1	D	B/W Contact Sheet	A4	13
1	D	B/W Negatives	Neg	299
1	D	Digital Images	CD	1
1	B	Trench Matrices	A4	15
FINDS	No. OF BOXES (1)			

11 APPENDIX 2: CONTEXT SUMMARY

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
1		Masonry	Wall	
2	21	Masonry	Probably eastern external wall of chapel as on 1900 plan.	Construction cut for wall 2.
4		Layer/Deposit	Levelled surface.	
6	5	Layer/Deposit	Loose fill after removal of wall.	Footprint of N-S wall subsequently removed.
7	8	Masonry	Possibly north wall of chapel entrance.	Cut Assigned to N wall of original chapel entrance
10	9	Layer/Deposit	Packing for wall 11.	Cut for wall 11
11		Masonry	Low N-S wall. Purpose unclear.	
12		Layer/Deposit	Levelled surface.	
14	13	Layer/Deposit	Packing for wall 15.	Construction cut for wall 15.
15		Masonry	Low N-S wall. Purpose unclear.	
16		Layer/Deposit	Levelled surface.	
18	17	Layer/Deposit	Packing for wall 019	Construction cut for wall 019
19		Masonry	N-S wall. Probably related to post-1900 extension of chapel.	
20		Masonry	N-S red brick wall.	
22		Layer/Deposit	Natural clay.	
24	23	Layer/Deposit	Fill after rail removed from cut 23	Cut for probable rail support.
26	25	Layer/Deposit	Fill after removal of rail support 25.	Cut for probable rail support.
27		Layer/Deposit	Degraded wood. Possible rail sleeper.	
28		Layer/Deposit	Industrial waste - made ground.	
29		Layer/Deposit	Made ground for contemporary surface.	
30		Layer/Deposit	Bedding/levelling layer for 31.	
31		Layer/Deposit	Former yard surface.	
32		Layer/Deposit	Modern concrete yard surface.	
33		Layer/Deposit	Very similar to material in upper part of site.	
34	35	Masonry	External wall foundations built from red brick.	Trench cut for wall 34.
36		Masonry	Red brick internal wall.	
37		Masonry	Internal red brick wall. Possible floor support.	
38		Masonry	Red brick wall section.	
39		Masonry	Red brick drain base.	
40		Layer/Deposit	Packing/levelling deposit.	
41		Layer/Deposit	Black layer, very rich in inkwells and other stoneware.	
42		Layer/Deposit	Tarmac layer. Probably car park surface.	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
43	53	Layer/Deposit	Demolition fill, probably represents bulk of demolished chapel and Sunday school.	Demolition cut.
44		Masonry	Red brick drain structure.	
45		Masonry	Probable south wall of Sunday school.	
46	47	Masonry	Red brick drain structure.	Trench cut for drain 46.
48		Layer/Deposit	Laminated deposit. Possibly (adjusted) levelling layer.	
49		Layer/Deposit	Black levelling/foundation layer for tarmac surface 50.	
50		Layer/Deposit	Concrete surface.	
51		Masonry	Exterior western wall of Sunday school.	
52	47	Layer/Deposit	Packing in cut 47.	Trench cut for drain 46.
55		Layer/Deposit	Dumps of industrial waste.	
56		Layer/Deposit	Industrial waste - made ground.	
57		Layer/Deposit	Industrial waste - made ground.	
58		Layer/Deposit	Hardcore levelling layer or possible floor surface.	
60	59	Masonry	Brick electric cable covering.	Electric cable cut.
61	59	Layer/Deposit	Sandy fill at base of cut	Electric cable cut.
62	59	Layer/Deposit	Backfill of cable cut.	Electric cable cut.
63		Layer/Deposit	Industrial waste - made ground / levelling layer.	
64		Layer/Deposit	Modern concrete yard surface.	
65		Layer/Deposit	Levelling/foundation layer for tarmac surface 46.	
66		Layer/Deposit		
67		Masonry	Possible sandstone column support.	
68		Layer/Deposit	Yellow brown clay.	
70	69	Masonry	Red brick wall.	Trench cut for wall 70.
71		Masonry	Red brick wall.	
72		Masonry	Red brick wall.	
73		Masonry	Short red brick wall.	
74		Layer/Deposit		
75		Layer/Deposit	Early hardcore/levelling layer.	
76		Layer/Deposit	Industrial waste - made ground.	
77		Layer/Deposit	Industrial waste - made ground.	
78		Masonry	Concrete support.	
79		Layer/Deposit	Modern concrete raft support.	
80		Layer/Deposit	Concrete support.	
81		Masonry	Modern concrete raft support.	
82		Layer/Deposit	Sand bedding layer for concrete	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
			83.	
83		Layer/Deposit	Modern concrete surface.	
84		Layer/Deposit	Levelling layer for house floor.	
85		Layer/Deposit	Made ground below house floor.	
86		Layer/Deposit	Made ground below house floor.	
87		Layer/Deposit	Industrial waste made ground below house floor.	
88		Layer/Deposit	Lower made ground below house flooring	
89		Layer/Deposit	Primary fill after wall construction.	
90		Layer/Deposit	Yellow clay.	
91	102	Masonry	Red brick external or supporting wall for house 2.	Construction cut for wall 91.
92		Masonry	Internal house structure, possible stair support.	
93	104	Masonry	Probable internal house wall.	Trench cut for wall 93.
94		Layer/Deposit	Made ground house floor.	
95		Layer/Deposit	Made ground below house floor.	
96		Layer/Deposit	Made ground below house floor.	
97		Layer/Deposit	Made ground below house floor.	
98		Layer/Deposit	Dumped demolition deposit.	
99		Layer/Deposit	Levelling/foundation layer for concrete surface 100.	
100		Layer/Deposit	Concrete car park/yard surface.	
101		Layer/Deposit	Foundation for wall 0091.	
105		Masonry	External ginnell floor surface west of house 1.	
106		Masonry	Western external wall of house 1.	
107		Masonry	Probable remains of staircase supports for house 1.	
108		Masonry	Remains of north staircase support in house1.	
109		Layer/Deposit	Possible house floor levelling.	
110		Layer/Deposit	Levelling layer for house floor under stairs, re-laid after 0113 out of use.	
111		Layer/Deposit	Levelling layer for brick floor 0112.	
112		Masonry	Brick floor surface. Possibly kitchen floor.	
113		Masonry	Red brick floor surface of under stairs cupboard/pantry in house 1.	
114		Masonry	Dividing wall between houses 1 and 2.	
115		Masonry	Brick flooring in house 2. Possibly kitchen.	
116		Layer/Deposit	Levelling layer.	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
117		Masonry	Southern staircase support in house 2.	
118		Masonry	Northern staircase support in house 2.	
119		Layer/Deposit	Levelling layer.	
120		Layer/Deposit	Levelling layer.	
121		Layer/Deposit	Levelling layer.	
122		Layer/Deposit	Levelling layer.	
123		Layer/Deposit	Concrete surface.	
124	103	Layer/Deposit	Backfill of construction cut.	Cut for footing for wall subsequently removed.
125		Layer/Deposit	Demolition rubble fill.	
126		Masonry	Possible chimney/fire place ash pit.	
127		Layer/Deposit	Dumped demolition deposit.	
128		Masonry	Internal wall between houses 3 and 4.	
129		Masonry	Internal wall running across houses 3 and 4. Probably housed staircase.	
130		Layer/Deposit	Demolition rubble deposit	
131		Layer/Deposit	Demolition rubble layer.	
132		Masonry	Wall support in wall 0093.	
133		Masonry	Wall support in wall 0093.	
134		Masonry	Possible remnant brick floor in house 4.	
135		Layer/Deposit	Concrete floor of foundry building.	
136		Layer/Deposit	Made ground - industrial waste.	
137		Layer/Deposit	Hardcore levelling layer.	
138		Layer/Deposit	Modern tarmac yard surface.	
140	139	Layer/Deposit	Rubble rich backfill.	Modern service trench.
141		Masonry	Eastern Iron I Beam set into concrete.	
142		Masonry	Western I beam set into concrete.	
144	143	Layer/Deposit	Levelling/made ground.	Probable demolition truncation.
145	174	Layer/Deposit	Wooden beams (prob. sleepers). Possible impact dampers for machine.	Cut through first phase made ground.
146	174	Masonry	Concrete machine base.	Cut through first phase made ground.
147	174	Masonry	Red brick machine base.	Cut through first phase made ground.
149	148	Layer/Deposit	Mixed fill in machine footing 148.	Cut for machine footing.
151	150	Layer/Deposit	Mixed fill in machine footing 150.	Cut for machine footing.
152		Layer/Deposit	Rubble fill W end of Trench 7	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
153		Masonry	External wall of foundry.	
154		Layer/Deposit	Concrete surface with rail fragment.	
155		Masonry	Features associated with machinery.	
157	156	Layer/Deposit	Fill of machine footing cut 156.	Cut for machine footing 157.
158	174	Layer/Deposit	Packing deposit.	Cut through first phase made ground.
159		Masonry	Concrete machine pad.	
160		Layer/Deposit	Current concrete floor surface.	
161		Layer/Deposit	Concrete surface containing rails 165.	
162		Layer/Deposit	Industrial waste - made ground.	
163		Layer/Deposit		
164		Layer/Deposit		
165		Masonry	Rails: standard gauge.	
166		Masonry	Concrete machine pad.	
167		Layer/Deposit	Deposit of coal.	
168		Layer/Deposit	Gleyed clay. Interpretation uncertain.	
169		Layer/Deposit	Lower fill of demolition truncation.	
170		Masonry	Possible iron runner stop.	
171		Masonry	2 iron (possible) runners/wheel guides/channels.	
172		Layer/Deposit	Industrial waste - made ground. First phase.	
173		Layer/Deposit	(Possible) iron runner.	
175		Masonry	N-S red brick wall.	
176		Masonry	Loose iron plate.	
177		Masonry	Red brick support for iron runner 171.	
178		Layer/Deposit	Partially revealed floor surface.	
179		Masonry	Red brick / sandstone machine base section.	
180		Layer/Deposit	Concrete surface.	
182		Layer/Deposit	Floor surface of earlier phase.	
183		Layer/Deposit	Levelling deposit, possibly for construction of concrete floor 180.	
184		Masonry	Group of cast iron plates. Probably platform to support a machine.	
186	185	Layer/Deposit	Backfill of possible machine footprint 185.	Purpose unclear. Possible machine footprint.
187		Layer/Deposit	Wooden Beam. Purpose unclear.	
188		Layer/Deposit	Floor surface.	
189		Layer/Deposit	Current tarmac yard surface.	
190		Layer/Deposit	Modern levelling layer.	
191		Layer/Deposit	Modern levelling layer.	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
192		Layer/Deposit	Modern industrial waste and rubble. Made ground.	
193	181	Layer/Deposit	Modern backfill.	Cut through concrete raft 180.
194	3	Layer/Deposit	Fill of demolition cut	
195		Layer/Deposit		
196		Layer/Deposit		
220		Layer/Deposit	Modern concrete raft extending over all of Trench 14	
222		Masonry	External E-W wall, part of main foundry	
223		Masonry	Machine base with fixing bolts	
225		Masonry	Southern machine base, probably same as 226 and 227.	
226		Masonry	Central stanchion base.	
227		Masonry	Northern stanchion base.	
228		Masonry	Small E-W sandstone machine base.	
229		Masonry	Large N-S sandstone base, possibly for hammer.	
230		Masonry	Concrete base, possibly for crane.	
231	224	Layer/Deposit	Fill of cable cut.	Cut for cable.
232	234	Masonry	West boundary wall extension (by 1881).	Construction cut for wall [234].
233		Layer/Deposit	Layer under wall [232]. Dirty subsoil?	
235	234	Layer/Deposit	Backfill around wall [232].	Construction cut for wall [232].
236		Layer/Deposit	Packing deposit against [232].	
237		Masonry	Concrete pillar or machine base. Similar to [238].	
238		Masonry	Concrete pillar or machine base. Similar to [237].	
239		Layer/Deposit	Rubble demolition.	
243		Masonry	East wall of foundry, 2nd phase.	
244		Masonry	1st phase west boundary wall.	
245		Masonry	1st phase east boundary wall.	
246		Layer/Deposit	Clay subsoil north of [314].	
247		Layer/Deposit	Black industrial waste deposit across site.	
249	248	Masonry	Deliberate backfill in void.	
250		Masonry	North foot of probable hammer (Steam).	
251		Masonry	South foot of probable steam hammer.	
252		Masonry	Probable anvil base support.	
253		Masonry	Concrete around hammer foot [250].	
254		Masonry	Cemented floor around steam hammer base.	
255		Masonry	Concrete floor around steam hammer base.	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
256		Layer/Deposit	Possible surface, badly truncated.	
257		Layer/Deposit	Modern concrete skim between voids.	
258		Masonry	Timber percussion dampeners in probable steam hammer.	
259		Layer/Deposit	Lower element of (255).	
260		Layer/Deposit	Industrial waste patch.	
261		Layer/Deposit	Compacted metalled deposit.	
262		Masonry	Stanchion base (part of western group).	
263		Layer/Deposit	Industrial waste around steam hammer.	
264		Masonry	One of the western stanchion bases.	
265		Masonry	Possible machine pad (with 266).	
266		Masonry	Part of machine base?	
267		Layer/Deposit	Damaged concrete block.	
269	268	Layer/Deposit	Fill of void {268}.	Void of removed machine base.
271		Masonry	Red brick rectangular wall	
272		Masonry	Part of possible machine base.	
273		Masonry	Foundation for machine foot.	
274		Masonry	Machine foot base.	
275		Masonry	Supporting paired I beam.	
276		Masonry	I beam.	
277		Masonry	I beam.	
278		Layer/Deposit	Backfill of void.	
279		Layer/Deposit	Deposit of sandy clay.	
281		Masonry	Concrete machine base, paired with [289].	
282		Masonry	Concrete floor surface.	
283		Masonry	Red brick floor surface replaced by [282].	
284		Masonry	Brick and timber shuttering for [354].	
285		Masonry	Red brick and timber shuttering, associated with [284].	
286		Layer/Deposit	Backfill of void/made ground.	
288	287	Layer/Deposit	Fill of [287].	Void caused by removal of unknown structure/object.
289		Masonry	Truncated machine foot.	
290		Masonry	Heat affected machine base, paired with [291].	
291		Masonry	Heat affected machine base, paired with [290].	
292		Layer/Deposit	Industrial waste deposit, possibly associated with [290,291].	
293		Layer/Deposit	Hammerscale and industrial waste. South of [290], [291].	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
294		Layer/Deposit	Industrial waste patch.	
295		Layer/Deposit	Patch of rusty metalled waste.	
296		Layer/Deposit	Metalled surface, uncertain phase.	
298	297	Layer/Deposit	Fill of [297].	Void caused by removal of object.
299		Masonry	Sandstone machine base.	
301		Masonry	Concrete pad, early to mid 20thC.	
302		Masonry	Brick drain.	
303		Masonry	Metal bar formerly part of drain [305].	
304		Masonry	Metal drain cover.	
305	322	Masonry	Brick drainage hatch.	Cut for drainage [305].
306		Masonry	Brick drain to south of drain [305].	
307		Masonry	Brick structure possible wall of floor surface.	
308		Masonry	Possible continuation of [307].	
310	309	Layer/Deposit	Fill of [309]. Unknown purpose.	Truncated cut of [307].
311		Layer/Deposit	Metalled deposit to south of (312).	
312		Layer/Deposit	Industrial waste.	
313		Layer/Deposit	Industrial, metalled waste.	
314		Masonry	Internal brick wall.	
315		Masonry	VOID.	
316	319	Masonry	Brick machine base.	Cut for machine base [316].
317		Masonry	Concrete machine base.	
318		Layer/Deposit	Clinker backfill between wall [314] and [316].	
320		Layer/Deposit	Remnant of concrete pad, floor surface.	
321		Layer/Deposit	Loose rusty metal layer.	
324	323	Layer/Deposit	Fuel dump associated with machine base [299].	Cut containing rubble deposits.
325	323	Layer/Deposit	Industrial dump deposit.	Cut containing rubble deposits.
326		Masonry	3 machine bases, probably from first phase of foundry.	
327		Masonry	Sandstone associated with machine bases [326].	
328		Masonry	Sandstone machine base.	
329		Masonry	Brick structure associated with [326], probably from the first phase of foundry.	
331	330	Masonry	Fe gas pipe	Cut for gas pipe [330].
332	330	Layer/Deposit	Fill of cut [330].	Cut for gas pipe [330].

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
333		Layer/Deposit	Demolition deposit.	
334		Masonry	Truncated brick and sandstone floor surface.	
335		Masonry	Probable machine base.	
336		Masonry	Modern I beam stancheon.	
337		Layer/Deposit	Bedding layer under concrete raft [220].	
338		Layer/Deposit	Probable bedding layer under sandy silt (337).	
339		Layer/Deposit	Dump deposit.	
340		Layer/Deposit	Dump deposit south of wall [222].	
341		Layer/Deposit	Dump deposit of industrial waste.	
342		Layer/Deposit	Backfill of void.	
343		Layer/Deposit	Bedding layer for unknown structure.	
344		Masonry	VOID.	
345		Layer/Deposit	Hardcore layer underlying tarmac.	
346		Masonry	Concrete machine base.	
347		Layer/Deposit	Made ground/backfill.	
348		Layer/Deposit	Bedding layer for surface [334].	
349		Masonry	Internal wall post-dating 1874 wall.	
350		Masonry	Concrete extension of [346].	
351		Masonry	Brick shuttering for pouring of concrete [350].	
352		Masonry	Brick surface with recess possibly for machine.	
353		Masonry	Western stanchion base.	
354		Masonry	Stanchion base in eastern row.	
355		Masonry	Stanchion base in eastern row.	
356	280	Layer/Deposit	Packing around [270].	
370		Layer/Deposit	Coal at south-east corner of trench.	
371		Layer/Deposit	Natural clay.	
372		Layer/Deposit	Dirty clay.	
374		Layer/Deposit	Clinker backfill.	
375		Layer/Deposit	Redeposited mixed clay.	
376		Layer/Deposit	Burnt material, possible waste from brick making.	
377		Layer/Deposit	Clinker above burnt material [376].	
379		Masonry	West stanchion base.	
381		Masonry	Stanchion base at east of trench.	
382		Layer/Deposit	Mixed re-deposited clay.	
384	383	Layer/Deposit	Gravel fill of [383].	Cut for rail.
388		Layer/Deposit	Re-deposited mixed clay.	
389		Layer/Deposit	Yellow clay.	
390	385	Layer/Deposit	Fill of modern rail cut.	Cut for modern rail.
391		Layer/Deposit	Modern hardcore associated with tarmac (392).	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
392		Layer/Deposit	Modern tarmac yard surface.	
400		Masonry	Enclosure wall in north west corner of TR15.	
401		Masonry	Possible bedding/surface deposit making up floor.	
402		Layer/Deposit	Built up deposit between [400] and [401].	
403		Masonry	Poured cement stanchion base.	
404		Masonry	Stanchion base.	
405		Masonry	Stanchion base.	
406		Masonry	Stanchion base.	
407		Masonry	Stanchion base.	
408		Layer/Deposit	Built up deposit to north of machine base [413].	
409		Masonry	Red brick wall.	
410		Masonry	Division of partition added to [409].	
411		Masonry	Small enclosure wall. Possibly related to [400].	
412	497	Masonry	Late dividing wall within steam engine.	Foundation cut for [412].
413		Masonry	Outer walling of steam engine.	
414		Masonry	Red brick structure, part of steam engine.	
415		Layer/Deposit	Deposit around [414].	
417	416	Layer/Deposit	Concrete base, possibly placed after steam engine is out of use.	Cut for [417] through [415].
418		Layer/Deposit	Made ground.	
419		Masonry	Red brick wall.	
420		Layer/Deposit	Made ground within [414].	
421		Masonry	Structure associated with former blowing engine or drive machinery.	
422		Masonry	Well for former drive wheel associated with machinery supported on [421].	
423		Layer/Deposit	Deposit within machine base structure [421].	
424		Masonry	Red brick alteration to south west corner of [421].	
425		Masonry	Mid phase concrete lump.	
426		Layer/Deposit	In fill between structures [421] and [427].	
427		Masonry	Heat carrying red brick flue.	
428		Masonry	North-south linear brick structure. Blocking for [427].	
429		Layer/Deposit	Overburden.	
430		Masonry	Late manhole.	
432	431	Layer/Deposit	Top waste fill of cut for pipe.	Cut for Fe pipe [499].
433	431	Masonry	Concrete and brick rubble within [431].	Cut for Fe pipe [499].
434	431	Layer/Deposit	Re-laid brick surface over fill (432).	Cut for Fe pipe [499].

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
435	431	Layer/Deposit	Compacted brick rubble.	Cut for Fe pipe [499].
436		Masonry	Handmade red brick wall, continuation of [421], cut by [431].	
437		Layer/Deposit	Compacted back sand between [438] and [439].	
438		Masonry	Brick fixing mount associated with [422].	
439		Masonry	Red brick wall east-west.	
440		Masonry	Red brick wall of engine shed.	
441		Layer/Deposit	Hard, compacted deposit associated with [338]	
442		Layer/Deposit	Made ground, clinker.	
444	443	Layer/Deposit	Very late fill of pipe trench.	Cut for modern pipe.
445	447	Skeleton	Concrete machine base similar to [469].	Construction cut for machine base [445]
446		Layer/Deposit	Ashy silt levelling layer, very late.	
448	447	Layer/Deposit	Primary fill of [447].	Construction cut for machine base [445]
449		Layer/Deposit	Dirty re-deposited natural used to level site.	
451	450	Masonry	Large pipe with soot on interior.	Large trench cut for pipe
452	450	Masonry	Chimney flue intersecting [451].	Large trench cut for pipe
453	450	Masonry	Brick structure joining [451] and [452].	Large trench cut for pipe
454	450	Layer/Deposit	Silty sand fill in [450], around pipes [451], [452] and [453].	Large trench cut for pipe
456	450	Layer/Deposit	Backfill of pipe trench.	Large trench cut for pipe
457	450	Layer/Deposit	Mortar used as a bedding layer for chimney pipe [451].	Large trench cut for pipe
458	443	Masonry	Modern (very late) drain. Unrelated to [451].	Cut for modern pipe.
459		Layer/Deposit	Water deposited fill of late pipe.	
460		Layer/Deposit	Deposit used to seal [427].	
461		Layer/Deposit	Probably re-deposited (449). Made ground re-deposited after construction of [427], (460).	
462		Masonry	Ferrous object containing wooden settings.	
463		Masonry	Fire brick structure, too little remains to interpret use.	
465	464	Layer/Deposit	Demolition deposit from [463], [464].	
466	468	Layer/Deposit	Backfill of construction cut for machine base [469].	
467	450	Layer/Deposit	Hardcore packing in [450]. Foundation for [453].	Large trench cut for pipe
469	468	Masonry	Concrete machine base similar to [445].	
470	431	Masonry	Modern access chamber for electrical cables.	Cut for Fe pipe [499].

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
471		Layer/Deposit	Concreted deposit of Fe by-product, cut by [472].	
473	472	Masonry	Possible concrete machine base, related to [445].	
474		Layer/Deposit	Silt and rust deposit at north end of TR15.	
475		Masonry	Red brick inspection hole.	
476		Layer/Deposit	Industrial accretion from in situ working from [477].	
477		Masonry	Red brick machine base.	
478		Layer/Deposit	Swarf like deposit on [477].	
479		Layer/Deposit	Mixed sandy deposit over (478). Probably related to [483].	
480		Layer/Deposit	Industrial waste deposit.	
481		Masonry	Concrete slab with metal pivot fixing.	
482		Masonry	Brick surround to [477].	
483		Masonry	Concrete machine fixing.	
485	484	Layer/Deposit	Demolition fill.	Demolition cut, a truncation of the eastern foundry wall.
486		Masonry	Red brick east foundry wall, 1st phase.	
487		Layer/Deposit	Clinker made ground.	
488		Layer/Deposit	Clinker bedding for possible hammer [490].	
489		Layer/Deposit	Industrial accretion cut by [492].	
490		Masonry	Cushioned machine fixing base, possibly for hammer or similar.	
491		Masonry	Possible hammer base.	
493	492	Layer/Deposit	General industrial material. Clinker fill of sub-circular area to south of [490].	Late disturbance.
494		Masonry	Timber overlying clinker (493). Appears to have replaced 1st phase east foundry wall.	
495		Layer/Deposit	Site overburden below [496].	
496		Masonry	20thC concrete raft.	
498	431	Layer/Deposit	Yellow sand packing around Fe pipe [499].	Cut for Fe pipe [499].
499	431	Masonry	Fe pipe	Cut for Fe pipe [499].
500		Layer/Deposit	Industrial waste deposit west of [477].	
501		Layer/Deposit	Concreted mix of iron, brick, slag and wood. Original post steam engine deposit.	
502		Masonry	Base of wheel pit.	
503		Layer/Deposit	Concreted deposit of Fe by-product.	
504		Masonry	Later machine fixing bolt.	
510		Layer/Deposit	Natural sub soil.	
511		Layer/Deposit	Terracing deposit, re-deposited	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
			clay.	
513		Layer/Deposit	Industrial waste spread, possibly from 1874 phase.	
515	514	Layer/Deposit	Construction cut backfill.	Construction cut for wall [516].
516	514	Masonry	North wall of foundry expansion.	Construction cut for wall [516].
517	518	Layer/Deposit	Made ground	Construction cut for wall [519].
519	518	Masonry	2nd phase north foundry wall.	Construction cut for wall [519].
520		Layer/Deposit	Slag & industrial waste layer	
522	521	Masonry	Gas or water supply pipe and manhole.	Cut for water/gas pipe and manhole.
523	521	Layer/Deposit	Backfill of pipe structure.	Cut for water/gas pipe and manhole.
525	524	Layer/Deposit	Spread of material following demolition.	Major demolition cut, prior to (527).
526		Layer/Deposit	Clinker bedding for concrete raft.	
527		Layer/Deposit	Early-mid 20thC concrete raft.	
528		Layer/Deposit	PMB building concrete raft.	
530	529	Masonry	Late stanchion base.	Cut for [530].
532	531	Layer/Deposit	Backfill of abandoned linear cut [531].	Short linear ditch, no obvious purpose.
533		Masonry	Small internal wall, truncated by [531].	
534		Masonry	External west wall of rooms attached to north wall of foundry.	
535		Masonry	Small internal east-west wall.	
536		Masonry	Concrete against [516], possibly as base for workbench.	
537		Masonry	Small structure forming end of poured concrete [536].	
539	538	Layer/Deposit	Backfill of [538] and small gas/water pipe.	Cut for insertion of small Fe pipe.
541	540	Layer/Deposit	Ashy fill of unexcavated pit [540].	Large unexcavated pit.
542		Masonry	Late drain, reusing bricks from nearby walls.	
543		Layer/Deposit	Alluvial fill of drain [542].	
545	544	Masonry	Large concrete base, possibly for machine.	Construction cut for [545].
546		Masonry	West wall of factory, 2nd phase.	
547		Layer/Deposit	Bedding layer for wall [548].	
548		Masonry	3rd phase extension to west foundry wall.	
549		Layer/Deposit	Packing to west of [548] restoring ground level after construction.	
550		Layer/Deposit	Coal waste deposit.	
551		Layer/Deposit	Made ground.	
552		Layer/Deposit	Clayey silt layer.	
553		Layer/Deposit	Compact sandy silt surface.	

Context number	Cut	Context type	Fill Interpretation	Cut Interpretation
555	554	Layer/Deposit	Post pipe	Post hole.
556	554	Layer/Deposit	Post packing.	Post hole.
557		Layer/Deposit	Levelling foundation mortar coursing.	
558		Layer/Deposit	E-W red brick wall.	
559		Layer/Deposit	Column support foundation.	
560		Layer/Deposit	Early concrete rafting.	
561		Layer/Deposit	Concrete raft.	
562		Layer/Deposit	Post demolition made ground.	
570		Layer/Deposit	Natural clay in trench 6.	
571		Layer/Deposit	Natural coal powder/clay mix.	
573	572	Layer/Deposit	Mortar and brick rubble foundation for stanchion [574].	Sub-rectangular cut for stanchion base
574	572	Masonry	Brick stanchion base.	Sub-rectangular cut for stanchion base
575	572	Layer/Deposit	Clay packing around brick stanchion [574].	Sub-rectangular cut for stanchion base
577	576	Masonry	Concrete and Fe stanchion.	Cut for stanchion [577].
579	578	Masonry	Brick support for [580].	Cut for rail bedding and weighbridge/ inspection pit.
580	578	Masonry	Fe weight bridge/ inspection pit (rail).	Cut for rail bedding and weighbridge/ inspection pit.
581	578	Layer/Deposit	Concrete rubble in inspection pit	Cut for rail bedding and weighbridge/ inspection pit.
582	578	Masonry	Concrete support for rail sleepers.	Cut for rail bedding and weighbridge/ inspection pit.
583		Masonry	6x timber rail sleepers for [584].	
584		Masonry	Fe rails	
585		Layer/Deposit	Clinker levelling layer/ rail fill.	
586	578	Layer/Deposit	Backfill of [578].	Cut for rail bedding and weight bridge/ inspection pit.
587		Layer/Deposit	Concrete surface around rail tracks.	
589	588	Layer/Deposit	Lower clay fill of tree throw [588].	Tree throw (not bottomed).
590	588	Layer/Deposit	Coal fill of removed tree void.	Tree throw (not bottomed).

12 APPENDIX 3: FINDS TABLES

12.1 Table 1: Finds totals by context (number / weight in grammes)

Tr	Context	Pottery	CBM	Glass	Slag	Metal	Other finds
1	0004	34/2046					
1	0194	25/1526	1/1110	2/356		2 Fe	
2	0043	7/1130	1/2000	2/284		1 Cu; 1 Fe	
2	0048	1/124					
3	0182					1 Fe	
4	0024		1/106				
4	0026		2/26		2/164		
4	0028	2/84		1/6	1/298		
5	375	2/30	1/756				
5	388	1/126					
6	589		7/58				
7	0140				3/1130		
7	0149	7/310					
7	0151			1/14			
7	0152						9 plastic
7	0158					1 other metal	6 leather
7	0172				3/128	1 other metal	
8	0057					6 Fe	
9	513						1 clay pipe
10	0162	14/628	1/44				
10	0163	3/20					1 animal bone
12	0084	10/564		3/386			
12	0094	19/530		2/652			
12	0097						1 animal bone
12	0109			4/50		1 other metal	1 plaster; 1 leather
12	0119				2/890		
13	0077	8/840					
14	235			2/20			
14	239					2 other metal	
14	247	1/20			1/58	3 other metal	
14	263					1 other metal	
14	286					1 other metal	
14	341				1/3000	1 other metal	
15	418	2/18		1/150		1 other metal	
15	423	1/144		3/326			
15	432	1/58					
15	442	4/72		1/32			
15	460				3/1925		
15	466			3/60			
15	480	2/16			5/316		
15	495					1 other metal	
-	617		1/52				
	TOTAL	**144/8286**	**15/4152**	**25/2336**	**21/7909**	**1 Cu; 10 Fe; 13 other metal**	

CBM = ceramic building material; Cu = copper alloy; Fe = iron

12.2 Table 2: Pottery totals by ware type

Ware	No. sherds	Weight (g)
Bone china	1	21
Pearlware	3	33
Porcelain	9	512
Redware	6	948
Refined whiteware	28	368
Stoneware	93	6339
Yellow ware	4	65
TOTAL	**144**	**8286**

12.3 Table 3: Archaeometallurgical summary

Context no.	Type of Context	Provisional context date	Material Type	Fragment no.	Comments	Retain for site archive
0026	?	Pre-1900 (1880's?)	Slag	3	Glassy tap slag. Possible cupola slag.	Yes (depending upon context type)
0028	?	Pre-1900 (1880's?)	Slag	1	Glassy tap slag. Possible cupola slag.	Yes (depending upon context type)
0043	Backfill of Chapel		Fe	1	Ferrous plate, possible damper from coal fired stove or range	
0043	Backfill of Chapel		Non-Fe	1	Part of gas lamp	
0057	Made ground	?pre-1900	Fe	1	Wrought iron bar	
0057	Made ground	?pre-1900	Fe	1	Hexagonal ferrous metal bar	
0057	Made ground	?pre-1900	Fe	1	rectangular plate	
0057	Made ground	?pre-1900	Fe	3	Ferrous plate, rod and bar	
0119	Demolition layer		Slag	2	2 x dense glassy tap slag. Possibly cupola slag.	
0140	Backfill of trench		Slag	3	2 x furnace slag with coke inclusions, 1 x un-diagnostic	
0172		1881-1900	slag	3	Furnace slag with coke inclusions.	
0182	Poss. early floor		Fe	1	Wrought iron bar	Possibly, depending upon date.
0194	Backfill of Chapel		CBM	1	Vitrified brick – un-diagnostic of process	
247		?post-1900	Slag	1	Slag with Cu inclusions, possibly relates to re-melting of copper alloy.	
263		Post WW2?	Cu alloy	1	Copper alloy swarf.	
341			Non-Fe	1	Lamp shade.	

Context no.	Type of Context	Provisional context date	Material Type	Fragment no.	Comments	Retain for site archive
418		?late 19th century	Other	1	Copper alloy tool or pressing.	Refer to SIMT (Hawley Collection)
			Object No.			
247	Backfill of Chapel?		1	1	Ferrous metal bar, 2.5" round	
247	Backfill of Chapel?		2	1	Ferrous metal bar, 1.5" round	
247	Backfill of Chapel?		3	1	Ferrous metal bar, 1.25" round	
239			4	1	Grinding wheel	
239			5	1	Grinding wheel	
341	Made ground	1881-1900	6	1	Low density furnace slag with coke inclusions	
495		Prob. 20th century	7	1	Ferrous metal, hexagonal section approx 3" diameter	
			Object no.			
480		?late 19th century	8	5	1 x coke, 3 x un-diagnostic slag, 1 x low density furnace slag	
460		?late 19th century	9	4	Low density furnace slag with coke inclusions	
			Sample no.	**Sample size (litres)**		
160			1	1l approx	Sample - crushed coke + ash with very low abundance of iron oxide flakes	
324			2	3l approx	Sample - crushed coke + ash with very low abundance of iron oxide flakes	
293			3	1l approx	Sample - crushed coke + ash with moderate abundance of flakes of iron oxide	
318			4	1l approx	Sample - crushed coke + ash with very low abundance of iron oxide flakes	
500			5	1l approx	Sample - crushed coke + ash with very low abundance of iron oxide flakes	
471			6	7l approx	Conglomerate of corroded deposits, possibly floor deposits or sweepings from machine shop/fettling shop.	

13 APPENDIX 4: OASIS FORM

Project details

Project name Heanor Haulage, Langley Mill, Derbyshire

Short description of the project Wessex Archaeology was commissioned by Asda Stores Ltd to carry out a programme of historic building recording and aechaeological excavations in connection with the redevelopment of Heanor Haulage, formerly G.R. Turners Vulcan Iron Works, at Langley Mill, Derbyshire. All of the standing buildings and historical features were demolished during the redevelopment of the site. The historical elements of the retained buildings at the time of survey were constructed during the late 19th and early 20th centuries and represented components of the former Vulcan (iron) Works. A total of 15 trenches were excavated to evaluate archaeological survival and mitigate the loss of remains in advance of development. Eleven trenches investigated the former Vulcan (engineering) Works; two investigated the site of the Methodist chapel, to the south-east of the Vulcan Works; and a further two were excavated on the site of former terraced housing along Bridge Street and Victoria Street, to the north of the Vulcan Works.

Project dates Start: 10-02-2010 End: 07-06-2010

Previous/future work No / Not known

Any associated project reference codes DRBYMU:2009-215 - Museum accession ID

Type of project Field evaluation

Site status None

Current Land use Industry and Commerce 1 - Industrial

Monument type ENGINEERING WORKS Post Medieval

Significant Finds SLAG Post Medieval

Significant Finds CERAMIC Post Medieval

Significant Finds BAR IRON Post Medieval

Methods & techniques 'Documentary Search','Measured Survey','Photographic Survey','Targeted Trenches'

Development type Urban commercial (e.g. offices, shops, banks, etc.)

Prompt Planning condition

Project location

Country England

Site location DERBYSHIRE AMBER VALLEY ALDERCAR AND LANGLEY MILL Heanor Haulage, Langley Mill, Derbyshire

Postcode NG16 4AL

Study area 3.37 Hectares

Site coordinates SK 445054 347210 52.9077560252 -1.338174545710 52 54 27 N 001 20 17 W Point

Lat/Long Datum Unknown

Project creators

Name of Organisation Wessex Archaeology

Project brief originator Local Authority Archaeologist and/or Planning Authority/advisory body

Project design originator Wessex Archaeology

Project director/manager Oliver Jessop

Project supervisor Neil Dransfield

Type of sponsor/funding body Developer

Name of sponsor/funding body ASDA Stores Ltd

Project archives

Physical Archive recipient Derby Museum and Art Gallery

Physical Contents 'other'

Digital Archive recipient Derby Museum and Art Gallery

Digital Contents 'other'

Paper Archive recipient Derby Museum and Art Gallery

Paper Contents 'none'

Paper Media available 'Aerial Photograph','Correspondence','Drawing','Map','Notebook - Excavation',' Research',' General Notes','Photograph','Plan','Report','Section','Survey '

Project bibliography

Publication type Grey literature (unpublished document/manuscript)

Title Heanor Haulage, Langley Mill, Derbyshire: Historic Building Recording

Author(s)/Editor(s) Dawson, L

Other bibliographic details 73610.04

Date 2010

Issuer or publisher Wessex Archaeology

Place of issue or publication Sheffield

Entered by Justin Wiles (j.wiles@wessexarch.co.uk) **Entered on** 22 September 2010

14 APPENDIX 5: BRIEF

SPECIFICATION FOR ARCHAEOLOGICAL DOCUMENTARY STUDY, BUILDING RECORDING AND FIELD EVALUATION

SITE NAME: Heanor Haulage Ltd, Wesley Street, Langley Mill, Derbyshire

PLANNING APPLICATION NUMBER: Amber Valley Borough Council AVA/2009/0467

NGR: SK 4510 4720 (centred)

ISSUED BY: Steve Baker (Development Control Archaeologist for AVBC)

DATE: 14th January 2010

1 Introduction

1.1 Outline consent AVA/2009/0467 has been granted for a mixed use development comprising office/workshop accommodation, a new Asda foodstore, petrol filling station, complimentary community/retail units (Classes A1-A5 and D1), associated car parking, landscaping and highways work, at Heanor Haulage Ltd, Wesley Street, Langley Mill.

1.2 The site has potential for historic buildings and buried archaeology relating to the former Vulcan Works foundry and engineering works of GR Turner Ltd. The following condition has therefore been attached to the planning consent:

"24. No development shall take place within the site until the developer has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation (WSI) submitted by the applicant and approved in writing by the Local Planning Authority. This scheme shall include on-site work, and off-site work such as the analysis, publication, and archiving of the results. All works shall be carried out and completed as approved, unless otherwise agreed in writing by the Local Planning Authority"

1.3 The initial archaeological programme will comprise a brief documentary study, building recording of surviving historic fabric, and evaluation trenching targeted to areas of archaeological potential. Further work may be required should evaluation results prove archaeologically significant, and a further WSI may be required at this stage.

1.4 This document is a specification for the archaeological programme defined in 1.3, and will allow the archaeological contractor to prepare a written scheme of investigation (WSI) for approval by the Development Control Archaeologist. The WSI must be submitted for approval at least two weeks before the scheduled commencement of fieldwork on site.

1.5 Please note the archaeological condition is not a pre-start condition to be discharged before site works commence. Approval of a WSI is sufficient for works to start, but full discharge will not be possible until all of the archaeological work is complete to the required standard including reports and archiving.

2 Background

2.1 The planning application is for a major development of an area of approximately 3.45ha between Wesley Street, Bridge Street and Cromford Road, Langley Mill, currently occupied by Heanor Haulage Ltd.

2.2 The proposal area was formerly occupied by the engineering works of GR Turner Ltd, making municipal castings, rolling stock for railways, and mining machinery. The firm enjoyed an international reputation during the late 19th century, when it employed 350

hands, and rolling stock was exported to railways all over the world. The works were established during the 1850s, and are shown on the First Edition Ordnance Survey of c1880 as 'Vulcan Works (Engineering)'. The early works buildings shown at this time are orientated north-south in the western part of the site, while the Bridge Street frontage is occupied by what appears to be workers' housing, possibly back-to-back in construction and laid out around four separate yards. The works expanded rapidly during the late 19th century, to occupy much of the western half of the proposal area up to the Bridge Street frontage, and continued in use up to 1980. The site is listed in the Derbyshire Archaeological Society's Derbyshire Industrial Archaeology, A Gazetteer of Sites, compiled in 1993 (Amber Valley site 123). At this time, a large early 20th century brick office and earlier castings shops were identified as surviving on site.

2.3 The site is therefore clearly of industrial archaeological interest, both in terms of standing buildings and the potential for below-ground archaeology relating to the early Vulcan Works. The proposed redevelopment of the site will clearly have major impacts on both standing buildings and below-ground archaeology. The historic buildings/below-ground potential of the site can perhaps be assessed as of local/regional significance and the impacts of development should therefore be mitigated through a conditioned scheme of archaeological work, under the provisions of PPG16 and Policy EN31 of the Amber Valley Local Plan.

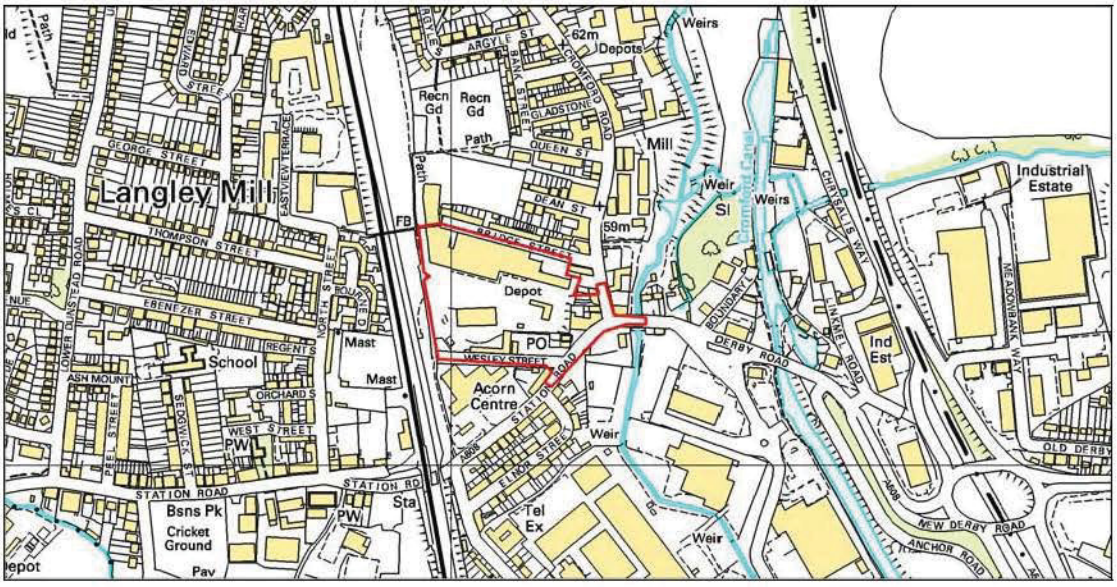


Figure 1: Site location

3 Objectives

3.1 The archaeological programme should provide overall for achieving an appropriate level of preservation by record for the historic buildings and buried archaeology within the site.

3.2 The archaeological evaluation trenching exercise aims to provide sufficient information for informed decisions to be made regarding i) the presence or absence of archaeological features, ii) their importance (e.g. using the Secretary of State's criteria as set-out in Annex 4 of Planning Policy Guidance note 16 (1990)), iii) the likely impact of the development upon any such features and iv) the appropriate mitigation of the development's impacts upon those remains.

4 Timetable for archaeological programme

4.1 The documentary study and historic building recording must be carried out before the commencement of any demolition on site. Demolition will not be permitted to start until the building recording archive has been inspected and found satisfactory.

4.2 Archaeological trial trenching in open areas of the site could be carried out before demolition, but could alternatively be deferred until after demolition, provided demolition is to slab level only.

4.3 Archaeological trial trenching in areas below currently standing buildings will need to be deferred until after demolition of these buildings (to slab level only).

4.4 It is therefore crucial that any demolition taking place before the archaeological trial trenching phase is carried out to slab level only. Removal of slabs and grubbing out of foundations at this stage would destroy buried archaeology.

5 Methodology

Documentary study

5.1 The documentary study will draw together and examine the available maps, historic photographs and documentary sources relating to the site.

5.2 The documentary study should attempt to provide a clear analysis of the evidence regarding the chronological development and use of the historic industrial site during the 19th and 20th centuries. Problems in documenting or establishing such an account should be highlighted.

Historic buildings survey

5.3 All building recording work should be carried out using the guidelines established in English Heritage's document Understanding Historic Buildings: A guide to good recording practice. (1st edition 2006), and the IfA's Standards and guidance for the archaeological investigation and recording of standing buildings and structures (October 2008).

5.4 The surviving late 19th/early 20th century buildings on site will be subject to building recording at English Heritage Level 2. The survey will include the surviving foundry wall now standing as a retaining wall along the western boundary of the site, and the late 19th/early 20th century rails surviving within the modern surfacing.

5.5 Although the photographic and drawn record will be at Level 2, the contractor is nonetheless expected to produce a fully interpretive report placing the historic buildings in their full context within the chronological development of the foundry site.

5.6 An analytical record of the building exteriors and interiors should be developed. This will include:

- A written summary of the buildings' form, function, date and sequence of development;
- Photography;
- Measured drawings.

5.7 The photographic record will include general views, a series of oblique or straight-on views of the building exteriors, views of the internal rooms and circulation areas, and any external or internal detail which is judged to be relevant to the wider understanding of the

buildings.

5.8 Black and white medium format photography should be used as the primary archive medium. This should be supplemented by 35mm colour slide photography or SLR colour digital photography at 7 megapixel minimum. All views are to be numbered in sequence and recorded on a photographic register detailing location, direction and subject of each shot. Position and direction of each photographic viewpoint should be recorded on plans of the site. All photographs will include a graduated photographic scale.

5.9 Measured plans will include all floor levels, including cellars, and the accessible parts of the roof structures, at a scale of at least 1:100. Measured drawings of the main external elevations will also be made at a scale of at least 1:100. Cross-sectional drawings should be made where appropriate.

5.10 Measured detail drawings may be made at 1:10 or 1:20 where it is considered relevant within a Level 2 survey, for example where a feature is not readily accessible for photography.

5.11 The drawings will use English Heritage architectural conventions to show (with annotations, where required) the historic construction of the buildings, the form and position of structural features of significance (former openings, straight masonry joints etc), and where former parts of the structures can be inferred to have been.

5.12 All drawings will include metric scales, north signs or details of orientation. There will be clear labelling to signify the subject, the date of survey and the name/ initials of the surveyor.

5.13 Where detailed architect's CAD drawings of an acceptable standard already exist, these may be used for the purposes of the building survey (and amended if necessary).

5.14 Where significant questions are raised concerning the development history, sequence, function or any other aspect of the buildings' character that may be resolved by hidden structural evidence this should be reported. A strategy for maximising opportunities for observation and recording during the demolition work would then need to be developed and agreed prior to the commencement of demolition.

5.15 Following completion of building recording, provision should be made for the Development Control Archaeologist to inspect the site archive. Demolition may not commence until this meeting has taken place and the archive is confirmed in writing to be satisfactory.

Trial trenching

5.16 It is not proposed to set a sample percentage for trial trenching. Rather, trial trenching will sample each known area of archaeological potential, to include:

- The historic core of the Vulcan Works as shown c1880;
- The expanded works of GR Turner as shown c1915;
- Areas of mid 19th century back-to-back housing shown along Bridge Street and in the eastern part of the site.

5.17 A detailed trenching plan should be formulated by the archaeological contractor following completion of the documentary study and discussion with the Development Control Archaeologist. A preliminary guide would be approximately 800 sq m of trenching (with an appropriate contingency added for extension or additional trenching), targeted on the areas established above (for example using 16 10mx5m trenches). Trench configurations should be appropriate to industrial archaeology – long narrow trenches make structural

interpretation difficult.

5.18 Lifting of ground slab over areas of archaeological interest should be carried out under archaeological supervision (watching brief).

5.19 Evaluation trenches will be excavated under the supervision of a professional archaeologist, using a mechanical excavator of appropriate size and tonnage fitted with a toothless bucket, to the level at which archaeological features/structures are identified, or to the upper surface of natural deposits, whichever level is reached first. A concrete breaker or toothless bucket may be used at the discretion of the supervising archaeologist to removehard surface and/or obstructions only.

5.20 Following machine excavation and cleaning, sample excavation and recording of features will take place according to the general guidelines set out below.

5.21 Recording of blank trenches (where no archaeological features are identified), should be as follows:

- Completion of trench record sheet, giving dimensions, stratigraphy and interpretation;
- At least one photograph of trench base and another of a typical trench section;
- Drawn 2m sample section of stratigraphy;
- EDM/Total Station survey of trench location, including AOD levels of top and bottom of trench section.

5.22 Recording of trenches where archaeological features are present should be as follows:

- Plan of trench base at 1:20, with AOD levels (pre-excavation and post-excavation planning should be carried out as appropriate);
- Detailed plans/sections of features and groups of features should be drawn at 1:10/1:20 as appropriate, with AOD levels;
- Standard stratigraphic recording using pro-forma sheets;
- General photographic shots of trench base and section(s), and detailed shots of archaeological features as appropriate;
- EDM/Total Station survey of trench location, including AOD levels of top and bottom of trench section.

5.23 No backfilling should take place until the Development Control Archaeologist has inspected trenches and is satisfied that the work has been carried out to an appropriate standard.

5.24 Following completion of the evaluation trenching a site meeting should be held with the Development Control Archaeologist to review the results and to determine the requirement for any further mitigation to satisfy the terms of the planning condition. It is possible that an additional WSI (or an addendum to the existing WSI) may need to be submitted and approved for this work.

<u>General guidelines for excavation and recording</u>

5.25 All archaeological fieldwork, recording of archaeological features and deposits and post-excavation analysis should be carried out to acceptable archaeological standards. The contractor will be expected to abide by the Code of Practice of the Institute of Field Archaeologists, and to follow the guidance provided in Archaeological Science at PPG16 Interventions (English Heritage 2003).

5.26 Decisions made on the methods and strategies for sampling features should be based upon the nature and extent of any deposits which are revealed. These decisions should be made in consultation with the DCA. As a guideline, all features early 20th century date or earlier should be fully investigated and recorded. Discrete features will be half-sectioned in the first instance; linear features will be sampled a minimum of 20% along their length (each sample section not less than 1m), or a minimum of a 1m sample section if the feature is less than 10m long. In addition, the deposits at junctions or interruptions in linear features should be sufficiently excavated for the relationship between components to be established.

5.27 Features are to be recorded according to the normal principles of stratigraphic excavation, and should be accurately located on a site plan and recorded by photographs, summary scale drawings and written pro forma sheets. Sufficient EDM/Total Station survey should take place to allow all features to be located accurately with relation to the National Grid and Ordnance Datum. Individual features will be planned at 1:20 where additional detail is required. Sections and profiles of each feature sampled will be drawn at 1:10 or 1:20, depending on the size of the feature. All plans, sections and profiles will be related to Ordnance Datum, in metres. Drawing conventions should follow the MoLAS Archaeological site manual (2004).

5.28 For brick/stone structures, the record should include details of brick dimensions and type (handmade/machine-made, plain/frogged), mortar (colour, composition, hardness) and the extent of structures (number of courses, thickness in skins).

5.29 Site photography should be in 35mm B/W print film and either 35mm colour slides or high resolution (7 megapixel or greater) colour digital photographs. Photography should include general site shots, shots of each trench, and shots of individual features and groups of features. All photographs should include a suitable photographic scale and will be recorded on a photographic register with the subject and direction of each shot.

5.30 It is not envisaged that deposits of palaeo-environmental material will be encountered. Should deposits of clear palaeo-environmental importance be identified then a recognized environmental specialist will visit the site to advise on a sampling strategy and the suggested strategy will then be implemented.

5.31 Artefact collection policy should be concerned with the provision of adequate samples for meeting the objectives of the work, although given the date of the foundry it is envisaged that all stratified 19th-early 20th century artefacts will be retained. Discarded artefactual materials should be described and quantified through assignment to broad categories in the field. All retained finds and palaeo-environmental samples should be treated in accordance with the EH guidance document A strategy for the care and investigation of finds (1995) and the UKIC's document Guidelines for the preparation of excavation archives for long term storage. Assessment and analysis of finds and palaeo-environmental samples will be undertaken, as necessary, by suitably qualified specialists.

5.32 Where there is evidence for industrial activity, samples will be taken to identify macroscopic technological residues in accordance with Archaeometallurgy (English Heritage 2001) and Science for Historic Industries (English Heritage 2006).

5.33 Any human remains encountered must initially be left in situ. If removal is necessary, this must comply with the relevant Ministry of Justice, Diocesan and other regulations, as appropriate. A strategy for the excavation, analysis, retention and/or reburial of a) disarticulated and b) articulated human remains will need to be developed and specified in the WSI. The cataloguing and analysis of all human remains will be undertaken, as necessary, by a suitably qualified osteoarchaeologist.

5.34 Contingency provision will be made for additional specialist advice, eg for finds analysis,

analysis of industrial samples, and conservation.

5.35 The appointed archaeological contractor should undertake a site risk assessment and operate at all times with due regard to health and safety regulations.

6 WSI and monitoring

6.1 A written scheme of investigation (WSI) should be formulated by potential contractors and submitted to the Development Control Archaeologist for approval. This document forms an agreed scope of works, and should explicitly cover all the requirements of this brief:

- The proposal should include:
- A description of the proposed fieldwork methods to be used.
- An explanation of the sampling strategies to be used
- A projected timetable for work on site
- Details of the arrangements made for deposition of the finds and site archive
- A list of specialists available for undertaking finds, industrial and palaeo-environmental analyses

6.2 The work will be carried out by appropriately qualified and experienced staff. The principal site archaeologist and buildings recorder should have appropriate experience of the excavation and recording of industrial sites, and CVs should be submitted to the Development Control Archaeologist in advance for approval. Details of staff numbers and their relevant experience should be included, plus their responsibilities in carrying out the work.

6.3 Any changes to the agreed WSI will be discussed with, and agreed with, the Development Control Archaeologist before implementation

6.4 During the course of the fieldwork the Development Control Archaeologist may undertake monitoring visits. One week's prior notice of the commencement of fieldwork should therefore be given, including the name and contact number of the archaeologist on site.

6.5 Should significant archaeological deposits be encountered the archaeological contractor should contact the Development Control Archaeologist and arrange a convenient date and time for a site visit. Your contact will be:

Steve Baker,
Development Control Archaeologist,
Derbyshire County Council,
Shand House,
Dale Road South,
Matlock,
Derbyshire DE4 3RY

steve.baker@derbyshire.gov.uk

Tel: 01629 539773

7 Report

7.1 The preparation of reports should follow the guidelines published by the Institute of Field Archaeology and English Heritage (MAP2). Provision should be made for assessment reporting (sensu MAP2) and interim reporting to be undertaken where appropriate.

7.2 A final report should be submitted within six months of the completion of fieldwork. Bound copies of reports should be provided for the interested parties. This should include the

Development Control Archaeologist and the Derbyshire Historic Environment Record. The archive should be deposited with the appropriate museum.

7.3 The final report should include as a minimum:

- Non-technical summary
- Introductory statement
- Aims and purpose of the archaeological work
- Method
- An objective summary statement of results
- A detailed interpretive discussion of the internal and external building features and sequence, in relation to relevant historical and archival information identified within the documentary study
- Full phased stratigraphic discussion of the archaeological features
- An interpretive discussion of the results, placing them in a local and regional context
- The results of assessments and/or analyses of artefacts and ecofacts carried out by suitable specialists
- Key building record photographs (printed at a minimum of 5" x 4") and a selection of supporting images of at least laser copier standard.
- Archaeological site photographs including key features and working shots
- Supporting illustrations and plans, suitably captioned, at appropriate scales. To include as a minimum: a location map at not less than 1:25000 and a site plan at not less than 1:500; copies of historic map extracts and historic photographs where relevant; a plan indicating positions of photographs used within the report; scale plans of buildings at each level; key elevations; phase plans of historic buildings on site; a plan and section of each trench (sample section if blank); detail plans/sections of archaeological features and structures as appropriate.
- A detailed context index
- Supporting data – tabulated or in appendices Index to archive and details of archive location
- References
- A copy of the OASIS form
- A copy of this brief

7.4 A short summary report should be supplied as hard copy and a pdf to the Development Control Archaeologist along with the full report. The appointed archaeological contractor should also provide the Development Control Archaeologist with a written statement on how the project is to be published. Where no further publication is envisaged then the short report will be published in an annual round-up on developer-funded archaeology in Derbyshire Archaeological Journal within 2 years of

8 Archive deposition

8.1 Arrangements should be made from the outset of the project for the full and final archive to be deposited at Derby Museum and Art Gallery in accordance with the deposition and archiving standards outlined in Procedures for the Transfer of Archaeological Archives (Museums in Derbyshire, 2003). The Museum should be contacted before fieldwork to discuss potential costs for archiving, and these must be built into agreed project costs. Before fieldwork commences an accession number should be drawn and permission obtained from the landowner for deposition of the archive. Your contact will be:

Derby Museum and Art Gallery The Strand Derby DE1 1BS 01332 641901

museum@derby.gov.uk

8.2 At the start of work (immediately before fieldwork commences) an OASIS online record

http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms. All parts of the OASIS online form must be completed for submission to the HER. This should include an uploaded pdf version of the entire report (a paper copy should also be included with the archive).

8.3 Written confirmation of the archive transfer arrangements, including a date (confirmed or projected) for the transfer, must be included as part of the final report. The Development Control Archaeologist must be informed in writing when final transfer of archives has taken place.

9 Publication

9.1 Contingency publication costs must be built into agreed project budgets from the outset. Where no further publication is envisaged then a summary of the project, with selected drawings, illustrations and photographs, should be submitted within 2 years of the completion of the project to Derbyshire Archaeological Journal for publication. A sheet of instructions for contributors is attached.

Guidance notes for contributors to the Derbyshire Archaeological Journal of interim and short reports on developer funded archaeology:

The aim is to publish annual compilations of short reports on developer funded archaeology in the county on a regular basis in the Derbyshire Archaeological Journal, in order to better inform the public of the results of the work being undertaken.

It is envisaged that the reports will take one of two forms;

Interim reports – short interim descriptions of an excavation or survey that will eventually be subjected to fuller publication.

Definitive reports – summaries of archaeological work which will not be pursued further. Note that even if the results were negative, if valid questions were posed then a brief explanation will be worthwhile.

MODEL – see 'Some Fieldwork in Derbyshire by the Trent & Peak Archaeological Unit in 1998-9' edited by Graeme Guilbert and Daryl Garton, DAJ vol. 121 (2001): 223-5. Number 18 is an example of an Interim report and numbers 19 to 20 are examples of definitive reports.

DETAILED NOTES

- Set individual reports out in alphabetical order of site names. NGR should follow site name, followed by names of those responsible for the report and/ or fieldwork.
- Give due acknowledgement to sponsors of project within text. Definitive reports should include whereabouts of the related written, drawn and photographic archive, as well as any artefacts.
- Illustrations – include line drawings and/or photographs if appropriate.
- References – include where appropriate at the end of each report.

FUNDING

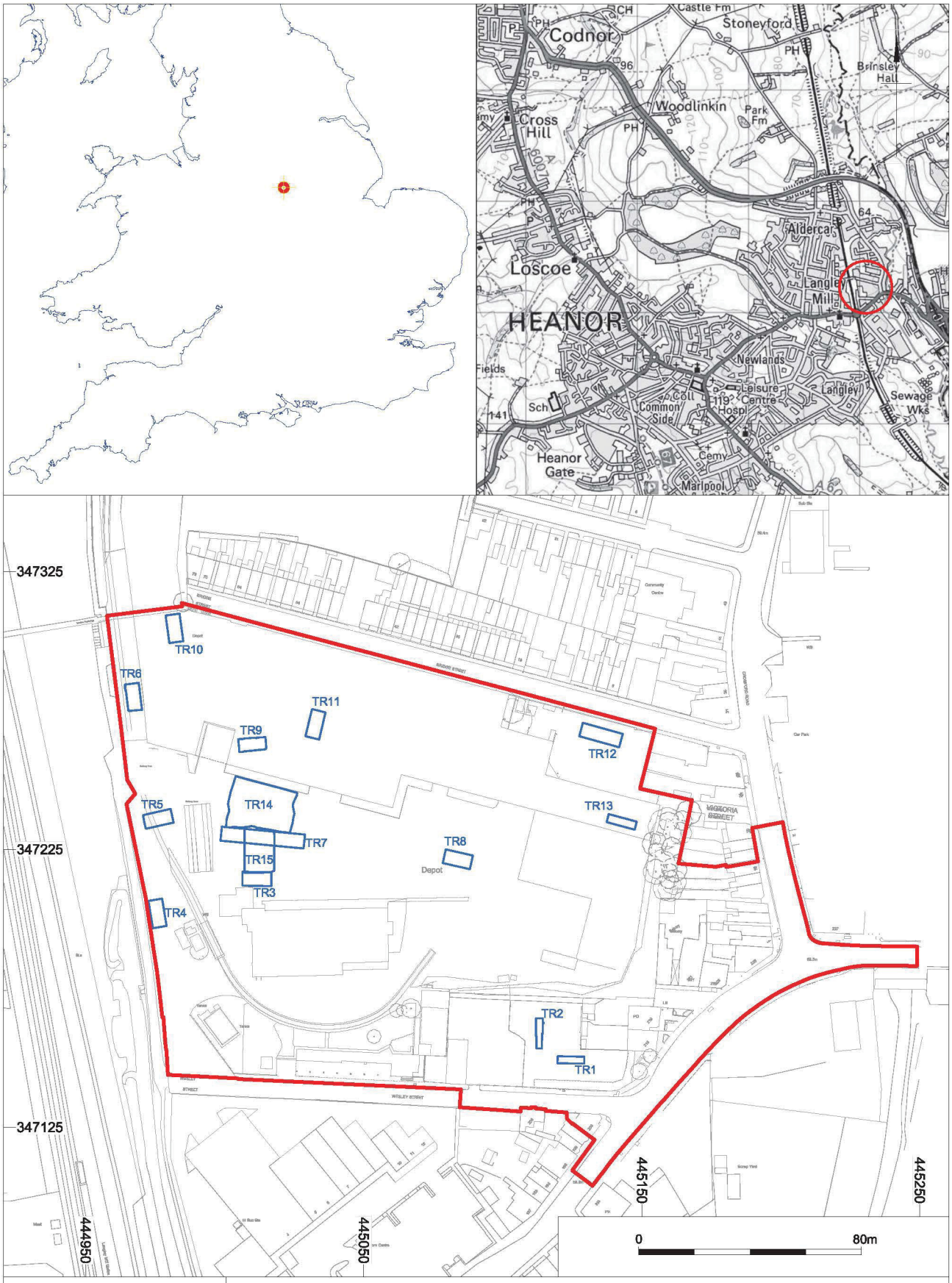
The Derbyshire Archaeological Society will require an offer of grant-aid towards the printing costs of short reports submitted in order to guarantee publication. Costs will be determined from the printer's estimate. A contribution towards these costs of around 60% will be sought from the relevant contracting archaeological organisation. For further information contact Pauline Beswick (Hon. Editor), 4 Chapel Row, Froggatt, Calver, Hope Valley, S32 3ZA or tel. 01433 631256.

DEADLINE

Reports received by the end of July will be considered for inclusion in DAJ in the year following. If too late they will be saved for consideration for the succeeding year.

Reports to be submitted in hard copy and on disk to:

Steve Baker at Environmental Services Department, Derbyshire County Council, Shand House, Dale Road South, Matlock, Derbyshire DE4 3RY.



Site boundary

Wessex Trenching

Date:	04/06/2010	Revision Number:	0
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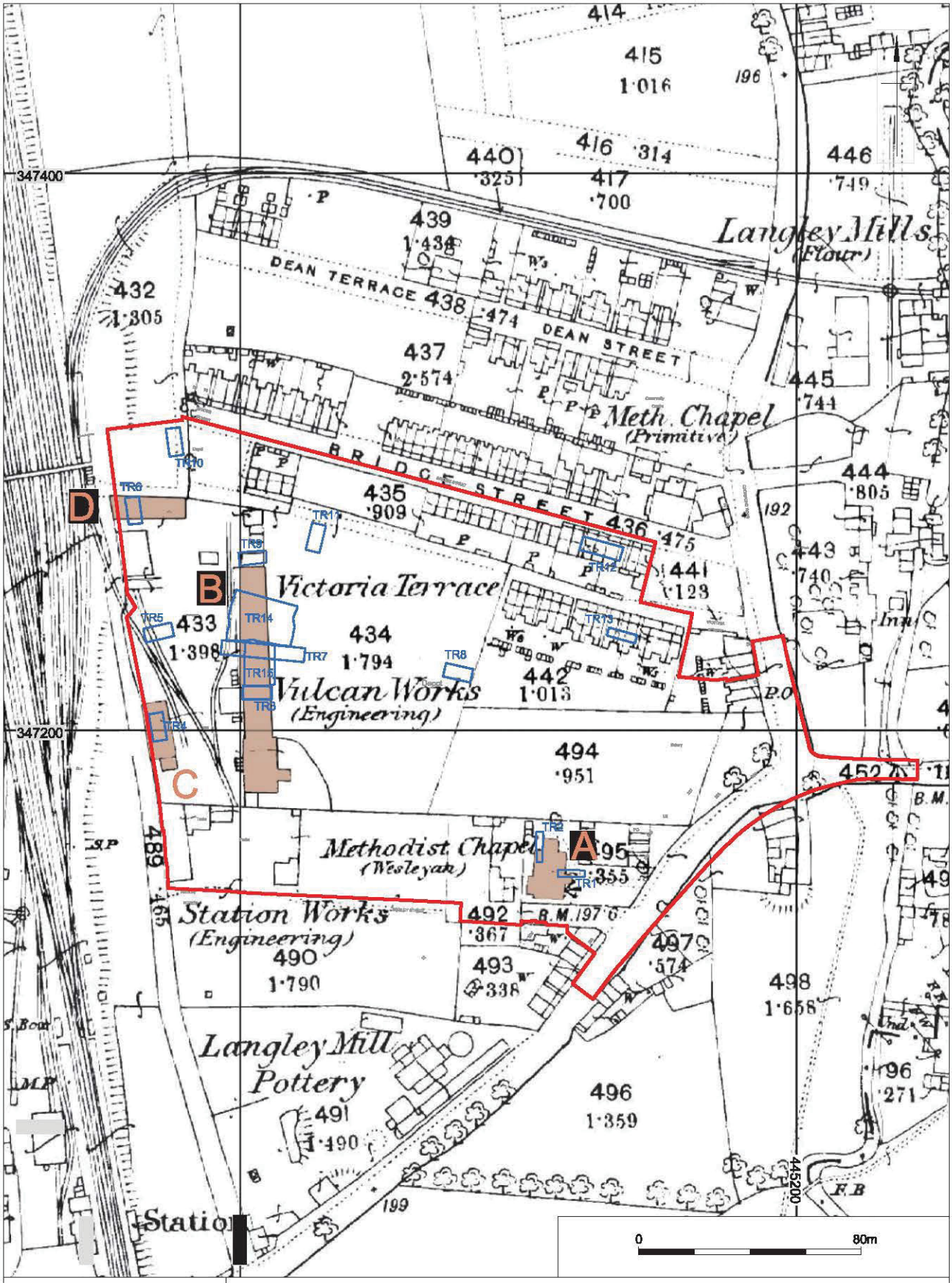
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Site location.dwg		

Wessex Archaeology

Site location

Figure 1



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Wessex Archaeology

1881 OS Map

Figure 2

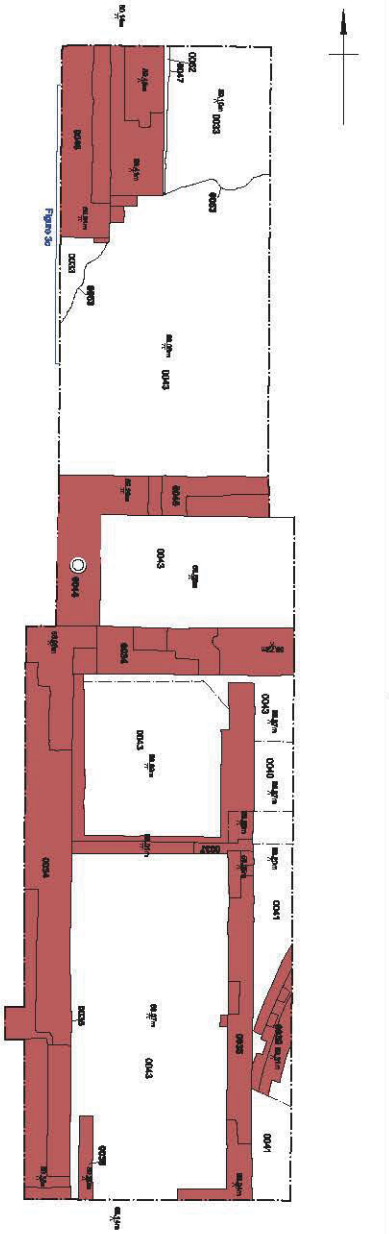
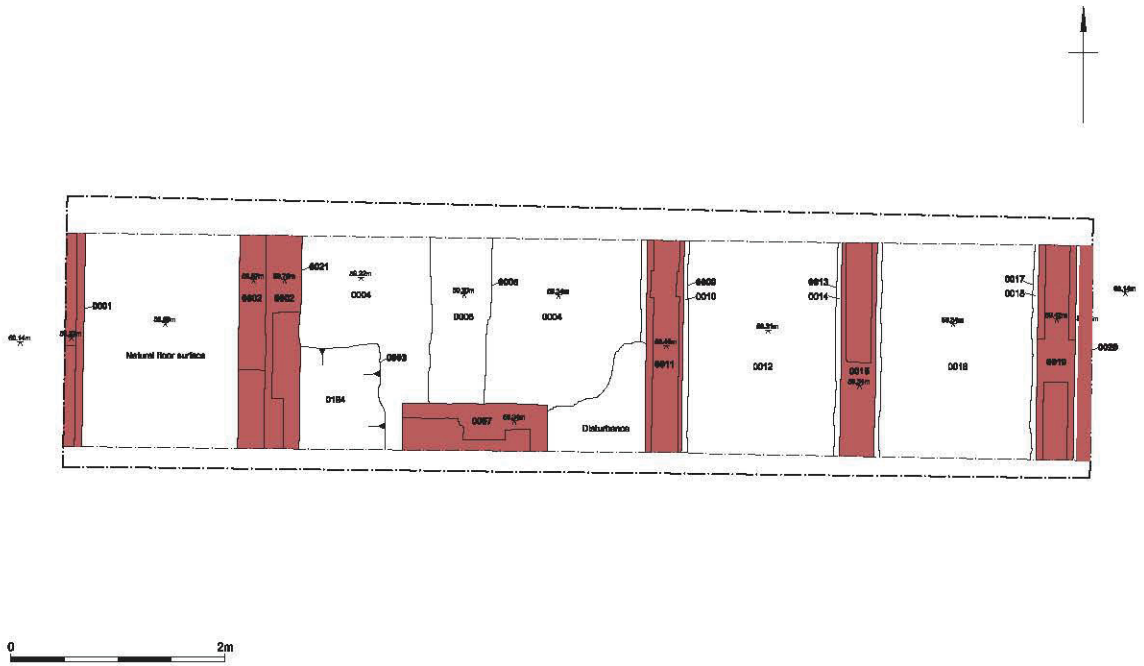
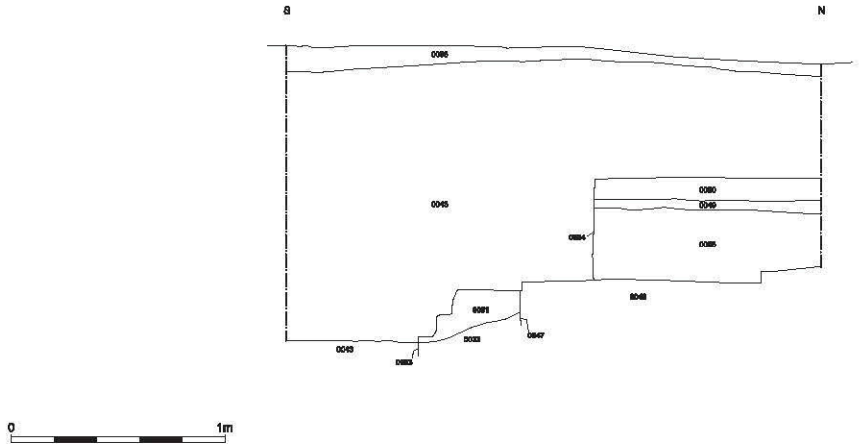


Figure 3a





Wessex Archaeology

Revision Number:	0
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Y:\Projects\73612_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73612_Trenching basemap_CS.dwg

Trench 1 & 2: Plans and Sections

Figure 3

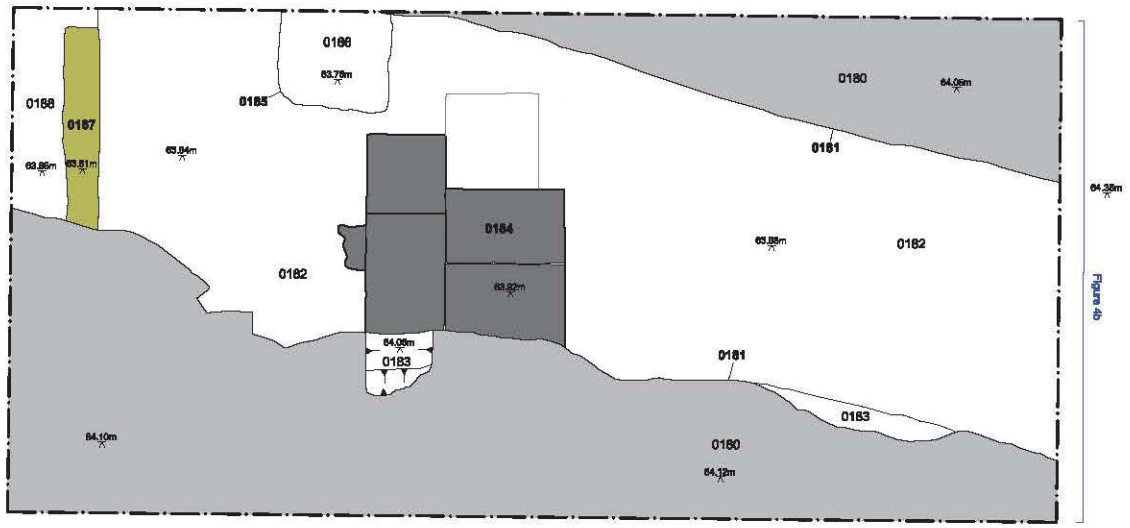

Figure 4a

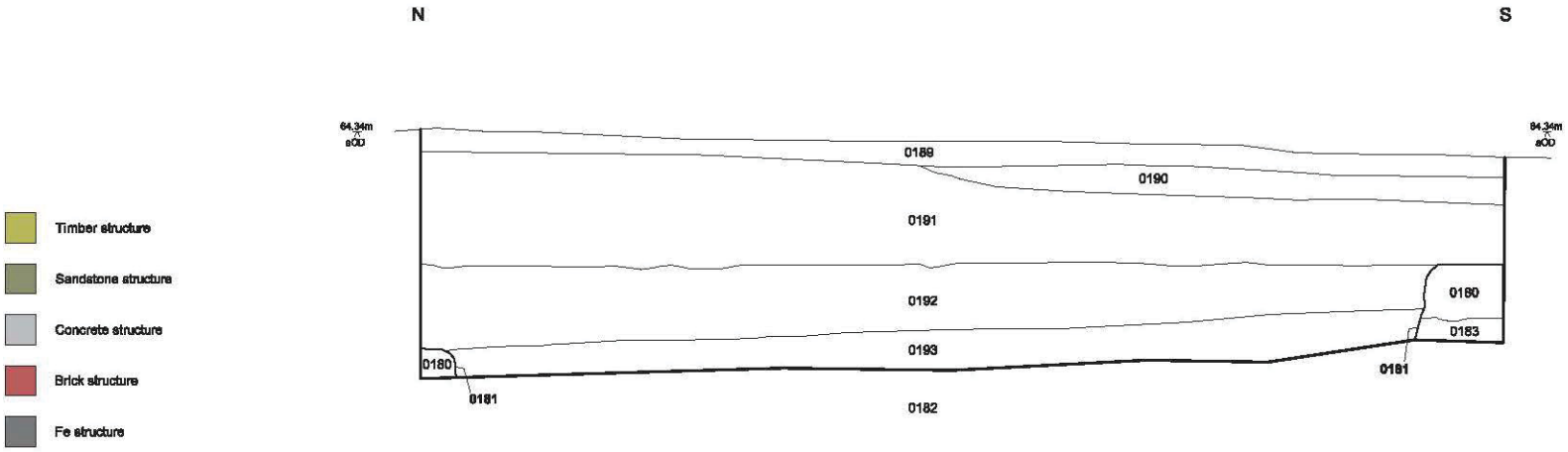

Figure 4b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:20 @ A4 1m

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Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Trenching basemap_OS.dwg		

Trench 3: Plan and section

Figure 4

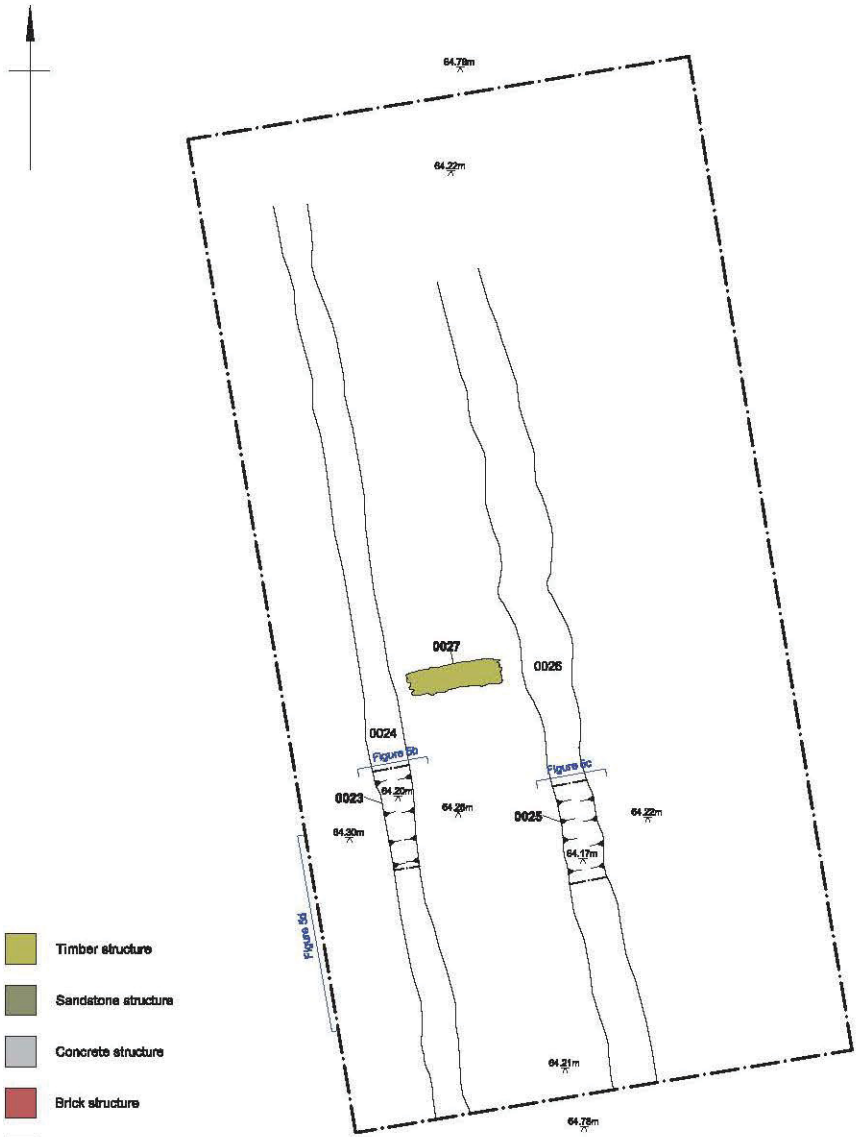

Figure 5a

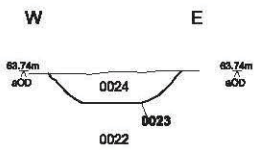

Figure 5b

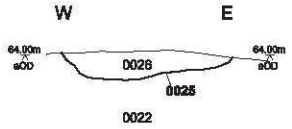

Figure 5c

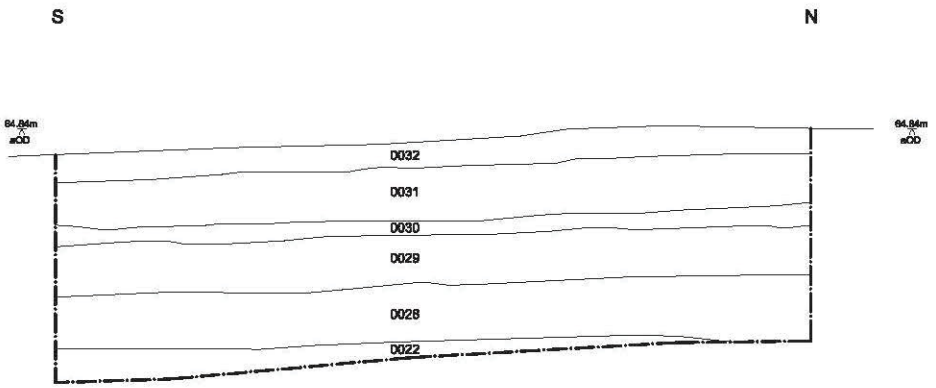

Figure 5d

Wessex Archaeology

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0 Section - 1:20 @ A4 1m

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Scale:	Plan - 1:75 @ A4 Section - 1:20 @ A4	Illustrator:	CS
Path:	Y:\Projects\73810_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73810_Trenching basemap_OS.dwg		

Trench 4: Plan and sections

Figure 5

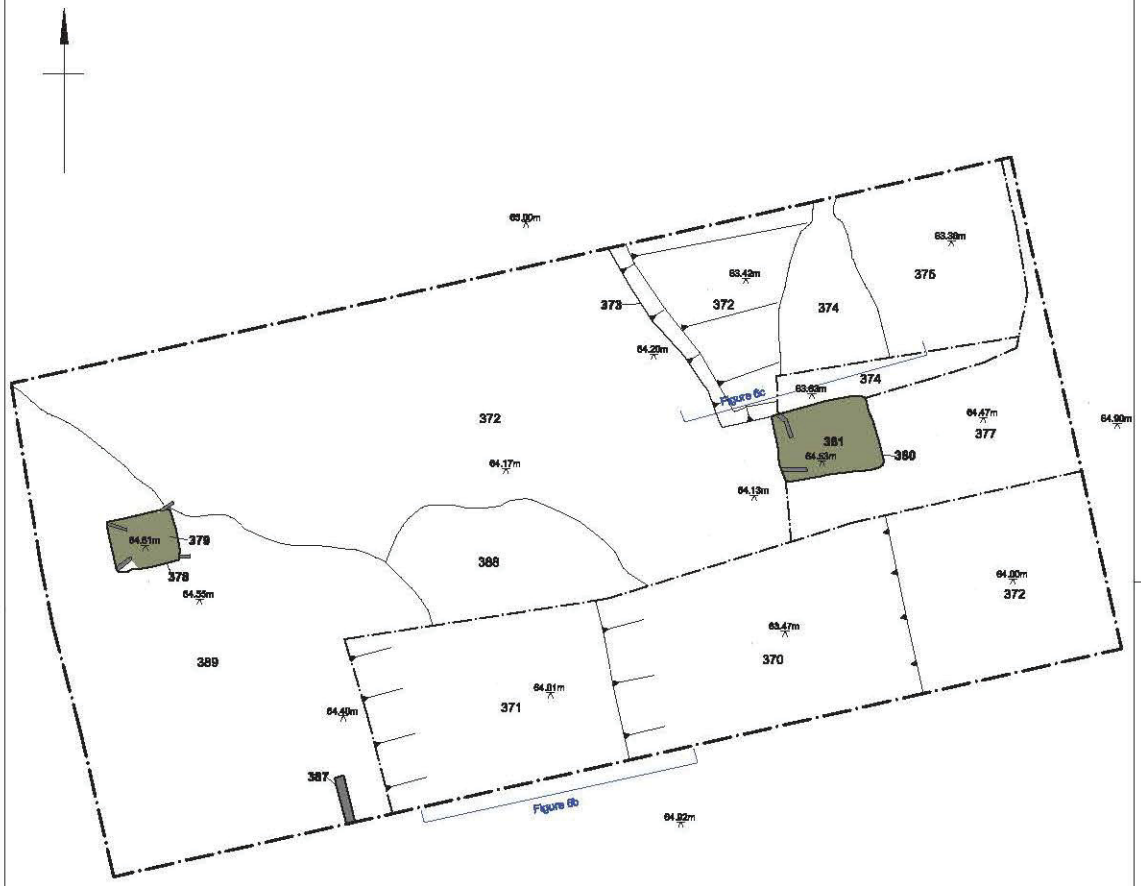

Figure 6a

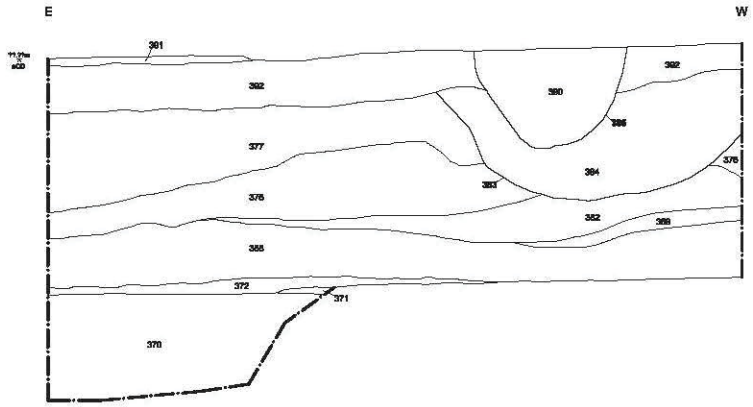

Figure 6b

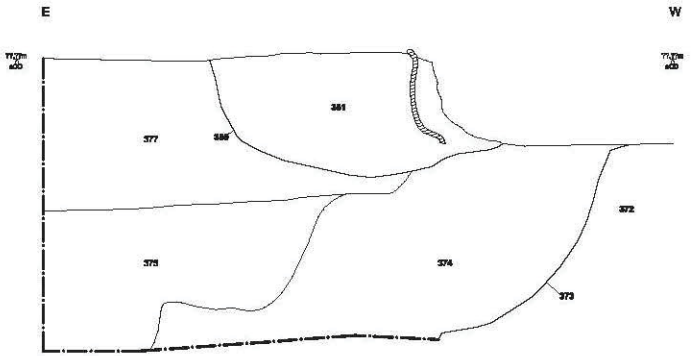

Figure 6c

Wessex Archaeology

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0 Section - 1:30 @ A4 1m

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Scale:	Plan - 1:75 @ A4 Section - 1:30 @ A4	Illustrator:	CS
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\ 73610_Trenching basemap_OS.dwg		

Trench 5: Plan and sections

Figure 6

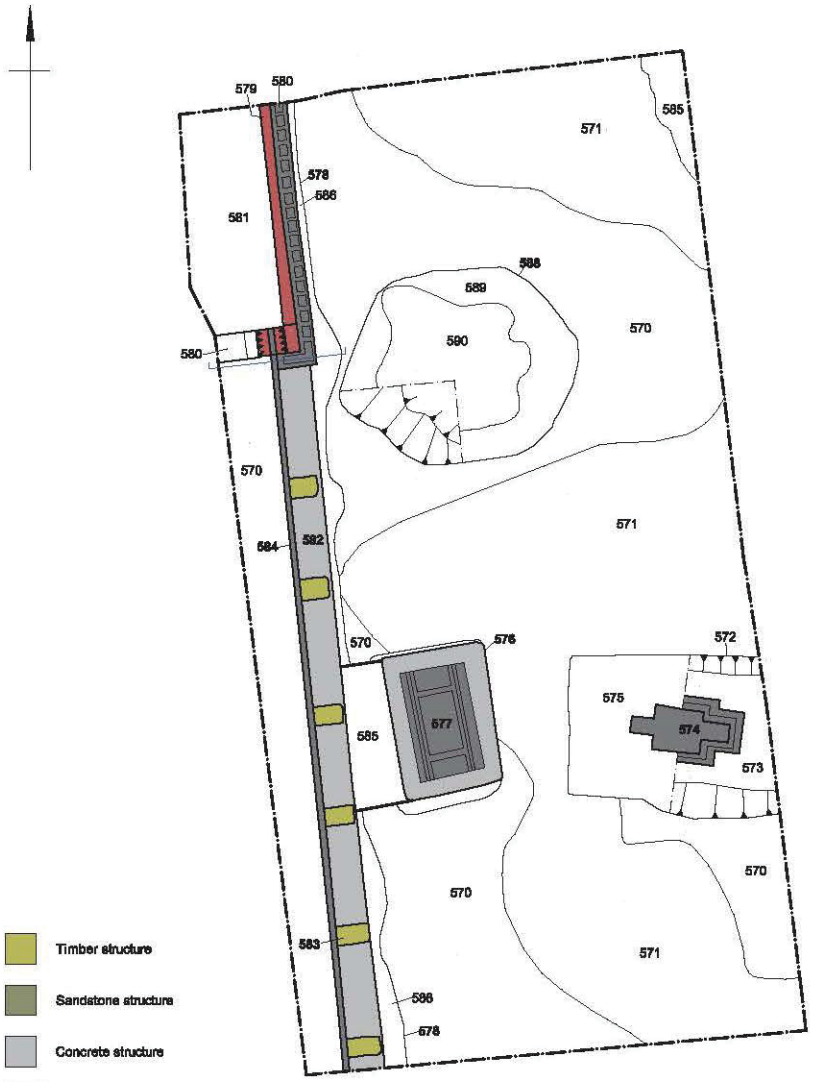

Figure 7a

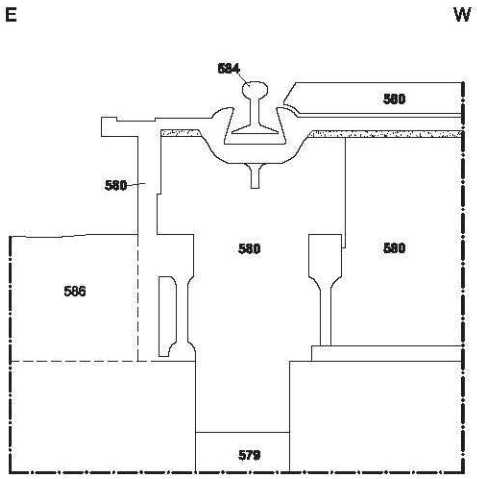

Figure 7b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:20 @ A4 1m

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Scale:	Plan - 1:75 @ A4 Section - 1:20 @ A4	Illustrator:	CS
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Trenching basemap_OS.dwg		

Trench 6: Plan and sections

Figure 7

Figure 8a

Figure 8b

Wessex Archaeology

0 5m

Date:	04/06/2010	Revision Number:	0
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Trench 7: Plan and overlay

Figure 8

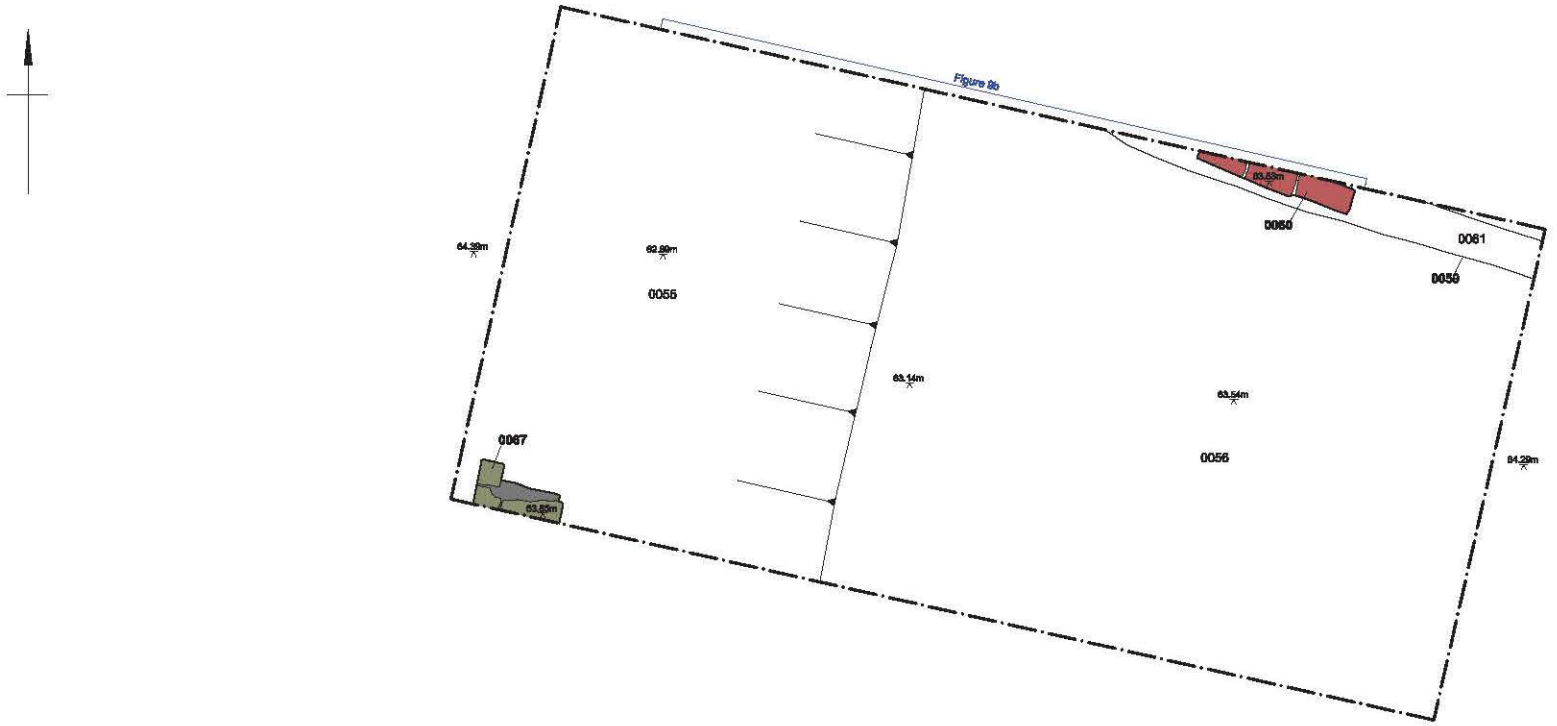

Figure 9a

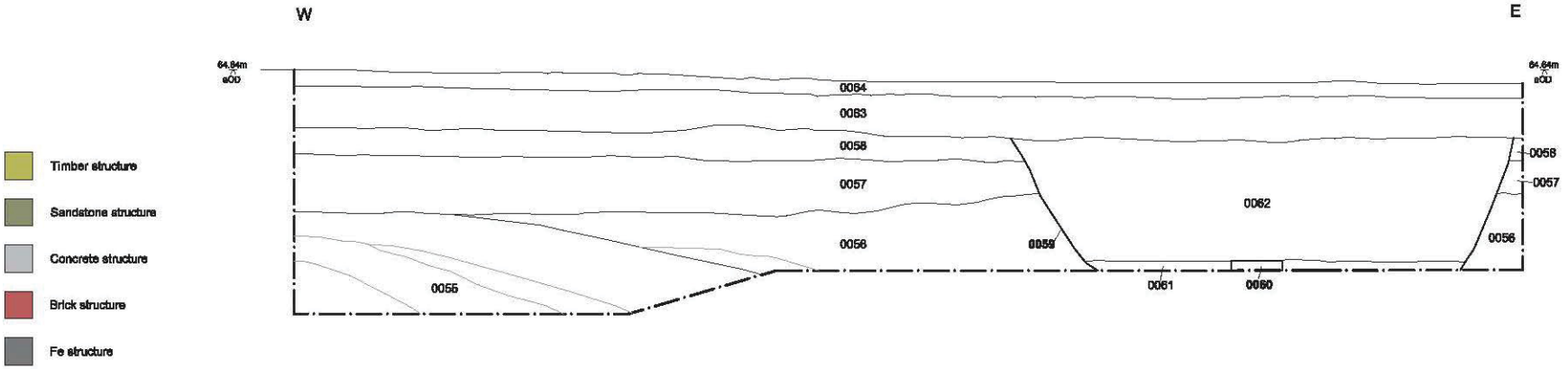

Figure 9b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:40 @ A4 2m

Date:	04/06/2010	Revision Number:	0
Scale:	Plan - 1:75 @ A4 Section - 1:40 @ A4	Illustrator:	CS
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Trenching basemap_OS.dwg		

Trench 8: Plan and section

Figure 9

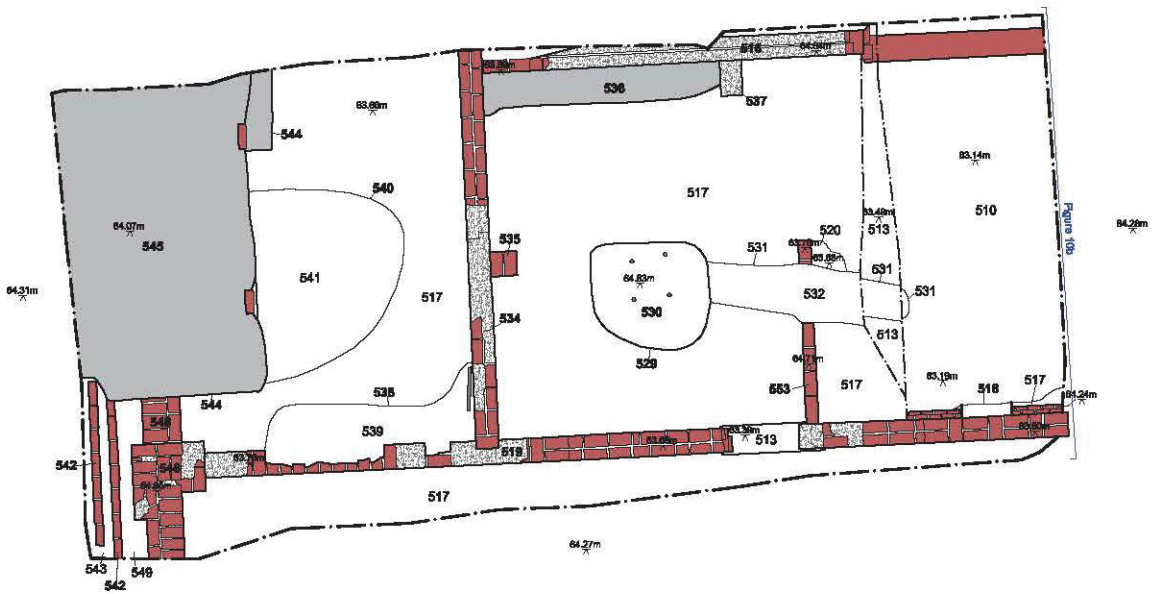

Figure 10a

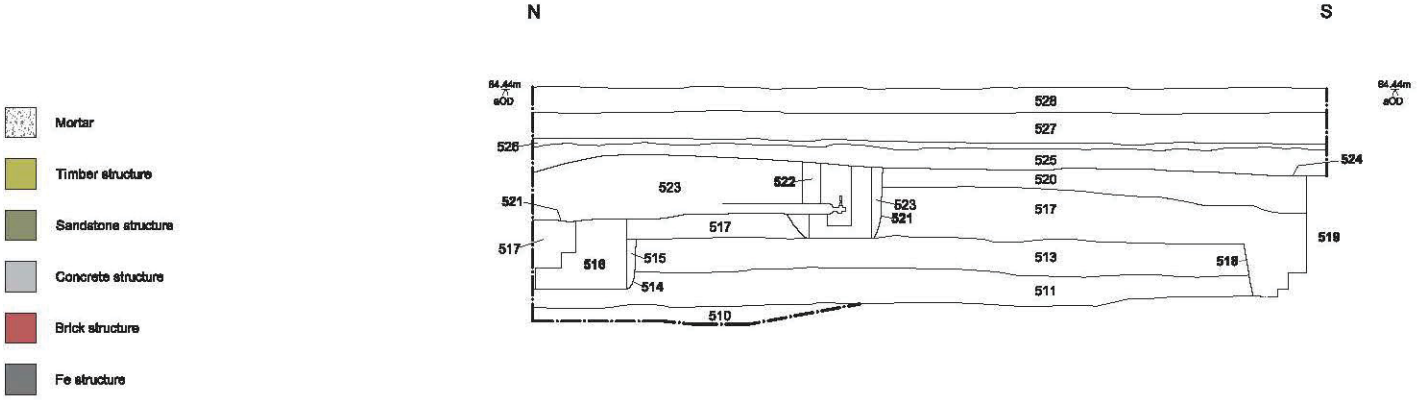

Figure 10b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:40 @ A4 2m

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Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Trenching basemap_OS.dwg		

Trench 9: Plan and section

Figure 10

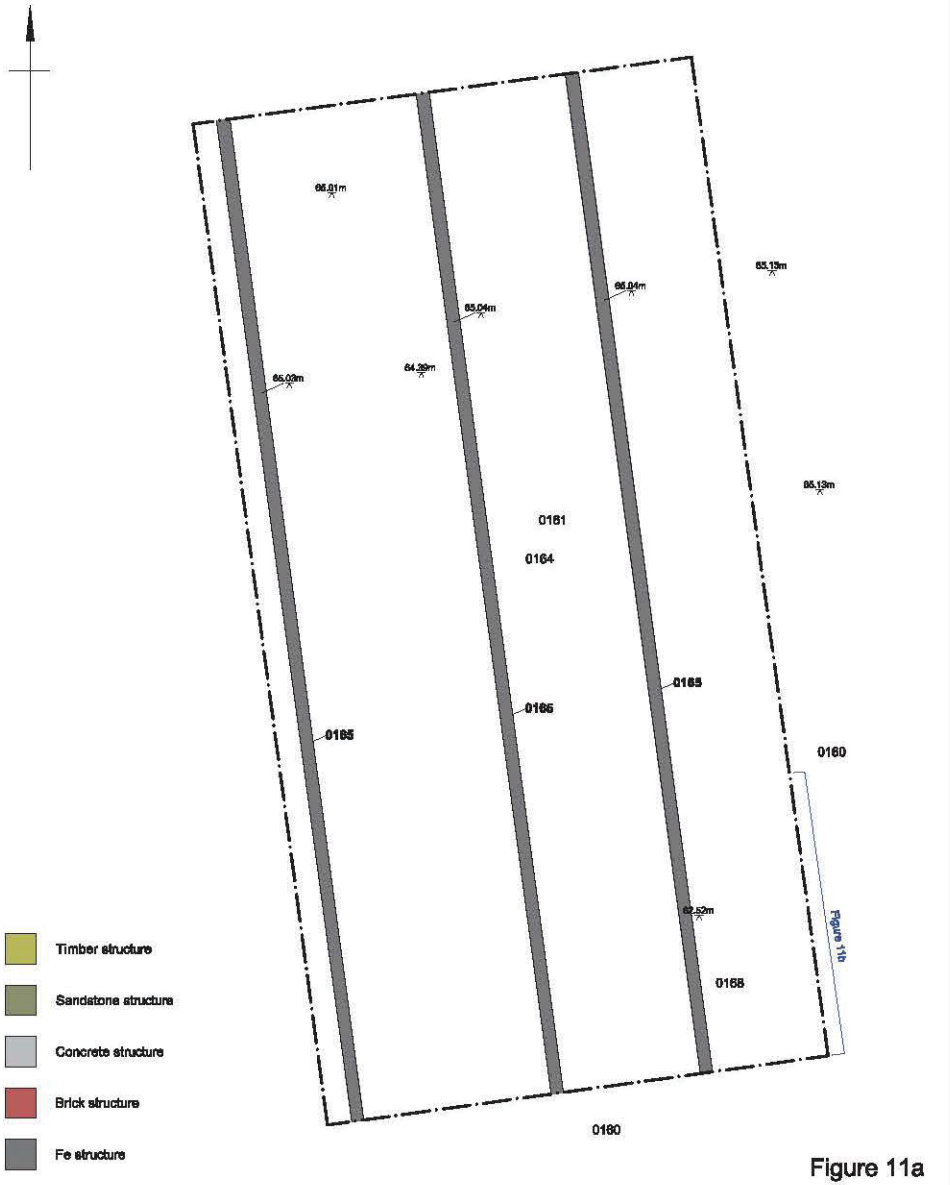

Figure 11a

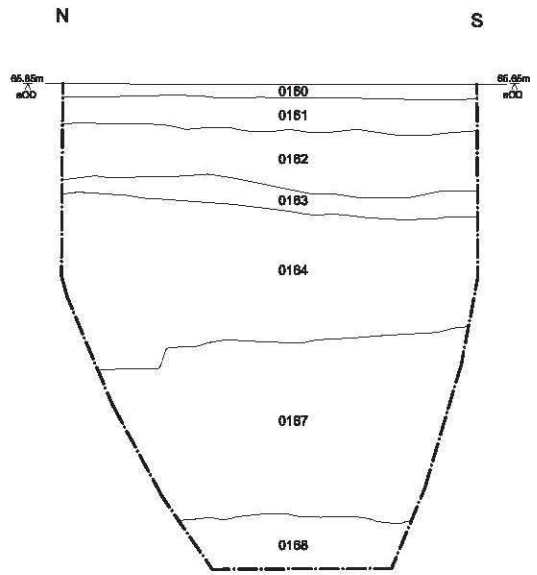

Figure 11b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:40 @ A4 2m

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Path:	Y:\Projects\73810_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\ 73810_Trenching basemap_OS.dwg		

Trench 10: Plan and overlay

Figure 11

Figure 12a

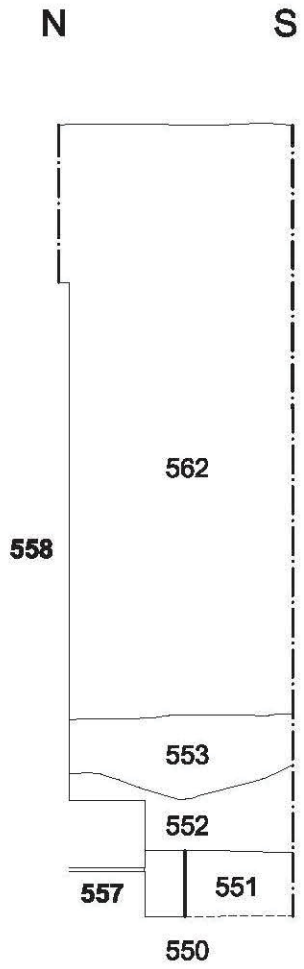


Figure 12b

Wessex Archaeology

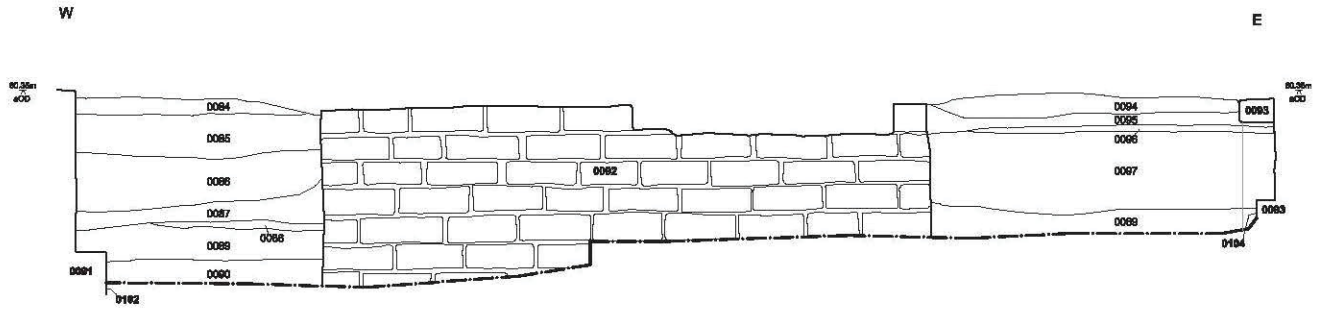
0 Plan - 1:75 @ A4 4m

0 Section - 1:100 @ A4 0.5m

Date:	04/06/2010	Revision Number:	0
Scale:	Plan - 1:75 @ A4	Illustrator:	CS
Path:	Y:\Projects\73810_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73810_Trenching basemap_OS.dwg		

Trench 11: Plan

Figure 12



Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:25 @ A4 1m

Date:	04/06/2010	Revision Number:	0
Scale:	Plan - 1:75 @ A4	Illustrator:	CS
Path:	Y:\Projects\73810_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73810_Trenching basemap_OS.dwg		

Trench 12: Plan

Figure 13

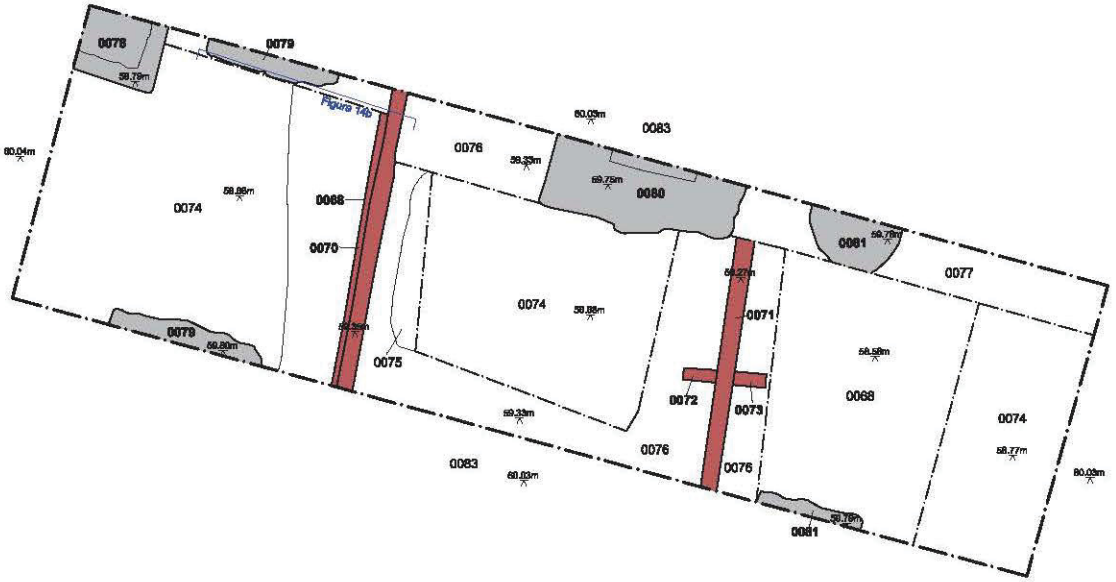


Figure 14a

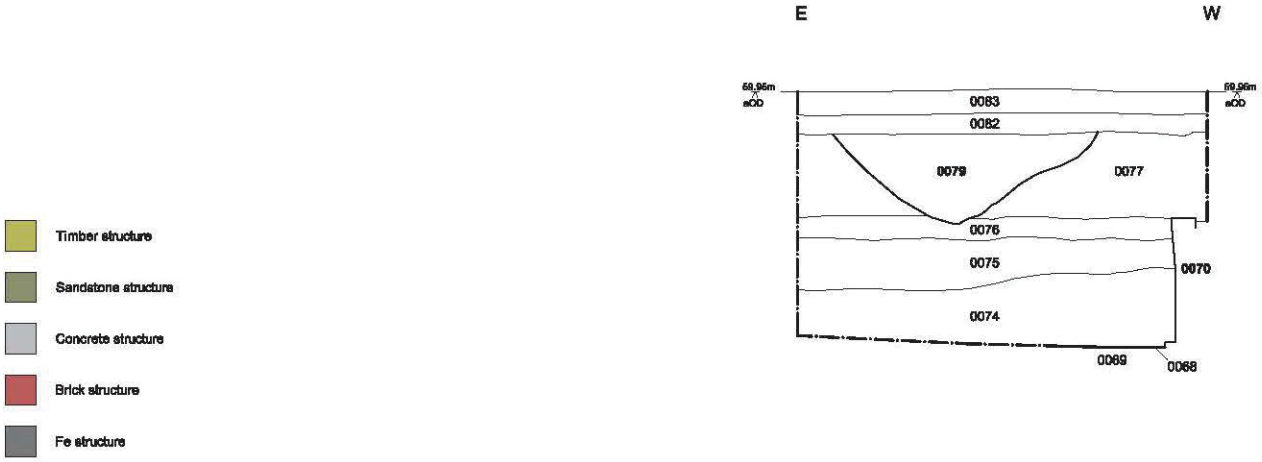


Figure 14b

Wessex Archaeology

0 Plan - 1:75 @ A4 4m

0 Section - 1:40 @ A4 2m

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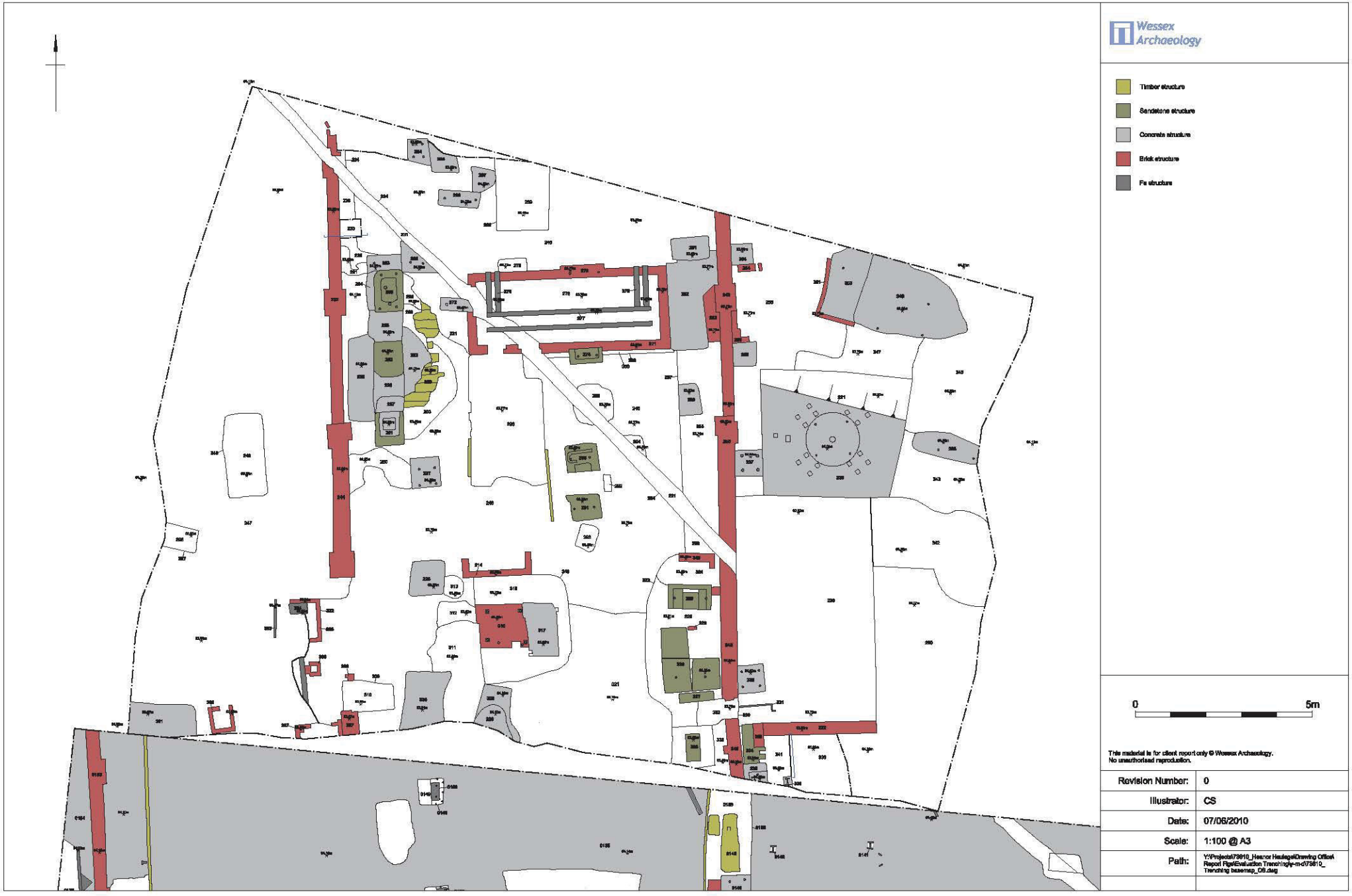
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d\73610_Trenching basemap_OS.dwg		

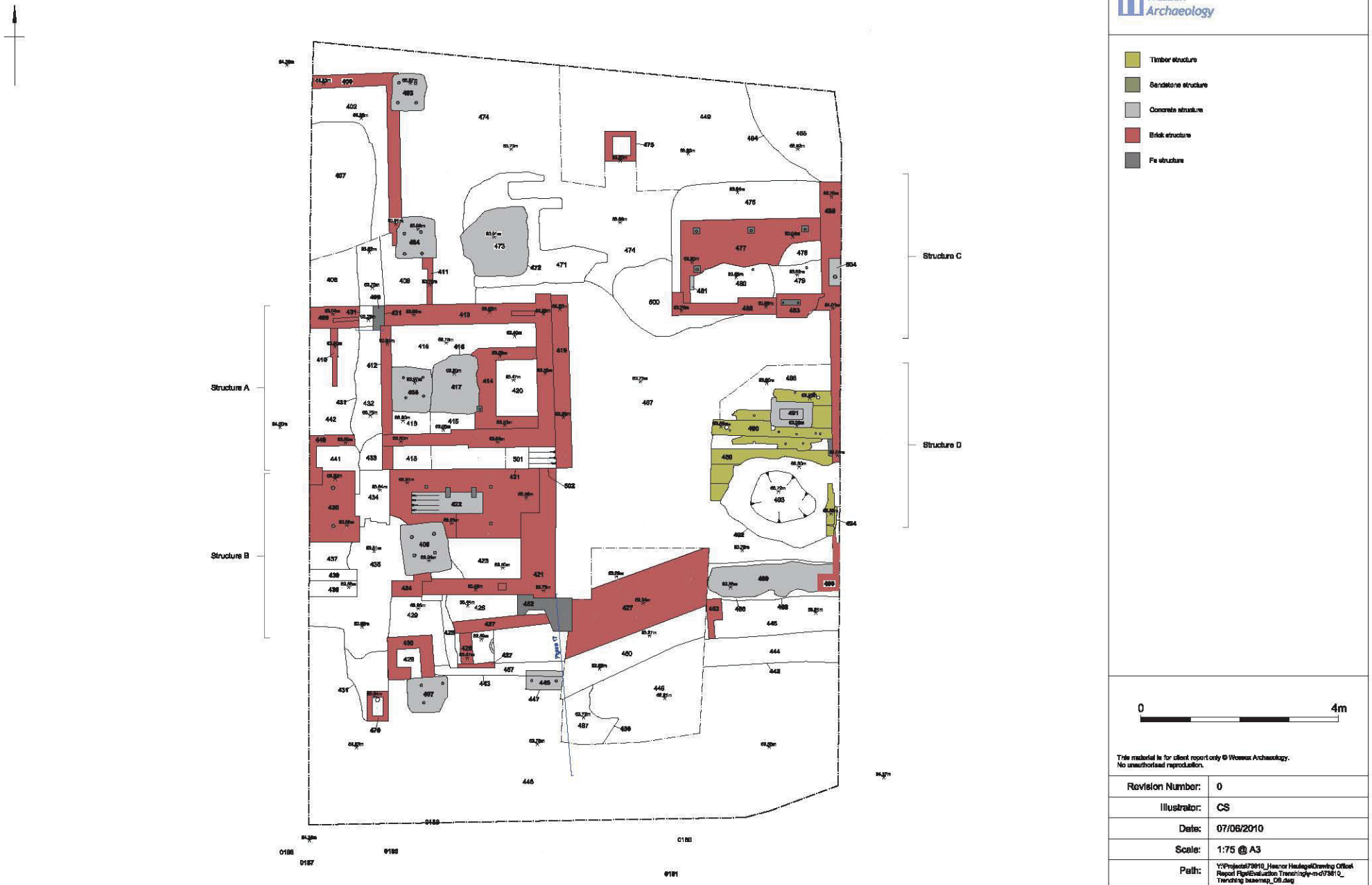
Trench 13: Plan and section

Figure 14



Trench 14: Plan

Figure 15



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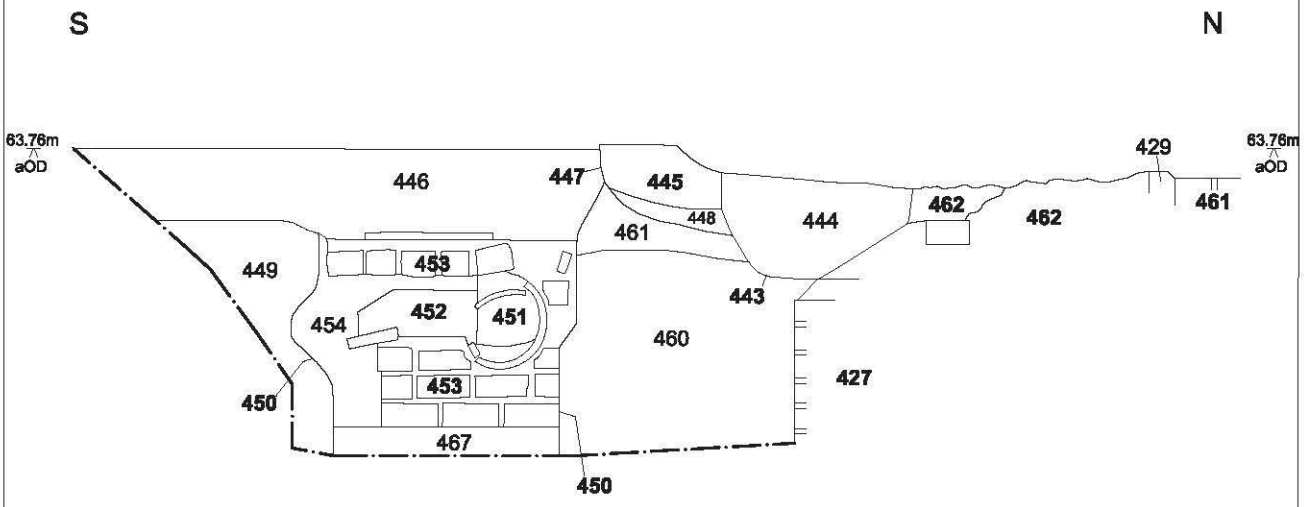
Trench 15: Plan

Figure 16



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Trench 15: Section

Figure 17

Plate 1: Trench 2, facing N

Date:	22/01/10	Revision Number:	0
Scale:	N/A	Illustrator:	CB
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d		

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Plate 2: Trench 6, facing east

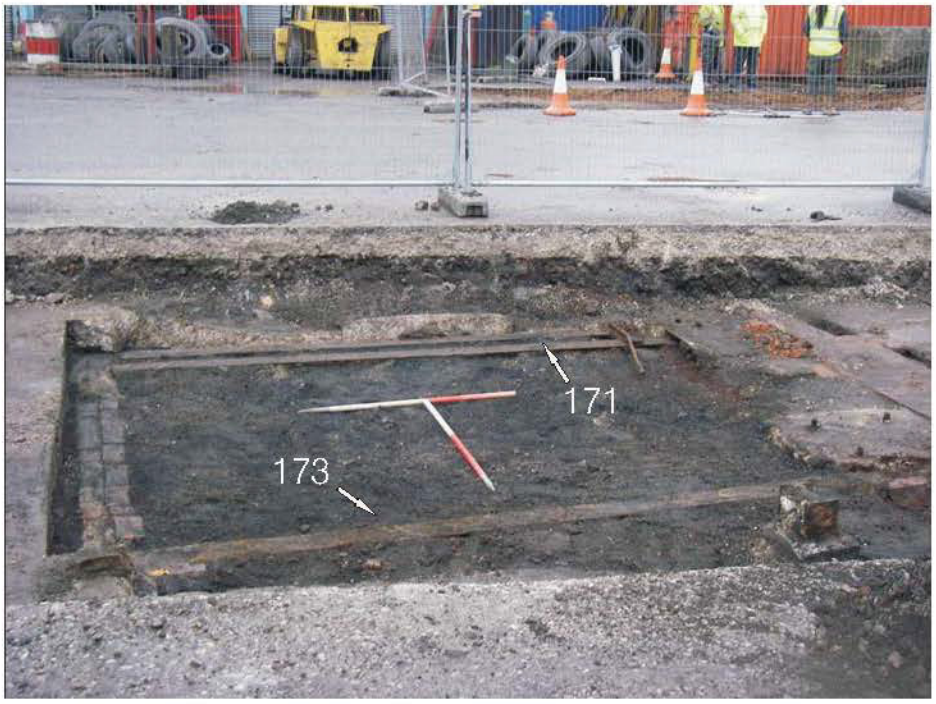

Plate 3: Trench 7, facing south

Date:	29/07/10	Revision Number:	0
Scale:	N/A	Illustrator:	CB
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d		

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Plate 4: Trench 9, facing east. Showing the 1881 factory extension and the small room appended to the north.

Plate 5: Trench 14, facing south-east. Showing the off line coursing between [245] & [243].

Date:	29/07/10	Revision Number:	0
Scale:	N/A	Illustrator:	CB
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d		

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Plate 6: Trench 14, facing west south-west.

Plate 7: Trench 15, facing south.

Date:	29/07/10	Revision Number:	0
Scale:	N/A	Illustrator:	CB
Path:	Y:\Projects\73610_Heanor Haulage\Drawing Office\Report Figs\Evaluation Trenching\y-m-d		

Wessex Archaeology

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For more information visit **www.wessexarch.co.uk**