

birmingham archaeology

**The New Library of
Birmingham, Cambridge
Street/ Centenary Square**

**Assessment of Potential and
Updated Project Design**

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June 2010

The New Library of Birmingham
Cambridge Street to Centenary Square
Assessment of Potential and Updated Project Design

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The New Library of Birmingham, Cambridge Street Car park/ Centenary Square

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The New Library of Birmingham, Cambridge Street Car Park/ Centenary Square

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Summary

Birmingham Archaeology was commissioned in June 2009 by Carillion Building, acting on behalf of Birmingham City Council, to undertake an archaeological excavation in respect of the proposed development of the Library of Birmingham, Cambridge Street, Birmingham.

The site of the Library of Birmingham is located on Cambridge Street in a plot of land between the REP theatre, Baskerville House and extending into Centenary Square, on the edge and to the north-west of the city centre of Birmingham (NGR SP 0631 8687). The work was undertaken between June and December 2009, in two stages in Area 1 at the north of the site and Area 2 a later extension at the south of the site. The work was undertaken in advance of the proposed development of the Library of Birmingham. Earlier desk-based assessment, evaluation and a watching brief on the geotechnical work had identified the potential of the site for archaeological remains of the Cambridge Street Brass Works dating to the 19th and 20th centuries. The City Archaeologist recommended a programme of archaeological excavation in order to preserve the remains by record.

The excavation revealed only minimal pre-modern remains recovering only a single sherd of medieval pottery. The earliest structural remains were associated with Gibson's and Baskerville Canal Arm and the Union Rolling Mill dated to the 1810-20s. These were later incorporated into the Cambridge Street Works, owned by Robert Winfield that flourished between 1830 and 1900. The north of the site (Area 1) was dominated by the remains of the brass rolling mill, the wire drawing mill, the engine house, boiler, chimney, muffles, and wheel pits were excavated. In the centre of the site were the remains of a series of workshops and brass crucible hearths that formed the bedstead works. In the early 20th century alteration occurred to the site as part of the war effort during the Great War of 1914-1918 that resulted in the conversion of certain areas of the site to galvanizing and tin-plating. The south of the site (Area 2) was heavily truncated due to the later construction of Centenary Square in the 1920s and remains of the Birmingham Screw and Metal Works survived. The remainder of the northern half of the site was eventually closed and demolished in the 1930s.

This report outlines the significance of the site and the archaeological remains recorded. It has recommended further work be conducted to place the site in context. This will include scientific analysis of the metallurgical residues, technical examination of the workings of the steam engine and power applications to the rolling mills and historic research aimed at understanding specific areas of the site.

The New Library of Birmingham, Cambridge Street Car park/ Centenary Square

Assessment of Potential and Updated Project Design
June 2010

1. INTRODUCTION

- 1.1.1. Birmingham Archaeology was commissioned by Carillion on behalf of Birmingham City Council to undertake an archaeological excavation ahead of the development of the new Library of Birmingham at the Cambridge Street car park/ Centenary Square (hereinafter referred to as the site; NGR SP 0631 8687, Fig. 1 and 2).
- 1.1.2. This report provides an assessment and updated project design of the excavation carried out between July and December 2009. The report includes an assessment of the archaeological findings of the site and of environmental and artefactual evidence recovered. An updated project design is given alongside a publication outline and details of further work necessary for completion. The structure of the report is based on guidelines provided by English Heritage (1991; 2006).
- 1.1.3. This report does not represent the final analysis of the excavation results, but outlines the remaining and recommended work which is necessary to achieve the dissemination of the project as outlined below.
- 1.1.4. An archaeological desk-based assessment carried out in October 2006 which through analysis of the available documentary and cartographic evidence concluded there was the potential for well-preserved archaeological remains on the site. The buildings that once occupied the site included buildings belonging to John Baskerville's house, a former canal wharf, and the Union Rolling Mill which became part of Winfield's Cambridge Street Works. The Cambridge Street Works comprised metal rolling, gas fitting, brass founding, carpentry and wire manufacture.
- 1.1.5. An archaeological evaluation carried out in 2008 consisted of four trenches in the existing car park. Well preserved archaeological features dating from the 19th to the early 20th century were identified in all of the trenches.
- 1.1.6. Geotechnical test pits were excavated in January and February 2009 in both the existing car park and the adjoining part of Centenary Square. These test pits confirmed the results of the evaluation trenches.
- 1.1.7. The excavation conformed to a brief produced by Birmingham City Council (Appendix 6), and a Written Scheme of Investigation (Birmingham Archaeology 2009) which was approved by the Local Planning Authority prior to implementation, in accordance with guidelines laid down in Planning Policy Guidance Note 16 (DoE 1990).

2. INITIAL AIMS AND OBJECTIVES OF INVESTIGATION

- 2.1.1. The objective of the excavation was to identify archaeological remains, and to preserve those remains by record.
- 2.1.2. More specific research aims were to:
 - To recover and analyse industrial residues of all kinds

- To identify and date phases of development of the site and the functions of different parts of it.
- To relate the excavated structures to the documentary record.
- To relate the historic development of the site to that found by excavation on nearby sites and to other sites of a similar type nearby.
- To interpret and discuss the remains in their regional and national context.

3. HISTORICAL SUMMARY ASSESSMENT

3.1.1. Historical assessment of the site was undertaken as part of the initial desk-based assessment (Lobb 2006). This was supplemented during the course of the excavations by detailed historical research by Ray Shill (see Appendix 4) designed to inform the process of the investigation. Ray Shill visited the site on several occasions to liaise with the site supervisor and project manager on specific research that could inform the direction of excavation.

3.1.2. The following timeline relates directly to the confines of the development area. (This area is only part of a larger complex of industrial buildings ultimately belonging to R.W. Winfield and sons). It is not necessary to describe every detail of the Winfield complex or how these related to their adjoining properties in this section, further detailed historical research is included as Appendix 4.

PHASE 1

- **1745** Easy Hill House constructed by John Baskerville. The area subsequently becomes known as the Baskerville estate. (Easy Hill house itself was outside of excavation area).
- **1788-1791** Occupation of John Ryland (Easy Hill House sacked by a drunken mob during the priestly riots of 1791).

PHASE 2

- **1810** Thomas Gibson and Shore acquired the Baskerville estate with a view to opening it up for industrial development.
- **1811** Canal basins constructed (became known as Gibson's Arm and Baskerville Basin, construction continued through 1812).
- **1820** R.W.Winfield set up in Cambridge Street (Easy Row side of Cambridge Street). Made small items of brassware such as stair rods. Winfield was listed in 1821 as a 'brassfounder and brass tube maker.

PHASE 3

- **1824/5** Baskerville wharf was fully laid out. This consisted of four symmetrically laid out canal arms (Fig. 3).
- **1824** Ledsam & Ledsam, Potts, Dixon and Winfield set up the Union Rolling Mills upon vacant land.
- **1827** Winfield took out patent for the production of brass bedsteads.
- **1829** Union Rolling Mills become occupied solely by Winfield. The Cambridge street works expanded. The main products were brass tubes and metallic bedsteads. Traded as R.W.Winfield & Co.

PHASE 4

- **1840's or 1850's** The land south of Gibson's arm canal developed by Winfield as the bedstead works.
- **1849** Winfield held a stall at the Birmingham Exhibition.
- **1851** Winfield exhibited at the Great Exhibition (Crystal Palace).

- **1853** Winfield acquired the lease of Union Mills. Around this time Winfield combined the rolling, wire and tube drawing plant into one operation.
- **1857** Winfield acquired the lease of 43 Cambridge Street (caretakers house).
- **1869** R Winfield died.
- **1880's** During this time the variety of products increased. Electric light fittings (1882>) and stained glass windows (1887 -1891) were produced.
- **1887** Enrolled as a limited liability company and traded as Winfields Limited.
- **1897** Winfield's Cambridge Street works went into receivership and was auctioned (the sales plan are shown on Fig. 4).
- **1898** Parts of the Cambridge Street Works were sold off separately.

PHASE 5

- **1900** Rolling Mill taken over by ICI metals Ltd.
- **1914-1918** The Cambridge Street works was taken over by the Ministry of Munitions (state owned for the war effort).

PHASE 6

- **1922** End of production and beginning of site clearance.
- **1936** Winfield's relocated, Gibson's Arm Canal filled in and the Beam engine scrapped.

3.1.3. A corresponding chronology of technical upgrades occurred over time in parallel with the historical development of the site. As detailed later these are relevant to alteration in the physical archaeological record as discerned within the site.

PHASE 3

- **1824** Union Rolling Mill Constructed

PHASE 4

- **1847** Three boilers and a 95hp steam engine used in the rolling mill.
- **1851/52** Watt & co replaced the old boilers and their foundations and provided a new condenser.
- **1882** *'Low pressure condensing engine, flywheel, 24ft diameter'* connected to a *'belt driving dynamo machines'*.
- **1897** –Sale catalogue information;
 - **Rolling Mill**- 7 pairs of rolls (intermediate, breaking down, finishing and preparing rolls). Driven by spur pinions/ wheels attached to mill race wheels.
 - **Mill Wheel Race**- x14 cast iron spur wheels.
 - X1 wrought iron crank to engine spear rod.
 - **Engine House**- *'160hp Condensing beam engine- 8ft stroke 48in cylinder- double cast iron beam 26ft by 4 ft crank 26ft long, 5 plunger rods, condenser 6ft by 3 ft diameter, cast iron receiving tank 9ft by 6ft by 8ft in, forcepump.'*
 - **Boiler House**- 2 double flue firing boilers (E. Danks Oldbury)
 - **Yard**- Double cylinder donkey pump
 - Brick built Annealing Furnace
 - Muffle House

PHASE 5

- **1899-1902** System of firing the muffles with gas from a gas producer introduced. (in 1902 an economiser was installed and in 1903 savings in coal consumption were achieved)

- **1911- 1912** Partial conversion of plant to electric power (including the taking down and rebuilding of a group of muffles. Part of the rolling mill plant was replaced by new rolls driven by electric motors at this time.

PHASE 6

- **1936** *'The beam engine at the Rolling mills was built by James Watt. After 100 years carries on supplying original work of driving power for rolling, tube, wire mills and the warehouse. The driving wheel (26ft in diameter) makes 19 revolutions per minute- the even larger fly wheel (28ft in diameter and weighing 30 tons) revolves 70 times per minute. The engine has been repaired 3 times and just after being built, had a new condenser put in. The engine originally had a wooden beam, which was replaced by a cast iron beam. It now has a twin steel one.'*

- 3.1.4. The principal historical chronology of the site relates to Phases 3 and 4 between 1820 and 1900, with some alteration in Phase 5 in 1900-20. The development of the site therefore relates to the 19th century when economic expansion of Britain and the Empire resulted in dramatic change in terms of the economy, industry and social aspects of Birmingham.

4. EXCAVATION SUMMARY ASSESSMENT

- 4.1.1. Full details of the excavation have been provided within Appendices 1-3 and include the methodology, background and detailed results. The following represents a summary assessment of the excavation results.

- 4.1.2. The excavation found evidence for six phases of activity pre-dating, during and after the completion of the brass metal works (Fig. 5). These six phases broadly relate to the following sequence and correspond closely with the historical record above;

PHASE 1 – 18th century. Evidence for pre-existing occupation of the site by the gardens and land associated with Easy Hill House.

PHASE 2 – 1810-20 Construction of canal basins.

PHASE 3 – 1820-30 Construction of the original Union Rolling Mill.

PHASE 4 – 1830-1900 Major expansion of the works.

PHASE 5 – 1900-20 Alteration of the works.

PHASE 6 – 1920-30 Demolition of the works.

- 4.1.3. The earliest (Phase 1) remains were an isolated island of post-medieval cobbled surface in Area 1 (Fig. 5, Plate 1). During Phase 2, the Gibson and Baskerville Wharves were developed, which survived in the archaeological record intact (Plate 2). The earliest construction were visible at the base of the investigative sondages.

- 4.1.4. The majority of the remains in Area 1 can be dated to 1820-1900 (Phases 3 and 4, Figs. 5 and 6; Plates 1-4). The development of the Union Rolling Mill in the 1820s (Phase 3) was visible in outline. Evidence for the outline of the Rolling Mill survives as the outline of the building. There would also appear that three large structures relate to this early phase as well as the earliest remains of the engine base and boilers. Expansion in Phase 4 included the construction of the bedstead works on the southern side of the canal arm, construction of the main wire drawing, brass rolling and tube rolling works, alteration of the engine-house and boiler set-up to accommodate the works. Sub-phases of the site can be seen within individual areas.

- 4.1.5. Change in ownership during the early 20th century (Phase 5) resulted in the sale of the bedstead works (Plate 5), and alteration south of the canal. North of the canal further alteration of the works can be seen in the removal of some elements entirely and the replacement of work surfaces with concrete structures. The demolition of the works in the 1920-30s (Phase 6) results in the overlying deposits and material relate to the final stage of the works.
- 4.1.6. Excavations in Area 1, within the western half of the site, uncovered the remarkably well preserved remains of the brass metal works (Plate 1). Remains relating to the earliest brass metal works on the site in the 1820s (Phase 3) and the main phase of occupation (Phase 4) means that there is a high research potential for the site. In contrast preservation of remains in Area 2 was limited to deep features such as the canal basin, and isolated pockets of other structures and the potential for further research was therefore low (Plate 6). The reason for this was extensive redevelopment of Area 2 in the 20th century as part of the public space that forms Centenary Square. The variation in the level of the ground surface between Area 1 and Area 2 was in the region of c. 1m, suggesting at least 1m of material had been removed during this process.
- 4.1.7. The artefact assemblage was dominated by waste products of metal manufacture: metal residues, scrap and waste. A limited assemblage of domestic/ industrial artefacts such as pottery, clay tobacco pipe or diagnostic glass was also recovered. The remainder of the artefact assemblage that was recovered from 20th-century contexts and associated with the latest (Phase 6) demolition of the site. The small chronological time-span, meant that dating evidence for the archaeological remains was derived from historic records, mapping evidence, plans and structural evidence as opposed to artefacts but has allowed an accurate chronology of the site to be established.
- 4.1.8. Stratigraphic relationships between structures were clearly defined and truncation was minimal in Area 1 so that detailed relations between structures could be established. In Area 2 this was largely absent as much of the archaeological remains were located in isolated islands and had been subject to extensive truncation.
- 4.1.9. The overall potential of the buried remains for the understanding the site is significant. It is unusual to find such high levels of preservation on industrial archaeological sites and on a local level this represents some of the best preserved industrial remains uncovered in Birmingham. On a regional and national level this is one of only three brass works archaeologically investigated by excavation in the country and as such will contribute significantly to our understanding of the industry – an industry which was highly important in the history of Birmingham.

5. ARTEFACTUAL ASSESSMENT

- 5.1.1. The excavations from Cambridge Street did not produce a diverse artefactual assemblage in the conventional archaeological sense. There were limited remains of pottery, glass and clay tobacco pipe that frequent typical post-medieval and early modern sites. In addition there were a series of objects could be associated with the 20th century demolition of the site. Most significantly the assemblage did, however, include fragments of production waste, glass and metal residues, and crucible fragments that may allow understanding of the processes occurring in the works. In addition a number of large finds were recorded and discarded on site, due to their size and the impractical nature of storing them.

5.1.2. The detailed specialist reports are listed in Appendix 5 below, summaries of the artefact assemblage and their potential are presented below.

5.2. Pottery by Emma Collins

5.2.1. The pottery assemblage consisted of 62 sherds weighing 1054 grams and was recovered from six contexts. The assemblage dates to the late post-medieval period to the modern period. For details of individual identifications see Appendix 5.1.

5.2.2. This is a small assemblage that does not hold any significant value in relation to the research aims of the investigation. No further work is recommended.

5.3. Brick by Emma Collins and Chris Hewitson

5.3.1. The brick assemblage consisted of 37 fragments (predominantly single whole brick samples) weighing 112,070g, recovered from 22 contexts and comprised of material from the early modern period (dated c. 1820-1920). Details of the assemblage are recorded in Appendix 5.2.

5.3.2. The assemblage represents a wide variety of bricks reflecting the multi-phases of the site and also bricks for specific purposes, for example, the firebrick lining of the boiler bases. The brick has the potential to inform us about techniques adopted in the construction of Birmingham factories in the early/ mid-19th century. At present there is little published and no excavated reports on this subject. Further research is required to place the use of brick for certain structures in context. In particular the firebricks have brick-stamps that relate to their factory of manufacture and patterns of localised brick-sourcing and trading can be examined. The variation of brick size/ type/ fabric should be examined with respect to the established site chronology. This may elucidate variations in brick use by phase. Comparisons with recently excavated examples of brickworks in the local area (e.g. Blakesley Hall, Cook 2008; Saltley, Duncan forthcoming) may add to our current knowledge of 19th century brick manufacture. In addition the brick should be placed within the chronology of brick building in the West Midlands generally.

5.4. Other finds by Erica Macey-Bracken

5.4.1. A small quantity of finds was recovered from the site including clay tobacco pipe, glass and worked bone. A summary table of the finds can be found in Appendix 5.3.

5.4.2. The assemblage is very small and largely non-diagnostic. The early modern date of the site has meant that finds have not provided significant dating evidence. The clay tobacco pipe and vessel glass is of limited archaeological significance. However, the group of glass fragments from contexts 1051 and 1058 may relate to the stained glass window production on the site. The worked bone fragments are common finds on Birmingham site and represent part of an increasing body of evidence for the shell button industry (see Patrick and Rátkai 2009; Edgeworth et al forthcoming; Wright 2010).

5.4.3. Assessment reporting is sufficient for the majority of the assemblage and no further work is recommended. The stained glass should be photographed for the

archive and a short report should be included on them as part of the final report. The working waste should be photographed as part of the site archive and a short report included as part of the final report. .

5.5. Large objects by Sam Hepburn and Chris Hewitson

- 5.5.1. The large finds were recorded by written record and photography on-site. They included a series of structural elements of various machinery parts recovered from the site of ferrous, wooden or composite material. The location of the find spot has been recorded and marked on plan. A list of the finds can be found in Appendix 5.4.
- 5.5.2. Many of the items do not warrant further investigation. Some of the structural elements may shed light on the function of machines within the works. These include the cast-iron machine arm (#23), the circular weight (#34), the small cast-iron pulley wheel assemblage (#27), the cast-iron decorative plate (#31), the wooden chocks (#32), large beam (#30), and the two possible machine components (#22 and 24). These should be examined as part of the overall research into the functioning of the works and items #23, #34 and #27 illustrated for the full report.

5.6. Scrap metal and crucible fragments by Sam Hepburn and Chris Hewitson

- 5.6.1. The assemblage consists of a range of ferrous and non-ferrous scrap metal fragments collected from stratified and unstratified contexts from the site. The assemblage consists of 209 fragments of material from 69 separate contexts, with a combined weight of 29.61kg. The material came from a series of early modern deposits dated from the period 1820-1920 AD. Full details of the scrap material are recorded in Appendix 5.5.
- 5.6.2. The assemblage was collected in order to establish the processes undertaken within specific areas of the site. The potential of the assemblage for understanding the composition of the different material used within the site, and thus the different processes undertaken is detailed in the archaeometallurgical assessment (McDonnell see below). The scrap wire and rolled brass also has the potential for understanding the nature of the final produced material from the factory. The assemblage also has the potential to understand the distribution and typology of small machines operating within specific areas of the site and from this the distribution of the work within different areas of the site.

5.7. Archaeo-metallurgical remains by Gerry McDonnell

- 5.7.1. The residues sent for assessment from the site are a sub-sample of the total quantity of material recovered and can be categorised into two main types. Firstly, the assemblage comprises metal artefacts and metal waste and secondly the slags and residues (Appendix 5.6). The metal artefacts include copper alloy and iron (alloy) artefacts. The copper alloy artefacts include both cast artefacts and wrought artefacts e.g. strip and wire. Within the copper alloy waste are sheet off-cuts, rod, bar and wire. The ironwork is either structural (a spike, [1044] SFN 14) or possibly part of manufacturing equipment (a tube with holes, (a tuyere?), Sample 13 [1042] SFN 86a). The slags and residues are sub-divided into three main groups. There are crucible fragments, including bases and wall fragments

(e.g. [1109] SFN 36g). The second group are broadly classified as slag, some have copper alloy corrosion products on the surface of the slags, indicative of use in hot working the wrought copper alloy (e.g. Sample 1 [1317]). The final sub-group comprise a varied range of slags some white (e.g. [1101] SFN 40b) other more similar to hammer scale (e.g. Sample 9 Bag 1 [1406]).

- 5.7.2. The Cambridge Street assemblage offers an excellent opportunity to investigate the use and manipulation of zinc based copper alloys of the 19th/20th centuries. It is essential to undertake archaeo-metallurgical analysis to understand and interpret the site and be specific about the alloys used, rather than a generic 'brass works'. It is a unique opportunity to investigate the quality of manufacture from one of the foremost brass works in Britain. The work would accord with the research agenda identified by Bayley *et al* (2008, 69) to provide archaeological/scientific data to complement historical data. This document notes that "...19th and 20th century remains should be given priority...". The assemblage is very significant in having both cast and wrought products, which offers the opportunity to investigate alloy selection for specific purposes. The presence of very specific processes e.g. wire drawing offers an excellent opportunity to investigate alloy composition and method of manufacture of very specific artefacts that require specific properties, i.e. the ability to be drawn to wire. The presence of a significant crucible assemblage will provide insight into linkages between residues in crucibles, the cast metal and the historical record. The evidence of hot working in the form of slags are an important indicator of manufacturing processes and require characterisation. The Cambridge Street assemblage will provide a benchmark for future excavations of similar sites dating to this period. Specific recommendations can be found in Appendix 5.6.

5.8. **Glass and Glass Residues** by David Dungworth

- 5.8.1. The small assemblage of glass and glass residues consisted of 39 fragments from 5 contexts, weighing 324 grams. The assemblage was visually examined and selected samples have been analysed using EDXRF. Full details of the assemblage are discussed in Appendix 5.7
- 5.8.2. The assemblage has been fully examined at assessment level. Glass manufacturing technology in Britain in the late 19th century was generally uniform throughout the country and there is nothing about this glass assemblage which could demonstrate its manufacture in Birmingham. As the assemblage was of such a small quantity, no further work is recommended.

6. INTEGRATED ASSESSMENT OF POTENTIAL

- 6.1.1. The excavation at Cambridge Street, Birmingham has been hugely successful in that they have produced exceptionally well-preserved remains of the 19th-century Brass Works. This has allowed detailed archaeological examination for the first time of one of the major 19th-century industries in Birmingham.
- 6.1.2. The potential of the buried remains for the further understanding of the industrial archaeology of Birmingham is highly significant. On a local and regional basis, industrial archaeological excavations have been undertaken at a number of locations in recent years in Birmingham and the Black Country, Telford/ Ironbridge area and the Stoke-on-Trent and Potteries region. These have tended to focus on a number of select industries, in particular those associated and recognised by the

- Monument Protection Programme Reports undertaken in the 1990s and 2000s but also other industries identified as significant in the local areas. This has tended to focus on Glass Works, Pottery and Ceramic Works. The ferrous industries have been addressed extensively by work in Coalbrookdale, and some work has been done on the extractive industries in particular within the Dudley region. The non-ferrous industries have not been addressed in the same level of detail and this is perhaps a reflection of the absence of suitable sites as opposed to a bias towards other site types. The complete excavation of a non-ferrous processing site is therefore highly significant in particular given the exceptional level of preservation.
- 6.1.3. On a national level the site type is likewise highly significant. The non-ferrous industry has not received the same level of focus that the ferrous industries have received and large scale investigation and excavation has been limited to two sites in the authors understanding. These are the Warmley Brass Works in Bristol (Day 1973; van Laun and Day 1995) and the remains of Copperopolis in Swansea, Wales (Hughes 2000; 2004; recent Oxford Archaeology excavations, *forthcoming*). These remains relate to the primary smelting remains. In contrast the Cambridge Street works relates to secondary processing of wire and brass manufacture. Given Birmingham's historical significance of one of the three major centres of brass manufacture (with Bristol and Swansea) this represents an important excavation that can contribute to the wider national debate surrounding the development of the non-ferrous industry in Britain.
- 6.1.4. The potential of the structural remains lie in two areas. The first involves understanding heavy industrial processes in particular brass-rolling and wire-drawing. This includes recognising specific structural remains, understanding the power mechanism and transfer, the machine layouts and manufacture process. The second is in understanding workshop practice in the bedstead works. Understanding workshop analysis has been highlighted as a potential research area in recent years (e.g. Grenville 2004). By examining the remains of the workshops, crucible furnaces, and material remains there is the potential to understand the functionality of the workshop. The examination of the material scrap evidence, both metallurgical and glass may allow us to understand specific workshop activities.
- 6.1.5. The potential and importance of the use of scientific analysis in order to understand aspects of production within metals industries has been discussed (Bailey and Williams 2005, 33-40; Dungworth and Paynter 2006; Bayley *et al.* 2008). The non-ferrous industry has been highlighted as lacking in comparative data from the archaeological and historical record for the post-medieval period. Although the brass works represents a secondary industry, residues have been collected from cast and wrought metal industries and should allow comparison of alloy composition (*see McDonnell above and Appendix 5*).
- 6.1.6. The potential to combine the archaeological information with historical research undertaken as part of the planning process, independent research undertaken previously to this work (e.g. <http://www.revolutionaryplayers.org.uk/>) and research undertaken as part of the post-excavation process from records housed in the Birmingham City Archives will allow an integrated approach to the understanding of the industrial, economic and social function of the Brass Works.
- 6.1.7. The forthcoming publication of the West Midlands Research Framework for the post-medieval, industrial and contemporary archaeology of the region (Belford *in press*) has built upon themes of the 2003 seminar series for the region (Hodder 2003) and has identified many of the themes above. Three broad themes apply to the Cambridge Street works, the industrial, the economic and the social aspect of

the site. It also highlights the necessity to place the archaeological and historical evidence in a wider context that includes the local, regional, national and international arena.

7. REVISED AIMS AND OBJECTIVES

7.1.1. In the light of the above assessment of potential, the revised research aim of the project should be to examine the excavated remains of the Brass Works and understand how they functioned. The brass works should be examined within its context which should include;

- The site, both within and immediately outside its boundaries.
- Birmingham and the Black Country, its people, industry and economy.
- The realm of Britain, the Empire, Europe, America and the World.

7.1.2. Within this context, the research undertaken should concentrate on three clear areas;

- **Industrial function** – how the brass works functioned, technological development and innovation, and the nature of the product itself.
- **Economic function** – how the brass works grew, developed and eventually declined. The economic locale of the brass industry in Birmingham. What the brass works produced and who consumed the goods.
- **Social function** – how people in the brass works interacted and operated, the hierarchical structure, who they were and where they lived.

7.1.3. **Industrial Function;**

- **Power mechanism** - examination of the stationary steam engine, boilers, chimney and wheel pits. Three-dimensional visualisation of the operating sequence.
- **Rolling/ wire drawing process** – examination of the machine bases, annealing furnaces and pickling vats. Process analysis of how different areas of the site functioned, how did material enter and move around the works. Three-dimensional visualisation of the operating sequence.
- **Transport** – examination of the role of the canal, how the finished product was transferred to the canals. How the canal was maintained in water.
- **Workshop functionality** – examination of the bedstead works in detail to establish individual functionality of the rooms. Examination of floor scars to ascribed machine placements in each room. Understanding how the rooms containing hearths operated.
- **Product of the brass works** – examination of historical design catalogues, scientific analysis of the collected brass samples.
- **Tinning/ Enamelling** – examination of 20th century processes, can these specific industries be related to the 1st World War and change in industrial function.

7.1.4. **Economic Function;**

- **The Brass Economy** – examination of the industry generally. Historic examination of the national development but also examining the brass works as part of the regional economy of Birmingham and the Black Country. Specific geographic work to place the works in the development of the area.
- **Growth** – examination of the excavation evidence and mapping evidence to establish changing patterns of the brass works geographically.
- **Decline** – examination of the historic reasons for the decline of the works, and comparison with geographical/ archaeological reasons, e.g. outmoded technology, poor transport links, absence of space for expansion, fragmentation of the business.

- **Production** – examination and identification of specific products produced by the works. Attribution to different areas of the work. How these areas of the works can be seen to have altered both through historic work, mapping and examination of the excavation results. Cross-examination of which areas grow and when.
- **Consumption** – examine the historical consumption of products of the brass works and their change over time. Examine where and to whom the products are sold. Tie these themes into growth and decline.

7.1.5. Social Function;

- **Patterns of human movement** – examination of specific areas of the works and identifying how humans would operate within these areas e.g. hot areas, loading areas, workshop areas, managerial/ office areas. Examine the functional flow of people from one area to another within the site and immediate area.
- **Social hierarchy** – Examine the historic, geographical and archaeological record for specific areas of social hierarchy. Where do the management work? Is there a separation between the heavier production and artisan craft?
- **Identity and domesticity** – who was working in the brass works, where did they live and what did they do? What was the life of the average Winfield's worker like? Examination of the census records may be able to establish the geographic spread of brass workers in the area and allow an understanding of the influence of the industry on this sector of Birmingham.

8. DISSEMINATION AND PUBLICATION

8.1.1. The Library of Birmingham project represents an important civic undertaking for the city of Birmingham, one of the most important new ventures in terms of the learning capacity of the city. The Library of Birmingham has been designed to reflect the 21st century nature of the city and it is therefore important that the dissemination of the archaeological work associated with it does likewise. It also important to realise that the results of the excavation are not simply locally or regionally important but are nationally important and its dissemination should reflect this.

8.1.2. It is therefore important that dissemination of the project takes on several forms. These should be;

- **Lectures and Presentation** – in the form of presented lectures or talks attended by members of the public and special interest groups.
- **Reporting at a community level** – Presentation of the results in easy to read written formats accessible to age groups 8-14, young adults, other interested members of the public and the senior citizens age groups. Many of these represent the most interested parties and are sometimes marginalised by academic reports that are not easy to read.
- **Reporting to the academic community** – Presentation of the results in a format suitable for the well informed parties including special interest groups, local history societies, and the wider national and international academic community.

8.1.3. The final grey literature report will involve;

- Introduction and methodology involved within the investigations
- Historic background to the report, detailing The Brass Industry in Birmingham, The History of the Site, The History of the Winfield Works, Reuse of the Site.
- The excavation results, and in-depth examination of the site that will incorporate a detailed excavation report, cartographic and historical development of the site and technical examination of the structures in a detailed narrative. This will be initially arranged around the phased development of the site with detailed discussion of individual areas/ processes in order to explain their use.

- Specialist scientific and technical investigations of the site by individual specialists, examining specific arguments.
 - Overall discussion of the site. This should be concise and informed and summarise the site in its local, regional national and international context drawing from the previous three strands of observation. It will follow the format of the revised aims of the site, notably examining;
 - Industrial function
 - Economic function
 - Social function
- 8.1.4. To some extent a certain level of dissemination has already been achieved (e.g. lectures at the Council for British Archaeology – West Midlands lecture series). The following section outlines non-specialist outcomes;
- Further lectures are due to be arranged later in the year designed for the local public in Birmingham.
 - Production of detailed notice boards about the excavations for display at suitable locations (e.g. the current library, Library of Birmingham presentation room).
 - Production of an accessible website page detailing the results of the excavation.
 - An accessible full report on the work suitable for varying age groups available to download in a suitable format of document (e.g. print document format).
- 8.1.5. The detailed public dissemination report will be a scaled down version of the final grey literature report that will aim to integrate the results with visual prompts and descriptive figures to make it accessible to a wider audience.
- 8.1.6. A number of outputs will address the academic and specialist audiences;
- Full reporting of the work as a grey report (see above) with production of sufficient hard copies of the work to allow it to be generally accessible to the public in the library itself.
 - Production of an academic paper about the work to be published in an international standard, peer reviewed journal (e.g. Industrial Archaeological Review).

9. METHOD STATEMENT

- 9.1.1. In order to achieve the stated revised aims and objectives certain parts of the work have already been completed at post-excavation assessment reporting stage and these merely need to be reworked;
- The site narrative (Appendix 3) – needs to be updated but essentially stands as valid as a framework for the remainder of the work.
 - The site background history (Appendix 4) – needs to be reworked into the format of the final report but essentially stands as valid. Certain areas may require further specific research.
 - The site phasing (see above) – this is complete and the absence of material based dating (eg pottery, radiocarbon etc...) means no further alteration of the phasing system is likely.
 - Specialist reporting (Appendix 5) – some of the specialist reporting will require further work (listed below) whilst others will require only small-scale reworking in order to be added to the full narrative.
- 9.1.2. A number of specific new areas of research need to be approached;

- Scientific analysis of the metallurgical residues and samples by Dr Gerry McDonnell as outlined above.
- Technical examination of the workings of the steam engine and power applications to the rolling mills in association with Chris Hodrien (International Stationary Steam Engine Society ISSSES) and Jim Andrew (Think Tank, Birmingham Museum Services).
- Further historic research aimed at understanding specific areas of the site by Ray Shill.
- Detailed cataloguing of the scrap metal fragments once these have been returned from Dr Gerry McDonnell by Chris Hewitson/ Sam Hepburn.

9.1.3. In addition updated examination of several specific finds groups;

- Updating of the brick assessment to full report status by Emma Collins/ Chris Hewitson.
- Updating of the finds report by Erica Macey-Bracken.

9.1.4. Illustration of the site will adopt a series of techniques that aim to include;

- GIS (Geographic Information System) of the site. Achieved at assessment level some alteration to allow publication. This will involve the completion of all site plans and placing them within the national grid. Possible integration with the database if this benefits overall analysis or dissemination.
- Three-dimensional modelling of the site including overall models of specific site elements (e.g. overall site composition, the power transmission and rolling mill elements).
- Illustration of selected larger items recovered from the site.

10. RESOURCES AND PROGRAMMING

10.1.1. This section details the tasks left to be completed for the production of the final publication and provides a breakdown of the project team, a statement of management structure and responsibilities.

Task List

Task Reporting

1.01	Project management	C. Hewitson
1.02	Stratigraphic analysis and finalising phasing	W. Mitchell
1.03	Updating database	S. Hepburn
1.04	Preparation of drawing roughs	S. Hepburn
1.05	Preparation of illustrations	N. Dodds/ S. Hepburn
1.06	Preparation of plates	N. Dodds
1.07	Preparation of final phasing	A Person
1.08	Integration of specialist reports	W. Mitchell/ C. Hewitson
1.09	Documentary research	R. Shill/ W. Mitchell
1.10	Preparation of discussion	W. Mitchell/ C.Hewitson

Specialists

2.01	Full brick analysis and report	C. Hewitson
2.02	Full small finds report	E. Collins/ E. M-Bracken
2.03	Full scrap metal report	S. Hepburn
2.04	Full metallurgical analysis	G. McDonnell
2.05	Full glass report	E. M-Bracken/ D. Dungworth

2.06	Historic analysis	R. Shill
2.07	Stationary steam engine advise	C. Hodrien/ J. Williams
2.08	3D Production	N. Dodds
2.09	Illustrations	N. Dodds
2.10	Proof read first draft	C. Hewitson
2.11	Editing	W. Mitchell
2.12	Amendments	W. Mitchell
2.13	Preparation of final draft	C. Hewitson
	<u>Publication</u>	
3.01	Proof reading	A. Forster
3.02	Submission of text	A Person
3.03	Review of text	M. Hodder
	<u>Archive</u>	
4.01	Preparation and deposition of archive	A Person

11. THE ARCHIVE

- 11.1.1. The paper archive consists of all the pro-forma records, permotrace plans, print-outs of digital surveys, black and white photographic contact sheets and negatives, contact sheets of the digital photographs and CD copies of all the digital data. In addition back-ups of all the pro-forma records and plans are currently stored on the external server of the University of Birmingham.
- 11.1.2. The artefactual archive consists of all finds and samples collected from site, and is currently stored at the Birmingham Archaeology offices.
- 11.1.3. The archive will be compiled in accordance with the brief and guidelines set out in *Guidelines for the preparation of excavation archives for long-term storage* (UKIC 1990) and *Archaeological Archives; a guide to best practice in creation, compilation, transfer and curation* (Brown 2007). The full archive will be transferred to the Birmingham Museums and Art gallery on completion of the analysis and reporting.
- 11.1.4. Full details of the contents of the paper and material archive are contained in Appendix 6.

12. ACKNOWLEDGEMENTS

- 12.1.1. The project was commissioned by Carillion on behalf of Birmingham City Council. Thanks are due to Ed Gardner for their co-operation and assistance throughout the project. Thanks are also due to Armoury for their assistance in machining. Thanks also go to Mike Hodder, who monitored the project on behalf of Birmingham City Council. Work on site was undertaken by Elisabeth Bishop, Mark Charles, Mary Duncan, Emma Collins, Chris Hewitson, Kristina Krawiec, Erica Macey-Bracken, Phil Mann and William Mitchell Specialists to whom thanks are due are Rod MacKenzie (Archaeometallurgy), Gerry McDonnell (Archaeometallurgy) and David Dungworth (Glass Residues), Ray Shill (Historic Research), Chris Hodrien (Stationary Steam Engines) and Jim Williams (Stationary Steam Engines) who provided advice on site and in post-excavation in their specialist areas. Chris Hewitson and William Mitchell produced the written report which was illustrated by Nigel Dodds, and edited by Chris Hewitson who also managed the project for Birmingham Archaeology.

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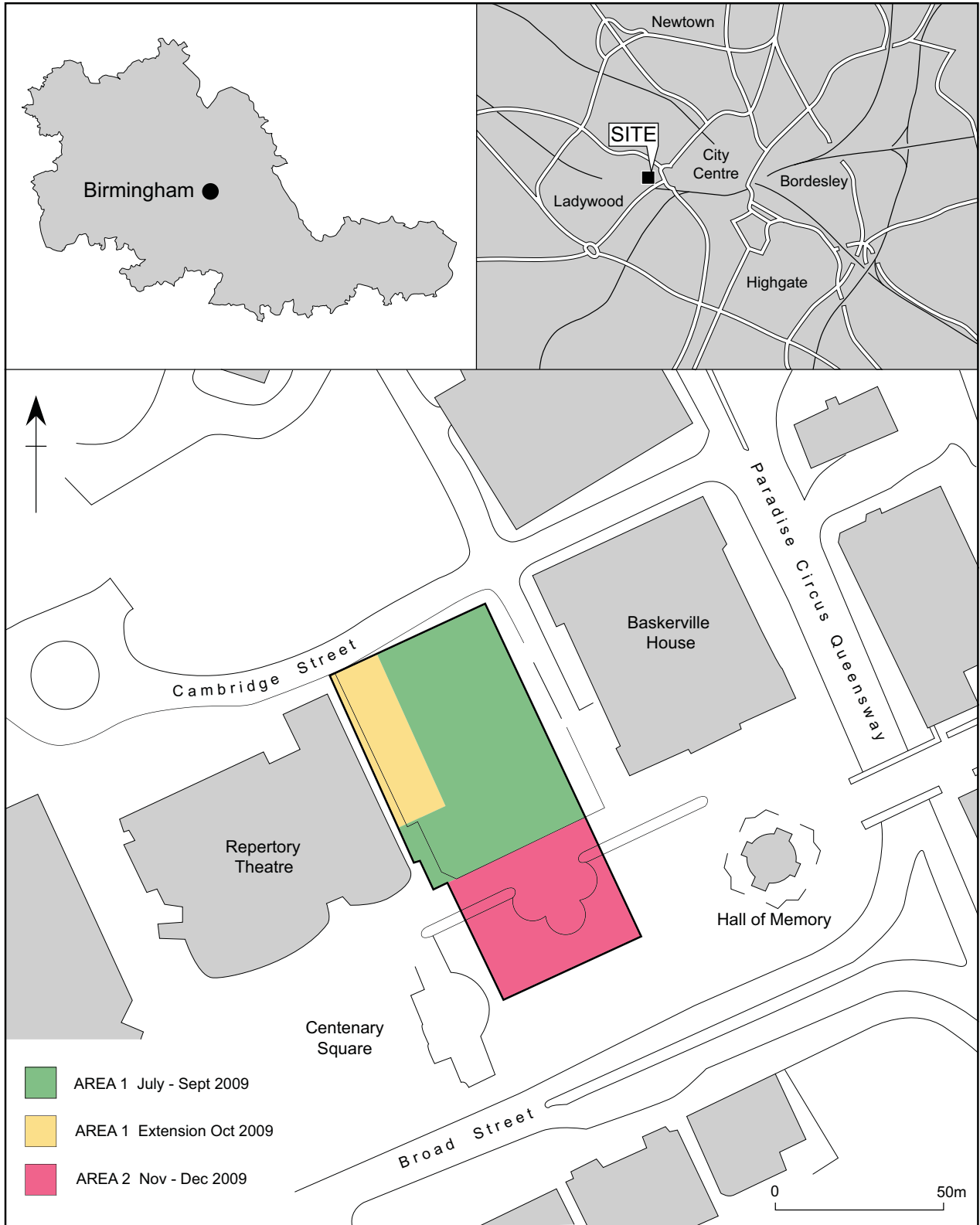
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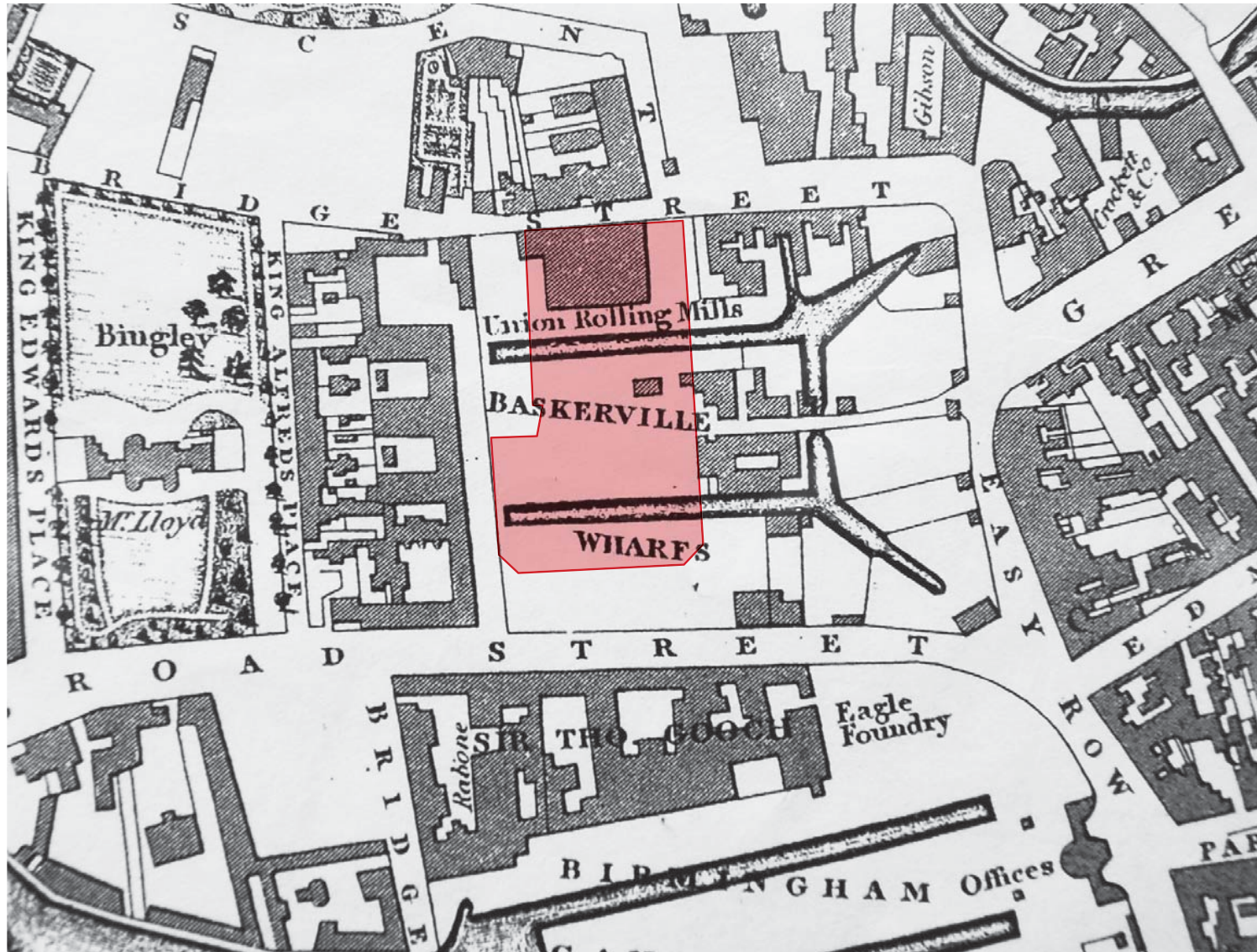
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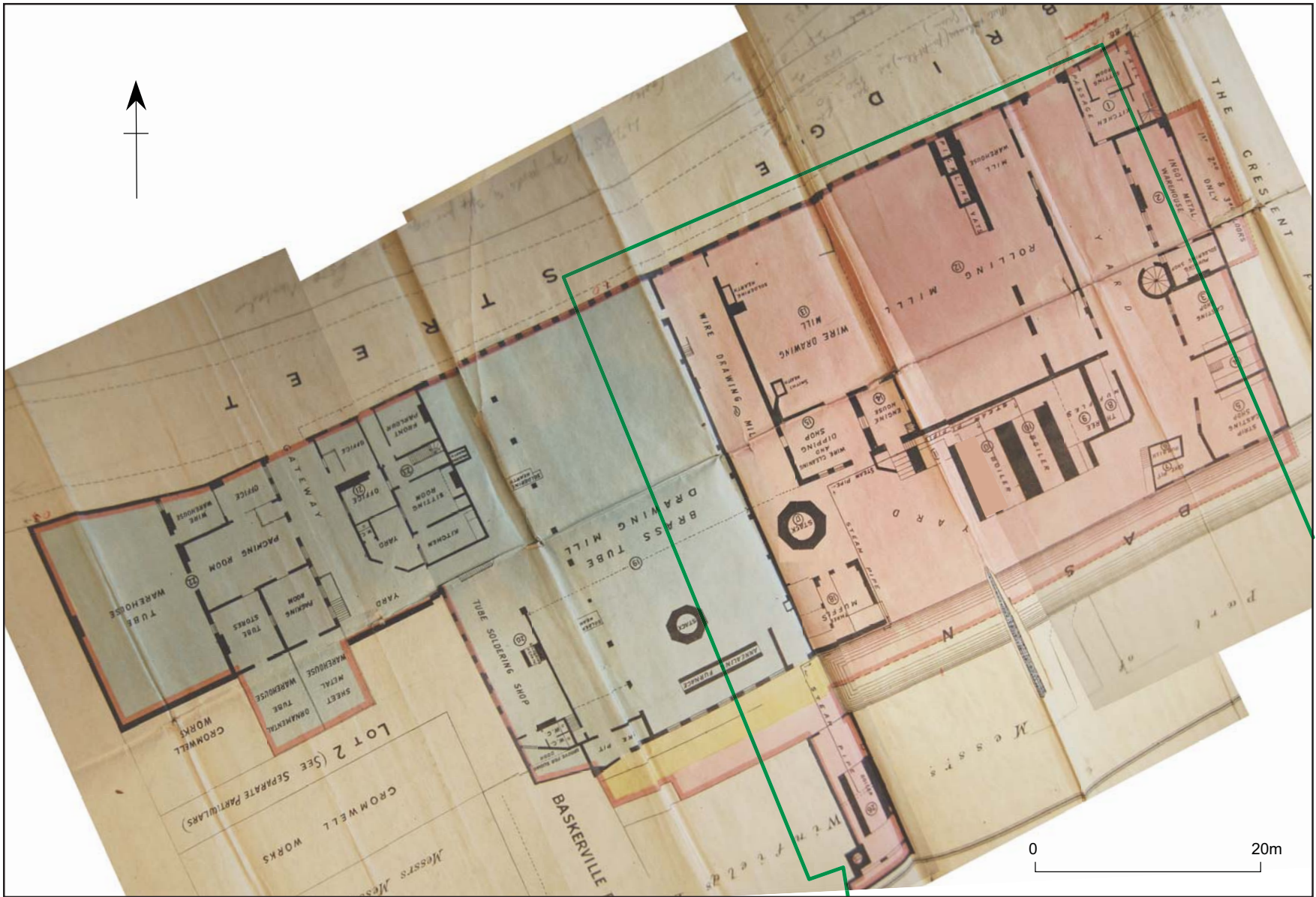








Plate 1: Area 1 East Facing



Plate 2: Area 1 - Gibson's Arm, East Facing



Plate 3: Area 1, The Muffles northeast facing



Plate 4: Area 1 the Chimney Base, southwest facing



Plate 5: Area 1 The Bedstead Works West Facing



Plate 6: Area 2 - Northeast Facing