

A SECOND SEASON OF FIELDWORK ON THE SITE OF  
DUKESFIELD SMELTMILLS, HEXHAMSHIRE

REPORT ON ARCHAEOLOGICAL EXCAVATION, RECORDING  
AND MONITORING CARRIED OUT BETWEEN  
JULY AND OCTOBER 2013



by  
THE ARCHAEOLOGICAL PRACTICE LTD.  
for  
THE FRIENDS OF NORTH PENNINES

*OASIS ID: thearcha2-177434*

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## SUMMARY

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*This document reports on a programme of archaeological fieldwork, including excavation and recording of features before and during structural consolidation works, carried out at the site of Dukesfield Smeltmills, on the Allendale Estate in the Parish of Hexhamshire, Northumberland where background documentary work had provided contextual information regarding the archaeological and historical development of an industrial site active from at least the mid 17<sup>th</sup> century to around 1840, during which time it was occupied by a lead smelting works.*

*The work carried out in 2013 was based on evaluation fieldwork and background research carried out in 2012 and comprised the excavation and structural recording of the chimney structures, excavation of the arches roof to reveal the remains of brick-built flues and limited re-excavation of the leat structure. The excavations successfully achieved the principal aims of facilitating the programme of consolidation carried out on the arches and chimney stacks. They also led to the enhancement of knowledge about the site amongst the local volunteer community, achieved largely through active participation, which in turn fed into the interpretation of structural remains revealed by excavation.*

*In order to further enhance understanding of the site, it is recommended that further recording is carried out on the chimney stacks to complete the record of features revealed at a late stage in 2013. Further, it is recommended, on the basis of fieldwork carried out in 2012 and 2013, that a number of other sites should be considered for excavation in 2014 with a view towards enhancing the interpretation of the site:*

*The area to the west and north of the Arches end wall should be investigated by widening and deepening the trench opened in October 2012, with the aim of establishing the extent, depth, character and chronological phasing of remains known or suspected to be present there, including the function of a wall, revealed in 2013, which may be associated with the documented smelting hearths structure, or could be part of an earlier phase of activity.*

*Further sections of the leat to the north and south of the excavated area should be excavated in order to explore features previously revealed by excavation in relation to the information shown on the historic site maps. The purpose of this will be to expose features for consolidation, interpretation and display, and to answer questions about the nature of the water supply to the smelting mills over time.*

*The remains of a retaining wall running at right angles to the west wall of the Arches, close to its junction with the chimneys structure, should be excavated in order to understand its origins and purpose; following excavation, its possible partial reinstatement may help to consolidate the earth slope here and divert visitors away from the steeper sections of the bank leading up to the chimneys.*

*Finally, a building shown east of the arches on the north side of the Hall burn, south of the entrance trackway, appears to be lightly buried by topsoil and merits excavation in order to determine the date and nature of its role within the site.*

## 1. INTRODUCTION

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The fieldwork reported here was carried out as the second phase of the Dukesfield Smelters and Carriers Project run by the Friends of the North Pennines, the overall aims of which are to restore the Dukesfield arches, reveal the industrial history of the site and encourage the exploration of the area by residents and visitors. Following initial evaluation of the site in 2012, the FNB secured a Stage 2 HLF grant to facilitate the main phase of structural consolidation works in Summer, 2013. Thus, the archaeological fieldwork carried out in 2013 revolved around the requirements of the structural works schedule, focussing on recording features revealed during site clearance works undertaken to enable consolidation work.

The archaeological fieldwork was directed by Richard Carlton of the Archaeological Practice Ltd. with the assistance of Marc Johnstone of AP Ltd., buildings historian Peter Ryder and a volunteer team led by historian Greg Finch and the industrial archaeologists, Ian Forbes and Pete Jackson. Thanks are also offered to the tenant farmers of Dukesfield Hall Farm, Andrew and Kath Swallow, who provided valuable local knowledge to the project team and aided them in site clearance work.

### 1.1 Purpose of Evaluation

The following is a report on a programme of archaeological fieldwork carried out on the site of the industrial complex known as Dukesfield Smeltermills, on the Allendale Estate in the Parish of Hexhamshire, some eight kilometres south of Hexham Northumberland, centred on NGR NY 942580. The site sits upon a narrow haugh between the south bank of the Devil's Water and a wooded bank running up to Dukesfield Hall at West Dukesfield. The Hall burn, which runs northwards towards the site from the hall, is diverted through the stone and brick arches which form virtually the only upstanding remains of the former leadworks and provided the focus for work carried out in 2013.

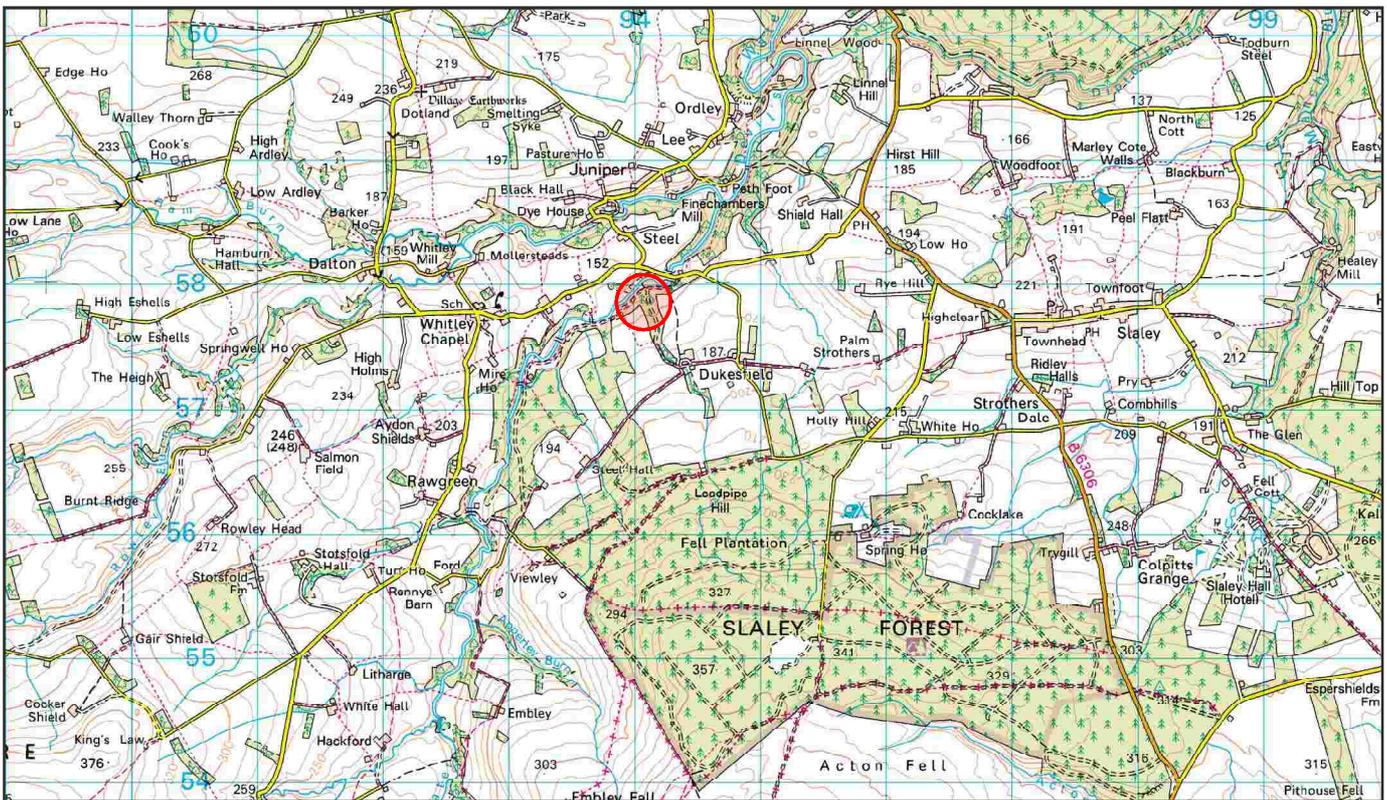
### 1.2 Cultural Heritage Background

[NOTE: A more detailed summary of the history of the site is provided in the report on fieldwork carried out in 2012 (TAP 2013), which draws upon extensive research carried out by Greg Finch and colleagues from the *Friends of the North Pennines*]

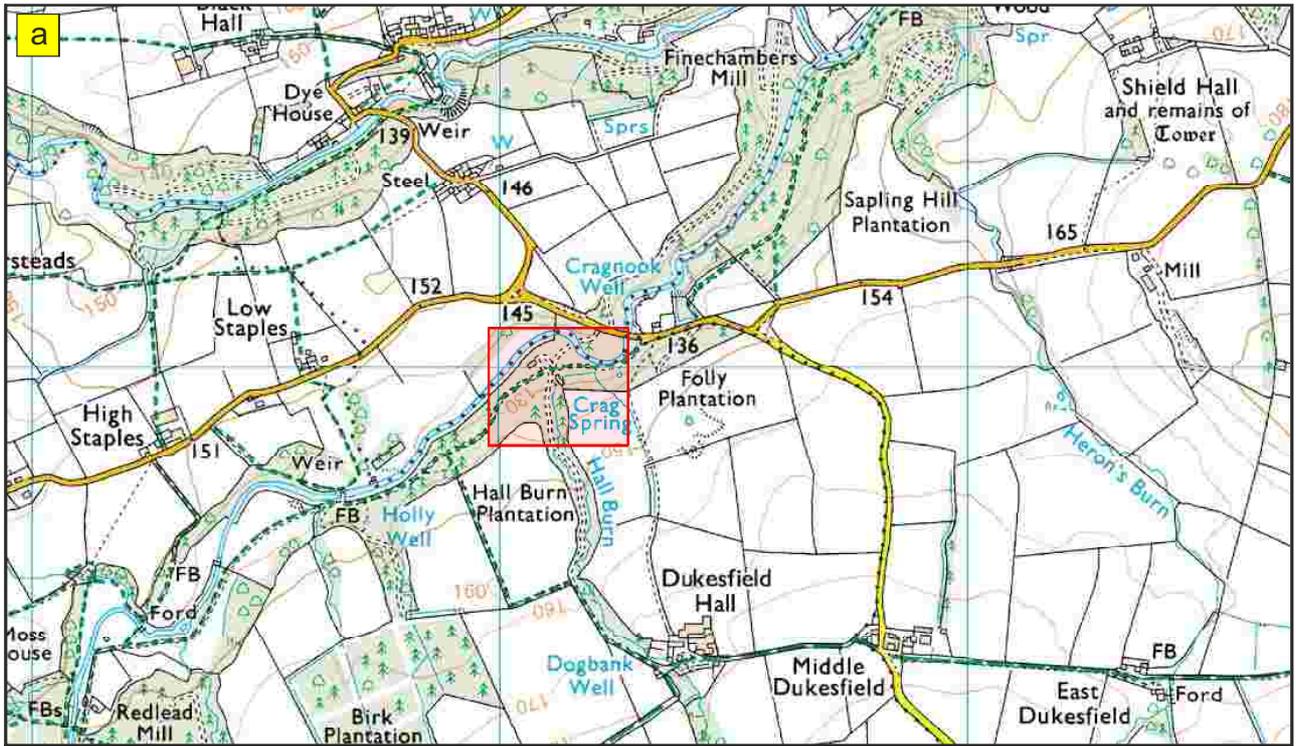
The Dukesfield estate, comprising several farms on the east bank of Devil's Water and the mill site, was bought in 1668 by William Blackett, who had been mining lead in the upper reaches of Weardale and the Allen dales for several years. It cannot be confirmed - as is suspected from a reference in 1687 to ore sent from mines in Blanchland - that the smelting of lead was in operation at Dukesfield prior to Blackett's purchase of the site, but the nearby Blackhall smelt mill was in operation by 1653, and by 1675 five ore hearths and a slag hearth were in operation at Dukesfield, which would have represented a dramatic increase on any previous smelting operations there. During the 18<sup>th</sup> century Dukesfield was the most important of the WB Lead Company's mills, with annual smelting fluctuating (according to the



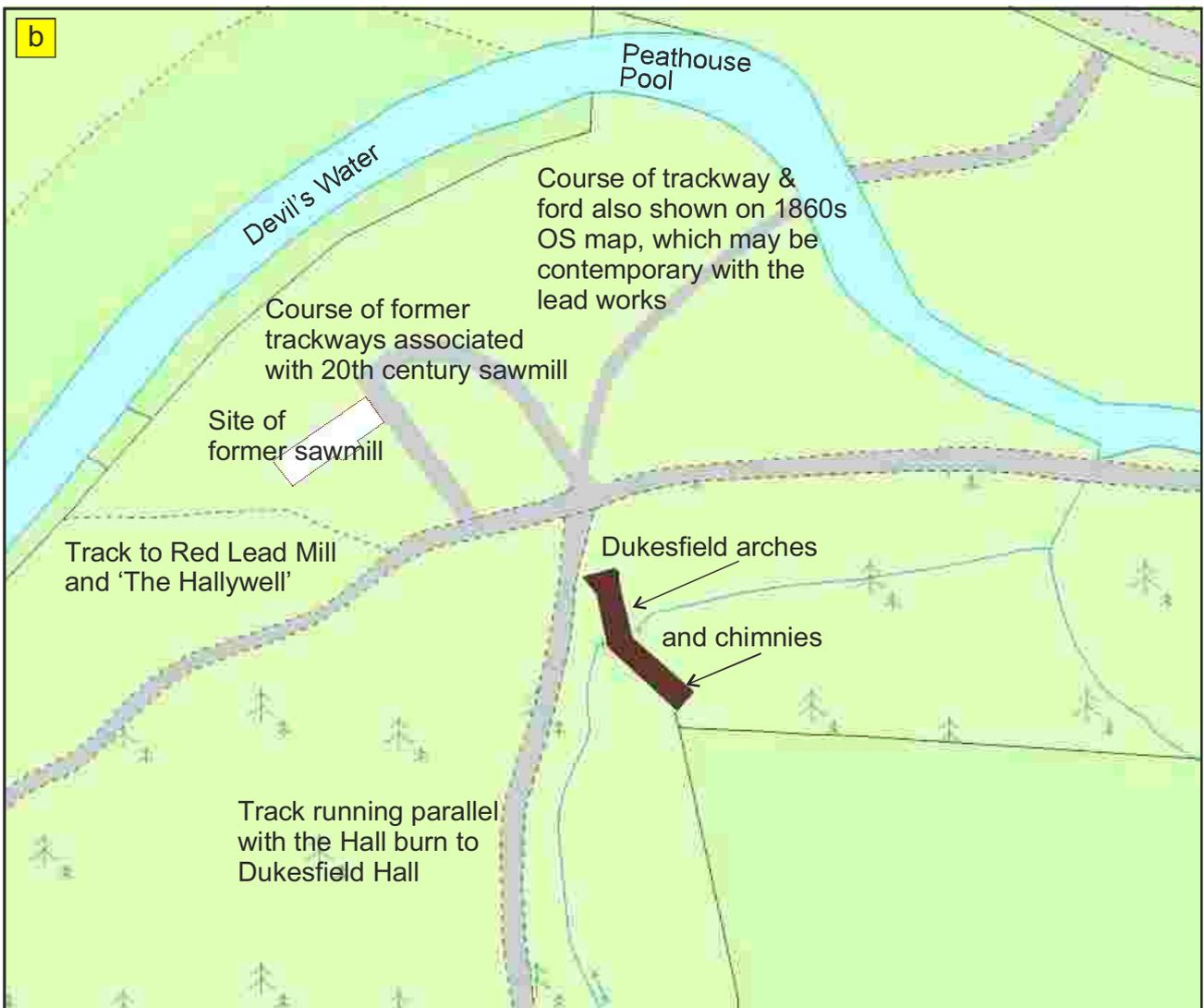
*Illus. 01: The Location of Dukesfield south of Hexham.*

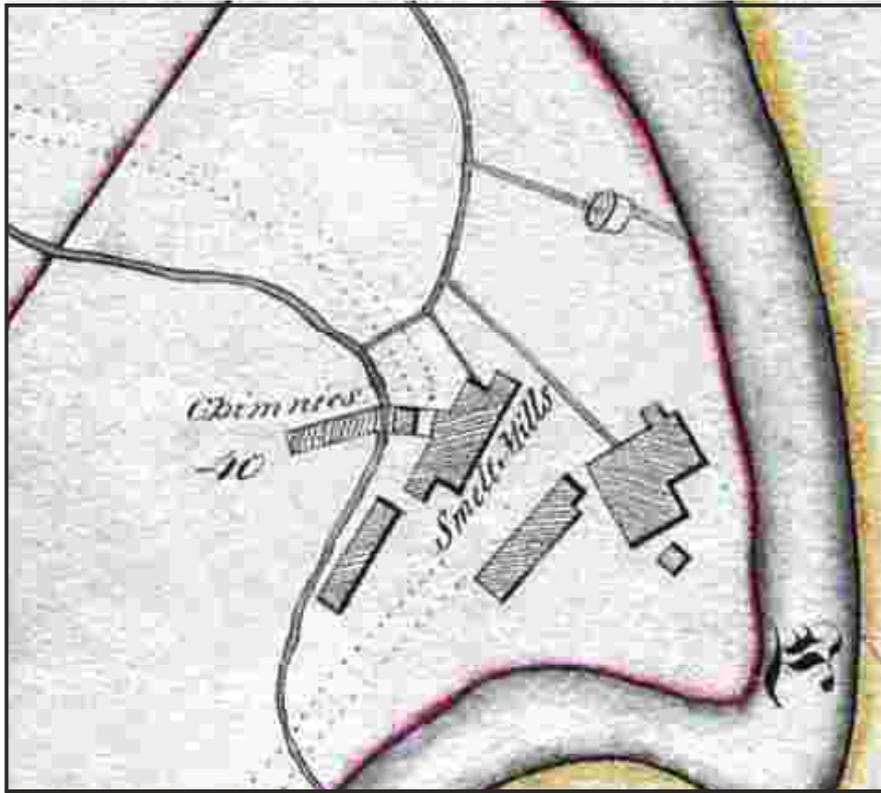


*Illus. 02: The Location of the Dukesfield leadworks site east of Whitley Chapel and west of Slaley.*

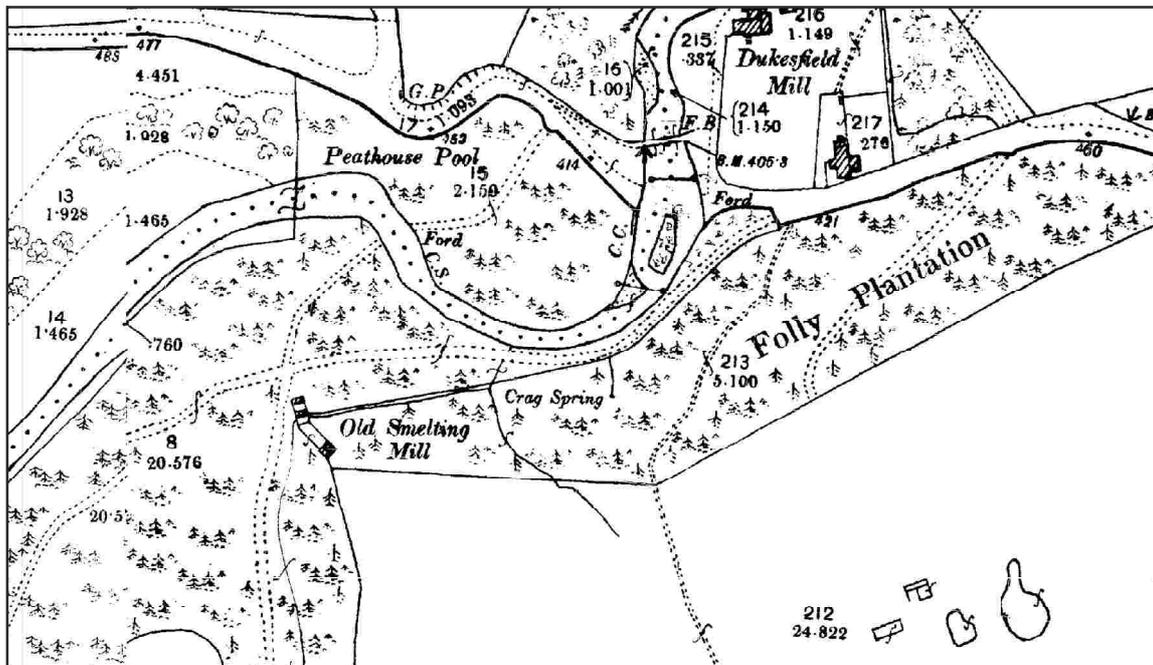


*Illus. 03 & 04: The Location (03: above) and layout (04 :below) of the Dukesfield smelt mill site as shown on modern Ordnance Survey plans of the area.*





**Illus. 05:**  
A plan of the smelt mill works taken from an estate plan of 1802.



**Illus. 06:** Extract from the 2nd edition Ordnance Survey plan (1890s) showing the Dukesfield lead smelt mill site in context.

price of lead) between 500 and 1,000 tons per year from the 1720s to the late 1760s, increasing to reach around 3,000 tons by 1790, thereafter stabilising at around 3,500 tons throughout the period of the Napoleonic Wars. It is likely that the surviving arches and the graded track running southwards to Dukesfield Hall date from this period of expansion in the second half of the 18<sup>th</sup> century.

The bulk of the plant closed in 1835 (Linsley 2006), largely due to the opening in that year of the Newcastle to Carlisle Railway, which allowed the transport of ore to processing plants on Tyneside, but small amounts of processing, or reprocessing of old slags, continued on the site until at least 1840. An estate map of 1848 shows the dismantling of the mill buildings to be well underway and perhaps nearly complete, while later plans, including the first edition of the Ordnance Survey series published in the 1860s, show the works in their present state, with no buildings surviving other than the arches, but with the original trackways along the valley bottom and from the arches to Dukesfield Hall, still present.

## 2. FIELDWORK PROGRAMME

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### 2.1 Aims

The main aims of the archaeological fieldwork elements carried out in 2013 were to facilitate the programme of consolidation works carried out on the arches and associated chimney stacks. Thus, it involved exposing and recording sensitive built features prior to their consolidation, as well as recording features revealed during landscaping and building works. In order to support the latter process, a certain amount of evaluation excavation was also carried out in advance of overburden removal on top of the arches.

### 2.2 Methods

Fieldwork was carried out in five major phases in advance of and during works carried out by the main contractor for building works, thus requiring close cooperation between the archaeological and structural works teams.

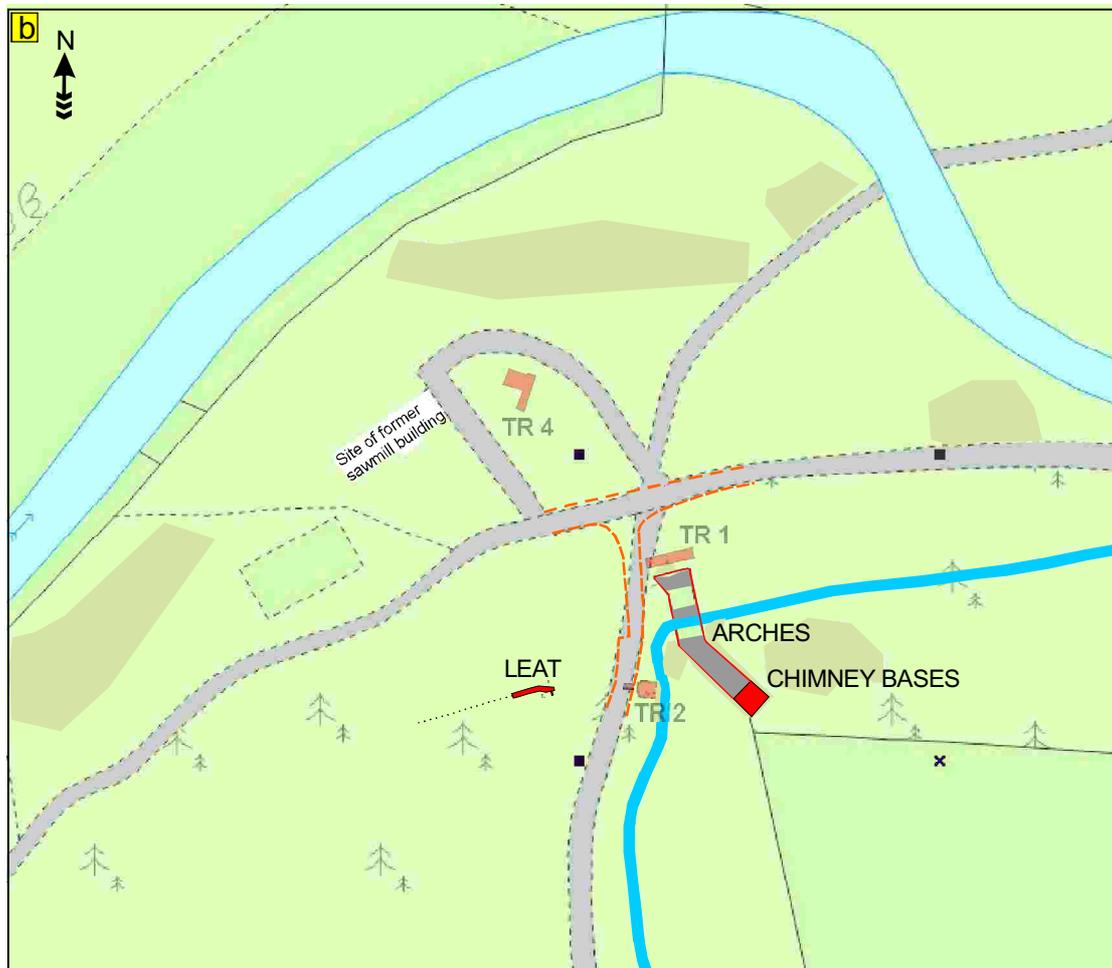
#### 2.2.1 PHASE 1: Excavation of the Chimneys (see *Photographs 1-15*).

Re-excavation of the chimney structures, which had been partially back-filled following exploratory excavation in 2012, took place between July 3rd - 8th in order to expose sufficient of the structures to allow them to be made safe for continued excavation later in the Summer. This work was duly carried out by removing sufficient spoil to reveal the wall tops then taking rubble infill from the internal compartments of the structure. Care was taken not to work below dangerous lintels or sections of crumbling masonry, but after five days it was judged that no further substantial work could be done without significant temporary shoring works or more permanent consolidation.

#### 2.2.2 PHASE 2: Machine Excavation of the south-east end of the arches, including chimneys (see *Photographs 16-21*).

A 5-tonne mechanical excavator was employed on August 20th, under archaeological supervision, to further excavate the rubble-filled external faces of the chimney structure at the south-east end of the arches, and to lower the ground surface of the adjoining sections of the north-east and south-west elevations of the arches structure itself. The purpose of exposing the buried lower courses of the south-west facing elevation of the arches structure, in particular, was to examine its junction with the chimneys structure and to make the wall more difficult to climb, thus improving site safety. It was also hoped that clearance of the ground in front of the south-west elevation would enable the course of a future pathway to the chimneys from the stream at the bottom of the arches to be laid out.

This work proved successful in removing tree roots and lowering external ground levels around the south-west, south-east and north-east elevations of the chimneys, although the depth of material removed from the south-west elevation and adjoining part of the arches structure was much less than expected. It was also found that at point on the arches wall some two metres north-west of its junction with the chimneys, a revetment wall built at right



*Illus. 07: Location of archaeological Investigations carried out on the chimney bases, arches and leat between July & October, 2013 (based on a site survey carried out in October 2012), with trenches excavated in 2012 shown as transparencies.*

angles to the arches survives, marking a step in the slope where it had been terraced. The wall, seen to be of rubble construction, faced with dressed-masonry, was covered again during the machine clearance work but is proposed for further investigation in 2014.

An additional wall revealed during site clearance, joining the south-west corner of the chimneys structure and running to the corner of the adjacent field wall, may also have functioned as a revetment, alternatively as some kind of boundary structure or marker.

### **2.2.3 PHASE 3: Record, Consolidation and Renewed Excavation of the Chimneys Structure** (Illus. 08-13 and see *Photographs 22-61*).

Prior to the beginning of phased consolidation work, a photographic record of the partially-exposed chimneys structure was made on September 9th. This allowed consolidation work to progress between September 10th - 13th which, in turn permitted further excavation of the infilled structure in advance of final recording and consolidation.

### **2.2.4 PHASE 4: Excavation**

Although some excavation of the chimneys structure and previously-excavated leat took place during this phase, only new site of excavation was the arches roof, where the purpose of the evaluation excavations were to determine the degree of survival, if any, of the putative flue structures between chimneys and the site of the smelting hearths at the other end of the arches. This would allow decisions to be made concerning the degree of removal of spoil from on top of the arches during tertiary landscaping works. Three sites were chosen, more or less equally spaced along the arches roof.

Prior to excavation, the arches were cleared of ground vegetation, largely comprising pine and larch saplings, the roots of which were found to be largely superficial to the built remains below. . The spoil excavated from the trenches was stored next to the excavated areas in separate piles for top-soil and stones/brick, which were subsequently to be used for back-filling and structural repairs. The Trenches were excavated by hand to the top of archaeological deposits, with all trench faces subsequently cleaned and features revealed investigated and recorded as deemed appropriate. All excavated contexts were recorded in plan and section, with plans and sections drawn at appropriate scales (generally either 1:10 or 1:20). The trenches were accurately tied into the OS national grid and accurately levelled using a total station. The sparse finds from the excavations were retained and recorded by context.

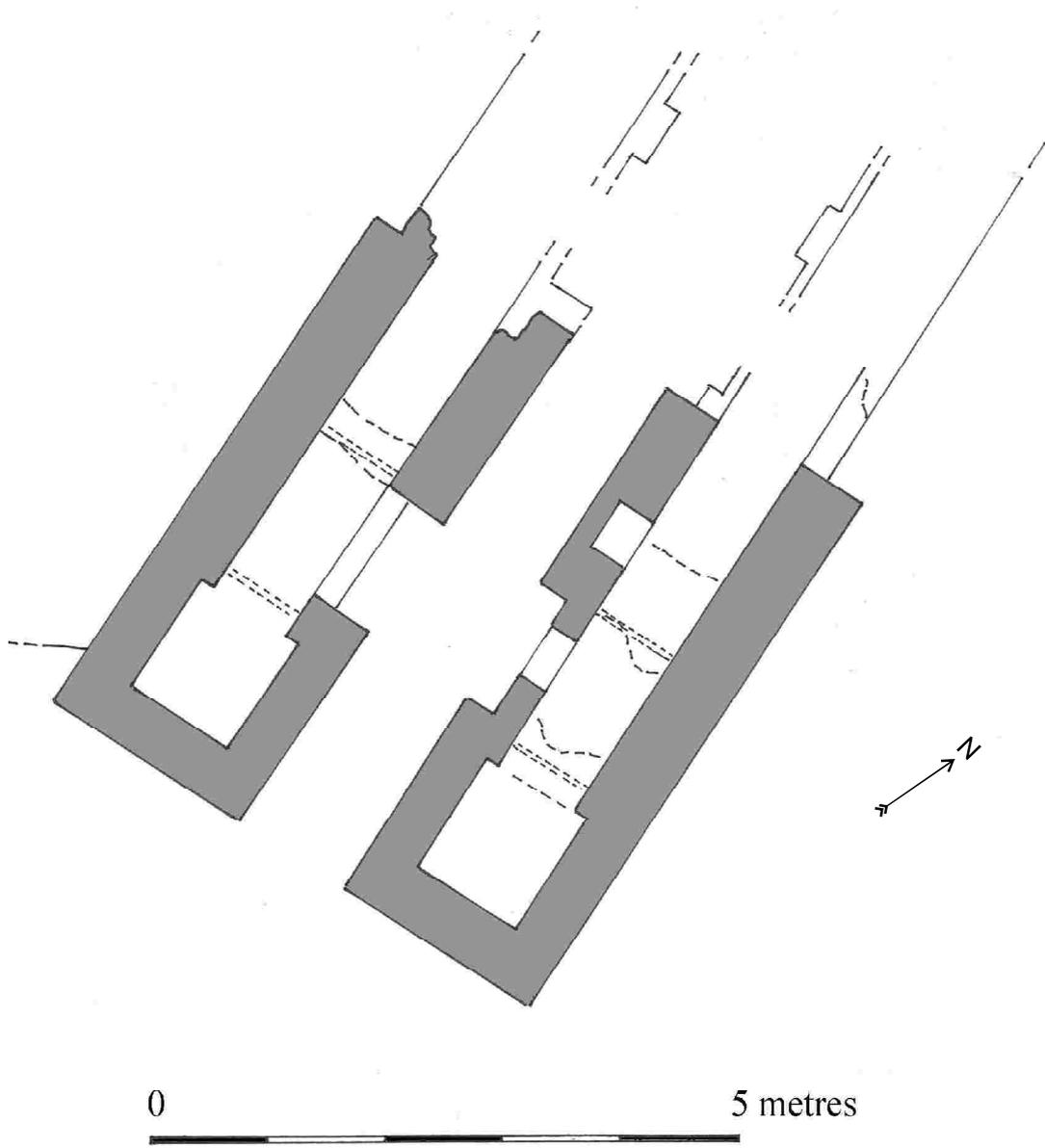
The main phase of excavation works, carried out between 16th - 24th September, 2013 comprised work in the following areas:

#### **A. Chimney Bases**

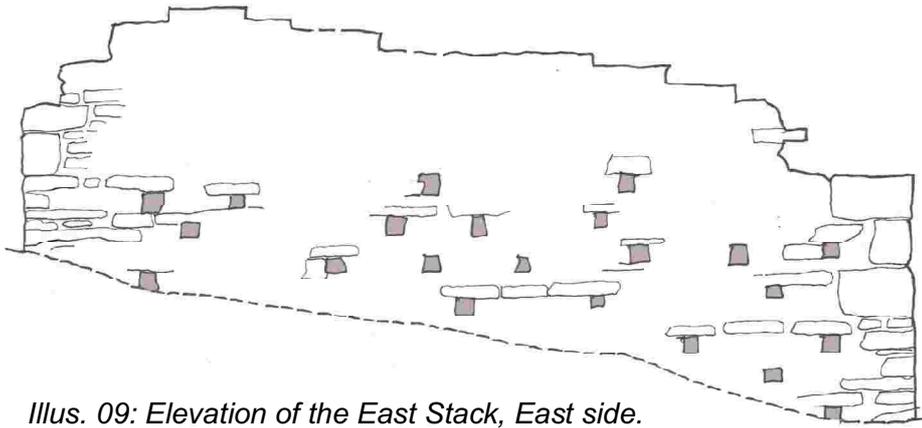
The chimney bases, 5 metres long by 4.70 metres wide, had previously been fully-exposed externally, but, following structural consolidation by the main works contractor, it became possible to carry out further excavation of internal features.

#### **Description** (Illus. 08 and see *Photos 62-69*)

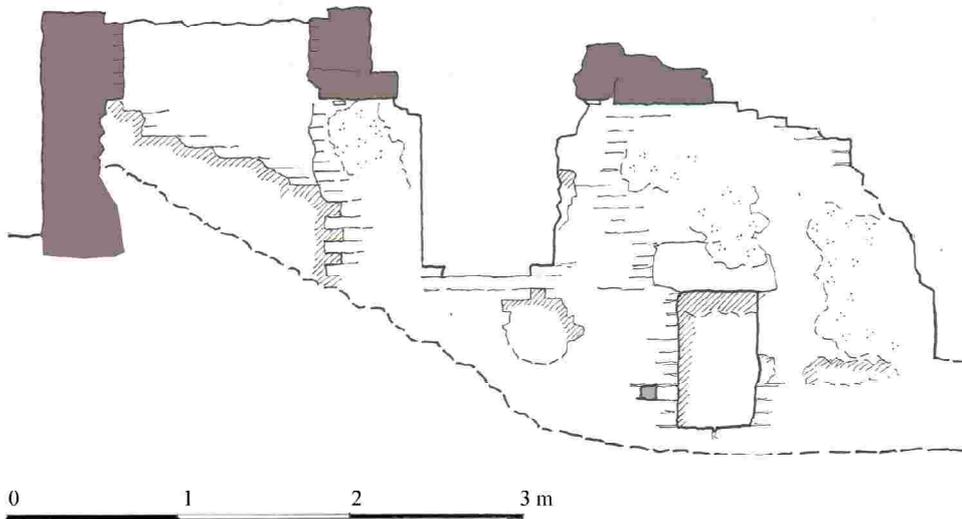
The chimney bases comprise two pairs of interconnected, stone-built and brick-lined chambers divided by a central passageway. Each pair of chambers comprises, at the front of



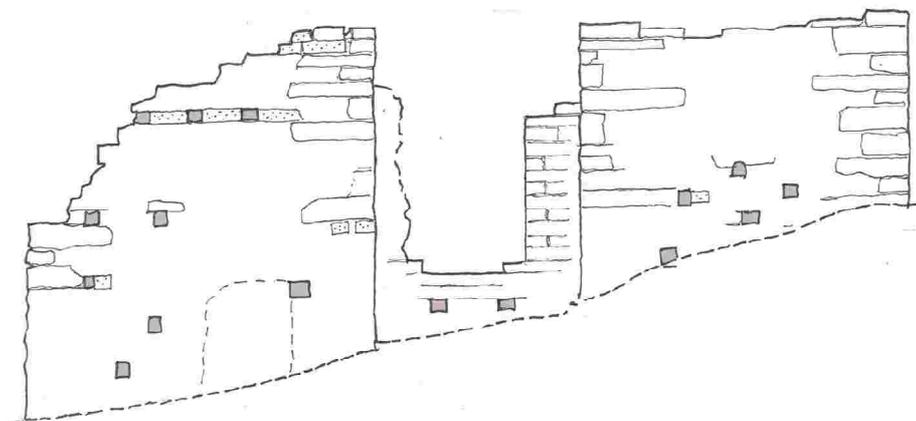
*Illus. 08: Plan of the Chimney Stacks*



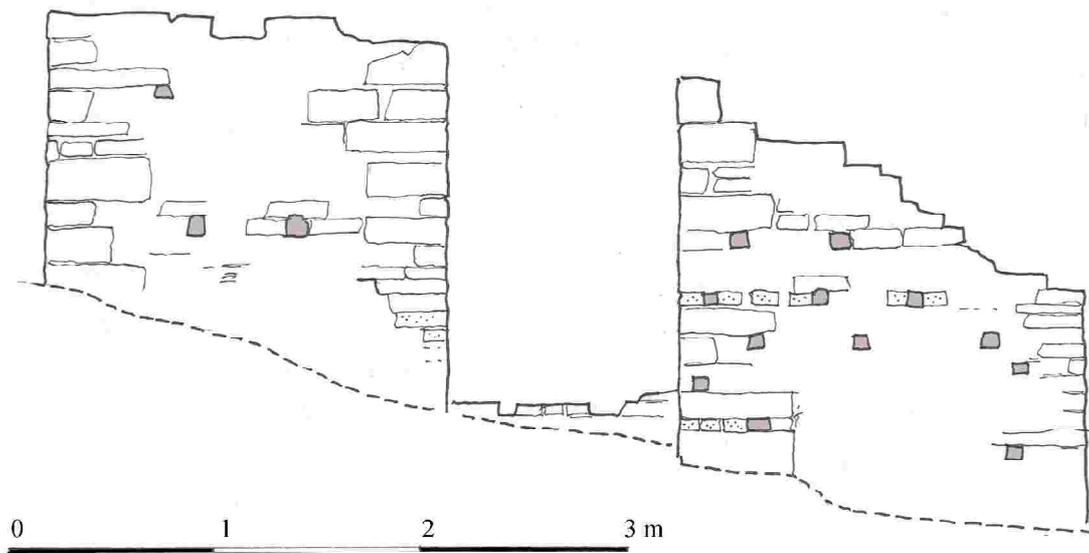
*Illus. 09: Elevation of the East Stack, East side.*



*Illus. 10: Section through the East Stack, looking west.*



*Illus. 11: Elevation of the East Stack, west side.*



*Illus. 12: Elevation of the West Stack, East side.*



*Illus. 13: Elevation of the West Stack, West side.*

the complex adjoining the stone-built arch structure, a covered (or formerly covered) chamber attached by means of a short, roofed conduit or flue to an open-topped chamber or chimney. The front chamber, interpreted as a condensing chamber, is connected to the arches structure by the remains of brick flues running from the position of the former smelting hearths at the north end of the arches. Each condensing chamber, which is stone-built but lined with hand-made earthenware bricks, has in its inner wall (i.e. facing the central passageway) a blocked opening, constructed with a sandstone lintel but otherwise featureless. The roofs of the condensing chambers were of sandstone flags, as were the flagged floors, upon which, as in the chimneys, were deposits of grey powder, probably ash-based but very likely containing other, mineral-based components resulting from the smelting process. The conduits or flues linking condensing chambers and chimneys were brick-built and roofed with flags; the eastern flue has had an opening in it from the central passage (i.e. through its west-facing wall) which does not appear to have been replicated in the corresponding wall of the western flue, unless the evidence for it has been lost. The brick-lined chimneys appear to have been of identical form and construction, brick-lined but slightly wider than their associated condensing chambers and connecting flues. One additional feature of note is the presence, in the external and internal passageway walls of the stone-built structure, of small holes, each about the dimensions of a brick end, forming no apparent pattern but spaced between 0.15 and 0.70 m apart. It was noticed that some of these holes were blocked, particularly on the west-facing external face of the structure, suggesting that they may have played a role in ventilation, or influencing in some way the draft between source and chimneys. A similar suggestion is made with respect to the (blocked) openings in the sides of the condensing chambers, while that in the connecting conduit/flue may have performed a similar role or, perhaps, have been used to gain access into the flue and chimney for purposes of waste deposit retrieval and general maintenance.

## **B. Remains of Flues on Arches Roof**

### ***Trench 1*** – 4.0 m (length) x 2.4 m (width)

This trench was excavated close to the north end of the Dukesfield arches structure and expanded on a small test excavation carried out by a local volunteer (see *Photograph 71*).

### ***Description*** (*Illus. 14 - 15 and see Photographs 72 - 76*)

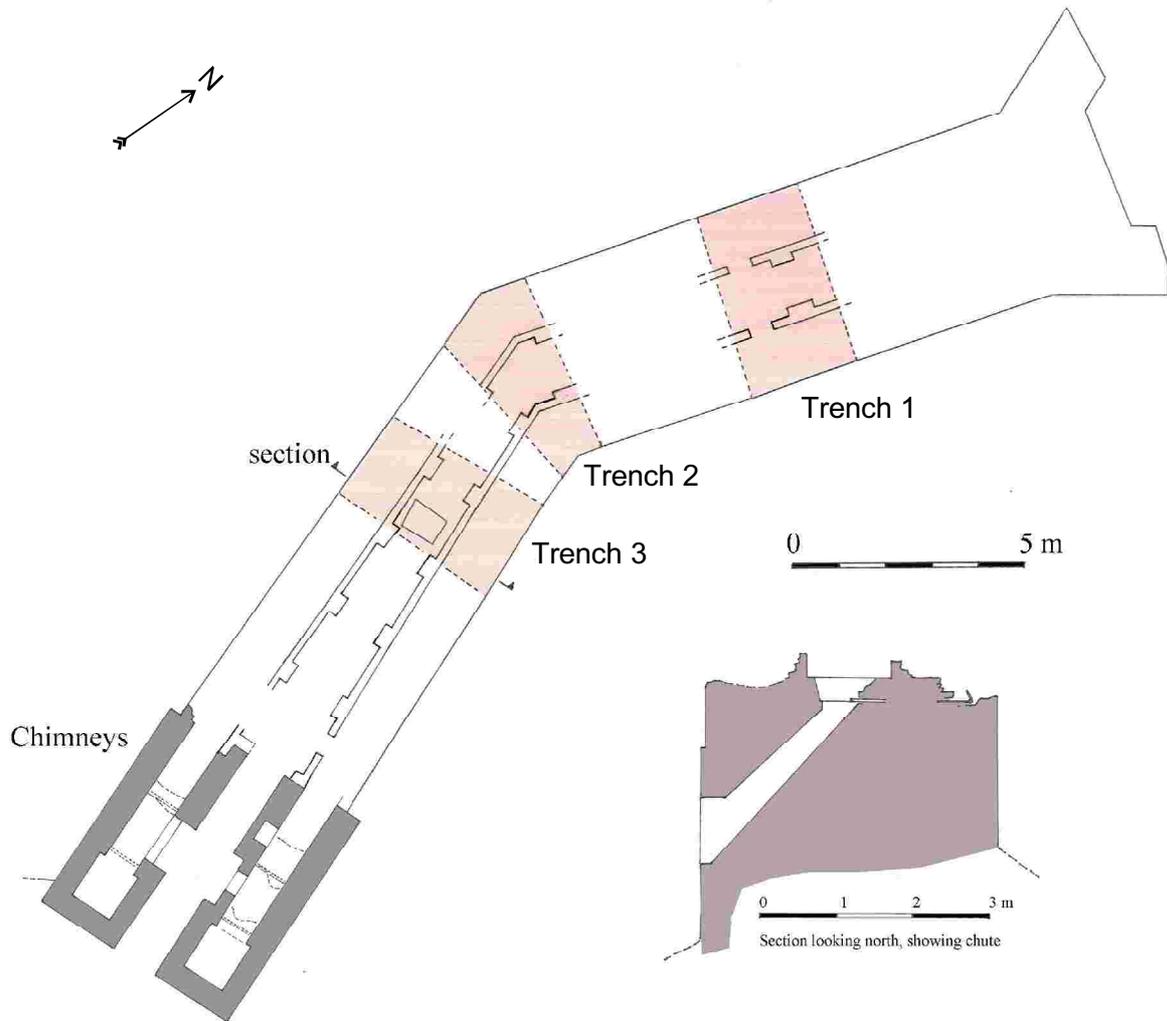
The excavation revealed parallel, double-skin brick walls up to four courses high - interpreted as forming the inner walls of parallel flues - each buttressed internally and sitting upon flagstone foundations themselves mortared to the flagged surface of the arches structure. A gap in each wall was probably constructed to be used as a doorway from the central passage running for the full length of the arches.

### ***Trench 2*** – 4.6 m (max length) x 2.4 m (max width)

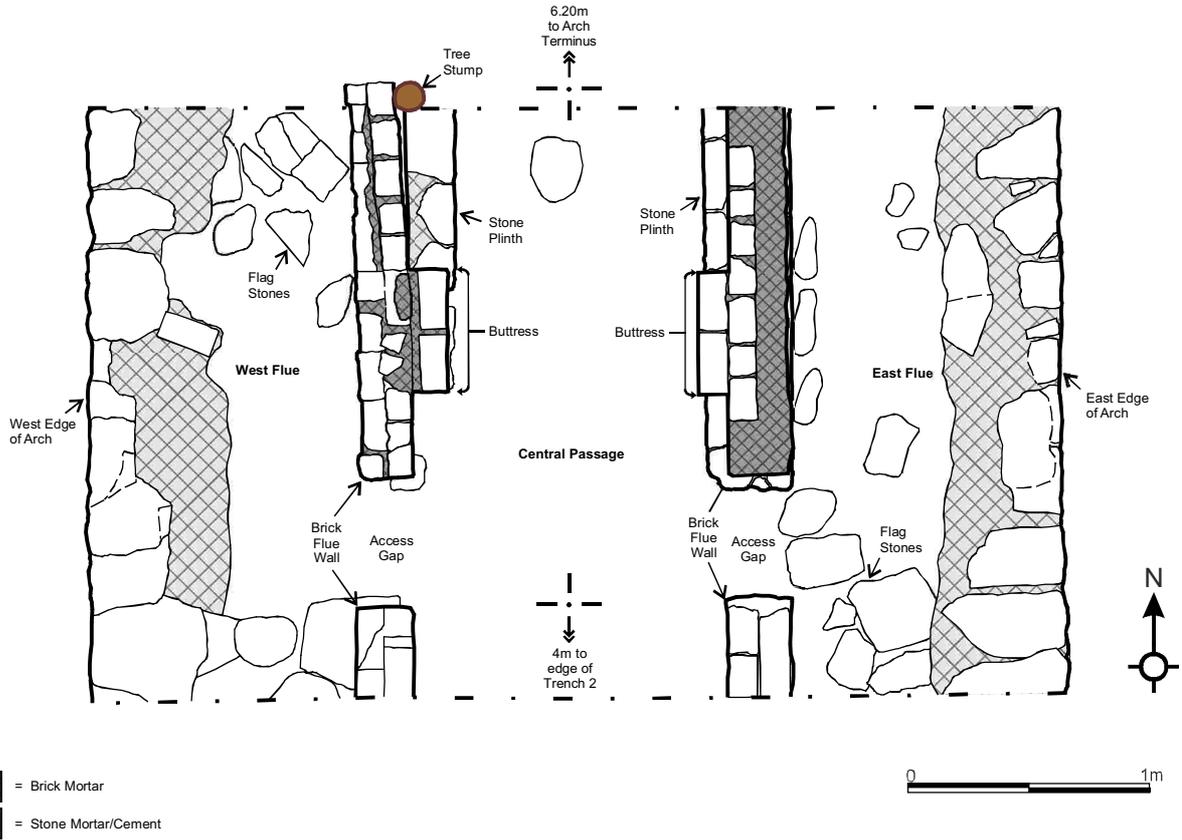
Trench 2 was opened in the central section of the arches roof where its course alters by some 40° towards the south, thereby providing an opportunity to examine how this change was managed and manifested structurally.

### ***Description*** (*Illus. 14 & 16 and see Photographs 77 - 81*)

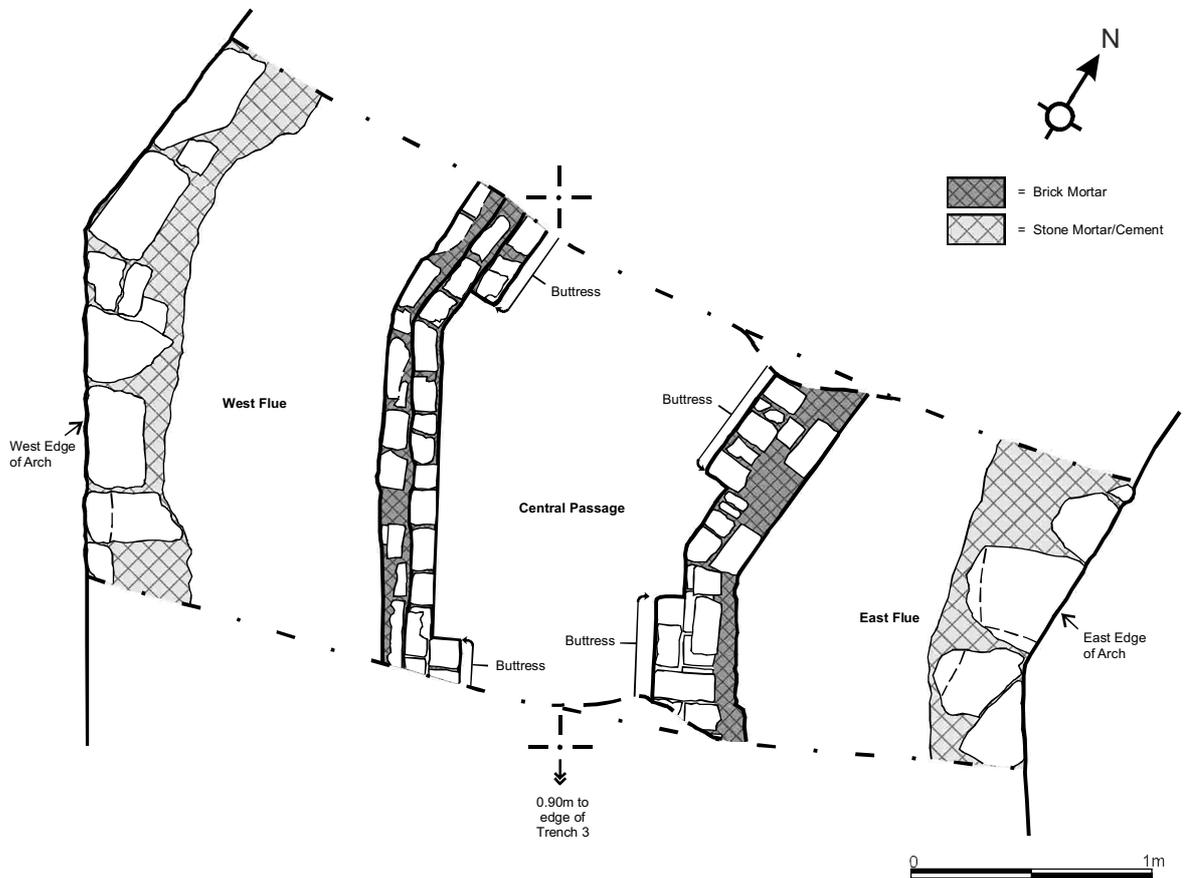
The excavation revealed a similar arrangement of double-skinned brick walls as in Trench 1, with single skin brick buttresses added either side of the angle marking the change in course of the walls, though not positioned adjacently as in Trench 1. Also revealed in this trench



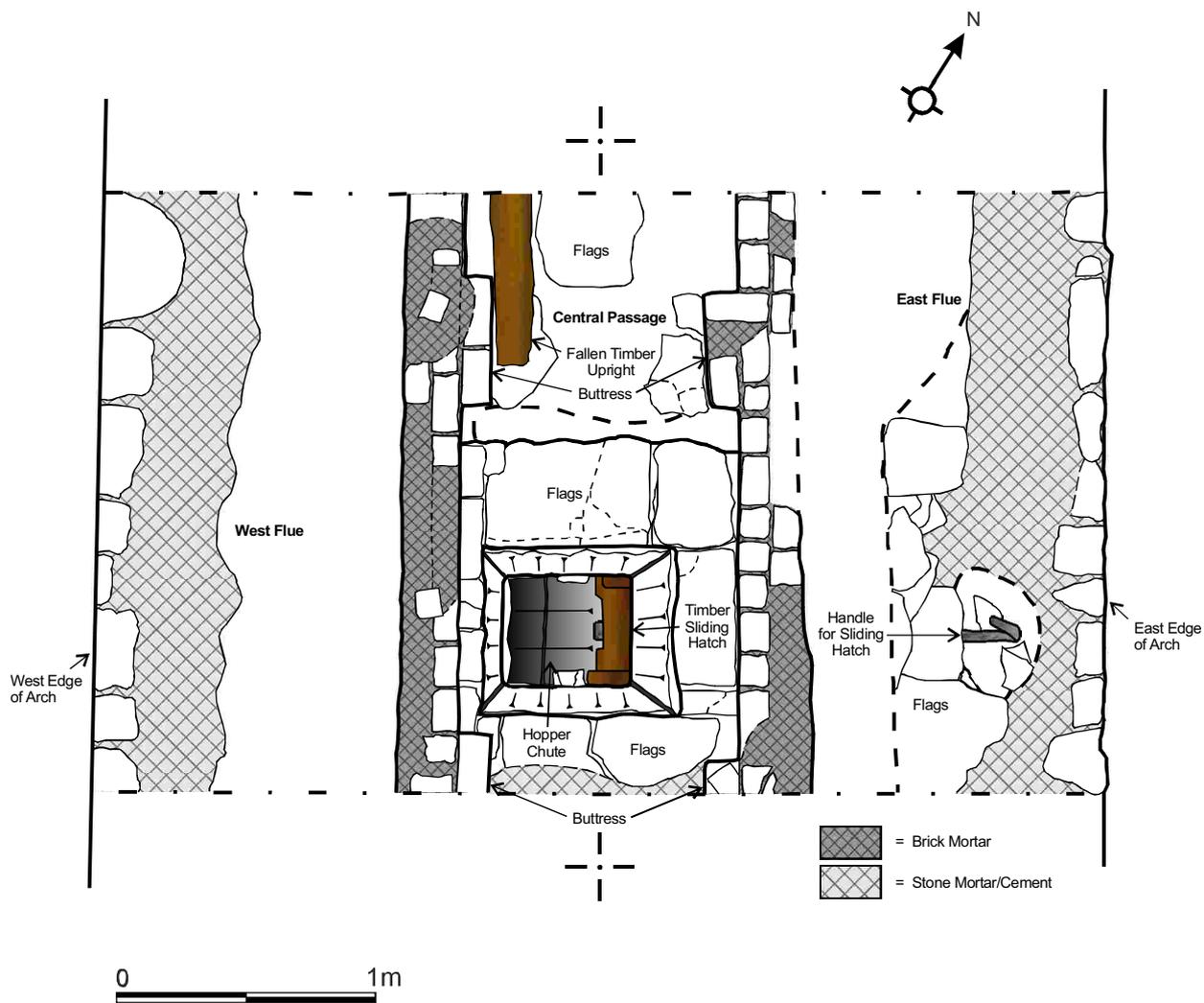
*Illus. 14: Plan of Evaluation trenches excavated on the arches roof; also showing course of other flue remains exposed in relation to the chimney stacks, with a section through the arches at the site of Trench 3 showing the course of the chute between roof and south-west facing wall.*



**Illus. 15:** Plan of Trench 1, Dukesfield Arches 2013.



**Illus. 16:** Plan of Trench 2, Dukesfield Arches 2013.



*Illus. 17: Plan of Trench 3, Dukesfield Arches.*

were the cemented rubble sides of the wall top, resulting from a relatively recent, previous phase of consolidation work.

**Trench 3** – 3.8 m (length) x 2.35 m (width)

This trench was excavated on the south arm of the arches roof, close to the chimneys structure which are themselves linked to brick flues emerging from the arches top.

**Description** (*Illus. 14 & 17 and see Photographs 82 - 94 & 96*)

Excavation revealed a similar composition of internally-buttressed brick walls, sitting on a flagged floor, to that seen in Trenches 1 and 2. However, in addition, Trench 3 revealed, within the central passage area, a stone-built chute with well-crafted stone roof and floor, its flag-surrounded opening 0.50 m x 0.42 m, with its long axis across the passage but positioned off-centre so that its recessed opening is chamfered or funnelled on three sides, but pressed hard up against the brick wall of the west flue on the fourth (short) side. The remains of a wooden door or hatch lie horizontally in the opening, while a metal rod protrudes from a position adjacent on the sloping, stone-built east side of the arches top, suggesting that it may have functioned in some way in relation to the wooden hatch (although this seems unlikely, given that the rod would have been inside the flue).

**C. Leat** (*see Photographs 103 - 108*)

The remains of the leat, first explored and back-filled in 2012, subsequently re-opened in 2013, were further cleaned of debris before the excavated area was slightly extended to reveal more of a cobbled chute close to the east end. The latter is thought likely to have provided an additional - or perhaps original - source of water from the Hall burn, since it enters the main leat just above a sluice gate which would have controlled the flow of water northwards into an overhead launder or westwards down the overflow channel back to the Hall burn. Also revealed in the leat, on its north side at the east end, was a low, poorly-bonded wall of locally-made bricks running roughly parallel with the course of the leat on the west side of another putative launder junction.

Following the renewed leat excavations, an internal inspection was made of its culverted section in order identify any features of particular interest with regard to phasing or function (*see Photographs 103 - 108*), but this resulted in no particular observations of note.

### **2.2.5 PHASE 5: Watching Brief and Recording**

The final phase of works, carried out intermittently between 24th September and October 8th, involved monitoring the clearance of parts of the arches roof not already subject to excavation (i.e. at the interface of the arches roof with the chimney bases) or evaluation (i.e. Trenches 1-3) and, at the end of that period, removal of the remaining infill within compartments of the chimney bases, followed by further structural recording.

**Description of results** (*Illus. 14 and see Photographs 95 - 102*)

The excavation of evaluation trenches on the arches roof had made it possible to anticipate the nature and state of survival of built features upon it. Therefore, the removal of vegetation and topsoil could be carried out with minimal damage to the degraded walls of the flues which were found to extend continuously to both ends of the arches structure. Although only the wall tops were revealed, a similar form of construction and arrangement of features to

that noted in the three evaluation trenches was recorded, with double-skinned brick wall strengthened at intervals by internal buttresses. At the south end, where the flue ran into the condensing chambers of the chimneys structure, an opening, presumably for a door, of similar dimensions to that recorded in evaluation trench 1, was observed in the inside wall of the east flue, and, a similar opening may be postulated for the corresponding position in the west flue, although the poor survival of the masonry in that position does not permit verification. At the north end of the arches roof, the flue remains tapered away into a mass of recently-consolidated masonry rubble, but it seems likely that the two flues diverged to join chimneys via the north-east and north-west projections of the arches roof.

Following recording of whatever could be seen of the flue walls on the arches roof, the remains were covered with a soft-capping and this, in turn, was turfed, thereby obscuring but preserving the surviving underlying structural remains.

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## 4. CONCLUSIONS AND RECOMMENDATIONS

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### 4.1 CONCLUSIONS

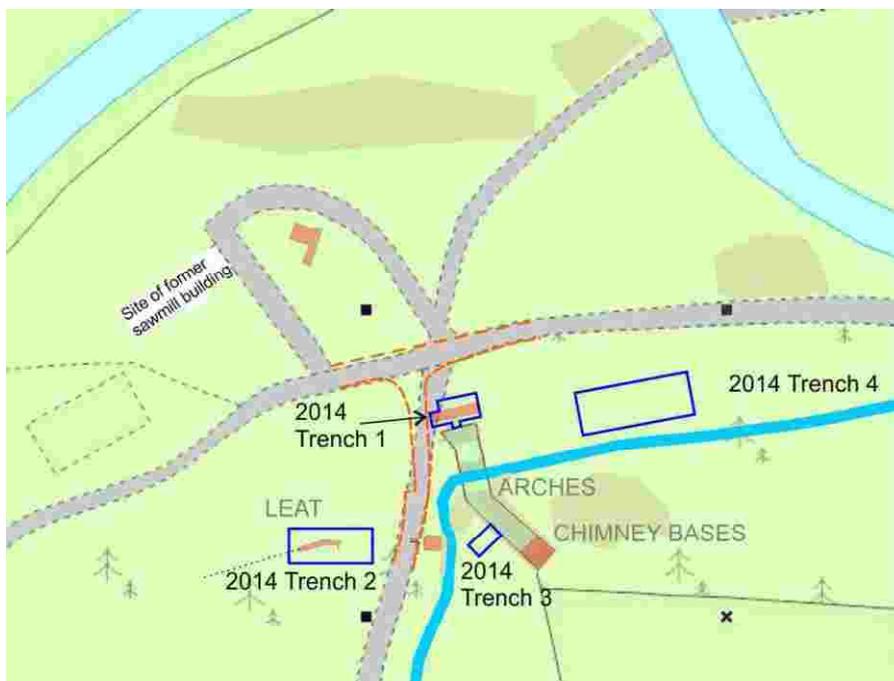
The excavations carried out at Dukesfield in 2013 successfully achieved the principal aims of facilitating the programme of consolidation carried out on the arches and chimney stacks.

Also successfully achieved were secondary aims of this work, including the enhancement of knowledge about the site amongst local volunteer community, achieved largely through active participation. The participation of volunteers also fed into the interpretation of structural remains revealed by excavation, although final analysis awaits a final season of excavation and recording.

### 4.2 RECOMMENDATIONS

It is recommended, on the basis of fieldwork carried out in 2012 and 2013, that further recording is carried out on the chimney stacks to complete the record of features revealed at a late stage in 2013.

It is further recommended, on the basis of fieldwork carried out in 2012 and 2013, that a number of other sites should be considered for excavation in 2014 with a view towards enhancing the interpretation of the site:



*Illus. 16: Suggested Trench Locations for excavation in 2014.*

The area to the west and north of the Arches end wall should be investigated by widening and deepening the trench opened in October 2012, with the aim of establishing the extent, depth, character and chronological phasing of remains known or suspected to be present there. Specifically, the character and function of a wall, first excavated in 2013, should be investigated to determine whether it is associated with the documented smelting hearths structure, or part of an earlier phase of construction. Its structural relationship with the current arches structure should be established by excavating a narrow sondage from a main trench running east-west in front of the arches end wall, up to the footings of the arches.

Further sections of the leat to the north and south of the excavated area should be excavated in order to explore features previously revealed by excavation in relation to the information shown on the historic site maps. The purpose of this will be to expose features for consolidation, interpretation and display, and to answer questions about the nature of the water supply to the smelting mills over time.

The remains of a retaining wall running at right angles to the west wall of the Arches, close to its junction with the chimneys structure, should be excavated in order to understand its origins and purpose; following excavation, its possible partial reinstatement may help to consolidate the earth slope here and divert visitors away from the steeper sections of the bank leading up to the chimneys.

Finally, a building shown east of the arches on the north side of the Hall burn, south of the entrance trackway, appears to be lightly buried by topsoil and merits excavation in order to determine the date and nature of its role within the site.

# Phase 1 - Chimney Clearance

## *Photos 1-6*



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

Phase 1 - Chimney Clearance  
*Photos 7-12*



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12

Phase 1 - Chimney Clearance  
*Photos 13-15*



Photo 13



Photo 14



Photo 15

## Phase 2 - Chimneys Clearance 2

*Photos 16-21*



Photo 16



Photo 17



Photo 18



Photo 19



Photo 20

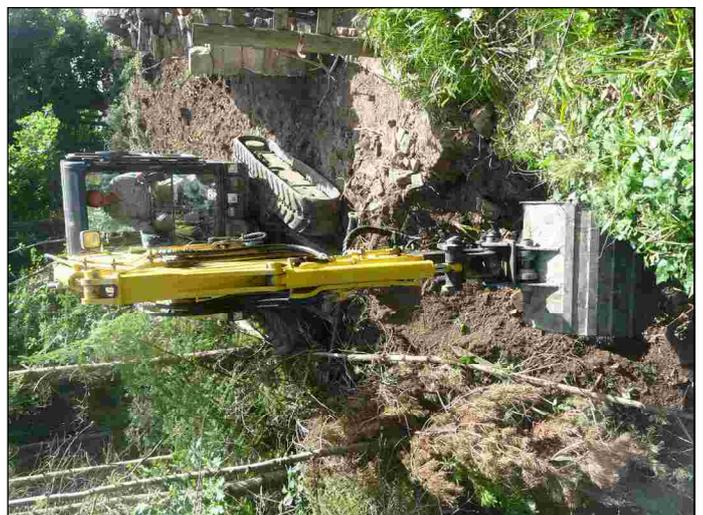


Photo 21

# Phase 3i - Record of Chimney Bases

*Photos 22-27*



Photo 22



Photo 23



Photo 24



Photo 25



Photo 26



Photo 27

# Phase 3i - Record of Chimney Bases

*Photos 28-33*

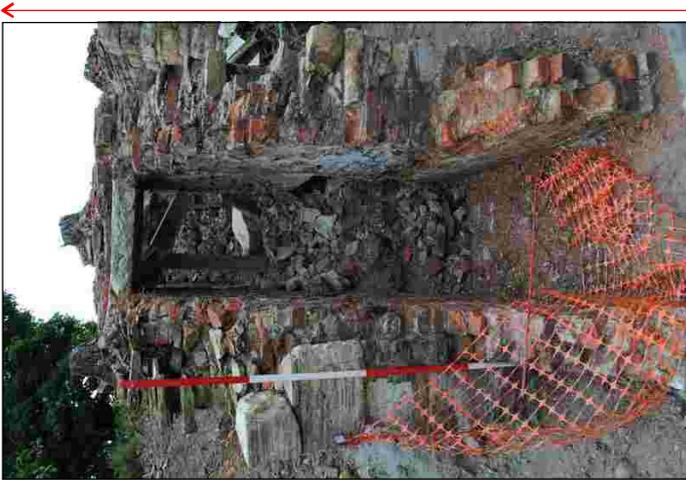


Photo 28



Photo 29



Photo 30



Photo 31



Photo 32



Photo 33

# Phase 3i - Record of Chimney Bases

*Photos 34-39*



Photo 34



Photo 35



Photo 36



Photo 37



Photo 38



Photo 39

Phase 3i - Record of Chimney Bases  
*Photos 40-44*



Photo 40



Photo 41



Photo 42



Photo 43



Photo 44

Phase 3ii - Consolidation  
*Photos 45-50*



Photo 45



Photo 46



Photo 47



Photo 48



Photo 49



Photo 50

Phase 3ii - Consolidation  
*Photos 51-56*



Photo 51



Photo 52



Photo 53



Photo 54



Photo 55



Photo 56

Phase 3ii - Consolidation  
*Photos 57-61*



Photo 57



Photo 58



Photo 59



Photo 60



Photo 61

Phase 4i - Chimney Clearance 3  
Photos 62-67



Photo 62



Photo 63



Photo 64



Photo 65

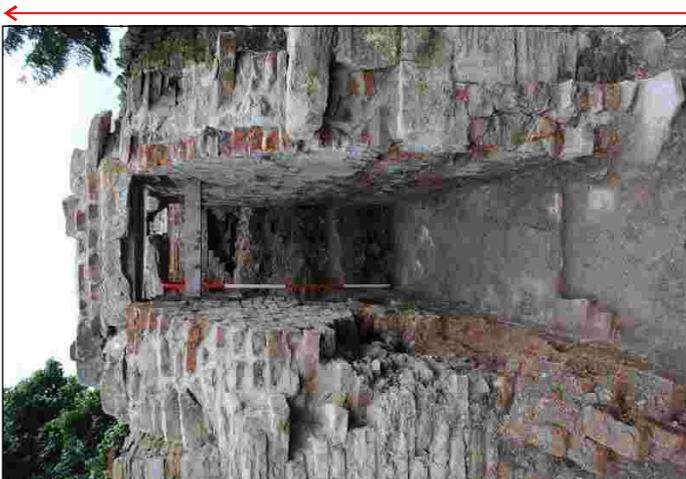


Photo 66



Photo 67

Phase 4i - Chimney Clearance 3  
*Photos 68-69*



Photo 68



Photo 69

# Phase 4ii - Arch top excavations

## Photos 70-75



Photo 70



Photo 71



Photo 72



Photo 73



Photo 74



Photo 75

Phase 4ii - Arch top excavations  
*Photos 76-81*



Photo 76



Photo 77



Photo 78



Photo 79



Photo 80



Photo 81

Phase 4ii - Arch top excavations  
*Photos 82-87*



Photo 82



Photo 83



Photo 84



Photo 85



Photo 86



Photo 87

Phase 4ii - Arch top excavations  
*Photos 88-93*



Photo 88



Photo 89



Photo 90



Photo 91



Photo 92



Photo 93

Phase 4ii - Arch top excavations  
*Photos 94-99*



Photo 94



Photo 95



Photo 96

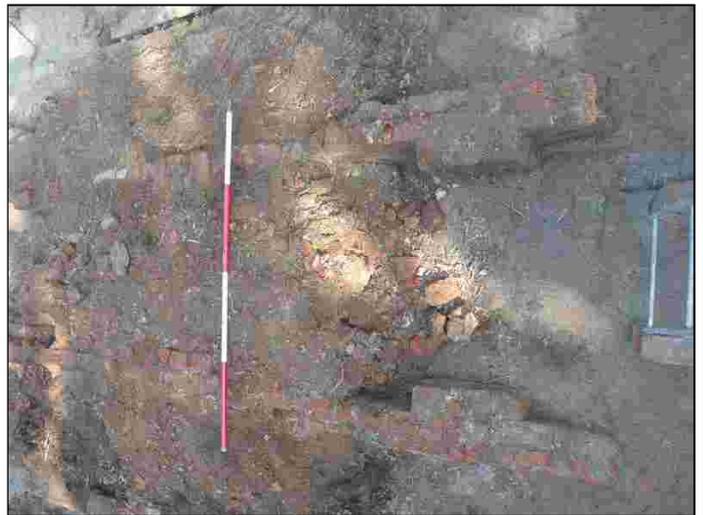


Photo 97

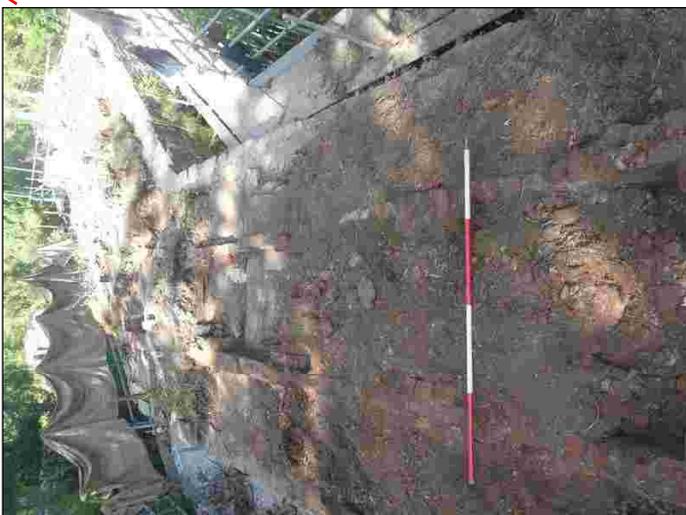


Photo 98



Photo 99

Phase 4ii - Arch top excavations  
*Photos 100-102*



Photo 100



Photo 101



Photo 102

Phase 4iii - Leat excavation  
*Photos 103-108*



Photo 103



Photo 104



Photo 105



Photo 106



Photo 107



Photo 108

Phase 4iii - Leat excavation  
*Photos 109-113*



Photo 109



Photo 110



Photo 111



Photo 112



Photo 113

Phase 5i - Chimney Clearance 4  
Photos 114-119



Photo 114



Photo 115



Photo 116



Photo 117



Photo 118



Photo 119

Phase 5i - Chimney Clearance 4  
Photos 120-125

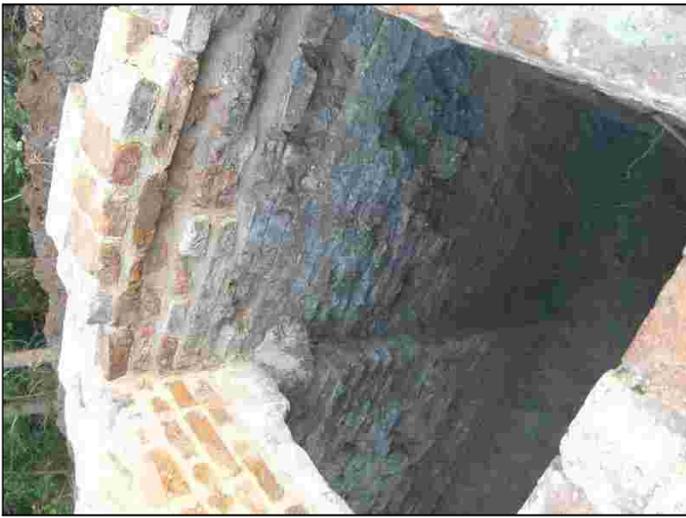


Photo 120



Photo 121



Photo 122



Photo 123



Photo 124



Photo 125

Phase 5i - Chimney Clearance 4  
*Photos 126-128*



Photo 126



Photo 127



Photo 128

Phase 5ii - Arch Top Watching Brief  
*Photos 129-134*



Photo 129



Photo 130

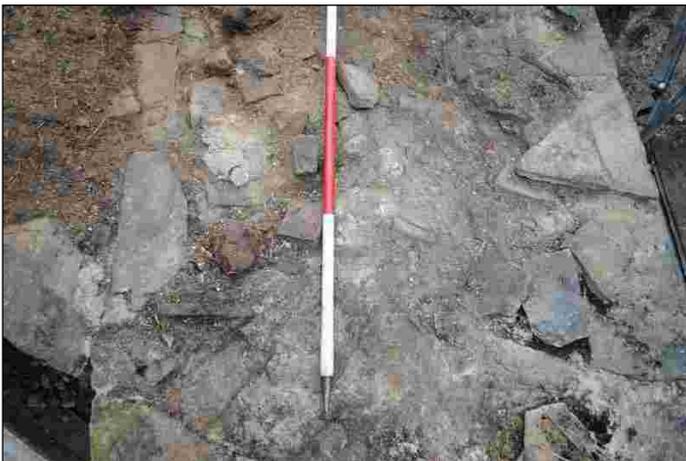


Photo 131



Photo 132



Photo 133



Photo 134

Phase 5ii - Arch Top Watching Brief  
*Photo 135*



Photo 135

## 5. REFERENCES

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