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**STOURBRIDGE SAND  
CAVERNS**

**WEST MIDLANDS**

Archaeological Survey

December 2008

UNIVERSITY OF  
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## Project No. 1887

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### Stourbridge Sand Caverns, Stourbridge, West Midlands

#### ARCHAEOLOGICAL SURVEY, DECEMBER 2008

by  
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for  
**Dudley Metropolitan Borough Council**

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**The Stourbridge Sand Caverns**  
St. John's Road, Stourbridge, West Midlands

Archaeological Survey, December 2008

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## The Stourbridge Sand Caverns

St. John's Road, Stourbridge, West Midlands

Archaeological Survey, December 2008

### SUMMARY

*Birmingham Archaeology was commissioned in November 2008 by the Engineer's Department of Dudley Metropolitan Borough Council, to carry out an Archaeological Survey of a series of sandstone caverns located below St. John's Road, Stourbridge, West Midlands (centred on NGR SO 90150 84545). The caverns were due to be backfilled following a condition assessment of early 2008, which raised serious concerns regarding the long term stability of the complex.*

*The caverns have been the subject of a previous Archaeological Desk-Based Assessment which established that the area of the caverns remained essentially undeveloped until the middle years of the 19<sup>th</sup> century, when expanding industrialisation gradually encroached onto an area of former fields and gardens. A brewery (the Stourbridge Brewery) was established by a Mr. John Wall, formerly a maltster, at some point between 1837 and 1851, occupying the area directly above the cavern complex. The caverns are commonly held to have been originally excavated as cellarage for this brewery but, though probable, no documentary sources have been identified to definitively support such a conclusion and their origins remain somewhat obscure. They certainly seem to have been sited to exploit the proximity of the Stour River, Stourbridge Canal, the railway goods yards and associated communication networks, either for the receipt of incoming raw materials or for the export of finished products. The Stourbridge Brewery was amalgamated in 1886 to form the North Worcestershire Breweries Company, subsequently being taken over by Wolverhampton and Dudley Breweries and closed soon after 1910, at which time the caverns became obsolete and were abandoned. During World War II, the complex of caverns was refurbished to function as air raid shelters for use by the general public and by pupils and staff of the King Edward VI Grammar School. Following the end of the war, the caverns were once again closed and partially infilled.*

*The survey has allowed for a detailed survey and photographic record of the cavern system to be made in advance of backfilling, while the use of laser scanning for the base survey allowed for the creation of full, 3-dimensional model of the complex to be generated.*

# The Stourbridge Sand Caverns

## St. John's Road, Stourbridge, West Midlands

Archaeological Survey, December 2008

### 1 INTRODUCTION

#### 1.1 Background to the Project

- 1.1.1 Birmingham Archaeology was commissioned in September 2008 by Dudley Metropolitan Borough Council (DMBC) to undertake an archaeological survey of a series of caverns excavated below St. John's Road, Stourbridge, West Midlands (centred on NGR SO 90150 84545; see Figure 1). The caverns were due to be backfilled following a condition assessment of early 2008, which raised serious concerns regarding the long term stability of the complex, the result of increasingly damp conditions and a rise in standing water levels.
- 1.1.2 The survey was undertaken in accordance with a Written Scheme of Investigation (WSI), prepared by Birmingham Archaeology and approved by DMBC. A copy of the project WSI is reproduced below as **Appendix A**.
- 1.1.3 This report outlines the results of the survey, which was undertaken in accordance with the Institute for Archaeologists *Standard and Guidance for the Investigation and Recording of Standing Buildings or Structures* (IFA, 2001).

#### 1.2 Aims and Objectives

- 1.2.1 The general aim of the survey was to make an archaeological record of the cavern system ahead of backfilling with a view to achieving 'preservation by record'. This was to be achieved by the implementation of a programme of fieldwork comprising three-dimensional laser survey and archaeological recording, as outlined in Section §.3 below.

### 2 LOCATION AND GEOLOGY

#### 2.1 Site Location

- 2.1.1 The sand caverns are located on the north of Stourbridge town centre extending below the north-east section of the St. John's Road ring road, slightly to the north of the junction with Duke Street and are centred on NGR SO 90150 84545 (Figures 1 and 2). Formerly accessed from the grounds of the King Edward VI College to the west, the present access, which may constitute an original access route, is via a long, narrow tunnel leading from the Mill Race Lane industrial estate to the east.

#### 2.2 Geology

- 2.2.1 The site of the tunnels is located within beds of Wildmoor Sandstone (Waite 2006, 2) which form part of the lower Sherwood Sandstone Formation of the Triassic period (formerly known as 'Bunter' Sandstone). These sandstones occur across a large area in the locality, from Stourport in the south to Stourbridge in the north and east to west from Bromsgrove to Hagley. Wildmoor sandstone is a red, poorly cemented, thick bedded, fine to medium grained sandstone with numerous mudstone and siltstone beds (*ibid.*). It is usually unsuitable for building stone although some of the lower beds are locally hardened by carbonate of lime and stand out in a rocky form. This is demonstrated at Kinver Edge, where former dwellings are cut into the sandstone cliff (Patrick 2000).

## **2.3 Statutory Designations**

- 2.3.1 The sandstone caverns are included on the Dudley Metropolitan District Council Sites and Monuments Record (SMR), reference number 12175.

## **3 METHODOLOGY**

### **3.1 Laser Scan Survey**

- 3.2.1 The base survey of the cavern complex was undertaken by means of a Leica HDS6000 3-dimensional laser scanner. The walls were recorded to an approximate resolution of  $\geq 4$ mm. In addition, a 2m x 2m portion of wall was selected and recorded at a higher level of resolution in order to provide a sample model of toolmarks. Full panoramic photography was taken from each scanning location using a high-resolution digital camera, allowing RGB colour values to be mapped onto the point cloud at a later date, as well as providing the option of panoramic Quicktime movies for archival or display purposes. The below ground survey was tied in to above ground features using an EDM.

### **3.2 Photographic Record**

- 3.2.1 A full photographic survey was undertaken comprising both 35mm monochrome print and high resolution digital photography. The survey extended to include both general and detail shots; contextual views, principal interior spaces and relevant structural/architectural details pertaining to the historical uses of the cavern system. Where possible, photographs included graded photographic scales. All photographs were recorded on *pro-forma* recording sheets detailing subject, orientation, scales included, photographer and date.

### **3.3 Written Record**

- 3.3.1 A written account was prepared to supplement laser survey and photographic record, summarising the history, character, date, techniques of construction, phasing and significance of the building as evident from a detailed inspection. Written records were made using *pro-forma* recording sheets

## **4 ARCHAEOLOGICAL AND HISTORICAL CONTEXT**

*The cavern complex has been the subject of a previous Archaeological Desk-Based Assessment (Tyler, 2008). The following map regression analysis and outline development of the caverns and their immediate context included here derive from the previous report and are repeated for reasons of completeness.*

### **4.1 Map Regression**

- 4.1.1 The earliest known map of Stourbridge dates to 1781 (see Perry 2001, 69; fig. 29);<sup>1</sup> the plan is somewhat schematic in nature, not allowing for detailed conclusions to be drawn about individual buildings, though it does indicate that the area to the east of High Street towards the Stour was undeveloped fields and gardens at that date. Mill Street (at that time, Mill Lane) was fairly well developed as far as the junction with Giles Hill which is clearly discernible, and the line of the later Duke Street is suggested by the line of a possible trackway.
- 4.1.2 Scott's plan of 1802 (see Perry 2001, 82; fig. 38) again indicates the area between High Street and Mill Street/The Cliff as undeveloped land, with buildings concentrated

<sup>1</sup> WCRO: BA 3762/149

towards the northern end of Mill Street up to its junction with Giles Hill. Duke Street would appear still not to have been laid out, or comprised simply a short lane leading northwards off Coventry Street.

- 4.1.3 By the time of John Wood's '*Plan of Stourbridge from an Actual Survey*' of 1837 (Figure 3), Duke Street had become established, and is clearly labelled. The area between High Street to the west and Mill Street/The Cliff to the east remained essentially undeveloped, though a concentration of buildings had become established around the central area of Duke Street. The area to the east is shown as being in the ownership of Joseph Pitman Esq., listed in Pigot's Directory of 1828 (p.877) as a tanner, whose residence is shown fronting High Street at the corner of Giles Hill and whose extensive works were located on the northern side of Mill Street adjacent to the river. To the east of Pitman's land ran The Cliff, an extension of Mill Street running approximately north-south to join Coventry Street, and east of this, a steep incline sloping down to the River Stour. An isolated structure is shown east of The Cliff at approximately the location of the entrance to the cavern system.
- 4.1.4 The Ordnance Survey County Series 1:2500 1<sup>st</sup> edition map of 1885 (Figure 4) shows the continuing development along Duke Street, with a brewery building first indicated to the eastern side of the road, occupying the area directly above the main area of the tunnel complex. A '*Parchment Works*' had been established on Pitman's land to the east of the brewery site, on the western side of The Cliff, with further associated development on the eastern side of the road.<sup>2</sup> Pitman's original skinning premises on the north side of Mill Street had been significantly enlarged with four ranges of buildings arranged around a central block, together labelled '*Leather and Parchment Works*'. Kelly's Directory of 1896 (p.221) reflects the state of development shown in this map, describing the large ironworks of William Orme Foster Esq (the Stourbridge Forge) and relating '...there is also a brewery, malthouse, skinyard, parchment manufactory, glue works and many glassworks in the area'.
- 4.1.5 The single greatest development by this date was the arrival of the railway in 1852, and the associated sidings and goods yards which occupied the east bank of the Stour opposite Pitman's Works (compare Figures 4 and 3).
- 4.1.6 The Ordnance Survey County Series 1:2500 1<sup>st</sup> revision map of 1903 (Figure 5) shows only limited changes from the 1885 edition, the principal development being the extension of the North Worcestershire Brewery site to the eastern side of Duke Street, while to the north of the current study area, the '*Forward Works*' of Palfrey and Ick are shown to the south of Giles Hill (here labelled Cliff Hill).
- 4.1.7 By the time of the Ordnance Survey County Series 1:2500 2<sup>nd</sup> revision map of 1919/20 (Figure 6), the North Worcestershire Breweries premises are labelled as being 'disused', a development which occurred following the purchase of the company by Wolverhampton and Dudley Breweries in 1910. The parchment works of the 1903 edition are here labelled '*Leather Works*', representing the premises of W J Turney.
- 4.1.8 The Ordnance Survey editions of 1938 and 1956 (Figures 7 and 8) show little significant change, though the buildings of the North Worcestershire Breweries had been adapted by 1938 for use by the Medusa Mills (Felts and Fillings).

<sup>2</sup> A surviving two-storey brick range and chimney stack may represent a survival from these buildings.

## 4.2 The Site in Context

### *The Duke Street Brewery*

- 4.2.1 The first reference in the trade directories to a brewery located in Duke Street is found in Slater's Directory of 1851 (p.132) which lists John Wall as the proprietor;<sup>3</sup> Littlebury's Directory of 1872 lists the executors of John Wall, and names the premises as the Stourbridge Brewery. Kelly's directories of 1884 (p.1276), 1892 (p.310) and 1896 (p.374) list Haskew, Whitwell and Hand as brewers in Duke Street. The North Worcestershire Breweries Ltd is first listed in Kelly's directory of 1901 (p.406) and last listed in Coe and Coe's Directory of Worcestershire of 1911 (p.111). No brewers are listed in Duke Street in Kelly's Directory of 1912. The brewery had evidently ceased production at this date, reflected in the buildings being annotated as 'disused' in the Ordnance Survey edition of 1919/20 (Figure 6).
- 4.2.2 The Stourbridge Brewery was amalgamated with the Rowley Brewery (Black Heath), the White Swan Brewery (Oldbury) and the Royal Oak Brewery (Brierley Hill) in 1886 forming the North Worcestershire Breweries Company, which also had a combined total of 135 tied-houses. Brewing was thereafter concentrated on the Stourbridge site at Duke Street (McKenna 2005, 103). The brewery premises were reconstructed after a fire in 1897, to designs by the architects Johnson Charles and Son while a new bottling store was erected in 1906/7, by the architects Folkes and Folkes of Hagley Road, Stourbridge.<sup>4</sup> The firm was taken over by Wolverhampton and Dudley Breweries (now Marston's Plc) in 1910 (*ibid.*) though it was apparently out of production by 1919; the implication being that W&DB purchased the brewery in order to take control of the tied-houses as opposed to the additional brewing capacity. A2A list various deeds and drawings related to tied houses of the North Worcestershire Breweries,<sup>5</sup> though no records pertaining to the Duke Street brewery itself.

### *Known Development of the Caverns*

- 4.2.3 The caverns are commonly held to have been originally excavated as cellarge for the Stourbridge Brewery (later North Worcestershire Breweries), though no documentary sources have been identified during the course of the current project to definitively support such a conclusion and their origins remain somewhat obscure. Whatever the origins of the caverns, with the closure of the North Worcestershire Breweries soon after 1910, they became obsolete and were abandoned and partially backfilled.
- 4.2.4 During World War II, the complex of caverns was emptied of backfill and refurbished to function as air raid shelters, providing accommodation for 1000 individuals; 600 places assigned for staff and pupils from the King Edward VI Grammar School and 400 places for the general public (Sanders, undated; Appendix B). School and public were provided with independent means of access to the caverns, the school entrance descending from the playground opposite 'Block C' and the public entrance on land adjacent to Duke Street between the school caretaker's house and George Wright's bakery (*ibid.*). The shelters were equipped with benches of concrete and wooden slat construction within the side galleries, were lit by electricity (with a chamber accommodating a back-up generator), and included rudimentary chemical-toilets and possibly cooking facilities (Waite 2007, 4).

<sup>3</sup> John Wall is listed (as a maltster) operating in High Street in Pigot's Directory of 1842 (p. 36), and again in Duke Street and High Street in the PO directory of 1850.

<sup>4</sup> WCRO: 705:399/8008/215/ii

<sup>5</sup> <http://www.a2a.org.uk/search/doclist.asp?nb=0&nbKey=1&com=1&keyword=north%20worcestershire%20breweries&properties=0601>



- 4.2.5 Following the end of the war, the caverns were once again closed and, in the spring of 1946, the entrances were demolished and closed over, with loose rubble being tipped down the entrance tunnels.

### **4.3 The Stourbridge Ring Road**

- 4.3.1 A comparison of historical Ordnance Survey mapping with a modern aerial view of the area (Figure 9) clearly illustrates the dramatic changes to the area wrought by the creation of an orbital ring road (Plates 1-3), officially opened by Viscount Cobham in November 1969 (Perry 2001, 216). The creation of the ring road greatly disrupted the historic street pattern of the town and effectively isolated the historic centre. The eastern arm of the ring road utilised and extended the line of St. John's Road northwards, curtailing Coventry Street and obliterating the northern end of Duke Street, which involved the demolition of the Medusa Mills (former Brewery) buildings.
- 4.3.2 The area to the east of the ring road to either side of the channelled Stour river has subsequently been redeveloped as the Mill Race Lane industrial estate, with associated car parking areas. An isolated two-storey brick structure with stack (Plate 4) represents a sole survival of the former leather works of W J Turney (closed 1957) rising above 'The Cliff' pathway. The eastern retaining wall of The Cliff survives to the western side of the car park area, below Turney's works, and includes a blocked doorway (Plate 5) serving the eastern access to the cavern complex.

## **5 DESCRIPTION OF CAVERN COMPLEX**

### **5.1 Overall Arrangements**

- 5.1.1 The cavern complex comprises a series of linear chambers, aligned approximately north-south, arranged to the north and south of a central, axial gallery aligned approximately east-west. All elements of the cavern complex are excavated out of the natural red sandstone and are floored throughout in brick pavers.

### **5.2 Detailed Description**

#### *The Western Stairway Entrances*

- 5.2.1 The caverns were formerly served by two stairs descending at the western end of the complex. The first of these descends from the grounds of the King Edward VI College, emerging into the southern end of Chamber S1. A second stair descends to the southern end of Chamber S2. Both stairs have been recently blocked in breeze block and were not accessed at the time of the current survey.

#### *The Eastern Access Tunnel*

- 5.2.2 The principal entrance to the cavern complex is by means of a c.38m long, east-west aligned **Access Tunnel** entered via a doorway within the brick-built retaining wall below the Cliff pathway (Plates 1-3), formerly overlooking the River Stour and currently opening off an area of ground to the south of the Mill Race Lane Industrial Estate car park (Plate 1). The tunnel is carved out of the natural sandstone, the side walls being faced in brick immediately adjacent to the eastern door (Plate 3). The tunnel stands 1.8m tall and is approximately 1m wide for most of its length, narrowing in places to a minimum of 0.75m. The side walls rise near vertical to c.1.3m above floor level, above which they slope inwards slightly to a flat head profile (Plate 4). The floor of the tunnel, apart from the western 3m, which is of brick, is formed of rough sandstone and falls approximately 3m from the level of the eastern entrance to the floor level of the main gallery to the west. Significantly, the walls of

the access tunnel show no traces of PFA (Pulverised Fuel Ash), evident elsewhere within the complex and representing the remains of the early 20<sup>th</sup>-century backfilling.

### *The Main Gallery*

- 5.2.3 The spine of the cavern complex is formed by the **Main Gallery**, a lateral passage aligned east/west (Plates 10/11), measuring approximately 26m long by 3m wide and standing to an average of 3.25m above floor level, though higher at the eastern end where it reaches a maximum of 4.6m tall. The gallery is accessed via the long narrow access tunnel (described above) that extends from its eastern end and rises to emerge below the retaining wall of the Cliff pathway (Plates 1/2). The walls of the gallery are near vertical to a height of c.1.25m above floor level (Plate 8), above which they curve gently inwards to form a flat crown, c.0.60m wide. The gallery is floored throughout in east/west aligned brick pavers (9in x 4½in), and includes a central axial drainage gully (5in wide x 2in deep) which runs the full length of the gallery, fed by secondary gullies emerging from each of the side chambers (Plates 10-12).
- 5.2.4 The northern and southern walls of the main gallery include a number of evenly spaced doorways (Plates 13-20), which provide access to the side chambers (N1-N4 and S1-S5 respectively).
- 5.2.5 At the far west end of the main gallery, beyond the entrances to side chambers S1 and N1, the gallery has been scoured out to form a large circular terminal (Plate 12), 4m in diameter with a domed roof, standing to a maximum of 4.3m tall. A series of vertical scars on the lower walls signify the former location of brick piers for the support of bench seating similar to that recorded elsewhere within the side chambers. A significant quantity of brick rubble and several fragments of reinforced concrete slab presumably originate from the dismantling of such benches.
- 5.2.6 A significant amount of restructuring would appear to have been undertaken at the eastern end of the main gallery adjacent to Chamber S5 (Plates 5-9) where, as noted above, the roof is set significantly higher. Specifically, the north wall of the gallery has been refaced in highly-fired 'Utopia' bricks, laid to English bond (Plate 7), while two transverse walls with arches of three header courses, again in 'Utopia' brick, have been introduced to the east and west of the entrance to Chamber S5 (Plates 5/6).<sup>6</sup> A small *in-situ* bench of reinforced concrete survives at the north-east corner of the gallery adjacent to the main entrance tunnel (Plate 8). It is possible that the refacing of the north wall may obscure the entrance to a further side chamber, reflecting S5 to the south, though the absence of a transverse drainage gully in the northern half of the brick floor would seem to negate this possibility.

### *Chamber S1 (Figure 11a)*

- 5.2.7 **Chamber S1** (Plates 21-27) is located off the western end of the south side of the main gallery from which it is accessed via a doorway formed in the southern wall of the latter (Plate 13). In contrast to the majority of the side chamber doorways, the profile here is wide and rounded, though with a flattened head. The latter feature suggests that the opening may have been adapted and enlarged from a former, narrower profile more in line with the 'standard' form of side chamber door recorded elsewhere. Internally, the chamber has maximum dimensions of 16m long by 2.90m wide and stands to a maximum height of 2.6m. The walls of the chamber are vertical to a height of c.1.3m above floor level, above which they slope evenly in to an uneven

<sup>6</sup> 'Utopia' bricks were highly-fired bricks produced by the Aldridge Brick and Tile Company, and were commonly used in the construction of air raid shelters, due to their extreme hardness. They were produced in two standard colours, sand-faced bluff and red. (ref: Black Country Bugle: [www.blackcountrybugle.co.uk/blackcountrybugle-news/displayarticle.asp?id=73128](http://www.blackcountrybugle.co.uk/blackcountrybugle-news/displayarticle.asp?id=73128)).



crown (Plate 22); a series of wooden brackets of unknown function are affixed to the eastern wall. The chamber is floored throughout in east/west aligned brick pavers (9in x 4½in.) and includes a central, 3in wide drainage gully which runs the full length of the chamber, feeding into the gully within the main gallery to the north, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.

- 5.2.8 An angled wall, built on a NE/SW alignment, blocks Chamber S1 at a distance of c.11.5m south of the entrance (Plates 23/4); the wall is of a single skin, comprising highly fired 'Utopia' brick, here laid to Flemish stretcher bond. The wall is clearly secondary and is related to a former stairway entry (blocked in breeze block) located within the west wall (Plate 23). Beyond the inserted angled wall, Chamber S1 continues for a further 4.5m, the southernmost section being accessed solely from Chamber S2 to the east by means of a secondary, angled tunnel excavated between the two chambers (Plates 24/5). The southern section of Chamber S1 incorporates a further former stairway entrance door within the west wall (again blocked in breezeblock, Plate 26), opposite which is located a circular section, vertical shaft, cut into the east wall of the chamber with a ledge at 0.75m above floor level (Plate 27).

*Chamber S2 (Figure 11b)*

- 5.2.9 **Chamber S2** (Plates 28-33) is located off the western end of the south side of the main gallery, from which it is accessed via a doorway formed in the south wall of the latter (Plate 14). As with Chamber S1, the doorway is wide and rounded though with an angular, flattened head; the head detail again suggests that the door may have been modified from a former, narrower profile more in line with the 'standard' form of side chamber door recorded elsewhere. Internally, the chamber has maximum dimensions of 15.46m long by 2.78m wide and stands to a height of c.2.15m. The walls are near vertical to a height of c.1m above floor level, above which they curve in to form a distinctly asymmetrical profile (Plates 28/9). The chamber is floored throughout in east/west aligned brick pavers (9in x 4½ in.) and includes a central 3in. wide drainage gully which runs the full length of the chamber, feeding into the gully with the main gallery to the north, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.
- 5.2.10 The chamber is again divided by an angled brick partition wall, cutting across the chamber on a NE/SW alignment at a distance of 10m south of the entrance door. The wall, which is again constructed in 'Utopia' bricks laid to Flemish stretcher bond (Plate 30), is contemporary with and aligned parallel to the partition wall within Chamber S1 (described above) and forms an extension of the southern side of the tunnel connecting chambers S1 and S2. The angled tunnel between S1 and S2 is clearly a secondary insertion, the former western edge of Chamber S2 being defined by the limit of the brick pavers forming its floor (see Plate 30). The brick partition wall includes a central doorway opening, c.1m wide, providing through access to the southern end of the chamber.
- 5.2.11 Beyond the brick partition wall, the chamber narrows (to 1.45m wide) and terminates to the south in a vertical shaft, c.1.55m in diameter, housing a spiral stair which is assumed to represent a primary feature. The spiral stair is formed of radiating slate treads (1½ in. thick) supported to the centre by a column of blue-grey, semi-circular coping bricks and set into the sandstone wall of the shaft to the exterior (Plate 32). The vertical extent of the shaft and stair was not investigated due to the concerns regarding structural stability.
- 5.2.12 Within the southern face of the brick partition wall (to the east side of the door opening), a short section of reinforced concrete slab set into the brickwork represents

the remains of a former bench seat; this feature would originally have stood 0.5m high and 0.40m proud of the chamber wall.<sup>7</sup>

*Chamber S3* (Figure 11c)

- 5.2.13 **Chamber S3** (Plates 34/5) is located off the central part of the main gallery, accessed via a doorway formed in the southern wall of the latter (Plate 15). The doorway takes the 'standard' form, being 1.42m wide at the base with gently sloping jambs narrowing to a 0.35m wide flat head and standing 1.94m tall. A small rectangular socket was noted to the western jamb of the doorway measuring 3½ in. x 4½in. (9 x 12cm) and set at 1.5m above floor level. Internally, the chamber has maximum dimensions of 11.50m long by 2.85m wide and stands to a maximum of 2.10m tall. The walls of the chamber are near vertical to a height of c.1.30m above floor level above which they slope to form a distinctly angular profile (Plate 34/5). The chamber is floored throughout in east/west aligned brick pavers (9in x 4 ½ in.) and includes a central, 3in. wide drainage gully which runs the full length of the chamber, feeding into the gully within the main gallery to the north, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.
- 5.2.14 The southern end of the chamber has been recently closed off by an inserted wall of breezeblock construction (Plate 32); the full extent of S3 was not observed though the previously issued plan of the complex indicates it formerly extended by a further c.3m.<sup>8</sup> Hard against the blocking wall in the east wall a small tunnel, 0.58m wide by 0.83m tall, communicates with Chamber S4 to the east (Plate 33).
- 5.2.15 Graffiti observed on the eastern jamb of the doorway to Chamber S3 reads 'J.H.' together with an unclear date inscription, possibly '188(?)'. Above this, the initials 'JH' and 'WH' are clearly legible.

*Chamber S4* (Figure 12a)

- 5.2.16 **Chamber S4** (Plates 36-42) is located off the eastern end of the main gallery, accessed via a doorway in the southern wall of the latter (Plate 14). The doorway (Plate 16) is again of 'standard' profile, 1.44m wide at floor level narrowing evenly to 0.33m wide at the head and standing 1.98m tall. The upper right hand (west) jamb of the doorway was noted to be cut back at an angle with a small socket measuring 3in. x 4in. (8 x 10cm) cut into the oblique face at 1.43m above floor level. Graffiti on the eastern jamb of the doorway to Chamber S4 clearly reads 'A.H.1856' (Plate 36). Internally, the chamber has maximum dimensions of 14.85m long, 2.70m wide and stands to an average of 1.92m tall. The chamber is floored throughout in east/west aligned brick pavers (9in. x 4½in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the north, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.
- 5.2.17 The lower walls of the chamber are approximately vertical, curving gently to form a generally rounded profile (Plate 37); in places, however, the crown follows the bedding plane of the natural sandstone resulting in discrete areas of flat vault (Plates 38 and 42). Small side tunnels within the east and west walls communicate with chambers S5 and S3, the latter being blocked in brick.
- 5.2.18 At the far south end, the chamber has been scoured out to form a 3.35m diameter circular terminal with domed roof standing 3.72m tall. To the eastern side of the domed chamber, a vertical shaft rises to a maximum of 7.55m above floor height

<sup>7</sup> A section of reinforced concrete bench slab was noted (ex-situ) within the small tunnel connecting S2 and S3 (Plate 33).

<sup>8</sup> Johnson, Poole and Bloomer (2007) Drg No. FS321/03.

(Plate 39) being capped at this level by coarse mix concrete and steel joists. In the south wall of the domed chamber, two vertical slots (12cm wide x 50cm tall at 85cm centres) were noted to be cut into the sandstone (Plate 41); associated rectangular sockets (in two parallel rows of four) were recorded within the brickwork of the chamber floor (Plate 40), these features together presumably representing settings for some form of machinery base.

- 5.2.19 A single galvanised steel toilet was present within Chamber S4 at the time of the survey (Plate 39), though no evidence for associated stalling was recorded.

*Chamber S5* (Figure 12b)

- 5.2.20 **Chamber S5** (Plates 43-47) is located off the far east end of the south side of the main gallery. It is distinct from the other chambers in scale, proportions and details suggesting either that it is a secondary feature or, most probably, that it has been radically remodelled. Unlike the other chambers, S5 is not entered via a door within the main gallery wall; rather the main gallery, which is here heightened, opens fully into the body of the tall chamber. The chamber has overall dimensions of c.14m long by 3m wide and stands to a maximum of 4.6m tall at its southern end where the roof of the chamber has been scoured out to form a high dome. The chamber is floored throughout in east/west aligned brick pavers (9in. x 4½ in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the north, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.

- 5.2.21 The walls of the chamber are tall and vertical, curving in above a level of approximately 3m to form an uneven vault. Approximately halfway along the length of the chamber, two 3m high piers of hard 'Utopia' brick support a transverse RSJ, itself supporting brickwork above which extends to vault level (Plate 43). A series of joist sockets were recorded within the west wall of the chamber between the main gallery and the dividing wall at a height of c.0.75m above floor level. Beyond the transverse division, the chamber is somewhat lower in profile and, in the vicinity of the domed terminal, the lower part of a possible former lower vault was noted (see Plate 44). A small side tunnel in the west wall communicates with Chamber S4 to the west. Within the south wall of the domed terminal, two vertical scars and a horizontal slot (Plate 45) possibly relate to fixings for former machinery; as in Chamber S4, these features would appear to be related to a series of eight regular rectangular sockets within the brickwork of the floor (Plate 46). A circular section vertical shaft rises from the eastern side of the domed terminal, extending to a height of c.8m at which level it would appear to be closed off by an iron cover. The shaft retains a fragmentary iron ladder (Plate 47).

- 5.2.22 A single galvanised steel toilet was present within Chamber S5 at the time of the survey (Plate 46/7) though again, no evidence for associated stalling was recorded.

*Chamber N1* (Figure 11a)

- 5.2.23 **Chamber N1** (Plates 48-54) is located off the western end of the main gallery, accessed via a doorway in the northern wall of the latter. The doorway measures 1.36m wide at floor level narrowing evenly to c.0.35m wide at the head and stands 1.98m tall; it takes a more rounded profile than recorded elsewhere (Plate 17) suggesting that it may have been enlarged. A small socket measuring 3in. x 4in. (8 x 10cm) is located to the eastern jamb of the door at 1.43m above floor level. Internally, the chamber is 17m long by 2.9m wide and stands to an average of 2.10m tall with sloping side walls and a curved vault (Plates 48/9). Regularly spaced pipes protrude from the centreline of the vault, possibly representing fixings for former lights. The chamber is floored throughout in east/west aligned brick pavers (9in. x

4½ in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the south, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.

- 5.2.24 The northern end of chamber N1 has been scoured out to form a large curved terminal, 3.25m in diameter with a flat back wall and high domed roof, standing to a maximum of 3.8m tall. Three vertical scars at 0.75m centres and extending to 2.10m above floor level, were noted on the rear wall of the chamber (Plate 54). These scars would appear to relate to opposing sockets in the eastern and western walls and with sockets noted in the floor, together implying a former arrangement with four narrow, partitioned cubicles occupying this part of the chamber; the survival of three galvanised iron toilets (Plate 53) within the chamber supports an interpretation as former toilet stalls. A high level tunnel extends from the south-eastern side of the domed terminal, being blocked by fallen brick and sandstone rubble.
- 5.2.25 Chamber N1 contained a significant quantity of loose brick rubble (Plate 50) together with a total of eight complete or fragmented reinforced grey concrete bench slabs, complete examples measuring 6ft long x 9in wide x 2in deep (Plates 50/1). This material would appear to originate from benches set along the sides of the chamber, scars of 20in. tall supporting brickwork piers being noted at 6ft centres along the length of the chamber walls (Plate 52).

*Chamber N2 (Figure 11b)*

- 5.2.26 **Chamber N2** (Plates 55-57) is located off the western end of the main gallery, to the east of Chamber N1. It is accessed via a doorway in the northern wall of the main gallery (Plate 18), of standard profile with gently tapering sides and a narrow, flat head. A small, approximately square socket is located in the eastern side of the doorway at a height of c.1.50m above floor level. Internally, the chamber measures 10.2m long by 2.95m wide; the chamber walls are vertical to a height of 1.3m above floor level, above which they slope evenly in to an uneven roof vault (Plate 55) at an average of 2.8m tall, though extending to a maximum of 3.65m towards the northern end (Figure 11b). The chamber is floored throughout in east/west aligned brick pavers (9in. x 4½ in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the south, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.
- 5.2.27 At the northern end of the chamber, a pier of 'Utopia' brickwork has been inserted at the north-eastern angle (Plate 56), the function of which was not ascertained. Immediately adjacent to this pier of brickwork, a small connecting tunnel (2ft wide x 2ft 6 tall), formerly communicating with Chamber N3 to the east, has been loosely unfilled with brick (Plate 57).
- 5.2.28 As in Chamber N1, the rear wall of N2 includes three vertical scars (Plate 55) which, together with surviving sockets within the floor and in the western wall imply a series of former partition walls enclosing four small stalls, probably housing toilets.

*Chamber N3 (Figure 11c)*

- 5.2.29 **Chamber N3** (Plates 58-59) is located off the central part of the main gallery between chambers N2 to the west and N4 to the east. It is accessed via a doorway in the northern wall of the main gallery of standard profile, 1.5m wide at floor level with gently tapering sides narrowing to a 0.30m wide flat head and standing 1.6m tall (Plate 19). A small, approximately square socket is again located to the east side of the doorway at a height of c.1.35m above floor level. Internally, the chamber measures 7m long by 3m wide and stands to an average of 2.65m tall. The chamber walls are vertical to a height of c.1.35m above floor level, above which they slope

evenly in to a curved vault (Plate 58), though the roofline follows the bedding plane of the sandstone in places, particularly to the south, resulting in a flat roof profile (Plates 59). The chamber is floored throughout in east/west aligned brick pavers (9in. x 4½ in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the south, this side chamber gully deflecting slightly to the east as it emerges into the main gallery.

- 5.2.30 Chamber N3 is blocked by a wall of breezeblock construction at a distance of 7m north of the entranceway (Plate 58); the full extent of the chamber was not observed though the previously issued plan of the complex indicates it extends for a further c.7m beyond the breezeblock partition.<sup>9</sup>

*Chamber N4* (Figure 12a)

- 5.2.31 **Chamber N4** (Plates 60-64) is located towards the eastern end of the main gallery, accessed via a doorway cut through the northern wall of the latter (Plate 14). The doorway is 1.5m wide at floor level narrowing to 0.30m wide at the head, which takes a more rounded profile in this instance (Plate 20). Internally, the chamber has maximum dimensions of 10.7m long, 2.95m wide and stands to an average of 2.5m tall, though the northern terminal includes a tall dome with a maximum height of 3.5m. Chamber walls are vertical to a height of c.1.35m above floor level above which they slope in evenly to a flat vertical roof line, producing a distinct, angular profile (Plate 60/1). The chamber is floored throughout in east/west aligned brick pavers (9in. x 4 ½ in.), with a 3in. wide central drainage gully running the length of the chamber and feeding into the gully within the main gallery to the south, the side chamber gully deflecting slightly to the east as it emerges into the main gallery.
- 5.2.32 A small side tunnel at the northern end of the west wall formerly communicated with Chamber N3 to the west; this tunnel having been recently blocked in loose brick (Plate 62). At northern terminal of the chamber, a recent brick capping has been introduced at floor level; it is understood that this capping covers a substantial void in the chamber floor previously noted to be water filled (Waite 2007, 4), possibly representing a natural, primary water source to the cavern complex. Opposing sockets within the eastern and western walls of the chamber at a height of c.2.05m above ground level possibly represent the remains of a former partition at the terminal end of the chamber; supporting evidence was not recorded within the floor of the chamber due to modern disturbance and the presence of concrete.
- 5.2.33 A narrow side chamber at the north-east corner of Chamber N4 contains a brick-built fireplace with low segmental arch, 0.70m deep, of two header courses all in highly fired brick, some salt glazed (Plate 63). The fireplace opening itself has been partly blocked in a more lightly fired, orange brick (Plate 64).

## **6 DISCUSSION AND CONCLUSION**

### **6.1 Discussion**

- 6.1.1 Man-made sandstone caverns are known from a number of towns on the lower Triassic sandstones fringing the Midland basins, for example at Stockport, Chester, Bridgnorth and Kinver (Waltham 1992, 1; Sewter 1990). More famously an extensive system of caves exist within the Sherwood Sandstones below the city centre of Nottingham where a variety of uses have been identified including storerooms, basements, factories, pub and brewery cellars, residences and air raid shelters (*ibid.*). Few of the caverns have a primary function as mines due to the poor quality of the stone as a building material, and their prevalence reflects the relative ease with which

<sup>9</sup> Johnson, Poole and Bloomer (2007) Drg No. FS321/03.



the strata can be excavated using only hand tools which makes them possibly more economical than building cellars by more traditional methods.

- 6.1.2 Local tradition holds that a number of cave systems survive beneath the modern town of Stourbridge, though the complex currently under consideration is the only example to be recorded on the DMBC HBSMR. It is commonly accepted that these caverns were originally excavated for cellaring of the Duke Street (Stourbridge) Brewery. No definitive evidence, documentary or structural, has been found during the course of the current project to directly support (or otherwise) this assertion. Should it be the case, then the caverns would probably date to some point between 1837, when the brewery was not marked on Wood's map of Stourbridge (Figure 3) and 1851 when John Wall was first listed as maintaining a brewery in Duke Street. In this respect, the graffiti dated 1856 is of interest, as it would date to early in the life of the complex.
- 6.1.3 The caverns would have presented ideal conditions for the storage of beer, providing a cool, consistent temperature; the arrangements and proportions of the complex, however, would appear to be somewhat constricted for brewery cellaring, especially if purpose-built,<sup>10</sup> and the possibility exists that the caverns pre-date the establishment of the brewery and were simply re-used for cellaring. Reference to Wood's map indicates a series of buildings around the centre of Duke Street which may have had access to the caverns, though the nature of the buildings, and thus the requirement for cellaring/storage, has not been established. The Post Office Directory of Birmingham Staffordshire and Worcestershire lists Henry Harris (coal merchant), Richard Williams (engineer) and John Wall and Co. (Maltster) as operating from Duke Street in 1850.

#### *Primary Arrangements*

- 6.1.4 The cavern complex originated as a series of linear chambers, aligned approximately north-south, arranged to the north and south of a central, axial gallery aligned approximately east-west, all elements of the cavern complex being excavated out of the natural red sandstone. The softness of the natural stone suggests that the complex could easily have been excavated using hand tools only. Each side chamber was originally of generally similar profile and proportions, though inconsistency in the natural bedding of the sandstone strata influenced the chamber profiles to a certain degree, resulting in a degree of variation from chamber to chamber.
- 6.1.5 The eastern entrance tunnel and the spiral stair descending to the southern end of Chamber S2 would appear to be primary features, though the paired doorways within the western wall of Chamber S1 may represent modifications related to the Second World War re-use of the complex.<sup>11</sup>
- 6.1.6 Following closure of the North Worcestershire Brewery in the early years of the 20<sup>th</sup> century the system of caverns was abandoned; it would appear that they were effectively and thoroughly cleared out as no clear evidence pertaining to the brewery phase of use of the complex has been identified during the current survey. A number of narrow, circular holes, bored into the walls of the side chambers, may originally have carried pipes, though no clear pattern was evident. An 'underground tramway to bring hops and barley to the Brewery from the canal wharf', located within the eastern access tunnel and described by Saunders (Appendix B), has left no trace to the

<sup>10</sup> Waltham (1992, 13-14) discusses a similar system of mid-19<sup>th</sup> century, parallel brewery storage caverns at Radford Road, Nottingham; in this case the individual galleries were 5m wide.

<sup>11</sup> It was not possible to investigate the nature of these tunnels which had been closed off by breeze-block walls; their relationship to the angled 'Utopia' brick walls forming separated, parallel entranceways suggests they may be secondary features.

present day. The width of the tunnel makes it unlikely that it would have been used for exporting of finished product in barrels.

- 6.1.7 Saunders (Appendix B) notes that, following abandonment, the cavern system was gradually infilled with waste material while extensive traces of PFA on the cavern walls indicates a more systematic programme of backfilling.

*Later Modifications*

- 6.1.8 A series of modification was undertaken to the tunnel complex coincident with their re-use as air shelters during the Second World War. It appears likely that the doorways to Chambers S1 and S2 were enlarged at this point, to facilitate ease of entry from the paired stairways descending to the southern end of Chamber S1 (the stairways themselves may also date to this phase). Likewise, the paired brick-built partition walls within Chambers S1 and S2 together with the associated linking tunnel logically belong to improvements related to the reuse. Their introduction would have greatly eased the logistics of public/school entry to the complex via separate entrances. The series of brick walls in 'Utopia' brick at the eastern end of the gallery presumably relate to the same phase of reorganisation.
- 6.1.9 Evidence has been recorded for a series of benches of reinforced concrete construction aligned along the sides of a number of the side chambers, while vertical scars within the terminal walls of Chambers N1 and N2 probably relate to the introduction of stalling for chemical toilets (see eye-witness description, Appendix B). The scouring out of the western terminal and the enlargement of Chamber S5 may also date to this phase of occupation, probably being related to the installation of generators and extraction machinery (see eye-witness description, Appendix B).

**6.2 Conclusion**

- 6.2.1 The current survey has allowed for a detailed survey and photographic record of the cavern system to be made in advance of backfilling while the use of laser scanning for the base survey has allowed for the creation of full, 3-dimensional model of the complex to be generated.

**7 ACKNOWLEDGEMENTS**

- 7.1 The project was commissioned by the Engineering Department of Dudley Metropolitan Borough Council; thanks go to Roger Morgan for help and assistance throughout the course of the project. Site work was undertaken under the general supervision of mines manager Mr Ken Leach. Thanks are also due to Mr John Hemingway and Mr Pete Boland of DMBC (Historic Environment).
- 7.2 The project was managed on behalf of Birmingham Archaeology by Ric Tyler AIFA who undertook the site assessment. Laser scan survey and data processing was undertaken by Michael Lobb of BA. Valuable assistance on site was provided by Mr Stuart Toole, MA Student at the University of Birmingham. The current report was written and illustrated by Ric Tyler and reviewed and edited by Dr Malcolm Hislop (Research Fellow) of Birmingham Archaeology.

## 8 SOURCES

### (a) Cartographic Sources (in chronological order)

- 1781 Plan of Stourbridge (WCRO: BA 3762/149)
- 1802 John Scott's 'Plan of the Town of Stourbridge in Worcestershire'
- 1837 John Wood's 'Plan of Stourbridge from an actual survey'.
- 1885 Ordnance Survey County Series 1:2500 map, 1<sup>st</sup> Edition.
- 1903 Ordnance Survey County Series 1:2500 map, 1<sup>st</sup> Revision.
- 1919/20 Ordnance Survey County Series 1:2500 map, 2<sup>nd</sup> Revision.
- 1938 Ordnance Survey National Grid Series 1:2500 map, 1<sup>st</sup> Edition.
- 1956 Ordnance Survey National Grid Series 1:2500 map, 1st Revision

### (b) Documentary Sources

English Heritage, 2006. *Understanding Historic Buildings: A Guide to Good Recording Practice*.

Institute for Archaeologists, 2001. *Standard and Guidance for the Investigation and Recording of Standing Buildings or Structures*.

McKenna J, 2005. *Black Country Breweries*. Tempus Publishing, Stroud.

Perry N, 2001. *A History of Stourbridge*. Phillimore, Chichester.

Sanders J V, undated. 'Do you know about the air raid shelters under C Block?'. Unsourced, though thought to be article for King Edward VI College magazine. (Copy supplied by DMBC).

Sewter P, 1990. 'Caves in an Urban Setting: Bridgnorth Shropshire'. Birmingham University Field Archaeology Unit (BUFAU) report.

Waite N J, 2006. 'Stourbridge Rock Cellars – Preliminary Inspection'. Report by Johnson Poole and Bloomer on behalf of DMBC, ref. FS321-02/SOG/NW, dated 31.01.06.

Waltham A C, 1992. 'The Sandstone Caves of Nottingham' in *Mercian Geologist*, **13**.

VCH, 1913. *Victoria History of the County of Worcester Vol III*. Page, W (ed.).

### (c) On-Line Sources

A2A (the on-line resource of the National Archives)

<http://www.nationalarchives.gov.uk/a2a>

British History On-line (Victoria County History)

<http://www.british-history.ac.uk>

Black Country Bugle

[www.blackcountrybugle.co.uk](http://www.blackcountrybugle.co.uk)

### (d) Trade Directories etc (in chronological order)

- 1828 Pigot's Directory
- 1850 PO Directory
- 1851 Slater's Directory
- 1872 Littlebury's Directory



- 1884 Kelly's Directory
- 1892 Kelly's Directory
- 1896 Kelly's Directory
- 1902 Littlebury's Directory
- 1911 Coe and Coe's Directory
- 1912 Kelly's Directory
- 1914 Kelly's Directory

**APPENDIX A: Written Scheme of Investigation (WSI)****Stourbridge Caverns, Stourbridge, West Midlands**

## Written Scheme of Investigation for an Archaeological Survey

**1 INTRODUCTION**

- 1.1 The following document represents a Written Scheme of Investigation (WSI) for an archaeological survey of a series of caverns excavated below St John's Road, Stourbridge, West Midlands (Figure 1). The caverns are due to be infilled following a stability inspection of 2008 which raised serious concerns regarding the long-term stability of the complex, the result of increasingly damp conditions and a rise in standing water levels.

**2 SITE LOCATION AND DESCRIPTION**

- 2.1 The sand caverns are located on the north of Stourbridge town centre extending from below the St. John's Road ring road slightly to the north of the junction with Duke Street and are centred on NGR SO 90150 84545 (Figure 2). Originally accessed from the grounds of the former Grammar School, the present access is via a tunnel leading from the Mill Race Lane industrial estate.
- 2.2 The complex of caverns comprises a series of two sets of parallel galleries, approximately 2.5m wide x 2.75m high, cut into the natural sandstone extending perpendicularly to either side of a central corridor aligned approximately east-west (Figure 3). The caverns vary in height between 2.00 and 2.45m with a varying thickness of rock overburden, down to a minimum extrapolated depth of 2.35m below the overlying road surface. Entry to the caverns is gained via paired entrances to the west within the grounds of King Edward VI College (presently blocked) and to the east via a long, narrow tunnel leading from the Mill Race Lane industrial estate on the western side of the channelled Stour River. In addition, a spiral stair rises from the terminal of one of the southern galleries (beneath the current ring road).

**3 AIMS AND OBJECTIVES**

- 3.1 The general aim of the survey will be to make an archaeological record of the cavern system ahead of backfilling with a view to achieving 'preservation by record'. This is to be achieved by the implementation of a programme of survey and archaeological recording, details of which are summarised below in section §.5.

**4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 4.1 The caverns have been the subject of a previous archaeological desk-based assessment (Tyler, 2008). The DBA established that the area of the caverns remained essentially undeveloped until the middle years of the 19<sup>th</sup> century, when expanding industrialisation gradually encroached onto an area of former fields and gardens. A brewery (the Stourbridge Brewery) was established at some point between 1837 and 1851, occupying the area directly above the cavern complex. The caverns are commonly held to have

been originally excavated as cellarage for this brewery but, though probable, no documentary sources have been identified to definitively support such a conclusion and their origins remain somewhat obscure. They certainly seem to have been sited to exploit the proximity of the Stour River, Stourbridge Canal, the railway goods yards and associated communication networks, either for the receipt of incoming raw materials or for the export of finished products. The Stourbridge Brewery was amalgamated in 1886 to form the North Worcestershire Breweries Company, subsequently being taken over by Wolverhampton and Dudley Breweries and closed soon after 1910, at which time the caverns became obsolete and were abandoned. During World War II, the complex of caverns was refurbished to function as air raid shelters for use by the general public and by pupils and staff of the King Edward VI Grammar School. Following the end of the war, the caverns were once again closed and partially infilled.

## 5 SURVEY METHODOLOGY

### 5.1 General Approach

- 5.1.1 It is proposed that the cave system be recorded by means of high-resolution laser scanning, a technique which lends itself admirably to the three-dimensional spatial aspects of the recording of a cavern complex.
- 5.1.2 The base survey will be undertaken in conjunction with a thorough archaeological analysis, photographic and written record to a level commensurate with a 'Level 3' record as defined by English Heritage in '*Understanding Historic Buildings: A Guide to Good Recording Practice*' (EH, 2006).
- 5.1.3 Given the existence of a previous desk-based assessment, it is not envisaged that any significant programme of new documentary research will be undertaken as part of the survey project. Previous research may however be reviewed in the light of the results of the survey.

### 5.2 Laser Scanning

- 5.2.1 The 3-dimensional survey of the cavern complex will be carried out using a Leica HDS6000 laser scanner. The walls will be recorded to an approximate resolution of  $\geq 4$ mm. In addition a 2mx2m portion of wall will be selected and recorded at a higher level of resolution in order to provide a sample model of toolmarks. Full panoramic photography will be taken from each scanning location using a high-resolution digital camera, allowing RGB colour values to be mapped onto the point cloud at a later date, as well as providing the option of panoramic Quicktime movies for archival or display purposes. The below ground survey will be tied to above ground features using an EDM.

### 5.3 Archaeological Recording

#### *Photographic Record*

- 5.3.1 A full photographic survey will be undertaken comprising both 35mm monochrome print and high resolution digital photography. The survey will extend to include both general and detail shots; contextual views, principal interior spaces and relevant structural/architectural details pertaining to the historical uses of the cavern system. Where possible, photographs will include graded photographic scales. All photographs will be recorded on *pro-forma* recording sheets detailing subject, orientation, scales included, photographer and date.

*Written Record*

- 5.3.2 A written account will be prepared to supplement laser survey and photographic record, summarising the history, character, date, techniques of construction, phasing and significance of the building as evident from a detailed inspection. Written records will be made using *pro-forma* building and room record sheets.

## **6 DELIVERABLES**

The survey project and reporting process can be logically broken down into three stages as follows:

### **6.1 Stage I: Survey**

- 6.1.1 Laser scanning on site plus preliminary processing to generate fully registered point-cloud. Undertaking of archaeological recording as outlined in section 5.3 above.
- 6.1.2 A full copy of the digital survey archive will be delivered to the local authority upon completion of the project. It is important to stress that once the basic data is gathered, additional levels of processing can be carried out at a future date.

### **6.2 Stage II: Archive Standard Report**

- 6.2.1 Survey stage as section 6.1 above, with additional processing of survey data to generate a series of 2-dimensional line drawings of the cavern complex (plans plus representational cross sections). Generation of fully illustrated archaeological report summarising results of survey work, containing the following information:

**Text**

- Non-technical summary
- Introduction
- Site location and description
- Aims and objectives
- Methodology
- Archaeological and historical context
- Historical development of the cavern complex as evident from documentary sources
- Detailed description of the cavern complex based upon the laser and archaeological surveys
- Discussion

**Figures**

- Appropriate illustrations, including location plan, detailed plans and cross sections and a selection of photographs arising from the archaeological survey

### **6.3 Stage III: 3-Dimensional modelling**

- 6.3.1 Survey and reporting stages, as outlined in sections 6.1 and 6.2 above, plus full colour mapping of survey point cloud data allowing 3 dimensional modelling and creation of 'fly-through' animation.

## **7 STAFFING**

- 7.1 Laser scan survey will be undertaken by Mr Michael Lobb of the University of Birmingham's Visual and Spatial Technology Centre (VISTA) with additional archaeological recording by Ric Tyler AIFA or a Birmingham Archaeology Historic Building Recording specialist of equivalent experience. The project report will be prepared by Ric Tyler and will be reviewed by Dr Malcolm Hislop MIFA, Project Manager and Research Fellow (Built Heritage and Conservation), Birmingham Archaeology.

## **8 TIMETABLE**

- 8.1 It is understood that the cavern complex will be available for inspection during the week beginning 17<sup>th</sup> November 2008. It is envisaged that the laser scanning fieldwork outlined in section 5.2.1 will be carried out over a period of four days during this period. The associated archaeological survey (written and photographic record would be undertaken concurrently, over a period of no more than two days. The results of the laser survey and associated report would ordinarily be completed within one working month of the completion of fieldwork.

## **9 PROFESSIONAL STANDARDS**

- 9.1 VISTA conform to English Heritage standards on laser scanning, and are committed to storage of digital archive data for a minimum period of six years after project completion.
- 9.2 The project will follow the requirements set down in the *Standard and Guidance for the archaeological investigation and recording of standing buildings or structures* (IFA, 2001).
- 9.3 Birmingham Archaeology is a Registered Archaeological Organisation (RAO) with the Institute of Field Archaeologists (IFA); all project staff will adhere to the *Code of Conduct of the Institute of Field Archaeologists* (IFA, 2002) at all times.

## **10 HEALTH AND SAFETY**

- 10.1 All current health and safety legislation, regulations and guidance will be complied with during the course of the project. It is understood (R Morgan DMBC *pers. comm.*) that all works within the cavern complex will be undertaken under the general supervision of a suitably qualified and experienced Mines Manager, appointed directly by DMBC and that all BA staff working on the project will be required to undertake a site specific safety induction prior to accessing the cavern complex.

## **11 REFERENCES**

English Heritage, 2006. *Understanding Historic Buildings: A Guide to Good Recording Practice*.

Institute of Field Archaeologists, 2001. *Standard and Guidance for the archaeological investigation and recording of standing buildings or structures*.

Institute of Field Archaeologists, 2002. *Code of Conduct*.

Tyler, 2008. *The Stourbridge Sand Caverns, St. John's Road, Stourbridge, West Midlands: Archaeological Desk-Based Assessment, September 2008*. Birmingham Archaeology, Report No. 1858.

**Birmingham Archaeology**  
24.10.08

**APPENDIX B:** Description of Cavern Complex (JV Saunders, undated)

**Construction:** During the summer of 1940, air raid shelters were constructed to accommodate 1000 people, with 600 places for King Edward VI School, and the remainder for the public. These shelters made use of sandstone caverns underneath Duke Street and the old North Worcestershire Brewery. The Brewery, until about 1910 used the caverns as cellars for storing strong ale and stout, the constant temperature at 46 degrees Fahrenheit being ideal. The caverns, 30 to 40 feet below ground level, comprised a central corridor running west to east, with four galleries at right angles on each side. A smaller tunnel, three feet in width, ran west to east and came out near the bank of the River Stour in Turney's Leather Works. By 1940 these caverns had been unused for many years and were choked to the roof with refuse. Construction work commenced at the end of March 1940. The original caverns were reached by a ramp, down a flight of 70 concrete steps. There were two entrances to the shelters. The School entrance was in the playground opposite C Block, and the public entrance on land adjacent to Duke Street, between the School caretaker's house and George Wright's 'Central Bakery'. The construction work was completed during the summer term, 1940, and the shelters fitted out with seating. The shelters were lit by electricity, and a chamber housed an electricity generator providing emergency power in the event of mains failure.

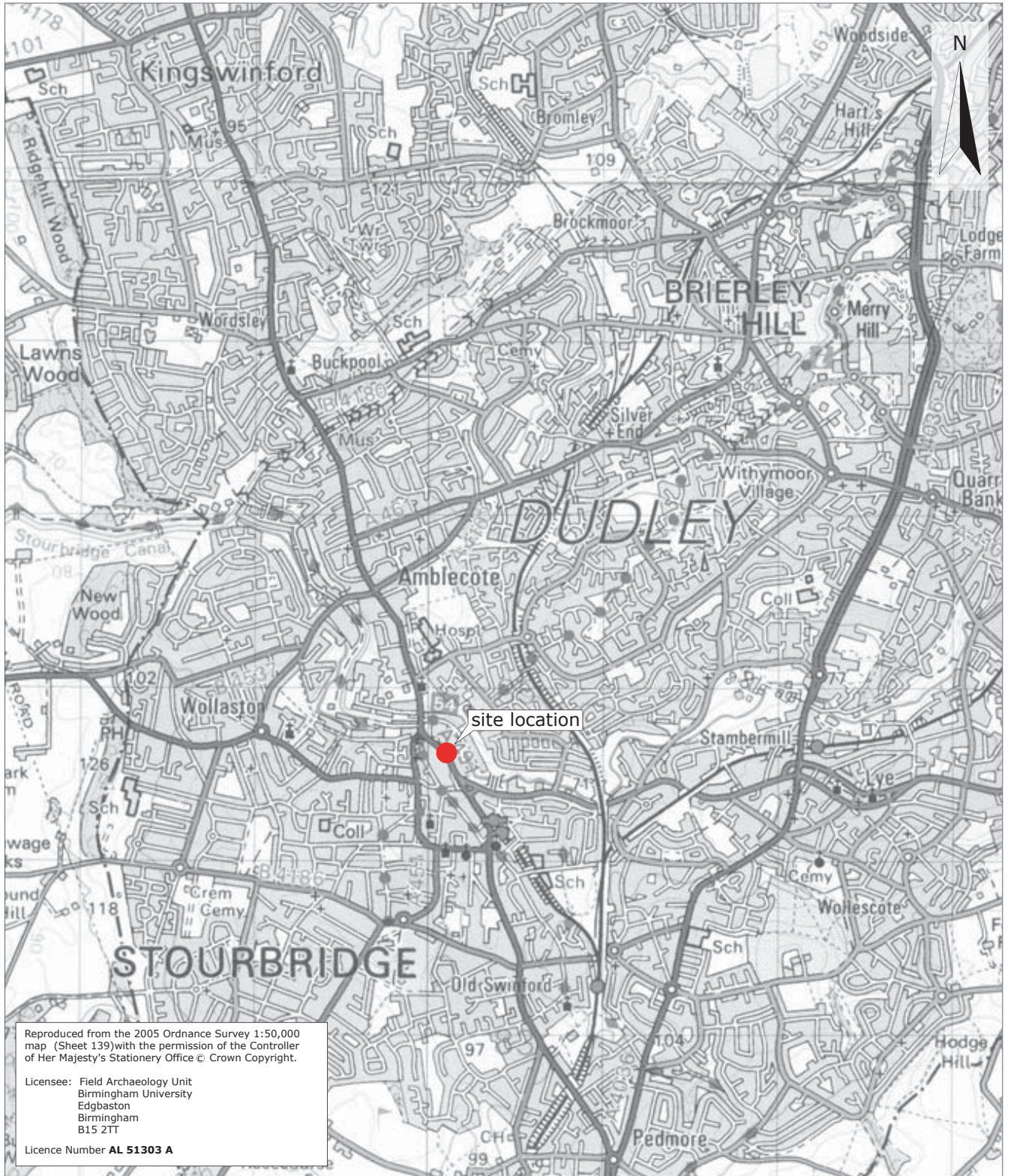
**Using the shelters:** The shelters were put into use on numerous occasions from autumn 1940 onwards. After I started at King Edward's in 1942, I went down the shelters during the daytime alerts with the rest of the School on at least three occasions, and probably more, at the end of 1942 and during 1943. The 600 boys at the School would collect gas masks and file, form by form, to the air raid shelter entrance, down the seventy, broad concrete steps, and seat ourselves in our allotted galleries off the main corridor. The seating was concrete and wooden slats. It was not cold or clammy, it was tolerably cool, and the air was fresh. The shelters were well lit, and chemical toilets were available. The teachers would accompany the boys, some remaining at the top of the steps at the entrance and also at the chamber to man the electricity generator.

**Closure of the shelters:** From early 1944 onwards, during the last 18 months of the War, the air raid shelters were seldom used. In spring of 1946 both entrances were demolished and rubble tipped down the shaft. The entrance in the playground was finally asphalted over in May 1946. The public entrance is blocked and sealed but access from the College is maintained through a manhole down a vertical shaft in front of the South entrance of C Block. It is necessary to use a ladder to descend vertically some 10 – 15 feet. A pile of rubble then has to be negotiated, once over that rubble it is an easy descent down what remains of the concrete steps into the caverns. The air is clean and as sweet as ever, with few signs of wartime occupation. There are remains of tubular metal electricity trunking and some switches on the walls and roofs. The caverns are free of rubble and detritus. In the roof one can see the outline of a spiral staircase, which once led from the Brewery, now the site of Medusa House. The still visible emergency exit tunnel came out near the River Stour and was originally used as an underground tramway to bring hops and barley to the Brewery from the canal wharf and railway goods yard off Mill Street.

**Size and significance:** In the 1940s there was a considerable residential population surrounding King Edwards and during business hours, numerous office, retail and other workers were in the area. Numerically, the main provision of the shelter was for the pupils and staff of the School, but the fact that the old caverns could accommodate one thousand people speaks for itself in assessing the size and significance of this communal air raid shelter facility.









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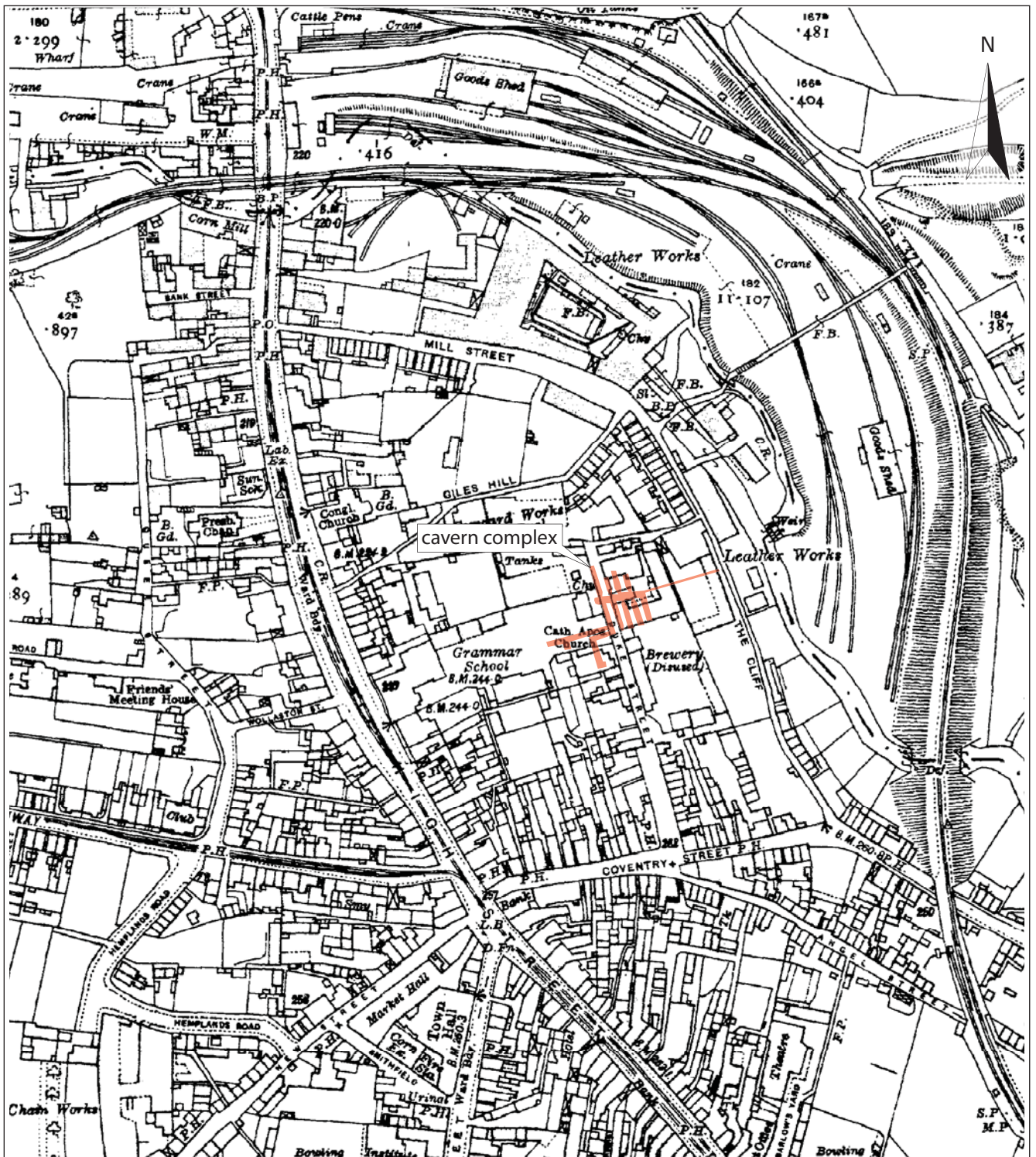




















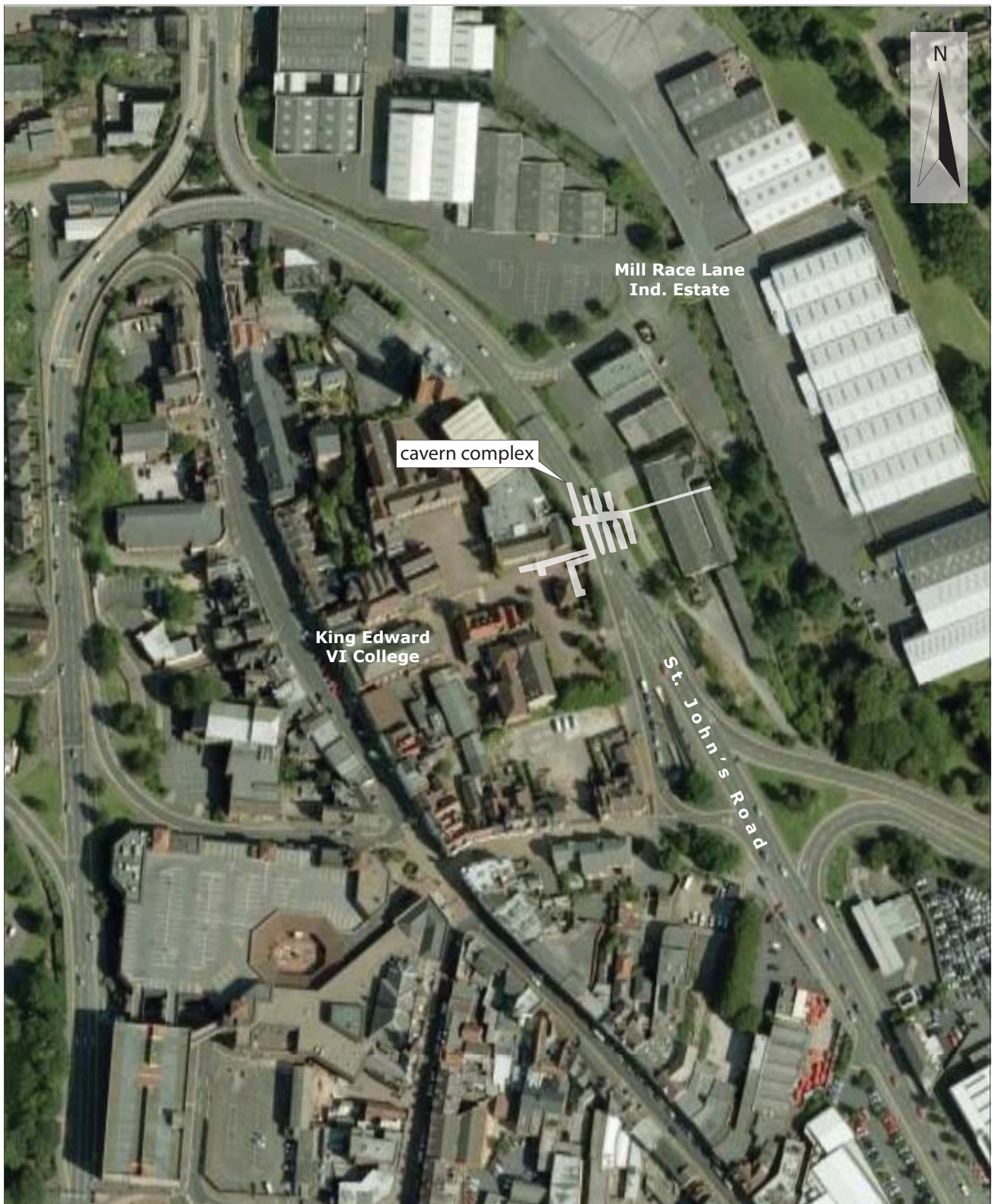
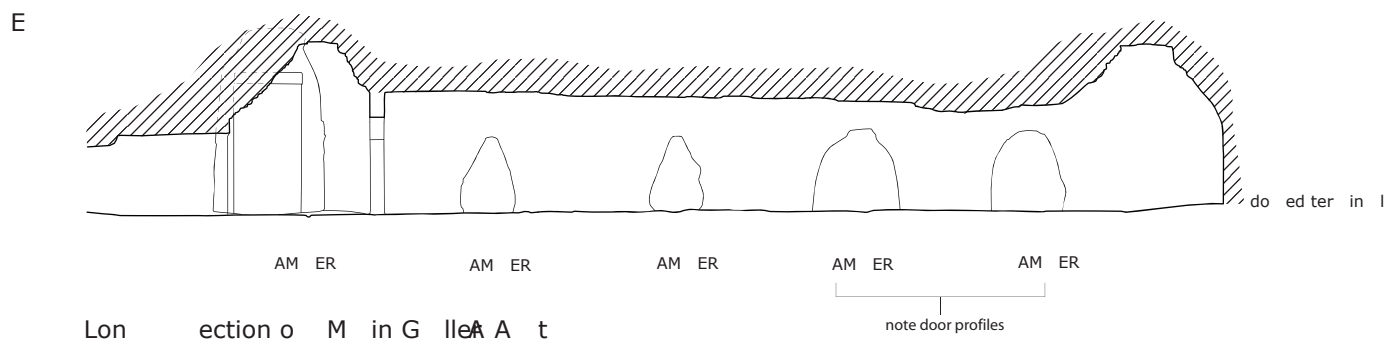
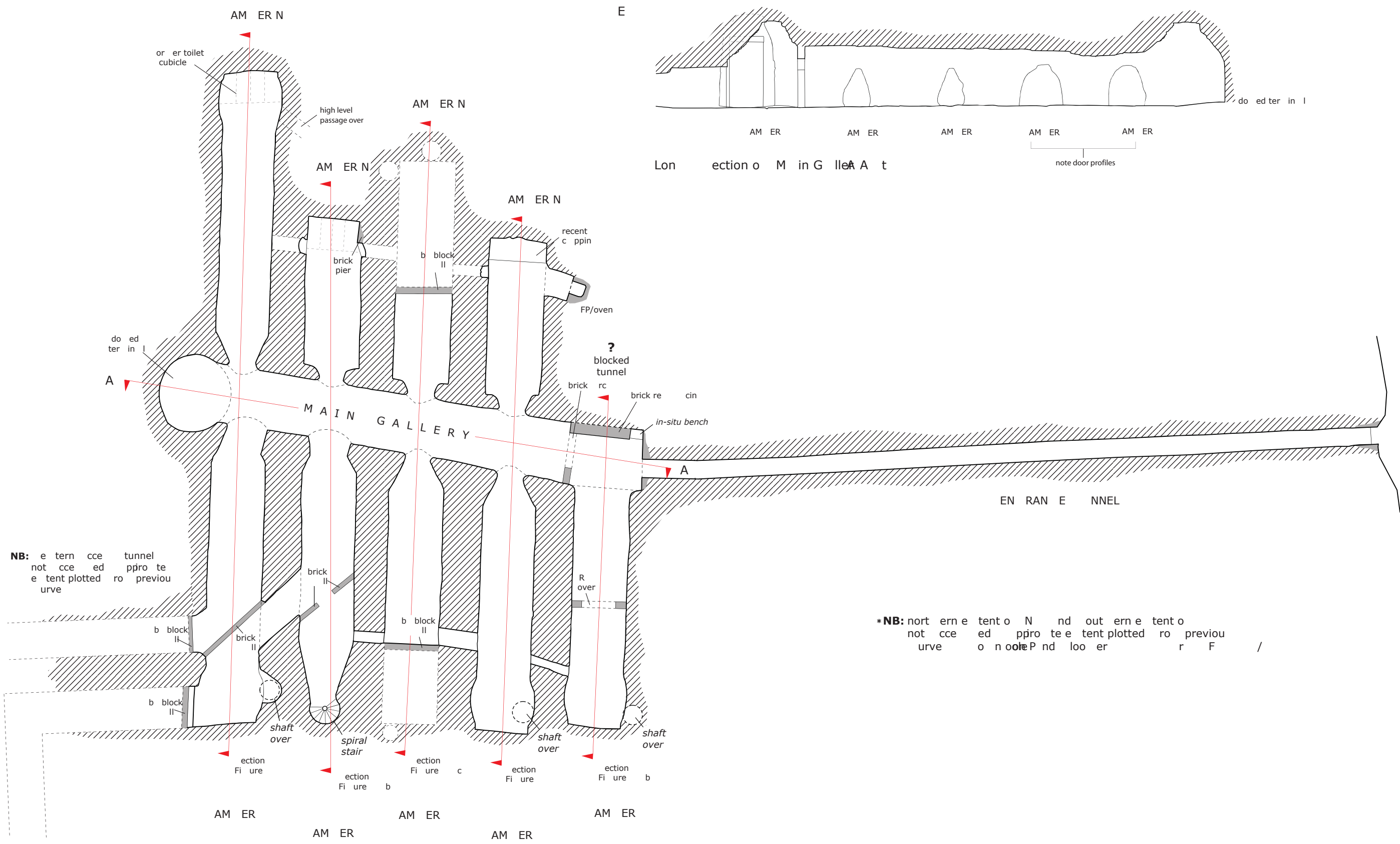


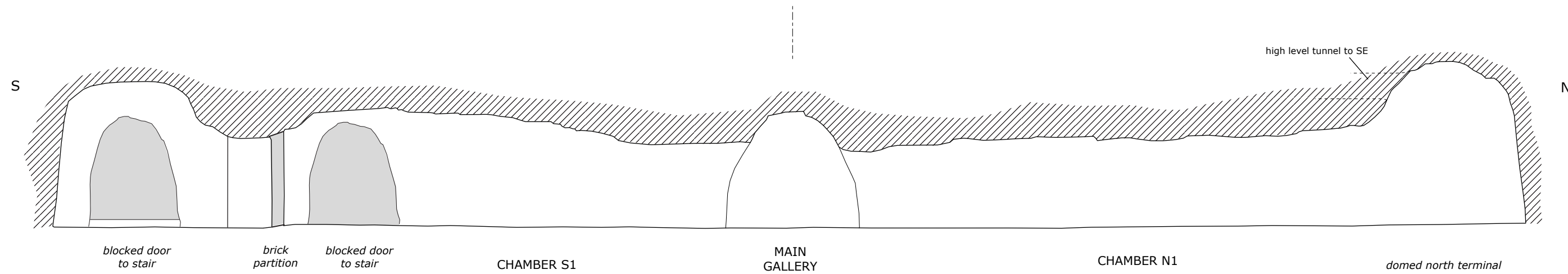
Image © Google Earth



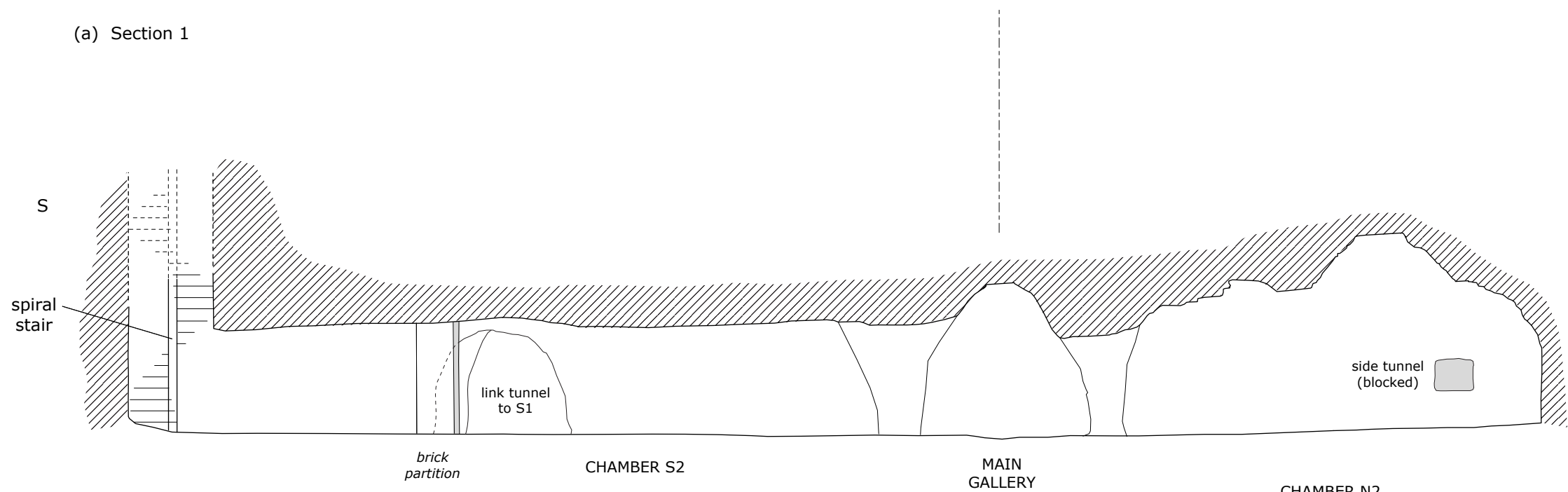
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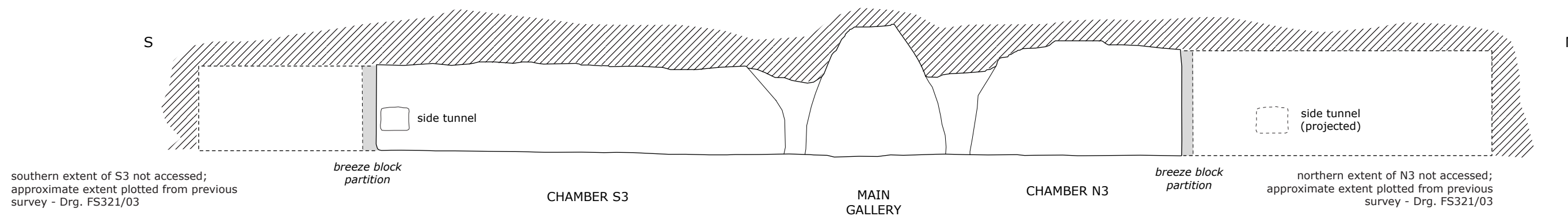




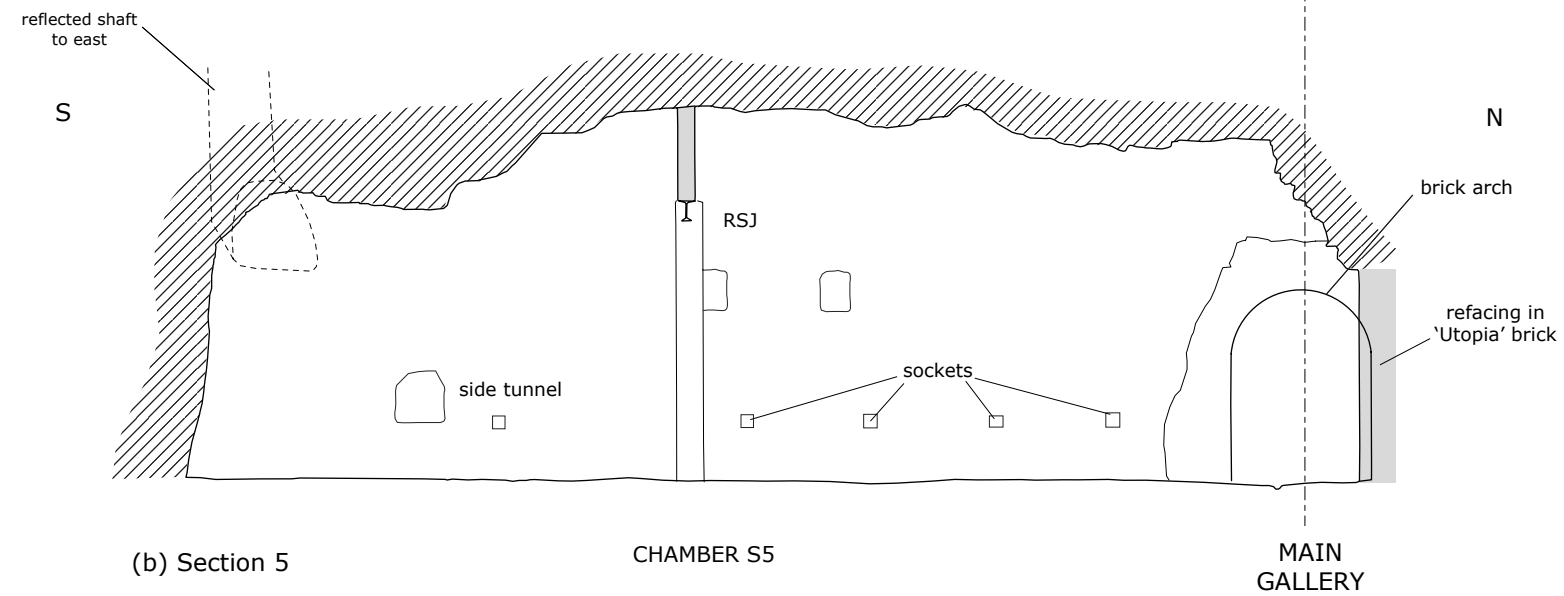
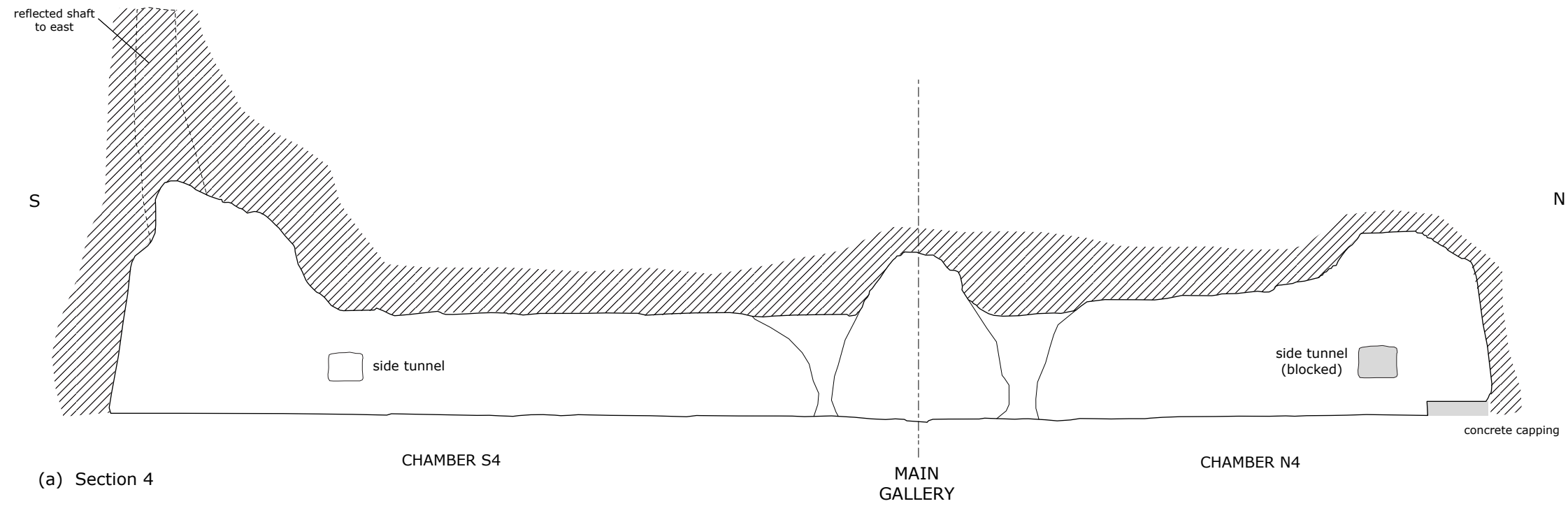
(a) Section 1



(b) Section 2



(c) Section 3







**Plate 1:** Location of main cavern complex entrance from the north.



**Plate 2:** Cavern complex entrance within retaining wall of 'The Cliff'.





**Plate 3:** Eastern entrance doorway.



**Plate 4:** Eastern entrance tunnel (→E).



**Plate 5:** WW2 brickwork at west entrance, arch to entrance tunnel (→E).



**Plate 6:** WW2 brickwork at west entrance, arch to Main Gallery (→E).





**Plate 7:** 'Utopia' brickwork against Main Gallery north wall at entrance (→N), note bench to right.



**Plate 8:** Detail of *in-situ* bench.



**Plate 9:** North jamb of wide brick arch.





**Plate 10:** Main Gallery looking east.



**Plate 11:** Main Gallery looking west.



**Plate 12:** Main Gallery, west terminal.



**Plate 13:** Main Gallery; doorway to S1.



**Plate 14:** Main Gallery; doorway to S2.



**Plate 15:** Main Gallery; doorway to S3.

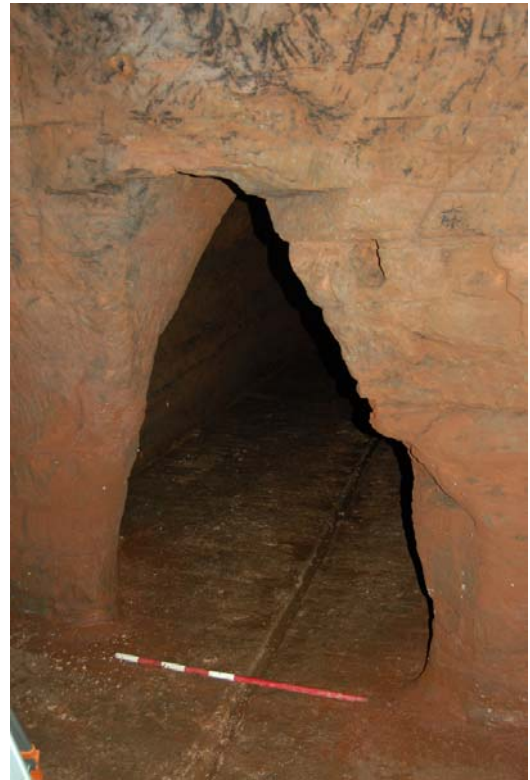


**Plate 16:** Main Gallery; doorway to S4.





**Plate 17:** Main Gallery; door to N1.



**Plate 18:** Main Gallery; door to N2.



**Plate 19:** Main Gallery; doorway to N3.



**Plate 20:** Main Gallery; doorway to N4.

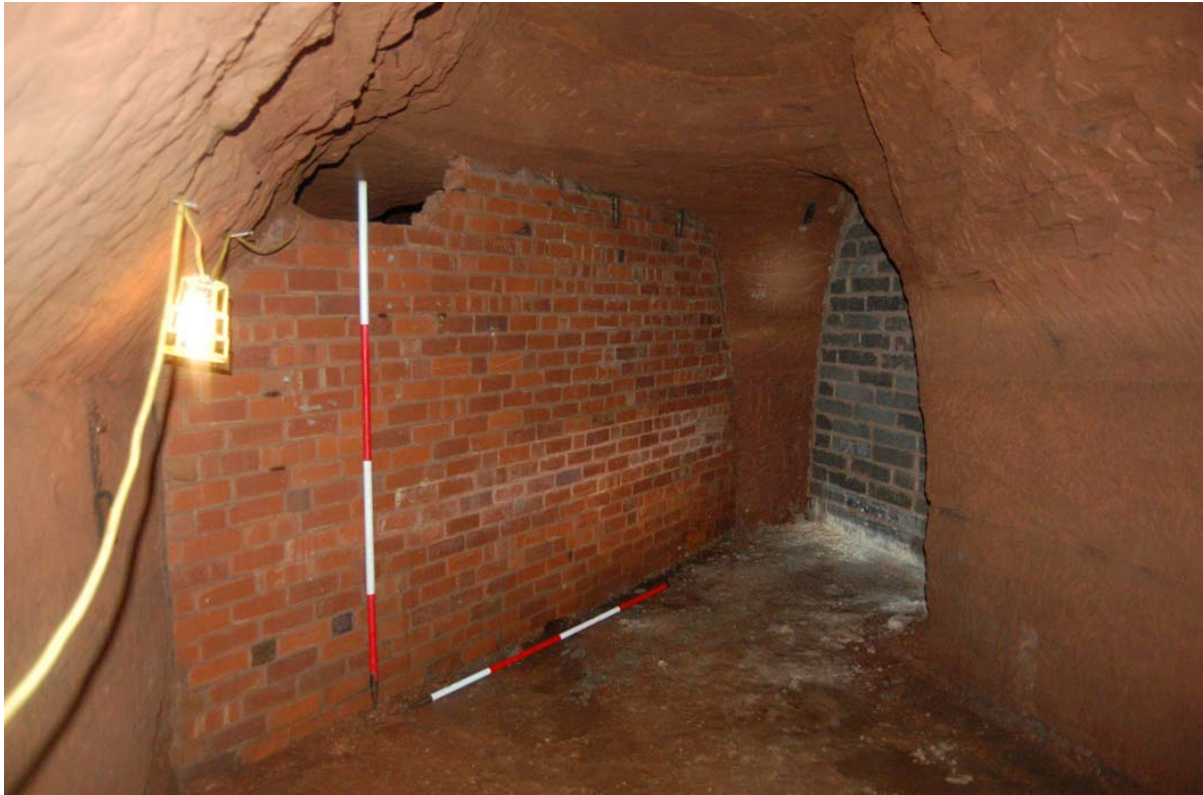


**Plate 21:** Chamber S1 looking south, note brackets on east wall (l.) and angled brick partition.



**Plate 22:** Chamber S1 looking north note brackets on east wall (r.).





**Plate 23:** Chamber S1, south end (→SW); inserted, angled brick wall and blocked entrance to stair.



**Plate 24:** Chamber S1; continuation beyond inserted wall (→NE), note secondary tunnel (r.) to S2.



**Plate 25:** Secondary tunnel between S2 and S1, WW2 brickwork wall to right.



**Plate 26:** Chamber S1 (S), blocked stairway.



**Plate 27:** Vertical shaft opposite Pl. 24.





**Plate 28:** Chamber S2, looking south.



**Plate 29:** Chamber S2 looking north.





**Plate 30:** Chamber S2; inserted angled brick wall, note secondary tunnel (r.) to S1 (see Pl.14).



**Plate 31:** Chamber S2, south end, note narrowing profile and spiral stair.



**Plate 32:** S2 detail of spiral stair.



**Plate 33:** S2/S3 inter-connecting tunnel.



**Plate 34:** Chamber S3 looking south.





**Plate 35:** Chamber S3 looking north.



**Plate 36:** Graffiti on west jamb of S3 entrance: 'A♦H♦1856'



**Plate 37:** Chamber S4 looking south.



**Plate 38:** Chamber S4 looking north.





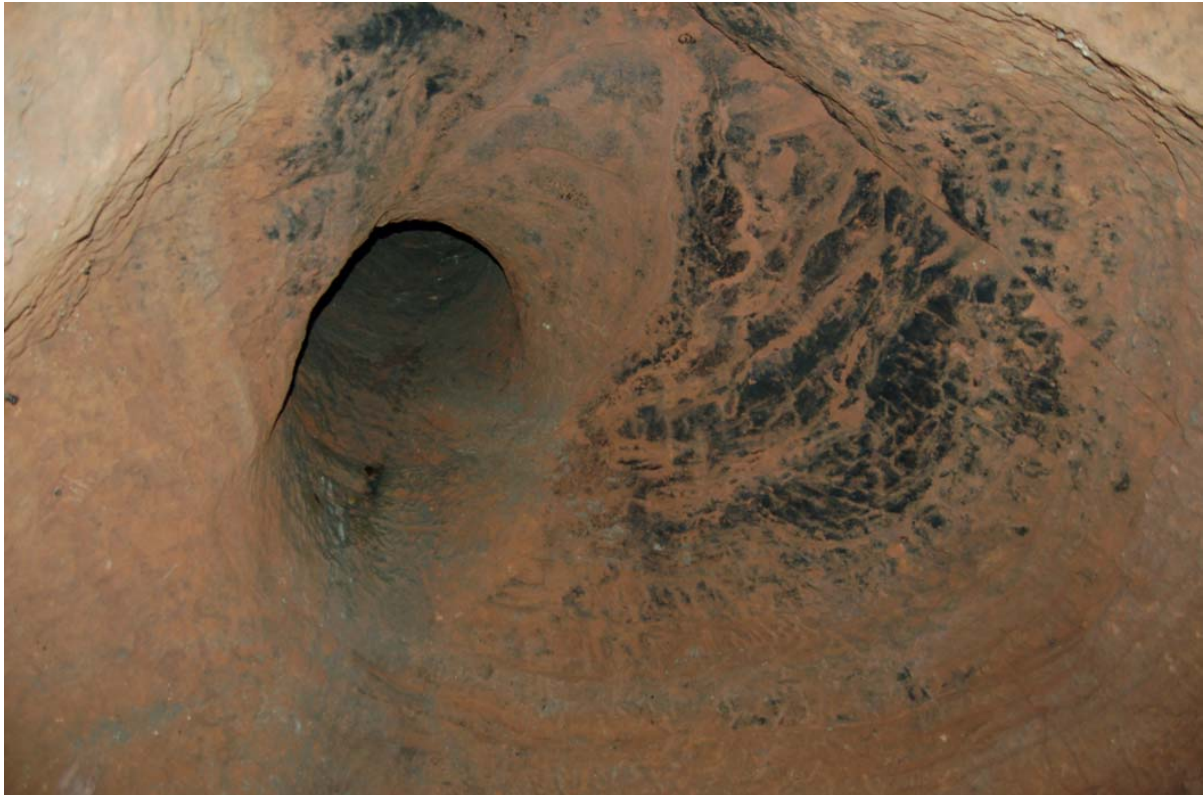
**Plate 39:** S4 Shaft at S end.



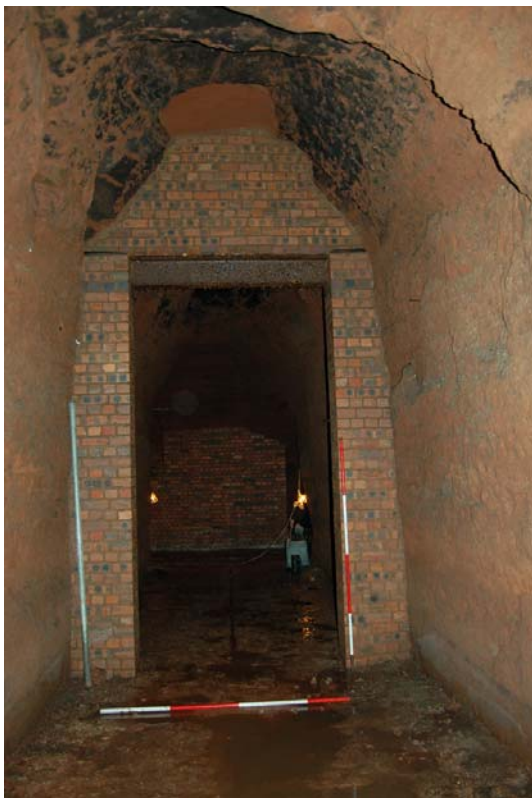
**Plate 40:** S4, plant settings in floor.



**Plate 41:** Chamber S4 south end; vertical scars in end wall.



**Plate 42:** Chamber S4; detail of vertical shaft.



**Plate 43:** S5 looking south.



**Plate 44:** S5, south end looking south.





**Plate 45:** Chamber S5 south end; vertical scars in end wall.



**Plate 46:** S5, plant settings in floor.



**Plate 47:** S5, detail of shaft.





**Plate 48:** Chamber N1 looking north.



**Plate 49:** Chamber N1 looking south.





**Plate 50:** Chamber N1: *ex-situ* reinforced concrete bench slabs.



**Plate 51:** Chamber N1: detail of reinforced concrete bench slab.





**Plate 52:** Chamber N1: scars of former bench support piers.



**Plate 53:** Chamber N1, north end: WWII galvanised steel toilets.





**Plate 54:** Chamber N1, north end: scars of former toilet partitions.



**Plate 55:** Chamber N2, looking south, note vertical scars in end wall.





**Plate 56:** N2, 'Utopia' brick pier at NE angle.



**Plate 57:** N2, blocked communication tunnel.



**Plate 58:** Chamber N3, looking north (modern breeze blocking).



**Plate 59:** Chamber N3 looking south.



**Plate 60:** Chamber N4, looking north.





**Plate 61:** Chamber N4, looking south.



**Plate 62:** Chamber N4, west wall: side tunnel formerly connecting to Chamber N3.





**Plate 63:** N4, fireplace in side chamber.



**Plate 64:** N4, detail of fireplace.