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Land at the Junction of Queen Street and Bridge Street, Bilston, West Midlands: An Archaeological Desk-Based Assessment and Evaluation Birmingham University Field Archaeology Unit Project No. 1009 January 2003

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> by M. Duncan and M. Hislop

For further information please contact: Simon Buteux or Iain Ferris (Directors) Birmingham University Field Archaeology Unit The University of Birmingham Edgbaston Birmingham B15 2TT Tel: 0121 414 5513 Fax: 0121 414 5516 E-Mail: BUFAU@bham.ac.uk Web Address: http://www.bufau.bham.ac.uk

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Land at the Junction of Queen Street and Bridge Street, Bilston, West Midlands: An Archaeological Desk-Based Assessment and Evaluation

Summary

Wolverhampton City Council has proposed that land at the junction of Queen Street and Bridge Street, Bilston, West Midlands (NGR SO95369638), be released for Birmingham University Field Archaeology Unit (BUFAU) was redevelopment. commissioned to carry out a desk-based assessment and subsequent evaluation of this site. Examination of the cartographic and documentary sources provided information regarding the likely location, extent and significance of any archaeological deposits within and around the proposed development site, and was used to target three trial trenches. One was situated against the frontage of Bridge Street, in order to assess the potential for archaeological preservation along this medieval thoroughfare. The other trenches were sited in areas thought to have the highest potential for the preservation of archaeological deposits in the back vards of 19th-century buildings. The evaluation demonstrated that archaeological preservation was best along the frontage of Bridge Street, in the northern corner of the site. A considerable build-up of garden soil dating to the 17th century was relatively undisturbed by later building activity here. This garden soil sealed earlier deposits of probable medieval date. The trenches to the southern side of the site suggest that much of this area had been quarried away. Nevertheless, part of a rectangular sandstone structure was identified against the Queen Street frontage that may be the remains of a Pin Fold, or pound for stray animals, first depicted on a map of 1832. Evidence of medieval activity is comparatively rare in Bilston and these deposits are potentially very significant in terms of the light that they may shed on the extent of medieval settlement here.

1.0 Introduction

The following report details the results of a desk-based assessment and subsequent archaeological evaluation of land at the junction of Queen Street and Bridge Street, Bilston, West Midlands (NGR SO95369638). Wolverhampton City Council has proposed that this land be released for redevelopment. Birmingham University Field Archaeology Unit (BUFAU) was commissioned to carry out this work in order to inform any future planning consent for this site. This work was undertaken in November and December 2002 and was carried out according to a written scheme of investigation prepared by BUFAU based on a brief written by Mike Shaw, the Black Country Archaeologist for Wolverhampton City Council (Shaw 2001). In addition, the work adheres to the guidelines set down in the *Standard and Guidance for Archaeological Desk-Based Assessments* (Institute of Field Archaeologists 1999) and the *Standard and Guidance for Archaeological Field Evaluations* (Institute of Field Archaeologists 1999).

2.0 Location (Figure 1)

The town of Bilston forms part of the City of Wolverhampton. It lies on a knoll of boulder clay that overlies the Staffordshire middle coal measure. The proposed development site lies on the southeast side of the town at NGR SO95369638. The site lies at the eastern extremity of the street block bordered by Bridge Street to the north, Stone Street to the south and Queen Street to the east (Figure 2).

3.0 Objectives

The objectives of the assessment were to determine the likely location, nature, extent and survival of archaeological remains within the area of the proposed development, and to inform a decision on the location of archaeological evaluation trenches.

The aim of the evaluation trenches was to appraise the preservation of any archaeological deposits and to define the character and extent of these deposits. It was also an objective to assess the degree of disturbance by later activity to the archaeological remains that exist within the area of the site. This was in order to facilitate discussions regarding the need for preservation or other mitigation measures in any future potential development, sufficient to enable a planning decision to be made.

4.0 Method

These objectives were achieved in the case of the desk-based assessment by an inspection of the Study Area that was carried out in order to assess current conditions. Documentary research of primary and secondary sources, including maps, was undertaken at Wolverhampton Archives and Local Studies. The Black Country Sites and Monuments Record (SMR), the primary source of archaeological information for the area, was also consulted. The results of this study were to inform the location of the evaluation trenches.

The aims of the evaluation were achieved through the excavation of three trialtrenches. These trenches were placed where the potential for the survival of archaeological deposits was considered greatest, mainly across old yard surfaces. A trench was also excavated up to the frontage of the site along Bridge Street in order to assess the potential for the preservation of archaeological deposits relating to this route into Bilston.

The trenches were excavated by machine, under archaeological supervision, down to the natural subsoil or the upper surface of any significant archaeological horizon. Any significant archaeological deposits encountered were excavated by hand and recorded on *pro-forma* record cards supplemented by scale plans, section drawings and photographs, where appropriate. Where no archaeological deposits were identified, the stratigraphy was recorded and photographed. Finds were retained by context and suitably qualified staff carried out finds recording and conservation.

The paper records, together with the finds, comprise the site archive and this has been prepared according to the guidelines in Appendix 3 of the *Management of*

Archaeology Projects (English Heritage, 1991), the Guidelines for the Preparation of Excavation Archives for Long-term Storage (UKIC, 1990) and Standards in the Museum Care of Archaeological Collections (Museum and Art Galleries Commission, 1992). The archive will be deposited with the relevant repository, with their prior notification and agreement, within a reasonable time after the completion of the evaluation.

5.0 Results

5.1 The Desk-Based Assessment 5.1.1 Development of the Study Area

The site lies at the eastern extremity of the street block bordered by Bridge Street to the north, Stone Street to the south and Queen Street to the east (Figure 1). Although this desk-based assessment was commissioned to research only the proposed area of redevelopment (hitherto referred to as the Development Site), it has, in fact involved a study of the whole street block (hitherto referred to as the Study Area).

Prior to the construction of Oxford Street in 1809, Bridge Street was a principal thoroughfare into the village of Bilston (Brercton 1996, 4). From the southwest the main street followed the route taken by High Street and Church Street, then turned east into Bridge Street where it turned southeast before crossing Bilston Brook. Bridge Street was therefore an important component of the medieval settlement, and its erstwhile importance is reflected in its width.

This route is first shown on an undated copy of a map surveyed in 1799 held in the City of Wolverhampton Archives and Local Studies Centre (Figure 3). The northeast side of the Study Area along Bridge Street was noted as being built up. While Stone Street is not shown, it has been suggested that it may have followed the course of a Roman Road; however, this must be an extremely tentative assertion (Cockin 2000, 54). The Duck Lane, later called Queen Street terminated at Bridge Street, and opposite it, on the southwest side of Bridge Street, was a single medium-sized building bordering small enclosures to the southeast and southwest. This building lies just beyond the northeast corner of the Development Site.

In 1832 (Figure 4) the southwest side of Bridge Street was lined with buildings as far as the Development Site. To the southwest of Bridge Street, Stone Street was first depicted cartographically, together with the recently constructed Oxford Street. Stone Street was a narrow lane that extended from the point at which Bridge Street turned southeast as far as the extension of Duck Lane to Duck Lane. For most of its length it ran roughly parallel with Bridge Street. No structures were depicted within the Development Site apart from a 'Pin Fold', that probably denoted an enclosure for keeping stray cattle. The building at the northeast corner of the Development Site became isolated when Duck Lane was extended.

On the 1839 Tithe Apportionment Map (Figure 5) two blocks of buildings are depicted on the northeast side of Stone Street. One of these was situated towards the northwest end of the Study Area set back from the road and at an angle to it. The other block lay just outside the Development Site, but close to its northwest extent

was an enclosed yard. The Pin Fold was also shown, but its northeast and southwest sides along the lines of Bridge Street and Stone Street respectively had been enclosed.

In 1887 (Figure 6) the southwest side of Bridge Street was lined with numerous closely packed buildings with occasional alleys between them leading to the back yards, that in some cases were communal. There is no marked regularity of form of these terraces and also no service ranges to the rear, so the likelihood is that they were built prior to the 1875 Public Health Act. In Stone Street in addition to the two blocks of buildings that were in existence in 1839, there had been a considerable amount of infill along the street frontage. Most of the Stone Street properties appear to have comprised terraced housing, and they also had communal back yards.

Duck Lane was renamed Queen Street, probably to commemorate Queen Victoria's Golden Jubilee. The outline of the Pin Fold was now defined by L-shaped building that respected its northwest and southeast sides. To the northwest of this L-shaped block was a yard, and beyond that yard another L-shaped building fronted onto Stone Street. The size of these structures suggests that they might have been small industrial units.

Immediately northeast of the Pin Fold at the corner of Bridge Street and Queen Street, and on the site of the structure that appears on the 1799, 1832 and 1839 maps, was a block of five attached properties. Three of the properties fronted onto Queen Street whereas the other two were immediately behind them and served by a narrow lane entered from Bridge Street. Northwest of this lane a large public house, named on later maps as 'The Three Tuns', had been built with a yard at the rear. Most of these developments probably took place in the mid-19th century. In 1862-3 the Trades Directory of Wolverhampton listed a pipe maker, a brass caster, and a tobacco box maker with premises on Stone Street. The address of William Tonks, the brass caster, was No.1 Stone Street, so it is a possibility that one of the two large L-shaped buildings at the southeast end of the street, within the Development Site, was a small brass works.

The Three Tuns is mentioned in 1865 when it was occupied by Thomas Slade (Jones's Directory, 80). Slade, according to Hulley's Hardware District Directory, was still in possession in 1890 when the house was referred to as a tavern. The Census Returns for 1881 give insights into the inhabitants of the terraced housing in Bridge Street and Stone Street at this period. A variety of working class occupations are given, the most common being coal miners, laundresses, and iron industry workers - but there was also an engine driver, a rope spinner, a brick layer and a town crier!

Further changes had taken place by 1903 (Figure 7). A few properties had been demolished towards the northwest end of the Study Area, leaving gaps in the buildings from Bridge Street and Stone Street. While at the corner of Bridge Street and Queen Street, the three Bridge Street properties had been demolished, as well as the southwestern of the two to the rear. The Pin Fold was still undeveloped, and its northwest and southwest sides were still defined by the L-shaped building, to the northwest of which, a covered entrance had been built leading to the yard behind it.

The only major change to have occurred by 1919 (Figure 8) is that towards the northwest end of the Study Area a large square area had been cleared from Bridge Street to Stone Street. By 1938 (Figure 9) three new buildings had been erected on this site they were set back from Bridge Street, their property boundaries extending as far as Stone Street. At the northwest extremity of the Study Area a new building had been erected on Stone Street. At the southeast end of the Study Area the buildings on the Stone Street frontage had been demolished, so too had the building served by the narrow lane leading from Bridge Street, and the public house had expanded onto this site. The Queen Street frontage had been replaced by a widened pavement, and the outline of the Pin Fold finally disappeared, though its site remained vacant, while at the redefined corner of Queen Street and Stone Street a new L-shaped structure had been built.

By 1965 (Figure 10) all the remaining terrace housing had been swept away and a large school kitchen had been erected in the centre of the Study Area. Within the Development Site only the Three Tuns and the L-shaped building at the southeast corner survived. In recent years these too were demolished and the site landscaped. The construction of the Black Country Route and the Oxford Street Island to the south of the Study Area have resulted in the southcast end of the Development Site being cut back and its southern corner being rounded off. It is likely that the effects of these encroachments include the removal or encapsulation of much of the Pin Fold and the putative brass works on the south corner.

5.1.2 Archaeological Deposit Model

The most significant mcdieval archaeological deposits are likely to lie along the Bridge Street frontage. Furthermore, the map evidence suggests that the site underwent a relatively low level of post-medieval development until the later 19th century. While the Three Tuns Tavern would almost certainly have been cellared and there is a strong probability that much of the archaeology on the southeastern corner of the Development Area has been lost, there is much better potential survival underneath the terrace of houses to the north. Indeed, there are four other areas within the Development Site that appear never to have been built on, namely, the yards behind the Bridge Street and Stone Street properties (Figure 11). These sites have the greatest potential for establishing the character of the underlying geology, and for confirming or contradicting the evidence of the maps which points to a largely open area prior to the mid-19th century.

5.1.3 Location of Evaluation Trenches (Figure 12)

Therefore, the evidence gleaned from the desk-based assessment suggested that the evaluation trenches should be located as follows:-

- Across the two buildings, and lane to the northwest of the public house site, and the yard behind them for the purpose of ascertaining the existence/survival of medieval properties along Bridge Street.
- Across the sites of the yards in order to establish the underlying character of the geology, and the archaeological potential of the former open areas within the site.

5.2 The Evaluation

5.2.1 Trench 1 (Figure 13 and Plates 1 and 3)

Trench 1 was situated in the northern corner of the site next to the frontage Bridge Street and aligned, northeast-southwest and perpendicular to the street. This trench was 12m long and 3.5m wide and excavated to a maximum depth of 1.3m below the modern surface (131.45m AOD).

The natural subsoil (1012) consisted of a compact yellow clay and sand. Cut into this was a linear feature aligned northwest-southeast, parallel to Bridge Street. Only 1m of the length was revealed of this feature that was 0.6m wide with a U-shaped profile with relatively steep sides. This cut (F108) was filled with a compact silt with yellow clay lenses (1018) from which a lump of ferrous material was retrieved, but no specific dating evidence.

An extensive layer (1013) 0.15m deep spread from the northeast end of the hand-dug sondage 5m to the southwest and sealed both F108 and the natural subsoil. This consisted of compact grey-brown clay and silt. No finds were retrieved from this context. Cutting this layer was a sub-circular pit (F106), 0.75m in diameter with a U-shaped profile 0.3m deep. Only the northwestern edge of this feature was revealed in the hand-dug sondage. This cut was also filled with a compact grey silt with lenses of yellow clay (1014). Also cutting 1013 was a linear feature (F101), aligned northeast-southwest, along the middle of the trench. This was 0.7m wide. F101 consisted of a U-shaped cut 0.2m deep, filled with brick rubble and grey silt (1010). On top of 1010 was set a layer of square-cut sandstone blocks (1005), 0.25m high and 0.2m wide. This feature was truncated on its northwestern side by a brick-built culvert (F105) visible only in the southeast-facing section.

Sealing these deposits was another extensive layer (1002), 0.45m deep, that was present over all of the trench. This consisted of a compact green-grey clay and silt with a notable concentration of coal inclusions towards the northeastern end of the trench. Pottery dating to the 17th century was retrieved from this context (S. Ràtkai pers comm).

Scaling 1002 was another extensive layer (1000) that consisted of clay and silt with building rubble and coal inclusions. Cutting this layer were several truncated brick walls of 19th century origin that in turn were scaled beneath a recent layer (1001) of friable brown sand with a capping of rubbish.

5.2.2 Trench 2 (Figure 14)

Trench 2 was located along the southwestern edge of the property, to investigate potential for archaeological preservation below a former yard surface. This trench was 15m long and excavated to a maximum depth of 3.5m below the modern ground surface (129.14m AOD).

The trench was excavated down to a horizon of compact yellow clay (2005) that was only exposed in a small sondage 4m long and 0.5m wide. The clay sloped dramatically down from 131m AOD to the east down to 129m AOD to the west. Above 2005 was a layer of friable black cinders and rubble (2002), that had a maximum depth of 2.88m, although this seemed to become shallower towards the southwest end of the sondage. Cut into 2002 was a series of truncated brick walls, mostly 19th century in date. Sealing these walls and 2002 was a layer (2001) present over the entire area of the trench and 0.5m deep. This consisted of brick and masonry rubble mixed with some silt and coal, plastic items were also included in this fill. Sealing 2001 was a layer (2000) of topsoil 0.35m deep.

5.2.3 Trench 3 (Figure 15 and Plate 2)

Trench 3 was located at the southern corner of the site in order to investigate the archaeological potential of a backyard plot. Difficulty of machine access meant it was excavated in a rhomboidal shape, roughly 6m in length and 4m width to a maximum depth of 1.4m below the modern ground surface (130.83m AOD).

The natural subsoil horizon was not encountered during the excavation of this trench. The return of a sandstone-built structure (F300) was revealed in the southeastern corner of the trench, but the full extent of this structure could not be seen. These walls were revealed to a height of 0.95m and were built from large square-cut sandstone blocks on the internal and external faces, with rubble infill between. The inside of the structure was filled by several layers of building rubble (3001-3007) mixed with coal and cinders. The finds from these fills notably contained large amounts of slag and crucible material.

Abutting this sandstone wall (F300) was a series of brick built walls (F301 and F302) to the north, and a brick yard surface (3010) to the west. A layer (3009) of friable building rubble covered the area of the trench above the external parts of the structure and a layer (3000) of rubble with coal and cinders covered the trench over the internal areas of the structure. These layers (3000 and 3009) in turn were sealed by a layer of topsoil (3006) 0.35m deep.

6.0 Discussion

The most interesting and significant archaeological deposits are located along the Bridge Street frontage in the vicinity of Trench 1. The linear feature (F108) is stratigraphically the earliest feature, although, unfortunately, no dating evidence was retrieved. The layer sealing this (1013), may be the remains of a buried topsoil, that in turn was sealed by a buried 17th-century garden soil (1002). This suggests that F108 is probably medieval or certainly early post-medieval in date. As F108 is parallel to Bridge Street, it is probably structural and may reflect early occupation here. If F108 represents a foundation for a timber-framed building the absence of foundation stones for a sill wall may imply that the structure was 'earthfast', which would be generally consistent with domestic timber-framed building design of the 13th century or earlier. The possibility therefore arises that medieval occupation along Bridge Street spread this far from the settlement centre in the 'boom' period of the

Middle Ages, but subsequently contracted during the period of the Black Death only to be re-established in the 17th or 18th centuries. Furthermore, because F108 was set some 8m back from the Bridge Street frontage it probably represents the former line of the rear wall of a structure whose main axis was aligned perpendicular rather than parallel to the street, a typically medicval urban plan form.

Cutting 1013, but scaled by the 17^{th} -century garden soil (1002) was another linear feature (F101) aligned perpendicular to the Bridge Street frontage that would appear to be a post-medieval property boundary. It is possible that F101 represents the recolonisation of this part of Bridge Street after its abandonment in the medieval period. The sandstone foundation (1005) was built over and on the same alignment as F101. It is contemporary with the 17^{th} -century garden soil (1002) and, given its poor quality build, may represent a property boundary within the gardens. It is also possible that these stones were reused from an earlier structure as they shared the same bedding depth of 9 inches.

It should also be noted that the 19th-century buildings along this part of the Bridge Street frontage had not disturbed the carliest archaeological deposits, and that there was no sign of cellaring below these properties.

In contrast to the Bridge Street frontage, there was over 2m of 19th century and later infill along the frontage of Stone Lane. This suggests that there may have been a quarry, natural depression, or slope here - although today the land is relatively level. Therefore, the archaeological potential of this area is deemed to be low.

It is tempting to identify the stone structure (F300) with the Pin Fold first identified on historic mapping in 1832 that survived as a property division into the 20th century. Stratigraphically, this structure was the earliest feature identified within Trench 3 and clearly pre-dated the 19th-century walls that abutted it on many sides. It is also roughly in the right location, given the limited accuracy of historical mapping of the 18th and early 19th centuries. Pin Fold is derived from the Old English 'pynd-fald' and there are numerous examples of this place-name in the West Midlands and Cheshire (Field 1972, 167). Pin Folds were pounds in which animals found roving the town or village fields were detained and their location near the periphery of settlements is common. However, this identification must remain tentative, given the limited amount of the structure investigated. Furthermore, because it is situated so close to the southern boundary of the Development Area it is likely that most of this structure is now located beneath Qucen Street.

7.0 Conclusions and Recommendations

The trial trenches suggest that the area with the highest potential for archaeological preservation will be along the frontage of Bridge Street, at least in the northern area of the site. This is important because this is potentially the location of the earliest archaeological deposits present on this site, relating to the medieval and post-medieval occupation of Bridge Street. These deposits have the potential to be very significant for understanding the medieval settlement in Bilston.

The survival of medieval deposits in Bilston can be judged on present evidence to be extremely rare given the extent of 19^{th} -century industrial disturbance in the town in general, while the proximity of these deposits to the modern ground surface means that they are vulnerable to development here. While the responsibility for the curation of these deposits rests ultimately with the Black Country Archaeologist, Mike Shaw, it can be anticipated that a recommendation for further archaeological excavation along the north end of the Bridge Street frontage would be the most likely archaeological response to any design scheme affecting this site. This is because while there is a presumption in terms of planning guidance in favour of preservation *in situ* the significance of these deposits has not been established absolutely and it may be argued that their potential contribution to archaeological research into Bilston outweighs the desirability of preserving them *in situ*. In addition these deposits are confined to a relatively small part of the overall Development Area.

8.0 Acknowledgements

The help of Bob Griffiths of Wolverhampton City Council is gratefully acknowledged. Thanks are also due to Mike Shaw, the Black Country Archaeologist for his help and suggestions throughout the project. From BUFAU Kate Bain, Mary Duncan, Andy Rudge and Andy Walsh excavated and recorded the site and Kirsty Nichol and Stephanic Ràtkai commented on the finds. John Halsted and Bryony Ryder illustrated the report, which was written by Mary Duncan and Malcolm Hislop. Steve Litherland managed the project and edited this report.

9.0 Sources

8.1 Primary Sources

White's Directory of Staffordshire. 1851.

Trades Directory of Wolverhampton. 1862-3.

Jones's Mercantile Directory of the Iron District. 1865.

Hulley's Hardware District Directory 1889-90.

1881 Census Returns

8.2 Secondary Sources

Brereton, S. 1996. Bilston Archaeological Survey. Oxford Archaeological Unit Report.

BUFAU 2001. Queen Street/Bridge Street, Bilston, West Midlands: Draft Scheme of Investigation for a Desk-Top Assessment and Field Evaluation.

Cockin, T. 2000. A Staffordshire Encyclopædia.

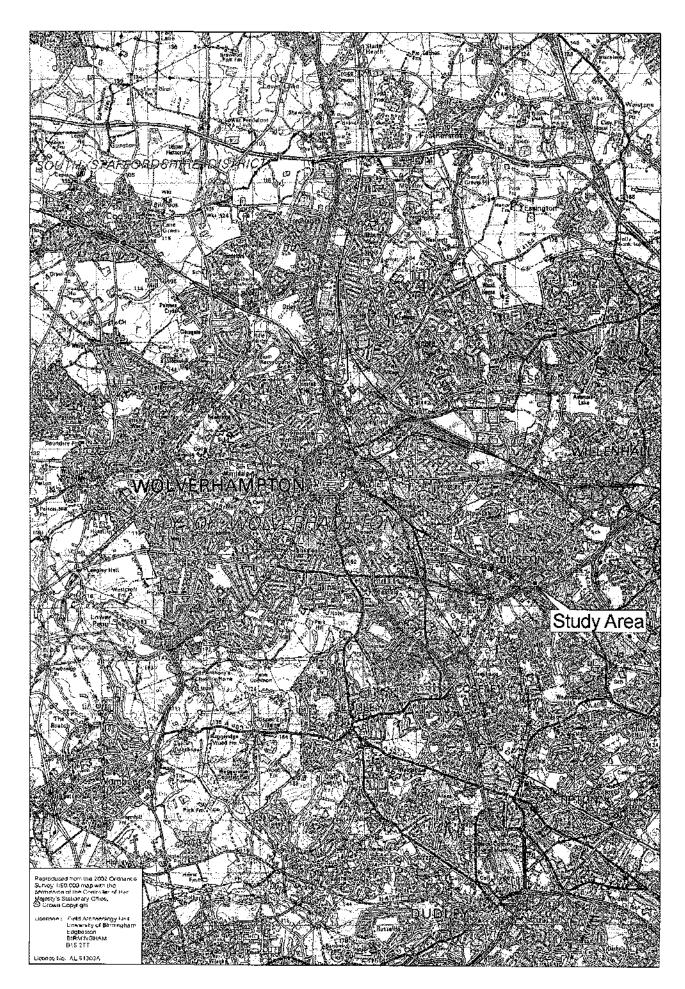
Field, J. 1972 English Field Names London.

Hooke, D. and Slater, T.R. 1986. Anglo-Saxon Wolverhampton. The Town and its Monastery. Wolverhampton Borough Council.

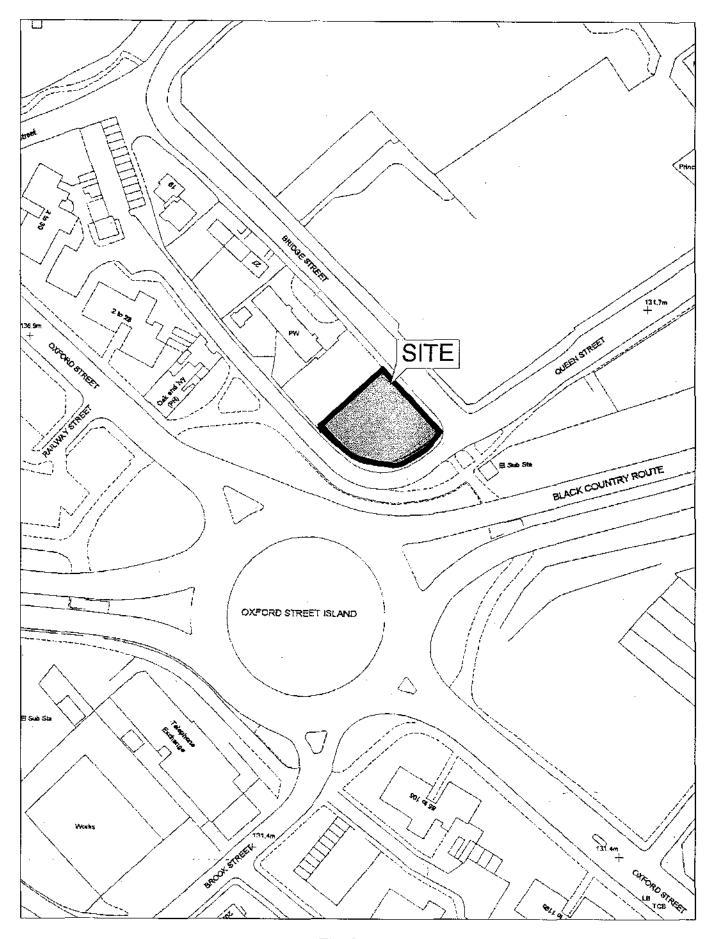
Shaw, M. 2001. Proposed Development at Queen Street/Bridge Street, Bilston: Brief for an Archaeological Evaluation.

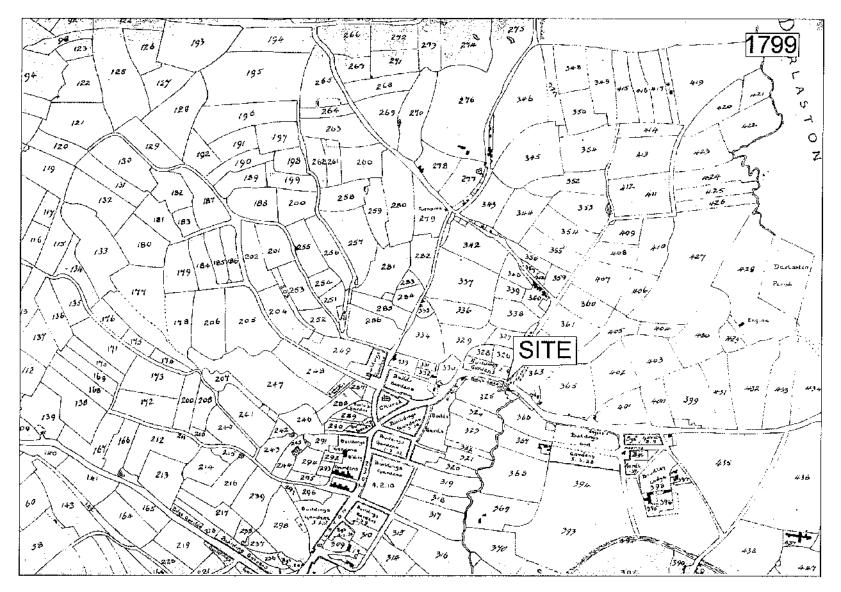
8.3 Cartographic Sources

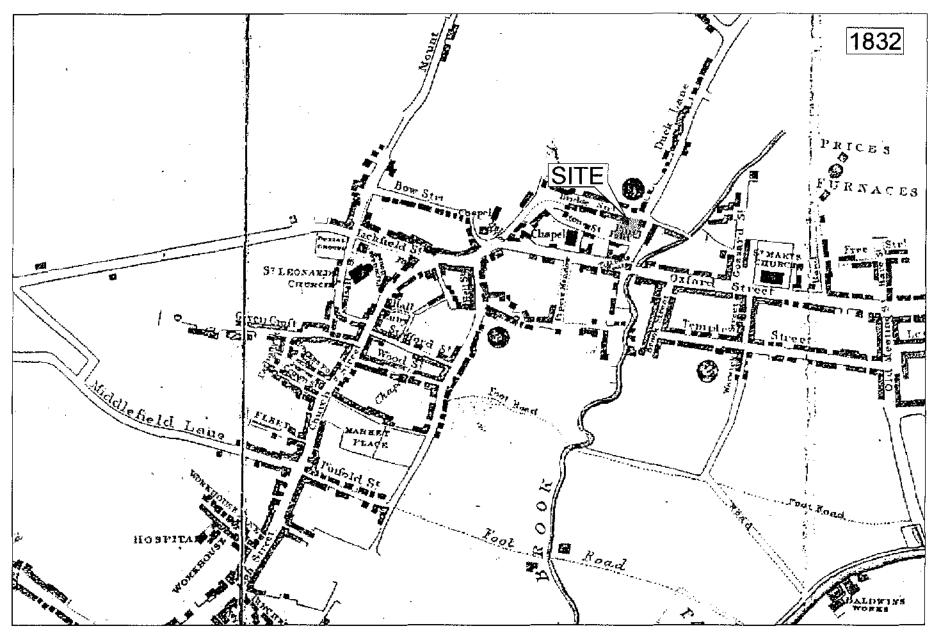
- 1799 Map of Bilstone Liberty (copy)
- 1832 Map of the Town of Bilston
- 1839 Map of the Township of Bilston (Tithe Apportionment map)
- 1887 Ordnance Survey 1:2500 Sheet LXII.16
- 1903 Ordnance Survey 1:2500 Sheet LXII.16
- 1919 Ordnance Survey 1:2500 Sheet LXII.16
- 1938 Ordnance Survey 1:2500 Sheet LXII.16
- 1965 Ordnance Survey 1:2500 Plan SO 9596

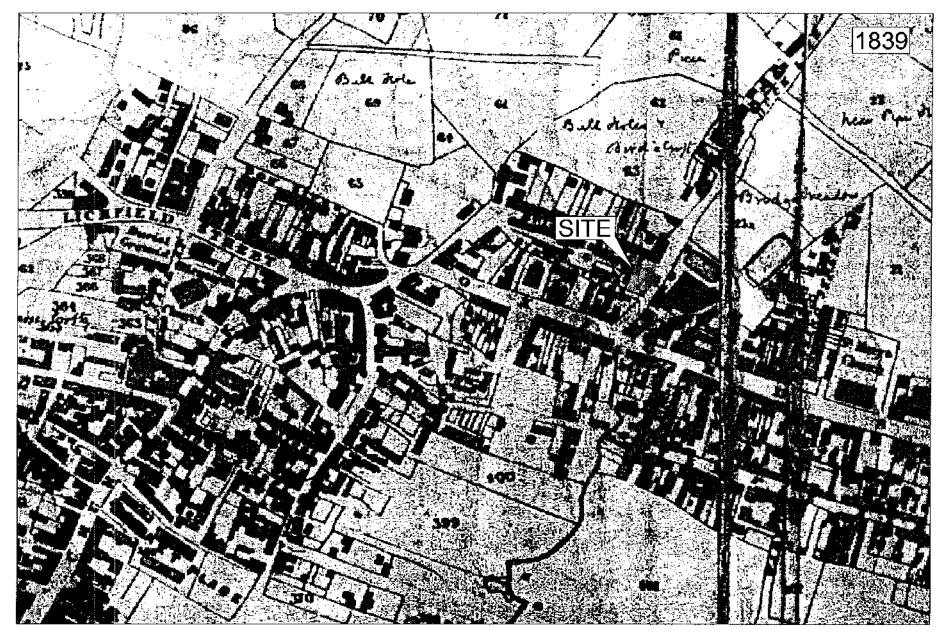


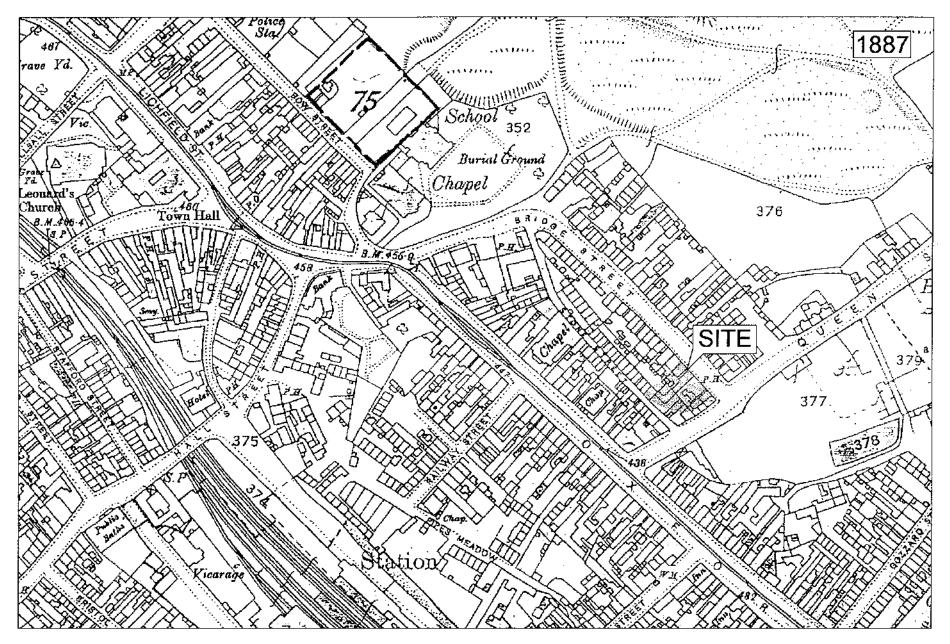


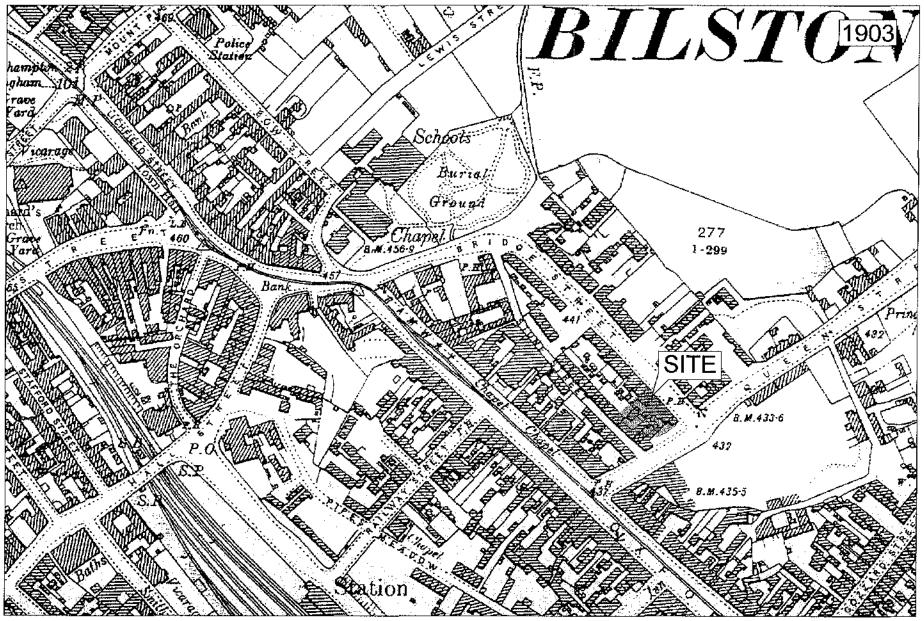


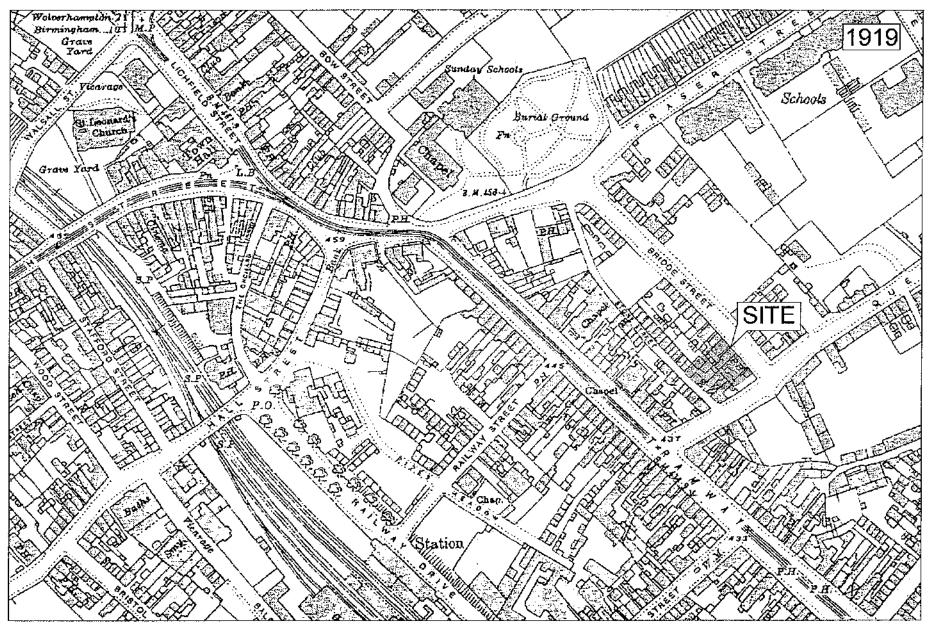


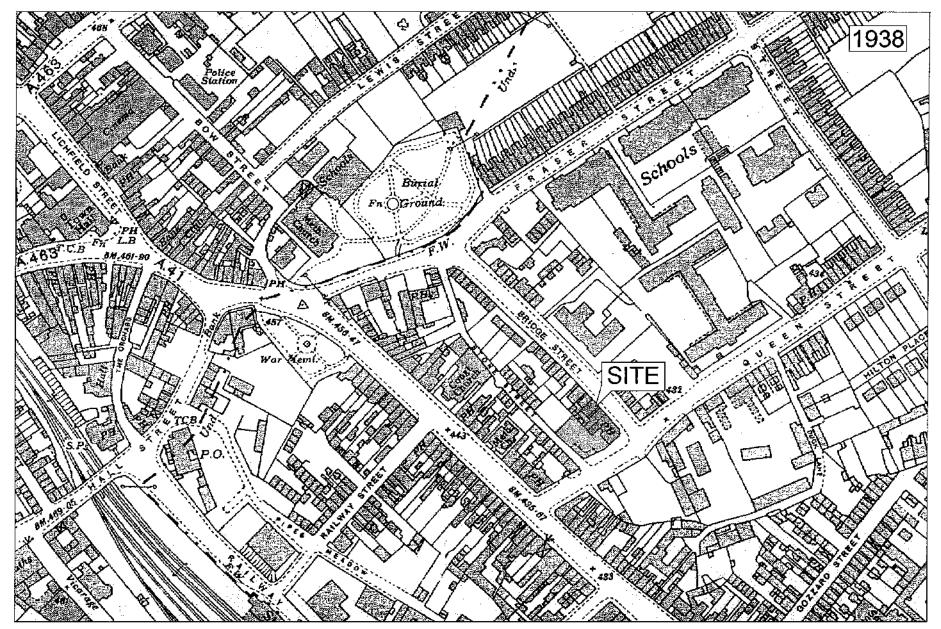


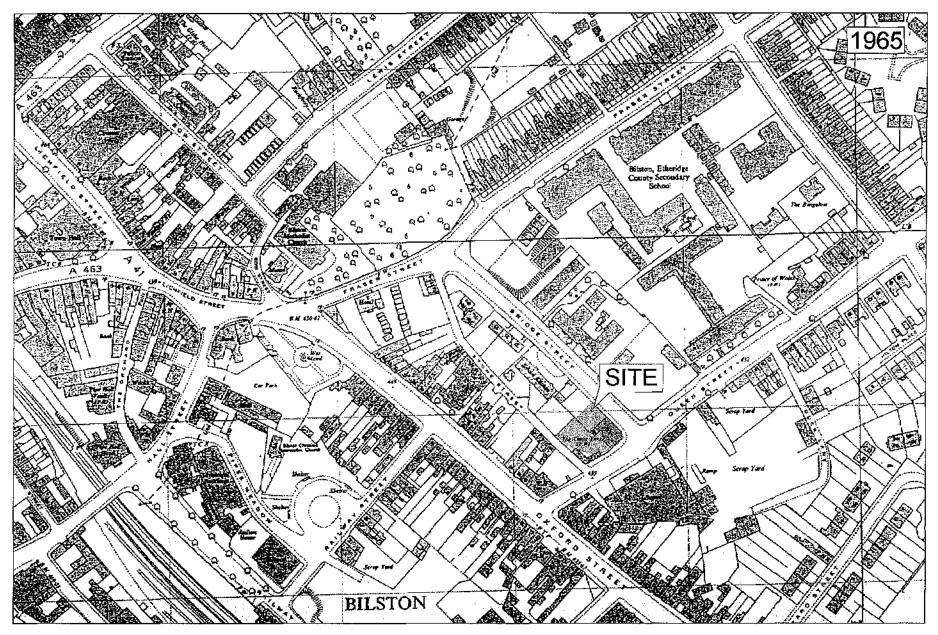












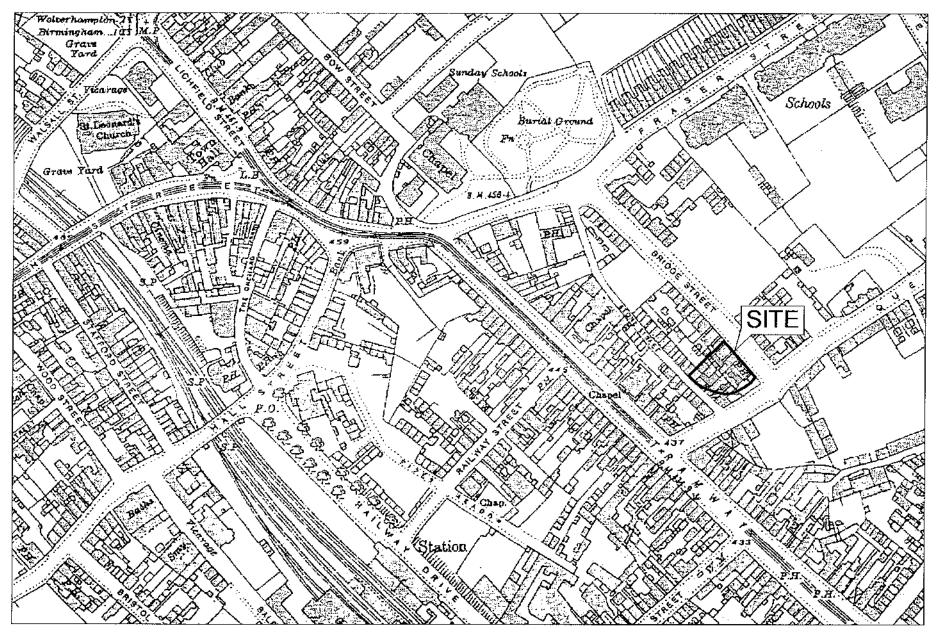
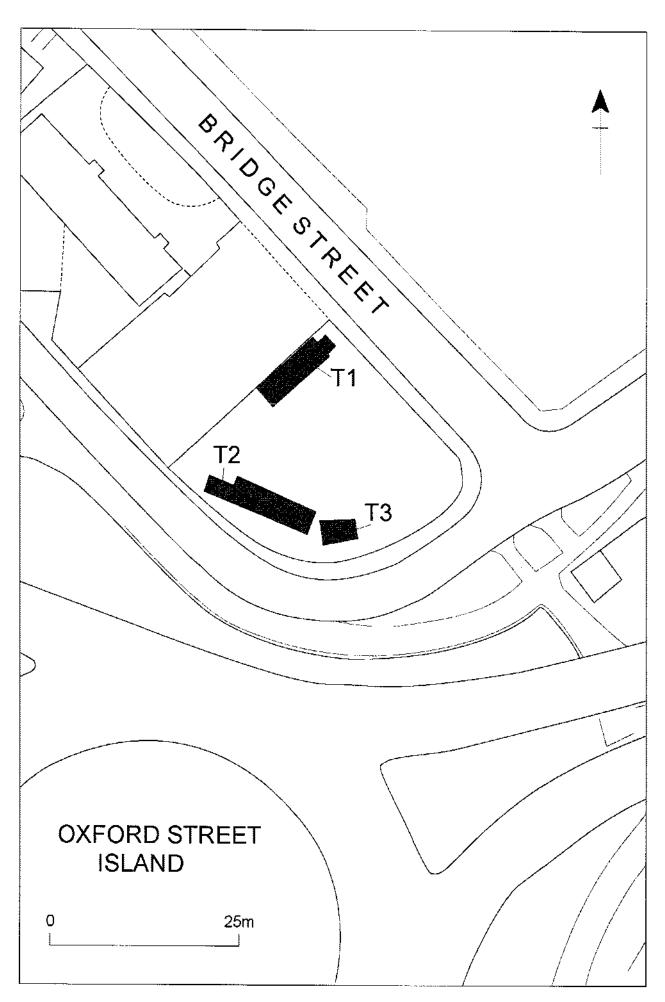
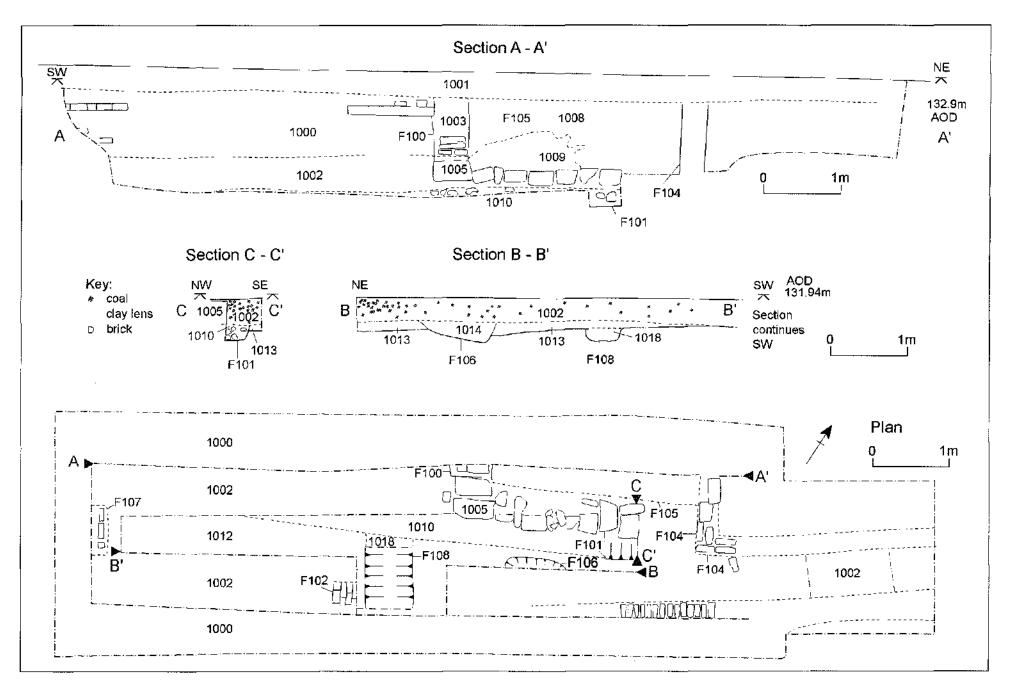
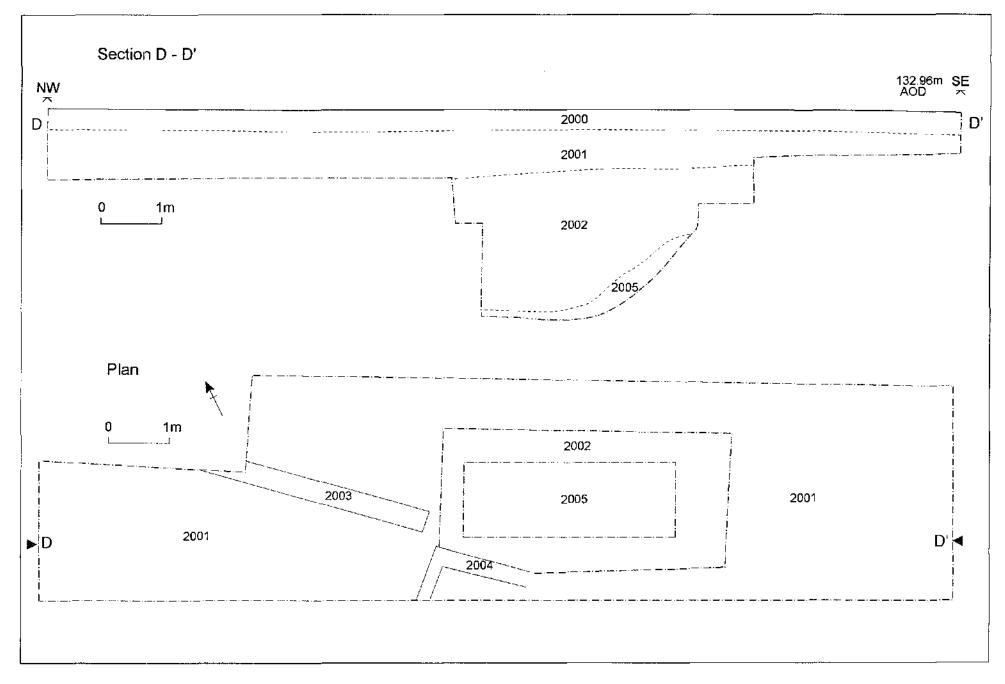
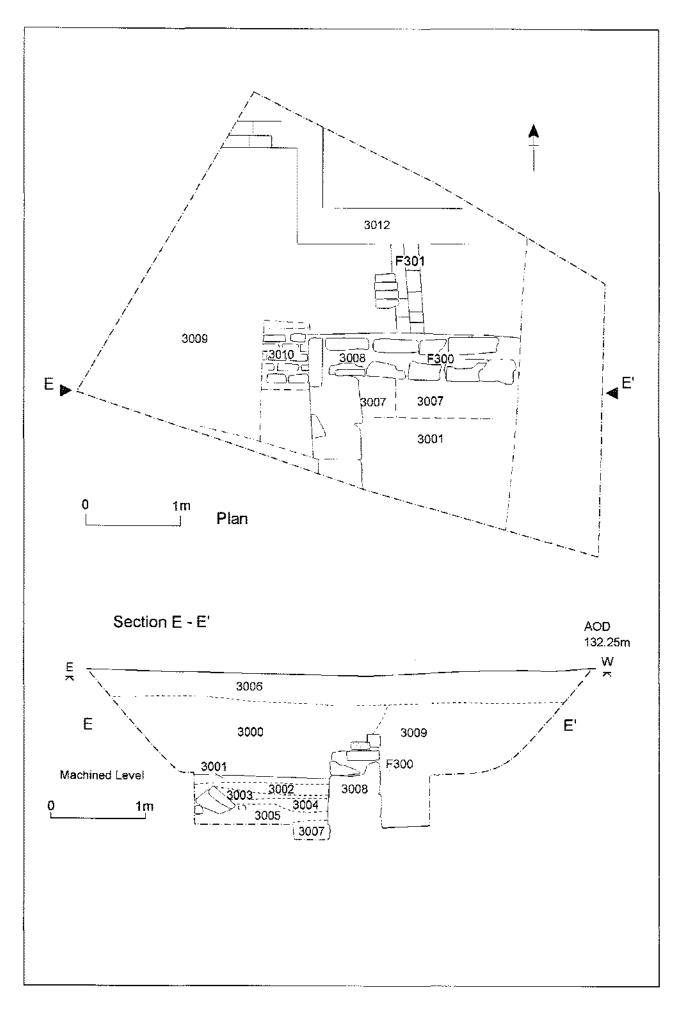


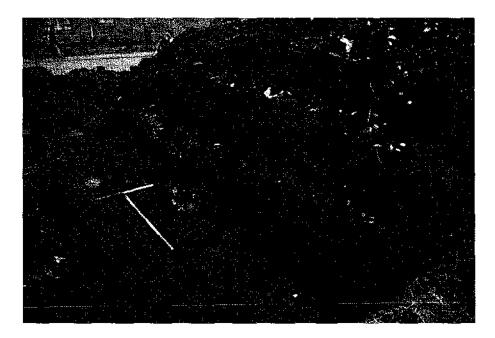
Fig.11 Location of undeveloped areas













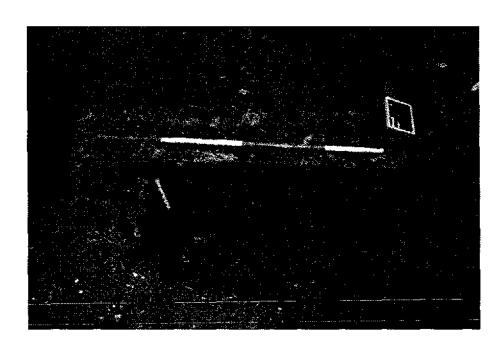






Plate 3