DESK-BASED ASSESSMENT AND GEOPHYSICAL SURVEY AT BUSHBURY HILL PRIMARY SCHOOL, OLD FALLINGS LANE, BUSHBURY, WOLVERHAMPTON

Tom Vaughan

Illustrations by Carolyn Hunt

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Historic Environment and Archaeology Service,
Worcestershire County Council,
Woodbury,
University of Worcester,
Henwick Grove,
Worcester WR2 6AJ

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Part 1 Project summary

A desk-based assessment and geophysical survey were undertaken at Bushbury Hill Primary School, Old Fallings Lane, Bushbury, Wolverhampton (NGR: SJ 9268 0213). It was undertaken on behalf of Jacobs UK Ltd whose client, Wolverhampton City Council, intends to demolish the existing school buildings and rebuild them on an unoccupied grassed area to the south and south-west. The project aimed to determine if any significant archaeological site was present and if so to indicate what its location, date and nature were.

The aims of this assessment were to summarise the character and extent of any identified features of the historic environment, indicate their significance, the impact of the proposed development and identify mitigation measures, where appropriate.

The farm is known to have existed from the 1780s, although there is cartographic evidence that a house may have occupied the site in 1775, and circumstantial evidence for a house as early as the 1580s. The house comprised a three storey, three bay brick building with sash windows and a shallow hipped roof. It overlooked a garden with trees, a oval pond enclosed by a wide sweeping drive off Old Fallings Lane. The farmyard buildings lay toward the north, while discrete paddocks, an orchard and a possible formal garden occupied the south-east side. The farm was owned and occupied by the Phillips family through the 18th and 19th centuries. In 1925 the then owners, Low Hill Bushbury Estate Company Ltd, sold it to Wolverhampton Corporation, who built the schools buildings to the north-east between 1930-3, and leased the house to the TOC H charitable organisation. The farm was finally demolished in 1948 and the land subsumed within the school.

The geophysical survey has identified extant buried deposits associated with the house, the eastern portion of the farmyard and the drive. The other elements of the farm may have been largely removed during demolition and subsequent landscaping. There are also a large number of irregular anomalies which cannot at present be ascribed to known farm buildings, nor can they be assigned a date.

The below ground archaeological potential of the site is therefore still somewhat indeterminate. It is recommended that further evaluation be undertaken with trial trenches excavated across the anomalies and a sample of apparently blank areas along with monitoring of any proposed geotechnical investigations.

The original school buildings along the north-east side of the site are typical of 1930s public building style and are integral to the surrounding housing estate which was planned and developed in the later 1920s and early 1930s. They therefore have group value as part of this sub-urban landscape. The recurring circular glazing bar motif design in the windows is unusual and potentially unique. It is therefore recommended that recording by undertaken of these buildings prior to alteration or demolition.

Part 2 Detailed report

1. Background

1.1 Reasons for the project

A desk-based assessment and geophysical survey were undertaken at Bushbury Hill Primary School, Old Fallings Lane, Bushbury, Wolverhampton (NGR: SJ 9268 0213; Fig 1). The project was undertaken on behalf of Jacobs UK Ltd, whose client, Wolverhampton City Council (WCC) intends to demolish the existing school buildings and rebuild on an unoccupied grassed area to the south and south-west, as part of the Primary Capital Programme (PCP).

It is considered by the curator that a site of archaeological interest may be affected (BCSMR: MBL 1835; Fig 15).

1.2 Project parameters

The project conforms to the *Standard and guidance for archaeological desk-based assessment* (IfA 2008), Planning Policy Guidance Notes 15 '*Planning and the Historic Environment',* and 16 *'Archaeology and Planning'* and relevant EIA guidance and Legislation.

The project also conforms to a brief prepared by Wolverhampton City Council (WCC 2009a) and for which a project proposal (including detailed specification) was produced (HEAS 2009).

1.3 Aims

The aims of the archaeological investigation were to summarise the character and extent of any identified features of the historic environment, indicate their significance, the impact of the proposed development and identify mitigation measures, where appropriate.

More specifically the following aims have been identified:

- to document the history of Bushbury Hill Farmhouse;
- to determine whether an earlier building may be anticipated

2. Methods

2.1 Study area

The study area included the site (Figs 1 and 14), although features of the historic environment were considered within *c* 500m to encompass the settings of Scheduled Ancient Monuments and Listed Buildings.

2.2 Documentary search

Prior to fieldwork commencing a search was made of the Black Country Sites and Monuments Record (BCSMR), and Wolverhampton Archives and Local Studies (WA).

The following sources are relevant to the study area:

Cartographic sources

- 1610, Stafford Countie Towne with the ancient Citie Lichfield described, John Speed, scale 5 miles: 4.25cm, WA: MAP/471d/C5 *(no detail)*

- 1648, Staffordiensis comitatus vulgo Staffordshire, Johann Blaeu, scale: 5 miles: 4.45cm, WA: MAP/473a/C5 *(no detail)*

- 1695, Staffordshire, Robert Morden, scale *c* 5 miles: 4.35cm, WA: MAP/478b/C5 *(no detail)*

- 1749, An improved map of the county of Stafford divided into its hundreds collected from the best materials and illustrated with historical extracts relating to its natural produce, trade, manufactures, etc, by Eman. Bowen, to John Gower, Earl Gower, scale 5 miles: 5.90cm, WA: MAP/487/C6 (Fig 2)

- 1766, Staffordshire and Worcestershire Canal, H Bliss, scale unknown, (modern transcription), WA: MAP/438/C6 (Fig 2)

- 1775, A Map of the County of Stafford from an actual survey, begun in the year 1769 and finished in 1775, William Yates, scale 5 miles: 12.46cm, WA: MAP/491/C6 pt 3 (Fig 3)

- 1788, A map of Staffordshire, engraved from actual survey; with improvements, for J Harrison, scale 5 miles: 3.85cm, WA: MAP/494/C6 *(no detail)* (Fig 3)

- 1804, A New Map of the County of Stafford, divided into Hundreds, C Smith, scale: 5 miles: 5cm, WA: MAP/497/C7 *(no detail)*

- 1805, A Map of Staffordshire from the best authorities, John Cary, 5 miles: 4.85cm, WA: MAP/498/C7 *(no detail)*

- 1806, A New Map of Staffordshire, divided into hundreds, exhibiting its roads, rivers, parks, etc, John Cary, 5 miles: 4.4cm, WA: MAP/499a/C7 *(no detail)*

- 1818, Map of the County of Stafford from an actual survey, made in the years 1818 & 1819, C & J Greenwood, scale: 5 miles: 4.2cm, WA: MAP/501b/C7 *(no detail)*

- 1820, Map of the County of Stafford from actual survey made in the years 1819 & 1820, C Greenwood, scale: 5 miles: 12.4cm, WA: MAP/502/C7 *(little detail)* (Fig 4)

- 1831, Wolverhampton from the Ordnance Survey, Robert K Dawson, scale 2 inches: 1 mile, WA: MAP/507b/B1 (Fig 4)

- 1834, Ordnance Survey, sheet 42 Lichfield, scale 1 inch: 1 mile, WA: MAP/509/C7 (Fig 5)

- *c* 1878, Staffordshire map, scale unknown, WA: MAP/562/B3 (Fig 5)

- 1st edition, 1884, OS map, Staffordshire sheet LVI.15, scale 25 inch: 1 mile (1:2,500) (Fig 6)

- 1895, plan accompanying conveyance: Messers Charles Neve & Tom Harry Sidney and another to Mrs Emma Louisa Lovatt, scale 6 chains: 1 inch, WA: DEEDS/L10 (Fig 7)

- 1899, plan accompanying indenture of conveyance between Tom Harry Sidney and Escrike Sidney Phillips of the 1st part, Louisa Catherine Phillips, widow, of the 2nd part

and H Lovatt of Wolverhampton, Builder and Contractor of the 3rd part, 6 chains: 1 inch, WA: DEEDS/L10

- 1899, plan accompanying indenture of conveyance between messers J H Sidney & S E Phillips and another to Henry Lovatt esq, scale 6 chains: 1 inch, WA: DEEDS/L10 (Fig 7)

- 1902, OS map, Staffordshire sheet LVI.15, scale 25 inch: 1 mile (1:2,500) (Fig 8)

- 1906, plan accompanying indenture dated 31 December 1906; Ralph J Hinckes Esq. To Miss M D Lovatt & others, scale 1000feet: 5.9cm, WA: DEEDS/L10 (Fig 8)

- 1919, plan accompanying indenture dated 9 April 1919, the Misses Margaret Dorothy and Emma Louisa Lovatt to the Low Hill Bushbury Estate Company Ltd, scale 6 inches: 1 mile, WA: DEEDS/L10 *(little detail)* (Fig 9)

- 1923, OS map, Staffordshire sheet LVI.15, scale 25 inch: 1 mile (1:2,500) (Fig 9)

- 1926, Plan accompanying supplement abstract of the title of the Low Hill Bushbury Estate Company ltd. to freehold farms known as Low Hill and Bushbury Farms, Wolverhampton in the County of Stafford, Redfern & Co., Birmingham, scale 1:2,500, WA: DEEDS/L10 (Fig 10)

- 1926, Plan accompanying Inland Revenue Office land tax redemption form, dated 5 November 1926, scale 1:2,500, WA: DEEDS/L10 (Fig 10)

- 1927, Map of Wolverhampton, Alfred Hinde, scale 6 inches: 1 mile, WA: MAP/586/B8 *(shows proposed Bushbury housing estate scheme, same as 1928 and 1929 editions; no site detail)* (Fig 11)

- 1932, Map of Wolverhampton, Alfred Hinde, scale 6 inches: 1 mile, WA: MAP/591/B9 *(earliest to show schools; same as 1933/4, 1934/5 & 1938 editions; no site detail)*

- 1933, Bushbury Hill Municipal School: Block Plan, H B Robinson, Borough Engineer, Wolverhampton, February 1933, scale 20 feet: 1 inch, (within contract for erection of Infants Schools at Bushbury Hill, Wolverhampton) WA: D-LEG/1933/2-38 (plans of infant school) (Fig 12)

- 1933, Bushbury Hill Municipal School: Infants Block, H B Robinson, Borough Engineer, Wolverhampton, February 1933, scale 8 inch, (within contract for erection of Infants Schools at Bushbury Hill, Wolverhampton) WA: D-LEG/1933/2-38 (plans of infant school)

- Revision of 1937, OS map, Staffordshire sheet LVI.15, scale 25 inch: 1 mile (1:2,500) (Fig 13)

- 1946, Bushbury Map, W M Law, Borough Engineer, Wolverhampton May 1946, scale 1:2,500, WA: MAP/309

- 1946, Map of Wolverhampton, Alfred Hinde, scale 6 inches: 1 mile, WA: MAP/605/B10 *(shows school buildings; same as 1956; no site detail)*

- 1949, Geographers' Plan of Wolverhampton, Alexander Gross, scale 6 inches: 1 mile, WA: MAP/612/B10 *(no site detail)*

- *c* 1950s, County Borough of Wolverhampton: Libraries (Future Proposals), W Mervyn Law, scale 6 inches: 1 mile, WA: MAP/604/B10 *(erroneously shows farm buildings as extant)*

- 1954, OS map, scale 1:1,250 (Fig 13)
- 1960, Map of Wolverhampton & District, Alfred Hinde, scale 6 inches: 1 mile, WA: MAP/632/B12 *(same as 1968 editions; no site detail)*
- 1973, OS map, scale 1:1,250
- 2009, Site Boundaries: Primary Capital Programme: Bushbury Hill Primary School, Jacobs drawing number J/BH/SK01, dated 24 February 2009 (Fig 14)
- 2009, 2D Topographic Survey Sheet 1 of 3: Building Schools for the Future: Bushbury Hill School, Jacobs drawing number BU10001T_Bush_Topo_2D, dated 23 April 2009

Photographs

- Photo of three children sitting on a wall in front of the farm building (left to right: Raymond Brown, John Gillam and Leonard Brown), 1930s?, WA: P/4206 (Plate XXX)
- Reproduction of an original photograph of the farmhouse, when it was in use as a Sunday School; date unknown, 1930s?, WA: P/4207 (Plate XXX)
- Aerial photograph, 2001, Property Services, Wolverhampton City Council (WCC 2009b, Fig 9)
- Aerial photograph, 2004, Property Services, Wolverhampton City Council (WCC 2009b, Fig 10)
- Aerial photograph, 2006, Property Services, Wolverhampton City Council (WCC 2009b, Fig 11)

Documentary sources

- Brown, C C J, 1956 *Over The Hill – A Survey carried out during 1956 at Bushbury Hill Secondary School, Wolverhampton,* Bushbury Hill Secondary School, unpublished document, WA: L59p
- Chatwin, A H, 1983 *Bushbury Parish and People 1550-1950*, unpublished booklet WALSL: L 283 P
- Cockin, T, 2006 *The Staffordshire Encyclopaedia*, second edition
- Litherland, S, 1990 *An Archaeological Survey of Bushbury Green Wedge*, Birmingham University Field Archaeology Unit, unpublished report, WA: L 913 SR
- Margary, I D, 1973 *Roman Roads in Britain,* third edition
- Mills, A D, 1998 *Oxford Dictionary of English Place-Names*, new edition
- Morris, J, 1976 *The Domesday Book of Staffordshire*
- Shaw, S, 1801 (1976) *The History and Antiquities of Staffordshire*, **II.1**
- Smalley, R, 2009 *Geophysical Survey Report – Bushbury Hill Primary School, Wolverhampton, for Worcestershire County Council*, Stratascan Ltd unpublished report, dated June 2009, **J2614**

- Soil Survey of England and Wales, 1983 Midland and Western England, sheet 3, scale 1:250,000 + *Legend for the 1:250,000 Soil Map of England and Wales (A brief explanation of the constituent soil associations)*

- Town Planning Committee, 1995 *Bushbury Hill Conservation Area*, leaflet, dated April 1995, WA: L7114p

- WCC, 2009b *Desk Study Report for land at Bushbury Hill School, Wolverhampton*, Property Services, Wolverhampton City Council, unpublished report **PSB/Bushbury Hill School**, dated March 2009

The following sources have also been cited in this assessment.

- DoE, 1990 *Planning Policy Guidance Note 16: Archaeology and Planning (PPG 16)*, Department of the Environment

- DoE, 1995 *Planning Policy Guidance Note 15: Archaeology and the historic Environment (PPG 15)*, Department of the Environment

- EH, 2006 *Understanding historic buildings: A guide to good recording practice*

- EH, 2009 *Listed Buildings Online*, English Heritage, website http://lbonline.english-heritage.org.uk/SearchForm.aspx accessed 12 June 2009

- IfA, 2008 *Standard and guidance for archaeological desk-based assessment*, Institute for Archaeologists

- HEAS, 2009 *Proposal for a desk-based assessment and geophysical survey at Bushbury Hill Primary School, Wolverhampton*, Historic Environment and Archaeology Service, Worcestershire County Council, unpublished document dated 2 March 2009, **P3331**

- TOC H 2009 *Participation*, website http://www.tochparticipation.co.uk/home htm accessed 12 June 2009

- WCC, 2009a *Bushbury Hill Primary School, Wolverhampton: Brief for Archaeological Evaluation,* Wolverhampton City Council, unpublished document dated 24 February 2009

The following sources were unavailable during the project, but may be relevant:

- 1840 Bushbury tithe map and apportionment (cited in Litherland 1990)

2.3 Other methods

A site visit was undertaken on 11 June 2009.

Consultation has been undertaken with the curator, Mike Shaw (Black County Archaeologist, Wolverhampton City Council), to establish the key issues likely to be of importance.

A detailed specification has been prepared by the Service (HEAS 2009).

2.4 Results

The details of individual features of the historic environment are given in Appendix 1. Event records have been omitted where this would repeat information in other record types, and would not materially affect the assessment. BCSMR references have been used throughout this assessment.

2.5 Impact assessment criteria

The criteria cited in Table 1 have been used.

Severe Adverse: Loss of integrity of nationally important archaeology/cultural heritage including Scheduled Ancient Monuments, Grade I/II* registered parks and gardens and registered battlefields. Demolition of a Grade I/II* Listed Building. Dramatic adverse change in the setting or visual amenity of the feature/site.
Major Adverse: Land take resulting in the degradation of a cultural heritage site of national importance and/or extensive change to the setting or visual amenity of such a site e.g. intrusion into the setting of a Scheduled Ancient Monument. Loss of integrity of sites of archaeological interest of regional value, or Grade II registered parks and gardens, e.g. a dramatic change in the setting or visual amenity of a regionally important site such as a Conservation Area. Widespread adverse effects on the setting or structure of a Grade I/II* Listed Building. Demolition of a Grade II Listed Building.
Moderate Adverse: Land take resulting in the degradation of a cultural heritage site of regional importance and/or extensive change to the setting or visual amenity of such a site. Extensive change to the setting or structure of a Grade II Listed Building. Demolition of a locally listed or other historically important building. Encroachment upon a Conservation Area, historic parkland or other historic landscapes where the quality of the setting or its amenity would be noticeably impaired. Slight change to the setting or structure of a Grade I/II* listed building. Removal of a historically important hedgerow (after the Hedgerows Regulations).
Minor Adverse: Loss of integrity of an area where archaeological features/areas of local importance have been identified. Slight change to the setting or structure of a Grade II Listed Building. Limited encroachment upon a Conservation Area or historic parkland or other historic landscape where intrusive views are created or slight effects upon its integrity would result.
Not Significant: Landscape or ecological planting on an area where locally important archaeological features have been identified but impacts are thought to have no long term effect on the resource. Removal of common hedgerows and limited damage to important hedgerows where no replacement proposed.
Minor Beneficial: Perceptible improvement in the setting or structure of a Grade II listed building, Conservation Area or Grade II historic parkland. Improved management of locally/regionally important archaeological site.
Moderate Beneficial: Perceptible improvement in the setting or structure of a Grade I/II* listed building, Conservation Area or Grade I/II* historic parkland. Improved management of nationally important archaeological site.

Table 1: Significance Criteria for Cultural Heritage Issues

2.6 The methods in retrospect

The methods adopted allow a high degree of confidence that the aims of the assessment have been achieved.

3. Topography, archaeological and historical context

3.1 Site description and topography

The site lies at the east corner of the junction of Old Fallings Lane, Leacroft Avenue, Sandy Lane and the track to Bushbury reservoirs, within the parish of Bushbury, approximately 3.5km north north-east of Wolverhampton city centre (NGR: SJ 9268 0213; Figs 1 and 14). It comprises a sub-rectangular area of land, approximately 16,500m², on the south-west corner of a complex of school and nursery facilities, including Bushbury Hill Nursery, Infants School, Junior School and Moreton Community School. It is bounded by Old Fallings Lane

to the south-west, the track to the north-west, the school's buildings to the north-east, associated car parking to the east and semi-detached housing off Old Fallings Lane to the south-east.

The greater portion of the site is put to grass, which is bisected by tarmac paths and with variable mature trees toward the south-west frontage (Plates 3, 13, 15-19). A sub-rectangular area of hardcore used for car parking occupies a levelled area toward the north-west side of the lawn (Plate 18). This is accessed off a tarmac track along the north-west side of the site (Plate 17), which extends around the front of the school buildings to the car parks on the east side. Vehicular access is gained from the west and south corners of the site, off Old Fallings Lane (Plates 15 and 16).

The south-west frontages of the 1930s school buildings occupy the north-east edge of the site. They were designed in sympathy with each other, in very similar art-deco style, typical of late 19th and early 20th century public buildings. For example the south-east elevations comprise red brick, laid in English garden wall bond. The windows are tall and wide, with rounded arches, a recurring circular glazing bar motif with central stained glass detail, separated by shallow flat pilasters topped by limestone capitals along a horizontal yellow limestone band which also act as the spring for the arches. The roofs are of red clay tiles, steep pitched, projecting and half-hipped (pers comm Shona Robson-Glyde; Plates 3-6).

School Cottage is located in front of the Junior School. It comprises an early 20th century red brick house on a T-shaped footprint. It was formerly two semi-detached cottages in typical late Edwardian style. It has two storeys and a pitched grey slate roof and is without embellishment. It lies within a discrete garden, enclosed by mature shrubberies and trees, a tall brick wall to the north-east, fencing to the north-west and south-east and iron railings to the south-west (Plates 8-10).

The grounds are surrounded by wire fencing and steel post fencing (Plates 15 and 16). Toward the north-west corner of the site there are two electricity sub-stations. There is a general slope across the site from north-east to south-west, from a maximum height of *c* 168.20m AOD adjacent to the Infants School buildings, down to *c* 160.60m AOD at the south gate (Plates 17-19). Bushbury Hill rises to the north, dominating the local topography at a maximum height of *c* 184m AOD. It slopes down to the valley of the Berry Brook to north and east, and to Bushbury urban centre to west.

3.2 Geology and soils

Bushbury falls within an unsurveyed urban area. However to the north and west the predominant soils belong to the Clifton Soil Association (711n) comprising slowly permeable seasonally waterlogged reddish fine and coarse loamy soils, and similar soils with slight seasonal waterlogging, some coarse loamy soils seasonally affected by groundwater over parent material of reddish till. There are small scattered areas of the Salwick Soil Association (572m) comprising deep reddish fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging, some deep well-drained coarse loamy soils, some fine loamy soils affected by groundwater, over parent material of reddish till and glaciofluvial drift. Along the River Penk to the north-west the soils belong to the Wick 1 Soil Association (541r) comprising deep well drained coarse and sandy soils, locally over gravel, some similar soils affected by groundwater, slight risk of water erosion, over parent material of glaciofluvial or river terrace drift (Soil Survey of England and Wales 1983).

The solid geology consists of undifferentiated strata of the Triassic Kidderminster Formation of the Sherwood Sandstone Group consisting of coarse brownish-red sandstones and conglomerates (Bunter Pebble Beds), with a north/south fault to the west. To the east lie the middle coal measures, which dominate the solid geology of this part of the West Midlands. There has been occasional subsidence in this area, attributed to the old mines. However there are understood to be no mines within the immediate vicinity of the site. Drift material comprises Triassic pebble beds of pebbly red sandstone and conglomerate. Boulders of

glacial drift have been recorded on the north-west slopes of the hill (Litherland 1990, 2; Cockin, 2006, 95-6; WCC 2009, 6-7).

A soil survey was undertaken of Bushbury Hill in 1956 by pupils of Bushbury Hill Secondary School. Within the school grounds they identified clayey soils to *c* 0.60m depth, neutral green in colour, with PH7, overlying clay at c 0.75m. On the hill itself they recorded gravely soils all way down to c 0.75m depth, which was very acidic, red in colour, with PH4 (Brown 1956, 5).

Geotechnical investigations carried out in 1999 and 2003 to the north-east of the present site, between two wings of the 1930s school buildings and adjacent to the Nursery School, identified variable made ground to 0.10-0.80m depth. It comprised loose to firm gravely sand with ash and occasional brick fragments, hardcore and clinker. Red brown pebbly clay till was recorded below, to a maximum depth of 1.20m (WCC 2009b, 6).

3.3 Historic environment

3.3.1 Prehistoric and Roman

There is very little evidence for prehistoric activity or settlement in the area. In the 17th century, an unlooped brass palstave (MBL 2508) is reported to have been found '…at the back of [the house] (in a field now called Gun-birch, formerly the Birchen Leasow) is supposed to have been found the antique celt, or military weapon, which Dr Plot, conjectured to be the bras (sic) head of a catapulta…' (Shaw 1801, 181). Shaw conjectured this to be of Anglo-Saxon date, but, although lost, it is now considered to be of Bronze Age date. The find spot is thought to have been the field to the south-east of the farm.

The place-name 'Low Hill' to the south-west may indicate the site of a barrow mound, although none have been found in the vicinity to date (Litherland 1990, 6).

In later Iron Age the area is considered to have been within the control of the Cornovii tribal grouping, whose dispersed pattern of settlement with farmstead enclosures is largely known today from cropmarks along the gravel terraces either side of the River Severn to the west. Hillforts would have provided the foci for such settlement, whether as centres of the tribal elites, trade and exchange, or refuge during periods of conflict. A hillfort is thought to have existed in the parish of Hilton to the north, while place-name evidence has been tentatively used to argue that a hillfort may have been located on Bushbury Hill itself (MBL 6866; Litherland 1990, 6).

The Roman road of Watling Street (Margary 1973, 1h) lies approximately 8km to the north. This was the major route between *Londinium* and mid Wales. A side road branched off at *Pennocrucium*, near Penkridge, running southwards (along the current A449 to the west of the site) to Greensforge and Salinae (Droitwich; Margary 1973, 191 and 192). A further branch appears to have been aligned north north-west to south south-east to Featherstone, approximately 3.5km to the north-east of the site. It is unclear if it continued beyond, to Metchley Fort (Margary 1973, 190).

3.3.2 Anglo-Saxon, medieval and post-medieval

The ridgeway over Bushbury Hill has been argued by Shaw to be the major route in the early medieval period from Stafford to Wolverhampton (and probably continued as Northycote Lane sunken trackway), although this has not been substantiated (MBL 6860; Shaw 801, 181; Litherland 1990, 6-7).

There is no known Anglo-Saxon charter for Bushbury. In the 10th and 11th century the settlement is referred to as *Biscobury, Byscopesbyri, Biscopesburie* and *Byscheburie.* meaning 'Bishop's bury' or 'Bishop's fortified manor' from the Old English *Biscop* + *burh*.

However it is unclear if this is evidence of ecclesiastical ownership or simply a personal name, as there is no recorded evidence of a bishop having lived in the parish. Bury is common English place-name, and can refer to such diverse places as hill forts, manor houses or towns (MBL 6331; Shaw 1801, 176; Litherland 1990, 6; Mills 1998, 65).

The Domesday Survey of 1086 records the state of the parish prior to the Norman Conquest of 1066. The estate was held by Wulfric from whom it then passed to William, son of Ansculf. It contained 2 hides, 2½ virgates, 5 ploughs, 3 villagers, 4 smallholders with 2 ploughs and 6 acres of meadow. In addition the Countess Godiva owned one virgate of waste land (MBL 6331; Morriss 1976; Litherland 1990, 7).

St Mary's church lies 0.35km to the north-east (MBL 404). It is of 14th century date, with a 15th century perpendicular tower, although was much altered in the 19th century. There are also argued to be fragments of 12th century fabric surviving (MBL 404; Litherland 1990, 5). The base and shaft of a cross in the churchyard have been conjectured to be part of a Late Saxon cross, although this early date has recently been called into question (MBL 2517).

Bushbury Hall is located adjacent and east of the church (MBL 406). It is grade II listed and comprises a 17th century house, with a late 18th century front range of painted brick with ashlar dressings (LB# 378339). A manor house existed on the site from at least the early 16th century and is conjectured to have been surrounded by a moat in the medieval period, prior to the late 18th century alterations, although the reference may relate to activity in an adjacent field (MBL 2540 and 13589). The brick farm buildings to the north are similarly late 18th century and grade II listed (MBL 6773; LB# 378340).

The first recorded enclosures in the parish were in the later half of 17th century, although there are references to enclosure causing problems regarding rights of way within the parish as early as 1369 (MBL 6331; Litherland 1990, 9).

During the English Civil War (1642-1651) Bushbury Hall was made the local Royalist headquarters in an area which was otherwise largely Parliamentarian. On the morning of Friday 21 May 1645 Charles I is reported to have observed a skirmish from the safe vantage point on top of Bushbury Hill, when a Parliamentary squadron attacked a detachment of Royalist horse, killing 16 men and capturing 26 horses. Local tradition has it that a raised area to the north of St Mary's church is the place of burial of the Royalist casualties (Litherland 1990, 10; Cockin, 2006, 95-6).

3.3.3 Bushbury Hill Farmhouse

Bushbury Hill farmhouse (MBL 1835) is purported, on the basis of a date inscribed on the interior woodwork, to have been built in the 1780s (Chatwin 1983, 80). It has been suggested that the house was in fact *rebuilt* at this time, on the basis of a reference in the 1580s to Henry Pitt having moved to Moseley from his former residence at Bushbury Hill (Chatwin 1983, 13; Litherland 1990, 11).

The wealth of the area is indicated by a number of other estate houses in the vicinity having been rebuilt or enlarged earlier in the 18th century, including Old Fallings Hall in the 1720s, Bushbury Hall and Old Moseley Hall (Litherland 1990, 11). However this does not provide firm evidence for the assertion that Bushbury Hill Farm House was similarly rebuilt on the site of a earlier building, rather than being a new built house on previously unoccupied land.

Stebbing Shaw, who referred to the parish as *Byshbury* (Shaw 1801, 176-93), described the house as follows:

> 'Near the top of the hill, above the church, on the south side, is the handsome modern-built house and offices of Richard Phillips, esq.' (Shaw 1801, 181).

Richard Phillips (1755-1833) occupied the house until his death. When his widow Elizabeth died in 1843 it passed to their fourth child, Escrike (1787-1871), who had previously resided at the nearby Underhill Farm. Escrike was involved in bloodstock breeding, with some success, most notably when his horse 'Truth' won the Cambridgeshire Stakes in 1851. The stables at the farm were then known as 'Bushbury Paddocks'. Escrike's eldest son, Henry died in 1876, at the age of 36, leaving a young son Escrike Henry born that same year. Chatwin recorded that in the later 19th century the farm passed to William Hordern Clifft , who emigrated to New Zealand in 1913. There is no forthcoming evidence for this however. Indentures indicate that in 1899 Escrike Sidney Phillips sold his interest in the farm to Henry Lovatt. Lovatt appears to have then leased it to Randle Bernard Jeavons. The Lovatt family then sold their interest in the farm to the Low Hill Bushbury Estate Company Ltd in 1919 (Chatwin 1983, 80; WA: P/4206 and DEEDS/L10).

A diary and booklet dated 1900/1901 (WA: D-NAJ/C/1/JE2) and signed by Randle Bernard Jeavons, the tenant farmer, lists the buildings around the farm, as follows:

> Boiling House, Malt Room, Shed under Hall Room, Cattle Yard, Cow House, Turnip House, Cutting Loft, Granary, Pigeon Pen under Granary, Rick Yard, Malt Yard

and the stock, as follows:

> 42 lambs, 33 ewes, 1 ram, 1 sow, 8 pigs, 1 foal, 1 filley, 1 blood mare, 3 cart horses, 2 bullocks, 1 bull, 2 calves, miscellaneous cows

Jeavons remained as tenant farmer, lessee and occupier of Bushbury Hill Farm until his death in the first half of 1925. A valuation of all of the fixtures, produce, crops, tenant rights, etc was drawn up (WA: D-NAJ/C1/JE2 and DEEDS/L10; see Appendix 3), when the property was taken over by the Housing Committee of Wolverhampton Corporation, as part of wide scale local authority land purchase in advance of planned housing schemes.

After the sale of the adjoining fields and farm equipment the agricultural function of the farm ceased. In the 1930s and 1940s the house was used as the headquarters of the 'TOC H' movement. This is a charitable organisation involved in school, family, neighbourhood and community volunteer and mutual support projects. It was originally established in 1915 during WWI in the Belgian town of Poperinge, which lay to the rear of the trenches, by the Reverend Phillip Thomas Byard 'Tubby' Clayton, to aid the rest and recuperation of the exhausted soldiers from the front (TOH C website).

The only two known photographs of the house appear to date from the 1930s or early 1940s, when it was in use as a Sunday School and by the TOC H (Plates 1 and 2; WA: P/4206 and 4207). In may be possible to further pinpoint the date of the former photo. It may have been taken during WWII, on the basis of what appear to be sandbags piled up in front of the only visible ground floor window. Further, the lack of foliage and the boys duffle coats indicates it to be late autumn or winter.

The photos show the house as a large rectangular brick building, of three storeys and three bays. A central entrance is surrounded by a portico with engaged columns and a semi-circular fanlight surmounted by an open pediment. The window details repeat the axial emphasis of the portico, and are all sash. The two on the ground floor appear to be oriel windows, with twelve central panes. The central first floor window contains twelve panes; those either side contain sixteen panes. A narrow protruding string course runs directly below the first floor window sills. The attic windows are half normal height. The central one contains six panes; those either side contain eight. The shallow pitch hipped roof is hidden behind a low parapet, with plain tall narrow chimney stacks at each corner. To the north-west a tall brick wall appears to butt the house and is recessed back from the front elevation. In the earlier photo the garden appears to contain many mature trees and shrubberies, while probable rose bushes occupy the frontage, directly behind the perimeter wall. This front wall comprises fourteen

courses of brick, below a course of rounded coping bricks. The bond is unclear. The bricks are bedded on at least two courses of dressed stone.

3.3.4 Cartographic sources

Cartographic sources identify the settlement as *Bishopbury* into the 17th century (ie Speed 1610, Blaeu 1648). It had largely settled on the current name *Bushbury* by the end of the century (Morden 1795).

The county maps of the 17th and 18th centuries generally indicate the existence of Bushbury, but with very little detail. For example Bowen's map for Gower of 1749 (Fig 2) denotes Bushbury, with a generic church image for St Mary's church (MBL 404) to the west of the road (Bushbury Lane), and a generic house image to the east. It is unclear exactly which house this is, although it is most likely to represent Bushbury Hall (MBL 406), which lies immediately adjacent to the church. Bliss's map of 1766 specifically names Bushbury Hill, with a depiction of the topography but no detail of buildings (Fig 2).

Yates' map of 1775 (Fig 3) is the earliest accurate representation of the layout of the major roads in Staffordshire. It appears to show a sub-rectangular building or property on the corner of Old Fallings Lane and the track up over the spine of the hill. This is the earliest indication of a building on the site.

Godson's map of 1788 (Fig 3) indicates the road up to Bushbury and the main settlement, but there is no mention of Bushbury Hill itself. Greenwood's map of 1820 (Fig 4) indicates Bushbury Hill and a number of buildings set back from the road, although it is unclear if they relate to the farm or not.

The 1831 map of Wolverhampton (Fig 4) is at a suitable scale to show some detail of the site. An L-shaped building occupies the north-west side, with one large building flanked by two smaller structures to the south-east, within a rectangular boundary. Interestingly given that it is subtitled 'from the Ordnance Survey', Bushbury is denoted as *Rysbury*, a variant which is not documented elsewhere.

The 1834 OS 1" map (Fig 5) contains more topographic detail generally, but only an amorphous block to depict the buildings, within a sub-rectangular property boundary.

There is reportedly a tithe map and apportionment for Bushbury Hill, which is referred to by Litherland (1990) although this was unavailable during the current project.

The *c* 1878 Staffordshire map (Fig 5) records a different layout to that of previous maps. A long narrow building faces the road frontage, with a long narrow L-shaped building extending behind and to the north-west. A small square building occupies the north-west corner and a sub-circular pond lies alongside the south-west frontage, between the house and road.

The 1st edition Ordnance Survey map of 1884 (Fig 6) is the earliest to depict the site in a full detail, which differs from the earlier maps. The farm is divided into a number of discrete areas. The main house is a substantial squarish building with apparent flights of steps off the south-west and north-east elevations, and a rectangular bay protruding from the north-west elevation. It lies within the centre of the property with outhouses to the north-west and south-east. A wide plot occupies the entire frontage alongside the road. This is bisected by a curving drive, flanked by trees, which enters the site from the north-west and south corners. A pond lies within the south-eastern angle of the drive, which sweeps up to the house and peels off around the south-eastern side of two aforementioned outhouses which are presumably coach house and stables. The pond is enclosed around its north-west side. The farmyard itself lies toward the north corner of the site, enclosed on all sides by farm buildings. It is accessed off the track along the north-western boundary, which also allows access to the northern yard with two further buildings to the rear of the farmyard. An

enclosed narrow stretch along the north-east side of the site allows access between the latter yard and the field to the south-east. The eastern third of the farm comprises three adjacent sub-rectangular plots; that to the southern contains trees; that to the east is bisected by a single path out toward the adjacent fields; while that to the north is bisected by rectilinear paths which may indicate that it contained a formal garden rather than being paddocks.

The farm lies within a landscape of large fields and coppices. Fields lie to the immediate north-east and south-east. A strip of mixed woodland and the 'Old Gravel Pit' occupy the opposite side of the track to the north-west which runs up the ridge of Bushbury Hill. The majority of the field boundaries and the roadsides are tree lined.

The plans of 1895 and 1899 drawn to accompany indentures (Fig 7) are conjectured to be based on the 1st edition OS map. The latter in particular appears to be very circumspect with regard to the detail of the buildings which are only roughly drawn. It cannot therefore be taken as representative of their accurate layout. The accompanying schedule (WA: DEEDS/L10) however, describes the individual plots in some detail:

No.	Description	State	Quantity (a/r/p)
610	Drive etc		-/ 2/ 36
611	House Buildings Fold Yards etc		-/ 3/ 2
612	Orchard		-/ 1/ 11
613	Garden etc		-/ 3/ 13
617	The Slang	Pasture	3/ 1/ 10
633	Pool	Water	-/ -/ 20
634	Croft	Pasture	2/ 1/ 8
645	The Innage	Arable	7/ 3/ 24

The OS map of 1902 (Fig 8) indicates no change to the layout of the farm buildings. A pump ('P') is shown at the north corner of the southernmost outhouse. The boundary around the north-western side of the pond appears to have been removed, as do the rectilinear paths and the access off the main drive beside the aforementioned outhouses. Lastly, the northern yard has been divided into two halves.

The plan of 1906 drawn to accompany an indenture (Fig 8) depicts only the larger buildings, so (as with those of 1895 and 1899 above) cannot be considered as an accurate indication of the layout of the farm buildings at the time. The same may be argued for the Bushbury Hill Farm and Low Hill Farm estate plan of 1919 (Fig 9), although it does identify a previously unrecorded structure within the eastern plot as 'cottages'. A schedule accompanying an indenture of 1920 (D-WA: NAJ/C/1/JE2) describes the farm as follows:

No.	Description	Quantity (a/r/p)
554	House, Buildings, Folds, Two Cottages, Garden and Orchard	2/ 3/ 1

The OS map of 1923 (Fig 9) reveals that the cottages are in fact two semi-detached houses with outhouses immediately to the north-east. They are accessed along a track laid along the outside of the south-east perimeter of the farm. The enclosed track which formerly lay inside the north-east boundary has been subsumed within the two plots it previously lay alongside. Lastly the south-eastern portion of the north yard has been opened out as part of a wider plot, enclosed out of the wider field which lies to the north-east of the farm. A small rectangular gravel pit has been dug adjacent within the aforesaid field.

The two plans of 1926 drawn to accompany an Inland Revenue Office land tax redemption form and an indenture (Fig 10) appear to be based on the 1902 and 1923 OS maps

respectively. While their accuracy may be called into question (neither include the cottages which had been erected by 1919) the accompanying schedule lists the plot details as:

No.	Description	State	Quantity (a/r/p)
553	Crab Field	Pasture	11/ 3/ 20
554	House, Buildings, Folds, Two Cottages, Garden and Orchard		-
583	The Innage	Arable	7/ 3/ 6

The plan published by Alfred Hinde in 1927 (Fig 11) is the first of a series of editions produced through the 20th century. They are not at a suitable scale to show any detail of the site, although they do indicate the footprint of the larger public buildings (including schools). This edition is of incidental interest however, as it shows the proposed road layout for a housing estate between Old Fallings Lane, Bushbury Hill, Underhill Lane and Cannock Road. This would have mirrored the 'spider web' layout of Low Hill Estate to the south-west built in the late 1920s. The western end of this scheme would have lain over the current site and the Bushbury Hill schools where a major east-west aligned road would have been constructed. These plans did not get off the drawing board and a different housing scheme was adopted when the estate was built in the early years of the 1930s.

Bushbury Hill Junior School opened in August 1930, as Old Fallings Temporary Junior Mixed School (WA: D-EDS-22). Bushbury Hill County Secondary School opened in 1931. It closed in 1974 when pupils moved to Heath Park Hill School (WA: D-EDS-132). Bushbury Hill Infants' School was built in 1933 by E Orton & Dalby of Hugglescote, Leicestershire (WA: D-LEG/1933/2-38) to the specification drawn up by the Borough Engineer (Fig 12). The school opened in April 1934 (WA: D-EDS-22).

The plans by H B Robinson, the Borough Engineer, in 1933 (Fig 12), show the building details for the new Infants School to be erected to the north-west of the Junior School buildings. Unfortunately they do not encompass the area of the farm buildings, although the outline of the cottages is included along with iron fencing, cleft chestnut fencing, tar paved paths and tar paving in front of a cycle shed along the perimeter.

The OS map of 1937 (Fig 13) indicates the full extent of all three school buildings which occupy the former field to the north of the farm, along with the housing estates to the south and east. The schools are accessed off Old Fallings Lane to the south and the track up Bushbury Hill to the north-west. Playing fields occupy the former field to the south-east. The layout of the farm has changed very little. To the south the pond has been filled in and the tree cover extended over it. Trees also now cover the plot to the immediate south-east of the farmyard, while to the north the yard which had previously been divided was once again unified.

The map by W M Law, Borough Engineer, in 1946 appears to be based on the previous OS map, and reveals no alterations to the layout of the farm or the adjacent schools buildings. Although the farm was demolished in 1948, the map drawn to denote the libraries within the County Borough of Wolverhampton in the 1950s indicates it erroneously as extant.

The house and farm buildings are documented as having been demolished in 1948 (Litherland 1990, 17).

The OS map of 1954 (Fig 13) is the first to show the site after the demolition of the farm buildings. The area of trees along the Old Fallings Lane frontage has been retained, within a new irregular zigzag boundary. The cottages are named for the first time, as 'Farm Cottage' and 'School Cottage'. The area of the main house and the southern third of the farmyard are empty, while the northern portion of the site (previously occupied by the north two-thirds of the farmyard and the north yard) is occupied by three blocks of school buildings with associated paths. These are conjectured to be a dining room block, recorded as erected in

1950 (WA: D-LEG/1950/1-3), additional classrooms and a hut, added in 1952 (WA: D-LEG/1952/14-1 and 15-7). The site appears to have been scarped and levelled along the north-eastern boundary, although it is unclear to what degree. Lastly the nursery has been built to the north-west of the school buildings.

The OS map of 1973 reveals no apparent difference to the layout of the site and adjacent schools buildings, although the former gravel quarries to the north-west of the track have been infilled and trees planted over. Moreton Community School was built to the south-east side of Bushbury Hill School in 1987 (WA: DX-949/4).

A series of aerial photographs from the first few years of the 21st century reveal a small number of alterations. By 2001 two of the 1950s school buildings have been removed and the area of the south-westernmost was in its current use for car parking. The playing field to the south-east of the cottages has been dug up and replaced with tarmac car parking and shrubberies. By 2004 the last of the 1950s blocks (a dining hall and kitchen) has been removed and the area appears to be rough gravel. A block has been built to infill between the north-west and middle school buildings. By 2006 there have been no further apparent alterations, although there is a possible faint parch mark indicating the line of the former curving drive across the south-western side of the site (WCC 2009b, Figs 8-10).

3.3.5 Geophysical Survey

The full geophysical survey report by Stratascan (Smalley 2009) is presented as Appendix 3. In summary:

The survey was undertaken of the grassed area which occupies the majority of the site. Using both gradiometer and resistance meters, a number of features were identified of possible archaeological origin, particularly relating to the presence of buried structural remains (Smalley 2009, 9 and Fig 10).

Some correlation is possible between the known layout of the farm and the survey results. This includes a spread of debris across the location of the house, the western portion of the farm yard buildings and the southern section of the drive. The lack of other correlations may indicate that the rest of the farm buildings' foundations were removed during demolition and levelling in advance of construction of the 1950s school buildings. There is no indication of the position of the pump noted on the OS map of 1902 (Figs 8 and 15).

There is also an oval anomaly of unknown origin within the vicinity of the pond. In addition there are a large number of irregular anomalies, particularly within the western corner of the site, which cannot at present be ascribed to any features recorded on the cartographic sources. It is not possible at this stage to conjecture whether they are of earlier or later origin.

3.4 Statutory and other designations

Bushbury Hill Conservation Area was designated in 1972. It occupies approximately 58.7 hectares of largely open space to the north and east of the school grounds. It also encompasses the reservoirs, St Mary's church, Bushbury Hall and Bushbury Cemetery (Town Planning Committee 1995).

There are no listed buildings or scheduled ancient monuments either on, or in the immediate vicinity of the site. The nearest are Bushbury Hall and associated farm buildings, approximately 0.3km to the north-west, which are not visible from the site.

The below ground archaeological potential of the site and the significance of remains is still somewhat indeterminate. There would appear to be deposits relating to the Georgian house itself, along with portions of the farmyard buildings and the drive. Should there only be archaeological deposits associated with the Georgian and later buildings then these may be

considered to be *local significance* only, and hence any impact on them would be *minor adverse*. However, if remains of earlier structures or activity exist (for example a house or farmstead with an associated pond of late medieval or earlier date), then these may be considered to be of *regional significance*, so any disturbance would have a *moderate adverse* impact.

The original school buildings along the north-east side of the site are typical of 1930s public building style and are integral to the surrounding housing estate which was planned and developed in the later 1920s and early 1930s. They therefore have group value as part of this sub-urban landscape. The windows along the south-west frontage are a common development from early 19th century industrial designs. However, the recurring circular glazing bar motif is unusual and potentially unique to Bushbury Hill (pers comm Shona Robson-Glyde). The existing school buildings are therefore of at least *local* and potentially *regional significance*, so their demolition or significant alteration to the site is considered to have a *moderate adverse* impact.

4. Potential impacts

The exact footprint of the proposed development, and the depth of groundworks involved (foundations, services, landscaping, etc), is at present unavailable. It is therefore not possible to determine exactly what impact the proposed development will have on below ground archaeological remains.

5. Mitigation

In order to mitigate any potential impacts of the development, the following actions are recommended.

It is recommended that an archaeological evaluation be undertaken with a series of trial trenches excavated across those available areas of the site, to ascertain the state of survival of the probable foundation walls and yard surfaces of the Georgian house, farm and associated buildings as identified by the geophysical survey and to determine if there is any evidence of earlier structures, layers or deposits predating the known house and farm.

The results of this evaluation should inform future mitigation strategy.

It is understood that geotechnical and environmental ground investigation works in the form of machine excavated trial pits and boreholes have been recommended (WCC 2009b, 19). Depending on their timescale, they may also be archaeologically monitored.

If the existing 1930s school buildings and the associated cottages are not to be retained within the current development proposal, then it is recommended that they be recorded, with a photographic or level 1 survey, as defined in English Heritage guidance (EH 2006).

The scope and specification of mitigation works will be agreed with Mike Shaw (Black Country Archaeologist, Wolverhampton City Council).

Any site investigation works or watching briefs required would be concluded by production of an archaeological report (and appropriate publication) to be deposited for public consultation with the Black Country Sites and Monuments Record (BCSMR) and a project archive to be deposited at Wolverhampton Museum and Art Gallery.

6. Residual effects

Implementation of the mitigation proposed above should ensure that there are no residual effects on the historic environment and archaeological resource from the proposed development. Mitigation should ensure that adverse impacts are restricted in scope to *not significant.*

The historic environment is a non-renewable resource and therefore cannot be directly replaced. However mitigation through recording and investigation also produces an important research dividend that can be used for the better understanding of the county's history and contribute to local and regional research agendas.

7. Publication summary

The Service has a professional obligation to publish the results of archaeological projects within a reasonable period of time. To this end, the Service intends to use this summary as the basis for publication through local or regional journals. The client is requested to consider the content of this section as being acceptable for such publication.

A desk-based assessment and geophysical survey were undertaken on behalf of Jacobs UK Ltd of Bushbury Hill Primary School, Old Fallings Lane, Bushbury, Wolverhampton (NGR: SJ 9268 0213; BCSMR: MBL 1835).

The farm is known to have existed from the 1780s, although there is cartographic evidence that a house may have occupied the site in 1775, and circumstantial evidence for a house as early as the 1580s. The house comprised a three storey, three bay brick building with sash windows and a shallow hipped roof. It overlooked a garden with trees, a oval pond enclosed by a wide sweeping drive off Old Fallings Lane. The farmyard buildings lay toward the north, while discrete paddocks, an orchard and a possible formal garden occupied the south-east side. The farm was owned and occupied by the Phillips family through the 18th and 19th centuries. In 1925 the then owners, Low Hill Bushbury Estate Company Ltd, sold it to Wolverhampton Corporation, who built the schools buildings to the north-east between 1930-3, and leased the house to the TOC H charitable organisation. The farm was finally demolished in 1948 and the land subsumed within the school.

The geophysical survey has identified extant buried deposits associated with the house, the eastern portion of the farmyard and the drive. The other elements of the farm may have been largely removed during demolition and subsequent landscaping. There are also a large number of irregular anomalies which cannot at present be ascribed to known farm buildings, nor can they be assigned a date.

The below ground archaeological potential of the site is therefore still somewhat indeterminate. It is recommended that further evaluation be undertaken with trial trenches excavated across the anomalies and a sample of apparently blank areas along with monitoring of any proposed geotechnical investigations.

The original school buildings along the north-east side of the site are typical of 1930s public building style and are integral to the surrounding housing estate which was planned and developed in the later 1920s and early 1930s. They therefore have group value as part of this sub-urban landscape. The recurring circular glazing bar motif design in the windows is unusual and potentially unique. It is therefore recommended that recording by undertaken of these buildings prior to alteration or demolition.

8. Acknowledgements

The Service would like to thank the following for their kind assistance in the successful conclusion of this project, David Warren and Bill Mantle (Jacobs UK Ltd), staff at Wolverhampton Archives and Local Studies, Simon Stowe, Richard Smalley and Bryony Marsh (Stratascan Ltd), Neil Woolley and Peng Seong Beh (Property Services, Wolverhampton City Council), Mrs Sue Cheyne (Head Teacher, Bushbury Hill Primary School), and Mike Shaw (Black Country Archaeologist, Wolverhampton City Council).

9. Personnel

The assessment was managed and undertaken by Tom Vaughan. Illustrations were prepared by Carolyn Hunt.

Plates

Plate 1, Three children sitting on a wall in front of the farm building (left to right: Raymond Brown, John Gillam and Leonard Brown), 1940s?, WA: P/4206 (reproduced with the permission of Wolverhampton Archives & Local Studies)

Plate 2, Reproduction of an original photograph of the farmhouse, when it was in use as a Sunday School; date unknown, 1930s?, WA: P/4207 (reproduced with the permission of Wolverhampton Archives & Local Studies)

Plate 3, School buildings, south-west range, view north-east

Plate 4, 1933 school building, detail of south-west elevation, view north-east (see Fig 12)

Plate 5, 1930 school building, detail of south-west elevation, view north

Plate 6, 1931 school building, detail of south-west elevation, view east

Plate 7, Outbuilding to south-east end of former cycle sheds, view west

Plate 8, Former cycle shed and brick boundary wall with School Cottage, view south

Plate 9, School Cottage, north-east elevation, view west

Plate 10, School Cottage, south-east elevation, view north-west

Plate 11, General view north-east toward 1931 school building, alongside south access

Plate 12, General view north toward 1930 school building and south access from south car park

Plate 13, General view south-west from front of school buildings, across to Old Fallings Lane frontage with School Cottage perimeter to left

Plate 14, General view north-west along front of school buildings

Plate 15, General view north-west from south access of Old Fallings Lane across frontage and location of farm pond

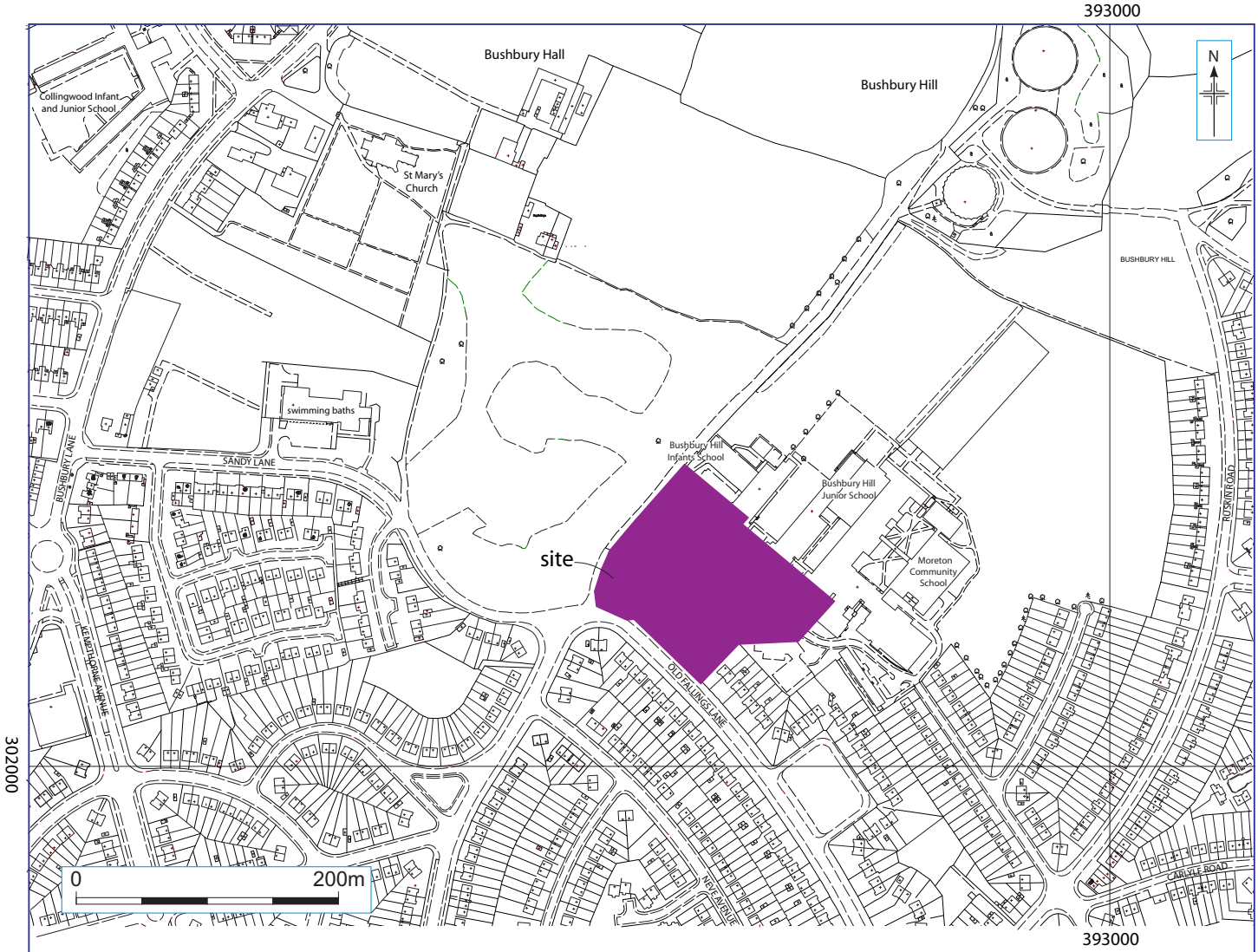
Plate 16, General view east from corner of Leacroft Avenue and Sandys Lane

Plate 17, General view west from in front of school buildings

Plate 18, General view south-west from in front of school buildings

Plate 19, General view south from in front of school buildings

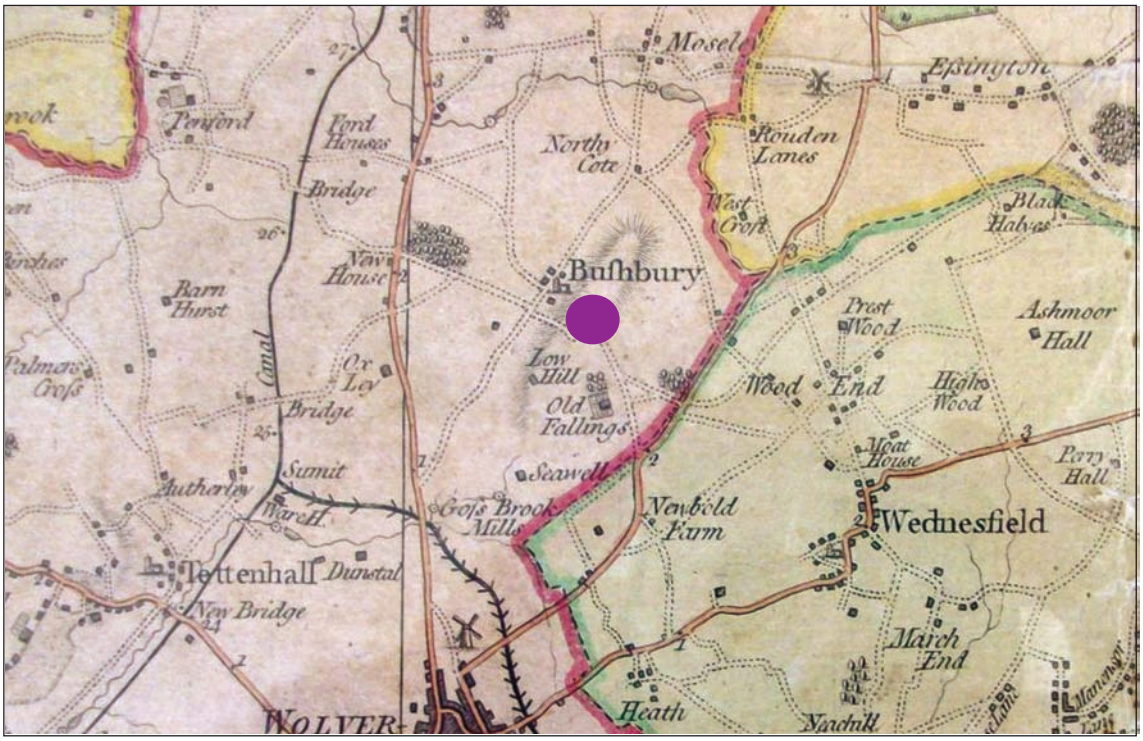
Figures



Location of the site *Figure 1*

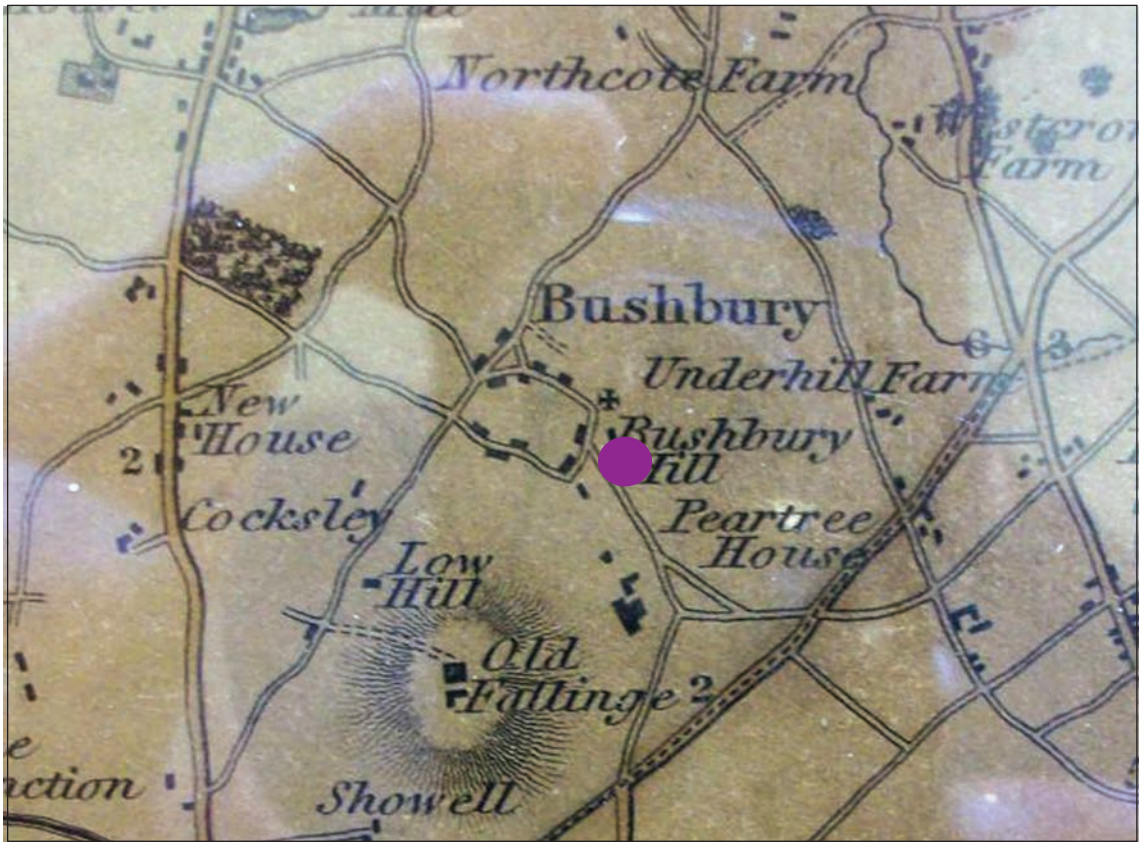
Gower map, 1749

Bliss map, 1766 *Figure 2*



Yates map, 1775

Godson map, 1788 *Figure 3*

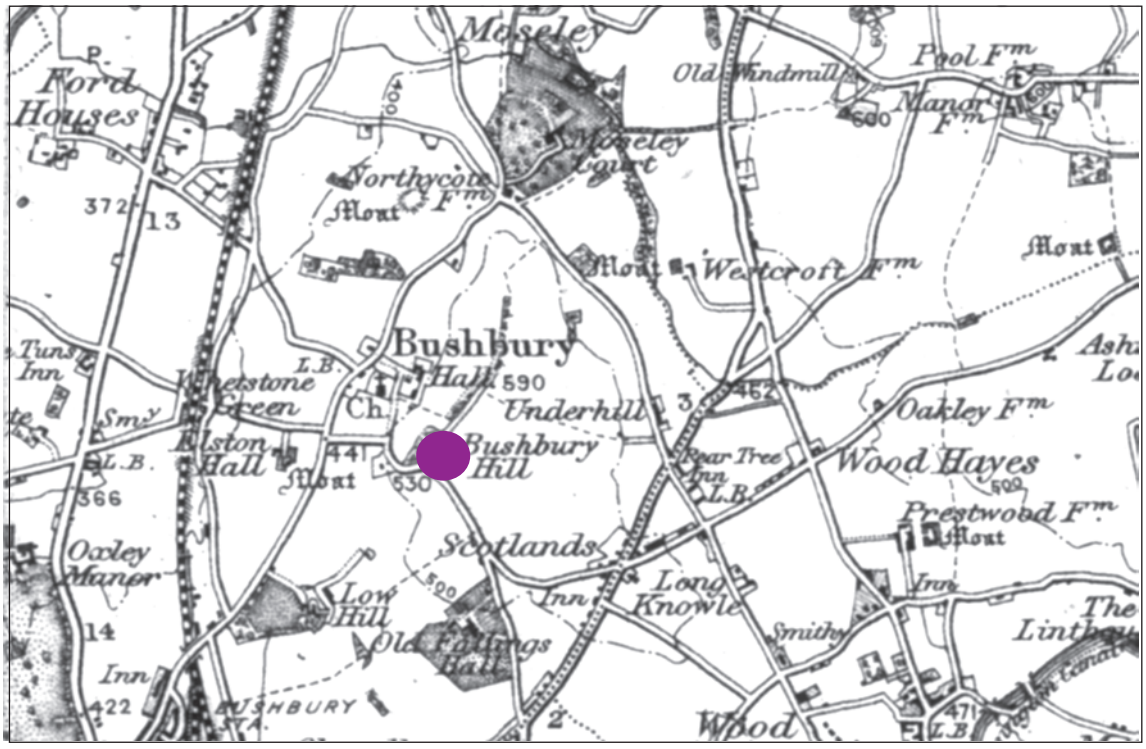


Greenwood map, 1820

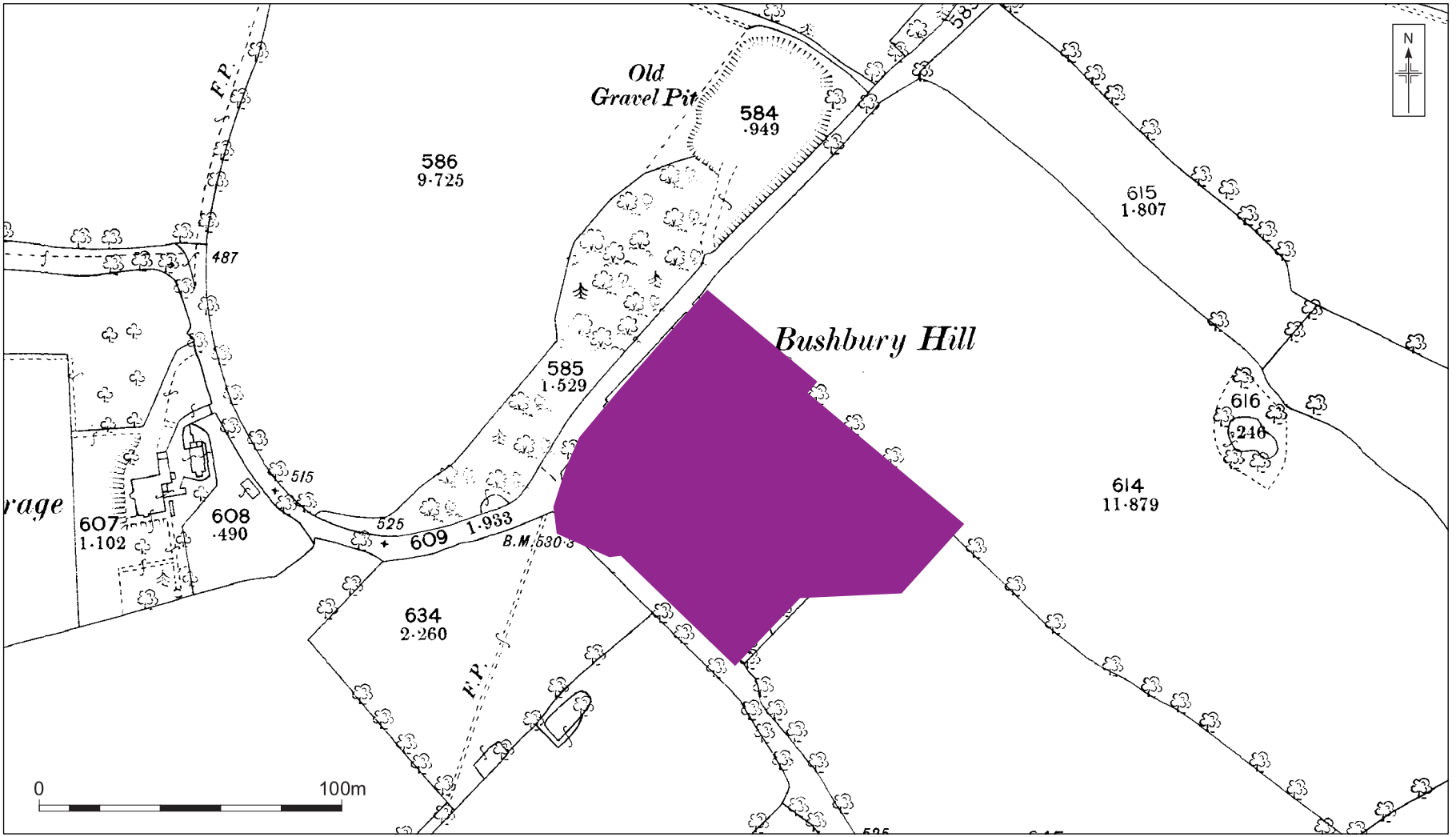
1831 map of Wolverhampton

Figure 4

Ist edition 1" OS map, 1834

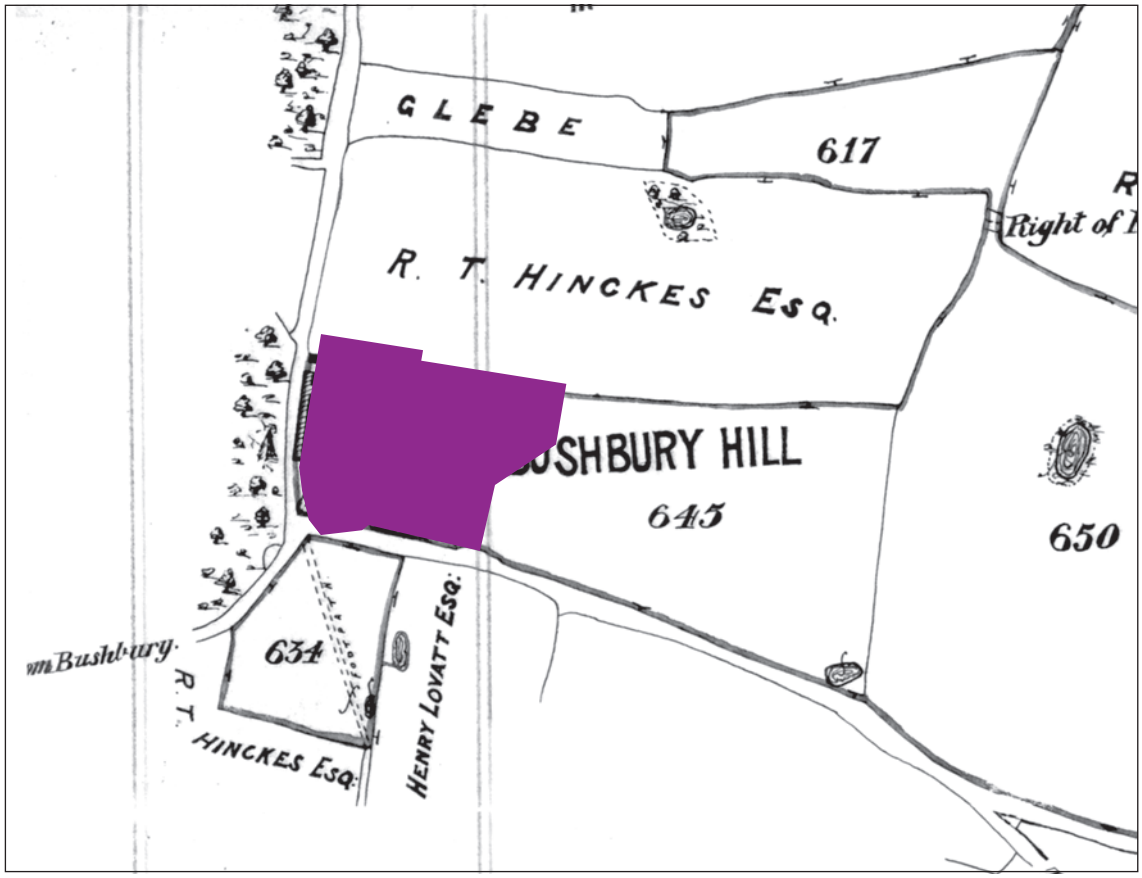


1878 map *Figure 5*

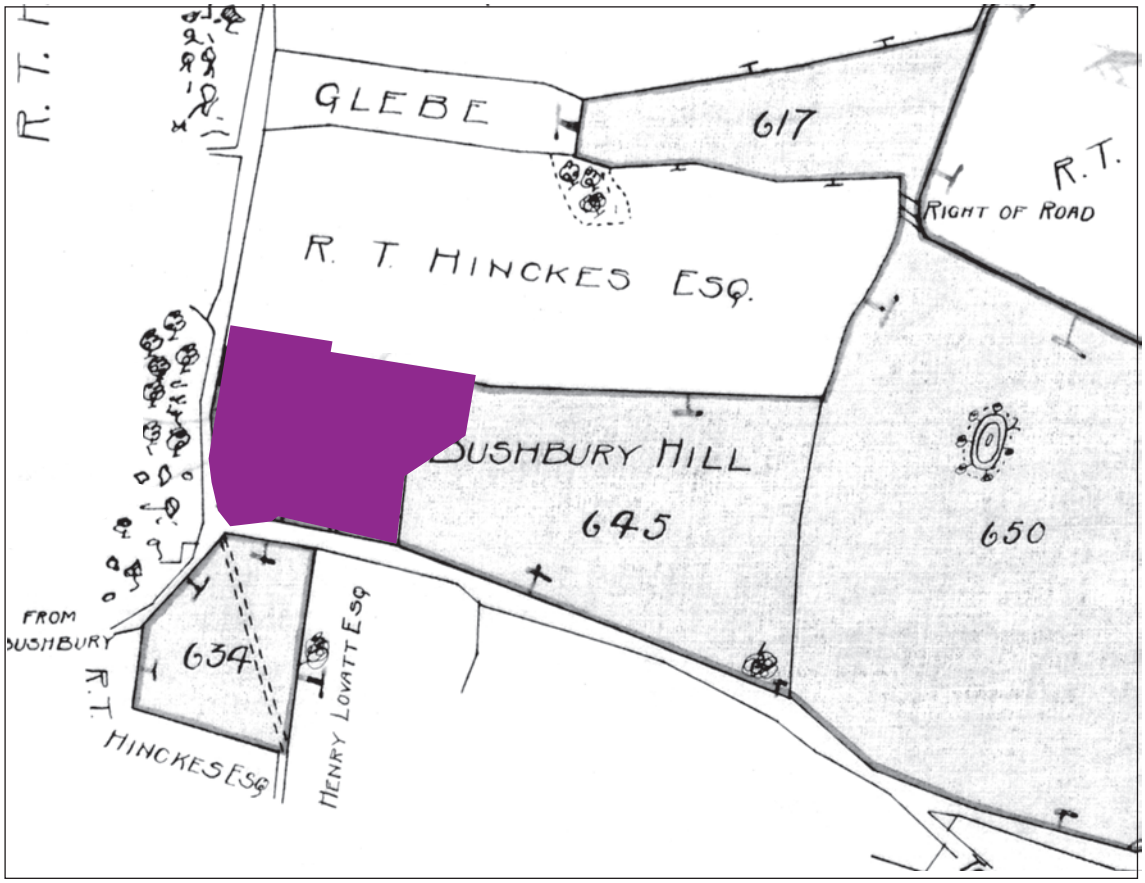


Extract from 1st edition (1884) OS map, 25"

Figure 6

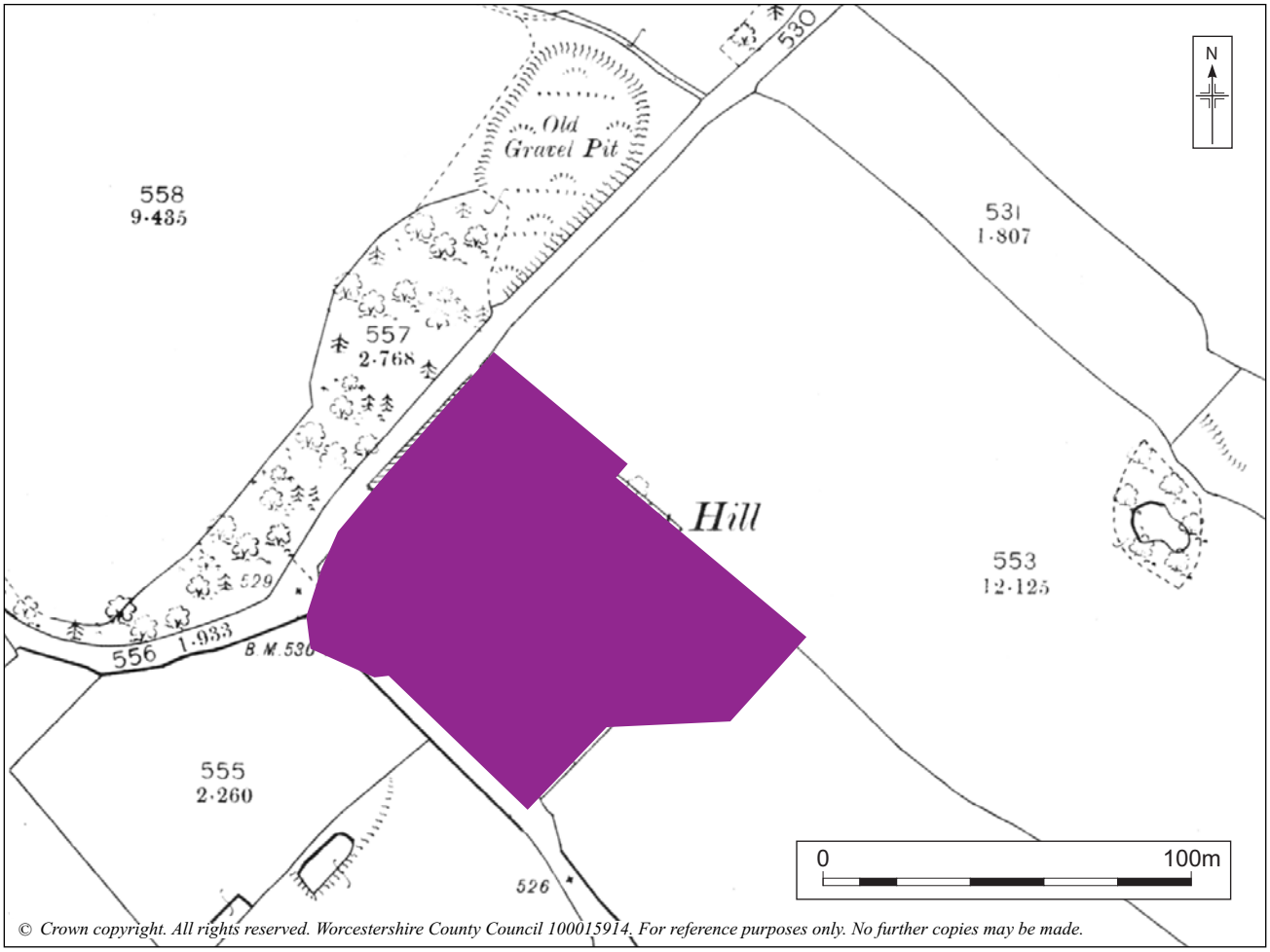


1895 plan accompanying Indenture

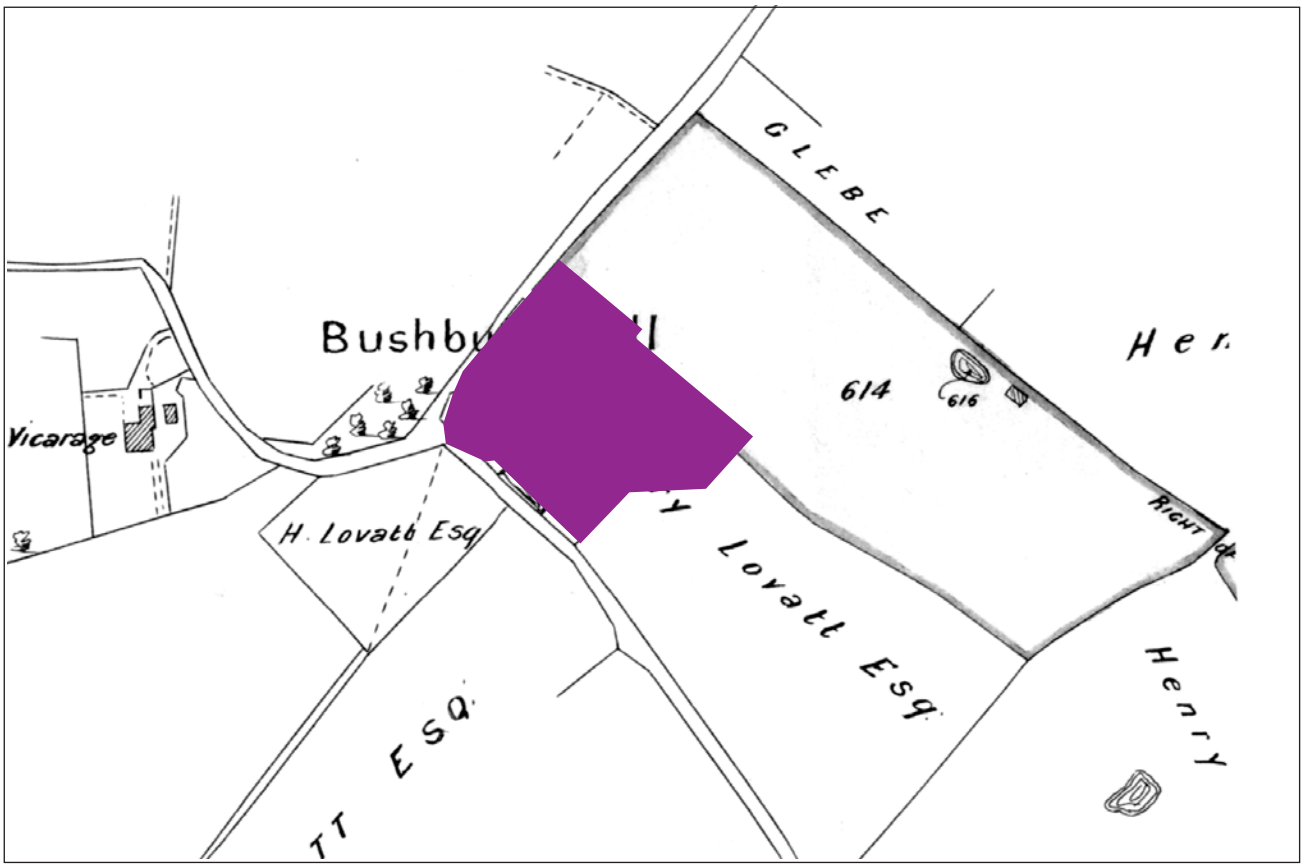


1899 plan accompanying Indenture

Figure 7

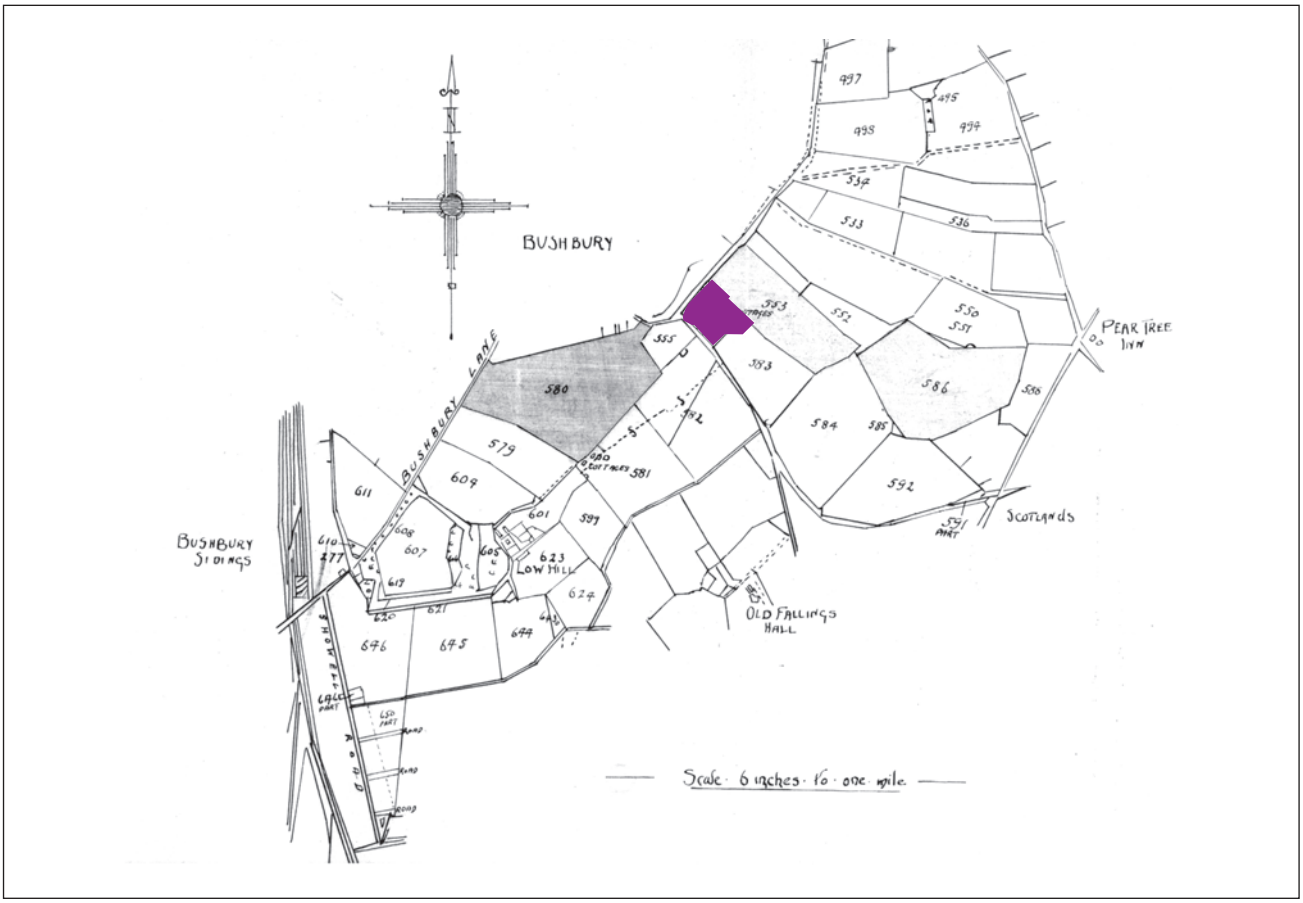


Extract from 1902 OS map, 25"

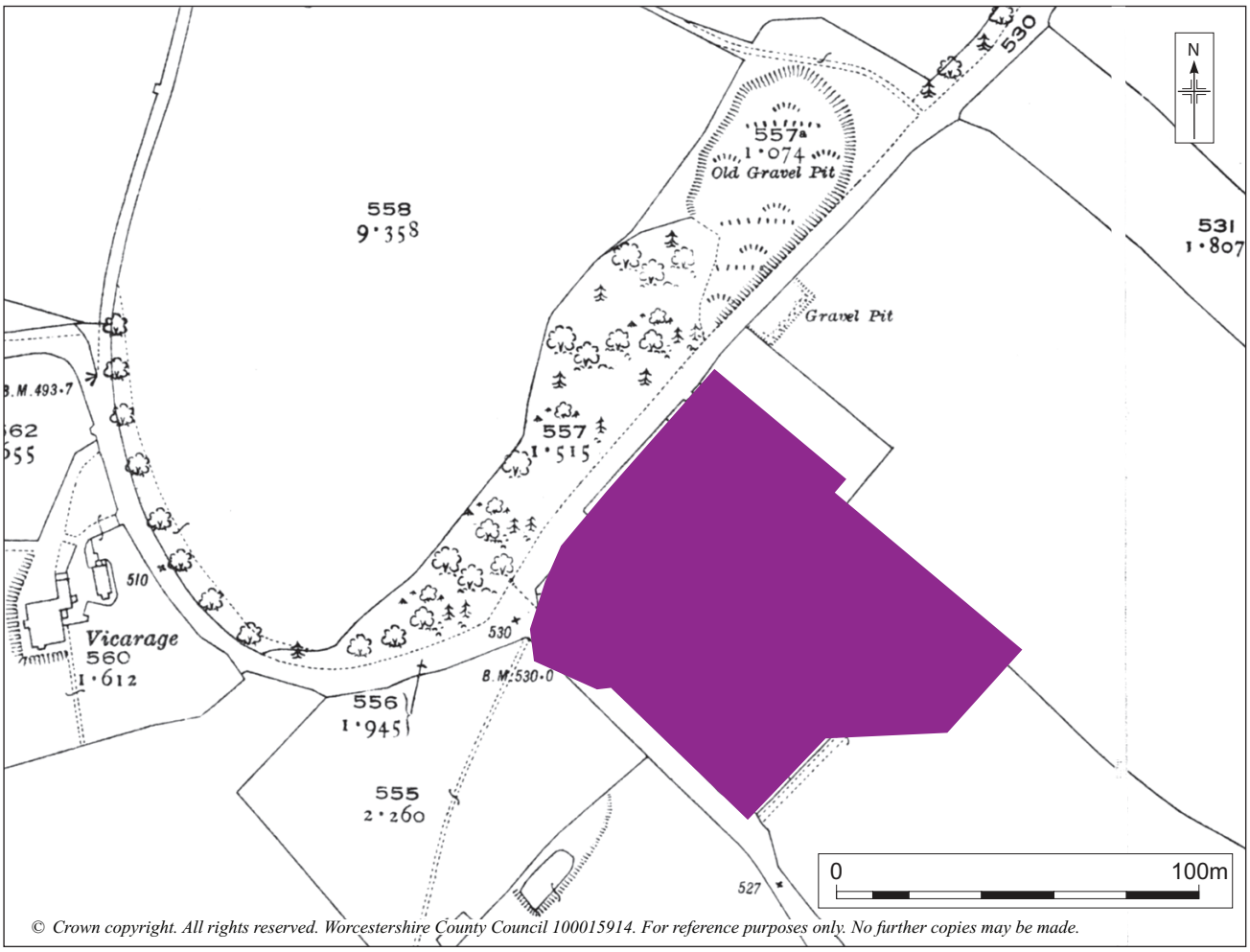


1906 plan accompanying Indenture

Figure 8



1919 plan accompanying Indenture

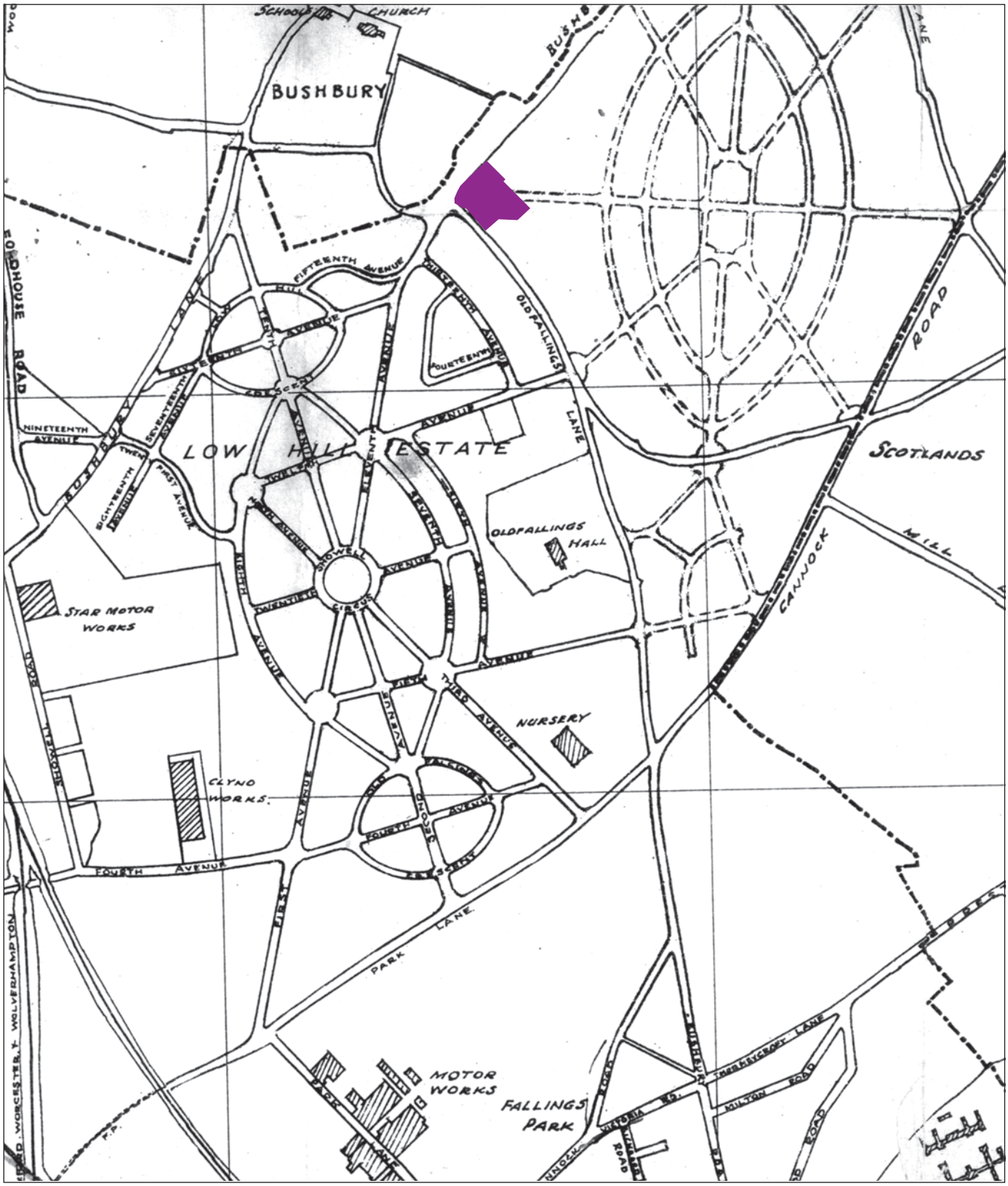


Extract from 1923 OS map, 25"

Figure 9

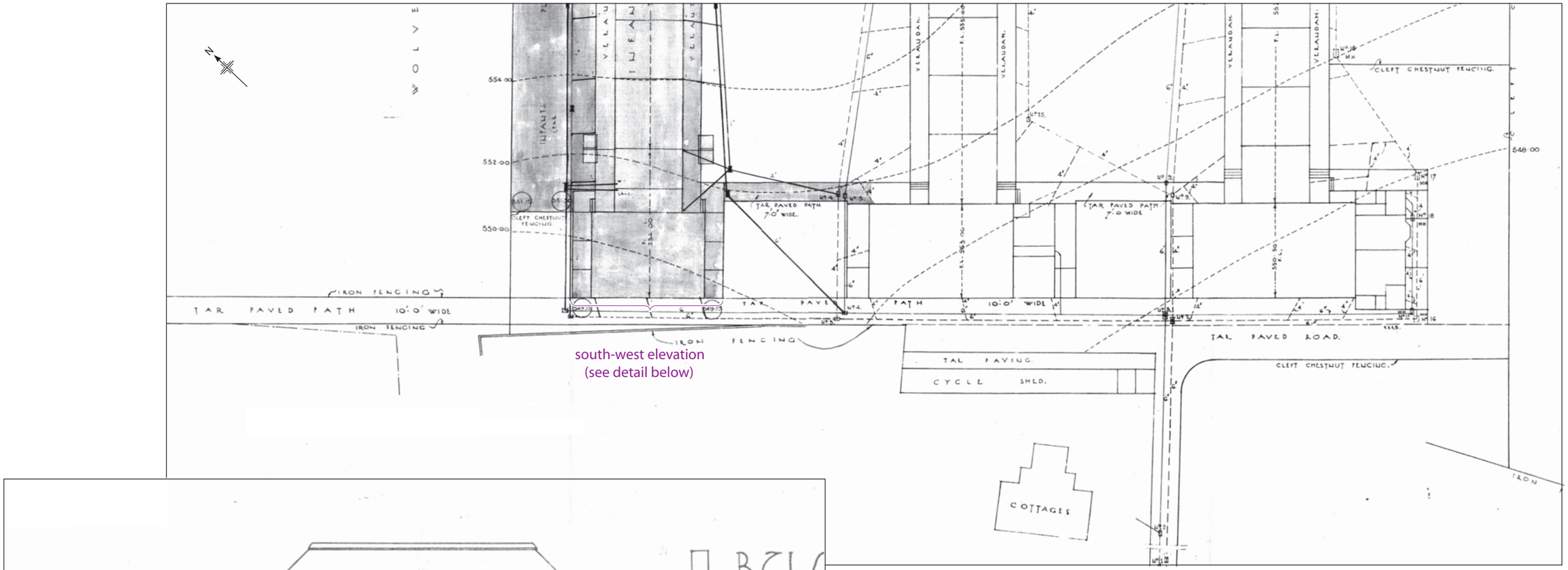
1926 plan accompanying Inland Revenue Office Land Redemption Form

1926 plan accompanying Indenture *Figure 10*

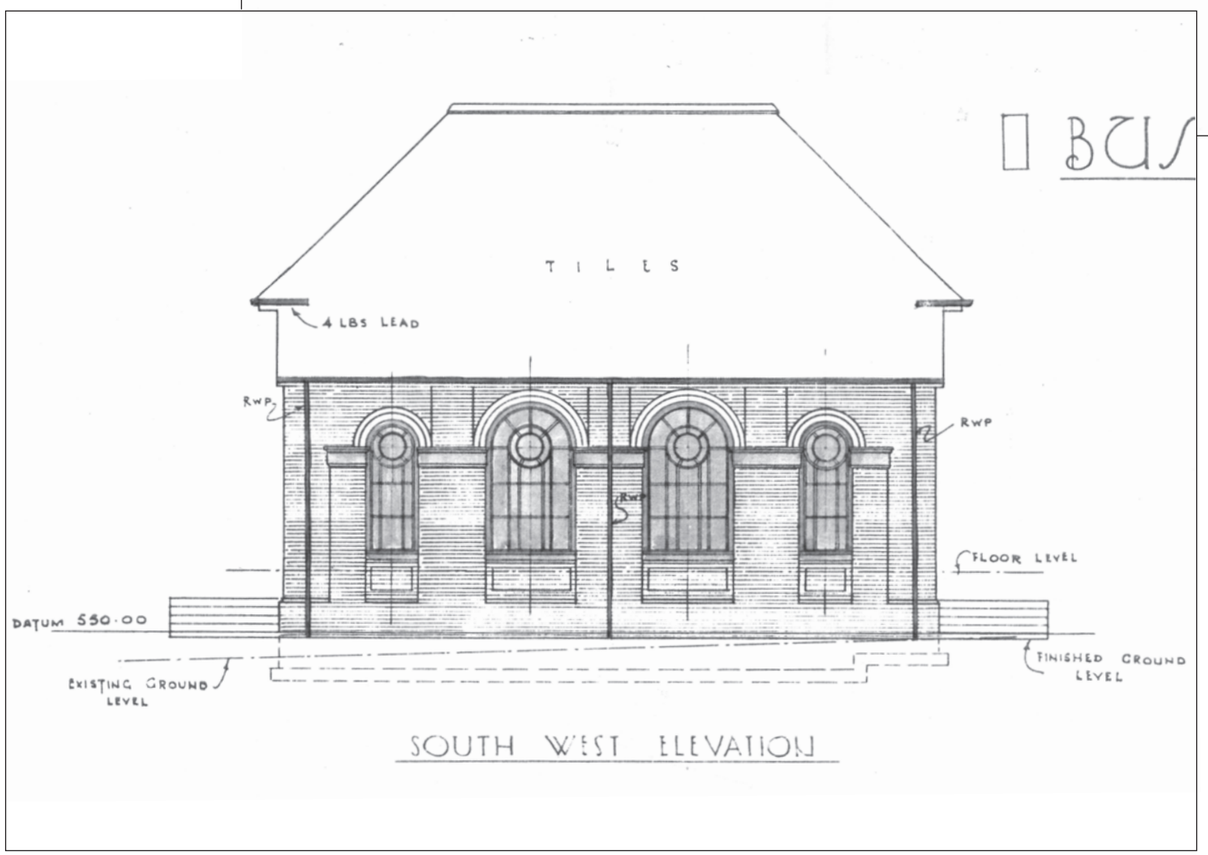


Hinde 1927 plan of proposed development

Figure 11



south-west elevation
(see detail below)



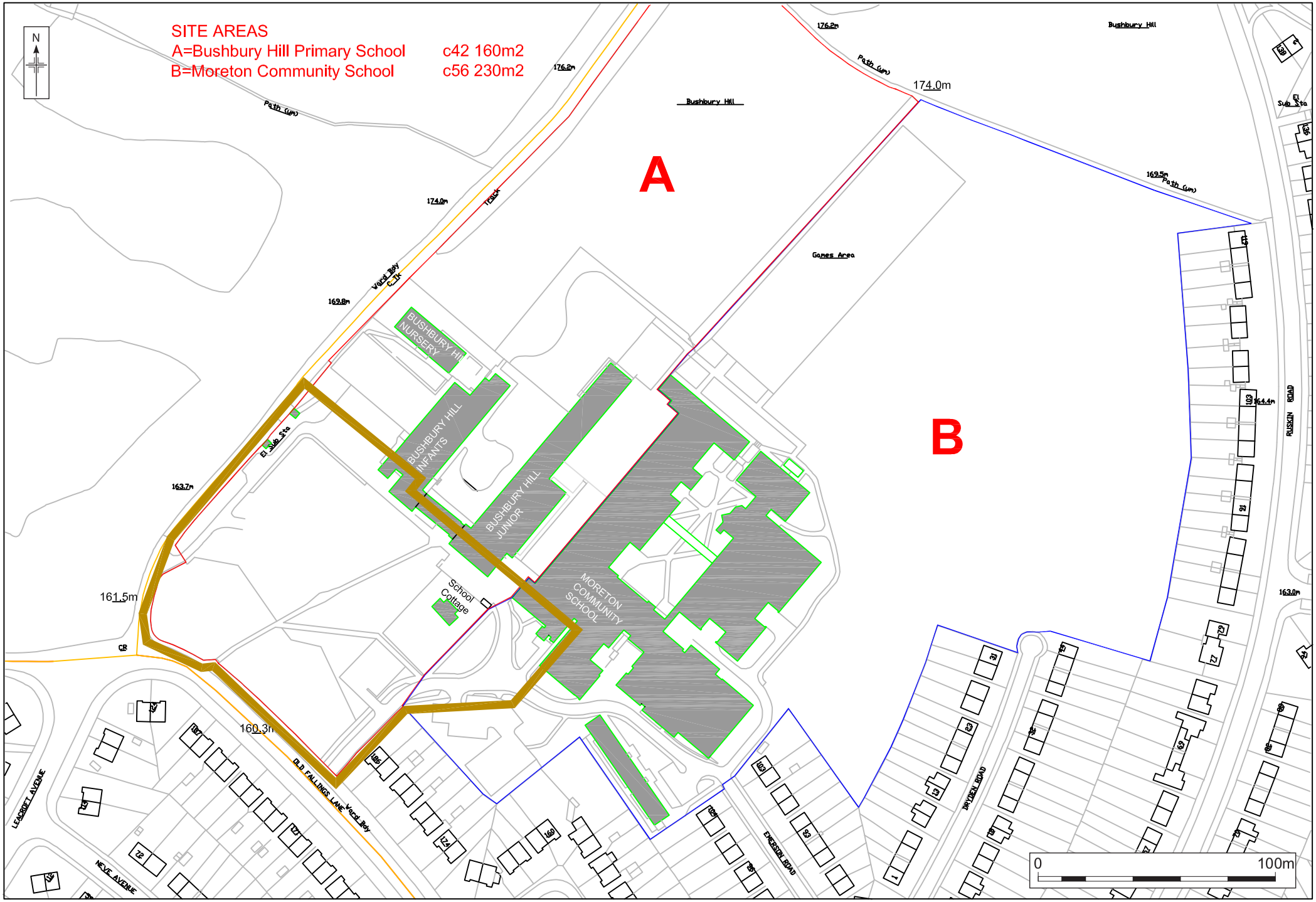
Part of a 1933 block plan of Bushbury Hill Municipal School and detail of south-west elevation

Figure 12

Extract from 1937 OS map, Revision

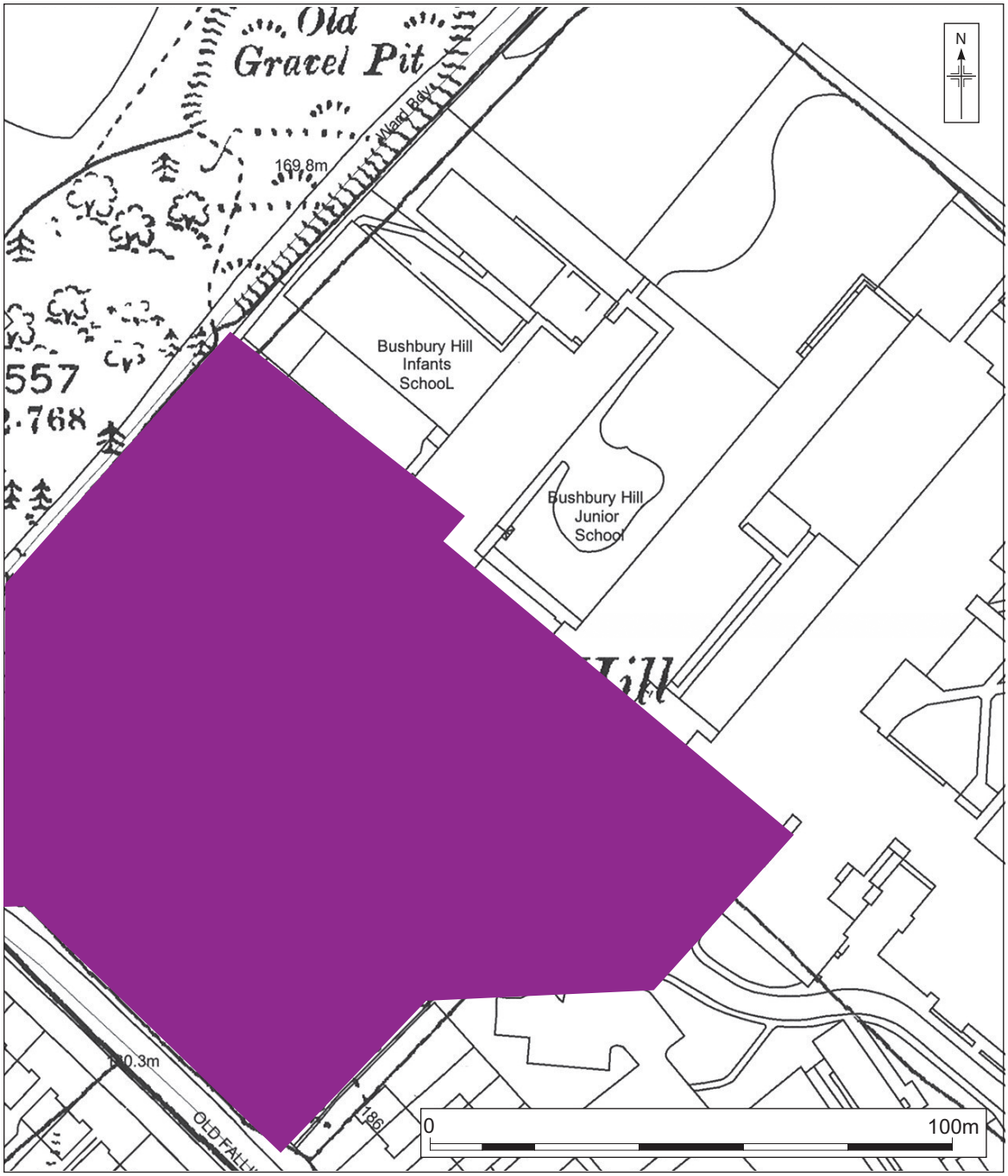
Extract from 1954 OS map

Figure 13



2009 site plan (based upon Jacobs drawing no. J /BH SK01)

Figure 14



1902 overlay plan

Figure 15

Appendix 1 Features of the historic environment registered with the BCSMR (those within the site are indicated in bold)

Ref. & status	Site name	NGR	Date	Description
404	St Mary's Church, Bushbury Lane	SJ 9244 0247	AD 1066-1900	14th C church with 15th C tower, much altered in 19th C
406 LB II	Bushbury Hall, Bushbury Lane	SJ 9254 0246	AD 1540-1900	17th C house with late 18th C alterations on site of possible moated manor house
1835 LB II	**Bushbury Hill House and Farm**	**SJ 9268 0213**	**AD 1780-1948**	**18th C house and farm buildings**
2508	Palstave, Bushbury Farm	SJ 9281 0198	2350-701 BC	Unlooped bronze axe head
2517	Cross, Churchyard, Bushbury Lane	SJ 9243 0245	AD 410-1065	Possible late Saxon round shaft cross
2540	Moat, west of Bushbury Church	SJ 9239 0246	AD 1066-1539	Possible moat
6331	Settlement, Bushbury	SJ 9245 0245	AD 410-present day	Historic settlement
6773 LB II	Farm buildings, Bushbury Hall	SJ 9258 0252	AD 1540-1900	Late 18th C farm buildings
6821	Field 1, Bushbury Survey	SJ 9231 0231	Unknown date	Slight east-west slope
6822	Field 2, Bushbury Survey	SJ 9259 0227	AD 1540-1900	Backfilled quarry
6823	Field 5, Bushbury Survey	SJ 9270 0243	AD 1066-1900 AD 1540-1900 AD 1901-2000	Possible pillow mounds Field boundaries House platform
6824	Fields 6 and 7, Bushbury Survey	SJ 9294 0248	AD1901-2000	Bushbury reservoirs
6825	Field 8, Bushbury Survey	SJ 9246 0252	AD 1066-1539 AD 1901-2000	Possible house platforms Deserted settlement
6860	Bushbury Hill Ridgeway	SJ 9289 0250	Unknown date	Ancient track with Moseley Rd and Northycote Lane forming possible major route from Stafford to Wolverhampton

6862	Bushbury Lane	SJ 9221 0225	Unknown date	Part of earlier road system
6863	Bushbury Library and School	SJ 9237 0250	AD 1800-1900	Former 1835 school building
6866	Possible hillfort, Bushbury	SJ 0284 0242	4000 BC-AD42	Place-name evidence for hillfort on Bushbury Hill
8692	Site of Pound, Bushbury	SJ 9240 0250	AD 1540-2000	Possible location from 1837 cartographic source
10880	Reservoir, Bushbury Hill	SJ 9289 0243	AD 1901-2000	20th C service reservoir
13589	Manor House, Bushbury	SJ 9253 0243	AD 1066-1900	Possible moated manor house

Appendix 2 Valuation of farm fixtures, produce, crops, tenant rights and machinery on the death of Randle Bernard Jeavons, 1925

V A L U A T I O N of FIXTURES, PRODUCE, CROPS, TENANT RIGHT etc., at BUSHBURY HILL and LOW HILL FARMS, Near WOLVERHAMPTON. Tenant Mr. R. B. Jeavons, as made the 18th June 1925.

S C H E D U L E.

Allowance for Decorations and Improvements to the House executed by Mr Jeavons two years ago, including new Grate and Mantelpiece in Sitting Room. £46 . 0 . 0

FIXTURES IN HOUSE.

Picture Rails in two Sitting Rooms.
Curtain Rods and Fittings.
Shelves and Wood Floor in Pantry.
Four Drying Rails and Fittings in Kitchen.
Linoleum on Floors.
Allowance re installation of Telephone. 22 . 10 . 0

FIXTURES OUTSIDE

6 unclimbable Iron Hurdles in Garden
Roof, Boarding and Floor to Fowl House.
Coal Shed.
Floor and Wood Partitions to Cooling House, also Refridgerator and Receiver and connections.
Copper Boiler with brickwork and underwork.
Share of Interest in Chaff Loft.
Engine Shed with wood platform.
Implement Shed.
Fronts and doors to Loose Boxes and wood troughs in Shed.
Iron gate to Foldyard and 50 iron hurdles and gate round rickyard.
Loft over Cowhouse.
40 Cow Ties.
Gate and Posts between fields No 555 and 580.

IMPROVEMENTS.

Proportion of cost of laying out Garden with paths, tiles, lawn etc.

About 25 Fruit Trees and Garden produce.

£171 . 0 . 0

IMPROVEMENTS (contd)

Improvements to front garden and drive, planting shrubs, creepers etc.

Laying water supply with lead piping from House to Cooling House.

Levelligg front and back yards and drawing gravel for same

£65 . 0 . 0

AT LOW HILL.

10 Iron Hurdles.
15 Cow Ties.

3 . 2 . 6

PRODUCE.

2 Tumps of Wheat Straw.
Tump of Hay
Do.
Do.
Rick of Clover.

174 . 0 . 0

CROPS and CULTIVATIONS.

Field No. 580. 22 . 1 . 27

5 acres Oats
11 acres Potatoes
6 acres Swedes and Cabbage
Cost of Manure applied 396 . 10 . 0

Field No. 611. 6 . 2 . 24

Mowing Grass 30 . 0 . 0

Field No. 579. 8 . 0 . 11

Winter Oats, Clover Seeds and Labor 90 . 0 . 0

Field No. 607. 6 . 1 . 5

Mowing Grass. 36 . 0 . 0

Field No. 644. 5 . 2 . 12

Worked and Manured for Roots 26 . 0 . 0

£820 . 12 . 6

VALUATION of Fixtures, Produce, Tenant Right, Tillages, &c on the Bushbury Hill Farm, Nr. Wolverhampton, the property of Jeavons

Made June 18th 1925

SCHEDULE

Decorations & improvements to House	60. 0. 0.
Improvements to front garden, drive & planting shrubs, creepers, &c	5. 0. 0.
Sitting Room	
New grate & mantel	6. 0. 0.
Picture rail & in 2 rooms	1. 0. 0.
Window fittings in house	1. 10. 0.
Pantry	
Shelves & wood floor	1. 0. 0.
Kitchen	
Dryer, rail & pulleys	- 10. 0.
Lino on floors	10. 10. 0.
Telephone, (time unexpired)	5. 10. 0.
Making garden & paths & fruit trees & all produce therein	30. 0. 0.
6 Hurdles	3. 0. 0.
Fowl House	
Roof & boarding, also ends and floor	10. 0. 0.
Coal Shed	2. 10. 0.
Front and doors to Loose Boxes with troughs & inside fittings	5. 0. 0.
Iron gate to Fold, hurdles & wicket & gateposts	12. 0. 0.
40 Cow Ties	2. 10. 0.
Loft over Cowshed	3. 10. 0.
Levelling front yard also drawing gravel	10. 0. 0.
Floor & wood partition in Cooling House	5. 0. 0.
Refridgerator, Receiver & Connections, &c	5. 0. 0.
Water supply from house to Cooling House	5. 0. 0.
Furnace, underwork & brickwork	10. 0. 0.
Share of loft floor	10. 0. 0.
Engine shed & platform	5. 0. 0.
Levelling back yard	10. 0. 0.
Implement Shed	1. 0. 0.
Gate & posts between 555 & 580	1. 10. 0.
15 Cow Ties (Low Hill)	- 18. 9.
10 Hurdles Do	2 - -
Produce	
2 Tumps of wheat straw	30. 0. 0.
1 Tump of Hay	24. 0. 0.
1 Do (Low Hill)	10. 0. 0.
1 Do (In field)	28. 0. 0.
1 stack of clover in Field	80. 0. 0.
	396. 18. 0.

Carried Forward

BUSHBURY HILL AND LOW HILL FARMS

NEAR WOLVERHAMPTON

-o-o-o-o-o-o-o-

The Exors. of the late Mr. R.B. Jeavons

to

The Sewerage Committee of the Wolverhampton Corporation

VALUATION OF MACHINERY &c at the above Farms as made the 31st July 1925

SCHEDULE

Grist Mill by Harrison McGregor
Pulper & Cleaner by Harrison McGregor
"The Clipper" 2 knife chaff cutter for power
6½ H.P. Amanco Petrol Engine
18 ft 3 in Shafting with brackets and 5 pulleys
5 Compo Belts
2 Flights of wood steps
Set of strong wood steps
Pig Tub
Galvanised Corn Bin
Wheelbarrow
Iron Water Tank
50 Iron Hurdles
Quantity of small tools including 6 buckets and 4 milking stools
Carpenters bench and vice

Having carefully considered the foregoing items, we value the same at the sum of SEVENTY THREE POUNDS (£73)

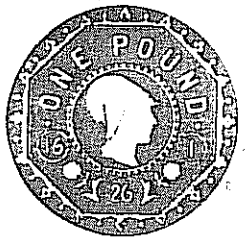
H. Mock

Valuer for the Outgoer

Frank Baccard

Valuer for the Wolverhampton Corporation

Penkridge Stafford



VALUATION OF FIXTURES, PRODUCE, CROPS, TENANT RIGHT, &c

at BUSHBURY HILL & LOW HILL FARMS, NEAR WOLVERHAMPTON

-o-o-o-o-o-o-o-o-o-o-o-o-o-

The Exors. of the late Mr. R. B. Jeavons

to

The Housing Committee of the Wolverhampton Corporation

Settled 14th December 1925

Taken over as from 11th June 1925

SCHEDULE

FIXTURES, &c in House

Picture rails in two Sitting Rooms
Curtain rods and fittings
Shelves and wood floor in pantry
Four drying rails & fittings in kitchen
Linoleum on floors
Allowance for installation of Telephone
Allowance for decorations and improvements to the house executed by Mr. Jeavons including new grate and mantelpiece in Sitting Room

FIXTURES, &c OUTSIDE

6 Unclimbable iron hurdles in Garden
Roof, Boarding and filor to fowl house
Coal Shed
Floor and wood partition to cooling House also refrigerator, receiver and connections
Laying water supply with lead piping from House to Cooling House
Copper boiler with brickwork and underwork
Part of Chaff Loft
Engine Shed with wood partition
Implement Shed
Fronts and doors to Loose Boxes and wood troughs in shed
Iron gate to foldyard and 50 iron hurdles and gate round rickyard
Loft over cow house
40 Cow Ties
Gate and posts between fields No. 555 & 580
10 Iron Hurdles and 15 cow ties at Low Hi
Allowance towards cost of laying out Garden with paths, tiles, lawn, drive, Fruit Trees, shrubs, creepers and garden produce
Levelling front and back yards and drawing gravelfor same

PRODUCE

Two tumps of wheat straw
Three tumps of hay
Rick of clover
Hay and clover the produce of Fields Nos. 611, 607, 624, 623, 599, 583, 584, 550, 536, 533, 534 in all about 71 acres

CROPS & CULTIVATIONS Growing Oats & Wheat on about 51 acres in fields No. 580, 579, 586. 494, 497

Growing Potatoes, Swedes & Cabbage on about 32 acres in fields No. 580, 644, 498

Clover Seeds on 26 acres

The unexhausted value of cake and corn consumed and artificial manures applied during the last two years of the tenancy

The value of the unexpired term which includes compensation for disturbance

For loss on business in respect of the unexpired term and allowance in respect of Tenants Costs

WE, the undersigned having inspected the foregoing items and having carefully considered all claims estimate the value of the same after making the necessary allowances at the sum of TWO THOUSAND AND FIFTY POUNDS (£2050. 0. 0.)

H. Mock.

Valuer for the Outgoer

Frank Baccard.

Valuer for the Wolverhampton Corporation

Penkridge Stafford.

Appendix 3 Geophysical Survey Report

STRATASCAN

Geophysical Survey Report

Bushbury Hill Primary School
Wolverhampton

for

Worcestershire County Council

June 2009

Job No. J2614

Richard Smalley BA (Hons) AIFA

Document Title:	**Geophysical Survey Report Bushbury Hill Primary School, Wolverhampton**
Client:	**Worcestershire County Council**
Stratascan Job No:	**J2614**
Techniques:	**Detailed Gradiometry and Earth Resistance**
National Grid Ref:	**SJ 926 021**

Field Team:	**Bryony Marsh BA and Matt Gillott**
Project Manager:	**Simon Stowe BSc. (Hons)**
Report written by:	**Richard Smalley BA (Hons) AIFA**
CAD illustration by:	**Richard Smalley BA (Hons) AIFA**
Checked by:	**Peter Barker C.Eng MICE MCIWEM MIFA**

Stratascan Ltd.
Vineyard House
Upper Hook Road
Upton upon Severn
WR8 0SA

Tel: 01684 592266
Fax: 01684 594142
Email: ppb@stratascan.co.uk
www.stratascan.co.uk

1 SUMMARY OF RESULTS

The geophysical survey undertaken over an area of playing field at Bushbury Primary School, Wolverhampton has identified a number of features of a possible archaeological origin. Areas of magnetic disturbance in the gradiometer data and high resistance anomalies in the earth resistance suggest the presence of buried structural remains within the survey area.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by Worcestershire County Council.

2.2 Site location

The site is located at Bushbury Hill Primary School, Wolverhampton at OS NGR ref. SJ 926 021.

2.3 Description of site

The survey area consists of approximately 1ha of land currently used as school playing fields.

The underlying geology is Permian and Triassic sandstone (British Geological Survey South Sheet, Fourth Edition Solid, 2001). The drift geology is recorded as boulder clay (British Geological Survey South Sheet, First Edition Quaternary, 1977).

The overlying soils are known as Clifton which are typical stagnogley soils. These consist of slowly permeable seasonally waterlogged reddish fine and course loamy soils (Soil Survey of England and Wales, Sheet 3 Midland and Western England).

2.4 Site history and archaeological potential

A map dating from 1902 shows a number of buildings and garden features positioned within the survey area. This would suggest that there is potential for the identification of anomalies of an archaeological origin within the survey data.

2.5 Survey objectives

The objective of the survey was to locate any anomalies that may be of archaeological significance prior to trenching.

2.6 Survey methods

Detailed gradiometry and earth resistance were employed on site in order to gain complementary data sets. More information regarding these techniques is included in the Methodology section below.

3 METHODOLOGY

3.1 Date of fieldwork

The fieldwork was carried out over two days from 8th June 2009. Weather conditions during the survey were fine.

3.2 Grid locations

The location of the survey grids has been plotted in Figure 2 together with the referencing information. Grids were set out using a Leica Smart Rover RTK GPS.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. A SmartNet RTK GPS uses Ordnance Survey's network of over 100 fixed base stations to give an accuracy of around 0.01m.

3.3 Description of techniques and equipment configurations

Gradiometer
Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field.

Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

Earth Resistance
This method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response, while features such as a ditch which retains moisture give a relatively low response.

The resistance meter used was an RM15 manufactured by Geoscan Research incorporating a mobile Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. The instrument uses an automatic data logger which permits the data to be recorded as the survey progresses for later downloading to a computer for processing and presentation.

The resistance meter was used in conjunction with an MPX15 multiplexer to allow two adjacent readings to be taken at each instrument position.

Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out.

3.4 Sampling interval, depth of scan, resolution and data capture

3.4.1 *Sampling interval*

Gradiometer
Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid. All traverses were surveyed in a "zigzag" mode.

Earth Resistance
Readings were taken at 1.0m centres along traverses 1.0m apart. This equates to 900 sampling points in a full 30m x 30 grid. All traverses were surveyed in a "zigzag" mode.

3.4.2 *Depth of scan and resolution*

Gradiometer
The Grad 601 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. The collection of data at 1.0m centres provides an optimum methodology for the task balancing cost and time with resolution.

Earth Resistance
The 0.5m probe spacing of a twin probe array has a typical depth of penetration of 0.5m to 1.0m. The collection of data at 1.0m centres with a 0.5m probe spacing provides an optimum resolution for the task.

3.4.3 *Data capture*

Gradiometer
The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each job, data is transferred to the office for processing and presentation.

Earth Resistance
The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each job, data is transferred to the office for processing and presentation.

3.5 Processing, presentation of results and interpretation

3.5.1 *Processing*

Gradiometer
Processing is performed using specialist software known as *Geoplot 3.* This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids.

The following schedule shows the basic processing carried out on all processed magnetometer data used in this report:

1. *Despike* (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

   Geoplot parameters:
   X radius = 1, y radius = 1, threshold = 3 std. dev.
   Spike replacement = mean

2. *Zero mean traverse* (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

   Geoplot parameters:
   Least mean square fit = off

Earth Resistance
The processing was carried out using specialist software known as *Geoplot 3* and involved the 'despiking' of high contact resistance readings and the passing of the data though a high pass filter. This has the effect of removing the larger variations in the data often associated with geological features. The nett effect is aimed at enhancing the archaeological or man-made anomalies contained in the data.

The following schedule shows the processing carried out on the processed resistance plots.

Despike	*X radius = 1*
	Y radius = 1
	Spike replacement
High pass filter	*X radius = 10*
	Y radius = 10
	Weighting = Gaussian

3.5.2 *Presentation of results and interpretation*

Gradiometer
The presentation of the data for the survey involves a print-out of the raw data both as grey scale (Figure 3) and colour scale (Figure 4), together with a grey scale plot of the processed data (Figure 5) and the abstraction and interpretation of magnetic anomalies (Figure 6).

Earth Resistance
The presentation of the data for the site involves a print-out of the raw data as a grey scale plot (Figure 7), together with a grey scale plot of the processed data (Figure 8). Anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing (Figure 9).

4 RESULTS

4.1 Gradiometer

The gradiometer data collected at Bushbury Primary School, Wolverhampton has been affected by the ferrous objects and ground disturbance present within the survey area. A number of pipes or cables (**1**) and be seen crossing the site and running around its northern perimeter.

A large, circular area of magnetic disturbance (**2**) can be noted in the southern limits of the survey area. Further investigation is required in order to ascertain the nature of this feature.

A linear area of magnetic debris (**3**) is evident in the southern region of the site. This anomaly has a similar position and orientation to a pathway shown on the 1902 map of the area and therefore may be related to it (*See Figure 10*).

Areas of magnetic disturbance possibly related to disturbed ground (**4**) have been identified within the survey area. It is interesting to note that there is a level of correlation between these features and a number of buildings marked on the 1902 map. It is possible that this disturbance is related to buried structural debris.

4.2 Earth Resistance

The earth resistance survey has identified a number of features of a possible archaeological origin. High resistance linear (**A**) and area (**B**) anomalies are evident throughout the survey area. These anomalies may indicate the presence of buried structural remains or debris. It is interesting to note that a number of these anomalies are in close proximity to the location of buildings shown on the 1902 map (*See Figure 10*).

Weaker areas of high resistance (**C**) can also be noted within the survey area. These anomalies may relate to areas of compacted earth. Small areas of high resistance often occur in close proximity to trees (**D**); these features may be related to root systems.

Low resistance linear (**E**) and area (**F** and **G**) anomalies are evident within the data with particular concentrations in the south western and south eastern limits of the site. These features may indicate the presence of cut features such as pits and ditches of a possible archaeological origin. A circular low resistance feature can be seen in the southern limits of the site. This feature correlates well with an area of magnetic disturbance in the gradiometer data and is of an unknown origin.

A low resistance anomaly (**H**) in the central region of the survey area correlates well with the position of a pipe or cable identified in the gradiometer data.

5 CONCLUSION

The geophysical survey undertaken at Bushbury Hill Primary School, Wolverhampton has identified a number of features of a possible archaeological origin.

There is an element of correlation between the gradiometer and earth resistance data sets with areas of magnetic disturbance correlating with high resistance area anomalies; suggesting the presence of buried structural remains or debris within the survey area.

There is also an element of correlation between the two data sets and the location of structures on a 1902 map of the area. This is the case with areas of magnetic disturbance and high resistance matching the position of buildings shown on the map. A linear area of magnetic debris in the gradiometer data also correlates well with the location of a path shown on this map.

A ring of low resistance can be seen in the same location as an area of magnetic disturbance. Further investigation is required in order to ascertain the origin of this feature.

6 REFERENCES

British Geological Survey, 2001. *Geological Survey Ten Mile Map, South Sheet, Fourth Edition (Solid)*. British Geological Society.

British Geological Survey, 1977. *Geological Survey Ten Mile Map, South Sheet, First Edition (Quaternary)*. British Geological Society.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 3 Midland and Western England*.

APPENDIX A – Basic principles of magnetic survey

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremnant* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremnance is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremnant archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

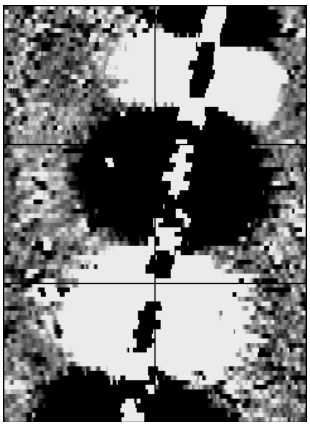
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically either 0.5 or 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

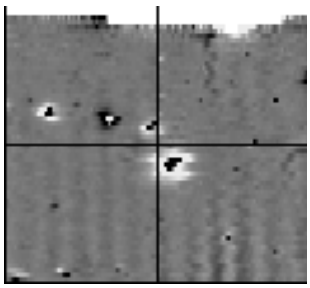
APPENDIX B – Glossary of magnetic anomalies

Bipolar



A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

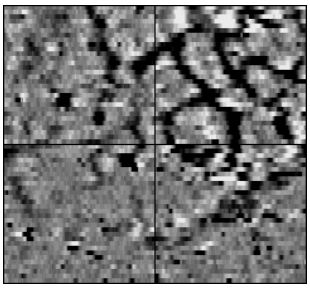


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

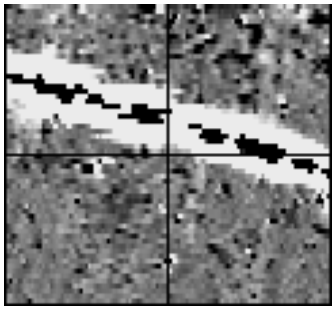
See bipolar and dipolar.

Positive linear



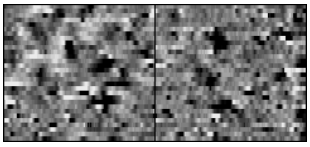
A linear response which is entirely positive in polarity. These are usually related to infilled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.

Positive linear anomaly with associated negative response



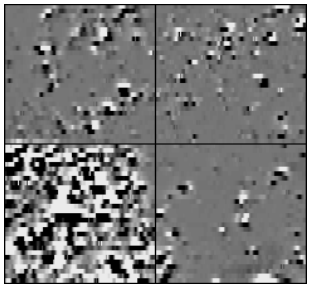
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

Positive point/area



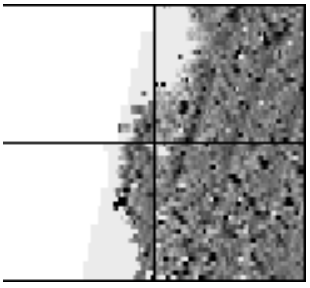
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by infilled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring depressions in the ground.

Magnetic debris



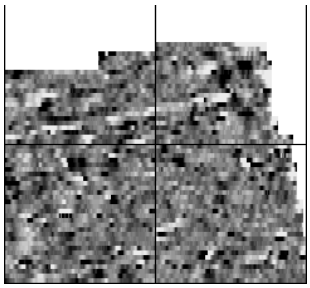
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly (+/-250nT) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremnant material such as bricks or ash.

Magnetic disturbance



Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.

Negative linear

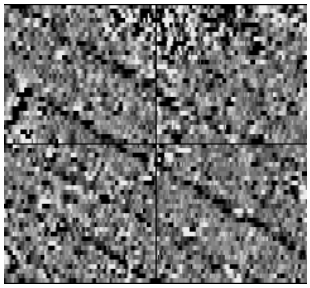


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity



Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing, clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

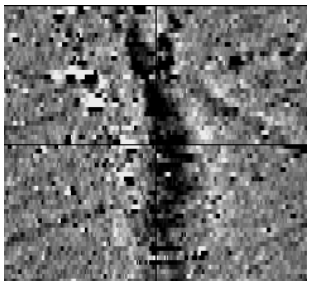
Strength of response

The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a $10m^2$ area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Trace plots are used to show the amplitude of response.

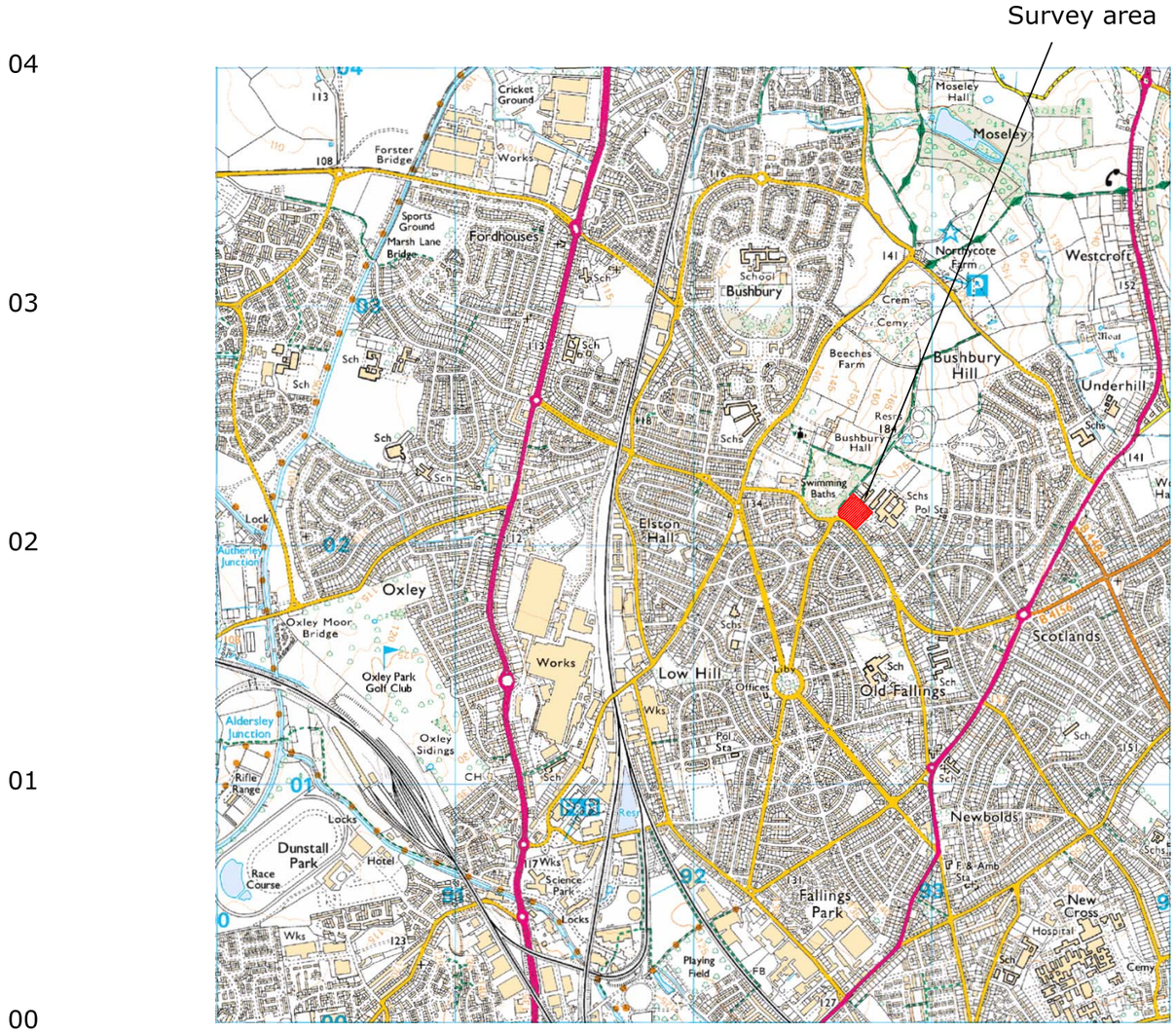
Thermoremnant response

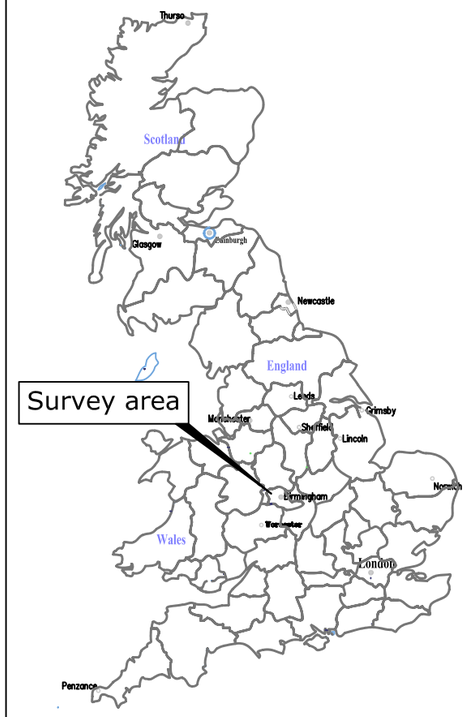
A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately +/-100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred insitu (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations



Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.





TRUE N

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Site centred on NGR SJ 926 021

Client
WORCS COUNTY COUNCIL

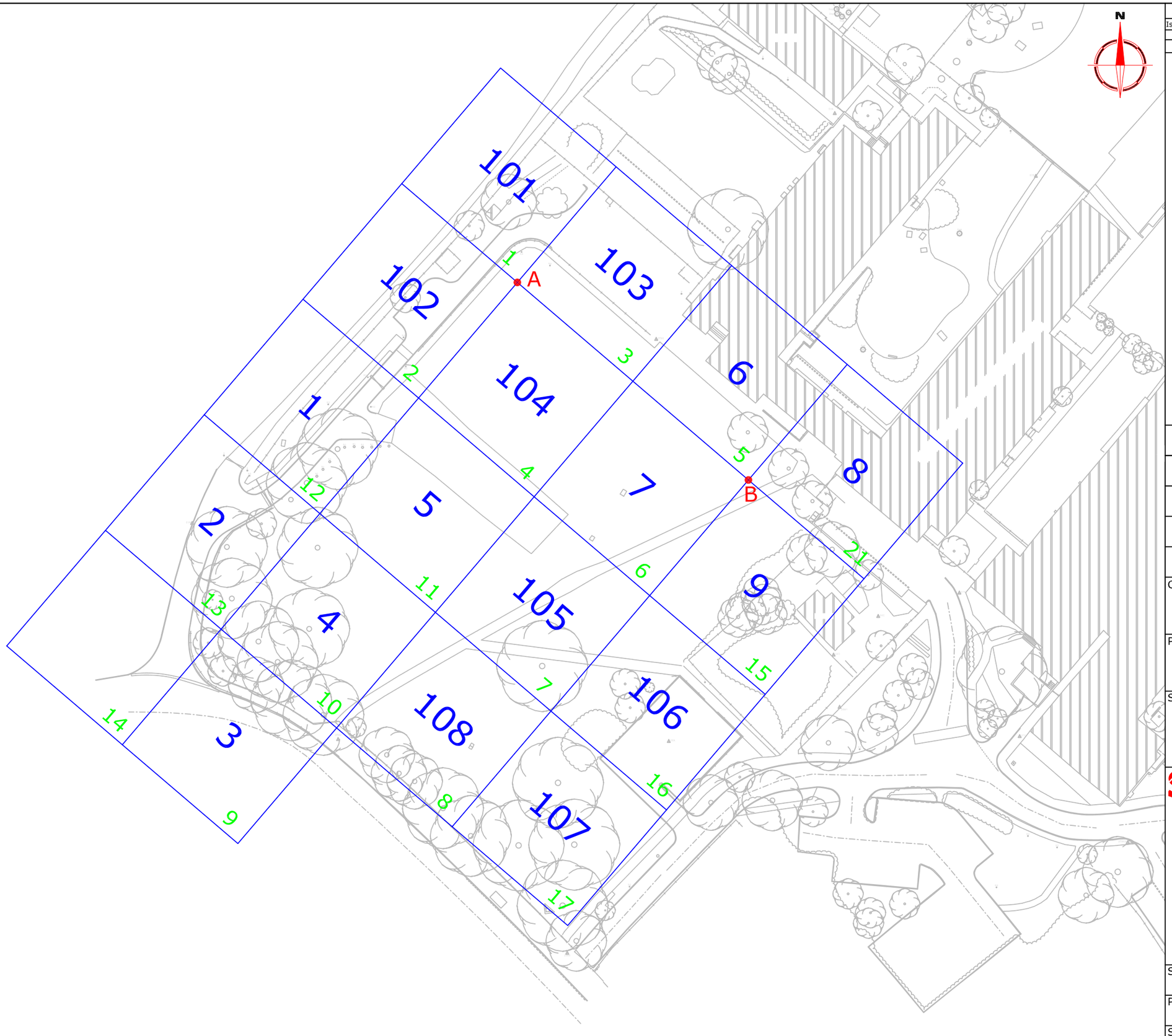
Project Title Job No. 2614
GEOPHYSICAL SURVEY -
BUSHBURY HILL PRIMARY SCHOOL,
WOLVERHAMPTON

Subject
LOCATION PLAN OF SURVEY AREA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

Scale 1:25 000 (0m 500 1000m)

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 06	RAJS	01



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

OS GRID REFERENCES

A	392671.58 , 302201.16
B	392717.19 , 302162.18
3	Gradiometer grid number
3	Earth resistance grid number

Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY - BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

LOCATION AND REFERENCING OF SURVEY GRIDS

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

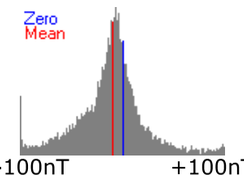
Scale 1:750 — 0m 5 15 30m

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	02

Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +100nT (black)
Minimum -100nT (white)



Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY -BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

PLOT OF RAW GRADIOMETER DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

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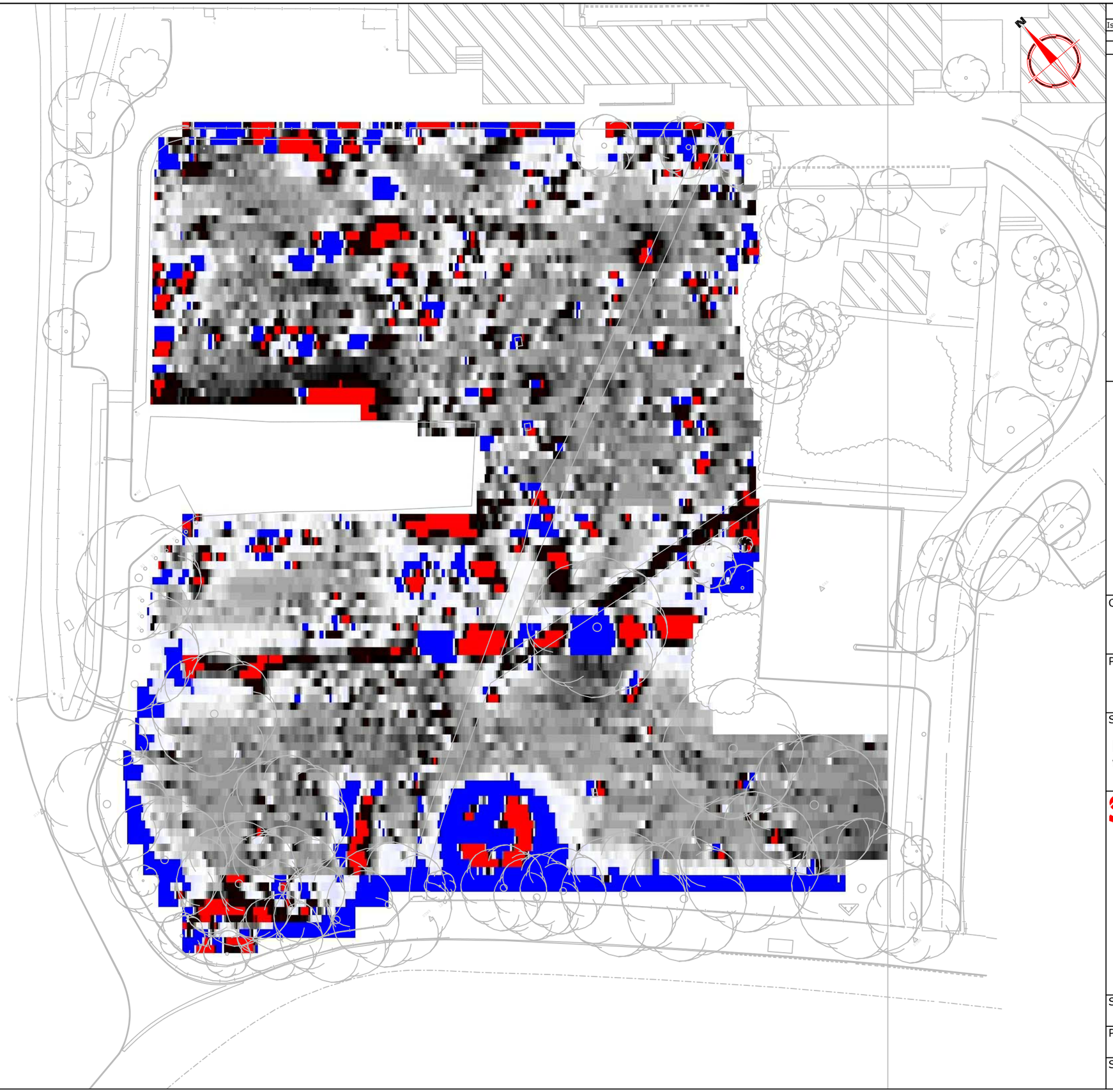
Scale 1:500

0m 5 10 15 20 25

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	03



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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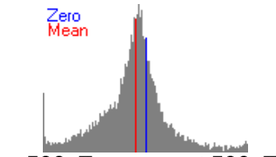
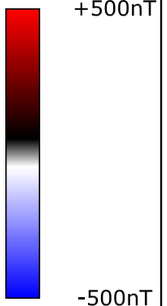
Minimum -500nT (blue)





Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY -BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

PLOT OF RAW GRADIOMETER DATA WITH COLOURED EXTREME VALUES

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

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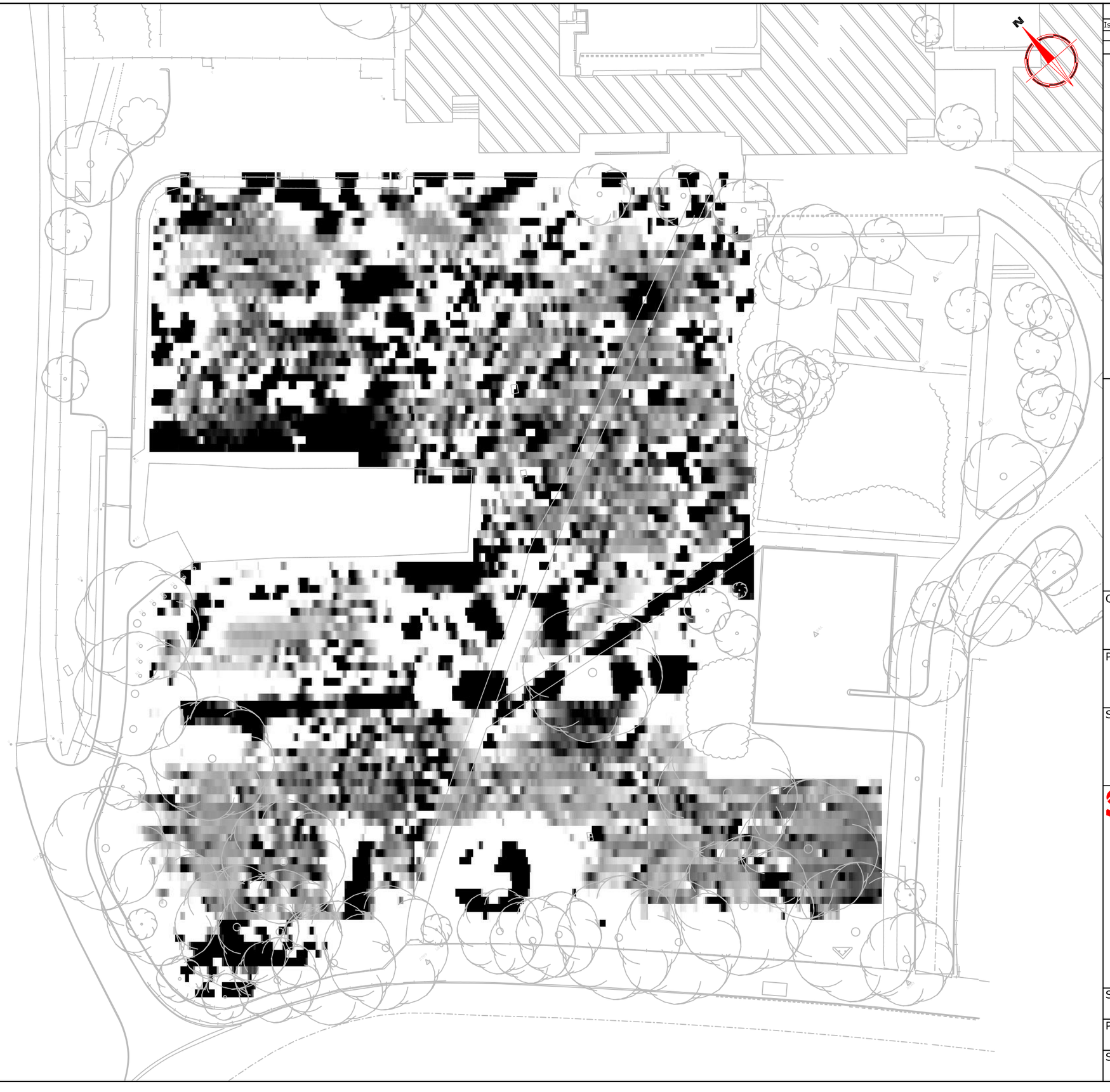
Scale 1:500 — 0m 5 10 15 20 25

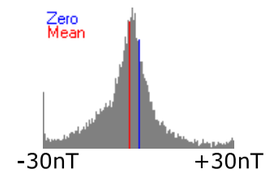
Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	04

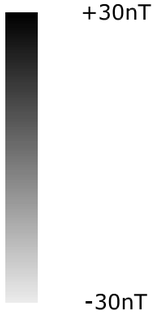


Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +30nT (black)
Minimum -30nT (white)





Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY -BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

PLOT OF PROCESSED GRADIOMETER DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

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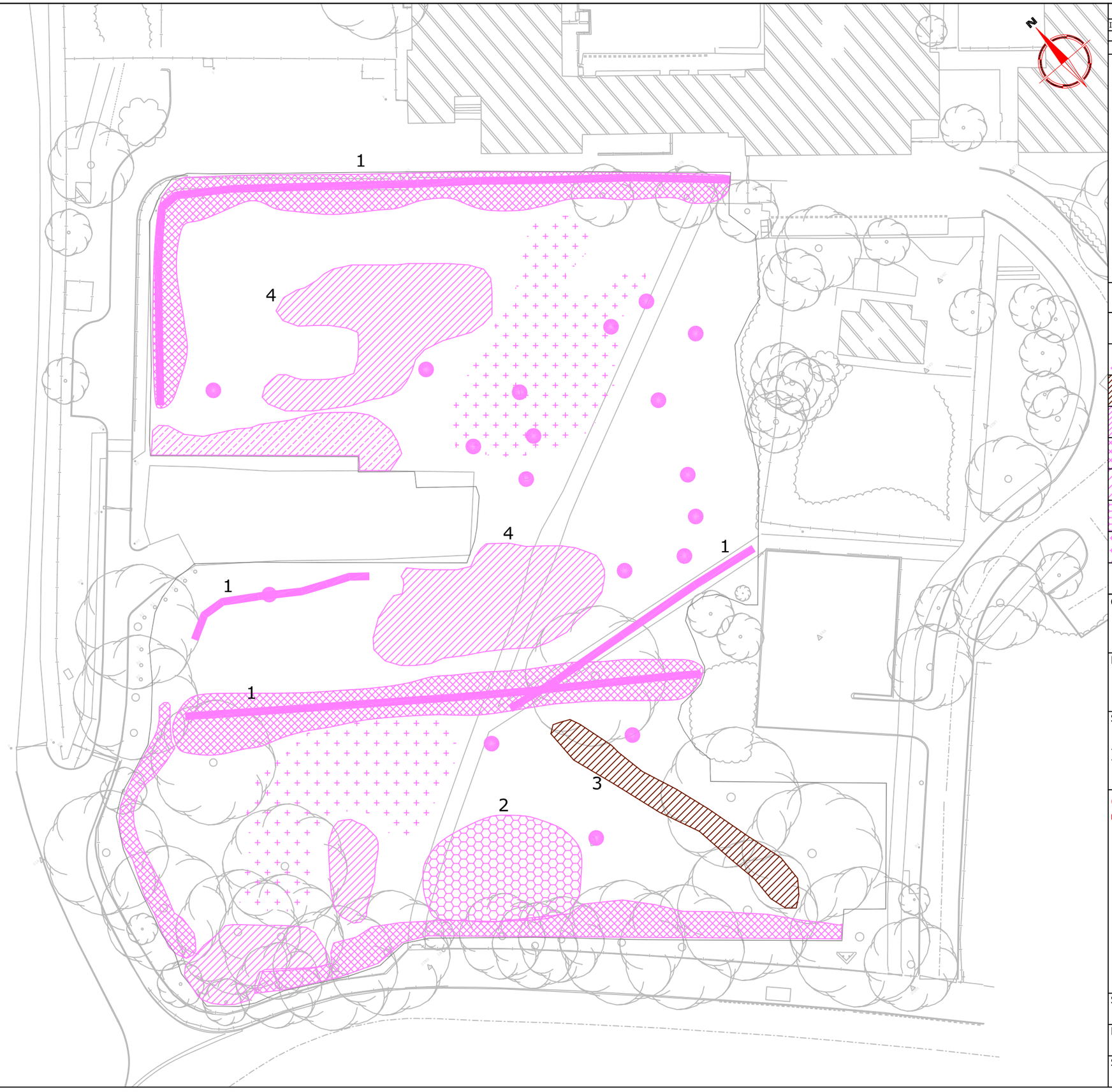
Scale 1:500 — 0m 5 10 15 20 25

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	05



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

KEY

	Positive anomaly with associated negative response - ferrous object
	Magnetic disturbance - associated with pipe/cable
	Linear area of magnetic debris/disturbance possibly related to former path
	Magnetic disturbance possibly related to structural debris
	Magnetic disturbance associated with nearby service or field boundary
	Magnetic disturbance associated with nearby metallic objects
	Magnetic disturbance of unknown origin
	Magnetic debris
1	Anomaly ID

Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY - BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

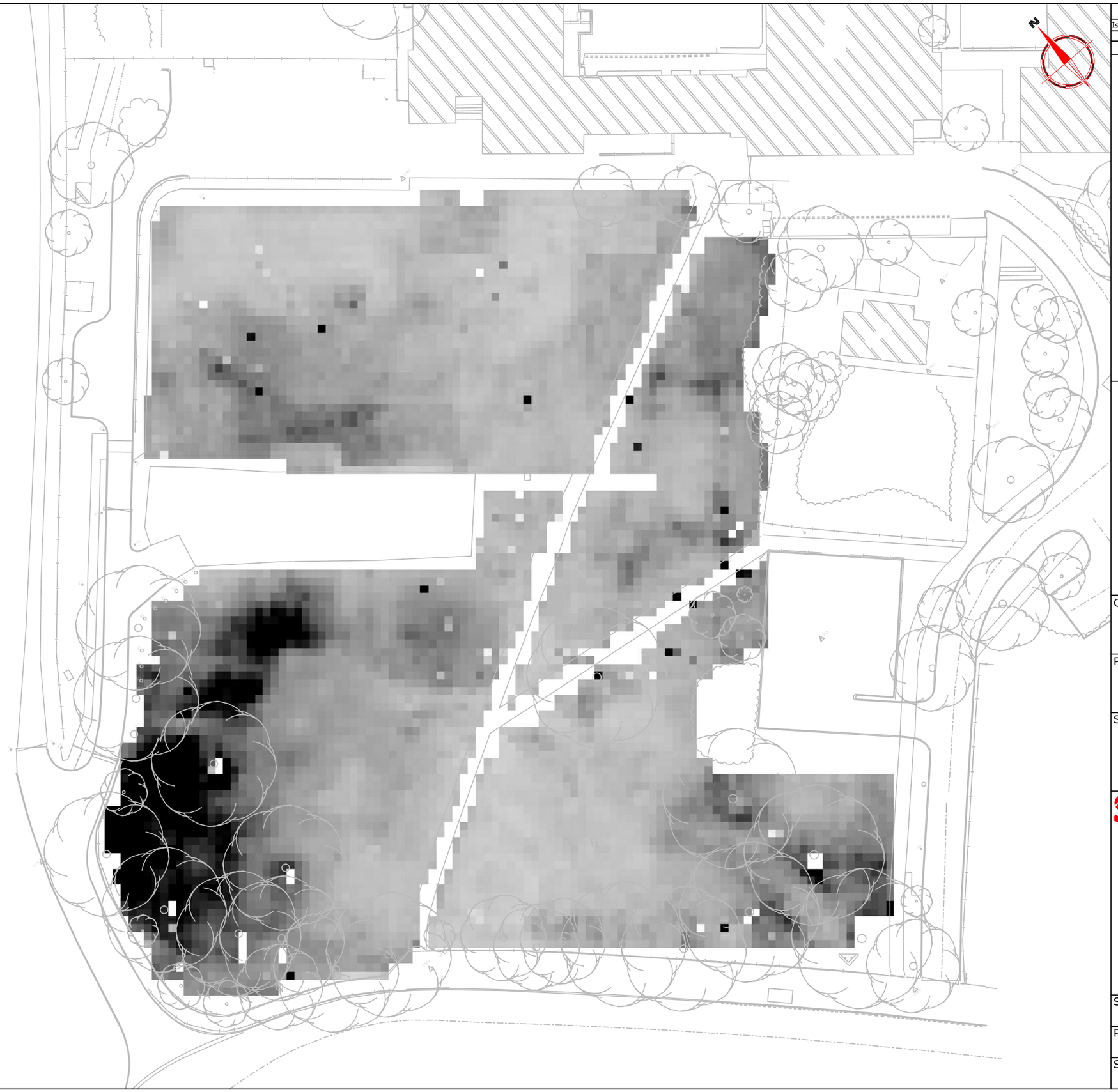
Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

Scale 1:500 (0m 5 10 15 20 25)

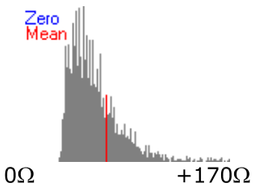
Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	06



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +170Ω (black)
Minimum 0Ω (white)



Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY -BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

PLOT OF RAW EARTH RESISTANCE DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk
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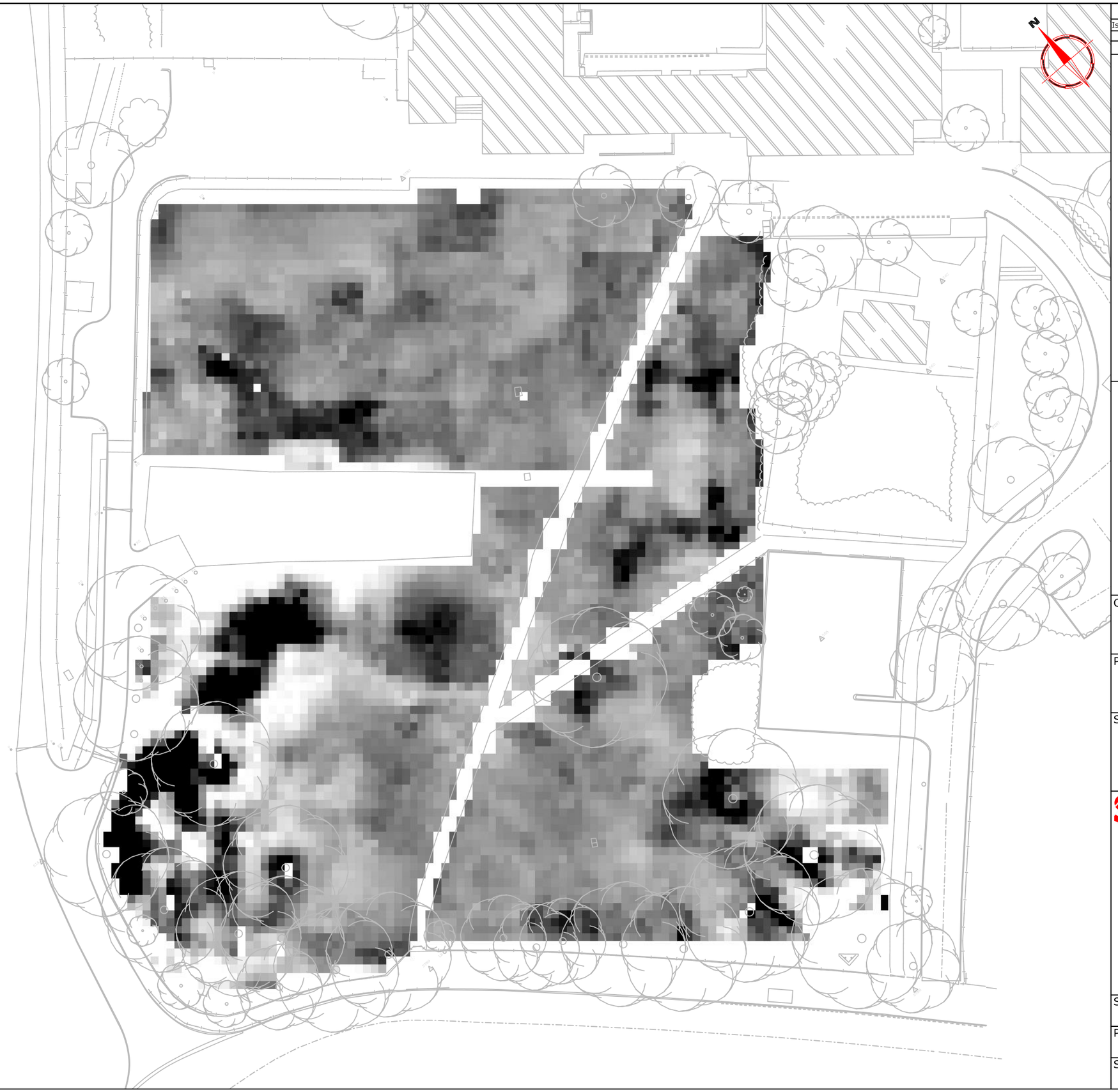
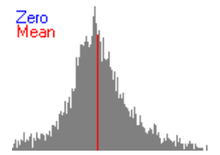
Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	07



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +100Ω (black)
Minimum +40Ω (white)



+40Ω +100Ω

+100Ω

+40Ω

Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY -BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

PLOT OF PROCESSED EARTH RESISTANCE DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

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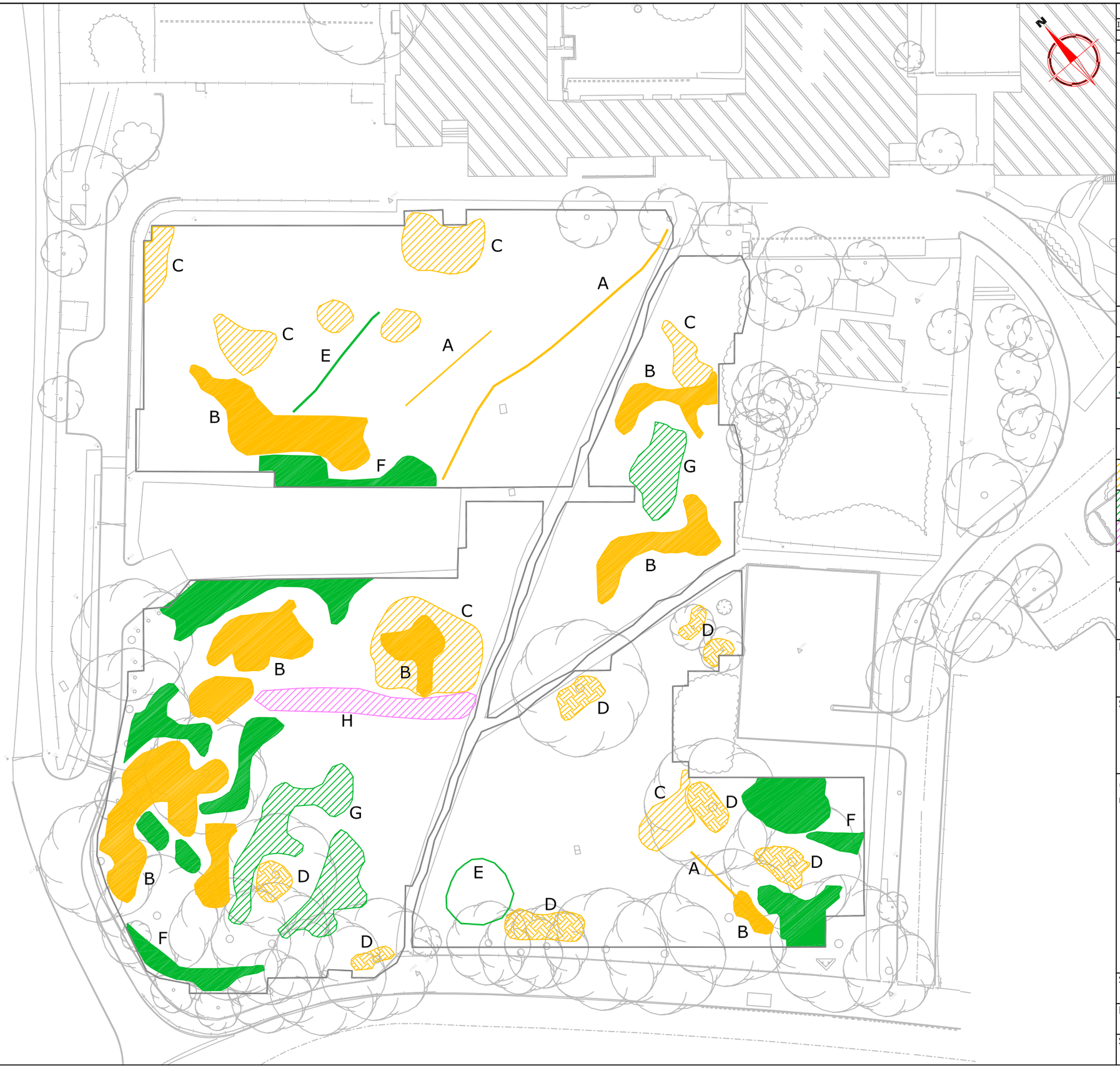
Scale 1:500 — 0m 5 10 15 20 25

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	08



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

KEY

	High resistance linear anomaly- possible structural remains
	Low resistance linear anomaly- cut feature of possible archaeological origin
	High resistance linear anomaly- possible structural remains or debris
	Low resistance linear anomaly- cut feature of possible archaeological origin
	Weaker high resistance linear anomaly- possible structural debris or compacted earth
	Low resistance linear anomaly- possible cut feature
	Low resistance linear anomaly associated with service
A	Anomaly ID

Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY - BUSHBURY HILL PRIMARY SCHOOL, WOLVERNHAMPTON

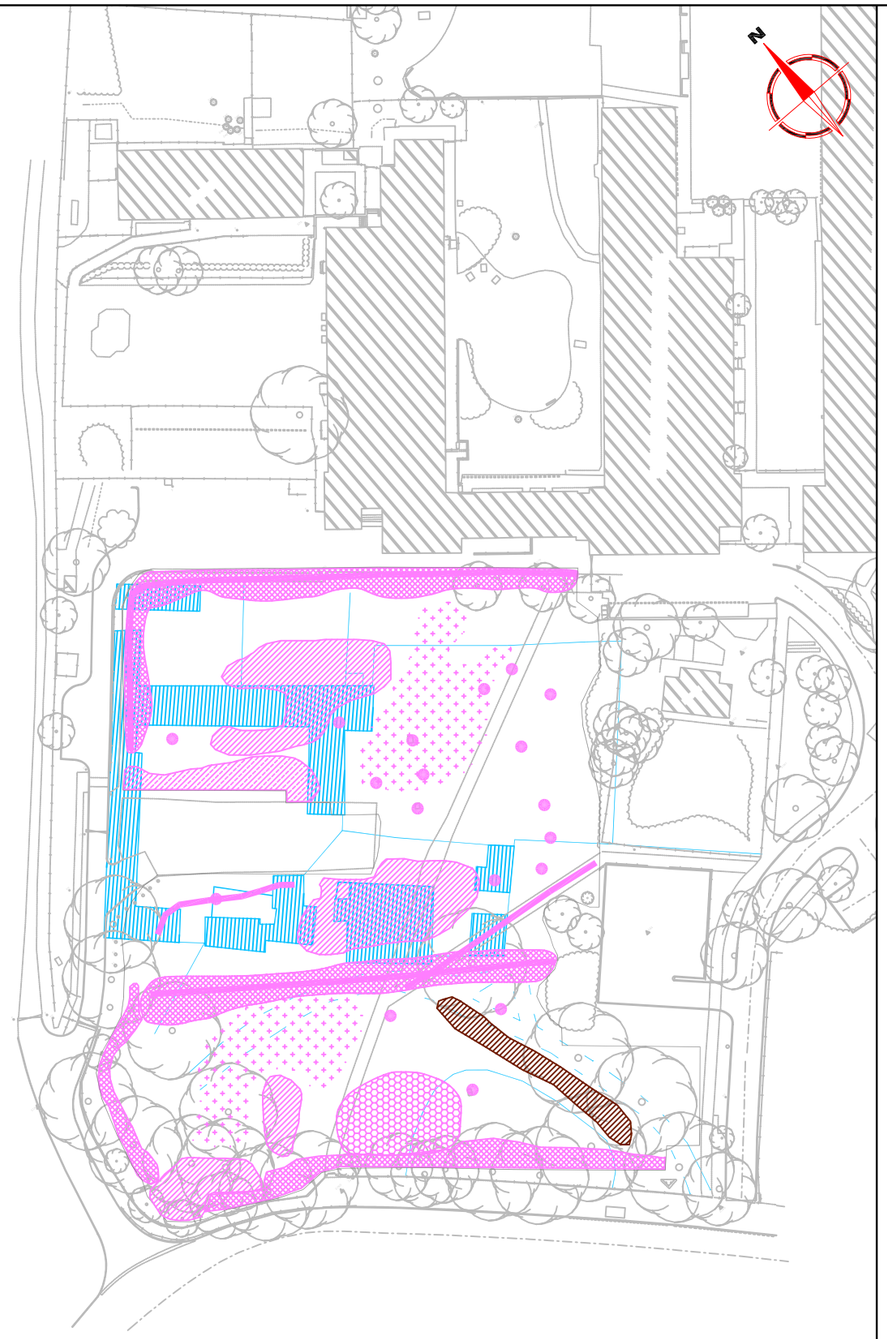
Subject

ABSTRACTION AND INTERPRETATION OF EARTH RESISTANCE ANOMALIES

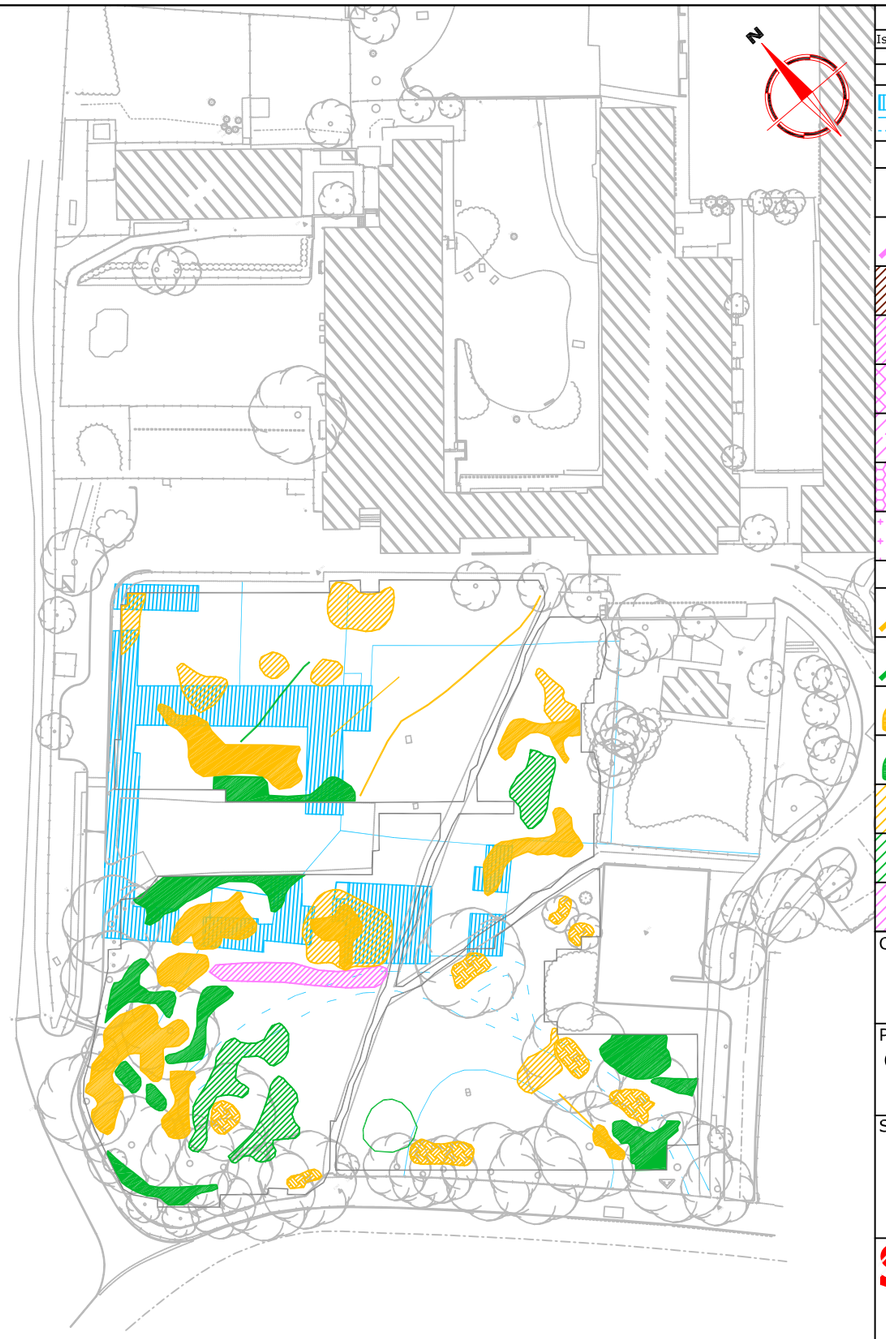
STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

Scale 1:500 (0m 5 10 15 20 25)

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	09



GRADIOMETER INTERPRETATION



EARTH RESISTANCE INTERPRETATION

Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

Features marked on 1902 map

GRADIOMETER KEY

- Positive anomaly with associated negative response - ferrous object
- Magnetic disturbance - associated with pipe/cable
- Linear area of magnetic debris/disturbance possibly related to former path
- Magnetic disturbance possibly related to structural debris
- Magnetic disturbance associated with nearby service or field boundary
- Magnetic disturbance associated with nearby metallic objects
- Magnetic disturbance of unknown origin
- Magnetic debris

EARTH RESISTANCE KEY

- High resistance linear anomaly- possible structural remains
- Low resistance linear anomaly- cut feature of possible archaeological origin
- High resistance linear anomaly- possible structural remains or debris
- Low resistance linear anomaly- cut feature of possible archaeological origin
- Weaker high resistance linear anomaly- possible structural debris or compacted earth
- Low resistance linear anomaly- possible cut feature
- Low resistance linear anomaly associated with service

Client

WORCS COUNTY COUNCIL

Project Title — Job No. 2614

GEOPHYSICAL SURVEY - BUSHBURY HILL PRIMARY SCHOOL, WOLVERHAMPTON

Subject

GRADIOMETER AND EARTH RESISTANCE ANOMALIES WITH FEATURES FROM 1920s MAP

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPPER HOOK ROAD
UPTON UPON SEVERN
UK
WR8 0SA
T: +44 (0)1684 592266
F: +44 (0)1684 594142
E: info@stratascan.co.uk
www.stratascan.co.uk

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Scale 1:1000 (0m 10 20 30 40 50)

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
JUNE 09	RAJS	10