

Archaeology Central

Land between Waterloo Street & The Ringway Kidderminster, Worcestershire

Field Evaluation



By
Chris E Smith BA (Hons) MA MCIfA
Report No. 1333


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Land between Waterloo Street & the Ringway Kidderminster, Worcestershire

Desk based assessment and site visit

Prepared For: Asbri Planning Ltd


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Non-Technical Summary

This report results from work undertaken by Archaeology Central Ltd (AC) for Matrix Medical. It draws upon the results gained by a field evaluation on land at Waterloo Street, Kidderminster, Worcestershire. A detailed planning application 14/0187/FUL was submitted for the construction of a new medical centre with associated landscaping, access and infrastructure on the site. The application documents included a Desk Based Assessment (DBA) undertaken by AC in 2013 (Smith 2013). The planning application was approved subject to conditions, with numbers 16, 17 and 18 specifically relating to a programme of archaeological work being required on site following the demolition of the existing buildings and before commencement of the main construction phase.

The DBA showed that the site was predominantly open fields in the mid-18th century but that by the end of the 18th century and into the early 19th century occupation of the site had begun. By the mid-19th century the site was occupied by a carpet factory as well as other ancillary structures and domestic housing.

A Written Scheme of Investigation (WSI) was also prepared by AC and approved by the local planning authority which has subsequently allowed condition 16 to be discharged. This current report details the results of the archaeological evaluation undertaken and is intended to discharge condition 18.

The archaeological evaluation has shown that, through previous demolition and landscaping activities, the majority of below ground structural remains on the southern and eastern edges of the site have been removed. Archaeological features from the 17th to 19th centuries, including structures, do exist in the remainder of the site and have been recovered during the fieldwork. These features are of local significance and accord with those expected to be encountered in the DBA.

If the main construction program as confirmed by Matrix Medical is unaltered and no ground works are undertaken to the north of the proposed medical centre then the requirement for further archaeological work is removed. If the construction program is altered then the requirement for further archaeological work will need to be reviewed. If alteration to the construction program is required, this document should be consulted to provide information about the location of archaeological features and their depths so they can be avoided where possible.

1 Introduction

1.1 Location and scope of work

- 1.1.1 In March 2015 Archaeology Central Ltd (AC) carried out a field evaluation on land at Waterloo Street, Kidderminster, Worcestershire. The assessment area was centred on NGR SO 8336 7686 (Figs 1 & 2). The work was carried out at the request of Asbri Planning Ltd in order to satisfy a planning condition from Worcester County Council (WCC).

- 1.1.2 The AC project number is 2182 and the site code is WSK/15/EVA.
- 1.1.3 The archaeological work is being undertaken pre-application and follows recommendations supplied by Mike Glyde of Worcestershire Archive and Archaeology Service (WAAS). A specification for the works was drawn up by Chris E Smith (Appendix 5). The local planning authority is Wyre Forest District Council.
- 1.1.4 The assessment area comprises the parcel of land located off Coventry Street between Waterloo Street and The Ringway within the centre of Kidderminster, Worcestershire.
- 1.1.5 A previously undertaken desk based assessment (Smith, 2013) showed that a 19th century carpet factory, as well as domestic housing and ancillary structures, previously stood within the assessment area and that prior to around the mid-18th century the site was in use as agricultural land.
- 1.1.6 The field evaluation was designed to assess the levels of below ground survival of the features identified by the desk based assessment, as well as identify any earlier, previously unknown, archaeological features, which may be damaged as a result of the proposed development.

1.2 Geology

- 1.2.1 The underlying solid geology of the assessment area is comprised of Triassic Mudstones, including Keuper Marl, Dolomitic Conglomerate and Rhaetic. These are part of the New Red Sandstone formations laid down in the Permian and Triassic periods. The solid geology is overlain by freely draining, slightly acid sandy soils (Geological Survey Map, 2001).

1.3 Site Location and Topography

- 1.3.1 The assessment area is located within the centre of urban Kidderminster. The area is composed of a mixture of housing and local businesses. The site is bounded by Coventry Street to the south, Waterloo Street to the west and the Ringway to the east. The area has most recently been in use as a large print shop and car services area, the structures for which were 20th century in date and have recently been demolished (Fig 2).
- 1.3.2 The site covers an area 138m long by 40m wide at its widest point. It is located at approximately 45m above Ordnance Datum.

1.4 Archaeological and Historical Background

- 1.4.1 The site has previously been the subject of a detailed desk based assessment (Smith, 2013). The principal historic map sources consulted as part of the desk based assessments historic map regression analysis are reproduced within this report as figures 3 to 6.

- 1.4.2 The following paragraphs concerning the areas archaeological and historical background are extracts from the desk based assessment (Smith 2013):
- 1.4.3 An Anglo-Saxon minster was founded in the area in the 8th century following a land grant from Ethelbald, King of Mercia, to Cynibehrt in 736 (Stone 1998, Buteux 1996). However, the first documentary reference to Kidderminster is in 1086, when the manor was held by the king. A church, probably on the site of St Mary's Church, is first mentioned in 1175.
- 1.4.4 In the early 13th century, the manor came into the hands of the Biset family. In 1241 it was divided amongst the three daughters of John Biset. Soon after this one third, including the church, was given to the Prior of Maiden Bradley in Wiltshire and became merged in the Priory's manor of Comberton. By 1385-6 the other two portions, Kidderminster Biset, which included the original manor house, and Kidderminster Burnell were both owned by Sir John Beauchamp (Buteux, 1996).
- 1.4.5 The earliest reference to the grant of a burgage in Kidderminster occurs in the early 13th century and the settlement was clearly considered a town by 1228 when it was granted a fair which lasted for three days (Stone, 1998). Two references to burgage tenure were recorded in 1254, and by 1307 the manor of Kidderminster Biset included sixty three burgesses (Buteux, 1996).
- 1.4.6 From about 1600 the main products of Kidderminster were linen and wool "Kidderminster stuff" of types that were largely used for wall-hangings and bed furniture. Coopering, glove making and pewter manufacture were also in evidence (Hurst, 1996). In 1650 the professions that had sufficient practitioners to warrant guilds were weavers, tailors, smiths and shoemakers (Stone, 1998). Shortly after The Restoration the prosperity of the town increased through the completion of the scheme to make the Stour navigable from Stourbridge to Kidderminster. Coal was first brought by water in 1665. By the end of the 17th century, however, the demand for Kidderminster Stuff had begun to decline and the output of the town's clothiers became more diversified (Buteux, 1996).
- 1.4.7 In the 18th century two new industries emerged. The first of these was carpet manufacture. This started around 1735 when John Pearsall and John Broom began producing reversible carpets without a pile at their loom shop on Mount Skipet (Thompson, 2002). This quickly became the dominant trade in the town (Buteux, 1996, Stone 1998). By 1772 there were eleven master carpet weavers in the town and 250 looms. The second new industry that developed in the 18th century was silk and worsted manufacture. Despite the fame of Kidderminster carpets, the production of silk and worsted developed to become the town's major industry in the second half of the 18th century. The great prosperity of the town at that period was primarily due to cloth production (Buteux, 1996).

- 1.4.8 In 1753 the population of the town had increased to about 4000. One developer alone, Lord Foley, had laid out new streets and built 200 houses. By 1773 the population had risen to 5749 (Gilbert, 2004).
- 1.4.9 A period of change followed as cloth production diminished and the demand for carpet grew. During the mid to late 19th century, however, the carpet industry went through a period of turmoil, when the forces of the Industrial Revolution hit the town, replacing small-scale production with power looms the factories. The skyline changed as the mills and their chimneys were constructed and the surrounding fields and open spaces became roads and factories (Thompson, 2002).
- 1.4.10 The boom in production of bombazine, a fine twilled fabric of silk and worsted or cotton, led to new streets being established during the end of the 18th century (and probably no later than 1810). These probably include the complex of streets off the top end of Blackwell street, comprising Union street, Silver street and the north end of Waterloo street (Gilbert, 2004).
- 1.4.11 The opening of the Kidderminster section of the Staffordshire and Worcestershire Canal in 1772 brought increased traffic and trade to the town. Largely as a result, the 19th century saw a rapid development in economic prosperity and a continued expansion of the carpet industry, which become the major industry of the town. In 1801 the population was 6110, but by 1851 this had risen to 20,852. Growth continued after the opening of the railway in 1852 and the adoption of the power loom in the 1860s (Buteux, 1996).
- 1.4.12 A Birmingham architect, J G Bland, was largely responsible for establishing the appearance and design to which most carpet factories in Kidderminster conformed in the second half of the nineteenth century (Stratton & Trinder, 1997). This was clearly an improvement on what had been built before. A local newspaper, when discussing the carpet factory buildings of Kidderminster in 1854, stated that:
- “In the construction of these buildings a desire has been manifested to make them not only substantial and convenient for the purposes for which they are destined but to render them ornamental to the neighbourhood. Hitherto the custom in Kidderminster has been to erect factories without the slightest regard to anything but the question how to accommodate a certain quantity of looms or other machinery at the least architectural cost and the result has been the town is filled with lank, plain walled, ugly windowed dismal looking factories, which, however necessary they may be for welfare, sadly compromise the respectability of its appearance” (Cited in Stratton & Trinder, 1997).
- 1.4.13 Kidderminster’s carpet mills of the later nineteenth century had red or blue brick walls, with simple blocks of stone or contrasting buff bricks to highlight the window-sills. Elevations were topped by dentilled cornices (Stratton & Trinder, 1997).

- 1.4.14 In the 20th century the industry continued to grow. The war years were difficult but the post-war boom of the 1950s injected new life and prosperity into the town. From the 1970s onward the industry was resurrected: many companies merged or were taken over. Some failed to meet the challenge and the number of people employed in the carpet industry was significantly reduced (Thompson, 2002).
- 1.4.15 The carpet factory on Waterloo street (WSM19993) belonged to Richard Smith & Sons: The Carpet Manufacturing Co Ltd. A brief chronology of the company from Thompson (2002) is listed below:
- 1855 Richard Smith leased a factory on Primrose Hill, Mill Lane, to produce Chenille hand loom rugs
 - 1868 Purchased said factory and expanded his business considerably
 - 1870 Purchased Lea's Brussels street factory and the Mount Skipet Factories
 - 1875 Richard Smith died. William Henry and Edward Smith (family members) became joint Managing Directors. The company continued to expand with factories near the Shakespeare Inn, Coventry Street, a factory in Hall street and another in Waterloo street.
 - 1877 The Park Wharf factory was purchased
 - 1884 A large new factory with offices was built in Mill street. Park Wharf extended. Chenille hand looms were replaced by weft and setting power looms
 - 1890 Richard Smith & Sons merged with Morton & Sons to form The Carpet Manufacturing Company.
 - Both companies continued to trade under their own names until 1919. The Waterloo street factory appears to have closed at around this date.
- 1.4.16 A further carpet manufacturing company, Woodward Grosvenor & Co, is listed as having a 'small premises' on Waterloo street in 1873. This is unlikely to refer to the same carpet factory as that recorded as being owned in 1875 by Richard Smith & Sons as 'small premises' seems more likely to refer to a store or offices.
- 1.4.17 As the Waterloo street Carpet Factory appears to date from after 1851, it is likely that it was fitted with the relatively new power looms, introduced from America after this date, rather than the earlier hand looms.

2 Aims and Objectives

2.1 Field Evaluation

2.1.1 The field evaluation was undertaken in order to:

- Establish the presence/absence of archaeological remains within and immediately surrounding the area of proposed development
- Determine the extent, condition, nature, character, quality and date of any archaeological remains present
- Establish the ecofactual and environmental potential of archaeological features and deposits
- Produce a record of the features.

3 Methodology

3.1 Field Evaluation

- 3.1.1 Excavation of seven evaluation trenches (five measuring 15x2m and 2 measuring 25x2m) was undertaken using a 5 ton tracked mechanical excavator under close archaeological supervision.
- 3.1.2 All on-site illustrations were undertaken on drafting film using recognised conventions and scales (1:10, 1:20, 1:50) as appropriate.
- 3.1.3 All areas were photographed using high resolution digital photography.
- 3.1.4 All works were undertaken in accordance with the CIfA's *Standards and Guidance: for an archaeological evaluation* (2014) and current Health and Safety legislation.
- 3.1.5 The field evaluation was undertaken by Chris E Smith (MCIfA) and the overall management of the project was undertaken by Rowena Hart (MCIfA).

3.2 Finds

- 3.2.1 Finds were recovered by hand during the course of the excavation and bagged by context.

3.3 Palaeo-environmental evidence

- 3.3.1 Suitable bulk samples were stored in large, sterile, sample bags for later processing.

4 Evaluation Results

4.1 Soils and ground conditions

- 4.1.1 The field evaluation took place after the demolition of the existing 20th century buildings on the site. The overburden deposits across the site were thus predominantly compacted and levelled building rubble/brick remains. The depth and extent of this overburden varied across the site.
- 4.1.2 The natural deposits, where exposed, were composed of compacted yellow, grey and orange sand with cobblestone and rounded gravel inclusions.

4.2 Description

- 4.2.1 Trench 1. Trench 1 (Fig 2, Plates 1-3) was 15m in length by 2m wide. It was located adjacent to and parallel with the southern boundary of the site and was oriented on a north-east to south-west alignment. The trench was positioned so as to investigate the houses fronting onto Coventry Street identified on the map regression analysis.
- 4.2.2 Mechanical excavation under close archaeological supervision showed that made ground deposits (101 - including mixed clay, sand, rubble and brick with modern plastic inclusions) were present to a depth of at least 2m. A rapidly excavated sondage showed the made ground to continue to a depth of around 2.5m before the natural (102) compacted sand deposits, with occasional dolomitic conglomerate inclusions, were reached.
- 4.2.3 No features of archaeological or historic significance were noted within trench 1.
- 4.2.4 Trench 2. Trench 2 (Figs 2 & 8, Plates 4-7) was 15m in length by 2m wide. It was also oriented on a north-east to south-west alignment and was located to the north of trench 1 so as to investigate yard areas and ancillary structures associated with the Carpet Factory.
- 4.2.5 Dark brown/black silt overburden with frequent rubble and brick inclusions (201) formed an overburden layer over the majority of the trench. This was up to 1m deep. It was found to overlie a moderately compacted mixed sand deposit (202) with occasional charcoal flecks evidence of bioturbation. This was 0.2m to 0.3m deep and was taken to represent the subsoil deposit within the trench as it directly overlay a compacted, clean, natural sand (203) at a depth of approximately 1.2m.
- 4.2.6 The line of a land drain (204), filled with subrounded cobbles, was noted at the north east end of the trench running on an approximate north to south alignment.
- 4.2.7 A single subrectangular pit feature [205] was noted cut into the natural at the base of the trench. It was 1.2m in length by 0.3m wide. Excavation showed it to contain a single dark brown silt fill and to be 0.2m deep. A fragment of clay pipe stem was recovered from within the fill (206).

- 4.2.8 No structural remains associated with the buildings identified on the map regression analysis were noted within trench 2.
- 4.2.9 Trench 3. Trench 3 (Figs 2 & 7, Plates 8-18) was located to the immediate north of trench 2, was aligned on a north-east to south west axis and measured 25x2m. It was positioned to investigate the structures belonging to the Carpet factory as identified on the map regression analysis.
- 4.2.10 Removal of mixed dark silt and rubble overburden (317/321) revealed, at the north-eastern end of the trench, a compact pale yellow sand natural (302) at a depth of 0.1m below the current ground surface. The base of a land drain, likely that seen in trench 2, was also observed at this depth.
- 4.2.11 To the immediate west of the land drain, cut into the natural sand (302) and partially obscured by the trench edge, was an elongated pit feature [318]. The pit had an undulating base with 45° sloping sides and contained a single mixed fill (319).
- 4.2.12 A one metre wide area of staining on the natural sand running perpendicular to the trench was noted to the west of pit [318]. This was interpreted as possible remnants of an old field boundary.
- 4.2.13 Within the middle of the trench was evidence of a now removed drainage system. A large square area of modern disturbance (with evidence of excavator bucket teeth marks) was noted with linear features running into it. This was interpreted as a drainage feature with drains running into it removed during a previous phase of demolition earlier in the 20th century. One of the ceramic drains, within a reasonably modern concrete reinforcement, was still *in situ* running into the area of disturbance.
- 4.2.14 To the west of the area of modern disturbance was an intact brick structure [324]. This was partially obscured by the trench edge though measured 2m in length. The structure was made of unfrogged bricks bonded with a lime mortar. The walls survived to between 3 and 5 courses high. The floor of the structure was also composed of similar bricks. The structure [324] appeared to have been backfilled with a gritty/ashy silt.
- 4.2.15 A single posthole [328] was noted adjacent to the brick structure. This measured 0.3m in diameter by 0.5m deep and contained a single mixed silt fill with stone and rubble inclusions.
- 4.2.16 At the very south-western end of the trench a brick structure [310] was noted. This was located beneath the overburden horizon (317/321). It was sat in a very narrow foundation cut [309], which was cut into a mixed silt/rubble horizon (315). The brick structure was composed of unfrogged bricks bonded with a lime mortar. Remains of half of a possible archway survive within the bricks, suggestive of a possible culvert. Excavation of the deposit (320) above the internal face of the arch produced a large amount of butchered animal bone suggesting disposal down a drain feature. A channel noted within the brick wall adjacent to the arch feature may also be suggestive of a drain related function to the brickwork in this area.

- 4.2.17 The terminus of a narrow (0.5m), deep (0.9m) gully [316] was also noted adjacent to the brick structure [310]. This appeared to be cut in very high in the section through overburden layer (321). This was assumed to be a modern intrusion though was of unknown function.
- 4.2.18 Trench 4. Trench 4 (Figs 2 & 8, Plates 19-24) was located adjacent to the western edge of the site and was aligned on a north to south axis running parallel with and close to Waterloo Street. It was positioned to investigate the houses marked in the area on the map regression analysis.
- 4.2.19 The trench measured 15m in length by 2m in width. A dark silt overburden (401) with occasional rubble inclusions was removed by mechanical excavator revealing the line of brick walls (402). Subsequent excavation of the walls showed them to represent the largely below ground foundation courses of the 19th century housing fronting Waterloo Street.
- 4.2.20 A back wall to the houses was located against the eastern edge of the trench with three equally spaced dividing walls projecting westwards at 90° from this, representing rooms within the structures. Excavation of the back wall showed it to be two bricks thick and have the remains of a cobbled surface to the east, presumably representing external yard space.
- 4.2.21 The two southernmost rooms were fully excavated to below the base of the foundation walls (402) thus exposing the buried dark silt soil horizon (403) and natural sand (404) on which the houses were constructed. Numerous finds of later 17th to mid-18th century date were recovered from the buried soil horizon below the 19th century housing. The natural sand, exposed at a depth of 1.2m, contained occasional large cobblestone inclusions though no finds or features predating the housing.
- 4.2.22 Although no floor levels survive within the rooms, the two northernmost rooms did have subfloor demolition horizons evident (405). This consisted of a mixture of mortar fragments and smashed slate pieces mixed with early 20th century finds. The demolition horizon was sealed by a layer of mixed sand and cobble stones (406) seemingly imported in order to backfill/cap the site post demolition.
- 4.2.23 A large (up to 1m), rectangular and seemingly modern pit [407] had been cut through the layer sealing the demolition horizon. Owing to very modern material being evident within its fill (408) this remained unexcavated.
- 4.2.24 The bricks, all unfrogged, forming the walls of the housing (402) showed signs of reuse (some were painted/plastered) and were not uniform in their dimensions. Structural samples were taken to form part of the project archive.
- 4.2.25 Trench 5. Trench 5 (Figs 2 & 8, Plates 25-28) was located towards the northern end of the assessment area within the middle of the plot and was positioned to investigate ancillary structures to the rear of domestic properties fronting onto Waterloo Street. The trench measured 15x2m and was oriented approximately north-west to south-east.

- 4.2.26 Mechanical excavation showed the overburden deposits to be formed of a compacted coke and ash material forming a rough surface (501). This was up to 0.3m deep in places. The overburden material (501) was found to directly overlie a firm, bright orange, sandy natural (502) at a depth of 0.3m.
- 4.2.27 Located immediately below the overburden (501) and cut into the natural sand (502) was a square pit [503], partially obscured by the trench edge. Excavation of the pit found it to contain a single friable fill (504) composed of loose dark silt and large amounts of late 19th and early 20th century material such as pottery, glass and clay tobacco pipes. The sides of the pit were vertical, the base was flat and the corners were very regular.
- 4.2.28 No further features were located within trench 5.
- 4.2.29 Trench 6. Trench 6 (Figs 2 & 8, Plates 29-35) was located to the east of trench 4 and measured 25x2m. It was aligned on a north-east to south-west axis and was positioned to investigate internal and external spaces within the carpet factory as well as a separate structure located between the carpet factory and the domestic housing on Waterloo Street.
- 4.2.30 Excavation revealed a silt and brick/rubble overburden (601) across the trench between 0.1m and 0.3m thick. Beneath this, at the south western end of the trench, two brick structures/plinths were located (602 & 603). Each were partially obscured by the trench edge though measured upto 2m in length and were composed of four courses of bricks bonded with an off-white/beige lime mortar.
- 4.2.31 Both brick structures (602 & 603) were constructed on top of a grey sandy silt subsoil material (604). Elsewhere within the trench this subsoil (604) was located directly beneath the overburden horizon (601) and above the natural sandy deposits at the base of the trench (606).
- 4.2.32 A large (3m wide) cut [607] was observed between the two brick plinths (602 & 603). This was made through the subsoil horizon (604) and into the natural (606). Modern plastic material was evident within the mixed rubble fill (608) suggestive of a relatively recent date.
- 4.2.33 A group of five small cuts [610], originally interpreted as postholes, was located cut into the natural to the east of brick plinth (603). Upon excavation these were found to angle into the ground at 45°. Their uniform size and regular spacing lead to a reinterpretation of the features as likely made by the teeth of a large excavator bucket, likely from an earlier phase of demolition on the site.
- 4.2.34 A single, 0.3m diameter, circular posthole [612] was noted to the east of group [610]. This was cut into the natural (606) and contained a single silt fill (614). It was approximately 0.05m deep with no associated dating material.

- 4.2.35 At approximately halfway along the trench the depth of made ground (towards the east) increased. This appears to reflect where the site has been terraced away, likely during construction of the adjacent Ringway road system.
- 4.2.36 Trench 7. Trench 7 (Figs 2 & 9, Plates 36-48) was located towards the northern end of the site. It measured 15x2m, was aligned roughly north to south and was positioned to investigate structures, presumably domestic, fronting onto Waterloo Street identified in the historic map regression.
- 4.2.37 Removal of a dark, mixed rubble overburden (701) revealed the tops of walls [706/711/728] forming three apparent internal dividing walls within the structure. The walls were composed of uniform bricks bonded with a cement mortar and were perpendicular to the trench alignment. The wall located within the middle of the trench had two brick buttresses on either side. Each was keyed in and was original to the construction of the wall. These are likely to represent chimney supports, with one being located on either side of the wall.
- 4.2.38 The walls located on either side of the central wall, to its north and south, were two brick widths wide. Excavation to the base of the northern wall proved that a cellar was present in this area. A brick floor (730) was uncovered at 1.45m below the current ground surface. A silver pin was recovered from the brick cellar floor (730). Rising groundwater covered the cellar floor very quickly after it was exposed.
- 4.2.39 Further excavation to the base of the southern wall did show that a cellar was present here too although, owing to its being backfilled with rubble resulting in very unstable trench edges, the floor was not reached.
- 4.2.40 Excavation within the two central rooms continued via a 2m x 0.6m sondage in each area. This necessitated the widening of the trench by mechanical excavator in order that the sondages be safely stepped. The trench was thus widened by approximately 1m to the east and west. The front and rear walls of the brick structure, exposed during the widening, thus marked the extent of the trench.
- 4.2.41 Sondage 1 was located within the northern central room between the two dividing walls [706/711]. Excavation between the walls defining the northern central room showed it to be backfilled with mixed overburden deposits (701 & 702) as well as a possible demolition horizon (703) comprised of crushed/degraded concrete fragments. The interface between (703) and (704 – a mottled clay silt made-ground deposit) likely reflects the ground height during the structures use/demolition.
- 4.2.42 Walls [706 & 711] were shown to extend to a depth of 1.5m. Wall [711] was, at its base, sat on a well preserved wooden sill beam at the base of its foundation cut [712]. The foundation cut [712] terminated within layer (713), a firmly compacted, clean, orange sand. This was a redeposit of the natural material found elsewhere on site. Excavation beneath (713) revealed six horizons beneath alternating between wet, organically rich deposits (714, 716, 717) and mixed sandy clay horizons (715, 718).

Natural compacted sand deposits (719) were reached in sondage 1 at a total depth of 2.82m below the current ground surface.

- 4.2.43 Finds recovered from the layers within sondage 1 all appear to date from the later 17th into the 19th century and include large amounts of ceramics, glass, clay tobacco pipe as well as an 18th century wig curler and a single gold pin.
- 4.2.44 Sondage 2, excavated within the southern central room and of the same dimensions, encountered the same natural sand redeposit horizon (713). Similarly the bottoms of the walls [706 & 728] were located at the same depth as those within sondage 1 though no wooden sill beams were observed.
- 4.2.45 Although horizons (713) & (714) were similar in both sondages, all layers below this in sondage 2 differed from the banded stratigraphy seen in sondage 1. Whilst organic horizons similar to those seen in sondage 1 were encountered (722), they were not in the same quantity. Horizon (721) appeared to be a dump of cobblestones and brick rubble whilst a small cut [723] appeared to be acting as a small cobblestone filled (724) soakaway. A further cut [725] was made beneath (721) and (722) and through sandy horizon (718). This was filled with a very wet sandy silt layer (726) with occasional organic remains. Owing to the fast ingress of groundwater at this level, excavation in sondage 2 ceased at this point, 2.42m below the current ground surface.
- 4.2.46 Finds recovered from the horizons encountered within sondage 2 included ceramics, ceramic building material and clay pipes. All were of later 17th to 19th century date.

5 Finds

5.1 Introduction

- 5.1.1 A moderate finds assemblage was recovered from the seven trenches comprising the field evaluation.
- 5.1.2 A total of 462 finds including pottery, glass, ceramic building material, metal, stone, animal remains and four small finds make up the complete assemblage.

5.2 Pottery

- 5.2.1 The pottery has been subject to specialist analysis by Paul Blinkhorn. His report is below:
- 5.2.2 The pottery assemblage comprised 308 sherds with a total weight of 9,709g. It was entirely of post-medieval date, with most of the material dating to the mid-18th century or later. Where possible, it was recorded using the conventions of the Worcestershire county type-series (eg. Bryant and Evans 2002) as follows:

F78: Post-medieval Red Earthenware, 17th – 19th century. 33 sherds, 1,207g

F81.3: Nottingham/Derby Stoneware, 18th – 19th century. 3 sherds, 85g.

F81.5: White Salt-glazed Stoneware, c 1720 – 80. 1 sherd, 3g.

F82: Tin-glazed Earthenware, 17th -18th century. 1 sherd, 3g.

F84: Creamware, mid-18th – 19th century. 29 sherds, 373g.

F85: Modern China, 19th – 20th century. 93 sherds, 1,213g.

F91: Post-medieval Buff Ware, 17th – 18th century. 1 sherd, 15g.

F100: Miscellaneous post-medieval and modern wares, 19th century. 132 sherds, 6,052g.

F108: Midland Purple Ware, late 14th – 18th century. 1 sherd, 20g.

5.2.3 The following wares were also noted:

F300: Staffs/Bristol Slipware, mid-17th – 19th century (Crossley 1994, 252). 8 sherds, 563g.

F301: Pearlware, mid-18th – 19th century (*ibid.* 254). 3 sherds, 301g.

F302: Cologne/Westerwald Stoneware, 17th – 19th century (Gaimster 1997). 1 sherd, 5g.

F303: English Stoneware, late 17th – 18th century (Mountford 1971). 1 sherd, 30g.

5.2.4 The pottery occurrence by number and weight of sherds per context by fabric type is shown in Table 1. Each date should be regarded as a *terminus post quem*.

5.2.5 The vast majority of the assemblage consists of very common wares of mid-18th – 19th century date. It comprises large quantities of domestic utilitarian earthenwares, mainly in the form of storage vessels, large bowls or pancheons, and chamber-pots, along with smaller quantities of tablewares, mainly plates and dishes, along with drinking pottery such as tea-pots, cups, and saucers. The Red Earthenwares are mostly black-glazed, which is typical of the period, and the Staffordshire Slipwares are nearly all late, 18th – early 19th century types. None of the 19th century pottery had any maker's- or date-marks, making any sort of precise dating or estimation of pottery sources possible.

5.2.6 There are a few sherds which could be of 17th century date, specifically the Tin-glazed Earthenware and the Cologne/Westerwald Stoneware, but such pottery was still being made and used in the 18th century. Similar comments apply to the sherd of Midland Purple Ware, which could be as early as the 14th century, although this seems unlikely given the date of the rest of the material from the site. There seems to be little to be gained by any further work on the assemblage.

5.2.7 A table showing ceramic finds by context is contained within Appendix 3.

5.3 Clay Tobacco Pipes

- 5.3.1 A total of 71 clay tobacco pipe fragments were recovered from the seven field evaluation trenches at Waterloo Street. Of the 71 fragments, a total of 9 are closely dateable bowls or bowl fragments.
- 5.3.2 Bowl 1 – Trench 2, subsoil horizon (202). Damaged bowl stylistically dated to c.1680-1710. Raked angle at which bowl projects from stem suggestive of Dutch origin or style.
- 5.3.3 Bowl 2 – Trench 3, mixed overburden horizon (317). Large capacity, undecorated, thin walled bowl. c.1840-80.
- 5.3.4 Bowl 3 – Trench 4, within layer sealing demolition (406). Large capacity, undecorated, thin walled bowl. Dutch style copied by English makers between c.1880-1920.
- 5.3.5 Bowl 4 – Trench 4, within buried subsoil horizon (403). Thick walled, relatively small capacity bowl with minimal rouletting around rim. Large flat heel. No makers mark. Stylistically dated to c.1660-80.
- 5.3.6 Bowl 5 – Trench 4, within buried subsoil horizon (403). Similar to above though with flared and trailed heel (West Country Style) bearing makers mark 'N'. Stylistically dated to c.1660-80.
- 5.3.7 Bowl 6 – Trench 5, within fill of pit [503]. Damaged large capacity thick walled bowl featuring a hand around base. Likely produced by Pollocks of Manchester between c.1880-1910.
- 5.3.8 Bowl 7 – Trench 5, within fill of pit [503]. Thin walled medium capacity bowl, largely undecorated apart from faint milling around rim. Irish style, made by some English makers from standard type mould c.1850-1910.
- 5.3.9 Bowl 8 – Trench 7, within 'pond' feature (714). Thick walled plain, parallel, bowl with flared and trailed heel (West Country Style). No makers mark. Stylistically dated to c.1680-1720.
- 5.3.10 Bowl 9 – Trench 7, within 'pond' feature (714). Thin walled, plain bowl with minimal heel. No makers mark. Stylistically dated to c.1680-1720.

5.4 Small Finds

- 5.4.1 A total of four small finds were recovered during the field evaluation. These consisted of a lead (Pb) musket ball, a gold (Au) pin, a silver (Ag) pin and a kaolin (pipe clay) wig curler).
- 5.4.2 Small Find 1, the musket ball, was recovered from context (319), the fill of pit cut [318] within trench 3. The ball is cast from lead alloy and has a casting seam around half of its diameter. At 90g (3.2oz) in weight and 23mm (0.9inch) the ball is considerably

larger than all of those in common, predominantly military, circulation throughout the 17th to 19th centuries. It may thus represent ammunition for a large calibre sporting gun - equivalent to 6 gauge.

- 5.4.3 Small Find 2, the gold pin, was recovered from context (716) within sondage 1, located in trench 7. The pin is a total of 18mm in length though is bent to a 70° angle 8mm from its point. It is less than 1mm wide, weighs less than 0.5 gram, and has a small globular head seemingly decorated through twisting of the metal visible under 40x magnification. Numerous finds from the same context date the pin to the later 17th/mid-18th centuries.
- 5.4.4 Small Find 3, the silver pin, was recovered from context (730), the brick cellar floor within trench 7. The pin is 36mm in length, 1mm in width with a flared and convex head 2mm in diameter. Under magnification small areas of corrosion are visible suggestive of a silver coating over a base metal. The structure from which the pin was recovered is securely 19th century in date.
- 5.4.5 Small Find 4, the clay wig curler, was recovered from context (716) within sondage 1, located within trench 7. The wig curler consists of moulded and kiln fired kaolin (pipe clay) in an elongated shape with globular ends. Only one end of the wig curler was recovered (likely up to a third). It measures 41mm in length, 14mm in diameter along the shaft and 20mm in diameter at the globular end. Ceramics and clay tobacco pipe dating from the same context suggest a later 17th to mid-18th century date.

5.5 Finds Summary and Date Ranges

- 5.5.1 The finds assemblage excavated from the seven trenches at Waterloo Street, Kidderminster, show a secure date range of later 17th to early 20th century. This date range is comparable to activity in the area of the development as depicted on the historical map sources.

6 Environmental and Structural Samples

- 6.1.1 A total of 4 bulk environmental samples and 10 structural samples were taken throughout the course of the field evaluation.
- 6.1.2 Structural samples consisted of bricks taken from various structures within trenches 3, 4, 6 & 7, both domestic and industrial in context, uncovered during the course of the evaluation. The brick samples, with their specific dimensions noted, will form part of the archive deposited with the regional HER in order to contribute to the local brick archive at Mike Glyde's request.

7 Geotechnical Investigation Report

- 7.1.1 A geotechnical ground investigation was undertaken by Georisk Management at the same time as the archaeological field evaluation. The full ground investigation report is contained within Appendix 4.
- 7.1.2 The areas investigated by the geotechnical team showed natural deposits being reached at depths varying from 0.5m to 1.8m below the current ground surface across the site. None of the logs show evidence for a redeposited natural across the site.

8 Evaluation Trench Interpretation

8.1 Trench 1

- 8.1.1 The excavation within trench 1 showed only heavily disturbed made ground to a depth of up to 2.5m below the current ground surface, at which point undisturbed natural was reached. The trench was located in this area to assess the levels of survival of the structures marked on the historic maps. The map regression analysis within the desk based assessment showed housing in this area from the mid-19th century until the erection of the printworks in *c.*1938. Further demolition and construction appears to have taken place between 1938 and 1989 with the construction of the adjacent Ringway and the larger printworks. This series of demolition/construction from *c.*1938 onwards appears to have largely removed all traces of the structures shown on the historic maps as being located fronting onto Coventry street at the southern end of the assessment area

8.2 Trench 2

- 8.2.1 The excavation within trench 2 was largely the same as that observed in trench 1 with similar made ground overlaying natural, though to a slightly shallower depth at 1.2m below the current ground surface. A single pit feature [205] of post-medieval date was noted cut into the natural at the base of the trench.
- 8.2.2 Trench 2 was positioned to investigate ancillary structures associated with the Carpet Factory first marked in detail on the 1884 Town Plan. The continuation of the made ground in this area, combined with the complete lack of structural remains, suggests that previous levelling and demolition in the 20th century has largely removed all structures in this area of the site.

8.3 Trench 3

- 8.3.1 Excavation in trench 3 showed that terracing/removal of deposits, including the vast majority of structural remains, during previous phases of demolition/construction continued into this area. Location of natural deposits and the base of a land drain at 0.1m depth at the north-eastern end of the trench confirmed this. Limited structural remains in the form of brick structures likely associated with below ground drainage

[324 & 310] were evident within the south-western end of the trench. Brick feature [324] appears likely, based on its appearance and location, to represent a small structure marked on the 1884 Town Plan and then labelled on a 1921 plan as being the Female WC's. This structure is first shown on the 1884 map and last shown on the 1921 plan. It is not shown on the 1924 map thus providing a demolition date.

8.3.2 The brick structure possibly incorporating a culvert [310], to the south-west of the Female WC's, is also seemingly depicted (for the first time) on the 1884 map, identifiable by the off-set angle at which it is located adjacent to [324]. This feature is last depicted as extant on the 1902 map.

8.3.3 An area of staining on the natural sand, approximately one metre wide, was interpreted as the possible remnant of a field boundary running approximately north to south across the assessment area. The 1753 John Doharty map does show the assessment area as being divided by a long, north to south, field boundary prior to any development.

8.4 Trench 4

8.4.1 The excavation within trench 4 showed good below ground survival of the mid-19th century domestic houses fronting onto Waterloo Street which stood from the mid-19th century to c.1938. All levels above the foundation courses have been demolished leaving approximately 0.5m to 0.8m intact below ground. Finds from within the demolition horizon suggest an early 20th century demolition date.

8.4.2 The housing overlies a buried soil horizon containing later 17th to mid-18th century finds.

8.5 Trench 5

8.5.1 The excavation of trench 5 showed that natural sand deposits lie within 0.3m of the current ground surface within this area. The trench was positioned in order to investigate ancillary structures to the rear of the domestic housing though no structural remains were identified suggesting complete removal during earlier 20th century demolition phases.

8.5.2 A single pit [503] was identified cut into the natural sand. Two clay pipe bowls from the fill of the pit (504) suggest a later 19th or early 20th century date.

8.6 Trench 6

8.6.1 Excavation within trench 6 showed limited survival of structural remains below ground, though only at the south-western end of the trench. The north-eastern end of the trench showed evidence of terracing away of the natural deposits (and, as a result, all structural remains above them).

8.6.2 The two brick plinth features [602 & 603], located below the overburden at the south-western end of the trench are likely to be 19th century in date and associated with the

structure shown in detail on the 1884 Town Plan within the historic map regression. The plinths themselves seem unlikely to be part of the fabric of the building though may have served as pier or machine bases inside the building. They were constructed above a buried soil horizon (604) similar to that seen in trench 4 beneath the housing, again containing later 17th to mid-18th century material. The large modern cut [607] between [602] and [603] remained unexcavated due to its evident modernity.

8.7 Trench 7

- 8.7.1 Excavation in trench 7 showed that the 19th century structures, presumably domestic, marked on the historic maps of the area survive in a good state of preservation below the current ground surface.
- 8.7.2 Excavation below the level of the 19th century structure showed it to have been constructed above a waterlogged feature with apparent deliberate capping in the form of redeposited natural (713).
- 8.7.3 Waterlogged deposits from the feature contain preserved sticks and twigs as well as hay/straw. This is suggestive of a feature which has been open to the elements such as a pond. Finds from within the various horizons within the feature date it from the later 17th to the 19th century. The 1753 John Doharty map contained within the desk based assessment (Smith, 2013) shows the area as being open fields at this time though a pond feature may have gone unrecorded.
- 8.7.4 Although the depth and the date of the ‘pond’ feature were both firmly established, the full extent was not able to be ascertained within the confines of the field evaluation.

9 Discussion

9.1 Overall

- 9.1.1 The field evaluation at Waterloo Street, Kidderminster, has shown largely that which was identified by the previous desk based assessment (Smith, 2013) although has also served to inform of below ground archaeological survival conditions.
- 9.1.2 Demolition and levelling activities in the 20th century have served to remove a great deal of structural remains from the site including all traces of the carpet factory.
- 9.1.3 The evidence from the field evaluation, when combined with that of the historic map regression analysis, shows four distinct phases across the site.
 - **Phase 1** – Late 17th into 18th Century. Site in agricultural use, likely with small scale allotment plots and ‘pond’ feature.
 - **Phase 2** – 19th Century. Site developed for housing with laying out of Waterloo Street. Industry (carpet factory) develops from mid-19th century onwards.

- **Phase 3** – Early 20th Century. Partial demolitions and clearance ahead of printworks construction.
- **Phase 4** – Later 20th Century. Total demolition and levelling of the site ahead of new printworks and Ringway construction.

9.1.4 No evidence for any activity prior to the 17th century was noted during the field evaluation.

9.2 Potential

9.2.1 The potential for the survival of below ground remains varies across the site. Along the eastern edge of the site and extending up to halfway back across its width, the site has largely been terraced down into the natural levels. In the south of the assessment area made ground has restored the ground level.

9.2.2 The western edge of the site and also the northern end where the ‘pond’ feature was located did, however, show evidence of high levels of preservation of below ground features. The 19th century structural features all appear to overlie earlier buried soils so the so the potential for earlier features within the western and northern areas is deemed to be good.

10 Acknowledgements

10.1.1 Thanks are due to Simon Reames (AW) for his on-site assistance and Mike Glyde of WAAS for curatorial help.

11 Bibliography and References

- British Geological Survey. 2001, 4th Edition. Solid Geology Map, UK South Sheet
- Buteux, V. 1996. *Archaeological Assessment of Kidderminster: Central Marches Historic Towns Survey*. Hereford and Worcester County Council Archaeology Service Internal Report 320
- Chartered Institute for Archaeologists. 2014. Standard and guidance for a field evaluation
- Gilbert, N. 2004. *A History of Kidderminster*. Phillimore & Co Ltd , London
- Hurst, J, D. 1996. Potential of artefactual studies. *Cited in* Buteux, 1996.
- Smith, C, E. 2013. Land Between Waterloo Street & The Ringway, Kidderminster, Worcestershire. Desk Based Assessment and Site Walkover. AC Report No. 1173
- Stratton, M & Trinder, B. 1997. *Industrial England*. BT Batsford/English Heritage, London
- Stone, R. 1998. *Kidderminster Town Centre*. Desk Based Archaeological Assessment. Marches Archaeology
- Thompson, M. 2002. *Woven in Kidderminster. An Illustrated History of the Carpet Industry in the Kidderminster Area 1735-2000*. Voice Associates, Kidderminster
- From specialist ceramic report:
- Bryant, V, and Evans, J, 2002 The Pottery in H Dalwood, and R Edwards, Excavations at Deansway, Worcester, 1988-89: Romano-British small town to late medieval city CBA Research Report 139
- Crossley, D, 1994. Post-Medieval Archaeology in Britain. LUP
- Gaimster, D, 1997. German Stoneware. British Museum Publications
- Mountford, AR, 1971. The Illustrated Guide to Staffordshire Salt-Glazed Stoneware. Barrie and Jenkins, London

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APPENDIX I: Figures

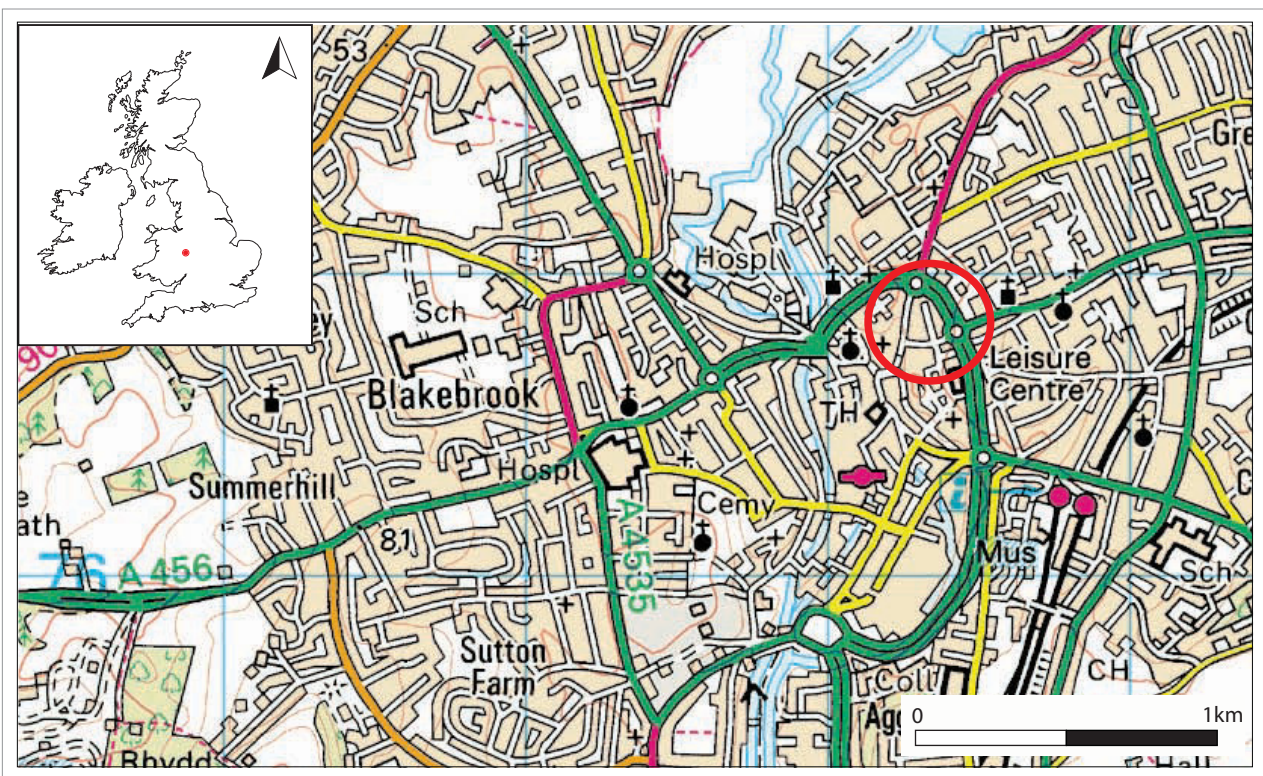


Fig 1: Figure showing location of assessment area

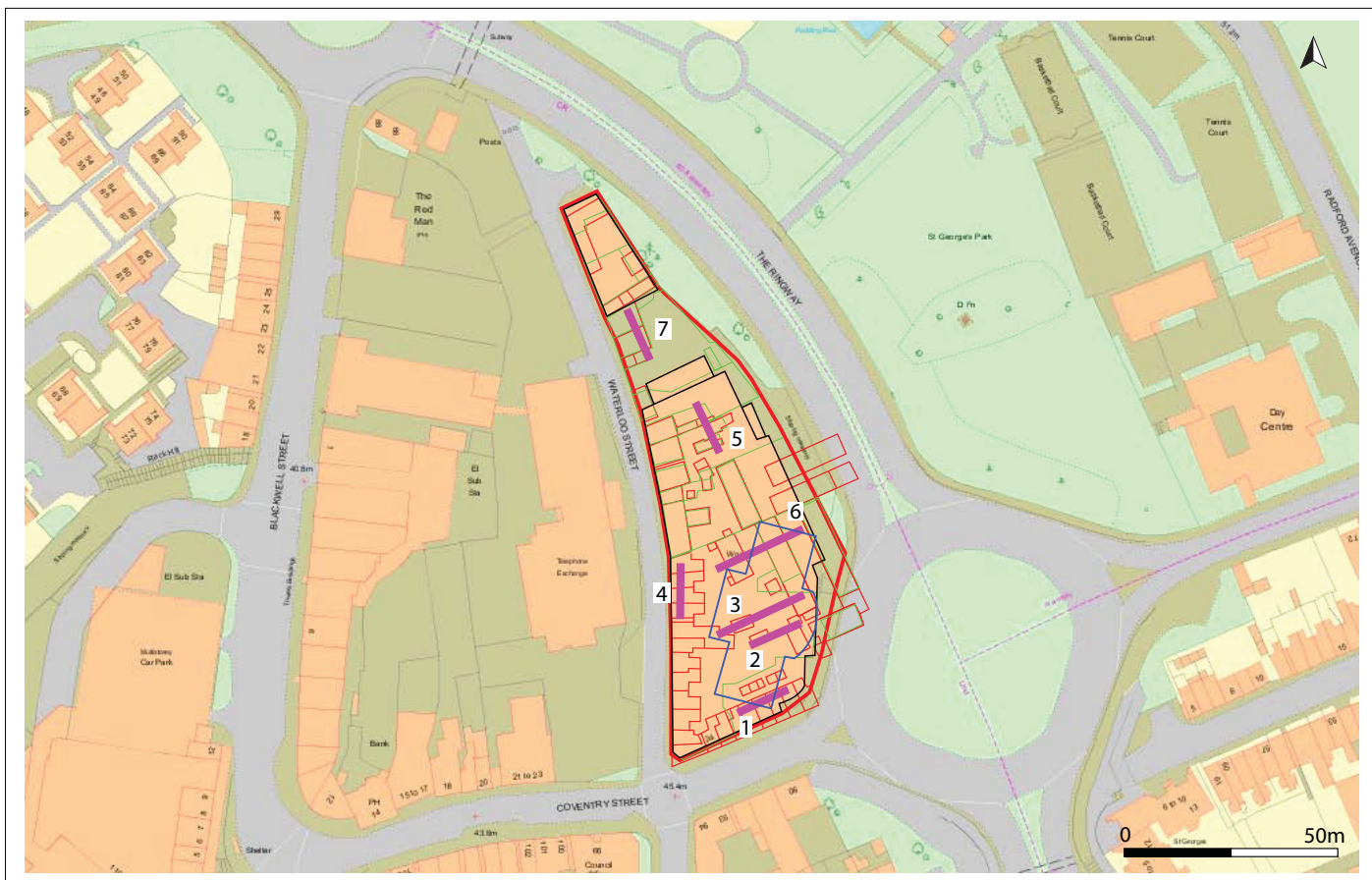


Fig 2: OS Mastermap showing assessment area with 1884 structures (red) 1938 structures (green), new medical centre (blue) and proposed trenches (solid pink).

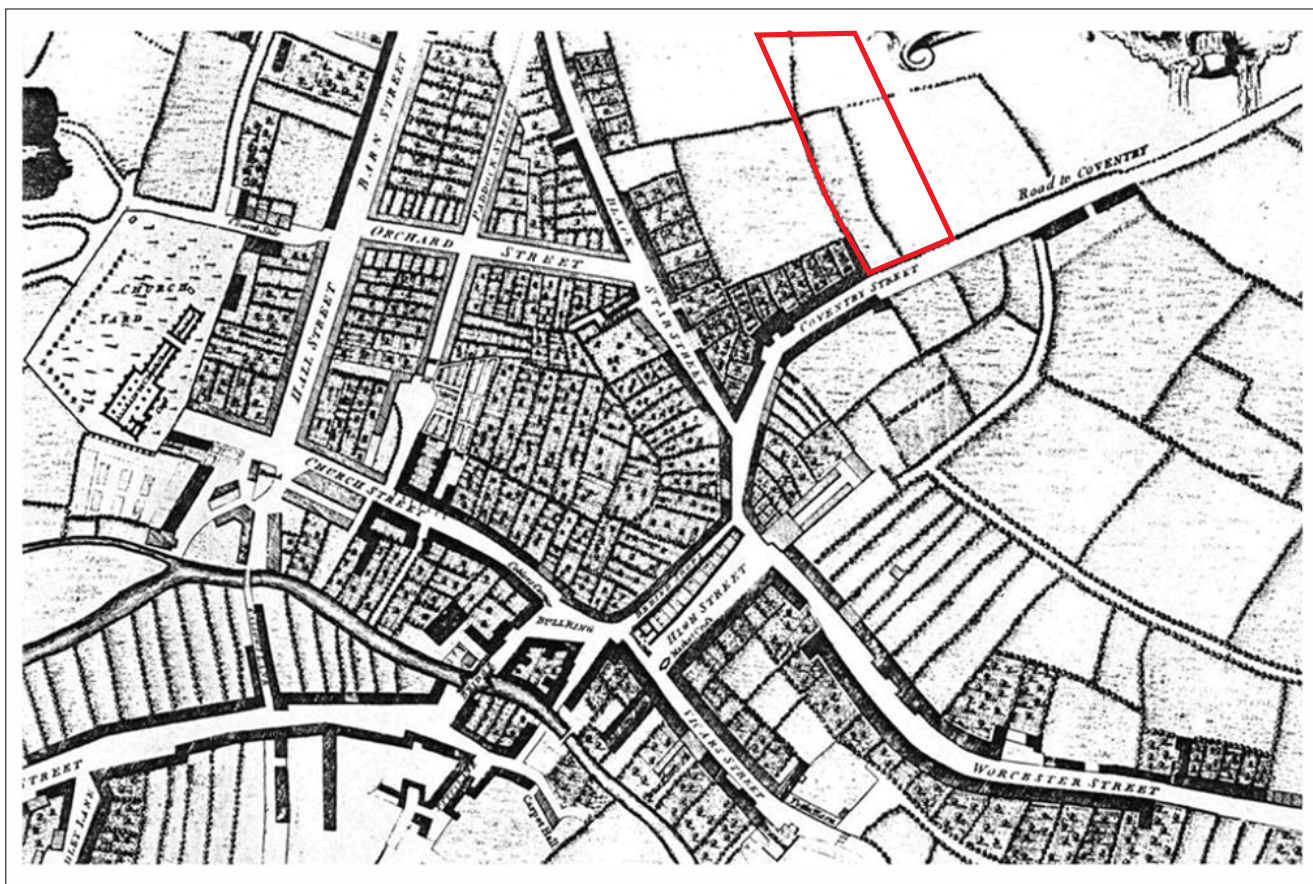


Fig 3: 1753 John Doharty map showing approximate assessment area



Fig 4: 1884 Town Plan
showing assessment area

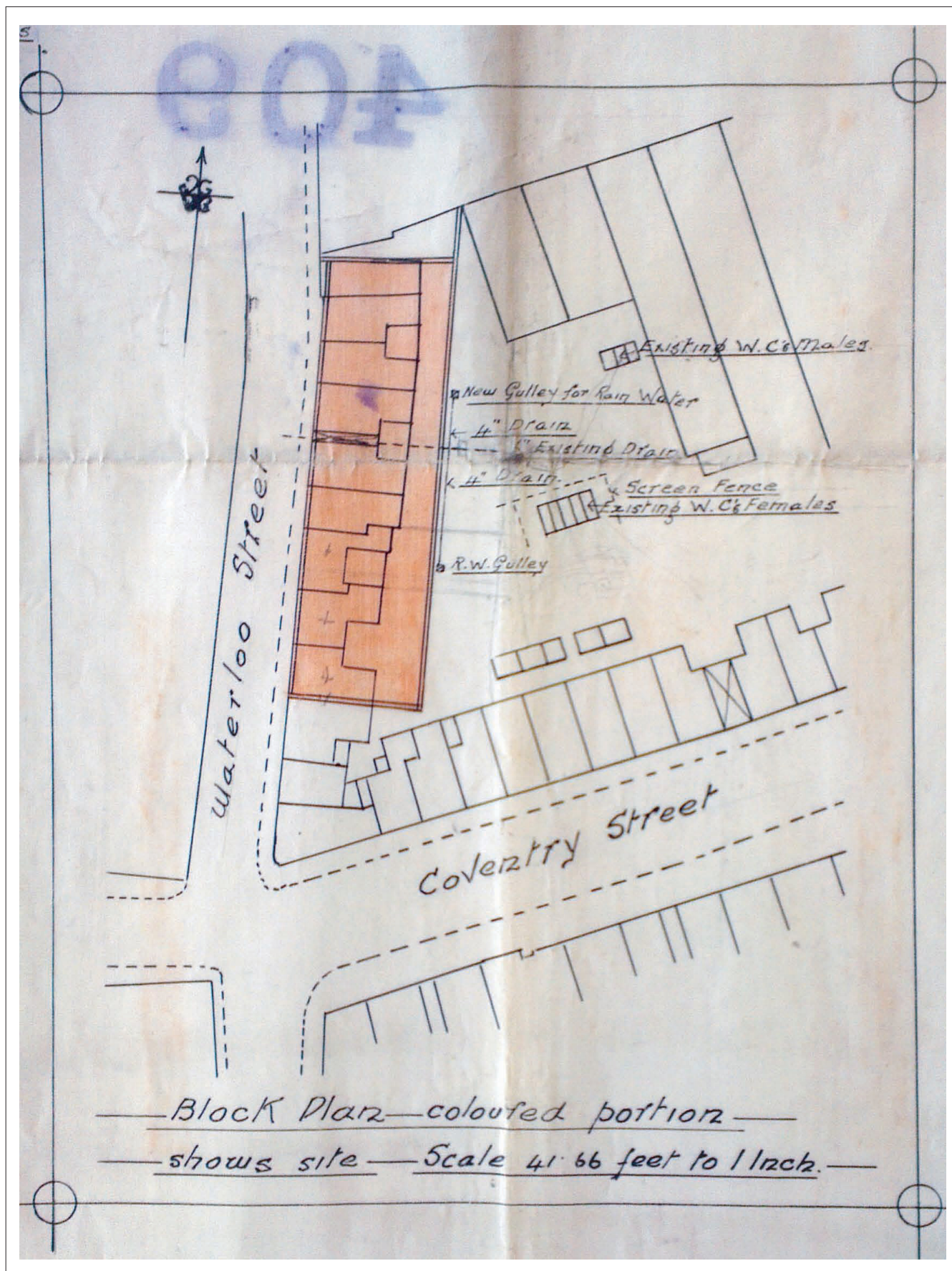


Fig 5: Extract from 1921 printing works proposals showing location

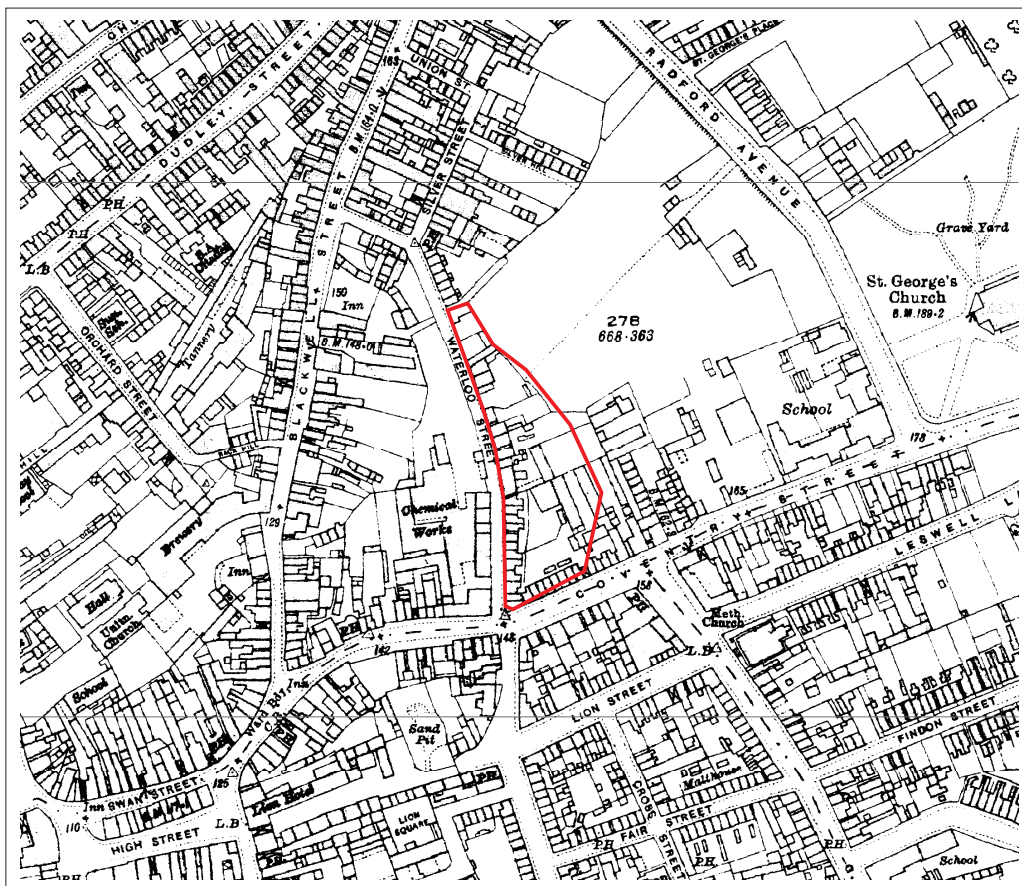
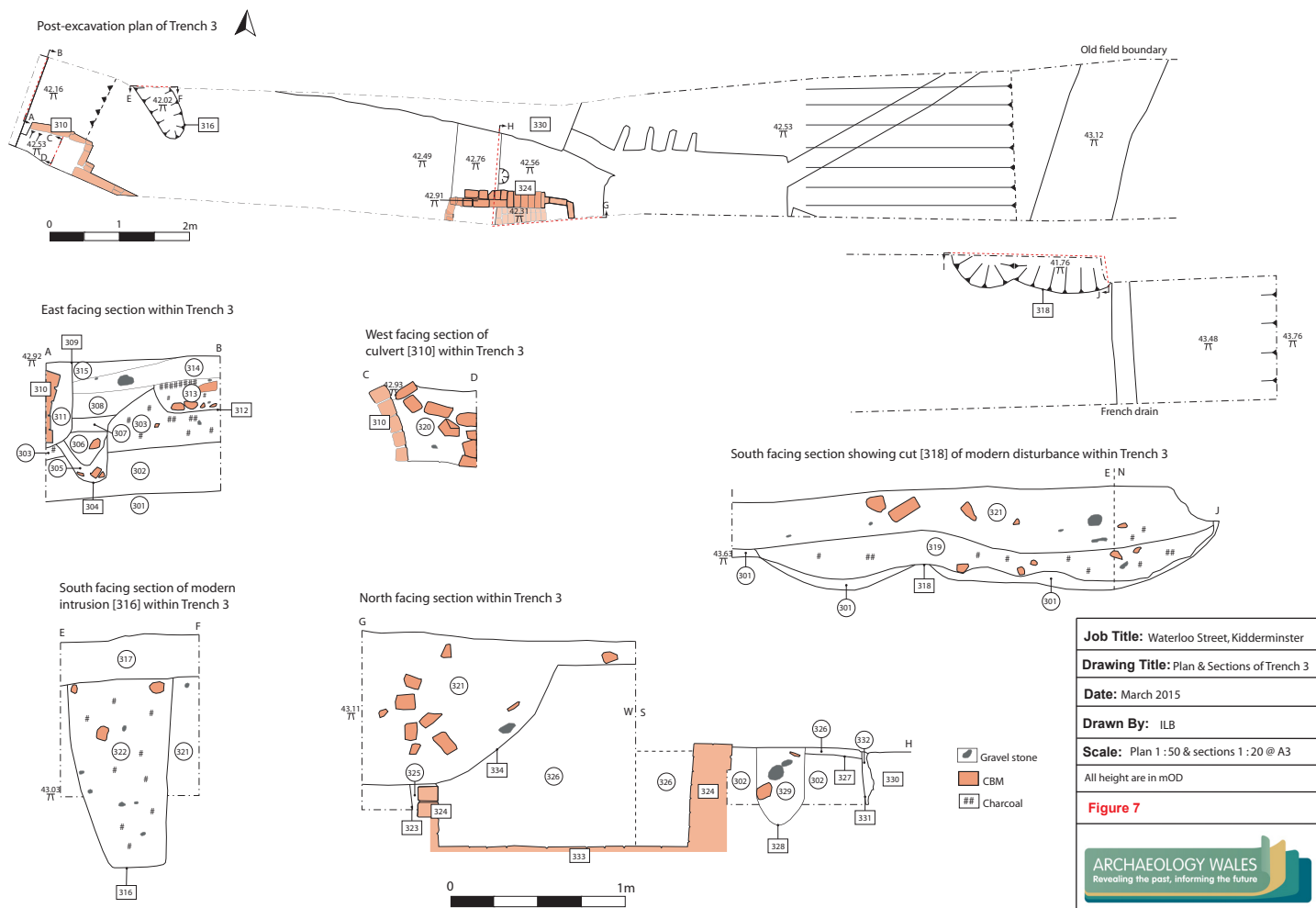
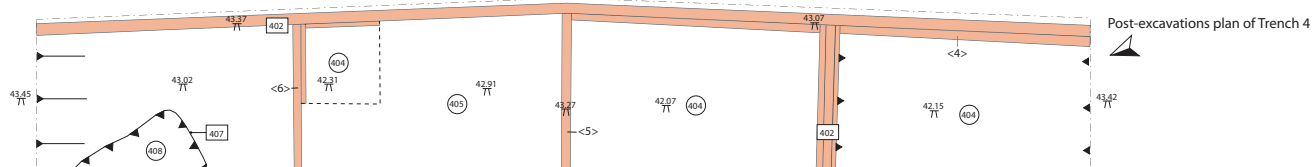


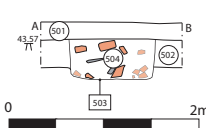
Fig 6: 1924 3rd Ed OS map showing assessment area



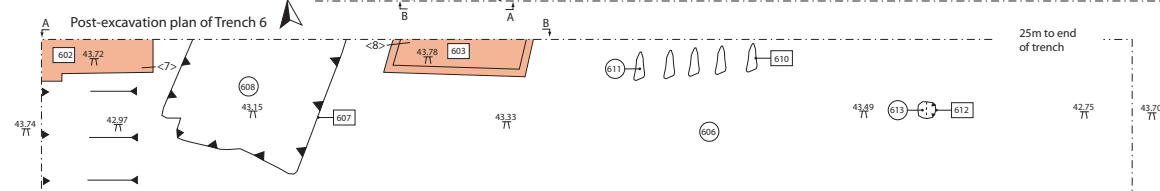
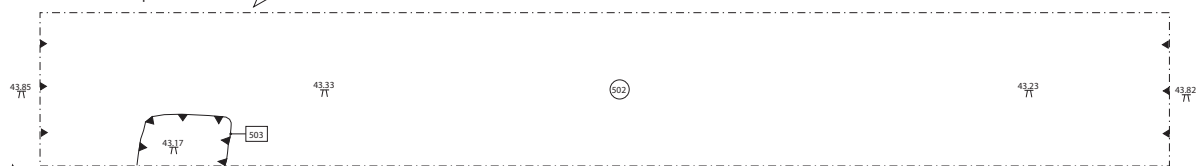
Post-excavation plan of Trench 2



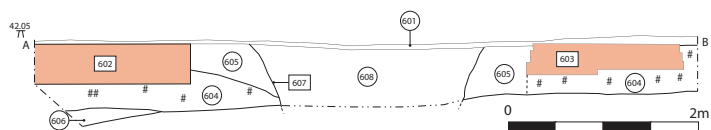
West facing section of pit [503] within Trench 5



Post-excavation plan of Trench 5



South facing section showing brick structures [602] and [603] within Trench 6



Key
 Brick
 CBM
 Stone
 Charcoal

Job Title: Waterloo Street, Kidderminster

Drawing Title: Plans & sections of Trenches 2, 4, 5 and 6

Date: March 2015

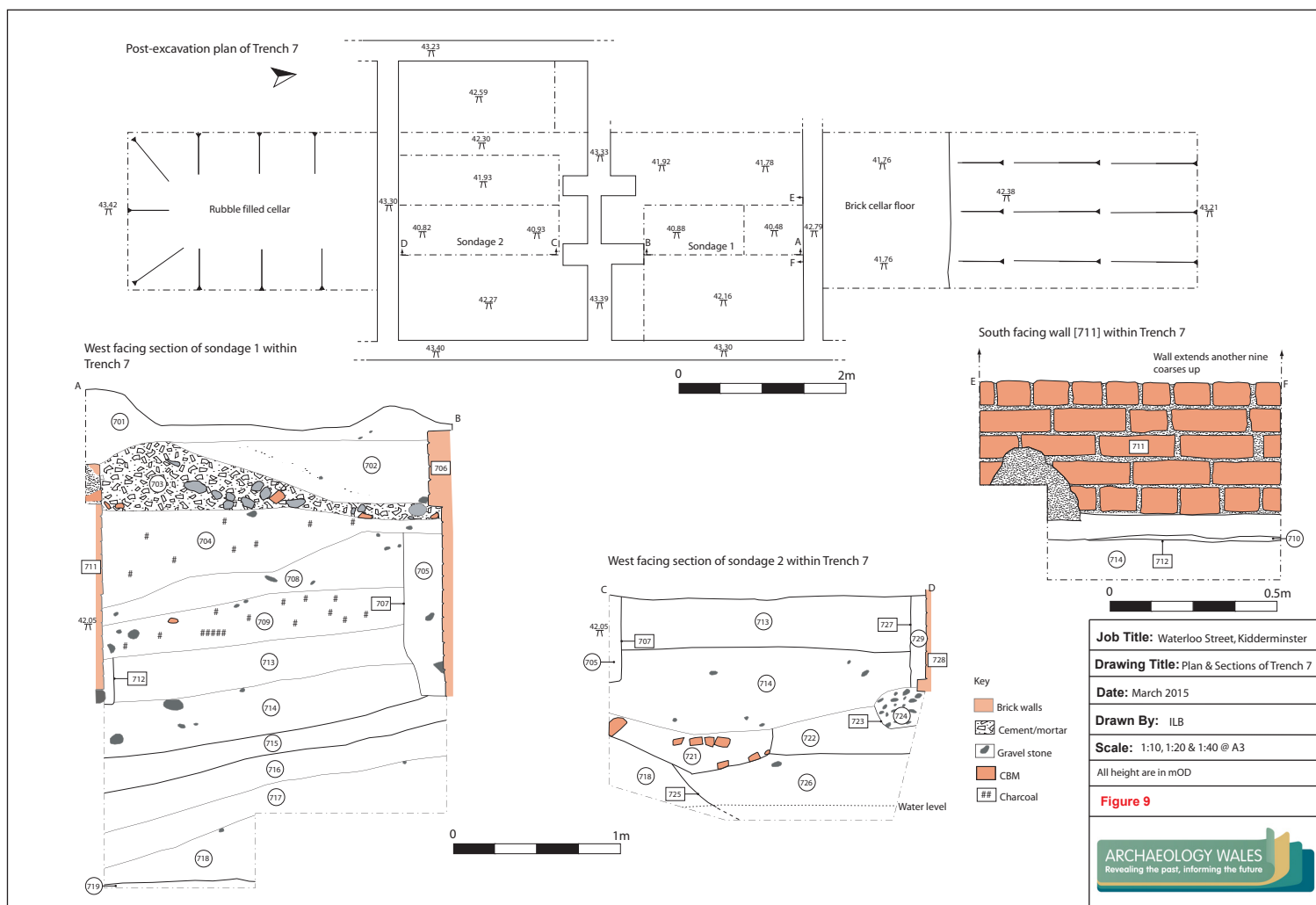
Drawn By: ILB

Scale: Plans at 1:50, sections at 1:40 @ A3

All heights are in mOD

Figure 8





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APPENDIX II: Plates



Plate 1: View along Trench 1, Looking SW. Scales 1x1m & 1x2m



Plate 2: View along Trench 1, Looking north east. Scales 1x1m & 1x2m



Plate 3: Oblique view along Trench 1 section showing made ground deposit.
Looking east. Scale 1x1m



Plate 4: View along Trench 2, Looking north east. Scales 1x1m & 1x2m



Plate 5: View along Trench 2, Looking south west. Scales 1x1m & 1x2m



Plate 6: View of sondage in north eastern end of Trench 2. Note land drain in section. Looking south east. Scales 1x1m & 1x2m



Plate 7: Post excavation view of pit [215]. Looking north east, Scale 1x1m



Plate 8: View along Trench 3 looking south west. Scales 1x1m & 1x2m



Plate 9: View along Trench 3, Looking north east. Scales 1x1m & 1x2m



Plate 10: Post excavation view of pit [318], Looking north west. Scale 1x2m



Plate 11: View along middle of Trench 3, Looking north east, showing area of removed drainage system. Scales 1x1m & 1x2m



Plate 12: Oblique view of middle of Trench 3, Looking north west, showing area of removed drains. Scales 1x1m & 1x2m



Plate 13: View of brick structure [324], posthole [328] and concrete set drain at base of Trench 3. Scale 1x1m



Plate 14: Plan view of brick structure [324] and posthole [328]. Scale 1x1m



Plate 15: View of staining area on natural sand, possible remnants of field boundary within Trench 3. Looking north east. Scales 1x1m & 1x2m



Plate 16: View of brick structure [310] at south western end of Trench 3. Scales 1x1m & 1x2m



Plate 17: Brick structure [310], plan view. Scales 1x1m & 1x2m



Plate 18: Post excavation view of gully terminus [316]. Scale 1x1m



Plate 19: View north along Trench 4. Scales 2x1m & 1x2m



Plate 20: View south along Trench 4. Scales 3x1m & 1x2m



Plate 21: Oblique view of mid 19th century structural remains within Trench 4.
Scales 3x1m & 1x2m



Plate 22: Oblique view of structural remains within Trench 4. Scales 3x1m & 1x2m



Plate 23: Plan view of sondage excavated within Trench 4 to base of foundation level. Scales 2x1m



Plate 24: View of buried soil horizon (403) beneath walls (402). Scale 1x1m



Plate 25: View south east along Trench 5. Scales 1x1m & 1x2m



Plate 26: View north west along Trench 5. Scales 1x1m & 1x2m



Plate 27: Pre-excavation shot of pit [503]. Looking north east. Scale 1x2m



Plate 28: Post excavation shot of pit [503]. Looking north east. Scale 1x2m



Plate 29: View south west along Trench 6. Scales 1x1m & 1x2m



Plate 30: View north east along Trench 6. Scales 1x1m & 1x2m



Plate 31: Oblique view of brick plinth structures (602) & (603) with modern cut [607] in between. Scales 1x1m & 1x2m



Plate 32: Detail view of brick plinth (602). Scale 1x1m



Plate 33: Detail view of brick plinth (603). Scale 1x2m



Plate 34: View along Trench 6, Looking west. Scales 1x1m & 1x2m. Note [610], group of excavator bucket teeth features



Plate 35: View north east of terraced away natural sand & gravel deposits within Trench 3. Scales 1x1m & 1x2m



Plate 36: View north east along Trench 7. Note rubble filled cellar in foreground. Scales 1x1m & 1x2m



Plate 37: View south west along Trench 7 prior to excavation of cellar floor (730) in foreground. Scales 1x1m & 1x2m



Plate 38: Cellar floor (730) post excavation shot. Scales 1x1m & 1x2m



Plate 39: Oblique view of 19th century structural remains within Trench 7.
Scales 1x1m & 1x2m



Plate 40: View of mid 19th century structural remains within Trench 7.
Scales 1x1m & 1x2m



Plate 41: View of central dividing wall within 19th century structural remains.
Scales 2x1m



Plate 42: Mid excavation shot of sondage 1 within Trench 7. Scale 1x2m



Plate 43: Post excavation view of sondage 1 (after trench widening) within Trench 7. Scales 1x1m & 1x2m



Plate 44: Plan view of sondage 1 within Trench 7. Scales 1x1m & 1x2m



Plate 45: Post excavation view of sondage 2 within Trench 7. Scales 2x2m & 1x1m



Plate 46: Oblique view of sondage 2 within Trench 7. Scales 1x1m & 1x2m



Plate 47: Oblique view of sondage 2 within Trench 7. Scales 2x2m & 1x1m



Plate 48: Plan view of sondage 2 within Trench 7. Scales 2x2m & 1x1m

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APPENDIX III: Stratigraphic Information

Archaeology Wales Ltd.

Finds catalogue Waterloo Street, Kidderminster

Site code: 2182 - WSK/15/EV

Number	Context	Description	Amount	Weight in grams	Kept/Disc.
Pottery					
	307	Post Medieval	11	824	Kept
	317	1 of 2, Post Medieval	15	1.698	Kept
	317	2 of 2, Post Medieval	18	854	Kept
	319	Post Medieval	6	156	Kept
	320	Post Medieval	5	32	Kept
	Tr 3	Overburden, Post Medieval	17	1.212	Kept
	403	Post Medieval	4	61	Kept
	406	Post Medieval	5	261	Kept
	604	Post Medieval	86	1.782	Kept
	604	Post Medieval	18	413	Kept
	714	Post Medieval	21	489	Kept
	714	Sondage 2, Post Medieval	28	918	Kept
	715	Post Medieval	9	97	Kept
	716	Post Medieval	33	317	Kept
	721	Post Medieval	19	865	Kept
Glass					
	320	Vessel	1	21	Kept
	406	Vessel	2	862	Kept
	604	Vessel	14	647	Kept
	714	Vessel	1	9	Kept
	714	Sondage 2, 2 vessel, 1 window	3	110	Kept
	716	Vessel	2	19	Kept
	721	Vessel	2	14	Kept
CBM					
	307		5	1.112	Kept
	714		2	149	Kept
	714	Sondage 2, 1 of 2	11	1.09	Kept
	714	Sondage 2, 2 of 2	5	1.143	Kept
	715		4	444	Kept
Clay pipe					
	206		2	4	Kept
	307		8	16	Kept
	317		2	14	Kept
	319		2	4	Kept
	320		1	1	Kept
	403		4	21	Kept
	406		2	11	Kept
	604		7	45	Kept
	714		8	27	Kept
	714	Sondage 2	13	36	Kept
	716		15	23	Kept
	721		7	22	Kept

Metal

307	Copper alloy button	1	3	Kept
320	Fe Nails	2	6	Kept
714	Fe Nails	2	28	Kept
715	Lead	1	3	Kept
716	Small find 2: Au pin	1	< 1	Kept
730	Small find 3: Ag Pin	1	< 1	Kept

Stone

307	Polished stones / pebbles?	2	337	Kept
604	Worked slate (gaming piece)	1	5	Kept
714	Stone object	1	23	Kept
716	Polished stone	1	537	Kept

Animal bones

202	Tooth	1	10	Kept
206	Tooth	1	< 1	Kept
307		16	1.584	Kept
714	Tooth	1	68	Kept
716		3	112	Kept
721		2	21	Kept

Miscellaneous

307	Melted glass residue?	1	60	Kept
319	Small find 1: musket ball	1	73	Kept
714	Melted glass residue?	1	52	Kept
716	Small find 4, Clay wig curler	1	16	Kept
716	Oyster shell	2	26	Kept
716	Coal	1	47	Disc.

Total finds:

Pottery	308
Glass	25
CBM	27
Clay pipe	71
Metal	8
Stone	5
Animal bone	24
Miscellaneous	7

Total: 475

Table 1: Pottery occurrence by number and weight (in g) of sherds per context by fabric type

	F78		F81.3		F81.5		F82		F84		F85		F91		F100		F108		F300		F301		F302		F303		
Cntxt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	Date
Tr3															19	1394											U/S
307									9	212									2	488	1	124					M18thC
317											8	224			31	2238											19thC
319			1	18											5	125											19thC
320											1	2			4	27											19thC
403													1	15					3	44							L17thC
406	1	32			1	3									2	222											M18thC
604											59	732			47	1398											19thC
714	21	711					1	3	12	63	5	46			10	397			1	5			1	5			19thC
715	5	54	1	5					1	2									2	26							M18thC
716			1	3					7	96	12	47			8	74	1	20			2	13			1	30	19thC
721	6	410	1	62							8	162			6	177											19thC
Total	33	1207	4	88	1	3	1	3	29	373	93	1213	1	15	132	6052	1	20	8	563	3	137	1	5	1	30	

Context Register - WSK/15/EVA

Trench 1

- 101 Made ground/overburden
- 102 Dolomitic Conglomerate natural

Trench 2

- 201 Made ground/overburden
- 202 Sandy subsoil
- 203 Natural sand
- 204 Land drain
- 205 Cut of elongated pit
- 206 Single silt fill of 205

Trench 3

- 301 Superficial geology
- 302 Natural sand
- 303 Charcoal flecked sand
- 304 Cut of unknown feature
- 305 Deliberate backfill of 304
- 306 Dump of sand in 304
- 307 Dump in 304
- 308 Deliberate backfill of 304
- 309 Cut for culvert 310
- 310 Brick built culvert
- 311 Deliberate backfill of 309
- 312 Cut of small pit
- 313 Deliberate backfill of 312
- 314 Layer of demolition refuse
- 315 Layer of demolition rubble
- 316 Cut of linear feature
- 317 Overburden
- 318 Cut of modern disturbance
- 319 Fill of 318
- 320 Deliberate backfill of 310
- 321 Overburden
- 322 Deliberate backfill of 316
- 323 Foundation trench for 324
- 324 Walls of possible toilet block
- 325 Deliberate backfill of 323
- 326 Deliberate backfill of klinker material
- 327 Cut from previous demolition
- 328 Cut of post hole
- 329 Fill of 328
- 330 Modern concrete drain
- 331 Foundation cut for 330
- 332 Deliberate backfill of 331

- 333 Brick floor surface of 324
- 334 Cut of modern demolition

Trench 4

- 401 Overburden rubble
- 402 Brickwork of house footings
- 403 Buried soil horizon
- 404 Natural sand
- 405 Construction horizon
- 406 Demolition rubble infill
- 407 Cut of modern pit
- 408 Rubble fill of 407

Trench 5

- 501 Ash/coke surface & overburden
- 502 Orange sand natural
- 503 Cut of square pit
- 504 Single dark fill of 503

Trench 6

- 601 Silt & Brick rubble overburden
- 602 Brick structure west end
- 603 Brick structure middle
- 604 Silt subsoil with charcoal flecks
- 605 Mixed silt, brick and sand subsoil
- 606 Mnatural sand
- 607 Cut of modern pit
- 608 Mixed sand fill of 607
- 609 Made ground at east end of T6
- 610 Group of 5 small cuts - modern
- 611 Group 610 single fill
- 612 Cut of small post hole
- 613 Single sandy silt fill of 612

Trench 7

- 701 Overburden
- 702 Modern dumping/backfilling
- 703 Deliberate backfilling
- 704 Deliberate backfilling
- 705 Deliberate backfill of foundation cut 707
- 706 Brick wall foundation
- 707 Foundation cut for 706
- 708 Backfill adj 711
- 709 Deliberate backfill
- 710 Fill of foundation trench 712
- 711 Brick wall foundation

712 Foundation cut for 711
713 Sand/redeposited natural
714 Organic horizon
715 Redeposited natural & mixed deposits
716 Organic material
717 Organic material
718 Silt horizon
719 Natural sand

Archaeology Central

APPENDIX IV: Geotechnical Report

georisk

MANAGEMENT



POST-DEMOLITION GROUND INVESTIGATION AND REMEDIATION METHOD STATEMENT

**CHESHIRE COLOURMAIL LIMITED
24 COVENTRY STREET, KIDDERMINSTER
DY10 2GB**

Report No: 12179/3
Date: April 2015

Prepared for

MATRIX REALTY INVESTMENTS LIMITED



Innovative Land Development Solutions

**PROJECT QUALITY ASSURANCE
INFORMATION SHEET**

**POST-DEMOLITION GROUND INVESTIGATION
AND REMEDIATION METHOD STATEMENT**

**CHESHIRE COLOURMAIL LIMITED
24 COVENTRY STREET, KIDDERMINSTER
DY10 2GB**

Report Status:	Final
Report No:	12179/3
Date:	April 2015
Prepared For:	Matrix Realty Investments Limited
Prepared By:	Georisk Management Limited Summit Point Summit Crescent Industrial Estate Smethwick BIRMINGHAM B66 1BT Telephone: 0121 553 4044
	
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APPENDICES

APPENDIX A DRAWING

Drawing No.	Drawing Title
12179/2a	Exploratory Hole Location Plan

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APPENDIX C CHEMICAL TEST RESULTS

EXECUTIVE SUMMARY

POST-DEMOLITION GROUND INVESTIGATION AND REMEDIATION METHOD STATEMENT

CHESHIRE COLOURMAIL LIMITED 24 COVENTRY STREET, KIDDERMINSTER DY10 2GB

Georisk Management Limited has been commissioned to carry out a post-demolition phase of ground investigation at the above site, which is to be redeveloped with construction of a medical centre.

Phase I	Comments
	For details of Phase I Desk Study and previous Ground Investigation information, reference should be made to reports reference 12179/1 dated February 2013 and 12179/2 dated November 2014 by Georisk Management Limited.
Ground Investigation	Comments
Ground Conditions	<p>Made Ground was identified in each trial pit to depths of between 0.5 and 1.8 m begl. It typically comprises brown locally silty gravelly locally cobbly sand with the gravel and cobble being brick, ash, slate, quartzite, ceramic fragments and concrete.</p> <p>During this phase of investigation, the Wildmoor Sandstone Formation was encountered beneath the Made Ground and proved to a maximum depth of 4.0 m begl. It comprised brown locally silty locally slightly gravelly sand to depths of between 0.5 and 4.0 m begl overlying very weak sandstone.</p>
Contamination	<p>During this investigation, visual/olfactory evidence of potential hydrocarbon impact was noted as follows:</p> <ul style="list-style-type: none"> TP5: hydrocarbon staining and odour in Made Ground to 1.3 m begl; TP6: hydrocarbon staining and odour in Made Ground to 1.4 m begl. <p>TP5 and TP6 were excavated in the area of BH3 from our previous investigation where a hydrocarbon type odour was noted in the Made Ground.</p>
Groundwater	During the fieldwork, groundwater was not encountered in the trial pits; however, slight seepages were noted in the Made Ground in TP5 to TP7 excavated in the area of BH3 from our previous investigation.
Environmental Assessment	Comments
Soil Contamination	All test results are below the adopted C4SL/SGV/GAC/SSV.
Remediation Action Plan	<p>The results of the groundwater quality testing carried out as part of the previous investigation indicated the presence of elevated petroleum hydrocarbons and VOCs in BH3. No TPH or VOC impact was recorded in the samples taken from other boreholes. No groundwater and no hydrocarbon impact was encountered in the trial pits excavated in the main part of the site during this investigation. The only area where hydrocarbon impact was noted was in the trial pits put down immediately adjacent to BH3. This would indicate that the zone of hydrocarbon impact is restricted to the area around BH3 and it is possible that there was a tank in this area sometime in the past, which has since been removed.</p> <p>To address risks to controlled waters, it is recommended that the following course of action is followed:</p> <ul style="list-style-type: none"> excavation of any hydrocarbon impacted soil and off-site disposal at a suitably licensed landfill site; pumping out of any hydrocarbon impacted groundwater encountered in excavations and disposal off-site by licensed tanker; infilling of excavations with clean soil. <p>It is considered that this localised remedial action comprising the removal of the hydrocarbon impacted soil and groundwater around TP5, TP6 and BH3 would remove the source of contamination and address risks to controlled waters and soil-gas risk.</p> <p>This process would need to be validated by an independent engineer and would require a Validation Report to be prepared for submission to and approval by the Local Authority.</p>

Foundation Design	Comments
Foundation Design	<p>The Georisk ground investigations have identified Made Ground up to 1.8 m thick at the site overlying predominantly loose and medium dense to dense sand representing weathered Wildmoor Sandstone with sandstone rock recorded at depths of between 0.5 and 4.0 m begl.</p> <p>Previous investigation recorded shallow water in boreholes put down in external areas and it was considered probable that this was perched water and not representative of true groundwater. The findings of this phase of work would confirm this, as no groundwater was encountered in TP3, TP4, TP8 and TP9 excavated in the main body of the site. On this basis, it is considered that pad foundations should be viable as it is unlikely that groundwater would be encountered (any localised seepage should be controllable by sump pumping) and excavations should be stable in the short-term.</p> <p>The weathered materials typically comprise loose and medium dense becoming dense with depth sand with SPT 'N' values ranging from 8 to 26 at depths of 1 and 2 m begl. For these materials, a net allowable bearing capacity in the order of 125 kN/m² improving to 200 kN/m² below 3.0 m begl in BH4 could be adopted for design with total and differential settlements not anticipated to exceed 25 mm. The Wildmoor Sandstone comprising very weak to weak rock was recorded at depths of between 0.5 and 4.0 m begl and a net allowable bearing capacity of 300 kN/m² is considered appropriate with total and differential settlements not anticipated to exceed 25 mm.</p> <p>On the basis of the ground conditions encountered and the proposed development, it is recommended that foundations extend down to the sandstone rock of the Wildmoor Sandstone Formation encountered at depths of between 0.5 and 4.0 m begl to benefit from the greater bearing capacity of this material.</p>
Additional Work	Comments
Additional Work	<p>This report should be submitted to the Local Authority for approval before works commence on site.</p> <p>Carry out remediation by removal of hydrocarbon impacted soil and/or groundwater from area adjacent to BH3.</p>

The above summary is intended for reference purposes only and specific details should be obtained by reading the entire report.

FOREWORD

This report has been prepared for the sole internal use and reliance of the Client(s) named on the Project Quality Assurance Information Sheet. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Georisk Management Ltd (Georisk). If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report should be read in its entirety, including all associated drawings and appendices. Georisk cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

The findings and opinions conveyed in this report are based on information obtained from a variety of sources as detailed within this report and which Georisk believes is reliable. All reasonable care and skill has been applied in examining the information obtained, nevertheless, Georisk cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geoenvironmental consultants. Georisk does not provide legal advice and the advice of lawyers may also be required.

Any recommendations made or opinions expressed in the Report are based on the exploratory hole records, an examination of samples and the results of the site and laboratory tests. No liability can be accepted for conditions not revealed by the exploratory holes particularly between positions. Whilst every effort is made to ensure accuracy of data supplied any opinion expressed as to the possible configuration of strata between or below investigation locations is for guidance only and no responsibility is accepted as to its accuracy.

Unless otherwise specifically stated, this report assumes that ground levels will not change significantly from those existing at present and that the proposed development will be of two to three storey construction. If this is not to be the case, some modifications to this report may be required.

The groundwater conditions entered on the borehole records and from any monitoring programme are those observed at the time of the investigation. Groundwater levels are susceptible to seasonal fluctuations and may be higher during wetter periods than those encountered during this investigation.

Where the report refers to the potential presence of invasive plant species, such as Japanese Knotweed, or the presence of possible asbestos containing materials, it should be noted that the observations are for information purposes only and should be verified by a suitably qualified expert.

Georisk reserves the right to amend the conclusions and recommendations made in this report in the light of any further or more detailed information that may become available.

**POST-DEMOLITION GROUND INVESTIGATION
AND REMEDIATION METHOD STATEMENT**

**CHESHIRE COLOURMAIL LIMITED
24 COVENTRY STREET, KIDDERMINSTER
DY10 2GB**

1. INTRODUCTION

- 1.1 Georisk Management Limited (Georisk) has been instructed by Matrix Realty Investments Limited to carry out a post-demolition phase of ground investigation and develop a remediation action plan at the former premises of Cheshires Colourmail Limited on Coventry Street, Kidderminster. The scope of work is set out in our email of 8 September 2014.
- 1.2 Georisk has previously prepared the following reports for the site:
- Phase I Desk Study and Preliminary Ground Investigation Report No. 12179/1 dated February 2013, which provides an Initial Conceptual Model for the site and findings of an initial phase of ground investigation;
 - Additional Ground Investigation Report No. 12179/2 dated November 2014, which provides the findings of a second phase of ground investigation, soil and groundwater testing and risk assessment.
- 1.3 The principal aims of this additional phase of ground are as follows:
- to provide further information on the prevalent ground and groundwater conditions at the site;
 - to provide an assessment of the concentrations of a range of potential contaminants of concern within the near surface soil including Phase 2 evaluation of risk to human health;
 - to provide recommendations for any remedial action considered necessary for the proposed development;
 - to provide foundation design recommendations for the proposed development.
- 1.4 This report presents the factual data obtained from the fieldwork and laboratory testing implemented by Georisk, together with an assessment of the contamination status of the near surface soil and groundwater together with foundation design considerations for the proposed development.

2. INFORMATION SOURCES

- 2.1 The information sources used in the production of this report were as follows:
- background information contained in Georisk Reports 12179/1 dated February 2013 and 12179/2 dated November 2014;
 - information gained with respect to the ground and groundwater conditions established in the programme of fieldwork carried out by Georisk;
 - appraisal of chemical laboratory data resulting from testing scheduled by Georisk;
 - topographical survey of the site by Tower Surveys Limited reference R-S7198 dated January 2013;
 - proposed layout drawing entitled 'Proposed Site Plan' by Bundred & Goode Architects reference 309_B01 dated October 2012.

3. REFERENCE SOURCES

3.1 This report has been prepared, where possible, with regard to the following sources of reference and guidance, supplemented with experience of similar sites:

- *Investigation of Potentially Contaminated Sites – Code of Practice. British Standards Institute BS10175 (2001);*
- *Code of Practice for Site Investigations. BS5930 (1999);*
- *Human health toxicological assessment of contaminants in soil. Science Report SC050021/SR2 EA (2009);*
- *Updated technical background to the CLEA Model. Science Report SC050021/SR3 EA (2009);*
- *Model Procedures for the Management of Land Contamination. CLR11, DEFRA and EA (2004);*
- *Guidance on Comparing Soil Contamination Data with a Critical Concentration. CIEH and CL:AIRE (2008);*
- *Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination. EA (2006);*
- *Guidance for the Safe Development of Housing on Land Affected by Contamination. R & D Publication 66, NHBC, Environment Agency and CIEH (2008);*
- *Concrete in Aggressive Ground. BRE Special Digest 1: Part 1 Assessing the aggressive chemical environment. Building Research Establishment (2005);*
- *Radon: guidance on protective measures for new dwellings. BRE Report BR211 (2007);*
- *Code of practice for the characterization and remediation from ground gas in affected developments. BS8485 (2007);*
- *Guidance on Evaluation of Development Proposals on sites where Methane and Carbon Dioxide are Present. NHBC report Edition No. 4 (2007);*
- *Assessing Risks Posed by Hazardous Ground Gases to Buildings. CIRIA Report C669 (2006);*
- *Passive venting of soil gases beneath buildings. DETR/ARUP Environmental PIT Research Report (1997);*
- *Protective measures for housing on gas-contaminated land. BRE/EA Report BR414 (2001);*
- *Site preparation and resistance to moisture. The Building Regulations 2000 Approved Document C (2004 edition).*

4. THE SITE

4.1 The site has been cleared of all previous structures. For details relating to the previous site layout, reference should be made to Section 4 of Georisk report reference 12179/1 dated February 2013.

5. FIELDWORK, MONITORING AND LABORATORY TESTING

5.1 Fieldwork

- 5.1.1 The fieldwork was carried out on 20 March 2015 and comprised the excavation of 7 No. trial pits, designated TP3 to TP9, by JCB 3CX to a maximum depth of 4.0 m below existing ground level (begl).
- 5.1.2 The fieldwork was supervised by Georisk. All soil description and sample logging was carried out in accordance with BS 5930 (1999) and the exploratory hole records are presented in Appendix B.
- 5.1.3 The positions of the exploratory holes were set out by Georisk and their approximate locations are shown on the Exploratory Hole Location Plans included as Drawing No. 12179/2a in Appendix A.

- 5.1.4 Disturbed samples were recovered from the exploratory holes as necessary to facilitate sample description and for subsequent laboratory testing.
- 5.1.5 Observations of groundwater encountered during the fieldwork are included on the relevant exploratory hole records included in Appendix B.
- 5.1.6 In addition to the agreed scope of works, a fuel tank was uncovered towards the northern end of the site by the demolition contractor and validation samples have been taken following its safe decommissioning and removal off-site.

5.3 Chemical Testing

- 5.3.1 A programme of chemical testing was scheduled by Georisk on selected soil samples retrieved from the exploratory holes. The testing was carried out at an independent UKAS accredited laboratory for a general suite of potential contaminants of concern as indicated in Georisk Report No. 12179/1. The chemical test results are presented in Appendix C.

6. GROUND AND GROUNDWATER CONDITIONS

Full details of the ground conditions encountered by Georisk are presented on the exploratory hole records included in Appendix B; however, a summary is presented below.

6.1 Made Ground

- 6.1.1 Made Ground was identified in each trial pit to depths of between 0.5 and 1.8 m begl. It typically comprises brown locally silty gravelly locally cobbly sand with the gravel and cobble being brick, ash, slate, quartzite, ceramic fragments and concrete.

6.2 Wildmoor Sandstone Formation

- 6.2.1 During this phase of investigation, the Wildmoor Sandstone Formation was encountered beneath the Made Ground and proved to a maximum depth of 4.0 m begl.
- 6.2.2 It comprised brown locally silty locally slightly gravelly sand to depths of between 0.5 and 4.0 m begl overlying very weak sandstone.

6.3 Evidence of Potential Contamination

- 6.3.1 During this investigation, visual/olfactory evidence of potential hydrocarbon impact was noted as follows:
 - TP5: hydrocarbon staining and odour in Made Ground to 1.3 m begl;
 - TP6: hydrocarbon staining and odour in Made Ground to 1.4 m begl.
- 6.3.3 TP5 and TP6 were excavated in the area of BH3 from our previous investigation where a hydrocarbon type odour was noted in the Made Ground.

6.4 Groundwater

- 6.4.1 During the fieldwork, groundwater was not encountered in the trial pits; however, slight seepages were noted in the Made Ground in TP5 to TP7 excavated in the area of BH3 from our previous investigation.
- 6.4.2 Long term groundwater monitoring was beyond the scope of this assessment.

7. HUMAN HEALTH RISK ASSESSMENT

7.1 General

- 7.1.1 The UK approach to the assessment of contaminated land is based upon the principles of risk assessment, which is founded on the use of “*source-pathway-target*” principles in order to establish the potential presence of “*pollutant linkage*”.
- 7.1.2 Georisk adopts a tiered approach to risk assessment in accordance with current UK guidance and good practice. The initial step of this process, known as Tier 1, is the comparison of site-derived data with relevant guideline levels.
- 7.1.3 Should the adopted criteria be exceeded then two courses of action are available. The first is to break the pollutant linkage by undertaking remedial works such as removing or treating the contaminated soil. Alternatively a more detailed risk assessment can be carried out to determine whether a contamination risk actually exists.
- 7.1.4 The UK approach to the assessment of human health risk from contaminated land is set out in the CLEA (Contaminated Land Exposure Assessment) framework, which was first published in 2002 by the Department for Environment, Food and Rural Affairs (DEFRA) and the EA. The original guidance was withdrawn and revised guidance issued in 2009, which is set out in the following documents published by the EA:
 - *Human health toxicological assessment of contaminants in soil*. Science Report SC050021/SR2;
 - *Updated technical background to the CLEA Model*. Science Report SC050021/SR3.
- 7.1.5 The CLEA model uses generic assumptions about the fate and transport of chemicals in the environment and a generic conceptual model for site conditions together with human behaviour to estimate long term human exposure to soil contaminants.
- 7.1.6 Soil Guideline Values (SGV) were derived using the CLEA Model by comparing estimated exposure with ‘Health Criteria Values’ (HCV) that represent a tolerable risk to health from chronic exposure. SGVs are scientifically based ‘generic assessment criteria’ that can be used to simplify the assessment of risk to human health from chronic exposure to contaminants in soil. SGVs are a screening tool for the ‘generic quantitative risk assessment’ of land contamination.

7.1.7 Since revised SGVs were developed in 2009, revised Part 2A statutory guidance was then published in 2012. The revised Part 2A statutory guidance introduces a four category system for classifying land under Part 2A for cases of SPOSH to human health. Category 4 applies to land where the level of risk posed is acceptably low. DEFRA appointed CL:AIRE to develop 'Category 4 Screening Levels' (C4SL), which would provide a simple test for deciding when land is suitable for use and definitely not contaminated.

7.1.8 In March 2014, C4SLs were published for several contaminants and these have been used in preference to the SGV. Where no C4SL exists, the following hierarchy has been followed for determining which assessment criteria to be followed:

- CLEA SGV;
- Generic Assessment Criteria (GAC) developed by LQM/CIEH (2009);
- Soil Screening Values developed by Atkins AtRisk.

7.2 Human Health Risk Assessment Design

Proposed Development

7.2.1 The proposed development is to comprise a medical centre with external areas of hardstanding for car parking and vehicular access together with small landscaped borders.

Assessment Criteria

7.2.2 The assessment criteria used for the screening of contaminants is summarised below:

Contaminant Group	Determinands	Assessment Criteria Selected
ORGANIC CONTAMINANTS		
Non-halogenated hydrocarbons	Phenol	CLEA SGV
	Total Petroleum Hydrocarbons	GAC based on 2009 LQM/CIEH guidelines
Polycyclic Aromatic Hydrocarbons (PAH); indicator compounds selected	Benzo(a)pyrene	Category 4 Screening Level (C4SL)
	Naphthalene	LQM/CIEH GAC
INORGANIC CONTAMINANTS		
Metals	Arsenic, Cadmium, Lead	C4SL
	Mercury, Nickel and Selenium	CLEA SGV
	Chromium, Copper, Zinc	LQM/CIEH GAC
Non-metals	Cyanide	Atkins AtRisk SSV

End Use

7.2.3 In view of the proposed development, a 'commercial' end use conceptual model is considered appropriate for the site.

Statistical Analysis

7.2.4 For the purposes of this assessment, it is considered acceptable to compare test results directly to guideline values to enable an assessment of risk to human health.

Contaminants of Concern

7.2.5 The potential contaminants of concern are detailed in Georisk Report No. 12179/1 and these contaminants have subsequently been targeted for chemical analysis.

7.3 Generic Quantitative Human Health Risk Assessment

7.3.1 The results of the chemical testing on soil samples from this phase of investigation can be summarised as follows:

Contaminant of Concern	Measured Concentration*		C4SL/SGV/GAC/SSV*	Number of results above C4SL/SGV/GAC/SSV
	Min	Max		
Arsenic	10	11	640	0
Benzo(a)pyrene	<0.1	0.99	76	0
Cadmium	0.29	0.42	410	0
Chromium	10	15	30400	0
Copper	48	72	71700	0
Cyanide	<0.5	-	34	0
Lead	210	360	2330	0
Mercury	0.6	0.7	3600	0
Naphthalene	<0.1	0.2	1100	0
Nickel	14	20	1800	0
Phenol	<0.3	-	3200	0
Selenium	<0.2	-	13000	0
Zinc	110	200	66500	0
TPH Aliphatic Fraction**				
C5-C6	<0.1	-	3400	0
>C6-C8	<0.1	-	8300	0
>C8-C10	6	120	2100	0
>C10-C12	18	690	10000	0
>C12-C16	13	360	61000	0
>C16-C35	55	310	1600000	0
TPH Aromatic Fraction**				
C5-C7 (benzene)	<0.1	-	28000	0
>C7-C8 (toluene)	<0.1	-	59000	0
>C8-C10	4.7	51	3700	0
>C10-C12	17	200	17000	0
>C12-C16	10	120	36000	0
>C16-C21	12	150	28000	0
>C21-C35	12	48	28000	0
*	Concentrations expressed in mg/kg			
**	GAC for 1% SOM adopted			

7.3.2 All test results are below the adopted C4SL/SGV/GAC/SSV and; therefore, no remedial action would be warranted to address risks to human health – this is consistent with previous findings.

7.4 Validation of Fuel Tank Removal

7.4.1 During the site clearance and demolition works carried out by AR Demolition Limited (AR), a fuel tank was encountered in the northern part of the site. It was located beneath the higher slab to the former structure in this part of the site and was of steel construction with a concrete surround.

- 7.4.2 It was reported to contain oily residue and this was pumped by AR for off-site disposal and then the tank itself was disposed off-site by AR in accordance with PPG27 'Installation, Decommissioning and Removal of Underground Storage Tanks'. The ground surrounding the tank was left for Georisk to carry out validation sampling.
- 7.4.3 Georisk attended site on 11 March 2015 to take soil validation samples. A total of 5 No. samples, designated VS1 to VS5, were taken from the area where the tank was removed, as shown on Drawing No. 12179/2a in Appendix A. The soil exposed comprised reworked natural orange-brown sand with occasional gravel and there was no evidence of any residual hydrocarbon impact.
- 7.4.4 The samples were scheduled for detailed petroleum hydrocarbon (TPH) testing and these test results are also included in Appendix C. They have been assessed using GAC derived by CIEH (in association with LQM) for TPH carbon chain groupings as follows:

Determinand		Measured Concentration*		GAC*	Number of Results that Exceed GAC
		Min	Max		
TPH Aliphatic Fraction**					
C5-C6		<0.1	-	3400	0
>C6-C8		<0.1	-	8300	0
>C8-C10		<0.1	-	2100	0
>C10-C12		<1	-	10000	0
>C12-C16		<2	-	61000	0
>C16-C35		<16	24	1600000	0
TPH Aromatic Fraction**					
C5-C7 (benzene)		<0.1	-	28000	0
>C7-C8 (toluene)		<0.1	-	59000	0
>C8-C10		<0.1	-	3700	0
>C10-C12		<1	-	17000	0
>C12-C16		<2	-	36000	0
>C16-C21		<10	13	28000	0
>C21-C35		<10	18	28000	0
*	Concentrations expressed in mg/kg				
**	GAC for 1% SOM adopted				

- 7.4.5 All results are significantly below the relevant GAC and are not indicative of any significant residual contamination following removal of the fuel tank.

8. REMEDIATION ACTION PLAN

- 8.1 The results of the groundwater quality testing carried out as part of the previous investigation indicated the presence of elevated petroleum hydrocarbons and VOCs in BH3. No TPH or VOC impact was recorded in the samples taken from other boreholes.
- 8.2 No groundwater and no hydrocarbon impact was encountered in the trial pits excavated in the main part of the site during this investigation. The only area where hydrocarbon impact was noted was in the trial pits put down immediately adjacent to BH3.
- 8.3 This would indicate that the zone of hydrocarbon impact is restricted to the area around BH3 and it is possible that there was a tank in this area sometime in the past, which has since been removed.
- 8.4 To address risks to controlled waters, it is recommended that the following course of action is followed:

- excavation of any hydrocarbon impacted soil and off-site disposal at a suitably licensed landfill site;
- pumping out of any hydrocarbon impacted groundwater encountered in excavations and disposal off-site by licensed tanker;
- infilling of excavations with clean soil.

8.5 It is considered that this localised remedial action comprising the removal of the hydrocarbon impacted soil and groundwater around TP5, TP6 and BH3 (refer to Drawing 12179/2a for locations of these exploratory holes on the eastern site boundary) would remove the source of contamination and address risks to controlled waters and soil-gas risk.

8.6 This process would need to be validated by an independent engineer and would require a Validation Report to be prepared for submission to and approval by the Local Authority.

9. FOUNDATIONS

9.1 It is understood that the proposed building will be mainly two storeys in height with column loads in the order of 1000 kN; however, the central section will be four storeys in height with column loads of around 2500 kN.

9.2 The Georisk ground investigations have identified Made Ground up to 1.8 m thick at the site overlying predominantly loose and medium dense to dense sand representing weathered Wildmoor Sandstone with sandstone rock recorded at depths of between 0.5 and 4.0 m begl.

9.3 Previous investigation recorded shallow water in boreholes put down in external areas and it was considered probable that this was perched water and not representative of true groundwater. The findings of this phase of work would confirm this, as no groundwater was encountered in TP3, TP4, TP8 and TP9 excavated in the main body of the site. On this basis, it is considered that pad foundations should be viable as it is unlikely that groundwater would be encountered (any localised seepage should be controllable by sump pumping) and excavations should be stable in the short-term.

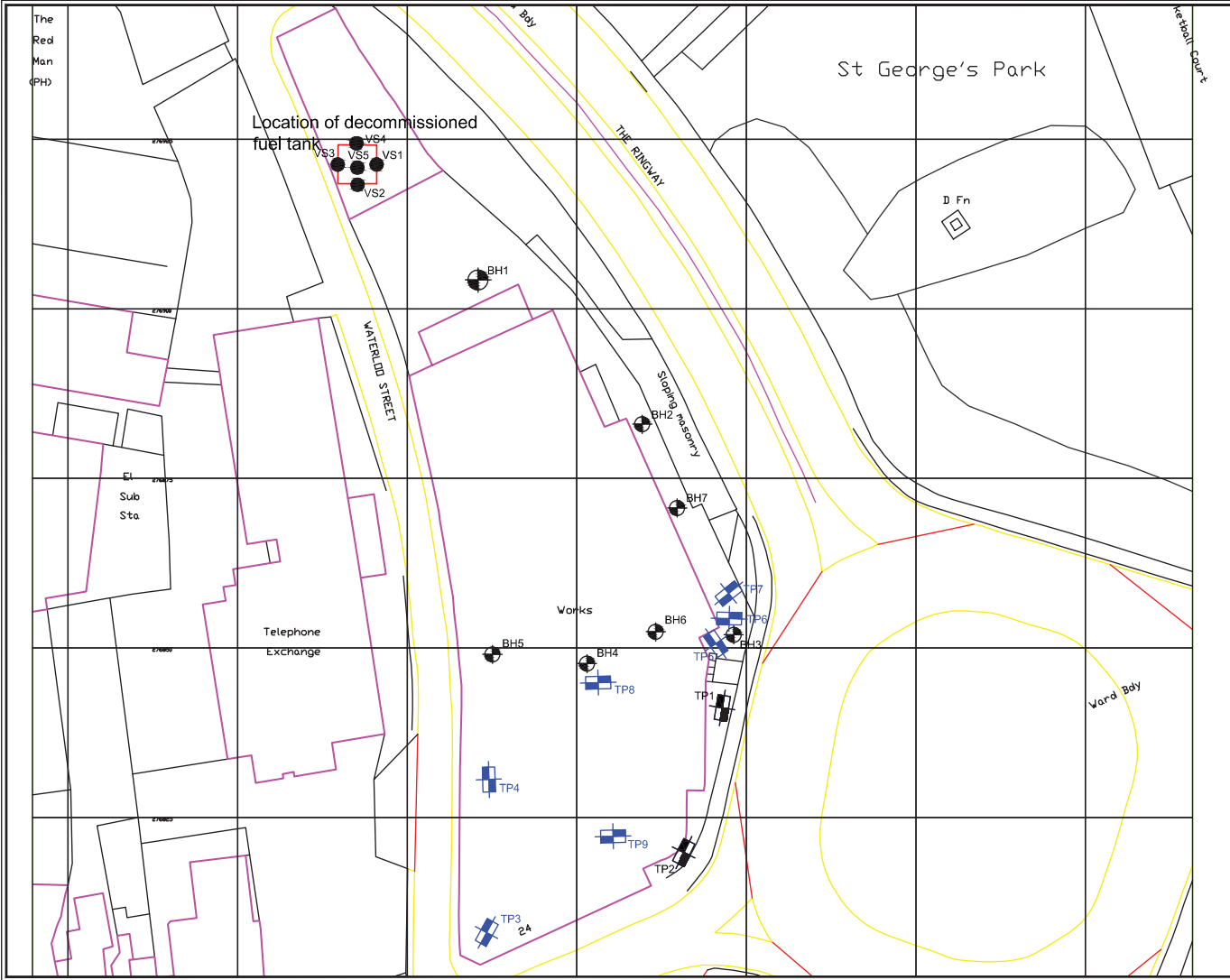
9.4 The groundworks contractor responsible for foundation construction will need to provide a suitable Method Statement and Risk Assessment for the excavation and construction of deep foundations ensuring that their method of work complies with all relevant guidance and legislation.

9.5 The weathered materials typically comprise loose and medium dense becoming dense with depth sand with SPT 'N' values ranging from 8 to 26 at depths of 1 and 2 m begl. For these materials, a net allowable bearing capacity in the order of 125 kN/m² improving to 200 kN/m² below 3.0 m begl in BH4 could be adopted for design with total and differential settlements not anticipated to exceed 25 mm. The Wildmoor Sandstone comprising very weak to weak rock was recorded at depths of between 0.5 and 4.0 m begl and a net allowable bearing capacity of 300 kN/m² is considered appropriate with total and differential settlements not anticipated to exceed 25 mm.

9.6 On the basis of the ground conditions encountered and the proposed development, it is recommended that foundations extend down to the sandstone rock of the Wildmoor Sandstone Formation encountered at depths of between 0.5 and 4.0 m begl to benefit from the greater bearing capacity of this material.

**APPENDIX A
DRAWING**

Drawing No.	Drawing Title
12179/2a	Exploratory Hole Location Plan



Notes

This drawing is the copyright of georisk management ltd and may not be reproduced, copied or used without express written permission.

This drawing is to be read in conjunction with all development drawings, and designers risk assessments.

This drawing must not be scaled. Work to figured dimensions only.

This drawing is based on proposed layout by Lowell entitled 'Planning Layout' reference ELLE501/010 dated October 2008 and topographic survey of site by RPS Design Limited reference AA04947 G1 dated February 2008.

KEY

Borehole Location

Trial Pit Location: 2014

Trial Pit Location: 2015

Rev	Date	Description	Initials
A	20/03/15	Addition trial pit locations added	BVM

Client

MATRIX REALITY INVESTMENTS LIMITED

georisk
MANAGEMENT

Severn Park, Severn Campus, Stratford, Birmingham B61 9ET
T 0121 555 4566 F 0121 555 1112
www.georisk.co.uk email: enquiries@georisk.co.uk

Contract

COVENTRY STREET KIDDERMINSTER

Drawing Title

EXPLORATORY HOLE LOCATION PLAN

Drawing Status		FINAL
Drawn By	BVM	Date 20/03/15
Checked/Approved	BVM	Date 20/03/15
Scale	NTS	Drawing Number 12179/2A

APPENDIX B
EXPLORATORY HOLE RECORDS

Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m

Scale
1:25

Client: Matrix Realty Investments Limited

Depth
4.00m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.70	D					MADE GROUND: Dark brown to grey brown slightly silty gravelly ashy sand with occasional cobbles. Gravel is brick, ash, slate, quartzite and ceramic, with cobbles of brick.	
0.80	D						
			1.80			Grey orange mottled brown slightly gravelly silty to very silty SAND. Gravel is medium to coarse subrounded quartzite. (WEATHERED WILDMOOR SANDSTONE FORMATION)	
			3.10				
			4.00			(Damp) red orange silty locally cemented SAND with bands of firm red orange silty sandy clay. Becoming a very silty sand to sandy silt at 3.8 m begl. (WEATHERED WILDMOOR SANDSTONE FORMATION)	
						Trialpit Complete at 4.00 m	

Remarks: Pit sides stable.

Groundwater: No groundwater encountered during excavation.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m

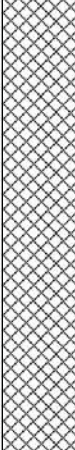

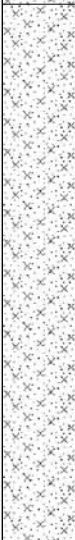
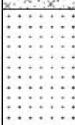
Scale
1:25

Client: Matrix Realty Investments Limited

Depth
4.00m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
						MADE GROUND: Dark brown to grey brown gravelly and cobbly sand. Gravel and cobbles of concrete, quartzite, brick and ceramic.	1
			1.50			Grey yellow brown silty SAND with gravel of quartzite. (WEATHERED WILDMOOR SANDSTONE FORMATION)	
			1.80			Red orange silty SAND with occasional gravel of medium subrounded quartzite. Becoming damp at 2.6 m begl and more competent at 3.4 m begl. (WEATHERED WILDMOOR SANDSTONE FORMATION)	2
			3.60			Red highly weathered SANDSTONE, very weak with some silt matrix. (WILDMOOR SANDSTONE FORMATION)	3
			4.00			Trialpit Complete at 4.00 m	4

Remarks: Pit sides stable.

Groundwater: No groundwater encountered during excavation.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m

Scale
1:25

Client: Matrix Realty Investments Limited

Depth
1.60m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.80	D					MADE GROUND: Orange brown gravelly silty sand with pockets of hydrocarbon stained sand between 0.4 and 0.8 m begl. Gravel is brick and concrete. (Strong hydrocarbon odour)	1
			1.30			Red brown silty sand becoming a highly weathered SANDSTONE, very weak. (WILDMOOR SANDSTONE FORMATION)	
			1.60			Trialpit Complete at 1.60 m	2
							3
							4

Remarks: Pit sides unstable.

Groundwater: Slight sandy ingress at 0.4 m begl.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m

Scale
1:25

Client: Matrix Realty Investments Limited

Depth
1.60m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D					MADE GROUND: Red brown and dark grey hydrocarbon stained silty sand with gravel and cobbles of brick and concrete. (Strong hydrocarbon odour)	1
			1.40			Red brown silty sand becoming highly weathered SANDSTONE, very weak.	
			1.60			(WILDMOOR SANDSTONE FORMATION)	
						Trialpit Complete at 1.60 m	2
							3
							4

Remarks: Pit sides locally unstable.

Groundwater: Slight sandy ingress at 0.2 m begl.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m



Scale
1:25

Client: Matrix Realty Investments Limited

Depth
0.70m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
						MADE GROUND: Grey brown to red brown silty gravelly sand. Gravel is brick, ash, ceramic and concrete. (No hydrocarbon odour)	
			0.50			Red brown silty sand becoming a highly weathered SANDSTONE, very weak.	
			0.70			(WILDMOOR SANDSTONE FORMATION)	
						Trialpit Complete at 0.70 m	
							1
							2
							3
							4

Remarks: Pit sides stable.

Groundwater: Slight sandy ingress at 0.4 m begl.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m



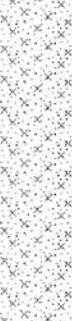

Scale
1:25

Client: Matrix Realty Investments Limited

Depth
3.20m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D					MADE GROUND: Dark grey to grey brown silty slightly gravelly sand. Gravel is brick, quartzite, concrete and ceramic.	
			0.70			Yellow grey silty gravelly SAND. Gravel and occasional cobble is subrounded quartzite. (WEATHERED WILDMOOR SANDSTONE FORMATION)	1
			1.70			(Damp) Red orange silty cemented SAND with pockets of slightly sandy silty clay. (WEATHERED WILDMOOR SANDSTONE FORMATION)	2
			2.80			Red brown highly weathered SANDSTONE, very weak. (WILDMOOR SANDSTONE FORMATION)	3
			3.20			Trialpit Complete at 3.20 m	4

Remarks: Pit sides stable.

Groundwater: No groundwater encountered during excavation.



Project Name
Coventry Street, Kidderminster

Project No.
12179

Co-ords: -
Level: -

Date
20/03/2015

Equipment: JCB 3CX

Dimensions: 1.50m






Scale
1:25

Client: Matrix Realty Investments Limited

Depth
3.30m

0.60m

Logged By
BVM

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
			0.35			MADE GROUND: Dark brown gravelly sand. Gravel is quartzite, ash, brick and concrete.	
						MADE GROUND: Orange brown silty gravelly sand with gravel of quartzite and brick.	
			1.00			Grey yellow very silty gravelly SAND. Gravel is medium to coarse subrounded quartzite. (WEATHERED WILDMOOR SANDSTONE FORMATION)	1
			1.70			(Damp) Red orange silty locally cemented SAND. (WEATHERED WILDMOOR SANDSTONE FORMATION)	2
			3.10			Red brown highly weathered SANDSTONE, very weak. (WILDMOOR SANDSTONE FORMATION)	3
			3.30			Trialpit Complete at 3.30 m	
							4

Remarks: Pit sides stable.

Groundwater: No groundwater encountered during excavation.



APPENDIX C
CHEMICAL TEST RESULTS



Final Report

Report Number: 15-06625 Issue-1

Initial Date of Issue: 27-Mar-2015

Client: Georisk Management Limited

Client Address: Summit Point
Summit Crescent Industrial Est
Smethwick
Staffordshire
B66 1BT

Contact(s): Ben Murphy

Project: 12179 - Coventry Street, Kidderminster

Quotation No.: **Date Received:** 23-Mar-2015

Order No.: **Date Instructed:** 23-Mar-2015

No. of Samples: 4

Turnaround: (Wkdays) 5 **Results Due Date:** 27-Mar-2015

Date Approved: 27-Mar-2015

Approved By:

Details: Darrell Hall, Laboratory Director

Results Summary - Soil

Project: 12179 - Coventry Street, Kidderminster

Client: Georisk Management Limited	Chemtest Job No.:		15-06625	15-06625	15-06625	15-06625
Quotation No.:	Chemtest Sample ID.:		118999	119000	119001	119002
Order No.:	Client Sample Ref.:		TP3	TP5	TP6	TP8
	Client Sample ID.:		D2	D1	D1	D1
	Sample Type:		SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.8	0.8	0.3	0.2
	Bottom Depth(m):					
	Date Sampled:		20-Mar-15	20-Mar-15	20-Mar-15	20-Mar-15
Determinand	Accred.	SOP	Units	LOD		
Moisture	N	2030	%	0.02	13	15
Stones	N	2030	%	0.02	< 0.020	< 0.020
pH	U	2010			7.9	8.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.4	4.7	2.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.01	0.97	0.38
Cyanide (Total)	U	2300	mg/kg	0.5	< 0.50	< 0.50
Arsenic	U	2450	mg/kg	1	11	10
Cadmium	U	2450	mg/kg	0.1	0.29	0.42
Chromium	U	2450	mg/kg	1	10	15
Copper	U	2450	mg/kg	0.5	48	72
Mercury	U	2450	mg/kg	0.1	0.70	0.63
Nickel	U	2450	mg/kg	0.5	14	20
Lead	U	2450	mg/kg	0.5	210	360
Selenium	U	2450	mg/kg	0.2	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.5	110	200
Aliphatic TPH >C5-C6	N	2675	mg/kg	0.1	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	2675	mg/kg	0.1	< 0.10	< 0.10
Aliphatic TPH >C8-C10	U	2675	mg/kg	0.1	6.0	120
Aliphatic TPH >C10-C12	U	2675	mg/kg	1	18	690
Aliphatic TPH >C12-C16	U	2675	mg/kg	1	13	360
Aliphatic TPH >C16-C21	U	2675	mg/kg	1	< 1.0	310
Aliphatic TPH >C21-C35	U	2675	mg/kg	1	< 1.0	55
Aliphatic TPH >C35-C44	U	2675	mg/kg	1	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	U	2675	mg/kg	5	37	1500
Aromatic TPH >C5-C7	N	2675	mg/kg	0.1	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	2675	mg/kg	0.1	< 0.10	< 0.10
Aromatic TPH >C8-C10	U	2675	mg/kg	0.1	4.7	51
Aromatic TPH >C10-C12	N	2675	mg/kg	1	17	200
Aromatic TPH >C12-C16	U	2675	mg/kg	1	10	120
Aromatic TPH >C16-C21	U	2675	mg/kg	1	12	150
Aromatic TPH >C21-C35	N	2675	mg/kg	1	12	48
Aromatic TPH >C35-C44	N	2675	mg/kg	1	< 1.0	< 1.0
Total Aromatic Hydrocarbons	U	2675	mg/kg	5	56	570

Results Summary - Soil

Project: 12179 - Coventry Street, Kidderminster

Client: Georisk Management Limited	Chemtest Job No.:				15-06625	15-06625	15-06625	15-06625
Quotation No.:	Chemtest Sample ID.:				118999	119000	119001	119002
Order No.:	Client Sample Ref.:				TP3	TP5	TP6	TP8
	Client Sample ID.:				D2	D1	D1	D1
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.8	0.8	0.3	0.2
	Bottom Depth(m):							
	Date Sampled:				20-Mar-15	20-Mar-15	20-Mar-15	20-Mar-15
Determinand	Accred.	SOP	Units	LOD				
Total Petroleum Hydrocarbons	U	2675	mg/kg	10		93	2100	
Naphthalene	U	2700	mg/kg	0.1	0.17			< 0.10
Acenaphthylene	U	2700	mg/kg	0.1	0.11			< 0.10
Acenaphthene	U	2700	mg/kg	0.1	0.41			< 0.10
Fluorene	U	2700	mg/kg	0.1	0.12			< 0.10
Phenanthrene	U	2700	mg/kg	0.1	1.3			0.29
Anthracene	U	2700	mg/kg	0.1	0.51			< 0.10
Fluoranthene	U	2700	mg/kg	0.1	2.5			0.65
Pyrene	U	2700	mg/kg	0.1	2.5			0.60
Benzo[a]anthracene	U	2700	mg/kg	0.1	1.1			< 0.10
Chrysene	U	2700	mg/kg	0.1	1.6			< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.1	1.4			< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.1	0.31			< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.1	0.99			< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.1	0.91			< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.1	0.14			< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.1	1.2			< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2	15			< 2.0
Total Phenols	U	2920	mg/kg	0.3	< 0.30			< 0.30

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk

**Emily Webb**

Georisk Management Limited
Summit Point
Summit Crescent
Smethwick
Birmingham
B66 1BT

t: 01215534044
f: 01215531112
e: emily.webb@georisk-uk.com



Environmental Science

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 15-68416

Project / Site name:	Coventry Street , Kidderminster	Samples received on:	13/03/2015
Your job number:	12179	Samples instructed on:	13/03/2015
Your order number:	12179	Analysis completed by:	23/03/2015
Report Issue Number:	1	Report issued on:	23/03/2015
Samples Analysed:	5 soil samples		

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.



Analytical Report Number: 15-68416

Project / Site name: Coventry Street , Kidderminster

Your Order No: 12179

Lab Sample Number				425453	425454	425455	425456	425457
Sample Reference				VS1	VS2	VS3	VS4	VS5
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/01/2015	11/01/2015	11/01/2015	11/01/2015	11/01/2015
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	15
Moisture Content	%	N/A	NONE	6.8	8.2	9.1	8.1	6.2
Total mass of sample received	kg	0.001	NONE	0.57	0.61	0.58	0.61	0.60

Monoaromatics

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	13	< 8.0	16	< 8.0	15
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	13	< 10	16	< 10	15

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	13	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	18	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	30	< 10	< 10



Analytical Report Number : 15-68416

Project / Site name: Coventry Street , Kidderminster

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
425453	VS1	None Supplied	None Supplied	Light brown sandy clay.
425454	VS2	None Supplied	None Supplied	Red sandy clay.
425455	VS3	None Supplied	None Supplied	Brown sandy topsoil.
425456	VS4	None Supplied	None Supplied	Red sandy clay.
425457	VS5	None Supplied	None Supplied	Red sandy clay with stones.

Analytical Report Number : 15-68416

Project / Site name: Coventry Street , Kidderminster

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BTEX and MTBE in soil	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073S-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Stones not passing through a 10 mm sieve is determined gravimetrically and reported as a percentage of the dry weight. Sample results are not corrected for the stone content of the sample.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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APPENDIX V: AC Specification

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**Specification
for Field Evaluation
on
land between Waterloo Street & The Ringway,
Kidderminster, Worcestershire**

**Prepared for:
Mr Simon Williams
Asbri Planning Ltd
1st Floor – Westview House
Unit 6 Oak Tree Court
Mulberry Drive
Cardiff Gate Business Park
Cardiff CF23 8RS**

October 2014

Archaeology Central Limited
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NON TECHNICAL SUMMARY

This Written Scheme of Investigations details a proposal for a field evaluation on land between Waterloo Street & The Ringway, Kidderminster, Worcestershire. It has been prepared by Archaeology Central Ltd for Asbri Planning Ltd, Cardiff.

1. Introduction

The proposed development is on between Waterloo Street & The Ringway, Kidderminster, Worcestershire (Henceforth – the site). The development proposal to construct a primary health care centre with associated access, landscaping and infrastructure has been submitted Asbri Planning Ltd. The local planning authority is Wyre Forest District Council (WFDC) and the planning reference number is WF/14/0187.

This specification has been prepared by Chris E Smith (MIfA), Project Manager, Archaeology Centra Ltd (Henceforth - AC) at the request of Asbri Planning Ltd. It provides information on the methodology which will be employed by AC during the field evaluation at the site.

The field evaluation has been recommended by Mike Glyde, Historic Environment Planning Officer with the Worcestershire Archive and Archaeology Service (WAAS) in their capacity as archaeological advisers to the planning authority. Details of the requirements of this work are set out in a Brief produced by Mike Glyde (WAAS) (WSM20745).

All work will be undertaken by suitably qualified staff and in accordance with the standards and guidelines of the IfA.

2 Archaeological Background

The site has previously been the subject of a desk based assessment carried out by Archaeology Central Ltd (Smith, 2013).

It was concluded in the desk based assessment that the whole of the assessment area had a high potential for 18th to 20th century remains, including those of a potentially locally significant carpet factory and associated tenement housing.

3 Objectives

The primary objectives of the field evaluation will be to locate and describe, by means of strategic trial trenching, archaeological features which may be present within the development area.

The evaluation will aim to clarify the nature, date, chronology, quality, quantity, significance and state of preservation of any archaeological remains identified by the evaluation trenches.

Preservation in situ will be advocated where at all possible, but where engineering or other factors may result in loss of archaeological deposits, preservation by record will be

recommended.

4 Method statement for strategic trial trenching

Preliminary work

After the demolition of the modern buildings currently occupying the site and the clearance of rubble, the archaeological project manager in charge of the work will satisfy him/herself that all constraints to ground works have been identified, including the siting of live services, Tree Preservation Orders and public footpaths.

Evaluation

A total of 7 trenches are proposed. The locations of the proposed trenches in relation to structures marked on the historic mapping is shown in figure 1.

Five of the trenches will measure 15m in length whilst the remaining two will measure 25 metres in length. All trenches will be 2m in width. This equates to a total evaluation area of 250m².

Four trenches will be positioned within the proposed footprint of the new medical centre in order to investigate the sites of the carpet factory, associated buildings and houses fronting onto Coventry Street.

Two trenches will be positioned so as to investigate the tenement plots fronting onto Waterloo Street (These structures are documented in detail within the desk based assessment from original archive drawings).

The last trench will be positioned within a central area to investigate structures and archaeological levels within this area.

All modern overburden and non-archaeological subsoils will be removed down to the level of the first recognisable archaeological horizon. All archaeological contexts subsequently located must be adequately sampled in order to define their function, date, and relationship to adjacent features.

All trench sides and bases must be cleaned manually by trowelling to reveal contexts in plan and profile. The level of natural soils below the archaeology should be tested for in at least one trench section location in each trench by means of machine/manual excavation.

Excavations through loose rubble will not exceed a maximum depth of 1.2m without the trench being widened/stepped or the edges battered by the mechanical excavator. Any areas of the site which extend below this depth (for example cellars), and WAAS require excavating, will not be entered without provision of adequate shoring if required.

As a minimum:

- i) small discrete features will be fully excavated;
- ii) larger discrete features will be half-sectioned (50% excavated); and
- iii) long linear features will be sample excavated along their length - with investigative excavations distributed along the exposed length of any such feature and to investigate terminals, junctions and relationships with other features.

Should the above percentage excavation not yield sufficient information to allow the form and function of archaeological features/deposits to be determined full excavation of such features/deposits will be required. Additional excavation may also be required for the taking of palaeoenvironmental samples and recovery of artefacts. iv) all structural features such as exposed wall lines, surfaces and/or foundations shall also be cleaned and examined for evidence of chronology such as butt joints with other features. Where possible samples of building materials will be taken as required.

Any variation of the above will be undertaken in agreement with WAAS.

All spoil heaps will be visually examined for the recovery of artefacts.

Human remains will be left *in situ*, covered and protected when discovered. No further investigation will normally be permitted and WAAS and the local Coroner must be informed immediately. After discussion, it may be appropriate to take bone samples for C14 dating. If removal is essential it will take place under the appropriate Ministry of Justice and Environmental Health regulations.

Recording will be carried out using AC recording systems (pro-forma context sheets etc), using a continuous number sequence for all contexts.

Written, drawn and photographic records of an appropriate level of detail will be maintained throughout the course of the project. Digital photographs will be taken using cameras with resolutions of 14 mega pixels or above.

Plans and sections will be drawn to a scale of 1:50, 1:20 and 1:10 as required, and these will be related to Ordnance Survey datum and published boundaries where appropriate.

Artefacts

Archaeological artefacts recovered during the course of the watching brief and field evaluation will be cleaned and labelled using an accession number, which will be obtained from the local museum. A single number sequence will be allocated to all finds. The artefacts will be stored appropriately until they are deposited with a suitable local museum.

All finds of gold and silver will be removed to a safe place and the Environment Agency, Cadw and the local coroner informed, within the guidelines of the Treasure Act 1996.

Any finds which are considered to be in need of immediate conservation will be referred to a UKIC qualified conservator (Phil Parkes at Cardiff University).

Radiocarbon, Environmental and Technological Samples

Archaeological contexts will be sampled as required for environmental remains, industrial waste, small-sized artefacts and/or radiocarbon as appropriate, when significant deposits are located. Technological samples will be taken where necessary when significant deposits are located. Samples will be retained as part of the project archive should post excavation analysis be deemed necessary at a later date. Reports on sampling will be added to the finished report as an addendum.

Specialists

In the event of certain finds/features etc. being discovered, the site archaeologist may have to seek specialist opinion for assistance. Such specialists will be accessed either internally within AC itself or from an external source should any such analysis be deemed necessary. A list of specialists is given in the table below. Specialist reports will be added to the finished report as an addendum.

Type	Name	Tel No.
Flint	Amelia Pannett	02920 899509
Animal bone	Jen Kitch	07739 093712
CBM, heat affected clay, Daub etc.	Rachael Hall	01305 259751
Clay pipe	Hilary Major	01376 329316
Glass	Andy Richmond	01234 888800
Cremated and non-cremated human bone	Malin Holst	01759 368483
Metalwork	Kevin Leahy	01652 658261
Neo/BA pottery	Dr Alex Gibson	Bradford University
IA/Roman pottery	Jane Timby	01453 882851
Post Roman pottery	Mr Stephen Clarke	
Charcoal (wood ID)	John Carrot	01388 772167
Waterlogged wood	Nigel Nayling	University of Wales (Lampeter)
Molluscs and pollen	Dr James Rackham	01992 552256
Charred and waterlogged plant remains	Wendy Carruthers	01443 233466
Palaeoenvironmental sampling and analysis	Dr Martin Bates	University of Wales (Lampeter)

5 Post-Fieldwork Programme

Conservation

After agreement with the landowner arrangements will be made for the long term conservation and storage of all artefacts in an appropriate local or county museum.

Archive

The site archive will be prepared in accordance with *Management of Research Projects in the Historic Environment* (English Heritage 2006). It will comprise all the data recovered during the fieldwork and shall be quantified, ordered and indexed and will be internally consistent. The archive will be deposited with the finds in a suitable local museum.

Reporting

An evaluation report will be produced which assesses the archaeological resource within the development area.

The results will be presented in such a way that data and supporting text are readily cross-referenced. The regional HER Officer will be contacted to ensure that any sites or monuments not previously recorded in the HER are given a Primary Record Number (PRN) and that data structure is compatible with the HER. The historical development of the site will be presented in phased maps and plans comprising clearly, the outline of the site.

Within the report an attempt will be made to indicate areas of greater or lesser archaeological significance and the sites will be ranked in level of overall archaeological importance (locally, regionally and nationally).

All relevant aerial photographs and historic maps will be included and be fully referenced. Any site photographs included in the report will be appropriately captioned and clearly located on a suitably scaled site plan.

The report will be used to inform future decision making regarding any possible further stages of archaeological work (Excavation, Watching Brief etc), the development construction and processes used.

The report will specifically include the following:

- a copy of the design brief
- a location plan
- all identified sites plotted on an appropriately scaled plan of the proposal site
- a gazetteer of all located sites and finds with full dimensional and descriptive detail including grid reference and period

Copies of the report will be sent to: Mr Simon Williams (Asbri Planning), WAAS (Mike Glyde and for inclusion in the regional HER. Digital copies will be provided in pdf format if required.

Any further stages of archaeological work, after the submission of the report for stages one and two outlined above, will be the subject of an additional WAAS curatorial brief against which a further AC specification will be drawn up.

The site archive

A project archive will be prepared in accordance with the National Monuments Record agreed structure and be deposited with the County Museum on completion of site analysis and report production. It will also conform to the guidelines set out in 'management of research projects in the historic environment' (English Heritage, 2006).

Arrangements will be made for deposition of the physical archive with the County Museum before work starts.

The digital archive will be deposited with the Archaeological Data Service.

An OASIS record will be created for the work.

Although there may be a period during which client confidentiality will need to be maintained, the report and the archive will be deposited not later than six months after completion of the work.

- Other significant digital data generated by the survey (ie AP plots, EDM surveys, CAD drawings, GIS maps, etc) will be presented as part of the report on a CD/DVD.

The format of this presented data will be agreed with the curator in advance of its preparation.

6 Monitoring

WAAS will be contacted at least one week prior to the commencement of site works, and subsequently once the work is underway.

Any changes to this specification that AC may wish to make after approval will be communicated to WAAS for approval on behalf of Planning Authority.

Representatives of WAAS will be given access to the site so that they may monitor the progress of the work. WAAS will be kept regularly informed about developments, both during the site works and subsequently during the post-fieldwork programme.

If significant detail is discovered, all works will cease and a meeting will be convened with the client and WAAS to discuss the most appropriate way forward.

7 Resources and timetable

Standards

The fieldwork will be undertaken by AC staff using current best practice.

Staff

The project will be undertaken by suitably qualified AC staff. Overall management of will be undertaken by Chris E Smith MIfA.

Equipment

The project will use existing AC equipment.

Timetable of archaeological works

No start date has yet been agreed though work will be undertaken at the convenience of the client.

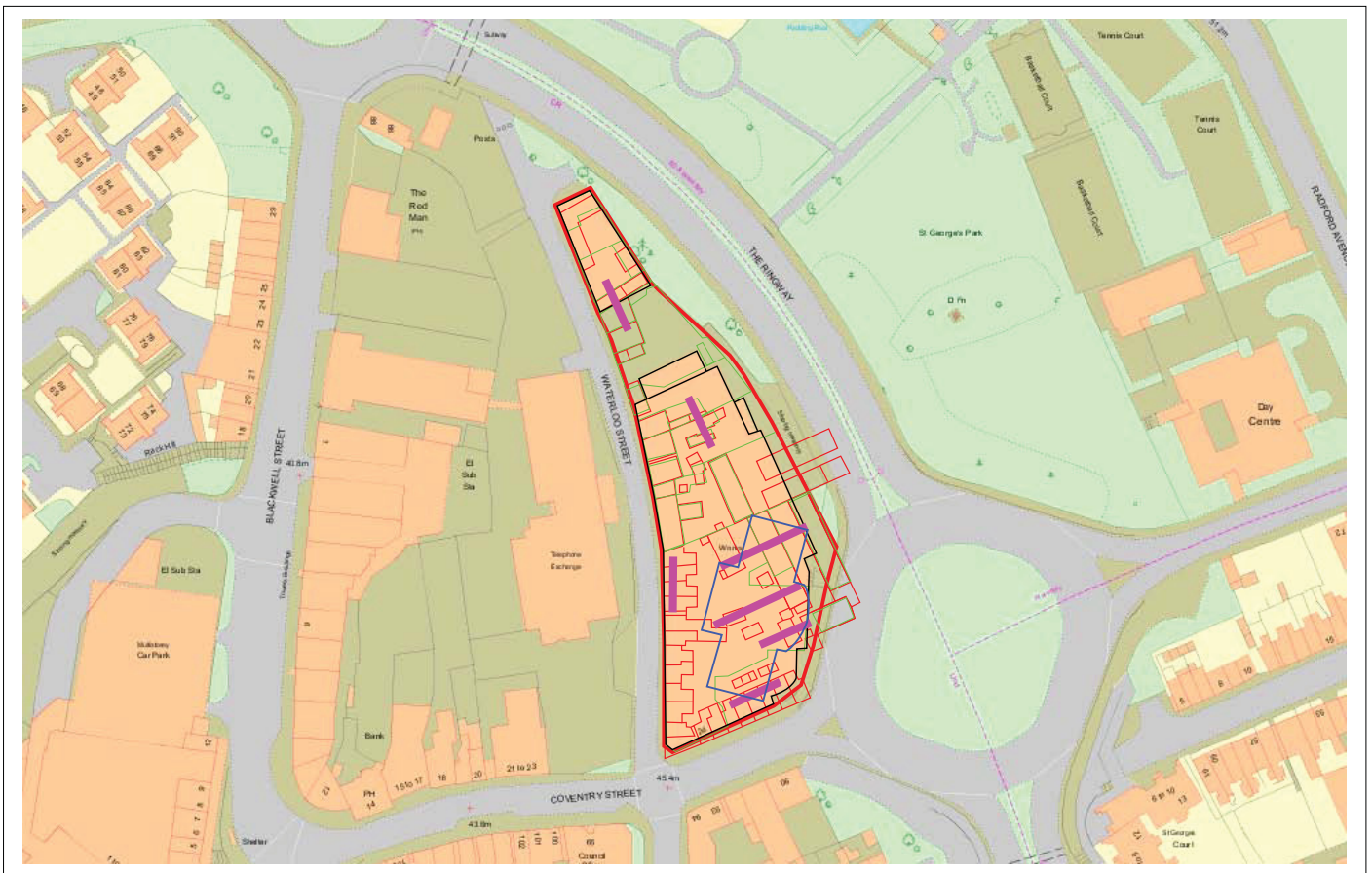
Insurance

Archaeology Central Limited (AC) is an affiliated member of the CBA, and holds Insurance through the CBA insurance service.

Health and safety

All members of staff will adhere to the requirements of the *Health & Safety at Work Act*, 1974, and the AC Health and Safety Policy.

AC will produce a detailed Risk Assessment for approval by the client before any work is undertaken.



2010 OS Mastermap showing assessment area with 1884 structures (red) 1938 structures (green), new medical centre (blue) and proposed trenches (solid pink).

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APPENDIX VI: Archive Cover Sheet

ARCHIVE COVER SHEET

Land between Waterloo Street and The Ringway, Kidderminster, Worcestershire

Site Name:	Waterloo Street
Site Code:	WSK/15/EVA
PRN:	-
NPRN:	-
SAM:	-
NGR:	NGR SO 8336 7686
Site Type:	Brownfield
Project Type:	Evaluation
Project Manager:	Rowena Hart
Project Dates:	March 2015
Categories Present:	17 th to 20 th century
Location of Original Archive:	AC
Location of duplicate Archives:	-
Number of Finds Boxes:	2
Location of Finds:	-
Museum Reference:	-
Copyright:	AC
Restrictions to access:	None

Archaeology Central

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