Cambridge Sporting Village, Cambridgeshire

Field walking, metal detecting and geophysical survey

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Cambridge Sporting Village, Cambridgeshire: Field walking, metal detecting, and geophysical survey

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Contents

Summary

In November 2012 a field walking and metal detector survey was undertaken, along with a geophysical survey in March 2013. These surveys supplemented an earlier investigation in 2005 that formed the basis of the Trumpington Meadows desktop study (Dickens 2005). There was little evidence for prehistoric, Roman, or Medieval archaeological activity with only 101 pieces of struck flint suggestive of prehistoric activity and 177 pieces of 18th and 19th century pottery from the 2012 survey. Material from the Trumpington prisoner of war camp, Camp 45/180 was recovered from the topsoil, predominantly through the metal detector survey, with the possible concrete pads for buildings identified in the geophysical survey. Distribution plots from the survey have differentiated parts of the camp, administrative buildings and bunk/sleeping huts, as well as in camp activities.

INTRODUCTION

In late November 2012 an archaeological surface investigation was undertaken in a field at the southeast extent of the Trumpington Meadows development area (centred on 544000 253750; Figure 1). Cambridge Community Sporting Company commissioned the work to supplement earlier archaeological investigations (Dickens 2005) ahead of the proposed development of the Cambridge Sporting Village. The proposed development area (PDA) is *c.*40ha in extent, within an agricultural field on a slight rise falling from 19m to 17m AOD (Above Ordnance Datum) at the intersection of the M11 to the south and the A1309 to the east. To the north and west were agricultural fields with the Trumpington Meadows development occurring further north. The geology comprises West Melbury Marly chalk (British Geological Survey 2014).

Archaeological Background

Much of the archaeological background of the site has been discussed elsewhere with evidence of landscape occupation spanning the Neolithic through to the Anglo-Saxon period having been recorded (see Dickens 2005, Brudenell and Dickens 2007, Patten 2012). Of particular significance for this investigation, is the post-Medieval and 20th century use of the site. The first of these relate to the coprolite industry in the latter half of the 19th century. In the mid to late 19th century there was a short-lived economic boom in southeast Cambridgeshire that centred on the need for new sources of fertiliser. In the 1830s, coprolites were identified as a source of phosphate that could be used in fertilisers. These were discovered within the Cambridgeshire Greensand, which lies at the base of the chalk and above the Gault Clay that stretches from Soham to Royston. By the 1890s, the coprolite industry had declined but with the outbreak of the First World War coprolites were seen as a source for phosphates in munitions amid fears of the impact of German naval action on merchant fleets. As a result, large-scale coprolite extraction was undertaken at Grantchester and Trumpington with reports suggesting upto 3000 men were involved (O'Connor 2001). Unlike earlier extraction, large machinery was used, which included draglines that worked on railway tracks to dig open quarries. The war ended before 'even a ton' of the material was taken off site (O'Connor 2001; 57) and the tracks and machinery were either sold off or buried leaving little trace.

A Second World War prisoner of war camp is situated within the study area. This camp (45/180) is described by English Heritage as 'standard type' (Thomas 2003) and was constructed in 1941 to house Italian prisoners of war. In 1943, at the time of an International Red Cross inspection, there was the capacity for 750 Italian prisoners. The buildings within the camp were single storey surrounded by high, barbed wire fences. The Italians were considered to be of little threat and were allowed to work on local farms. Towards the end of the war, the camp was used for German prisoners under stricter security, and described as a German working camp. The camp closed in July

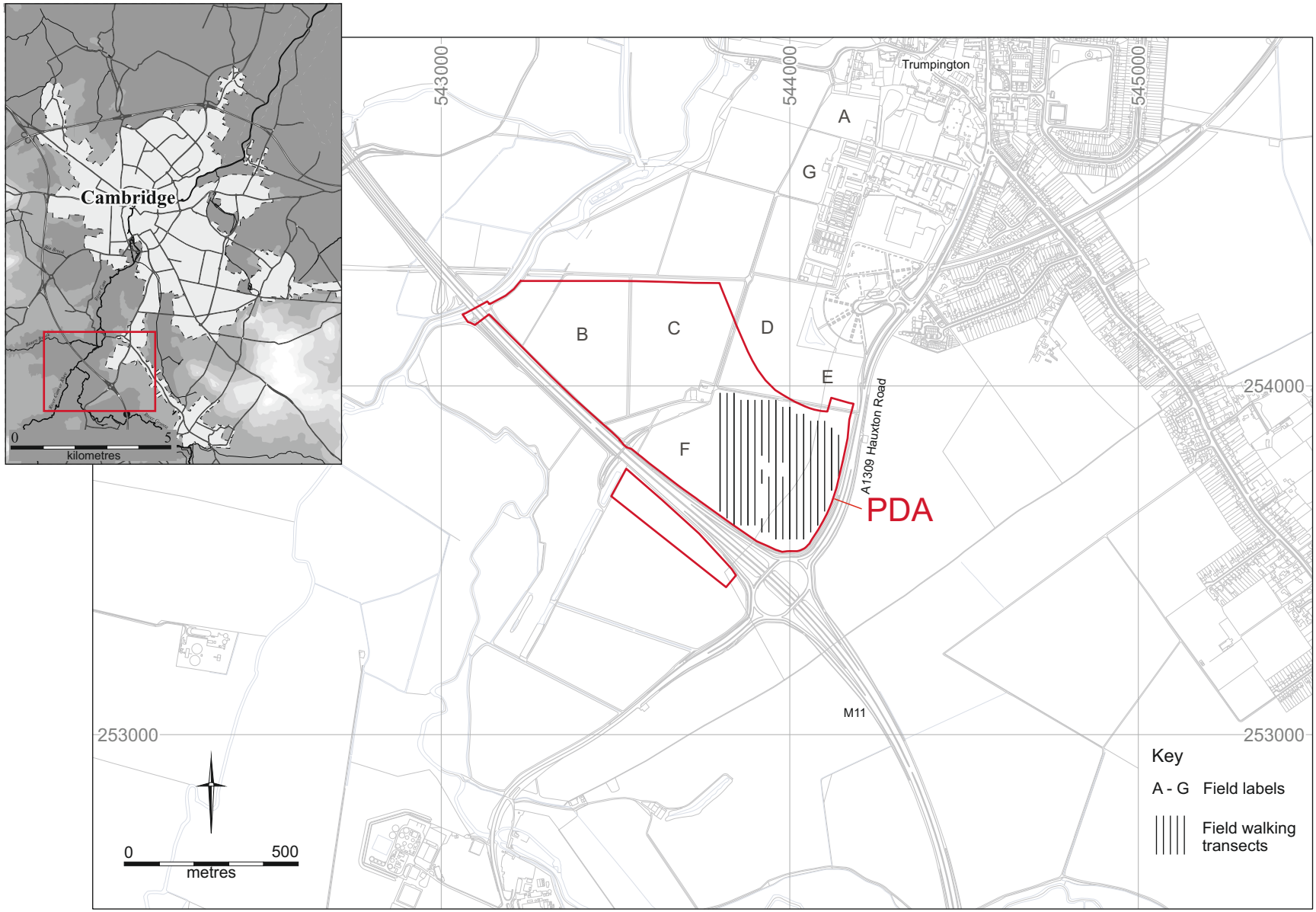

Figure 1. Location map

1947 and by 1950 had been converted into a National Service Hostel for displaced people and soldiers, both Polish and German.

During the early part of the war there was no standard design for these camps, although there were certain structures and a basic layout. After the success of the North African Campaign against the Italian Army a large proportion of Italian prisoners, initially held in North Africa, were transported to Britain and housed within purpose built, or 'Standard' camps. Many of these 'Standard' camps were built by the prisoners themselves living in temporary structures until they were complete, although some were built by construction companies (Thomas 2003). The most common building was the Ministry of War Production standard hut (18ft 6in span), although timber Laing and Nissen huts were used. These 'Standard' camps consisted of guard's compound, prisoner's compound, garden plots, and a recreation ground. Elements of all of these can be seen on photographs of the Trumpington camp.

Methodology

Part of the PDA was covered during the assessment was conducted as part of a larger evaluation of the Trumpington Meadows landscape, first undertaken in 2005 (Dickens 2005). At this time seven fields (A-G) were field walked and three (A, D, and E) were metal detected. Of the fields examined in the 2005 survey B, C, part of D, and F are within the current proposed development area. This investigation (referred to as 2012 study) was an addendum to the earlier program within part of the area that was not field walked previously. For consistency the same methodology was used and the labelling of the fields and transects continued; the field is identified as F. The results of the 2005 survey have been discussed previously (Dickens 2005) and will be reiterated here where pertinent. The earlier survey covered 23.4ha. within the current PDA boundary and this field added a further 13.8ha. to that survey. At the time of the 2012 field walking and metal detecting conditions were good, the field had been ploughed and harrowed with a low winter cereal.

The field walking survey was undertaken on a 20m grid, aligned to the National Grid. These were walked north–south in transects 20m apart, with a corridor of approximately 2m. Artefacts were bagged at 20m intervals along the transects. These divisions are referred to as transect points. The transects allowed large areas to be walked relatively quickly, and also provide an approximate 10% sample of all the fields evaluated.

The metal detecting survey was carried out to complement the field walking data. This was carried out along the same transects as the field walking, i.e. along north–south lines at 40m intervals. This was walked by two experienced detectorists at a slow pace with the sweep covering 1.5-2.0m using XP 150 metal detectors. Small iron objects such as nails were discriminated out and very recent objects of little or

no archaeological significance such as milk bottle tops, ring pulls, shotgun cartridges etc., were collected but discarded prior to finds assessment.

All metal finds were numbered individually and plotted to within a metre, along each transect. The numbering sequence does not reflect any dated chronology of the finds but reflects the order in which the objects were recorded during post-excavation. The results for each field are illustrated below and listed within the tables below.

RESULTS

Presented below are the results of the 2012 field walking and metal detecting survey. These were undertaken on the same transect lines with the metal detector survey at 40m rather than 20m intervals. There were areas of set aside around the edge of the field, towards the centre, and in the northeast corner, these were not walked or metal detected. A total of 234 transect points were walked.

Excluding the metalwork assemblage, 628 items were recovered during the 2012 field walking (Table 1). The flint is discussed first followed by the remainder of the material and a separate section on the metalwork.

Category	Quantity	Weight (g)
Burnt flint	22	131
Bone	2	21
Brick	1	142
Burnt stone	5	78
Brick/tile	1	1
Flint	101	468
Glass	4	41
Mortar	4	81
Moulded stone	2	372
Misc	125	1765
Pottery	188	1349
Oyster shell	71	143
Clinker	47	699
Stone	6	40
Tobacco pipe	20	56
Total	**628**	**5722**

Table 1: Recovered material from the 2012 survey, excluding metalwork

The worked flint

Emma Beadsmoore

A total of 101 (≥468g) flints were recovered from 2012 survey; 71 (≥323g) were unburnt and worked, 8 (≥14g) burnt and worked, whilst 22 (131g) were just burnt. The flints are listed by type and feature in Table 2.

The assemblage recovered from the 2012 field walking comprises flint working waste, no tools were recovered. The flint is abraded and many flakes are broken/damaged, which whilst not uncommon in field walking assemblages, makes dating the flint problematic. Broadly, the assemblage is chronologically non-diagnostic. However, there is some very limited evidence for the systematic flake production/core reduction prevalent in the Late Mesolithic/Neolithic periods, whilst other flakes are broadly comparable to later Neolithic/Early Bronze Age flake production/core reduction strategies. No concentrations or 'sites' were identified (Figure 2).

	Type										
Hectare	primary flake	secondary flake	tertiary flake	irregular core	single platform core	core rejuvenation flake	chip	chunk	burnt chunk	unworked burnt chunk/chip	**Totals**
H3		1									1
H4		3	1					1		1	6
H6		5	3							1	9
H7	1	7	8					2		3	21
H8		2		1				1		1	5
H9		3	2		1		1			1	8
H10	1	2	3	1						1	8
H11		1					1				2
H12			3							3	6
H13	1		4						1	3	9
H14		2				1			1	4	8
H15		1	4								5
H16		1		1						2	4
H17		2	2							1	5
H18	1	1	1							1	4
Totals	**4**	31	31	3	1	1	2	4	2	22	101

Table 2: Flints listed by hectare and type from the 2012 survey

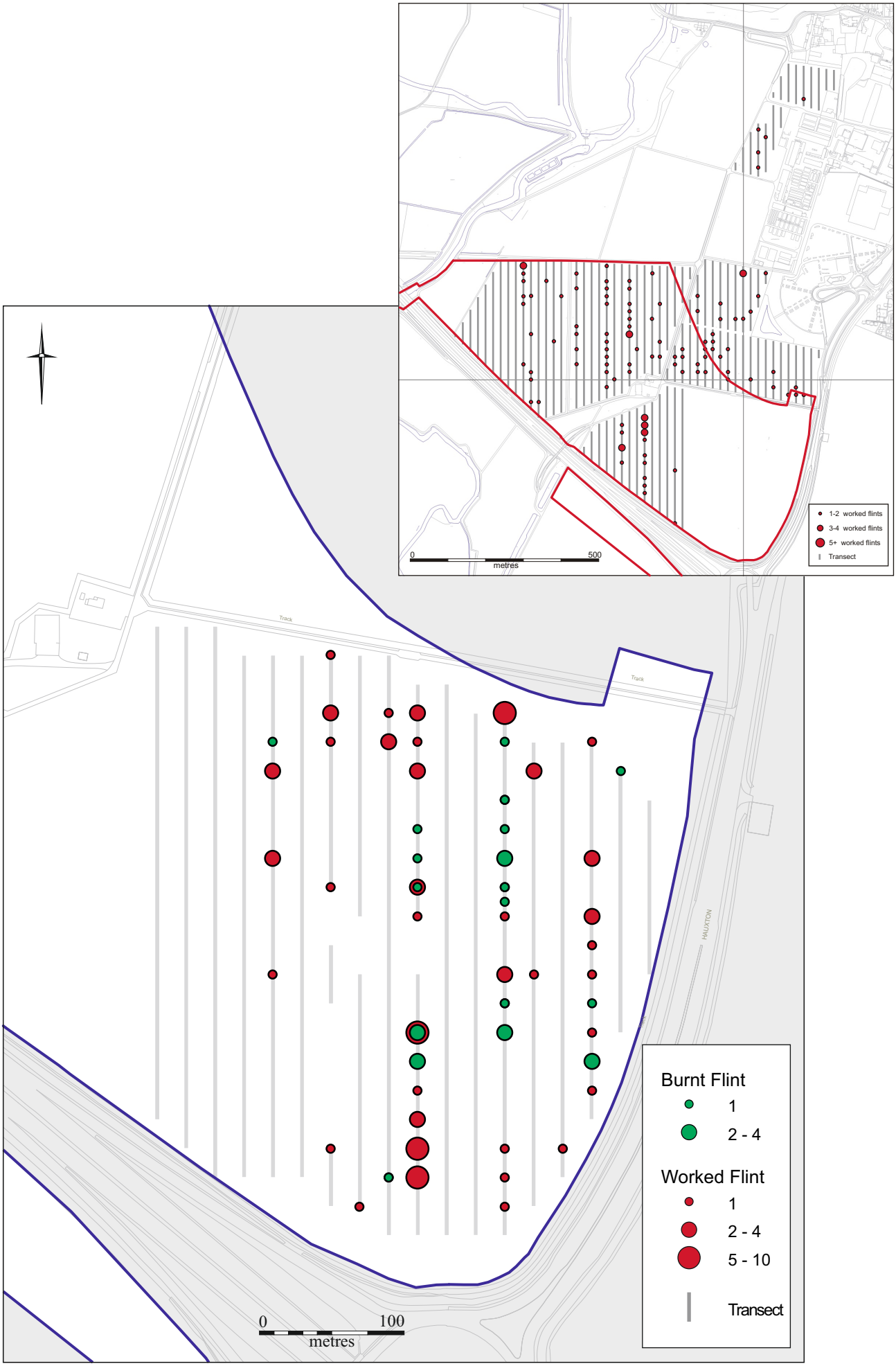

Figure 2. Distribution of worked and burnt flint

Pottery and other material
Grahame Appleby

The pottery assemblage from the 2012 survey consists of mainly 18th and 19th century material, with an unusually high quantity of 18th century porcelain (Figure 3). This material is indicative of dumping or night-soiling/manuring, the likely source of the material either from the village or from Cambridge. Only a small quantity of probable, very abraded, Roman pottery was found (max. 11 sherds), indicating the area was located some distance from any significant settlement, due to the nature of this material it has not been further analysed or reported on separately.

Of note is the quantity of oyster shell recovered and which due to its generally good preservation state is likely to be post-Medieval in date. Similarly, the clinker and 78 pieces of cinder (529g) included under the 'Misc.' category represent discarded material that has been exposed to very high temperatures, such as a furnace or firebox on a steam-engine. These deposits may be related to the former Bedford to Cambridge railway line located to the north or the light railway and workings associated with the coprolite works opened during World War I. Alternatively, clinker may have been imported to the area as hardcore for building foundations and pathways during construction of the former POW camp.

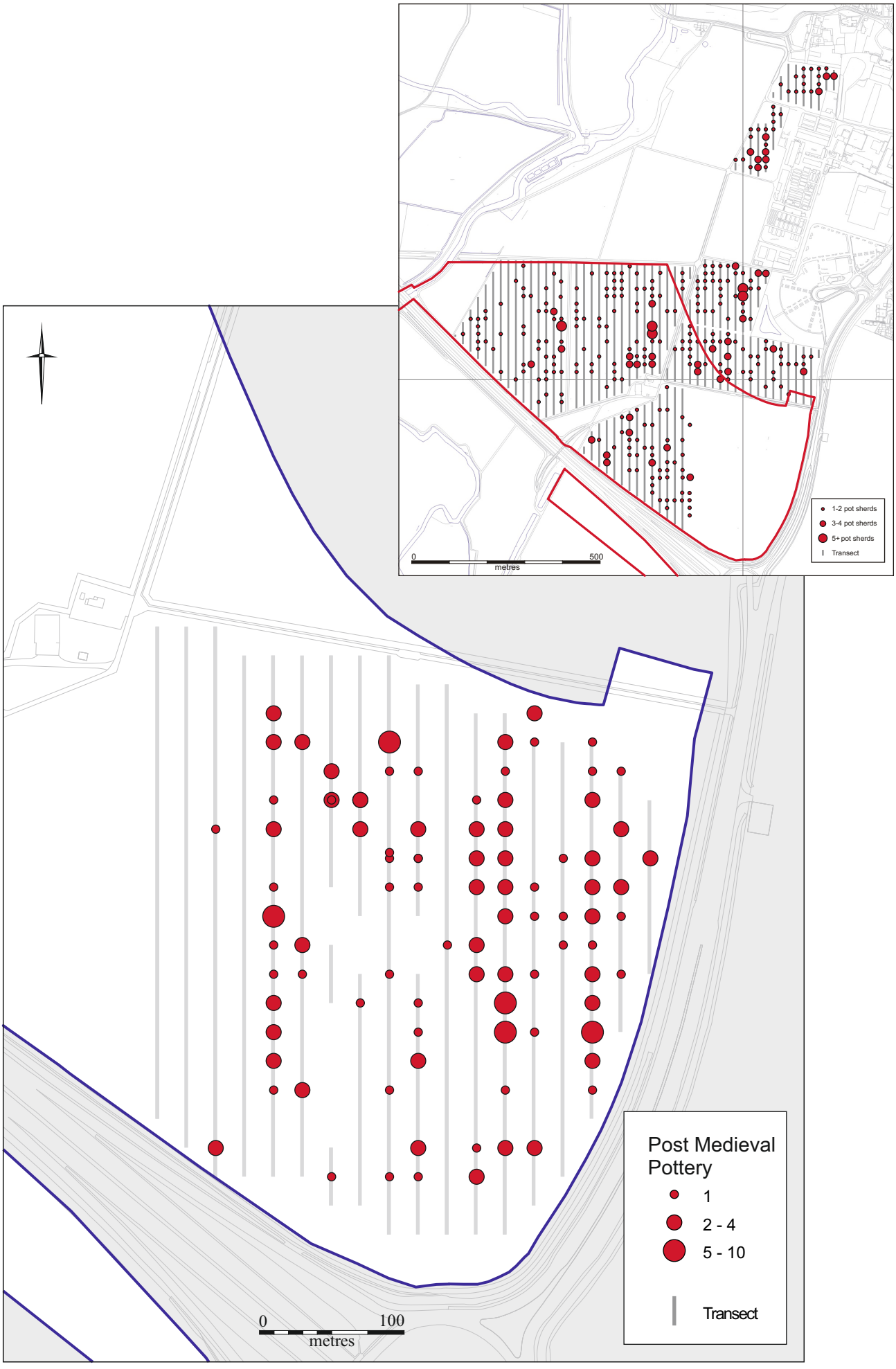

Figure 3. Distribution of post-Medieval pottery

Metal Detecting Survey

A total of 277 metal artefacts were recovered from the 2012 survey which covered approximately 13.8 hectares; however, only a 2% sample of the field was covered (Appendix 1). Of these, 150 were copper alloy, 82 were made of lead, one of silver, six Iron, and the remainder of non-ferrous white metal. A proportion of the finds such as fragments of copper or lead sheet were un-diagnostic and therefore difficult to date. The majority of finds dated from the post-Medieval period through to the modern day, with no Prehistoric, Roman or Saxon metalwork recovered (Table 3). The pre-20th century material and 20th century material have been plotted separately (Figures 4 and 5 respectively).

Type	Quantity
Pre 20th Century	28
Roof Washer	55
4-Hole Buttons	45
.303 Bullets and Casings (Discharged)	7
Military Dress Items	7
Aluminium and Other Offcuts	15
Other	120

Table 3: Summary of metal finds from 2012 survey

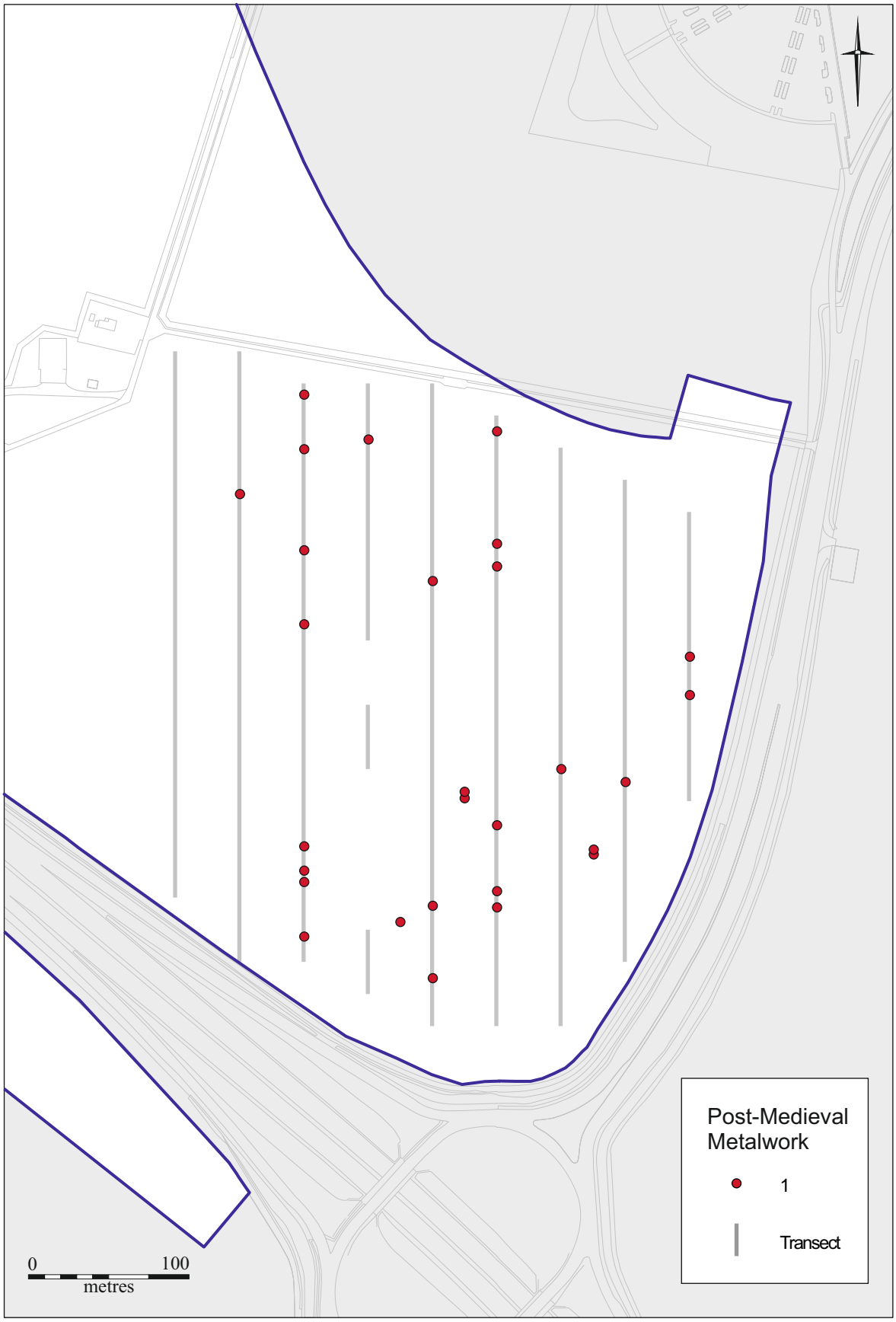

Figure 4. Distribution of post-Medieval (pre-20th Century) metalwork

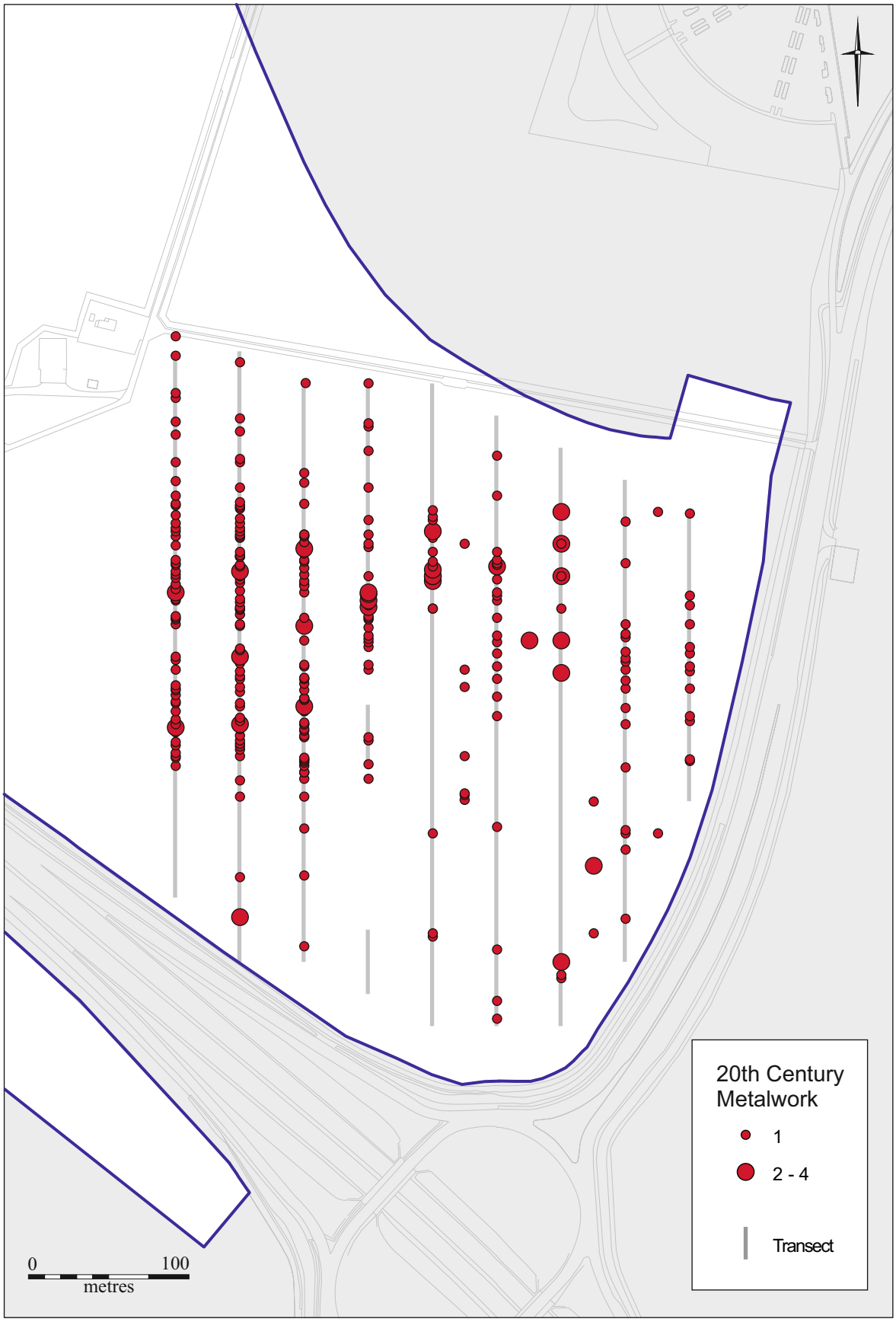

Figure 5. Distribution of 20th Century metalwork

DISCUSSION

There was little pre-20th century material recorded beyond the worked and burnt flint, that comprised of undated working waste. The majority of the pottery recovered was of 18th and 19th century date with no more than 11 abraded sherds of probable Roman pottery and no identifiable Medieval sherds. This is consistent with the results from the 2005 field walking that identified very little Roman or Medieval activity in Fields B, C, and D. There, there was a much greater quantity of post-Medieval material recovered, with an even distribution throughout the surveyed area. This post-Medieval material comprised predominantly of 18th and 19th century pottery, similarly dated *tombak* or *hessian* buttons, and other assorted metal objects. This most likely derives from night-soiling/manuring; however, there is the possibility that some of the material may be related to coprolite extraction and associated infrastructure.

The vast majority of the material recovered from these investigations was derived from, or associated with, the Second World War prisoner of war camp or the National Service Hostel as it became post 1949. The study of these sites, along with all 20th century military sites, has become a topic of interest recently with the Defence of Britain Project undertaken by the Council for British Archaeology (CBA), and the Twentieth Century Military Recording Project undertaken by Historic England (formerly English Heritage: Thomas 2003). Prisoner of war camps tended to be commandeered stately homes, old army barracks, or hastily built complexes, the latter of which if demolished are likely to survive only in the topsoil with little cut archaeological features. This may well be the case for the camp at Trumpington, a 1975 article in Antiquity states that 'it is remarkable how nearly all traces of the of the former POW camp that occupied the Plant Breeding Institute at Trumpington, near Cambridge, have already vanished' (St. Joseph 1975). This survey clearly demonstrates the importance of the topsoil assemblage as an archaeological resource. Even though the area has been intensively metal detected in the past (see Dickens 2005), the survey undertaken here produced a significant collection of metalwork. Within the area of the camp 203 pieces of 20th century metalwork were recovered from a 2% sample of the upper 25cm of the topsoil horizon. If this sample was extrapolated then 10,150 pieces could be expected from the areas within the footprint of the camp alone.

By studying this material, even with this limited sample, it is possible to see patterning. Relating to the layout of the camp and the construction of its buildings (Figure 6), and to the occupants and some of the activities they undertook (Figure 7).

The plot of the lead washers and the clinker show concentrations within the areas of the camp buildings (Figure 6). The lead washers would have been used to affix the roof panels; some of washers still contained traces of tar like substance suggesting that the rectangular huts had timber roofs covered with felt and bitumen. Their plot, once overlain on the plan of the camp, shows a distinct clustering within the area that would most likely have been designated for the occupants of the camp. The clinker is

slightly more widespread, and although it is possible it came from the coprolite workings, there are concentrations within the areas of both the occupant's buildings and the administrative buildings that suggest it may have been used in pathways between buildings throughout the camp. The geophysics report, included as an appendix, identified features primarily associated with the camp (Figure 8). These comprised a series of ditches that most likely formed enclosures around and within the camp. In addition the concrete platforms of several buildings have been identified that would have formed part of the camp.

Further patterning is suggested by the plots of 4-hole buttons and items of military origin (Figure 7). There were no German or Italian uniform dress items recovered suggesting the occupants wore plain British issued battledress uniforms, with simple/plain 4-hole buttons. Their distribution is more widespread than the clinker, but is still concentrated within the footprint of the camp. The items of military origin comprised items of dress, including military buttons, and .303 bullet/casings all of which had been discharged. These were again dispersed throughout the camp area but were concentrated within the area of the administrative buildings. In addition to these, there are artefacts indicative of different activities that may have been occurring in the camp. There were 11 pieces of aluminium offcuts. These may be associated with the construction of the camp, but equally could suggest some form of metalworking was occurring, probably within a workshop. A copper alloy block <620> from a printer's type tray was recovered suggesting there may have been a printing press on site. Of further note was a copper alloy object of oval tapering shape that was formed from a penny of George V (1910-36) <590>. The penny had been machine punched removing the centre of coin to form a ring or band. This reworked/improvised object is reminiscent of 'trench art' often associated with prisoners of war (Read 2015).

The small sample from within the camp has shown that a valuable archaeological resource is located within the topsoil. Although many former prisoner of war camps have been recorded as part of the Twentieth Century Military Recording Project (Thomas 2003), these were closed communities and as a result, little is known regarding the life and activities of prisoners within the camps. Some camps afford glimpses of this: Camp 93 at Harperly, County Durham has graffiti ('Viva Mussolini') scrawled on the inside of the still standing huts; while from Camp 90, at Friday Bridge, Cambridgeshire, objects made by the occupants, include doll shoes made from bread, an articulated snake, and a brass ring, are housed in Wisbech and Fenland Museum. The survey at Camp 45/180 Trumpington, again although limited, shows that further work could help further elucidate some of the activities occurring within the camp itself. Importantly this type of topsoil evidence relates to both the national study of these sites and the local communities into which the occupants frequently integrated.

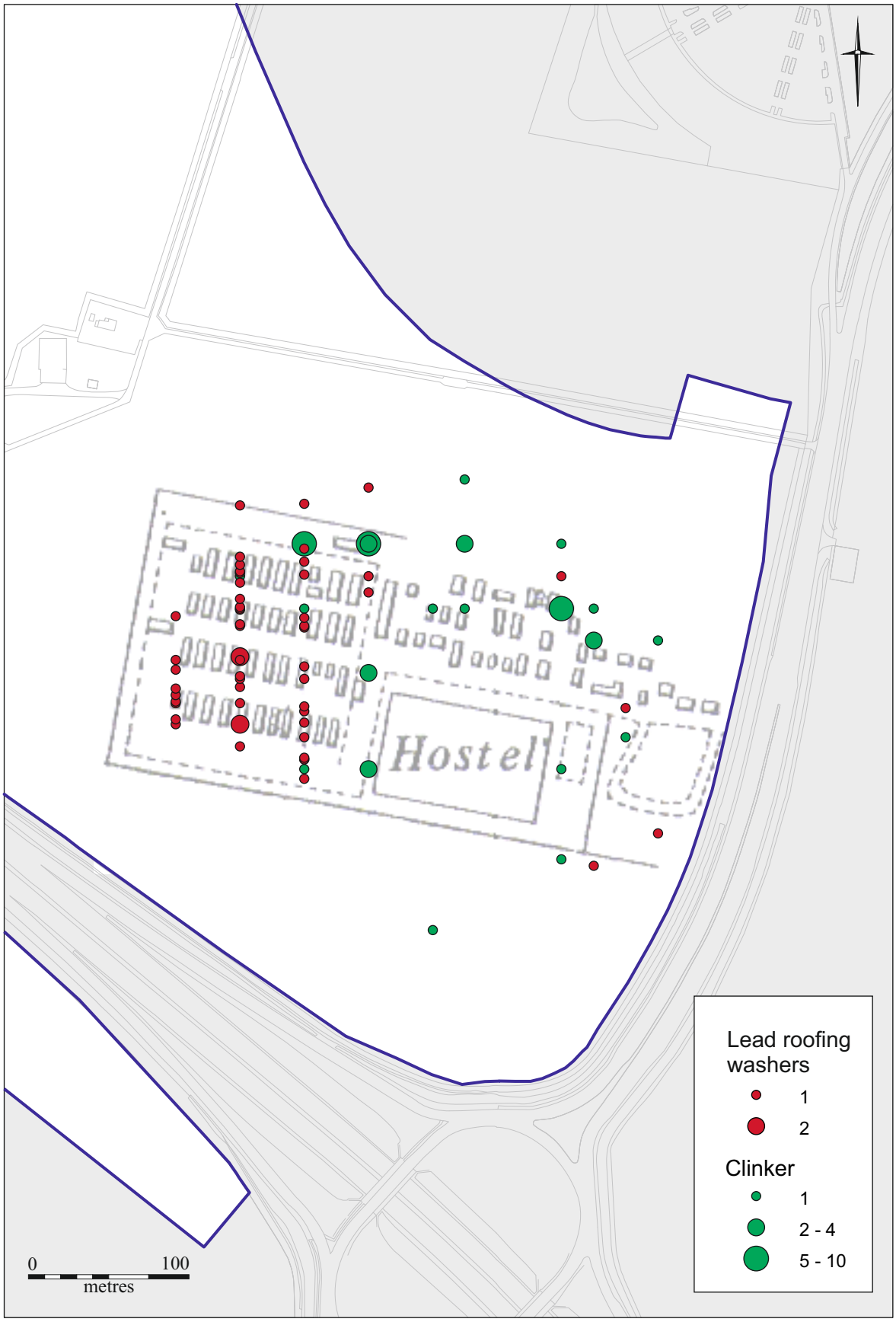

Figure 6. Distribution of construction related material

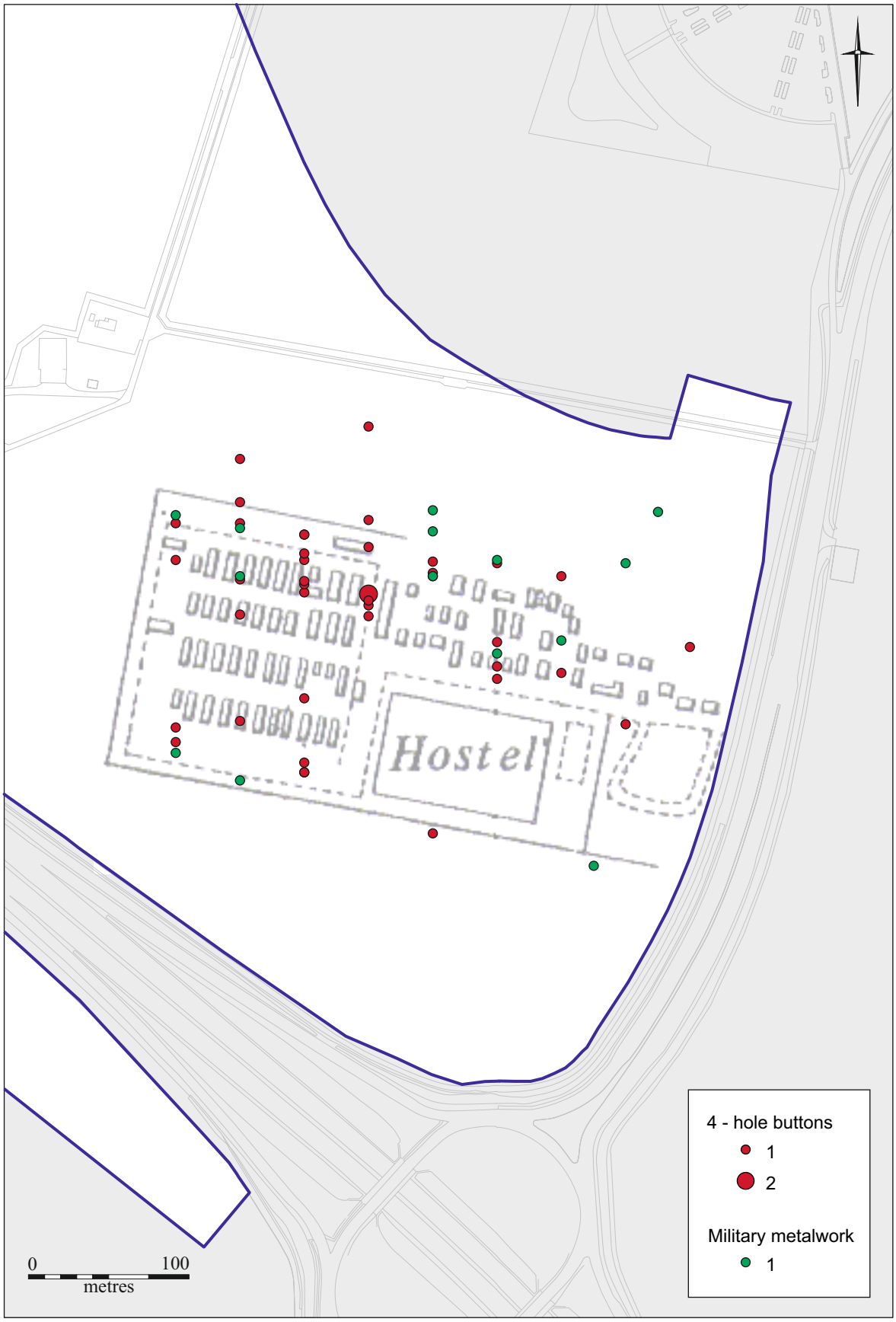

Figure 7. Distribution of dress accessories

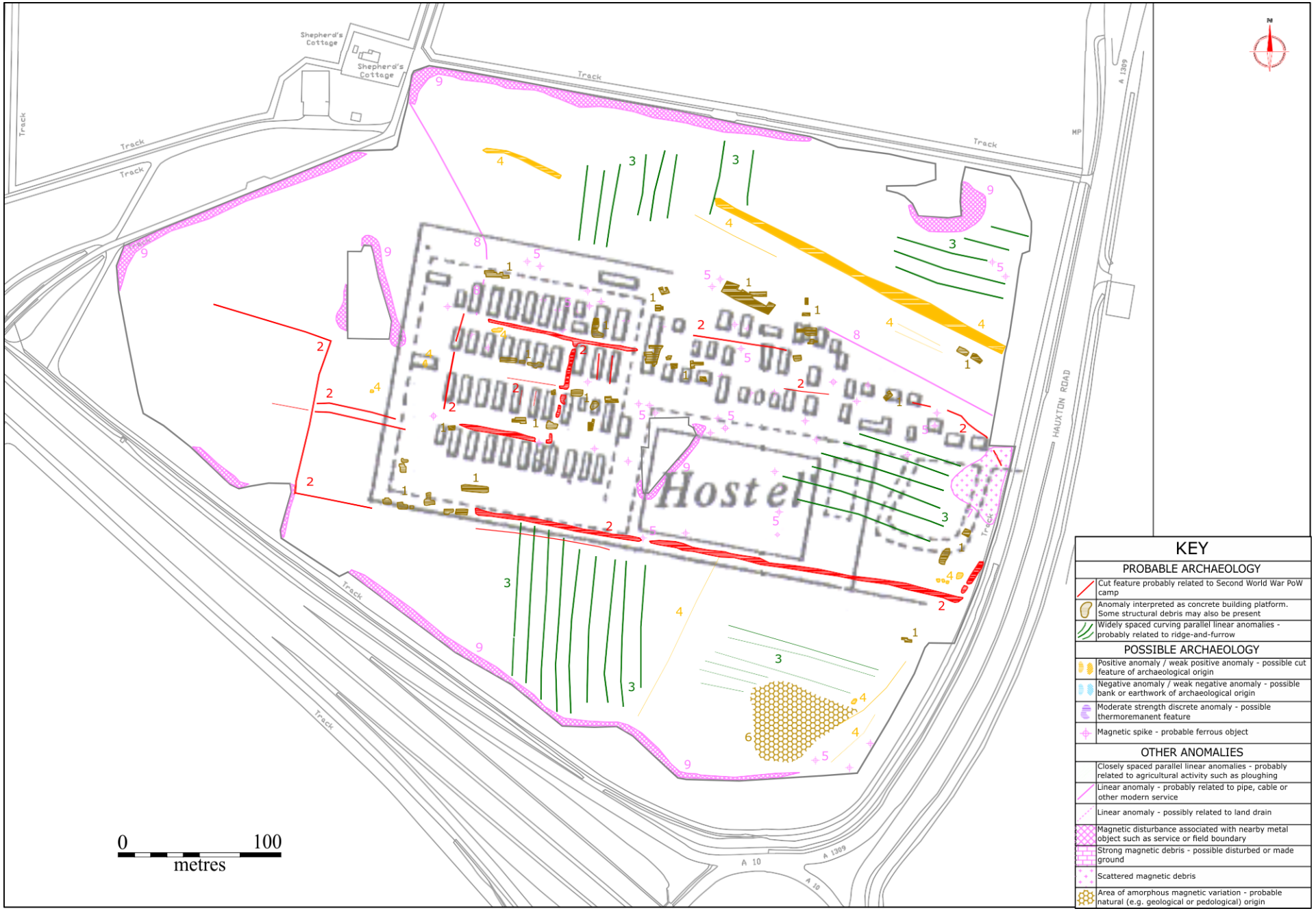

Figure 8. Stratascan geophyics plot with Ordnance Survey 1959 plan of camp

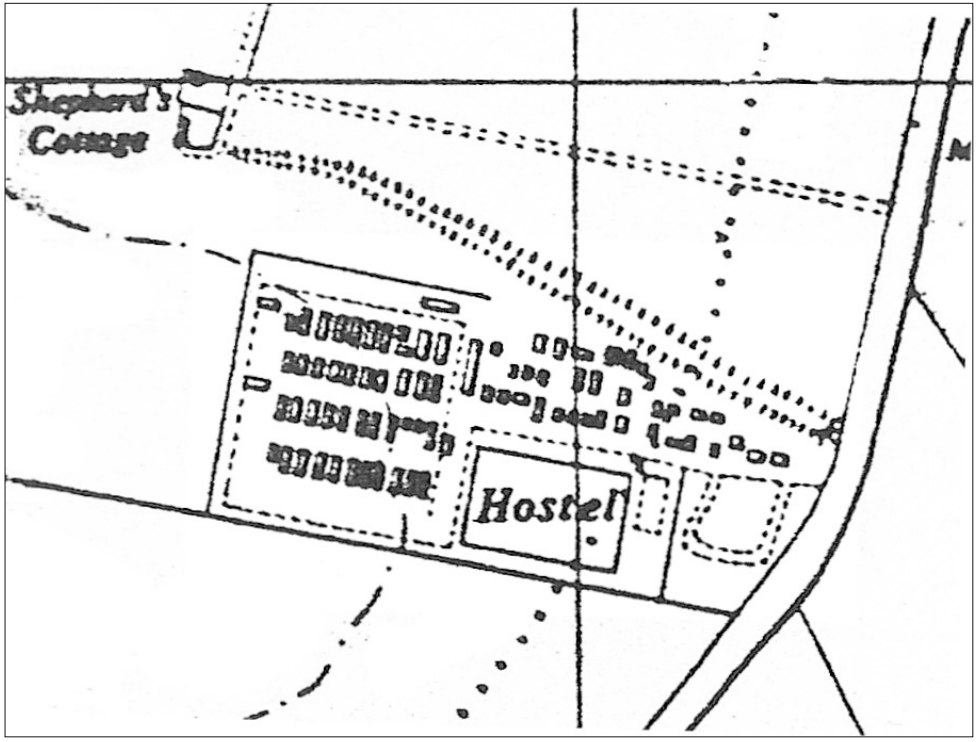

Figure 9. 1960 OS map (Sheet TL45 SW, 1:10560) and 1940s B&W aerial photograph showing prisoner of war camp

ACKNOWLEDGEMENTS

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APPENDIX 1: Metalwork

	Catalogue	Description	Date	Location
1	<551>	Lead washer for fixing corrugated roofing panels, 24mm diameter	20th	H3A82
2	<553>	Copper alloy washer, 23mm diameter	20th	H3A90
3	<554>	A fragment of sheet copper alloy, 31 x 34mm	20th	H3C3
4	<556>	A pressed aluminium screw cap impressed with *Boots* logo	mod	H3C28
5	<557>	A fragment of an aluminium can	mod	H3C32
6	<559>	Fragment of sheet aluminium, 55 x 39mm	20th	H3C36
7	<560>	Small fragment of aluminium offcut, 10 x 5mm	20th	H3C38
8	<561>	Sheet aluminium offcut	20th	H3C41
9	<562>	Fragment of aluminum sheet	20th	H3C45
10	<565>	Aluminium sheet offcut	20th	H3C52
11	<568>	Small fragment of aluminium sheet, 30 x 12mm	20th	H3C68
12	<583>	Triangular sheet aluminium offcut	20th	H4A25
13	<585>	Rectangular sheet aluminium offcut	20th	H4A26
14	<591>	Fragment of cast corrugated aluminium bar of triangular cross-section, 82 x 21 x 12mm	20th	H4A41
15	<593>	A small fragment of cast white metal bar of rectangular section	20th	H4A47
16	<605>	A rectangular strip of sheet aluminium, 72 x 25 x3mm	20th	H4A99
17	<614>	A rectangular strip of aluminium with central rivet, 52 x 19mm	20th	H4C26
18	<621>	Circular lead washer with bitumen coating (from hut roof), 30mm diameter	20th	H4C46
19	<621>	Fragment of thin copper alloy sheet	-	H4 C47
20	<628>	Copper alloy cover of unknown function, diameter 17mm	20th	H4C66
21	<633>	Small fragment of copper alloy ? sheet	20th	H4C82
22	<634>	Fragment of aluminium sheet of irregular shape	20th	H4C83
23	<638>	Aluminium offcut from 5mm thick block / bar, 25 x 10 x 5mm	20th	H4C95
24	<640>	Aluminium rectangular strip with rounded corners, 48 x 20 x 2mm	20th	H5A28
25	<644>	Irregular lump of ?aluminium casting spill	20th	H5A77
26	<650>	Small aluminium strip with rounded corners, 25 x 5 x 1mm	20th	H5C73
27	<539>	Copper alloy four-hole overall button of 17mm diameter	20th	H3A37
28	<531>	Copper alloy strip with champhered edge, rivet and semi-circular recess	20th	H2C28
29	<534>	Rectangular white metal strip.	20th	H3A22
30	<535>	A circular slightly tapering collar formed from sheet copper alloy, max diameter 23mm	20th	H3 A27
31	<555>	A copper alloy cartridge case .303 caliber (fired)	20th	H3C13
32	<575>	An Edwardian farthing 21mm in diameter	20th	H3C89
33	<581>	Hexagonal facetted cast copper alloy hollow cap with screw thread internally. 20 x 19mm	mod	H4A14
34	<587>	A cast copper alloy tap and rectangular sheet of copper alloy	20th	H4A30
35	<588>	Rectangular block of copper alloy, of 3mm thickness with two circular holes towards each end. 48 x 20mm	20th	H4A32
36	<590>	A copper alloy collar of oval tapering shape, formed from a penny of George V (1910-36). The coin appears to have been machine punched into its current form with the central portion of the coin removed. The obverse coin inscription reads perfectly around the interior of the band. Reminiscent of trench art. Possibly a misshapen finger ring	20th	H4A39
37	<594>	Aluminium collar, possibly from field irrigation system	mod	H4A48
38	<598>	A copper alloy finger ring of improvised manufacture , possibly cut from a copper pipe and shaped by hand, 22m diameter	20th	H4A68
39	<573>	A machine turned copper alloy band pierced with circular holes, possibly a machine part	20th	H3C86
40	<595>	A copper alloy four hole overall button of 18mm diameter	20th	H4A50
41	<541>	A copper alloy four hole overall button of 18mm diameter together with a 29mm diameter copper alloy curtain ring	20th	H3A46
42	<564>	A copper alloy four hole overall button of 18mm diameter	20th	H3C50

	Catalogue	Description	Date	Location
43	<600>	A copper alloy four hole overall button of 18mm diameter	20th	H4A73
44	<601>	A copper alloy cartridge case .303 caliber (fired)	20th	H4A78
45	<603>	A copper alloy barrel from a dart, the point having corroded away	20th	H4A85
46	<604>	A copper alloy circular fixing of 18mm diameter	20th	H4A90
47	<608>	A copper alloy four hole overall button of 18mm diameter	20th	H4C16
48	<612>	Short length of copper alloy pipe, most likely plumbers' offcut. Length 40mm, diameter 15mm	20th	H4C24
49	<616>	A four hole copper alloy overall button of 18mm diameter	20th	H4C36
50	<617>	A Folded sheet copper alloy buckle plate with fragment of buckle frame intact. The plate is folded over and riveted with three rivets. Likely to be from military dress or webbing. 35 x 35mm	20th	H4C38
51	<622>	Length of copper pipe, 55mm x 16mm diameter	20th	H4C52
52	<626>	Length of copper pipe, 85mm x 15mm diameter	20th	H4C64
53	<629>	A copper alloy barrel from a dart with incised transverse grooves. Point corroded.	20th	H4C68
54	<630>	A pressed copper alloy general service military button for the British armed forces. 24mm in diameter	20th	H4C70
55	<636>	A copper alloy four hole overall button of 18mm diameter	20th	H4C86
56	<637>	A copper alloy *tombak* or *hessian* button of the later 18th or 19th century	18th / 19th	H4C91
57	<641>	A bronze farthing of George V, distorted / damaged	20th	H5A36
58	<642>	Fragment of a copper alloy toothed cog wheel from a ratchet mechanism, 55mm in diameter	20th	H5A51
59	<645>	Length of copper alloy wire bent over to form loop at one end	20th	H5A89
60	<647>	Copper alloy four hole overall button, 18mm diameter	20th	H5C13
61	<313>	Fragment of curved copper alloy sheet	-	H2E10
62	<314>	A copper alloy *tombak* or *hessian* button of the later 18th or 19th century, 18mm diameter	18th / 19th	H2E16
63	<315>	Small plain copper alloy button with loop, 12mm diameter	19th	H2E50
64	<316>	Copper alloy sleeve formed from rolled sheet, 45mm in length	20th	H2E54
65	<317>	Copper alloy domed pin or tack head, 12mm diameter	19th	H2E57
66	<318>	Copper alloy cast handle fragment.	19th	H2E72
67	<319>	Bronze penny of George VI, dated 1946	20th	H2E83
68	<320>	Copper alloy oval ring furniture? handle with square section pin	20th	H3E3
69	<322>	Copper alloy four hole button, 14mm diameter	20th	H3E18
70	<323>	Copper alloy four hole overall button, 18mm diameter	20th	H3E18
71	<325>	White metal strip, 30 x 15mm	20th	H3E22
72	<326>	Copper alloy four hole overall button, 18mm diameter	20th	H3E24
73	<332>	Copper alloy door handle collar / escutcheon	20th	H3E41
74	<333>	Fragment of white metal sheet, 35 x 20mm	20th	H3E44
75	<335>	Aluminium sheet offcut	20th	H3E48
76	<338>	Copper alloy zip pull	20th	H3E56
77	<341>	White metal rectangular sheet with circular, recessed drilled hole	20th	H3E63
78	<342>	Aluminium casting spill	20th	H3E64
79	<343>	Debased silver (.500 fine) sixpence of George VI dated 1946	20th	H3E64
80	<344>	Copper alloy four hole overall button, 18mm diameter	20th	H3E64
81	<345>	Fragment of white metal rectangular section bar with two projections, possibly structural element. 54 x 32 x 6mm	20th	H3E69
82	<346>	Folded fragment of copper alloy? sheet	-	H3E73
83	<348>	Twisted copper alloy (horseshoe shaped) wire fixing with looped terminals	20th	H3E76
84	<351>	Folded white metal rectangular sheet fragment	20th	H3E85
85	<355>	Copper alloy rectangular sheet with rounded end. 42 x 25mm	19th 20th	H4E10
86	<356>	Copper alloy four hole overall button, 18mm diameter	20th	H4E24
87	<357>	Copper alloy four hole overall button, 18mm diameter	20th	H4E30
88	<359>	Copper alloy four hole overall button, 18mm diameter	20th	H4E34
89	<361>	White metal sheet offcut. 29 x 18mm	20th	H4E41
90	<363>	Copper alloy four hole overall button, 17mm diameter	20th	H4E50

	Catalogue	Description	Date	Location
91	<364>	Copper alloy four hole overall button, 18mm diameter	20th	H4E50
92	<367>	Fragment of white metal sheet	20th	H4E57
93	<368>	A circular white metal lid, with slight overturned rim, 32mm diameter	20th	H4E61
94	<369>	A pressed aluminium padlock? key	20th	H4E65
95	<371>	A copper alloy four hole overall button of 18mm diameter	20th	H4E66
96	<377>	A copper alloy *tombak* or *hessian* button of the later 18th or 19th century, 14mm diameter	18th / 19th	H5E53
97	<379>	A copper alloy *tombak* or *hessian* button of the later 18th or 19th century, 18mm diameter	18th / 19th	H6D90
98	<380>	A crudely made copper alloy washer of 12mm diameter	18th / 19th	H7B25
99	<382>	An irregular shaped folded fragment of copper alloy sheet	-	H7D18
100	<383>	A copper alloy *tombak* or *hessian* button of the later 18th or 19th century, 16mm in diameter	18th / 19th	H7D35
101	<384>	A copper alloy four hole overall button	20th	H7D80
102	<385>	A white metal cylindrical case with cover at one end, flattened, 52mm in length	20th	H8B14
103	<387>	A hexagonal bolt with patent no. 482636, “an electrical tapping coupling” patented in 1937/8	20th	H8B38
104	<389>	A triangular shaped offcut of sheet copper alloy	-	H8B82
105	<390>	An electrical component, disc shaped with exposed contacts, main body formed from bakelite? 30mm diameter	20th	H8B85
106	<393>	A copper alloy wire pin with looped terminal, 50mm in length	20th	H8D1
107	<394>	A copper alloy button back with loop, 15mm diameter	19th	H8D2
108	<398>	A copper alloy connection block from the inside of a standard three pin plug	mod	H8D28
109	<399>	A copper alloy mount of circular form with central projection	20th	H8D71
110	<370>	A copper alloy four hole button of 18mm diameter	20th	H4E65
111	<400>	A white metal hinged circular cover, 60 x 40mm	20th	H8D82
112	<402>	A right angled aluminium fixing or bracket	20th	H9B3
113	<404>	A white metal lid with overturned lip, 32mm in diameter	20th	H9B13
114	<406>	A copper alloy four hole overall button of 18mm diameter	20th	H9B15
115	<409>	A copper alloy four hole overall button of 18mm diameter	20th	H9B22
116	<410>	A rectangular strip of white metal, 70 x 26mm	20th	H9B23
117	<411>	A copper alloy four hole button and a bayonet light fixing	20th	H9B25
118	<412>	Two copper alloy four hole overall buttons of 18mm diameter	20th	H9B24
119	<416>	A copper alloy four hole button of 18mm diameter	20th	H9B58
120	<418>	A fragment of copper alloy sheet	-	H9B66
121	<419>	Small copper alloy four hole overall button, 14mm diameter	20th	H9B75
122	<420>	Lead washer (from hut roof), circular of 28mm diameter	20th	H9B95
123	<423>	Copper alloy bold with nut and washer, 55mm in length	20th	H9D20
124	<424>	A copper alloy, rectangular buckle, with offset bar and pin missing. 40 x 35mm	19th / 20th	H9D37
125	<425>	A group of finds including a four hole button, two fragments of white metal sheet and a naval button with anchor design, 20mm in diameter	20th	H9D40
126	<427>	A copper alloy four hole overall button of 17mm diameter	20th	H9D42
127	<430>	A copper alloy four hole overall button of 17mm diameter	20th	H9D49
128	<432>	A cylindrical copper alloy electrical fitting?	20th	H9D64
129	<433>	A rectangular military uniform clasp of copper alloy together with a white metal fixing	20th	H9D68
130	<436>	A copper alloy cartridge case of .303 caliber (fired)	20th	H9D81
131	<438>	A fragment of folded copper alloy sheet	-	H10B18
132	<439>	A cast copper alloy foot and lower leg (broken) possibly from a tripod skillet or similar vessel, or from a piece of furniture. Initially thought to be Roman, but unlikely to be of this date. 40mm in length	17th-18th	H10B25
133	<440>	A small four hole button in copper alloy	20th	H10B33
134	<441>	A copper alloy eyelet of 29mm diameter	20th	H10B35
135	<443>	A copper alloy cylinder with a glass ball inset at one end, possibly a	20th	H11C50

	Catalogue	Description	Date	Location
		pressure catch? 21mm in length		
136	<446>	A small fragment of a copper alloy disc with single drilled hole, 22mm in length	20th	H11A76
137	<450>	A cast copper alloy fixing with hollow box shaped head on taping round section shaft (broken) 31mm in length	20th	H12A08
138	<451>	A copper alloy coin or jetton of 20mm diameter, worn smooth	16th-17th	H12A37
139	<452>	A circular copper alloy buckle with central bar, 26mm in diameter	15th-17th	H12A44
140	<453>	A copper alloy hinged hasp for a padlock 55mm in length	20th	H12A84
141	<454>	A domed, circular, plain copper alloy button with loop. 18mm in diameter	19th	H12A85
142	<456>	A copper alloy cartridge case .303 caliber (fired) together with a lead washer (from hut roof)	20th	H12C60
143	<458>	A copper alloy coin or jetton of 22mm diameter, worn smooth	16th-17th	H12C70
144	<459>	A copper wire loop fixing with loop terminals	20th	H12C100
145	<460>	A small copper alloy washer of 15mm diameter	20th	H12E27
146	<463>	A copper alloy disc of 4mm thickness and 24mm diameter, possibly a coin, surface heavily corroded and worn	?	H12E82
147	<464>	A cooper wire loop fixing of horseshoe shape with looped terminals	20th	H13A53
148	<465>	A white metal sheet offcut	20th	H13A65
149	<466>	A four hole copper alloy overall button of 18mm diameter	20th	H13A76
150	<467>	A four hole copper alloy overall button of 18mm diameter	20th	H13A83
151	<468>	A copper alloy cartridge case .303 caliber (fired)	20th	H13A92
152	<469>	A copper alloy four hole button of 17mm diameter	20th	H13A99
153	<471>	A fragment of a curved copper alloy blade?, possibly from a scythe or sickle of 25mm width, one side stamped with various capital letters.(G,BS,M)	19th / 20th	H13C20
154	<473>	Copper alloy four hole overall button , 18mm diameter	20th	H13C80
155	<474>	Copper alloy clasp from military dress / webbing	20th	H13C100
156	<475>	A hexagonal bolt with patent no. 482636, “an electrical tapping coupling” patented in 1937/8	20th	H13C100
157	<477>	A small cast copper alloy foot from a tripod skillet or posnet, 15 x 17mm	16th / 17th	H13E12
158	<478>	A white metal toothpaste tube end	20th	H13E14
159	<480>	A copper alloy four hole button of 16mm diameter	20th	H13E48
160	<483>	A cast copper alloy handle fragment 48mm in length	20th	H13E75
161	<484>	A fragment of copper alloy sheet, 28 x 21mm	-	H13E82
162	<487>	A flat copper alloy tool or key, 56mm in length	20th	H13E93
163	<488>	A flattened copper alloy lid or cover with ribbed sides, 30 x 20mm	20th	H14A3
164	<494>	A circular copper alloy escutcheon with central circular hole, probably from a piece of furniture, 38mm in diameter, together with a small copper alloy hollow cylinder, 25 mm in length and 7mm diameter	19th / 20th	H14A46
165	<496>	Copper alloy four hole overall button, 18mm diameter	20th	H14A48
166	<497>	Copper alloy and lead? .303 caliber bullet (not casing) fired	20th	H14A50
167	<498>	Curved aluminium rectangular sheet with two holes, 90 x 75mm	mod	H14A55
168	<499>	Copper alloy “t shaped strip with rectangular slot centrally positioned towards one end, possibly part of a book clasp or furniture mount	16th / 18th	H14A60
169	<500>	A small rectangular strip of copper alloy sheet, 25 x 10mm	-	H14A90
170	<502>	Fragment of a small spanner with hexagonal socket, together with four hole copper alloy overall button, of 18mm diameter	20th	H14C40
171	<510>	Copper alloy rectangular buckle with central bar, possibly military.	19th / 20th	H14E48
172	<512>	Copper alloy rectangular strip, 20 x 7mm	-	H15A15
173	<513>	Copper alloy *tombak* or *hessian* button, 25mm diameter	18th / 19th	H15A30
174	<515>	A fragment of copper alloy sheet, 28 x 21mm	-	H17B25

	Catalogue	Description	Date	Location
175	<517>	A small triangular aluminium sheet offcut with two drilled holes	20th	H17B50
176	<518>	A length of copper alloy wire, 70mm	20th	H17B53
177	<519>	A fragment of a cast copper alloy bell (crotal /rumbler) 20 x 25mm	17th	H17B66
178	<521>	A circular cover, 17mm in diameter (identical to No.20)	20th	H17B81
179	<522>	A copper alloy eyelet for canvas etc. 28mm diameter	20th	H17B84
180	<523>	A decorated fragment from a copper alloy crotal (animal) bell, 30mm in diameter	17th / 18th	H17B90
181	<525>	A four hole overall button, 17mm in diameter	20th	H17D96
182	<526>	A copper alloy cartridge case .303 caliber (fired)	20th	H18A80
183	<528>	An irregular fragment of white metal sheet 60 x 35mm	20th	H18B28
184	<529>	A rectangular sheet of copper alloy, folded. 55 x 60mm	20th	H18 B33
185	<537>	A rectangular three bar strap fastening or buckle probably from military uniform or webbing, 50 x 20mm	20th	H3A30
186	<532>	A white metal tooth paste tube end with nozzle, 22mm diameter	20th	H2C53
187	<540>	An irregular spherical lump of lead	-	H3A43
188	<542>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3A48
189	<543>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof)	20th	H3A51
190	<545>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof)	20th	H3A61
191	<546>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3A62
192	<547>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof)	20th	H3A66
193	<548>	Aluminium offcut of strip with raised five pointed star	20th	H3A69
194	<549>	A circular lead roofing washer (from hut roof)	20th	H3A70
195	<552>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof)	20th	H3A88
196	<558>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3C34
197	<563>	Two circular lead roofing washers with traces of asphalt / bitumen (from hut roof) both 28mm diameter	20th	H3C48
198	<566>	Lead sheet with overlaid seam, of irregular shape, 30 x 25mm	-	H3C59
199	<567>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3C61
200	<569>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3C71
201	<570>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3C76
202	<571>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3C78
203	<574>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3C88
204	<576>	Two circular lead roofing washers with traces of asphalt / bitumen (from hut roof) both 28mm diameter	20th	H3C90
205	<582>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4A15
206	<586>	A semi-circular lump of lead with deep “chop” marks, 30 x 15 x 8mm	-	H4A28
207	<589>	A toothpaste, ointment or adhesive tube end with nozzle	20th	H4A35
208	<597>	A cast copper alloy triangular plate with large central aperture and three small holes for attachment, rounded corners. Probably from a piece of machinery. 55 x 55 x 7mm	20th	H4A65
209	<606>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C9
210	<607>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4C10
211	<609>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C19
212	<610>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C20
213	<611>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C21
214	<613>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4C25
215	<615>	A circular lead roofing washer with traces of asphalt / bitumen (from	20th	H4C31

	Catalogue	Description	Date	Location
		hut roof) 28mm diameter		
216	<618>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C40
217	<619>	A circular lead roofing washer (from hut roof) 28mm diameter, together with a copper alloy hook fragment	20th	H4C42
218	<620>	A copper alloy rectangular block measuring 19 x 14 x 3mm. Stamped at one end with “Caslon Machinery Ltd.” This is a piece of type from a printers’ type tray, probably a space.	20th	H4C53
219	<623>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C52
220	<625>	A length of lead rod of irregular cross section.	-	H4C55
221	<631>	A copper alloy four hole overall button of 17mm diameter	20th	H4C73
222	<632>	A aluminium sheet offcut	20th	H4C76
223	<635>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4C84
224	<643>	A toothpaste, ointment or adhesive tube end with nozzle	20th	H5A54
225	<649>	A rolled lead strip	-	H5C39
226	<321>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3E14
227	<328>	A circular lead roofing washer (from hut roof) 28mm diameter,	20th	H3E26
228	<329>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3E26
229	<330>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3E27
230	<331>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3E40
231	<337>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3E49
232	<339>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3E56
233	<340>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H3E59
234	<347>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3E76
235	<350>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H3E84
236	<353>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4E8
237	<354>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4E9
238	<360>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4E37
239	<362>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H4E45
240	<365>	A degraded lead alloy button	18th / 19th	H4E54
241	<366>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter. Together with a toothpaste, ointment or adhesive tube end with nozzle.	20th	H4E56
242	<372>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4E85
243	<374>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H4E14
244	<376>	A lead musket or pistol ball of 16mm diameter	17th-19th	H5E19
245	<381>	A triangular offcut of lead sheet 50 x 25mm	20th	H7D16
246	<392>	A folded strip of lead sheet of 20mm width	-	H8B99
247	<395>	A small strip of lead sheet of 7mm width	-	H8D4
248	<397>	Fragment of lead alloy sheet (pewter?)	18th / 19th	H8D6
249	<408>	An irregular shaped blob of lead casting spill	-	H9B21
250	<414>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H9B30
251	<415>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H9B40
252	<457>	A crude lead circular token with stamped portcullis design to one side, 21mm diameter	Med	H12C67
253	472>	Small blob of lead casting spill	-	H13C20
254	<476>	A length of flattened lead pipe od approx 7mm diameter, together	20th	H13C100

	Catalogue	Description	Date	Location
		with a n irregular shaped lump of lead casting spill		
255	<481>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H13E58
256	<482>	A folded rectangular strip of lead sheet, 70 x 15mm	-	H13E70
257	<486>	A small irregular shaped blob of lead casted spill	-	H13E89
258	<489>	A small irregular shaped piece of lead	-	H14A14
259	<490>	A small irregular shaped blob of lead casted spill	-	H14A25
260	<495>	A small irregular shaped blob of lead casted spill	-	H14A47
261	<503>	A circular lead roofing washer (from hut roof) 28mm diameter	20th	H14C40
262	<505>	A small irregular shaped blob of lead casted spill	-	H14C60
263	<506>	Two small fragments of lead scrap	-	H14C80
264	<511>	An irregular shaped pierce of lead	-	H14E74
265	<514>	A circular lead roofing washer with traces of asphalt / bitumen (from hut roof) 28mm diameter	20th	H16A80
266	<524>	A small folded strip of lead sheet	-	H17B92
267	<530>	An ovoid lead line or net weight 28mm in height by 18mm diameter	20th	H18B79
268	<324>	A copper alloy Yale padlock, 65 x 40 x 20mm	20th	H3E18
269	<403>	An iron diamond shaped plate with central hole. Possibly a form of washer or fixing	20th	H9B8
270	<429>	A iron, circular, three way electrical junction box, with lugs to attach to a wall	20th	H9D46
271	<437>	A iron, circular, two way electrical junction box, with lugs to attach to a wall	20th	H9E60
272	<501>	An iron diamond shaped plate with central hole. Possibly a form of washer or fixing	20th	H14C20
273	<599>	A white metal mechanism, possibly from an irrigation system, 130 x 100mm	mod	H4A70
274	<624>	A heavily corroded iron padlock, 65 x 35 x 12mm	20th	H4C53
275	<627>	An iron screw cap 32mm diameter	20th	H4C65

Table 4: Metal finds from 2012 survey

APPENDIX 2:

GEOPHYSICAL SURVEY REPORT

STRATASCAN™

SUMO Survey Services
SUMO Group Member

Project name:

Trumpington, Cambridge

Client:

University of Cambridge Archaeological Unit

March 2013

Job ref:
J3287

Report author:
Richard Smalley BA (Hons) AIFA

GEOPHYSICAL SURVEY REPORT

Project name:
Trumpington, Cambridge
Client:
University of Cambridge Archaeological Unit

Job ref:
J3287

Techniques:
Detailed magnetic survey – Gradiometry

Survey date:
18th - 21st February 2013

Site centred at:
TL 439 537

Post code:
CB2 9NN

Field team:
Sean Parker BSc. (Hons)
Aiden Rossiter
Liam Tasney

Project manager:
Simon Haddrell BEng(Hons) AMBCS PIFA

Report written By:
Richard Smalley BA (Hons) AIFA

CAD illustrations by:
Richard Smalley BA (Hons) AIFA

Checked by:
David Elks MSc AIFA

TABLE OF CONTENTS

LIST OF FIGURES

1 SUMMARY OF RESULTS

The geophysical survey undertaken over an area of land at Trumpington, Cambridge has identified a number of anomalies likely to be related to the WWII PoW camp known to have existed within the survey area.

The presence of ridge and furrow within the survey data suggests that the site was part of Trumpington's agricultural hinterland during the medieval/post-medieval period.

Several discrete positive linear and area anomalies have been identified within the survey area. These anomalies may be related to archaeological pits and ditches. However, it is important to note that they may also have been caused by localised changes in geology or pedology.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by the University of Cambridge Archaeological Unit (UCAU).

2.2 Site location

The site is located near Trumpington, Cambridgeshire at OS ref. TL 439 537.

2.3 Description of site

The survey area is comprises approximately 18ha of relatively flat agricultural land south of Trumpington, Cambridgeshire. The presence of a perimeter fence resulted in it not being possible to collect data up to the road edge.

2.4 Geology and soils

The underlying geology is chalk (British Geological Survey website). No drift geology is recorded for the site (British Geological Survey website).

The overlying soils are known as Milton which are typical gleyic brown calcareous earths. These consist of deep, calcareous fine loamy soils variably affected by groundwater (Soil Survey of England and Wales, Sheet 4 Eastern England).

2.5 *Site history and archaeological potential*

The site is the location of a WWII Prisoner of War (PoW) camp used to hold German and Italian prisoners during and after the war. After the camp closed in 1947 it was used by displaced Polish people and soldiers (www.trumpingtonlocalhistorygroup.org).

Iron Age remains were excavated by UCAU immediately adjacent to the site and there is also evidence for Neolithic and Roman activity in the wider area.

2.6 *Survey objectives*

The objective of the survey was to locate any features of possible archaeological origin in order that they may be assessed prior to development. Of particular interest is the state of preservation of the PoW camp.

2.7 *Survey methods*

This report and all fieldwork have been conducted in accordance with both the English Heritage guidelines outlined in the document: *Geophysical Survey in Archaeological Field Evaluation, 2008* and with the Institute for Archaeologists document *Standard and Guidance for Archaeological Geophysical Survey.*

Detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomalies. More information regarding this technique is included in the Methodology section below and in Appendix A.

2.8 *Processing, presentation and interpretation of results*

2.8.1 *Processing*

Processing is performed using specialist software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

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

1. *Destripe* (Removes striping effects caused by zero-point discrepancies between different sensors and walking directions)
2. *Destagger* (Removes zigzag effects caused by inconsistent walking speeds on sloping, uneven or overgrown terrain)

2.8.2 Presentation of results and interpretation

The presentation of the data for each site involves a print-out of the minimally processed data both as a greyscale plot and a colour plot showing extreme magnetic values. Magnetic anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing for the site.

3 RESULTS

The detailed magnetic gradiometer survey conducted at Trumpington has identified a number of anomalies that have been characterised as being either of a *probable* or *possible* archaeological origin.

The difference between *probable* and *possible* archaeological origin is a confidence rating. Features identified within the dataset that form recognisable archaeological patterns or seem to be related to a deliberate historical act have been interpreted as being of a probable archaeological origin.

Features of possible archaeological origin tend to be more amorphous anomalies which may have similar magnetic attributes in terms of strength or polarity but are difficult to classify as being archaeological or natural.

The following list of numbered anomalies refers to numerical labels on the interpretation plots.

*3.1 **Probable Archaeology***

1 A number of discrete areas of strong magnetic response have been identified in the central and eastern regions of the survey area. These anomalies have been interpreted as being related to concrete building platforms related to the former WWII PoW camp. There may also be elements of structural debris present in these areas.

2 Several linear and rectilinear anomalies are evident within the data set. These anomalies are likely to be related to cut features, such as ditches. Their regular arrangement suggests that they are likely to be related to the WWII PoW camp infrastructure.

3 Widely spaced curving parallel linear anomalies can be noted in the eastern half of the survey area. These anomalies are characteristic of ridge and furrow and have been interpreted as such.

3.2 Possible Archaeology

4 Several positive linear and area anomalies have been identified within the data set. These anomalies may be related to cut features such as pits and ditches of a possible archaeological origin. However; their generally amorphous character means that a natural origin cannot be ruled out at this stage.

5 A large number of magnetic 'spikes' (strong focussed values with associated antipolar response) indicate the presence of ferrous objects. These are likely to be related to debris from the PoW camp.

3.3 Other Anomalies

6 A swathe of magnetic variation can be noted in the south eastern limits of the survey area. This anomaly has been interpreted as being of a geological or pedological origin.

7 An area of magnetic enhancement can be noted in the eastern limits of the survey area. This anomaly is likely to be related to a spread of ferrous debris.

8 These linear anomalies are likely to be related to pipes or cables.

9 Areas of magnetic disturbance are the result of substantial nearby ferrous metal objects such as fences and underground services. These effects can mask weaker archaeological anomalies, but on this site have not affected a significant proportion of the area.

4 CONCLUSION

The detailed magnetic gradiometer survey undertaken at Trumpington, Cambridge has identified a number of anomalies likely to be related to the WWII PoW camp. Discrete areas of magnetic disturbance have been interpreted as being related to concrete building platforms and long linear/rectilinear anomalies may be related to foundation trenches for perimeter fences etc.

Evidence for the medieval/post-medieval agricultural use of the site has also been identified in the form of ridge and furrow.

5 REFERENCES

British Geological Survey, n.d., *website*: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps) Geology of Britain viewer.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 4 Eastern England*.

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www.trumpingtonlocalhistorygroup.org

APPENDIX A – METHODOLOGY & SURVEY EQUIPMENT

Grid locations

The location of the survey grids has been plotted together with the referencing information. Grids were set out using a Leica 705auto Total Station and referenced to suitable topographic features around the perimeter of the site or a Leica Smart Rover RTK GPS.

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

Survey equipment and gradiometer configuration

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

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

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

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

Sampling interval

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

Depth of scan and resolution

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m, though strongly magnetic objects may be visible at greater depths. The collection of data at 0.25m centres provides an optimum methodology for the task balancing cost and time with resolution.

Data capture

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

APPENDIX B – BASIC PRINCIPLES OF MAGNETIC SURVEY

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

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

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

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

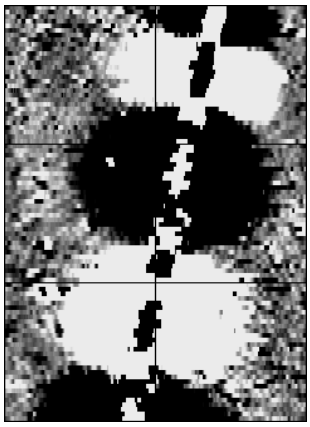
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement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

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

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

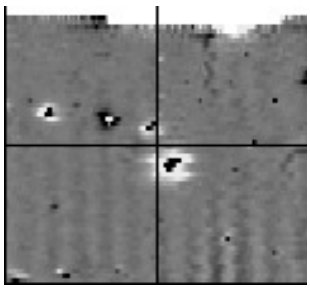
APPENDIX C – GLOSSARY OF MAGNETIC ANOMALIES

Bipolar



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

Dipolar

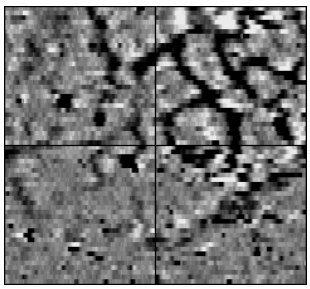


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very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

Positive anomaly with associated negative response

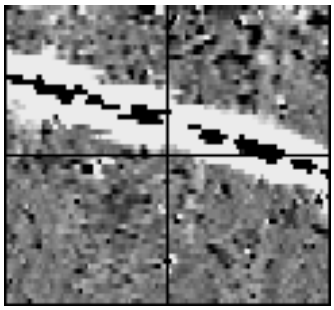
See bipolar and dipolar.

Positive linear



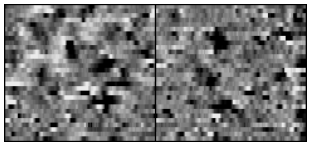
A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity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

Positive linear anomaly with associated negative response



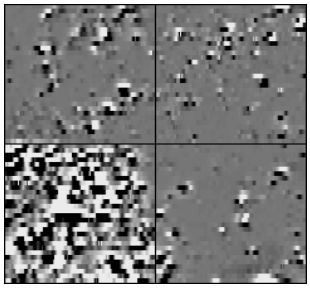
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field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

Positive point/area



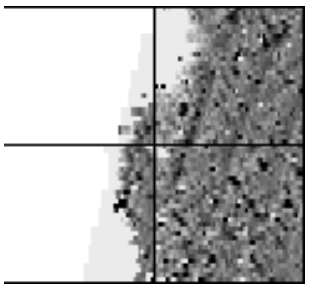
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally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

Magnetic debris



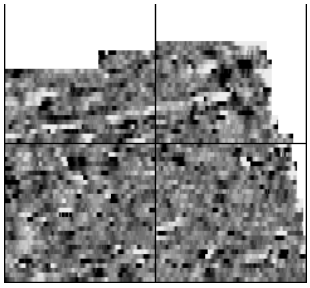
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly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

Magnetic disturbance



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

Negative linear

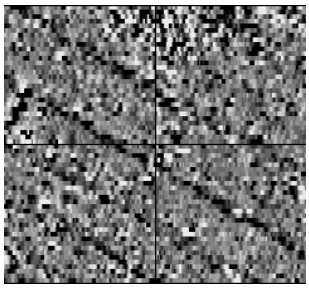


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative the background top soil is built up. See also ploughing activity.

Negative point/area

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

Ploughing activity



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

Polarity

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

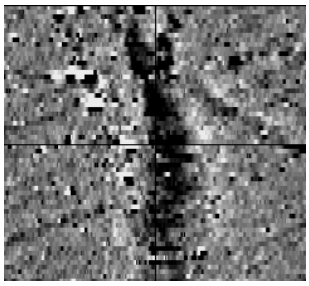
Strength of response

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

Thermoremanent response

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

Weak background variations



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

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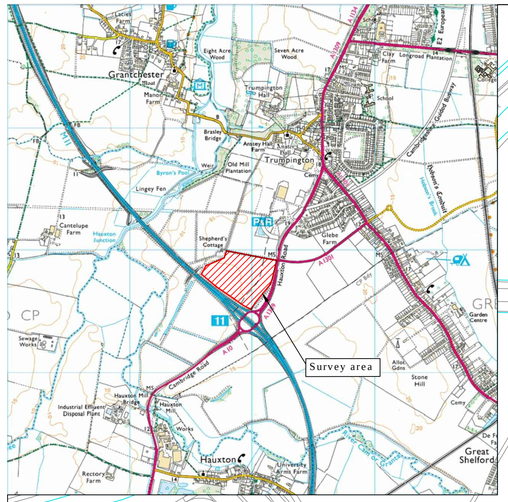

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Site centred on NGR TL 439 537

OS REFERENCING INFORMATION

A	543623.21 , 253817.63
B	544103.11 , 253817.63

Job No.	Survey Date
J3287	FEB 13

Client

UNIVERSITY OF CAMBRIDGE ARCHAEOLIGCAL UNIT

Project Title

GEOPHYSICAL SURVEY - TRUMPINGTON, CAMBRIDGE

Subject

SITE LOCATION AND SURVEY AREA & REFERENCING

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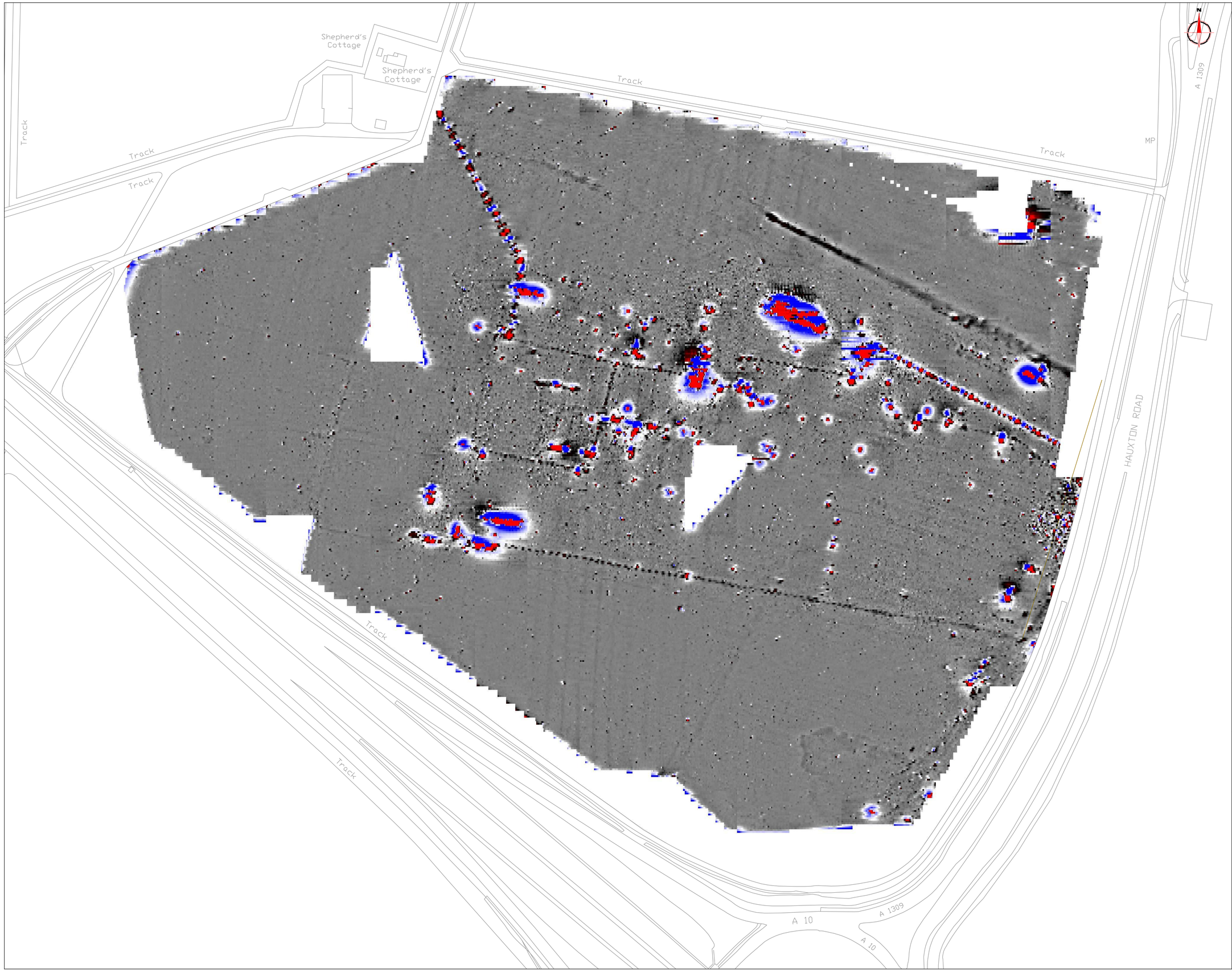
Scale 1:2000 (0m 20 40 60 80 100 120m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
MAR 2013	RAJS	01



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT
+10nT
-10nT
-100nT

Job No.	Survey Date
J3287	FEB 13

Client

UNIVERSITY OF CAMBRIDGE ARCHAEOLIGCAL UNIT

Project Title

GEOPHYSICAL SURVEY - TRUMPINGTON, CAMBRIDGE

Subject

COLOUR PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA SHOWING EXTREME VALUES

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Scale 1:1000 (0m 10 20 30 40 50 60m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
MAR 2013	RAJS	02

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +3nT (black)
Minimum -3nT (white)

Zero Mean

-3nT +3nT

+3nT

-3nT

Job No.	Survey Date
J3287	FEB 13

Client

UNIVERSITY OF CAMBRIDGE ARCHAEOLIGCAL UNIT

Project Title

GEOPHYSICAL SURVEY - TRUMPINGTON, CAMBRIDGE

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA

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Scale 1:1000 (0m 10 20 30 40 50 60m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
MAR 2013	RAJS	03

Shepherd's Cottage
Shepherd's Cottage
Track
Track
Track
Track
Track
Track
Track
Track
Track
Track
A 1309
HAUXTON ROAD
MP
A 10
A 10
A 1309

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

KEY

PROBABLE ARCHAEOLOGY

- Cut feature probably related to Second World War PoW camp
- Anomaly interpreted as concrete building platform. Some structural debris may also be present
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin
- Moderate strength discrete anomaly - possible thermoremanent feature
- Magnetic spike - probable ferrous object

OTHER ANOMALIES

- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Strong magnetic debris - possible disturbed or made ground
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin

Job No.	Survey Date
J3287	FEB 13

Client

UNIVERSITY OF CAMBRIDGE ARCHAEOLIGCAL UNIT

Project Title

GEOPHYSICAL SURVEY - TRUMPINGTON, CAMBRIDGE

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES

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Scale 1:1000 (0m 10 20 30 40 50 60m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
MAR 2013	RAJS	04

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: cambridg3-233828

Project details

Project name	Cambridge Sporting Village, Cambridgeshire: Field walking, metal detecting, and geophysical survey
Short description of the project	In November 2012 a field walking and metal detector survey was undertaken, along with a geophysical survey in March 2013. These surveys supplemented an earlier investigation in 2005 that formed the basis of the Trumpington Meadows desktop study (Dickens 2005). There was little evidence for prehistoric, Roman, or Medieval archaeological activity with only 101 pieces of struck flint suggestive of prehistoric activity and 177 pieces of 18th and 19th century pottery from the 2012 survey. Material from the Trumpington prisoner of war camp, Camp 45/180 was recovered from the topsoil, predominantly through the metal detector survey, with the possible concrete pads for buildings identified in the geophysical survey. Distribution plots from the survey have differentiated parts of the camp, administrative buildings and bunk/sleeping huts, as well as in camp activities.
Project dates	Start: 26-11-2012 End: 03-12-2012
Previous/future work	No / Yes
Any associated project reference codes	TSV12 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	POW CAMP Modern
Significant Finds	METALWORK Modern
Significant Finds	POTTERY Post Medieval
Significant Finds	FLINT Late Prehistoric
Methods & techniques	"Fieldwalking","Geophysical Survey","Metal Detectors"
Development type	Housing estate
Prompt	Voluntary/self-interest
Position in the planning process	Pre-application

Project location

Country	England
Site location	CAMBRIDGESHIRE CAMBRIDGE CAMBRIDGE Cambridge Sporting Village, Trumpington
Postcode	CB2 9PQ
Study area	13.8 Hectares
Site coordinates	TL 4400 5375 52.162780552357 0.105545490955 52 09 46 N 000 06 19 E Point
Height OD / Depth	Min: 17m Max: 19m

Project creators

Name of Organisation	Cambridge Archaeological Unit
Project brief originator	Self (i.e. landowner, developer, etc.)
Project design originator	Alison Dickens
Project director/manager	Alison Dickens
Project supervisor	Ricky Patten
Type of sponsor/funding body	Developer

Project archives

Physical Archive recipient	Cambridge Archaeological Unit
Physical Contents	"Ceramics","Glass","Industrial","Metal","Worked stone/lithics"
Digital Archive recipient	Cambridge Archaeological Unit
Digital Contents	"none"
Digital Media available	"Database","GIS","Geophysics","Images raster / digital photography","Spreadsheets","Survey","Text"
Paper Archive recipient	Cambridge Archaeological Unit
Paper Contents	"none"
Paper Media available	"Map","Notebook - Excavation"," Research"," General Notes","Photograph","Plan","Report","Survey ","Unpublished Text"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Cambridge Sporting Village, Cambridgeshire: Field walking, metal detecting, and geophysical survey
Author(s)/Editor(s)	Ricky Patten and Andrew Hall

Other bibliographic details	Report No. 1316
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Place of issue or publication	Cambridge
Entered by	Ricky Patten (rp257@cam.ac.uk)
Entered on	11 December 2015