Archaeological evaluation on land to the west of Granta Cottages, Newmarket Road, Great Chesterford, Essex, CB10 1PE

July 2016

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on behalf of Graham Elmer

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Contents

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Cover: general site shot

1 Summary

An archaeological evaluation by trial-trenching was carried out on to the west of Granta Cottages, Newmarket Road, Great Chesterford in advance of the construction of a new dwelling. The development site lies within the southwestern corner of the scheduled Roman town. The evaluation revealed the remains of a large (2m wide) robber trench, aligned southwest to northeast. Probably the remains of the 4th century Roman town wall the robber trench appears to be on the same alignment as part of a wall foundation identified in 2013 at No 4 Granta Cottages. Three Roman pits, two undated pits and an undated linear, possibly a ditch, were also excavated.

2 Introduction (Fig 1)

This is the archive report for an archaeological evaluation by trial-trenching on land to the west of Granta Cottages, Newmarket Road, Great Chesterford, Essex which was carried out on 19th July 2016. The work was commissioned by Graham Elmer in advance of the construction of a new dwelling. The work was undertaken by Colchester Archaeological Trust (CAT).

In response to consultation with Essex County Council Place Services (ECCPS), Historic Environment Advisor Richard Havis advised that in order to establish the archaeological implications of this application, the applicant should be required to commission a scheme of archaeological investigation in accordance with the *National Planning Policy Framework* (DCLG 2012).

All archaeological work was carried out in accordance with a *Brief for archaeological trial trenching*, detailing the required archaeological work, written by Richard Havis (ECCPS 2016), and a Written Scheme of Investigation (WSI) prepared by CAT in response to the brief and agreed with ECCPS (CAT 2016).

In addition to the brief and WSI, all fieldwork and reporting was done in accordance with English Heritage's *Management of Research Projects in the Historic Environment* (*MoRPHE*) (English Heritage 2006), and with *Standards for field archaeology in the East of England* (EAA **14** and **24**). This report mirrors standards and practices contained in the Institute for Archaeologists' *Standard and guidance for archaeological field evaluation* (CIfA 2014a) and *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (CIfA 2014b).

3 Archaeological background

The following archaeological background utilises the Essex Historic Environment Record (EHER) held at Essex County Council, County Hall, Chelmsford.

The proposed development site lies on the southern edge of the scheduled area of the 4th-century walled Roman town (SM 24871). Within the recently published '*The Roman Town of Great Chesterford*' (Medlycott 2011) the town wall is shown directly bisecting Granta Cottages. The town wall has been identified on the eastern side of the town off Newmarket Road as a large robbed-out foundation trench.

Archaeological evaluations undertaken at 3 and 4 Granta Cottages both found evidence of masonry walls. That at no. 3 found evidence of a substantial wall thought to represent the original town wall, with that at no. 4 finding the remains of a masonry structure inside the walled town area (EHER 48223).

On the southern side of Newmarket Road Roman burials are recorded within the 'south-eastern cemetery' (Medlycott 2011, Gazetteer 106, 107, 109, 115). Masonry foundations have also been identified which are likely to be part of the second walled enclosure located around the church (*ibid*, Gazetteer 15, 105).

An evaluation in 2015 to the east of 6 Granta Cottages failed to locate any trace of the town wall (CAT Report 864).

For further details of the archaeology of Great Chesterford see the Historic Town survey (Medlycott, 1999) and the recent publication on the town (Medlycott, 2011).

4 Geophysical survey

Prior to the evaluation and to aid the siting of the trial-trenches, a geophysical survey was carried out by Tim Dennis. See Appendix 1 for the full report.

5 Results (Figs 3-5)

Two trial-trenches were excavated within the development site. The first was targeted over three anomalies identified during the geophysical survey. The second was located at the south end of the site away from tree canopies. Both trenches were dug by mechanical excavator under archaeological supervision.

Three layers were identified across the site. Modern topsoil (L1, *c* 330mm thick) sealed a layer of sandy-silty subsoil (L2, *c* 320-420mm thick) which sealed natural sands and gravels (L3, identified at a depth of approximately 34.66-35.00m AOD).

Trench 1 (T1) – 24m long by 1.8m wide

A small post-medieval pit (F1) containing iron wire and coal (none retained) cut an east-west ditch (F2) at the north end of the trench. The ditch was undated but was possibly associated with the other Roman features in the trench. It measured approximately 1m wide by 0.3m deep and had a curving U-shaped profile. A large Roman pit (F3) was excavated immediately to the south of ditch F2, but its relationship to the ditch could not be established.

Two small undated pits (F4 and F7) and two Roman pits (F5-F6) were excavated in the centre in the trench. Pit F7 cut Roman pit F6.

At the south end of the trench was a robber trench (F8) full of crushed and compacted whitish-cream mortar fragments with common flint nodules. Likely to be the robber trench of the Roman town wall, it measured 2m wide and was aligned northeast to southwest. At the request of the ECC Historic Environment Advisor a slot was not dug through this feature. It was however, cut by pit F9, and a section through F9 showed that the robbing was at least 0.25m deep. Pit F9 contained a single sherd of Roman pottery, but this is likely to be residual in this context as the town wall was largely robbed in the post-medieval period for road-mending materials (Medlycott 2011, p49).

Trench 2 (T2) – 5m long by 1.8m wide

A modern service was recorded at the south end of the trench. No significant archaeological horizons were identified.

Photograph 1 T1, looking N

Photograph 2 T1, F8 and F9, looking N

Photograph 3 T2, looking S

6 Finds

Bulk Finds

by Stephen Benfield

Introduction and finds listing

Quantities of bulk finds of Roman date were recovered from four pits (F3, F5, F6 & F9) in T1. The finds consist primarily of pottery, with small quantities of animal bone, ceramic building material (CBM) and a few or single finds of worked flints, glass, shell and charcoal. The Roman pottery fabrics recorded refer to the Fabric series used in the Great Chesterford Roman town report (Medlycott 2011). Where appropriate the fabric codes relating to the Essex (Chelmsford) Roman pottery fabric series (Going 1987), commonly used for recording Roman pottery in Essex, are given in brackets following the fabric name. The pottery fabrics referred to are listed in Table 1. The pottery forms follow the Essex (Chelmsford) type series (Going 1987). All of the bulk finds are listed and described in Table 2. In addition there are two metal small finds (**SF1** & **SF2**) that are reported separately.

Fabric code	Fabric name
BSW	Black surface ware
EGRHN	East Gaulish Rhenish ware (Going Fabric 9)
GRS	Roman sandy greywares (general) (Going Fabric 47)
HAG	Hadham greyware (Going Fabric 36)
HORN	Horningsea ware
MSH	Roman (Midlands) shell-tempered ware (includes Going Fabric 51)
NVC	Nene Valley colour-coated ware (Going Fabric 2)
UNSFB	Unspecified buff wares (Going Fabric 31)

Table 1 Roman pottery fabrics

Feature and find number	Form/ description	Finds spot date
F3, (1)	**Roman pottery:** Fabric NVC (1, 18g) beaker sherd (3-4C); Fabric HAG (2, 44g) greyware base, probably Hadham (Rom 1/2-4C); Fabric GRS (3, 30g) (Rom); Fabric BSW (1, 8g) cordoned shoulder jar/bowl (M1-E2/2C). **Roman CBM:** brick, red fine sand fabric, 35 & 45 mm thick (RB) (2, 548g). **Nails:** (2) (moderate corrosion) sub-round, flat heads, 40 & 50 mm long. **Animal bone:** (2 pieces) Cow femur (fresh fracture for marrow extraction?) & bone piece from an indeterminate small mammal.	**Roman** (3-L3/4C)
F5, (3)	**Roman pottery:** Fabric GRS (1, 54g) base sherd from large jar (Rom). **Animal bone:** (1) Cow, complete 1st phalanx.	**Roman**
F6, (4)	**Roman pottery:** Fabric NVC (12, 108g) sherds from a minimum of 3 beakers, two bases and at least 3 folded beakers are represented, one scale decorated, one with rouletted decoration (M3-E4/4C); Fabric EGRHN (1, 1g) (3C); Fabric UNSFB (1, 4g) (Rom M1-2/3C?); Fabric HAG (7, 180g) includes Plain dish Form B1 3/1 (1 pot) B1 2/1 or 3/1 (2 pots) (2/3-4C), Dish with groove below rim Form B3 2/2 (1 pot); Fabric GRS (39, 868g) includes Platter/Dish approximating to Form A2 3/1 (1 pot) sandy fabric, possibly Hadham (Fabric HAG) as several similar at Great Chesterford (see Martin 2011, fig 3.1.1) (M1-L1C), Bowl with bead rim Form B4 (1 pot) (E/M2-3C), Dish/bowl with incipient flange Form B5 (1 pot, part vessel in sherds) (L2-3C), Jar decorated with vertical groups of vertical comb lines (same as pot in F6 (5)) (Rom 2-3C); Fabric BSW 3, 20g) (Rom); Fabric HORN (2, 34g) probably Horningsea storage jar, combed on interior and exterior surfaces (2-4C); Fabric MSH (2, 34g) (late Roman – 4C/L4C?). **Roman glass:** (1, 4g) blue-green, small, slightly curving piece, surfaces abraded/scratched (Roman). **Flint:** (2) Blade, narrow (7 x 43mm), soft hammer, cortex on one edge, previous flake (blade) scar removals, edge damage /use wear along non cortex edge (late Mesolithic-Early Neolithic), Flake, pieces snapped off at one end, possibly soft hammer flake with areas of retouch and use wear on edges and small notch (earlier prehistoric – Neolithic-Early Bronze Age). **Animal bone:** (7 pieces) Cow 3rd phalanx, ulna piece & metapodial(?) piece; Sheep metatarsal (2) & tibia (2) pieces (one punctured/gnawed by a dog). **Shell:** Oyster shell (1). **Charcoal:** (1) piece comprising a complete section from a stick/rod (length 45mm, dia. 30mm)	**Roman** (3-4C probably L3-E4C)
F6, (5)	**Roman pottery:** Fabric HAG (1, 4g) small sherd probably Hadham (Rom 2-4C); Fabric GRS (13, 180g) greyware jar decorated with groups of vertical combed lines and wavy line around shoulder (same as pot in F6 (4)) (Rom 2-3C) Fabric HORN(?) (1, 6g) sandy grey fabric and thin grey-white slip on smoothed/ burnished surface (Rom – 2-4C); **Roman CBM:** brick (RB) (2, 820g) red, fine sand fabric with moderate inclusions of small pieces of chalk. **Stone:** (1, 256g) small piece of hard, grey, sandy limestone. **Animal bone:** (2 pieces) Cow metacarpal (fused), one other small indeterminate piece	**Roman** (2-3C)
F9 (6)	**Roman pottery:** Fabric GRS, small sandy, medium-grey sherd (1, 2g) (Rom)	**Roman**

Table 2 Finds by context

Finds discussion

All of the finds come from four pits. Although only a small quantity of finds were recovered from three features (F3, F5 & F9) all of the closely datable finds are of Roman date and suggest that all of these features date at least to the mid-late Roman period of the 3rd-early 4th/4th century. One pit (F9) which produced only a single sherd that is not closely datable, other than as Roman, is cut into the robbing of the town wall and is clearly also of late or post-Roman date. There are also two prehistoric worked flints residual in pit F6 (4). One is a blade of Late Mesolithic or Early Neolithic date, the other a flake that can be broadly dated as earlier prehistoric (Neolithic-Early Bronze Age).

A small but significant assemblage of Roman pottery (82 sherds weighing 1439 g) was recovered from pit F6. The pottery from this feature is listed in Table 3.

Fabric code	Sherd no.	Weight, g.	Vessel forms
BSW	3	20	
EGRHN	1	1	
GRS	52	1048	Dish/platter A2 3.1 (1 pot); Bowl B4 (1 pot); Dish/bowl B5 (1 pot), also a jar with grouped combed vertical lines
HAG	8	184	Dish B1 3.1 (1 pot) & B1 2.1/3.1 (2 pots); Dish B3 2.2 (1 pot)
HORN	3	40	Comb decorated storage jar (small sherds)
MSH	2	34	
NVC	12	108	Beakers (3 pots min) inc rouletted and scale decorated pots
UNSFB	1	4	
Total	*82*	*1439*	

Table 3 Pottery from pit F6 by fabric and identified numbered vessel forms (form numbers following Going 1987)

Apart from one dish/platter (Form A2) of mid-late 1st or possibly early 2nd century date, the types of vessel represented are typical of the mid-late Roman period (3rd-4th century) and a late third-early 4th century date appears likely. The fine wares include sherds of Nene Valley colour-coated beakers among which a scale decorated beaker is probably of late 2nd-3rd century date. A sherd from a Rhenish colour-coated pot is probably also 3rd century. Among the coarsewares two part pots are significant in relation to the date of the pit. One is a bowl with an incipient flanged rim of probable late 2nd-3rd century date. This is represented by several large sherds, some of which join and is likely to have been broken at the time that the pit was open. The other is a jar or large beaker represented by a number of large sherds decorated with spaced groups of comb scored vertical lines with a similar combed wavy line around the shoulder and is probably broadly of 2nd-3rd century date. Possibly of later date is a large sherd from a jar in a Roman shell-tempered ware. This could indicate a 4th century date, as elsewhere in Essex shell-tempered pottery of this type is typical of the late 4th century. However, this fabric occurs throughout the Roman period at Great Chesterford and although not common, is not confined to the 4th century there (Martin 2011, Fabric MSH). The presence of two plain dishes, might also suggest a date in the 4th rather than the 3rd century. Both of these are probably products of the Hadham kilns (Fabric HAG), the wider (regional) distribution of the pottery from which occurs from in late 3rd-4th century. However, Hadham can be seen as essentially a local pottery supplier in relation to Great Chesterford with greyware products from these kilns reaching the town throughout the Roman period (Martin 2011 Fabric HAG). The presence of small sherds of pottery from the Horningsea industry is also notable as this pottery is common among assemblages at Great Chesterford while being rare or absent from sites further to the southeast (Martin 2011, Fabric HORN).

The other bulk finds from the site include a piece of Roman blue-green coloured vessel glass (F6(4)), a few pieces of Roman CBM (including pieces in a fabric with chalk inclusions (F6(5)) and a small piece of stone that might also represent a building material, although it has no clear sign of previous use (F6(5)). There are also a number

of pieces of animal bone from domesticate species (cow and sheep), probably representing butchery waste with at least one split for marrow extraction (F3(1)) and one of the pieces has been gnawed by a dog (F6(4)). A single oyster shell (F6(4)) probably also represents food consumed in the town.

Small Finds

by Pip Parmenter

Two metal small finds, a copper-alloy folding knife handle (SF1) and a highly corroded iron fixing (SF2) were recovered from Great Chesterford. Both were from relatively late Roman pits (3rd/4th century).

The iron fixing (SF2) appears to have been roughly pear-shaped, with a hooped projection to the wide end and what was possibly another to the narrow end. It is very corroded and seems to have been bent almost 90° at its narrow end. It is difficult to ascertain whether its shape as seen was its original shape, or whether it has been misshapen.

The copper-alloy folding knife handle (SF1) is an extremely unusual find with no known direct parallels. It is roughly triangular with two bars extending from the upper end to a small round chape-like terminal. The central area is hollow. The upper end is very simply decorated with two incised lines just above the hinge rivet. It has iron corrosion around the hinge rivet and down the incised groove into which the blade would have sat.

Most Roman copper-alloy folding knife handles are anthropomorphic or zoomorphic and in Britain, hare-and hound type and erotic scene type are common. This handle is extremely simple both in terms of form and decoration. It is probably best described as being scabbard-shaped, so is skeuomorphic. Scabbards and scabbard-shape knifes are often seen as being the result of Roman innuendo, and are, if not overtly, then obscurely phallic in form (Nina Crummy, pers comm.). Although this example certainly doesn't fall into the overtly phallic type of symbolism the inference is likely to have been recognised at the time.

Phallic symbolism, rather than being seen as being particularly erotic, was traditionally used to ward off the evil eye (Johns 1982, 72) from and to bring good luck to the bearer (Plouviez 2005, 163). This sort of copper alloy object, which is relatively uncommon in the east of England, are often associated with soldiers as symbolism of this nature remained largely unadopted by local people due to its unfamiliarity and lack of practical utility (i*bid*). Having said this, the relatively simple form and poor finish on this particular handle might suggest that it is a Romano-British product (Nina Crummy, pers comm.).

The nearest comparison to this handle that can be found is one of solid bone which was recovered from Ephesus. Although certainly not very similar, this handle had the same round chape-like terminal and is described by the author as being of scabbard-type (von Mecklin 1940, 345).

Catalogue

Fig 6, SF1 (2) F3. Skeuomorphic copper-alloy folding knife handle. Triangular in shape, with round chape-like terminus. Upper end has D-shaped rivet and is simply decorated with two parallel incised lines. Incised groove for blade runs the length of the side and this groove and the rivet hole have vestiges of corroded iron around them. Length: 111mm, Width: (Upper end) 26mm (terminus) 10mm, Weight: 56g.

SF2 (4) F6. Roughly pear-shaped iron fixing. Heavily corroded. Looped attachment on broad end, though possibly not in position it was intended. Neck has been bent 90°. Narrow end has possibly got another fixing attached, though difficult to make out through corrosion. Length: 104mm, Width: 37mm, Weight: 72g.

7 Discussion

Archaeological evaluation on land to the west of the Granta Cottages, Great Chesterford revealed a robber trench, thought to be the robber trench of the Roman town wall. The wall was still visible at the beginning of the 18th century but was practically non-existent by the mid 20th century after it had been robbed for road-mending materials (Medlycott 2011, p49). A plan of the town walls was published in 2011 using a combination of archaeological evidence (excavation, geophysics and aerial photography) and educated guesswork (*ibid*, p51, Fig 3.26 p48). In plan it was an oval circuit built in the 4th century with an external ditch, enclosing an area of about 15ha (*ibid*, p51, p182-4, p195-6). Where seen, the foundations of the wall comprised rammed chalk or rag stones and mortar, with the wall itself constructed of flint, rubble, stone and mortar with courses of brick. Antiquarian records state that the standing wall averaged 3.6-4.0m wide, although Brinson's 1940s excavations on the northern wall foundations averaged 2.7m wide (*ibid*, p49-51). Other investigations along the eastern side of the town wall have identified robber trenches filled with soil, chalk and flint (*ibid*, Gazetteer 12, 14, 25).

The robber trench identified here does appear to fit into the existing evidence of the town wall. No trace of an external ditch was found though, but was this because the evaluation trench did not go far enough to the south? The robber trench does lines up with a piece of wall foundation recorded during a 2013 evaluation in the rear of No 4 Granta Cottages (Miciak 2013) (Fig 4). This wall foundation was initially thought to be part of an internal structure but is perhaps instead part of the town wall. On this alignment the town wall should also have been picked up in the corner of evaluation trench T2 during a 2015 evaluation (CAT Report 864), but then only if the wall ran in a perfectly straight line over this distance.

As plotted, this new possible alignment for the town wall also does not match with the projected line in Maria Medlycott's 2011 publication (see Fig 4), but this was the result of 'informed guesswork' (p51). Another complication is the occurrence of second section of wall foundation found during the 2013 evaluation, this time at No 3 Granta Cottages (Miciak 2013). This was recorded exactly on the line of the Medlycott projected town wall and identified as such. Does this actually represent an external structure or is it town wall? If town wall, is our robber trench and the wall foundation at No 4 actually internal/external structures? Clearly, more work needs to be completed in this area of Great Chesterford before the route of the town wall can be accurately plotted.

As well as the robber trench, this evaluation revealed a number of pits in the northern half of the site. Located within Insula 11 of the town, these pits correspond to a number of geophysical anomalies previously recorded within the insula which have also been identified as pits (Medlycott 2011, Fig 3.15, p37). In fact, two of the evaluation pits, and the probable ditch, were identified as anomalies in the geophysical survey carried out at the start of this project (Appendix 1; Fig 3). The robber trench itself was not identified in this survey.

8 Acknowledgements

CAT thanks Graham Elmer for commissioning and funding the work. The project was managed by C Lister, fieldwork was carried out by M Baister, R Mathieson and A Wade. Figures are by CL and E Holloway. The project was monitored for ECCPS by Richard Havis.

9 References

CAT 2014 *Health and Safety Policy*
CAT 2016 *Written Scheme of Investigation (WSI) for archaeological*

		evaluation on land to the west of Granta Cottages, Newmarket Road, Great Chesterford, Essex
CAT Report 864	2015	*An archaeological evaluation at Granta Cottages, Newmarket Road, Great Chesterford, Essex: August 2015*
CIfA	2014a	*Standard and guidance for archaeological field evaluation*
CIfA	2014b	*Standard and guidance for the collection, documentation, conservation and research of archaeological materials*
DCLG	2012	*National Planning Policy Framework.* Dept of Communities and Local Government.
EAA **14**	2003	*Standards for field archaeology in the East of England*, East Anglian Archaeology, Occasional Papers, **14**. Ed. D Gurney
EAA **24**	2011	*Research and archaeology revisited: A revised framework for the East of England*, East Anglian Archaeology Occasional Papers **24**, by Maria Medlycott
ECCPS	2015	*Archaeological brief for trial trenching on land to the west of Granta Cottages, Newmarket Road, Great Chesterford*
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Plouviez, J	2005	'Whose good luck? Roman Phallic Ornaments from Suffolk' in N. Crummy (ed.), *Image, Craft and the Classical World. Essays in honour of Donald Bailey and Catherine Johns* (Monogr. Instrumentum 29), Montagnac, p. 157-164
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10 Abbreviations and glossary

CAT	Colchester Archaeological Trust
CIfA	Chartered Institute for Archaeologists
context	specific location of finds on an archaeological site
ECCPS	Essex County Council Place Services
EHER	Essex Historic Environment Record
feature (F)	an identifiable thing like a pit, a wall, a drain: can contain 'contexts'
layer (L)	distinct or distinguishable deposit of soil
medieval	period from AD 1066 to Henry VIII
modern	period from *c* AD 1800 to the present
natural	geological deposit undisturbed by human activity
NGR	National Grid Reference
post-medieval	from Henry VIII to *c* AD 1800
residual	something out of its original context, eg a Roman coin in a modern pit
Roman	the period from AD 43 to *c* AD 410
Section	(abbreviation sx or Sx) vertical slice through feature/s or layer/s
WSI	Written Scheme of Investigation

11 Contents of archive

Finds: one box

Paper and digital record

One A4 document wallet containing:

The report (CAT Report 988)

ECC Evaluation Brief, CAT Written Scheme of Investigation

Original site record (Feature and layer sheets, Finds record, plans)
Site digital photos and log, Architectural plans, Attendance register, Risk assessment

12 Archive deposition

The paper and digital archive is currently held by the Colchester Archaeological Trust at Roman Circus House, Roman Circus Walk, Colchester, Essex CO2 7GZ, but will be permanently deposited with Saffron Walden Museum under accession code – SAFWM: 2016.19.

Distribution list:
Graham Elmer
Richard Havis, Essex County Council Place Services
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Geophysical survey at Newmarket road, Great Chesterford, May 2016

Land Registry Title Number EX908109

Scheduled monument list entry number 1013484 (formerly SM24871)

NGR TL504428

T J Dennis, June 2016

Summary. *A ground penetrating radar survey on a site at Great Chesterford, Uttlesford District, Essex has been carried out on behalf of Colchester Archaeological Trust. The survey, covering 30 x 15 m, lies within a scheduled area immediately to the southwest of a Roman wall surrounding the Roman small town. The results show features of possible archaeological significance, in particular at its northern extremity, that may be part of the wall remains.*

Introduction

A ground penetrating radar survey on a site in Great Chesterford, Essex has been carried out, on behalf of Colchester Archaeological Trust. The location is a vacant plot southwest of Granta Cottages. It lies within a larger scheduled area covering the Roman fort and town (Appendix).

An original suggestion for ground resistance was considered inappropriate, based on the local electrical environment: a mainline railway less than 200 m to the northwest, 11 kV power lines, the cottages, main road, and a pumping station in the adjacent plot. These factors would have made resistance measurements 'noisy', or unacceptably prolonged the survey duration.

The Site

Modern Great Chesterford lies to the south of a Roman 'small town' and fort that occupied what are now fields east of the River Cam. A comprehensive review of research on the site up to 2011 is available in East Anglian Archaeology, volume 137[1]. As well as early excavation activity, it includes results and interpretation of a large-scale magnetometer survey that has revealed much of the internal plan of the Roman fort and later town, and most of its 4th century wall.

Fig. 1a[2] is an aerial view, looking northwest and showing parch marks of connecting Roman roads. Fig. 1b is an enlargement of part of the same image. The roads converge at the south entrance of the first century fort[3]. The survey location is a plot towards the southwest corner of the Roman town wall, shown in Fig. 1c[4] as it was known by 1991.

Fig. 1d is the detailed plan from 2011 reported in EAA137.

Tracing its route clockwise, a section of Newmarket Road lies within the wall, before the wall line, its route here less certain, crosses the modern road to pass beneath nos. 3 and 4 Granta Cottages. On this plan it does not cross nos. 1 and 2, but tracks through the northern corner of

1. *The Roman Town of Great Chesterford*, M. Medlycott, EAA137, 2011. ISBN 9781841940724.
2. From *The 'Small Towns' of Roman Britain,* B. Burnham and J. Wacher, B T Batsford Ltd., London, 1990.
3. 'The Roman Fort at Great Chesterford, Essex', W. Rodwell, Britannia, **3** (1972), 290-293.
4. 'Recent Archaeological Work in Great Chesterford', H. Brooks and S. Wallis, Essex Archaeology and History, **22** (1991), 38-45.

the target site, shown on the detailed plan of Fig 1e. In spite of the recent updates provided by EAA137, the precise track remains speculative on this section, there having been no additional information on it since that reported by 1991.

An archaeological evaluation northeast of Granta Cottages in 2015 did not produce evidence of pre-modern activity[5].

Fig. 2a shows a ground-level view the site looking northwest at the completion of the GPR survey.

Topography. Fig. 3a is an indication of the local topography covering an area of 200 x 200 m, where Fig. 1e corresponds to the southern half of the image. It includes contours spaced at 0.5 m intervals overlaid on a highpass filtered[6] rendition of the raw height data which is derived from the UK Environment Agency's LIDAR floodplain survey archive, digital terrain model (DTM)[7]. This strips-out superficial objects like trees and buildings to show the underlying ground level. The prominent dark strip is a former gravel pit.

The land occupied by Granta Cottages, and the adjacent sewage pumping station, slopes gently towards the river at the southwest corner, and is about 1 m lower than the field to its northwest, now subject to cultivation. A broad ridge parallels the former gravel pit while a low bank forms the boundary to the field. A pair of narrow depressions runs SW to NE across the target site and into the bank. The surface of the survey area itself is slightly undulating. These features are more clearly seen in the 3D view of Fig. 3b, and in the detailed plan overlay in Fig. 3c.

Apart from the gravel working strip, the boundary of the significantly higher ground lying to the north and west of Newmarket Road may reflect the line of the Roman wall as outlined by Brooks and Wallis[8] and others, the rectangular indentations being modern incursions associated with the Granta Cottages development and their rear gardens.

Fig. 3d is an enhanced version of the LIDAR image for the full area, and 3e is the same with an overlay of Fig. 1d from EAA137. Apart from the raised bank following the western section of the wall[9], which also marks the transition from the alluvial floodplain substratum to sand and gravel, there are no indications of the underlying archaeology of the town itself as revealed by the roadway cropmarks, and the magnetometer survey reported in EAA137. This is typical of land areas that have been subject to cycles of cultivation over an extended period. Where this has not happened there can be excellent survival of such features[10].

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5. *An Archaeological Evaluation at Granta Cottages, Newmarket Road, Great Chesterford, Essex*, P. Parmenter and B. Holloway, Colchester Archaeological Trust, CAT Report 864, September 2015.
6. *Highpass* in this context meaning high spatial frequencies, or fine detail in an image. The implementation involves a subtracting a Gaussian-weighted local average from each pixel. This has the effect of suppressing the large-scale changes in 'amplitude' (=vertical height) that would otherwise swamp small-scale features of interest.
7. http://www.geostore.com/environment-agency/survey.html#/survey?grid=TL54. The raw data are sampled at 1 m intervals and georeferenced to OS.
8. *Ibid*.
9. The bank is aligned closely to the line of the wall, an alignment that continues to the southeast beyond the supposed corner of the wall to its southern section past the Granta Cottages site.
10. *An archaeological watching brief at the Knowledge Gateway, the University of Essex, Colchester, Essex September 2010-August 2011*, A. Wightman, Colchester Archaeological Trust, CAT Report 638, June 2012.

GPR Survey Methodology[11]

The system used was a 400 MHz Groundvue 3 unit supplied by Utsi Electronics Ltd (Fig. 2b). It has a WiFi link to communicate with a laptop PC which controls sampling rate and time window, and logs the raw data collected, one file per traverse. The laptop and its batteries are carried on the antenna box itself. Along-track sampling is controlled by a shaft encoder fitted to a sense wheel attached to the antenna box. Given that the underlying soil type is sand and gravel[12], unlike over a material containing clay GPR would be expected to good signal responses.

Survey parameters summary (Utsi GV3, 400 MHz)

Survey block size	30 x 15 m
Traverse length	30 m
Traverse spacing	0.5 m
Sample spacing in traverse direction	2.5 cm (40 samples/m), zig-zag traverse pattern
Traverse speed	≈1 $m.s^{-1}$.
Time window	40 ns (Assuming E_r[13] = 10, which is typical for sandy soils, the maximum sub-antenna depth detected will be approximately 2 m.)
Samples per time window	256

Results

The GPR survey was carried out on 20 May 2016, based within the red outline on Fig. 1e.

The raw data can be thought-of as generating a series of images stacked on their long edges like a pack of cards: each image is a vertical slice through the ground, its horizontal axis distance along a track, vertical axis time which is proportional to depth. The preferred display is in 'timeslice' format which is effectively a horizontal slice through the cards, taking one line of the output image from each card, and gives a plan view of the signals at a fixed time delay. Ideally this also means constant subsurface depth, but may not if the soil composition is highly variable.

The main signal processing operations are:

1. Normalise track length. Track lengths typically vary slightly from one to the next by ≈±2%, due to surface irregularities, and there may a systematic error from the sense wheel. Raw data from each track are hence rescaled to the correct number of samples required for the current track length and nominal resolution.

2. Filter-out fixed near-surface (short delay) reflections which are due to direct transmit-

11. GPR is a short-delay analogue of the conventional active radar system in which a brief radio frequency pulse is radiated by a transmit antenna vertically into the ground surface. The waveform representing echoes of the pulse, up to the selected time range, is received via an adjacent identical antenna, sampled and stored. The antenna bandwidth is reciprocally related to the time resolution of the system; here it was 400 MHz giving a time equivalent of 2.5 ns (= 2.5 x 10^{-9} s).

12. EAA137. *Ibid*.

13. E_r = relative dielectric constant of a medium. Propagation velocity of RF through physical media is given by $v = c/\sqrt{E_r}$, where c is the velocity of light *in vacuo*.

receive antenna coupling. Perform 'full wave rectification' to obtain the signal magnitude.

3. Compensate for increasing signal attenuation with time delay/depth. This attempts to equalise the signal RMS value over all timeslices, which typically requires attenuation of near-surface slices and amplification of deep ones. The dynamic range can be large, 70 dB or above.

4. Scale as necessary. The results images use 20 pixels/m.

5. Convert to output 8-bit greyscale video image format – contrast is adjusted by varying the internal signal amplitude that will be scaled to the maximum 8-bit value of 255, and is done to maximise visibility of real features with noise at an acceptable background level. It is likely that this will result in hard-limiting (clipping) of the maximum signals, but that is of no consequence. The signals are then inverted so that zero signal becomes video white and maximum black.

Figures 4a-f contain selected timeslices from the survey, annotated with possibly-significant features that are described briefly in the captions.

Most of the very near-surface responses are likely to be modern, from the remaining scatter of rubble and other debris from previous occupation of the site. At deeper levels, below the topsoil, there is evidence of structured features, especially towards the northern corner of the survey block.

Interpretation. Figs. 4a and b approximately cover topsoil level, so are likely to be dominated by modern activity, for example an apparent curved line of 'point' features in 4a. High-amplitude responses from a steel manhole cover appear throughout, and what are likely to be connections to it show in 4b, but not strongly: earthenware drainpipes normally generate high-amplitude and characteristic responses which are absent here.

Remaining images have an overlay of the wall lines used previously. In 4c there is the start of subsoil features, including a broad strip of increased background signal activity (B) which has well-defined boundaries especially on its west and north sides. Its alignment is not obviously connected to the modern layout of the site, but does appear to match quite closely that of the wall. A thin linear feature (A) could still be modern. The highest amplitude signals are those on the alignment of C: these are returns typical of solid objects (≈0.25 m dia. or more) with randomly-oriented reflecting surfaces. An example would be a scatter of large stones or masonry fragments.

In 4d, feature A, the active strip of 4c, has an internal pattern of striations, parallel to its long axis and also matching the wall line. It may be bounded on its southern edge by a pair of slightly curving noise-free lines (C-C). The high-amplitude feature B at the northern extremity now has a more well-defined alignment, slightly different from C in 4c. It has the same alignment in 4e.

Fig. 4e is mainly notable for feature A, a rectangular outline having within it a small number of spot reflections. At a depth of approximately 1 m, this may represent a small building foundation.

In Fig. 4f, the northwest corner (B) has fewer high-amplitude returns but they are replaced by a moderately well-defined band of lower amplitudes on the same alignment. Extending from that

corner SE along the block edge is a series of spot features that may be related to B. They are approximately equally-spaced at 5 m intervals and of unknown origin.

Comparison with the detailed Lidar overlay of Fig. 3c may also be instructive: the pair of slight depressions (darker strips) within the survey area crosses the wall line from the southwest, and extends beyond it, possibly into the adjacent plot and as far as the bank. They subtend an angle of about 80 degrees to the wall line. These may be related to the GPR, but given they are surface features, are more likely to be of recent origin: investigation of the previous history of the site could be useful.

Later timeslices do not show further significant features, but the whole sequence is available as a video animation and should be examined, as features are best appreciated by manually-controlled sweeps through it.

Conclusions

Close examination of the timeslices suggests the existence of features that may relate to the Roman town nearby and its boundary wall, principally taking the form of matching alignments. Indeed, it is possible that substantial evidence of the wall remains, or more likely from structures within it, is being detected at the extreme northern corner of the survey area. The position of the features is consistent with the track conjectured by Brooks and Wallis[14], and a source referenced by Parmenter and Holloway[15]. There are in addition low-contrast structured features further into the site, in particular a small rectangular outline at a depth approaching 1 m.

The principal recommendation would be for further archaeological investigation. GPR survey of trial areas on the main site in the adjacent field may also be productive: this should concentrate initially on areas that are active in the magnetometer survey reported in EAA137.

14. *Ibid*.
15. 'At 3 Granta Cottages the main town wall was discovered to run directly beneath the property and at 4 Granta Cottages these masonry walls are thought to represent a structure inside the walled town area rather than the town wall itself'. Parmenter and Holloway, 2015, *ibid*.

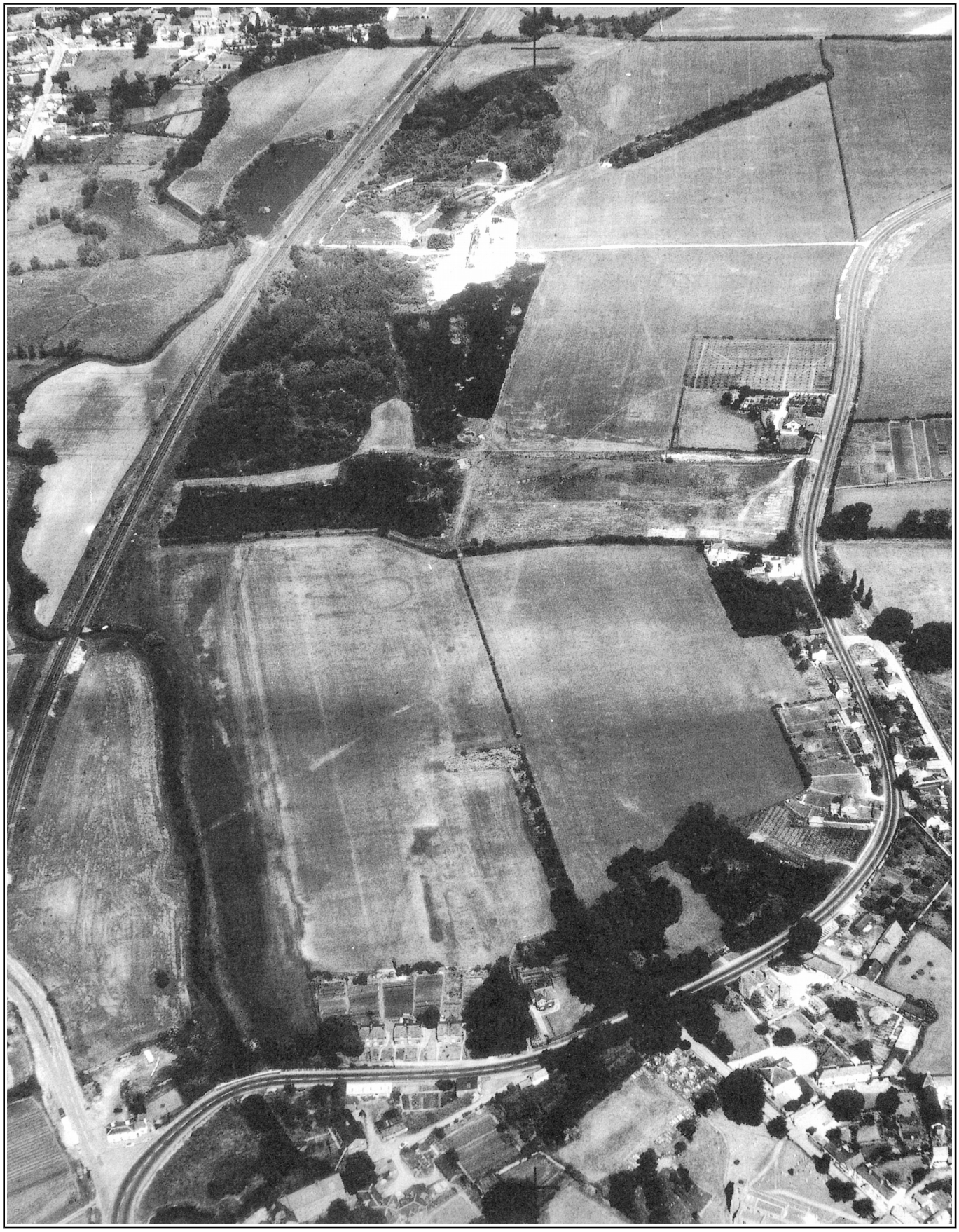


Figure 1a. Aerial view of Great Chesterford looking northwest.[16].

16. Burnham and Wacher, 1990. *Ibid*.

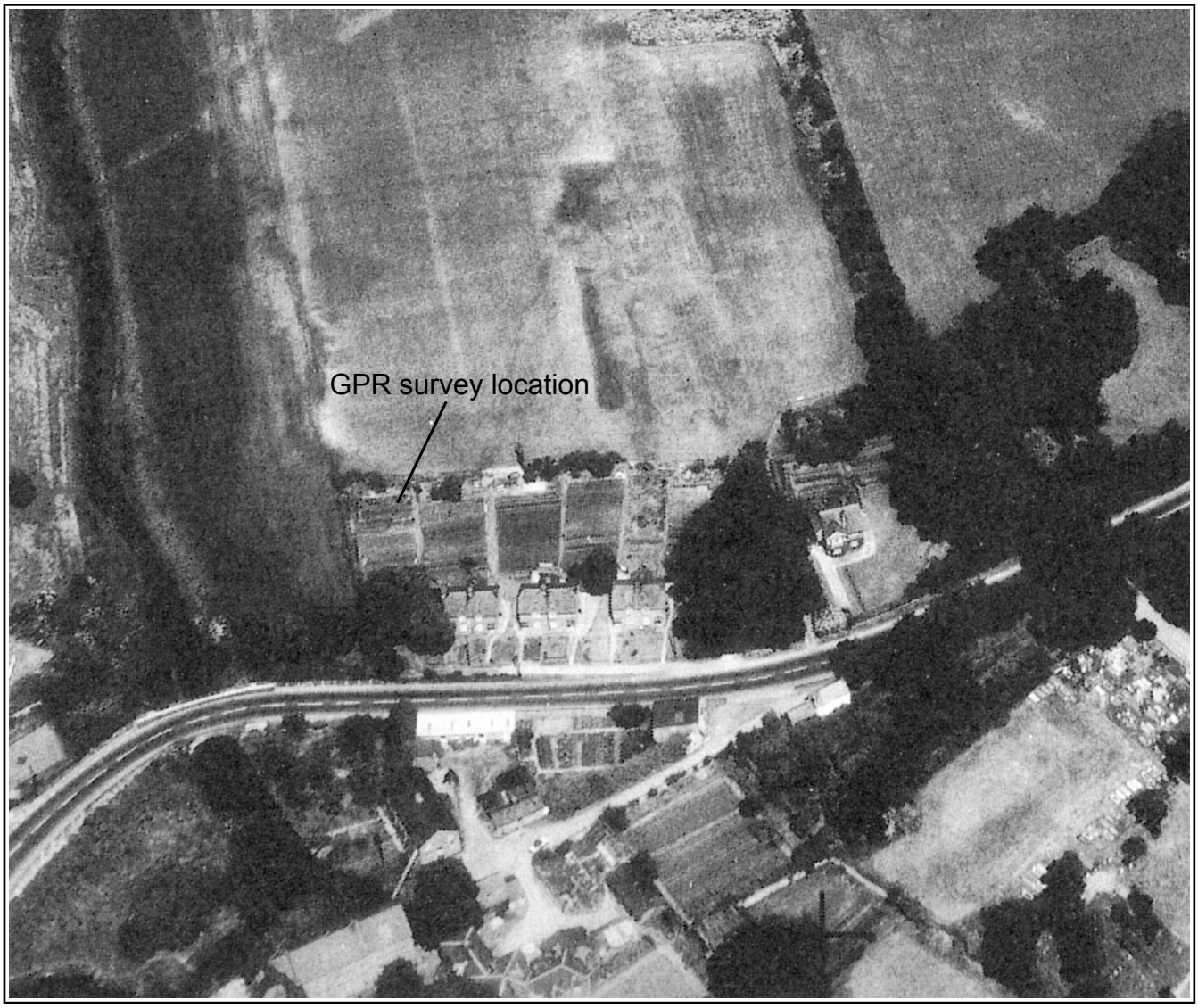


Figure 1b. Closeup from Fig. 1a, showing the Granta Cottages area.

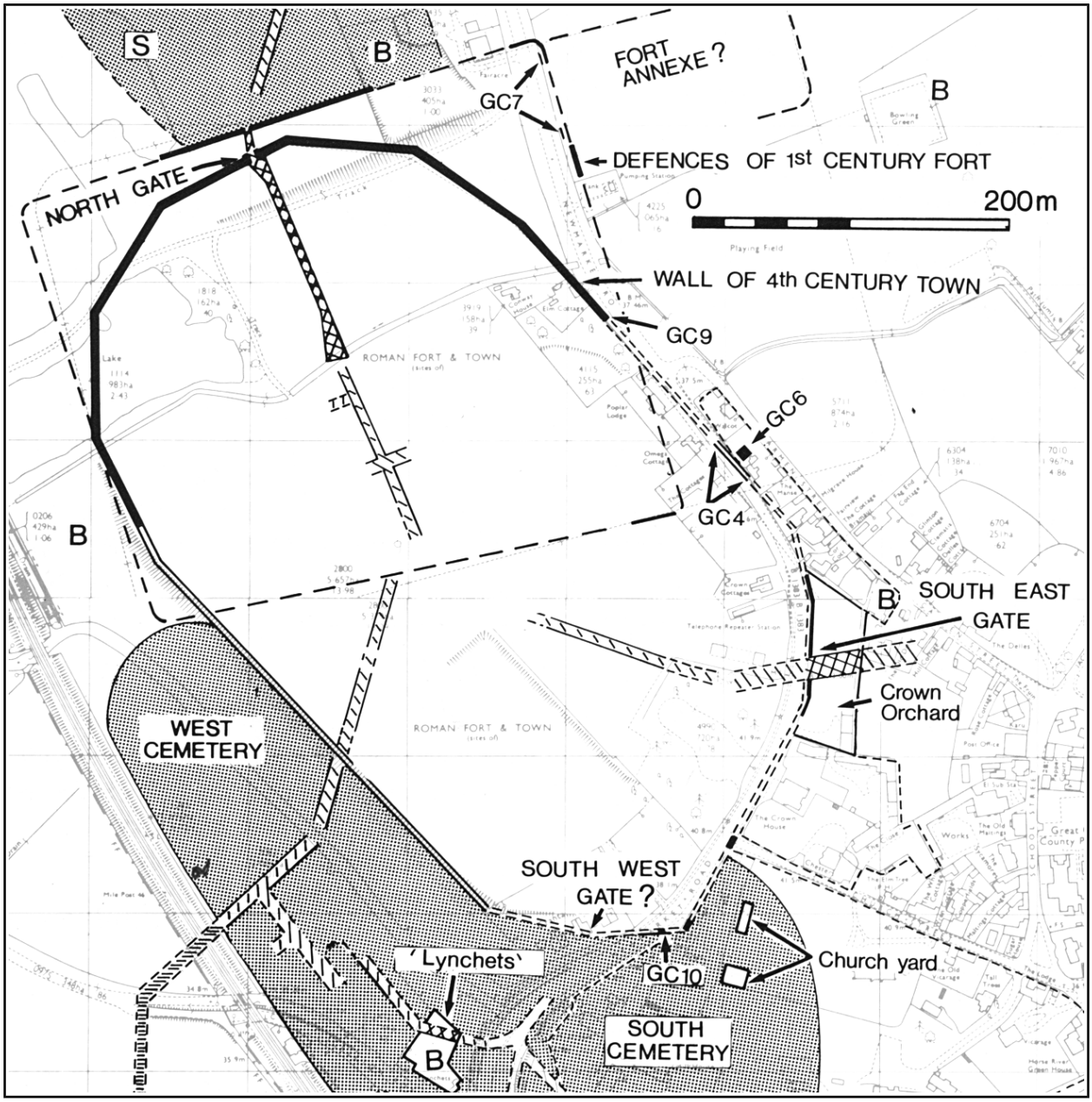


Figure 1c. Great Chesterford incorporating information up to 1991 that confirms at discrete locations the exact route of the Roman town wall[17].

17. Brooks and Wallis, EAA22. *Ibid*.

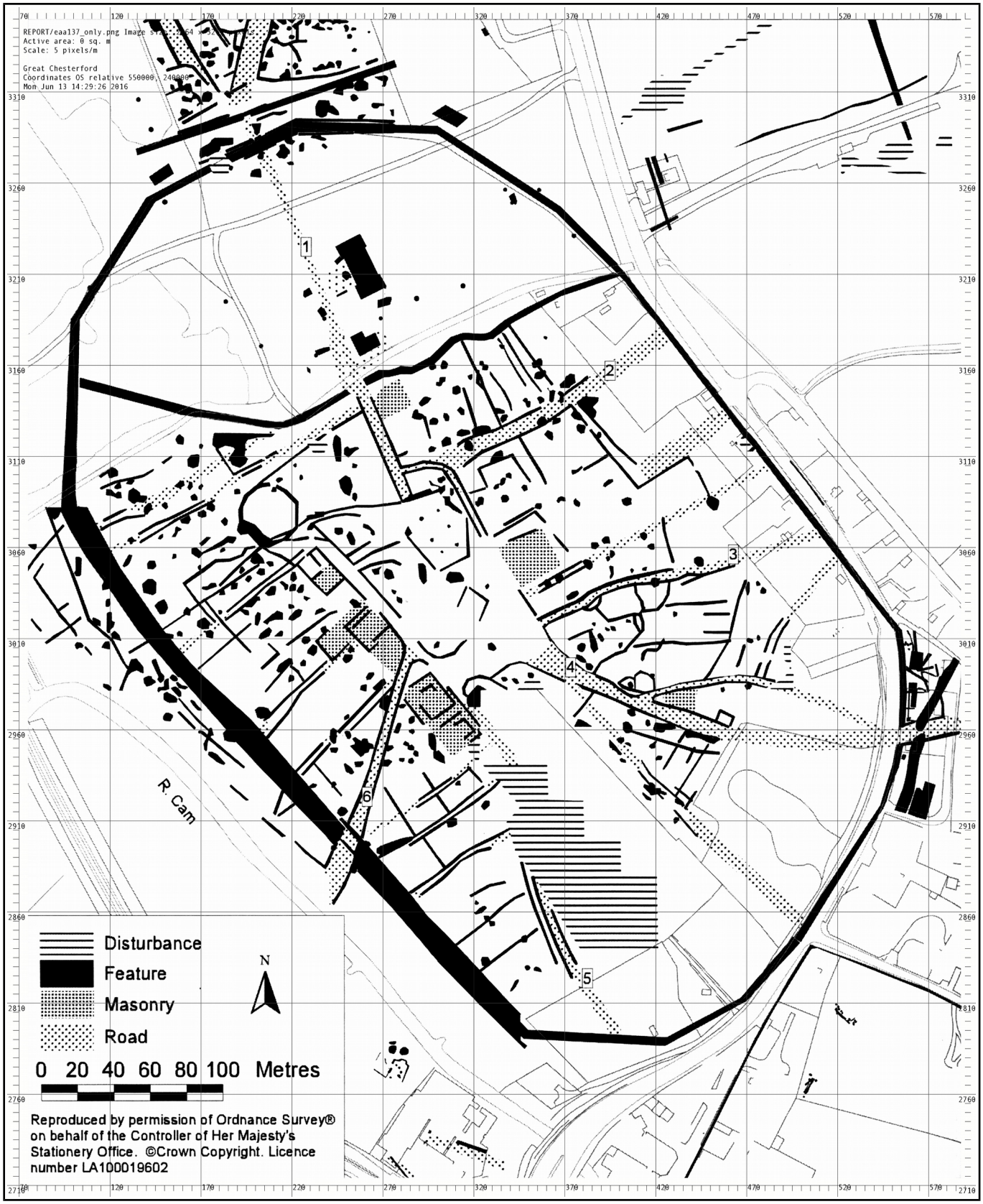


Figure 1d. The site plan as of 2011 on reconstructed OS coordinates relative to 550000, 240000[18].

18. Figure 3.1 from EAA137. *Ibid*.

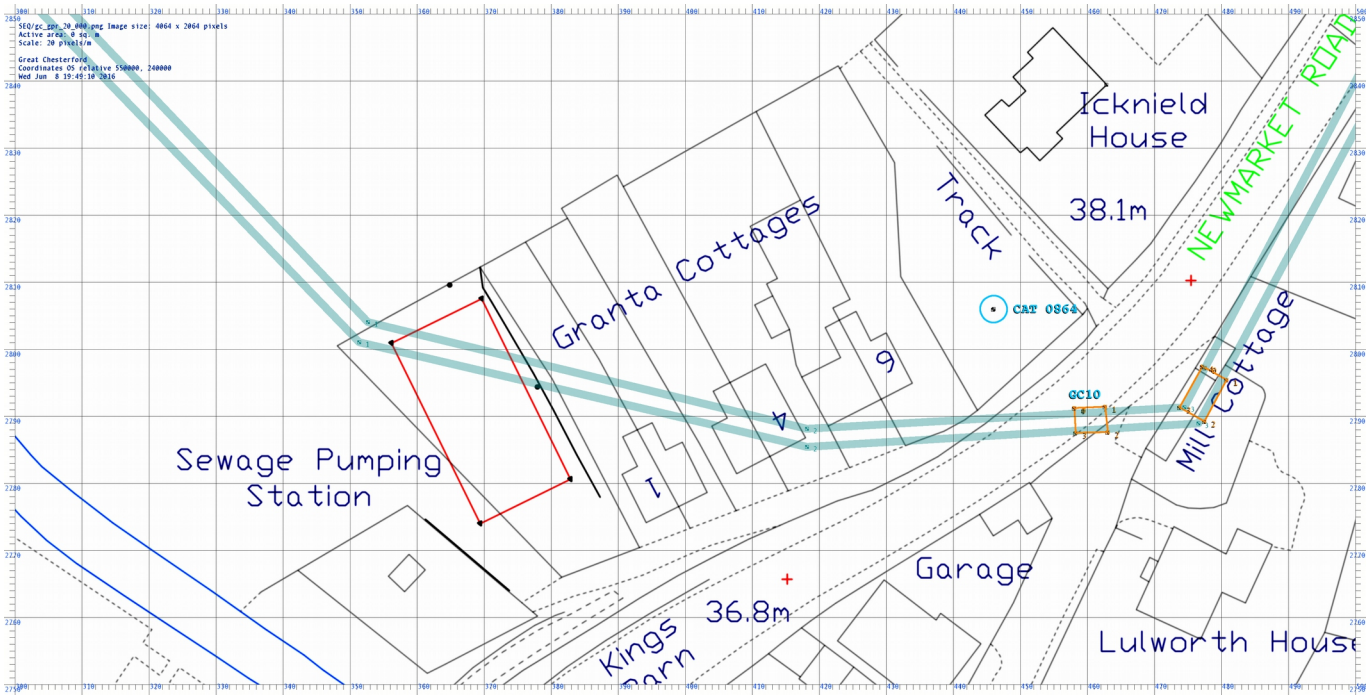


Figure 1e. Granta Cottages, Newmarket road, Great Chesterford. Plan covers 200 x 100 m. The GPR survey area is outlined in red. Blue lines mark the approximate track of the Roman wall line (width not to scale), digitally traced from Fig. 1c together with its confirmed locations outlined in orange. 'GC10' is an Essex County Council site reference. 'CAT 0864' is the location of the 2015 evaluation exercise by Colchester Archaeological Trust[19].

19. Parmenter and Holloway, 2015. *Ibid*.

Figure 2a. View of the site looking west at completion of the GPR survey. A bank at the far end rises to the field beyond (see Fig. 3). Prior to the survey, parts of the area had to be cleared of a dense cover of tall weeds. It appears to have been previously occupied by a building of some kind, so a scatter of rubble and metal debris was also removed. Because of the remaining weed stems, surface contact and orientation of the GPR unit was slightly irregular.

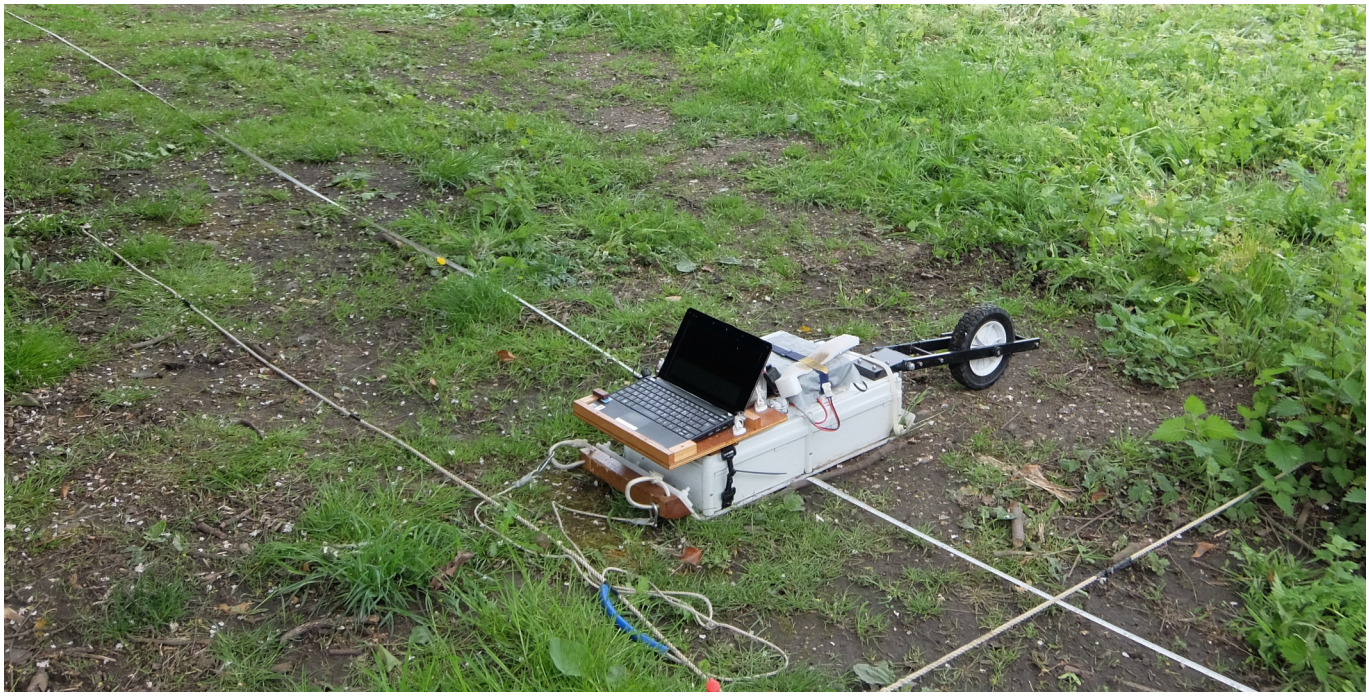


Figure 2b. Utsi GV3 GPR system, with data-logging laptop and sense wheel. In operation, the system is towed manually parallel to and each side of a taut guide string such that the zig-zag tracks are 50 cm apart. The string is set using parallel tapes across the short ends of the survey block.

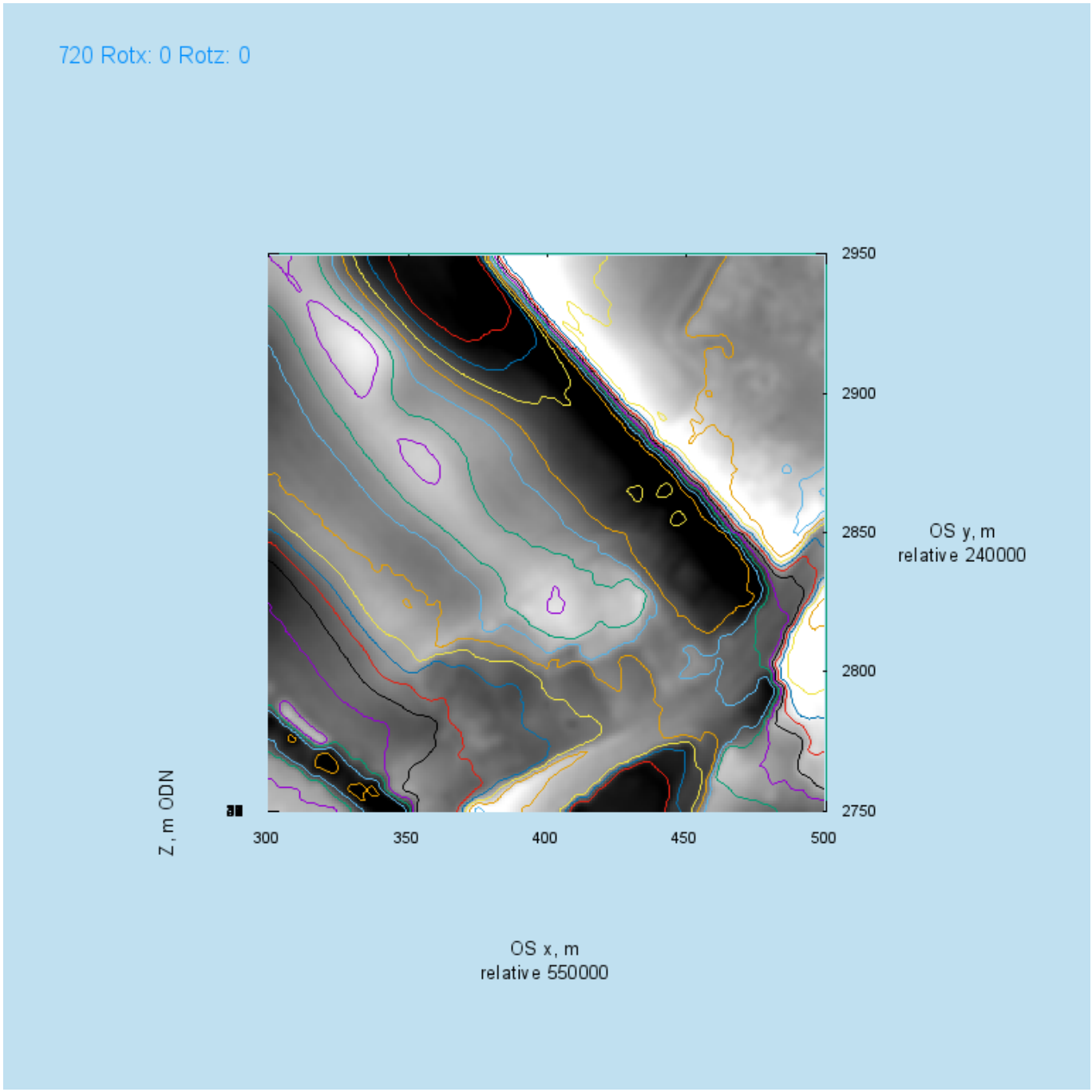


Figure 3a. Site topography, derived from digital terrain model (DTM) LIDAR data. Contours are at 0.5 m intervals, and overlay a highpass filtered greyscale interpretation of the surface model.

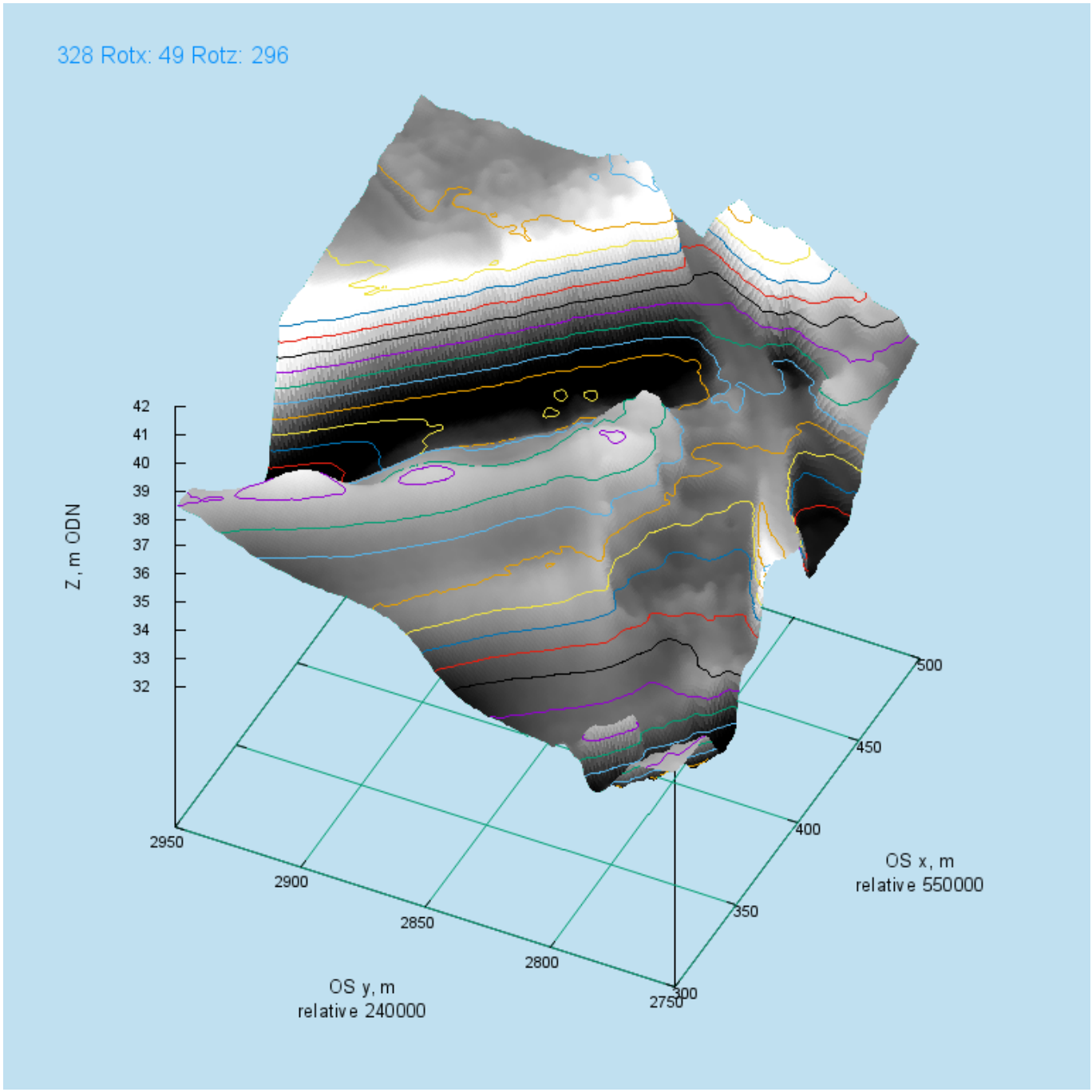


Figure 3b. Pseudo-3D interpretation of the DTM data, viewed from the southwest.

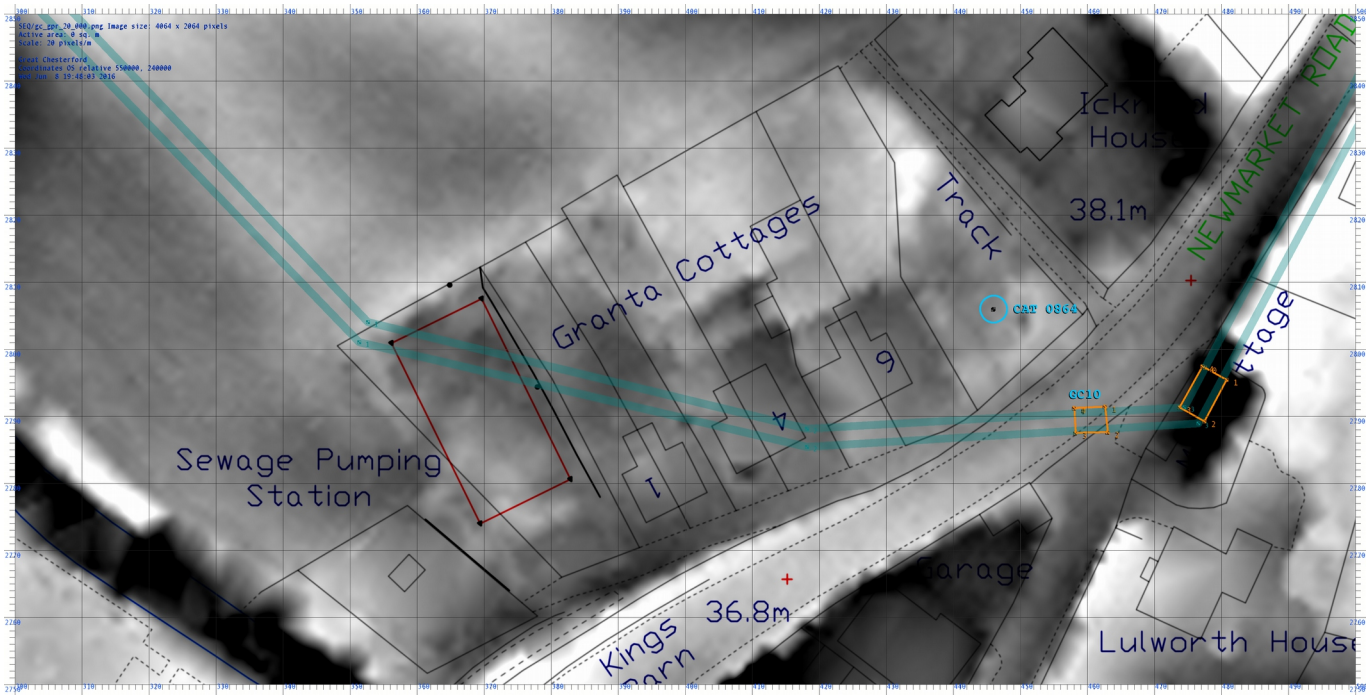


Figure 3c. Highpass-filtered LIDAR (greyscale) with overlay of the site plan and Roman wall lines of Fig. 1c.

Figure 3d. Highpass filtered LIDAR image for the area covered by Fig. 1d. The filter averaging footprint is approximately 15 m with video dynamic range 0.5 m.

Figure 3e. Composite LIDAR and site plan from Fig. 1d.

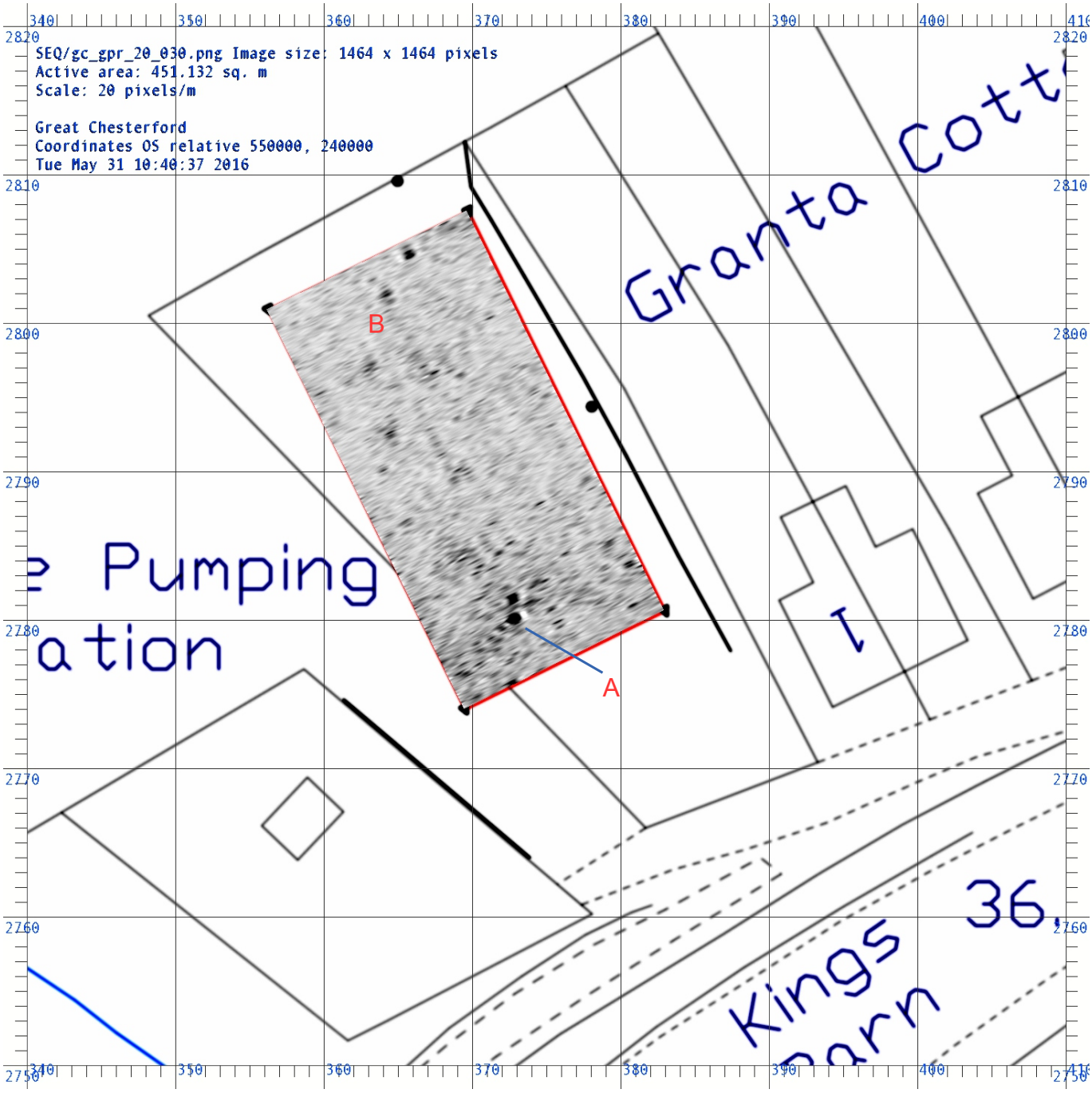


Figure 4a. Timeslice 30, depth ≈ 0.23 m.

A: From steel manhole cover. Its response persists through all timeslices and can be ignored.

B: Possibly-connected set of 'spot' features.

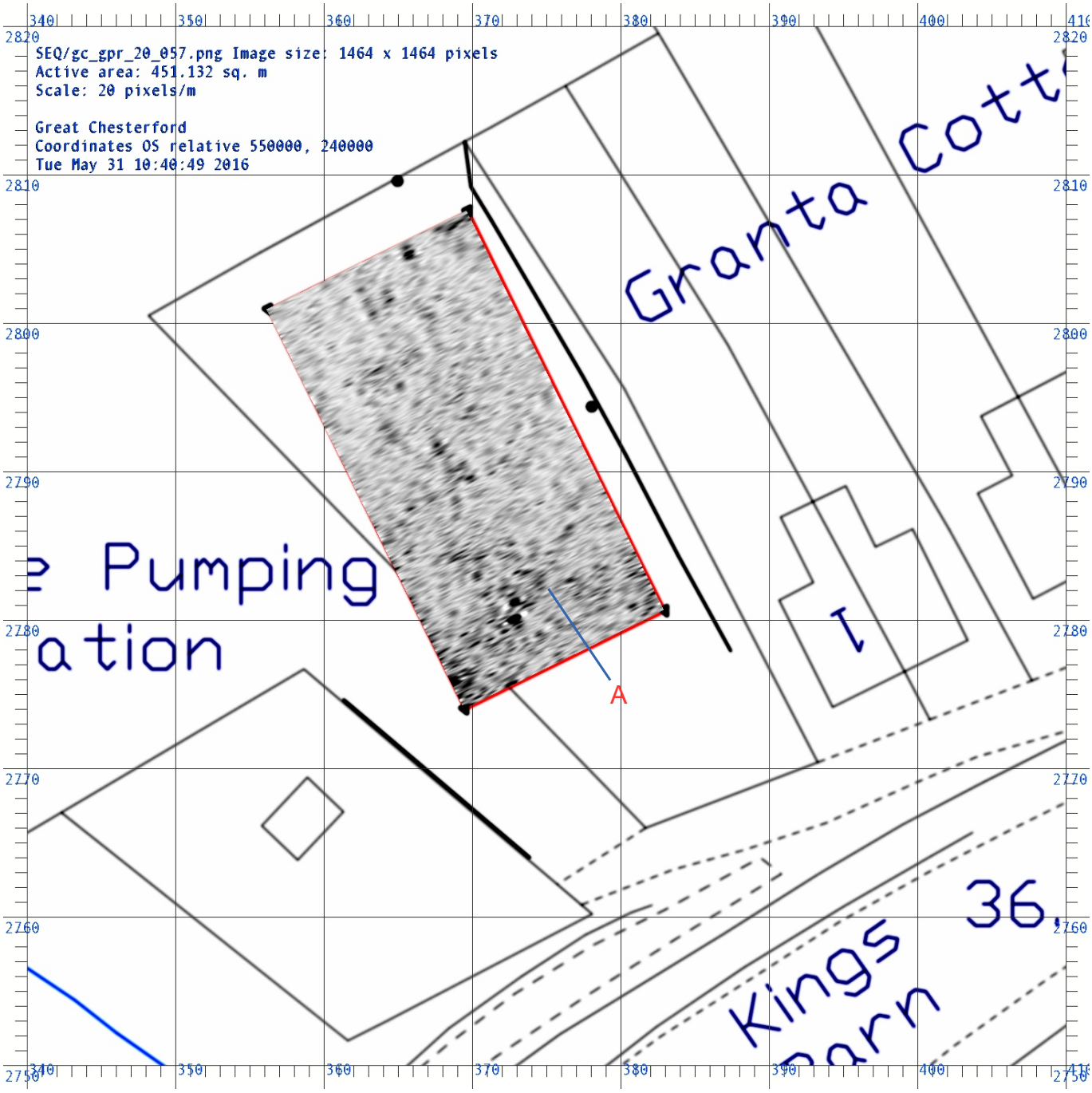


Figure 4b. Timeslice 57, depth ≈ 0.45 m.

A: Pipelines connecting with the manhole.

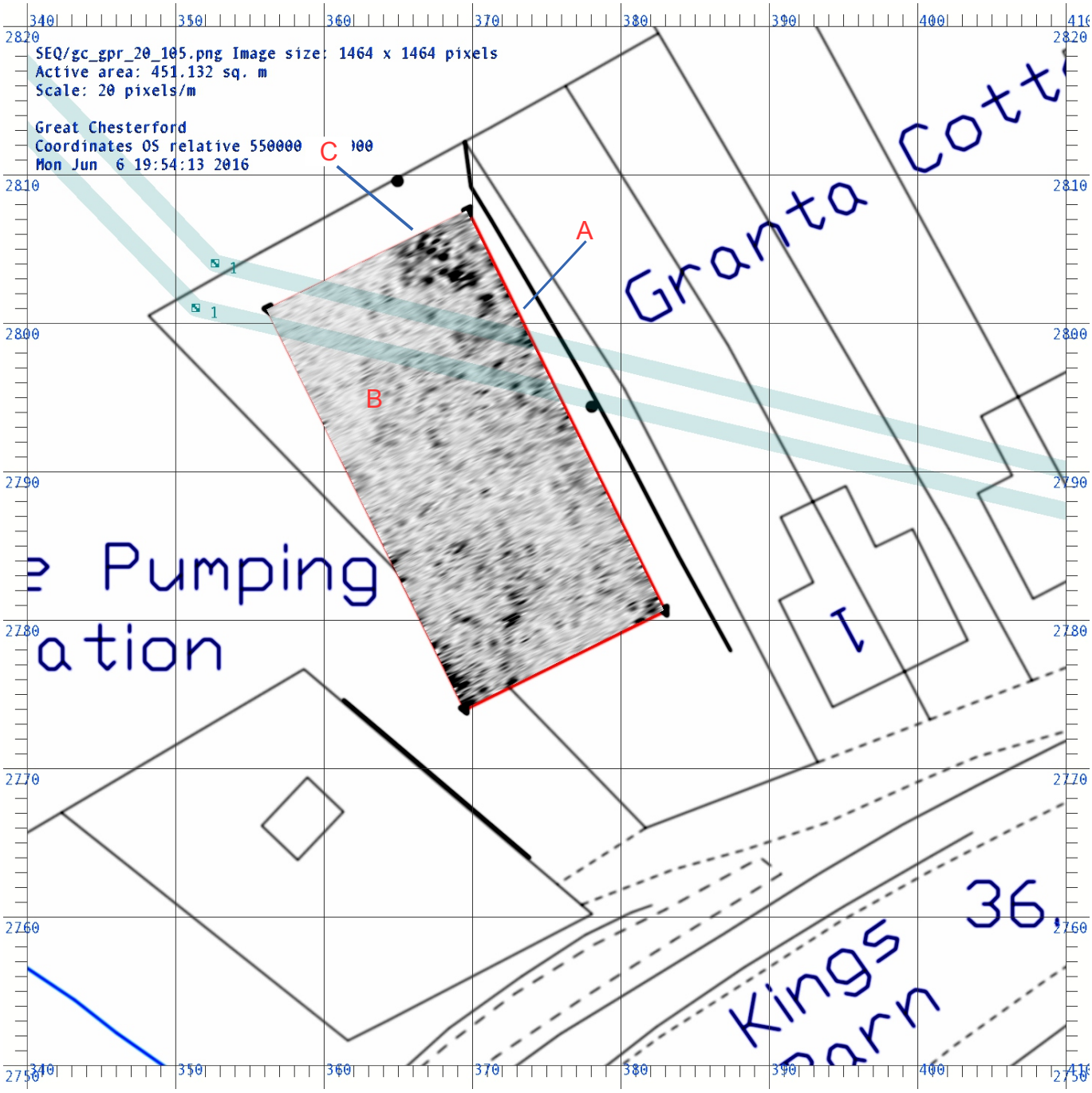


Figure 4c. Timeslice 105, depth ≈ 0.82 m, incorporating the conjectural route of the Roman wall.

A: Low-contrast linear feature

B: Rectangular region of enhanced but unstructured responses. Persists through many timeslices

C: High-amplitude responses, possibly aligned in the direction indicated. Continue through many timeslices.

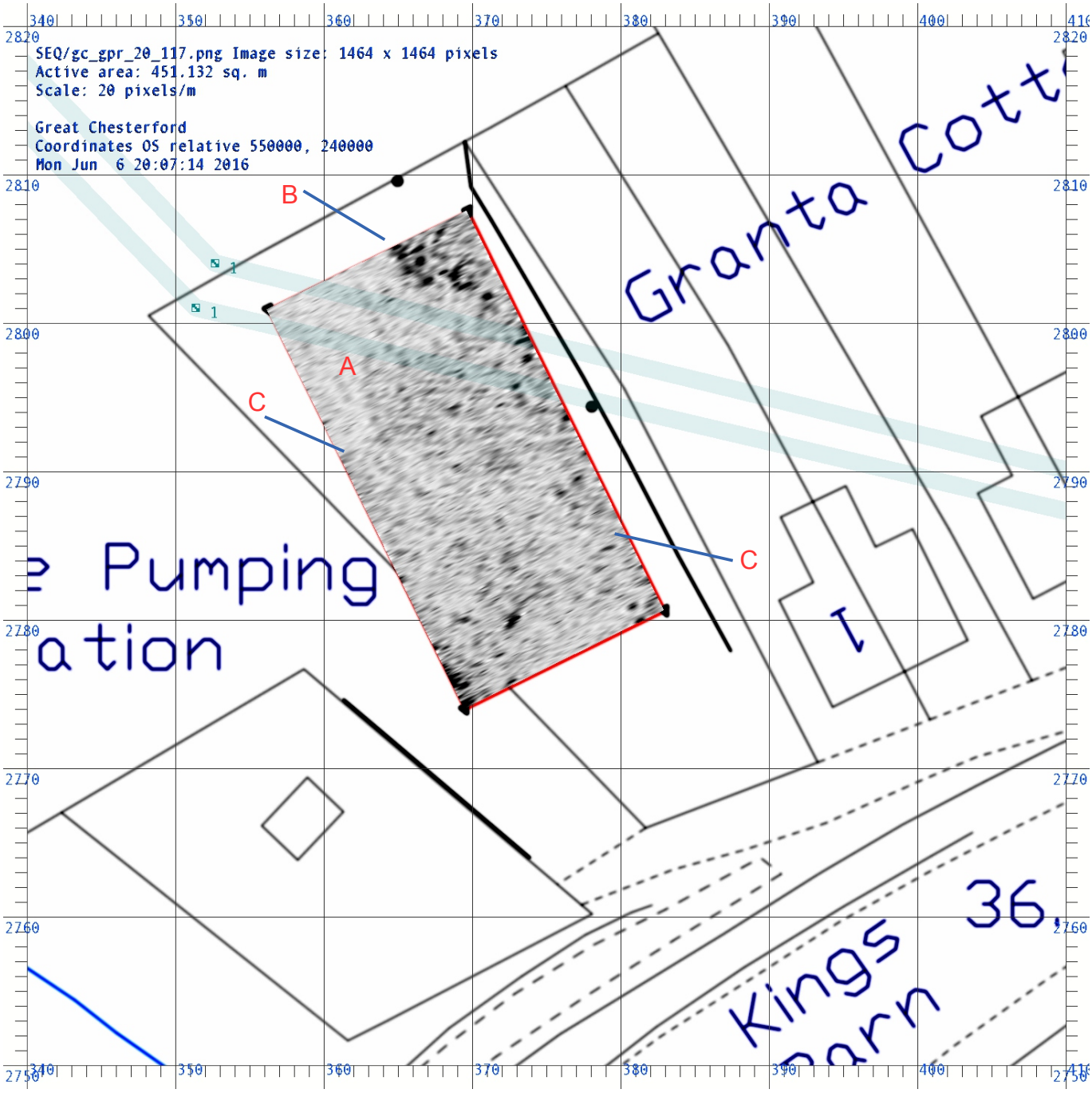


Figure 4d. Timeslice 117, depth ≈ 0.91 m.

A: Raised signal region has internal striations parallel to its long axis.

B: Continuation of high-amplitude signals, alignment slightly different to Fig. 4c.

C: Extended 'negative' response, possibly with slight curvature. Indicates a homogeneous medium with reduced density of reflection centres. Commonly occurs in ditches or channels in coarse (stony) gravel backfilled with alluvium.

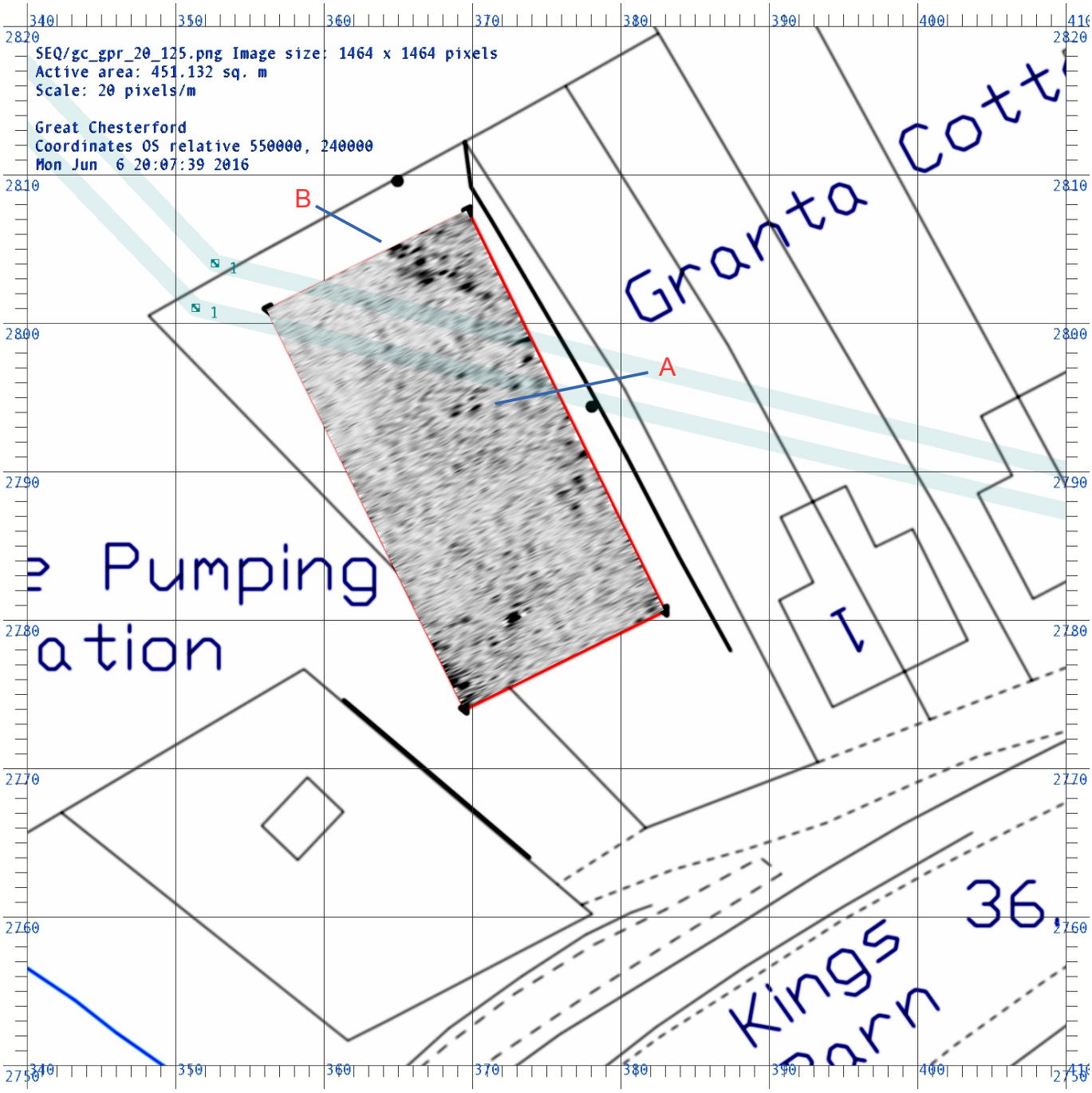


Figure 4e. Timeslice 125, depth ≈ 0.98 m.

A: Low-amplitude rectangular or 'L' shaped outline, 4.75 x 2.8 m.

B: Northwest corner responses becoming more dispersed.

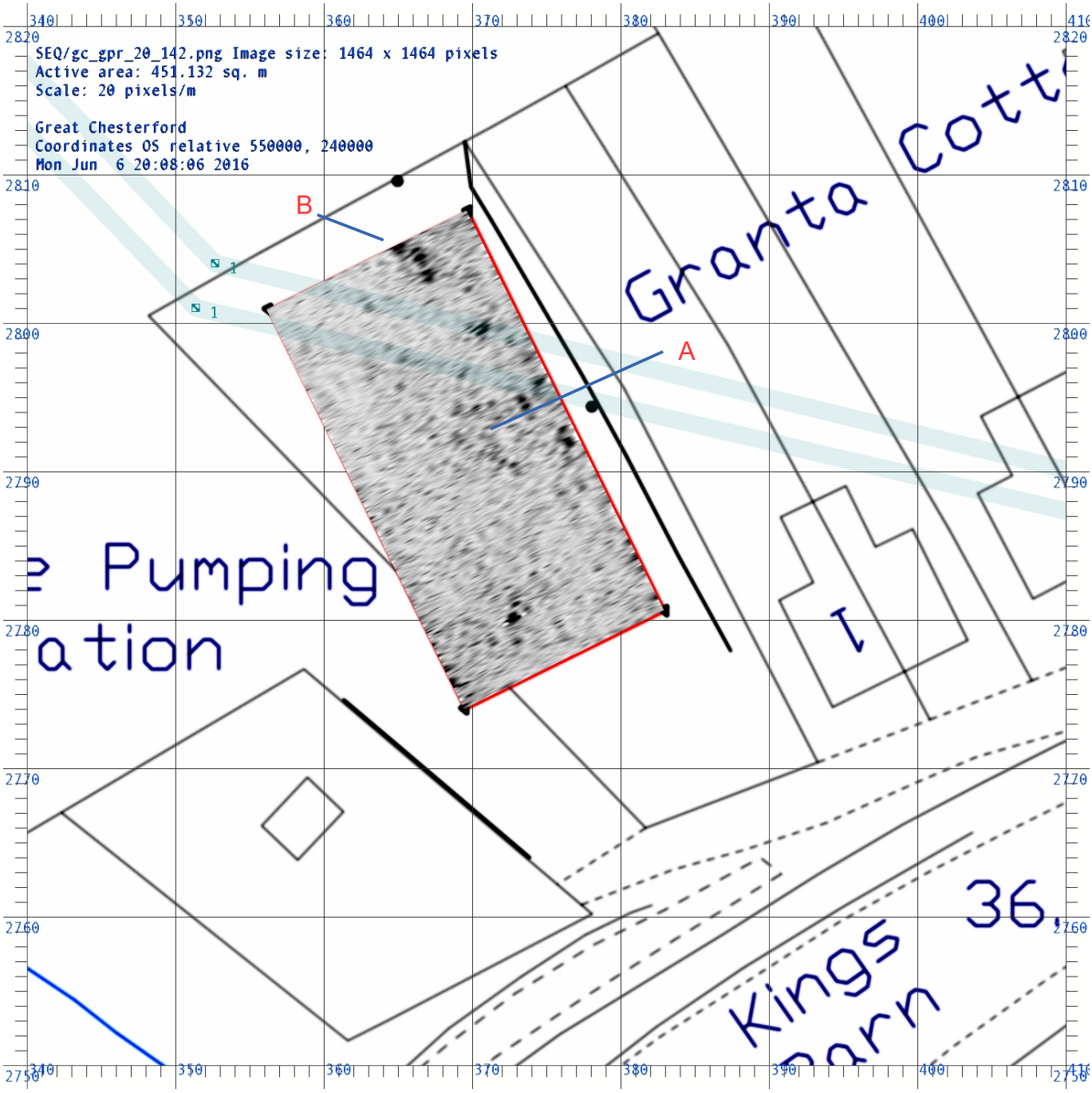
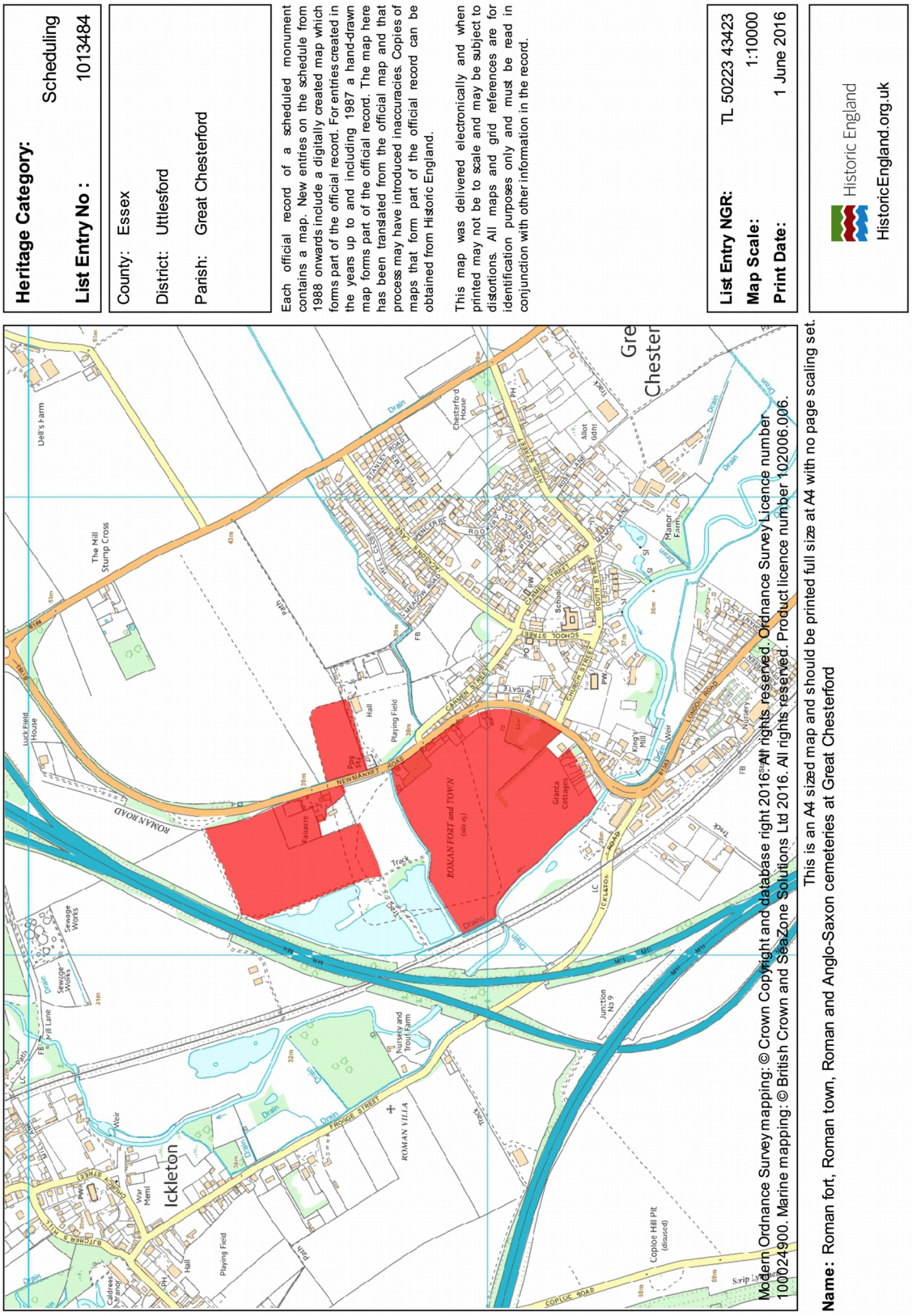


Figure 4f. Timeslice 142, depth ≈1.1 m.

A: Region of medium-level responses that may have structure.

B: High-amplitude responses less abundant, but underlying band of medium ones. Isolated strong responses further south on the same general alignment.

Appendix



Name: Roman fort, Roman town, Roman and Anglo-Saxon cemeteries at Great Chesterford

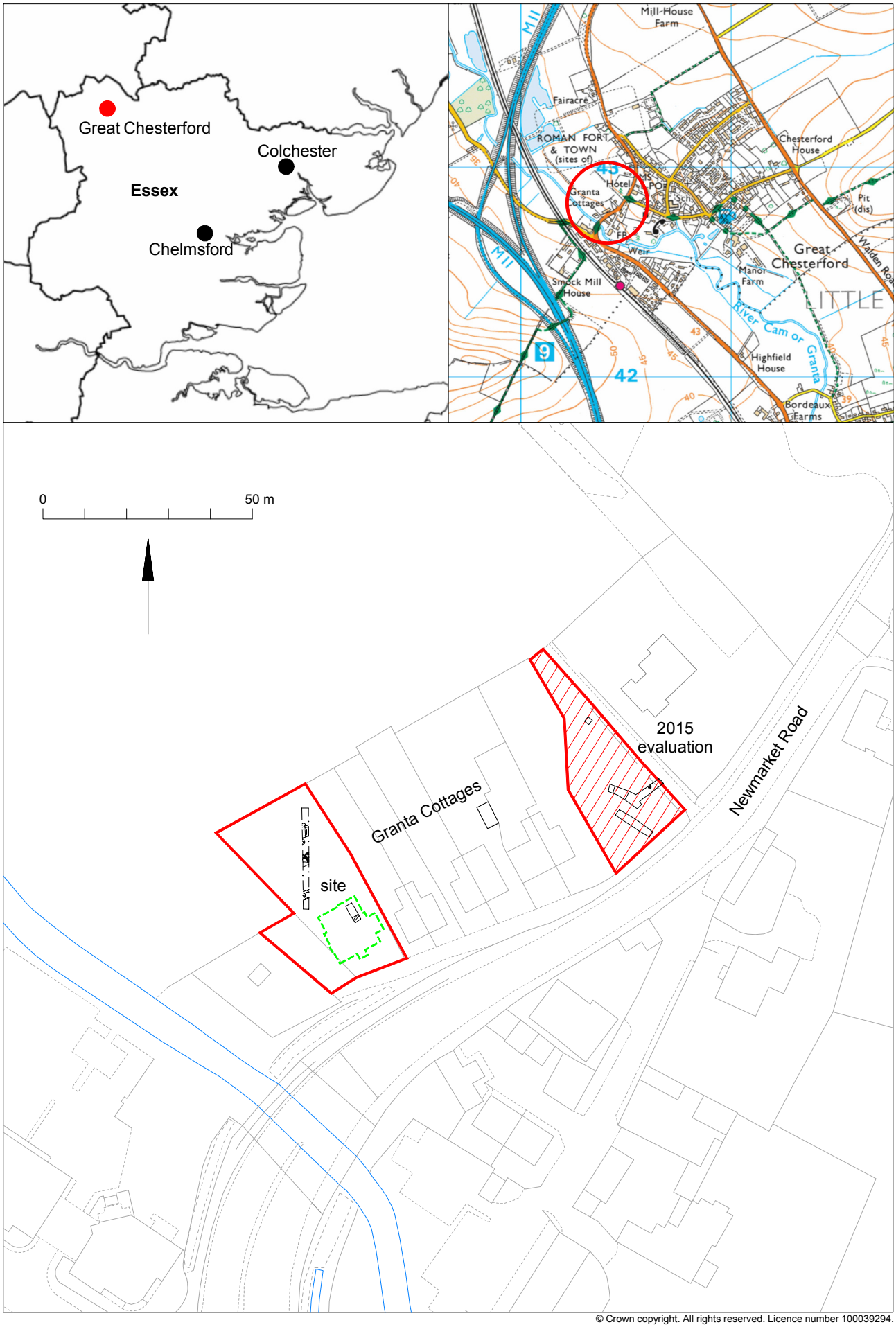


Fig 1 Site location.

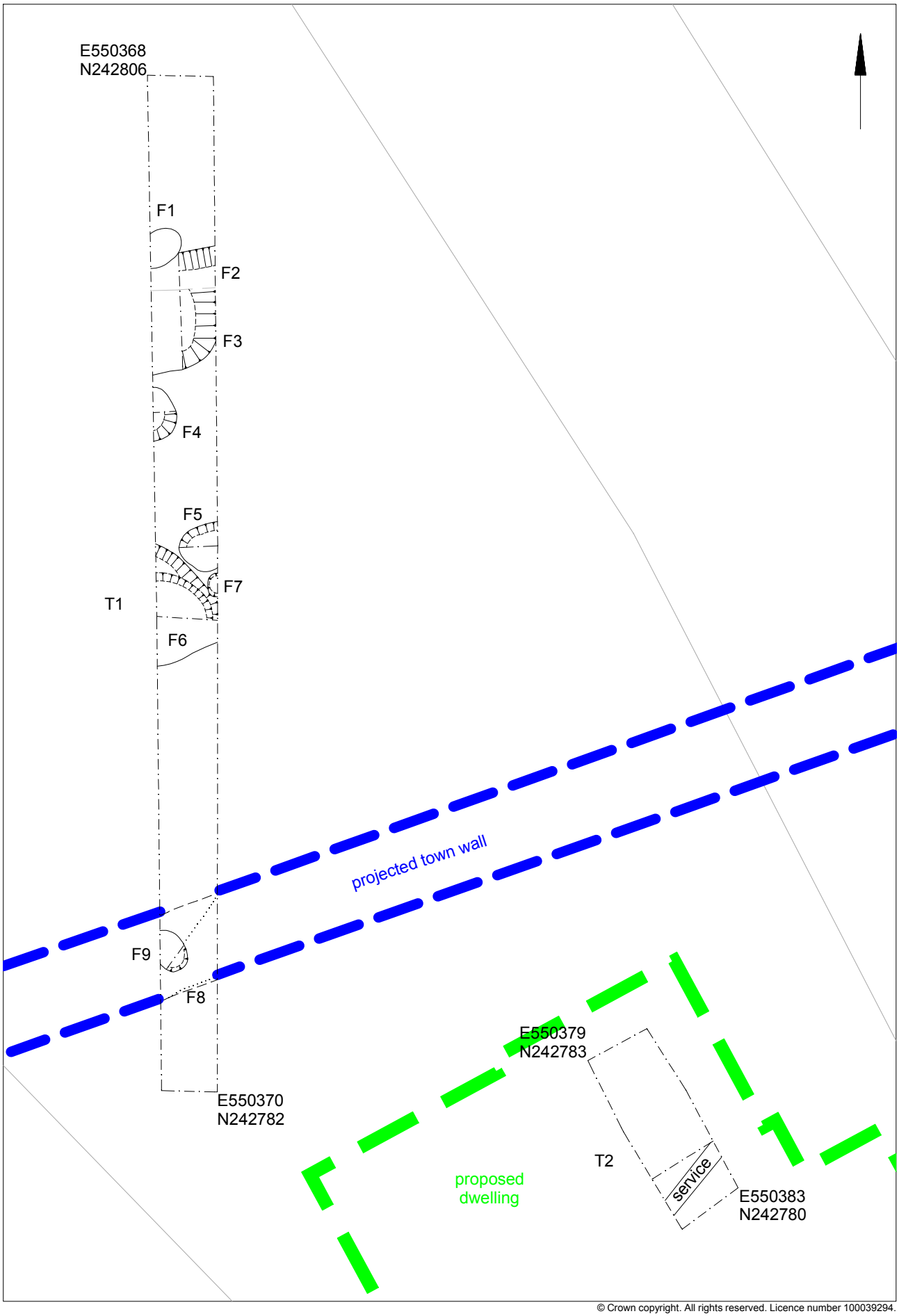


Fig 2 Results.

0 5 m

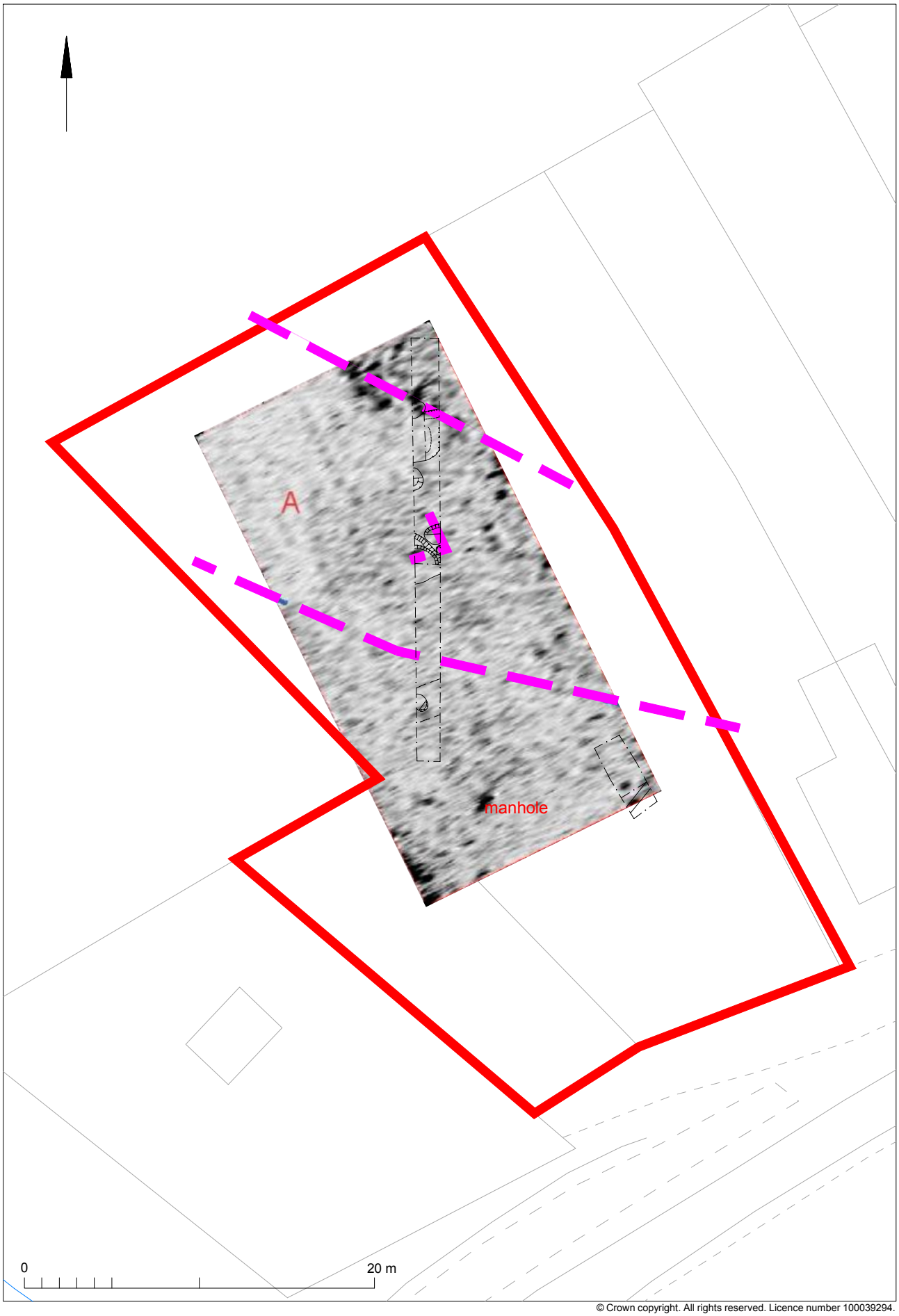


Fig 3 Evaluation results in relation to Ground Penetrating Radar interpretation.

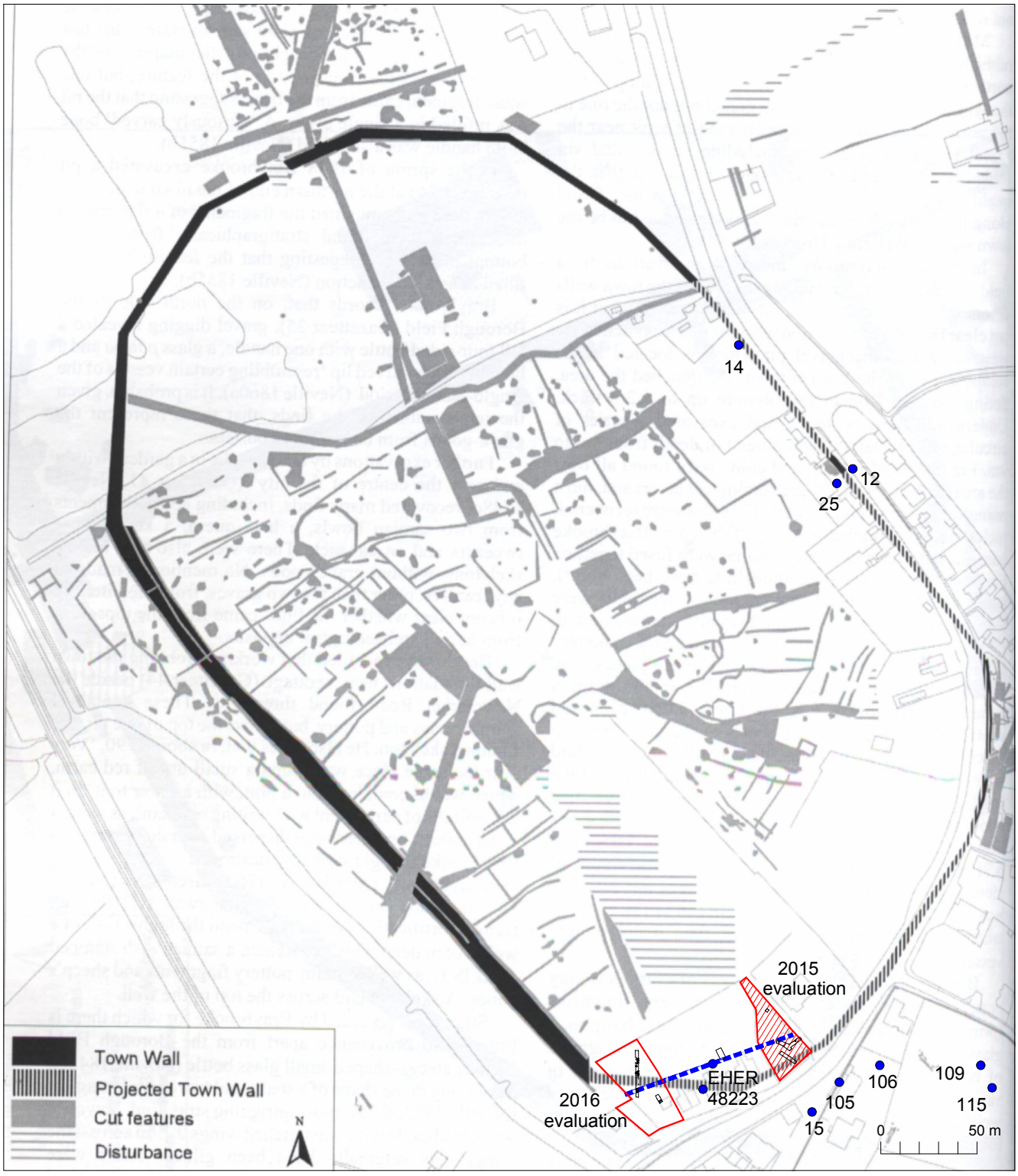


Fig 4 Evaluation results in relation to the projected line of Great Chesterford's Roman town wall (after Medlycott, 2011). Blue circles represent location of Medlycott Gazetter sites and other investigations mentioned in report.

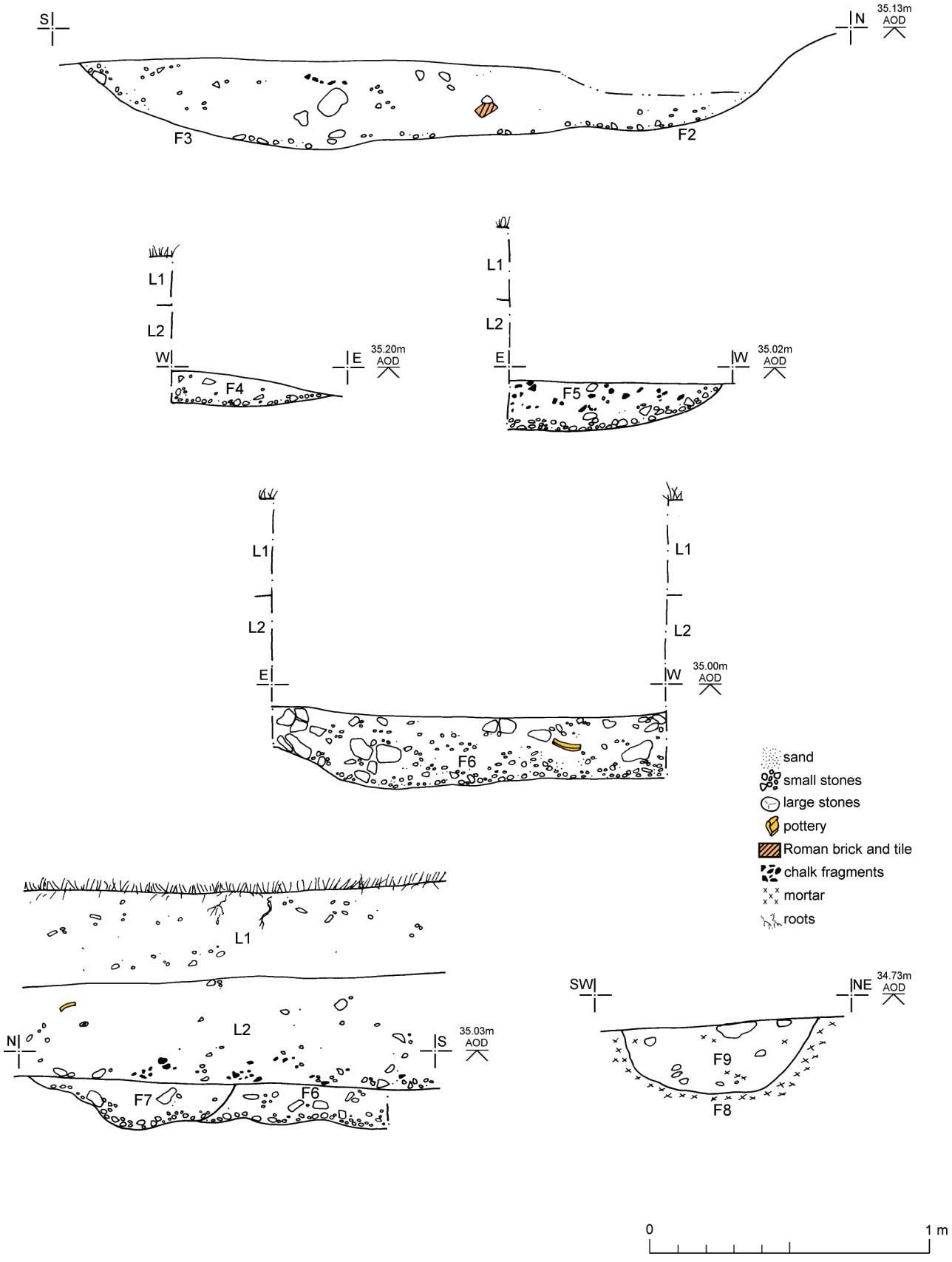


Fig 5 Sections.

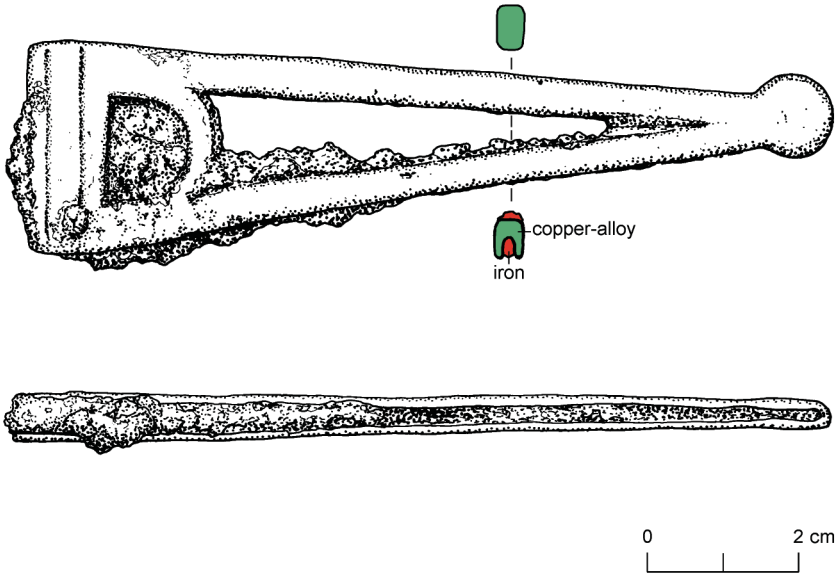


Fig 6 Folding knife handle (SF1).

Essex Historic Environment Record/
Essex Archaeology and History

Summary sheet

Address: Land to the west of Granta Cottages, Newmarket Road, Great Chesterford, Essex, CB10 1PE	
Parish: Great Chesterford	***District:*** Uttlesford
NGR: TL 50390 42776 (centre)	***Site code:*** CAT project code: 16/05i ECC project code: GC63 OASIS project ID: colchest3-255216
Type of work: Evaluation	***Site director/group:*** Colchester Archaeological Trust
Date of work: 19th July 2016	***Size of area investigated:*** Two trenches – totalling 29m long by 1.8m wide (52.2m²)
Location of curating museum: Saffron Walden Museum accession code SAFWM: 2016.19	**Funding source:** developer
Further seasons anticipated? Not known	***Related EHER number:*** EHER 4941, 13922, 48223
Final report: CAT Report 988	
Periods represented: Roman	
Summary of fieldwork results: An archaeological evaluation by trial-trenching was carried out on to the west of Granta Cottages, Newmarket Road, Great Chesterford in advance of the construction of a new dwelling. The development site lies within the southwestern corner of the scheduled Roman town. The evaluation revealed the remains of a large (2m wide) robber trench, aligned southwest to northeast. Probably the remains of the 4th century Roman town wall the robber trench appears to be on the same alignment as part of a wall foundation identified in 2013 at No 4 Granta Cottages. Three Roman pits, two undated pits and an undated linear, possibly a ditch, were also excavated.	
Previous summaries/reports: CAT Report 864, FAU Report 2644	
Keywords: –	***Significance:*** **
Author of summary: Laura Pooley	***Date of summary:*** August 2016