Investigations at Houghton Grange, Houghton, Cambridgeshire

Archaeological Evaluation Report

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Investigations at Houghton Grange, Houghton, Cambridgeshire

Archaeological Evaluation

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Summary

OA East (formerly Cambridgeshire County Council's CAM ARC) conducted an archaeological evaluation on land at Houghton Grange near St Ives, Cambridgeshire in late September and early October 2008. The investigation consisted of 14 trenches, 406m in total length, within the proposed redevelopment area of the former research centre, which is to include the construction of c 90 new homes with associated access and services.

This initial phase of evaluation dealt with the area to the north of the Grange itself in open areas constrained by the presence of newts. Appropriate fencing was erected around the trenches prior to the start of work to minimise the threat to this protected species. Huts containing asbestos surround the site. Further evaluation may be required when these huts are removed.

This investigation revealed a number of ditches on a northwest to southeast alignment. A sample of these features were excavated and revealed a wide, shallow profile. They were all alike in colouration of fill, width and orientation and have been interpreted as furrows. Ditches on the same alignment may represent drainage or boundaries associated with the ridge and furrow system. A number of post-medieval and modern drainage ditches were also noted and two undated ditches may represent pre-ridge and furrow drainage or field system.

1 INTRODUCTION

1.1 Location and scope of work

1.1.1 An archaeological evaluation was conducted at Houghton Grange, Houghton, Cambridgeshire.

1.1.2 Houghton Grange lies east of the village of Houghton, on the south side of the Houghton to St Ives Road (TL 5296 2721). The site lies at the top of a steep scarp overlooking the River Ouse and its alluvial floodplain.

1.1.3 The current development involves the construction of c 90 new homes with associated access and services.

1.1.4 This archaeological evaluation was undertaken in accordance with a Brief issued by Kasia Gdnaiec of Cambridgeshire County Council (CCC; Planning Application 0212719OUT), supplemented by a Specification prepared by OA East (formerly Cambridgeshire County Council's CAM ARC).

1.1.5 The work was designed to assist in defining the character and extent of any archaeological remains within the proposed redevelopment area, in accordance with the guidelines set out in *Planning and Policy Guidance 16 - Archaeology and Planning* (Department of the Environment 1990). The results will enable decisions to be made by CCC, on behalf of the Local Planning Authority, with regard to the treatment of any archaeological remains found.

1.1.6 The site archive is currently held by OA East and will be deposited with the appropriate county stores in due course.

1.2 Geology and topography

1.2.1 The site lies on the West Walton formation/ Ampthill Clay beds, capped with boulder clay. The site slopes gently from north to south and lies at approximately 33m OD. Just to the south of the site boundary, a steep scarp falls down to the River Ouse (Drummond-Murray, 2008).

1.3 Archaeological and historical background

Prehistoric

1.3.1 A large number of prehistoric flints have been located in the area, including 3 from within the site boundary (01910, 01914, 01917). These were thought to be Neolithic. A range of other artefacts, including Mesolithic and Bronze Age, have been recovered from surrounding fields, though no direct settlement evidence has been recorded. However the presence of the flints on Boulder Clay is itself of importance as this is a rare occurrence and suggests the absence of colluvium on site.

Roman

1.3.2 Of particular note is an antiquarian observation from the site itself of a rich Roman grave (00712). Whilst the accuracy of the location cannot be verified, locating the presence or absence of a Roman cemetery on the site was a significant aim of the investigation.

Post-Medieval

1.3.3 Houghton Grange was built in 1897. After the Second World War the house was taken over by the Biotechnology and Biological Sciences Research Council and huts were built on the grounds for research into poultry diseases. This use ended in 1992 and the site has been largely vacant since then.

1.4 Acknowledgements

1.4.1 The author would like to thank the Biotechnology and Biological Sciences Research Council who commissioned and funded the work and to Stephen Wadeson, Louis Budworth and Hannah Bosworth who assisted with the evaluation. Thanks are also due to Kasia Gdaniec of Cambridgeshire County Council who monitored the evaluation. The site was directed and surveyed by the author and managed by James Dummond-Murray, additional trenches were excavated by Thomas Lyons.

2 AIMS AND METHODOLOGY

2.1 Aims

2.1.1 The objective of this evaluation was to determine as far as reasonably possible the presence/absence, location, nature, extent, date, quality, condition and significance of any surviving archaeological deposits within the development area.

2.2 Methodology

2.2.1 Machine excavation was carried out under constant archaeological supervision with a tracked 360^0 excavator using a 2.10m wide toothless ditching bucket.

2.2.2 Before work could commence the trenches had to be set out with fencing in order to protect Great Crested Newts which were identified as a protected species on the site. The fencing allowed a 5m wide area for the trenches with access points at either end of the site.

2.2.3 The trench design was approved by Cambridgeshire County Councils Archaeology section before work took place, however, due to restriction from newt fencing, this design had to be revised whilst on site.

2.2.4 The evaluation was carried out in two stages. The first stage (Trenches 1-10 directed by the author) ran between 15th and 19th September 2008. The second stage (Trenches 11-14 directed by Thomas Lyons) was carried out on 1st October at the request of Cambridgeshire County Councils Archaeology section. This was due to the fact that limited trenching was completed in stage 1, as a result of the narrow newt fencing. This second phase aimed to finally establish the presence/absence of any evidence of the Roman burials believed to have been located in the northeast corner of the site (HER 00712).

2.2.5 All archaeological features and deposits were recorded using OA East's *pro-forma* sheets. Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits

2.2.6 The site survey was carried out by the author using a Leica GPS which is located on the Ordnance Survey grid. Levels were also recorded on the top and bottom of each trench and on section drawings with the GPS.

2.2.7 Drawn plans were incorporated with the survey data to accurately plot the position of the trenches.

2.2.8 Colour, monochrome and supplementary digital photographs were taken of all relevant features and deposits.

2.2.9 Service plans were consulted and the area was scanned using a CAT scanner prior to machining.

2.2.10 Weather conditions were good, with constant sunshine and no rain.

2.2.11 A geophysical survey has been undertaken in 2006 by Archaeological Services and Consultancy Ltd (Appendix C). The survey was a detailed magnetometer survey using a Bartington Grad 601-2 with a traverse interval of 1m and sample interval of 0.25m. The survey grids were tied in with TST to semi permanent reference objects. The survey was concentrated on the grounds to the south of the grange itself and the new access in the field to the east of the main site. The results in the area of the revised

scheme provided no targets to assist in the location of the archaeological evaluation trenches.

3 RESULTS

The results will be presented below, trench by trench. Cut numbers will be displayed in **bold** text, all other context in normal text. Appendix B provides descriptions of topsoil and subsoil depths. The location of all trenches can be seen in Figure 1.

3.1 Trench 1

3.1.1 Trench 1 measured 20m in length, 2.10m wide and was oriented approximately east to west (Figure 2).

3.1.2 This trench was excavated to a depth of 0.60m where a natural clay was encountered.

3.1.3 A furrow (**28**) was recorded within this trench. Orientated north-west to south-east, this furrow measured approximately 2m wide and 0.08m deep. No finds were retrieved.

3.2 Trench 2

3.2.1 Trench 2 measured 46m in length, 2.10m wide and was oriented approximatley north to south (Figure 2).

3.2.2 This trench was excavated to a depth of 0.58m where a natural clay was encountered.

3.2.3 Three furrows on a north-west to south-east orientation were recorded. Although these were not excavated, they had the same pale brown silty fill, width, and were on the same orientation as those excavated in Trenches 1 and 5.

3.2.4 Two post-medieval ditches/plough scars were also noted and planned, both cut from above the level of subsoil.

3.3 Trench 3

3.3.1 Trench 3 measured 30.5m in length, 2.10m wide and was oriented approximately east to west. This trench continued into a hard-standing area where the concrete was removed with the machine bucket. This trench was shorter than intended as a sewer/water pipe was prevented further machining (Figure 3).

3.3.2 This trench was excavated to a depth of 0.62m where a natural clay was encountered.

3.3.3 A north-south orientated ditch (**16**) was recorded within this trench. This ditch measured 0.29m wide and 0.10m deep with gradual sloping edges and a flat base (Figure 3, section 4). Filled by a light orangey brown silty clay (15), no dating evidence was retrieved.

3.4 Trench 4

3.4.1 Trench 4 measured 6.5m in length, 2.10m wide and was oriented approximately east to west. Due to the limited space for spoil storage, machining of this trench had to be stopped. The topsoil and subsoil coverage was greater here than on most of the site, creating more spoil. Although natural was reached, it was not possible to continue this trench to meet Trench 2 as intended.

3.4.2 This trench was excavated to a depth of 0.79m where a natural clay was encountered.

3.4.3 No archaeological features were recorded within this trench.

3.5 Trench 5

3.5.1 Trench 5 measured 105m in length, 2.10m wide and was oriented approximately north to south (Figure 4).

3.5.2 This trench was excavated to a depth of 0.57m where a natural clay was encountered.

3.5.3 Seven furrows on the same north-west to south-east orientation were recorded within this trench Three of the furrows were excavated (**06, 08** and **26**) revealing a shallow profile (Figure 8, sections 3 and 9) and light orangey brown fill. All of the furrows were alike in colouration of fill, width, spacing and alignment. No datable finds were retrieved.

3.5.4 One ditch on the same northwest to southeast orientation as the furrows was recorded. Ditch **24** was located approximately 0.50m to the north of furrow **26** and although it was similar in fill and orientation, in profile it was narrower and had more distinct cut edges (Figure 8, section 8), suggesting that this was a ditch. This ditch may represent a boundary ditch to the ridge and furrow system.

3.5.5 A narrow ditch with a dark blackish was recorded, also on the same orientation as the furrows. This ditch (**10**) had moderate sloping edges and a flattish base (Figure 8, section 1). As it is on the same orientation as the furrows and associated boundary trench, this ditch may also be associated and represent a small boundary or drainage ditch. The environmental sample taken from the fill of this feature (Sample 2) did not reveal any surviving environmental or dating evidence.

3.5.6 An undated ditch was recorded within Trench 5 on a different alignment to the furrows and other ditches. Ditch **02** was orientated southwest to northeast. It had steep sloping edges and a flat base (Figure 8, section 7). The fill of this ditch (context 11) was a light orangey brown silty clay with occasional charcoal flecks. No finds were retrieved from the fill of this ditch and the environmental sample taken did not reveal any surviving environmental evidence.

3.6 Trench 6

3.6.1 Trench 6 measured 105m in length, 2.10m wide and was oriented approximately north to south (Figure 4).

3.6.2 This trench was excavated to a depth of 0.55m where a natural clay was encountered.

3.6.3 This trench contained a furrow on the same northwest to southeast orientation as the others investigated in this evaluation. Furrow **04** was very shallow, measuring 0.10m in depth and 1.23m wide with very gradual sloping edges and an undulating irregular base. Finds retrieved included two fragments of redware c. C17th to C18th in date, two mending and deteriorated base fragments of late medieval to early post-medieval date and two small charcoal fragments. This furrow was recorded continuing in Trench 5 where it was planned but not excavated.

3.6.4 Furrow **04** was truncated by a small north to south orientated ditch which contained modern finds including glass and plastic. This was noted and planned but not excavated.

3.7 Trench 7

3.7.1 Trench 7 measured 14.50m in length, 2.10m wide and was oriented approximately east to west (Figure 4).

3.7.2 This trench was excavated to a depth of 0.55m where a natural clay was encountered.

3.7.3 A single ditch on a northwest to southeast orientation was recorded (**12**). This ditch was very shallow, measuring 0.09m deep and 0.53m wide. This ditch had very gradual sloping edges and a concave base (Figure 8, section 2). No finds were retrieved from context 11, the fill of the ditch which was a light, pale brown silty clay. This ditch may represent a small drainage or boundary ditch.

3.8 Trench 8

3.8.1 Trench 8 measured 27.50m in length, 2.10m wide and was oriented approximately north to south (Figure 5).

3.8.2 This trench was excavated to a depth of 0.55m where a natural clay was encountered.

3.8.3 This trench contained a modern service/drainage ditch (**18**) on a north-northeast to south-southwest orientation. This ditch was investigated in a single slot. It had steep sloping edges and a flat base (Figure 5, section 6) measuring approximately 0.70m wide and 0.30m deep. The upper fill has slumped into the top of pit **20**.. It was filled by context 17, a light-mid grey brown, soft silty clay containing occasional chalk flecks. A fragment of post-medieval pottery and two small fragments of undated ceramic building material, likely to be Cambridgeshire clay brick, were retrieved from the bottom on this ditch.

3.8.4 Ditch **18** truncated the edge of a pit (**20**). This pit was 0.25m+ wide and 0.26m deep with steep sloping edges and a flat base (Figure 5, section 6). The fill of this pit was a light greyish brown silty clay and did not contain any finds.

3.8.5 A small undated pit was also excavated in this trench. Pit **22** had steep sloping edges and a rounded base measuring approximately 0.22m wide and 0.14m deep. A sample was taken from context 21, the fill of this pit, however this sample did not contain any environmental or dating evidence.

3.9 Trench 9

3.9.1 Trench 9 measured 25m in length, 2.10m wide and was oriented approximately east to west (Figure 5).

3.9.2 This trench was excavated to a depth of 0.80m where a natural clay was encountered.

3.9.3 No archaeological features were recorded within this trench.

3.10 Trench 10

3.10.1 Trench 10 measured 38m in length, 2.10m wide and was oriented approximately north to south. This trench was located within an area up until recently used as a car park. (Figure 6).

3.10.2 This trench was excavated to a depth of 0.75m where a natural clay was encountered.

3.10.3 A single ditch on an approximate east to west orientation was recorded (**14**). This ditch was moderately shallow, measuring 0.14m deep and 0.40m wide. This ditch had moderately steep sloping edges and an irregular base (Figure 6, section 5). No finds were retrieved from context 13, the fill of the ditch which was a dark, grey-brown silty clay. This ditch may represent a small drainage or boundary ditch.

3.11 Trench 11

3.11.1 Trench 11 measured 3.5m in length, 2.10m wide and was oriented approximately northwest to southeast (Figure 7).

3.11.2 This trench was excavated to a depth of 0.60m where a natural clay was encountered.

3.11.3 No archaeological features were recorded within this trench.

3.12 Trench 12

3.12.1 Trench 12 measured 30m in length, 2.10m wide and was a “T”-shape in plan (Figure 7).

3.12.2 This trench was excavated to a depth of 0.54m where a natural clay was encountered.

3.12.3 A single ditch on an approximate north-west to south-east orientation was recorded (**30**). This ditch was moderately shallow, measuring 0.12m deep and 0.50m wide. This ditch had moderately steep sloping edges and an irregular base. No finds were retrieved from context 29, the fill of the ditch, however fragments of red brick and glass were noted along the surface of the ditch.

3.13 Trench 13

3.13.1 Trench 13 measured 3.5m in length, 2.10m wide and was oriented approximately northwest to southeaast (Figure 7).

3.13.2 This trench was excavated to a depth of 0.72m where a natural clay was encountered.

3.13.3 No archaeological features were recorded within this trench.

3.14 Trench 14

3.14.1 Trench 14 measured 3.5m in length, 2.10m wide and was oriented approximately northwest to southeast (Figure 7).

3.14.2 This trench was excavated to a depth of 0.64m where a natural clay was encountered.

3.14.3 No archaeological features were recorded within this trench.

3.15 Environmental Summary

3.15.1 A total of three environmental samples were taken, however all samples were artefactually and ecofactually sterile.

Sample Number	Fill/Cut number	Feature type
1	01 / **02**	Boundary ditch
2	09 / **10**	Drainage ditch
3	21 / **22**	Pit

4 Summary of the Geophysical Survey on the Areas Investigated

4.1 Introduction

4.1.1 A geophysical survey was undertaken by Archaeological Services and Consultancy Ltd in May 2006. The survey was a detailed magnetometer survey using a Bartington Grad 601-2 with a traverse interval of 1m and sample interval of 0.25m.

4.1.2 Summarised below are the results of the survey in the areas trenched and those features identified which may correspond.

4.2 Block 3

4.2.1 Block 3 was located at the centre of the site over a grassed area surrounded by hardstanding, research establishments and metalled roads (Figures 11-12).

4.2.2 A north-south aligned linear dipolar anomaly at the south of the survey block defines the position of a modern ferrous service pipe or cable. This is likely to be the service trench identified and investigated in Trench 8. A linear dipolar anomaly at the eastern edge of the block defines the location of another modern ferrous service pipe or cable.

4.2.3 The magnetic background of the southern part of the block is disturbed and contains large discrete dipolar anomalies which identify the presence of ferrous objects. Archaeological metalworking residues may cause this type of disturbance but the presence of the service pipe and proximity of other modern features suggests that modern landscaping/intrusive activities are the most likely origin.

4.2.4 Magnetic anomalies suggesting the presence of archaeological features are not identified in this block.

4.2.5 Due to the limited results for this area, the trenches were not set out to target any anomalies.

4.3 Block 4

4.3.1 The block was located at the north of the main body of the site on a grassed area of rough ground containing occasional clumps of waist high grass and nettle (Figures 13-14).

4.3.2 Magnetic disturbance is evident at the eastern perimeter of the block. The disturbance is caused by proximity of the eastern edge of the block to a chain link fence and a research establishment building.

4.3.3 A small number of discrete dipolar anomalies are visible in the western half of the block and could be caused by archaeological ferrous objects. However, significant grouping of the magnetic anomalies, which are more usually caused by modern ferrous objects incorporated into topsoil, is absent and a modern origin is more probable.

4.3.4 A discrete area of magnetic enhancement could define the position of an in-filled pit. An archaeological origin for this anomaly is possible although its proximity to a research establishment building indicates that a modern origin is more probable. This feature may have been in the location of Trench 2, however the only features identified which may have caused this result were furrows and a modern ditch.

4.3.5 Due to the limited results for this area, the trenches were not set out to target any anomalies.

5 Discussion and Conclusions

5.1 Discussion

Post-Medieval

5.1.1 Investigations at Houghton Grange have revealed evidence of post-medieval ridge and furrow in the area to the north of the Grange itself. The northwest to southeast layout of the field system is clearly evident in Trenches 1, 2, 5 and 6 (Figure 9).

5.1.2 Ditch **24**, although undated is on the same alignment as the furrows and may be contemporary and represent a boundary between plots or fields.

5.1.3 The fact that there was no continuation of the furrows identified in Trench 10 may suggest that there may have been a boundary to this field system located between Trenches 5 and 10.

5.1.4 There was no obvious continuation of the furrows into Trench 10 to the west, which may suggest they did not continue this far.

5.1.5 Consultation of aerial images (www.live.maps.com) does not show the ridge and furrow revealed from the evaluation, nor does it show any continuation in nearby fields. However, the orientation of the furrows respects that of Houghton Road as it continues into Sawtry Way and therefore may be respecting an earlier road layout.

5.1.6 The area investigated was likely to have been heavily landscaped during the construction of Houghton Grange in the late 19th century. Consultation of an early 20th century map from 1907 (www.old-maps.co.uk) shows that the site has varied little (apart from the construction of the research laboratories) since then. Landscaping and wholesale movement of soil to create a flat parkland surrounding the approach to the Grange would explain the increased depth in topsoil at the southern end of the site.

Undated

5.1.7 Despite investigation, a number of ditches remain undated.

5.1.8 Ditches **16** (Trench 3), **12** (Trench 7) and **14** (Trench 10) were all similar in profile, depth and colouration of fill. These ditches were all relatively shallow (c.0.05-0.14m deep) and quite narrow (c. 0.25-0.53m) as well as having a similar light-mid grey brown silty fill. Ditch **02** (Trench 5) is also undated, although wider and deeper than those mentioned previously. These ditches are all on different alignments (Figure 9) and also different to the furrows. They may represent pre-ridge and furrow field systems or settlement boundaries, however a lack of dating evidence prevents further conclusions.

5.2 Conclusions

5.2.1 Investigations at Houghton Grange have revealed evidence of post-medieval cultivation and undated activity likely to be earlier.

5.2.2 The Roman burial thought to be located in the north-east corner of the site was not identified despite specific targeted trenching in this part of the site. Despite the inaccuracy of plotting in the 19th century and the known unreliability of such spot finds, this investigation has not proven that the burial was not located in this part of the site – simply that it was not identified in the trenches dug. If this was an isolated burial, it is not totally surprising that it was not found. However,

if there was a cemetary associated with this burial, the evaluation has proven that it did not extend into the area investigated.

5.2.3 Further work which may be required when the research huts are removed and may add more of a level of certainty to this discussion.

Recommendations for any future work based upon this report will be made by the County Archaeology Office.

Appendix A. Trench Descriptions and Context Inventory

Trench 1						
General description					**Orientation**	E-W
This trench contained a shallow NW-SE orientated ditch (**28**), interpreted as a furrow. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.60
					Width (m)	2.10
					Length (m)	20
					Height(mOD) top of trench	34.19
					Height(mOD) base of trench	33.71
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
100	Layer	2.10m	0.17m	Topsoil	-	-
101	Layer	2.10	0.43m	Subsoil	-	-
27	Fill	2.25m	0.08m	Fill of **28**	-	-
28	Cut	2.25m	0.08m	Cut of Furrow	-	post-medieval

Trench 2						
General description					**Orientation**	N-S
This trench contained three ditches on a NW-SE orientation. Due to the similarity in spacing, colour of fill and orientation with **28** in Trench 1, these features were all interpreted as furrows and therefore not excavated. Post medieval brick and glass was observed on the surface of two of these features. Two modern service trenches were planned and noted, but not excavated. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.58m
					Width (m)	2.10
					Length (m)	45.80
					Height(mOD) top of trench	34.37
					Height(mOD) base of trench	33.84
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
200	Layer	2.10	0.20	Topsoil	-	-
201	Layer	2.10	0.38	Subsoil	-	-

Trench 3						
General description					**Orientation**	E-W
This trench contained a single north-south orientated ditch (**16**). Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.62
					Width (m)	2.10
					Length (m)	30.5
					Height(mOD) top of trench	34.24
					Height(mOD) base of trench	33.66
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
300	Layer	2.10	0.20	Topsoil	-	-
301	Layer	2.10	0.42	Subsoil	-	-
15	Fill	0.28	0.05	Fill of **16**	-	-
16	Cut	0.28	0.05	Cut of ditch	-	-

Trench 4						
General description					**Orientation**	E-W
No archaeological features were recorded within this trench. A modern service trench (complete with cable) was noted. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.79
					Width (m)	2.10
					Length (m)	6.50
					Height(mOD) top of trench	34.54
					Height(mOD) base of trench	33.83
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
400	Layer	2.10	0.24	Topsoil	-	-
401	Layer	2.10	0.55	Subsoil	-	-

Trench 5						
General description					**Orientation**	N-S
This trench contained three ditches (**24**, **02**, and **08**), six furrows on a roughly northeast to southwest orientation (**26** and **06** excavated) and a modern drainage (?) ditch (**10**). Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.57
					Width (m)	2.10
					Length (m)	105
					Height(mOD) top of trench	34.39
					Height(mOD) base of trench	33.84
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
500	Layer	2.10	0.37	Topsoil	-	-
501	Layer	2.10	0.20	Subsoil	-	-
23	Fill	0.71	0.12	Fill of **24**	-	-
24	Cut	0.71	0.12	Cut of ditch	-	-
25	Fill	0.91	0.12	Fill of **26**	-	-
26	Cut	0.91	0.12	Cut of Furrow	-	-
01	Fill	0.61	0.32	Fill of **02**	-	-
02	Cut	0.61	0.32	Cut of ditch	-	-
07	Fill	1.07	0.20	Fill of **08**	-	-
08	Cut	1.07	0.20	Cut of Furrow	-	-
05	Fill	1.73	0.12	Fill of **06**	-	-
06	Cut	1.73	0.12	Cut of Furrow	-	-
09	Fill	0.45	0.17	Fill of **10**	-	-
10	Cut	0.45	0.17	Cut of modern ditch	-	-

Trench 6						
General description					**Orientation**	E-W
This trench contained a furrow (**04**) which continued into Trench 5 where it was planned but not investigated. A modern ditch on a north to south orientation was noted but not investigated. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.55
					Width (m)	2.10
					Length (m)	52.50
					Height(mOD) top of trench	33.80
					Height(mOD) base of trench	33.35
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
600	Layer	2.10	0.25	Topsoil	-	-
601	Layer	2.10	0.30	Subsoil	-	-
03	Fill	1.23	0.10	Fill of **04**	Pottery	post-medieval
04	Cut	1.23	0.10	Cut of furrow	-	-

Trench 7						
General description					**Orientation**	E-W
This ditch contained a narrow undated ditch on a northwest to southeast orientation. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.56
					Width (m)	2.10
					Length (m)	14.5
					Height(mOD) top of trench	33.96
					Height(mOD) base of trench	33.32
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
700	Layer	2.10	0.21	Topsoil	-	-
701	Layer	2.10	0.35	Subsoil	-	-
11	Fill	0.53	0.09	Fill of **12**	-	-
12	Cut	0.53	0.09	Cut of ditch	-	-

Trench 8						
General description					**Orientation**	N-S
This trench contained a modern service/drainage ditch (**18**) on a north-northeast to south-southwest orientation and an undated pit (**20**). Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.58
					Width (m)	2.10
					Length (m)	27.50
					Height(mOD) top of trench	33.15
					Height(mOD) base of trench	32.65
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
800	Layer	2.10	0.34	Topsoil	-	-
801	Layer	2.10	0.24	Subsoil	-	-
17	Fill	0.90+	0.30	Fill of **18**	Pottery, CBM	post-medieval
18	Cut	0.90+	0.30	Cut of mod drainage ditch	-	-
19	Fill	0.25+	0.26	Fill of **20**	-	-
20	Cut	0.25+	0.26	Cut of pit?	-	-

Trench 9						
General description					**Orientation**	E-W
No archaeological features were recorded within this trench. Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.80
					Width (m)	2.10
					Length (m)	25
					Height(mOD) top of trench	33.66
					Height(mOD) base of trench	33.21
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
900	Layer	2.10	0.20	Topsoil	-	-
901	Layer	2.10	0.60	Subsoil	-	-

Trench 10						
General description					**Orientation**	N-S
This trench contained one modern service trench and a ditch on an approximate east-west orientation (**14**). Car park surface layers and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.75
					Width (m)	2.10
					Length (m)	38.0
					Height(mOD) top of trench	34.29
					Height(mOD) base of trench	33.59
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
1000	Layer	2.10	0.23	Car park construction and surface layers	-	-
1001	Layer	2.10	0.47	Subsoil	-	-
13	Fill	0.40	0.14	Fill of **14**	-	-
14	Cut	0.40	0.14	Cut of ditch	-	-

Trench 11						
General description					**Orientation**	
No archaeological features were recorded within this trench. Car park surface layers and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.60
					Width (m)	2.10
					Length (m)	3.50
					Height(mOD) top of trench	34.15
					Height(mOD) base of trench	33.26
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
1100	Layers	2.10	0.26	Car park construction and surface layers	-	-
1101	Layer	2.10	0.34	Subsoil	-	-

Trench 12						
General description					**Orientation**	N-S & E-W
This “T”-shaped trench contained a narrow post-medieval ditch on a northwest to southeast orientation (**30**). Topsoil and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.54
					Width (m)	2.10
					Length (m)	30
					Height(mOD) top of trench	34.11
					Height(mOD) base of trench	33.28
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
1200	Layer	2.10	0.24	Car park construction and surface layers	-	-
1201	Layer	2.10	0.30	Subsoil	-	-
29	Fill	0.50	0.12	Fill of **30**	-	-
30	Cut	0.50	0.12	Cut of ditch	Y	Post-medieval brick – not collected

Trench 13						
General description					**Orientation**	
No archaeological features were recorded within this trench. Car park surface layers and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.72
					Width (m)	2.10
					Length (m)	3.50
					Height(mOD) top of trench	34.11
					Height(mOD) base of trench	33.30
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
1300	Layers	2.10	0.30	Car park construction and surface layers	-	-
1301	Layer	2.10	0.42	Subsoil	-	-

Trench 14						
General description					**Orientation**	
No archaeological features were recorded within this trench. Car park surface layers and subsoil were recorded overlying a natural clay with chalk flecks.					**Avg. depth (m)**	0.64
					Width (m)	2.10
					Length (m)	3.50
					Height(mOD) top of trench	34.14
					Height(mOD) base of trench	33.27
Contexts						
context no	**type**	**Width (m)**	**Depth (m)**	**comment**	**finds**	**date**
1400	Layers	2.10	0.20	Car park construction and surface layers	-	-
1401	Layer	2.10	0..44	Subsoil	-	-

APPENDIX B. POST MEDIEVAL POTTERY ANALYSIS, BY DR ALISDAIR BROOKS

B.1 Introduction

B.1.1 The evaluation at Houghton Grange produced a total of nine artefacts from two contexts. These included four fragments of pottery and two charcoal fragments in context 03, and one fragment of pottery and two fragments of ceramic building material in context 17. This small assemblage consists of small, fragmentary objects with individual object weighing more than 24 grams. With the exception of two fragments of late medieval to transitional medieval to post-medieval fragments in context 03, the pottery is post-medieval in date.

B.2 Methodology

B.2.1 In so far as a formal citable methodology was deemed necessary for such a small, fragmentary post-medieval assemblage featuring no diagnostically dateable fragments, the pottery has been catalogued and processed according to the procedures in the author's own guide to later post-medieval pottery (Brooks 2005).

B.3 Quantification

B.3.1 Context 3 contains:

- 2 fragments of post-medieval redware (total weight 12 grams), one of which features a small fragment of slip decoration. These are most probably 17th- to 18th-century in date.
- 2 mending and deteriorated base fragments (12 grams), most probably late medieval or transitional late medieval to early post-medieval in date. Precise identification is difficult given the surface deterioration.
- small fragments of charcoal (2 grams).

B.3.2 Context 17 contains:

- 1 fragment of post-medieval redware (24 grams), most probably 18th-century in date, but not particularly diagnostic.
- 2 small fragments of ceramic building material, probably brick (9 grams). These feature the pale yellow clay typical of Cambridgeshire CBM, but are otherwise not diagnostic.

B.4 Research Potential and Further Work Statement

B.4.1 This small assemblage has no real research potential, and no further work is either necessary or recommended.

Archaeological Services & Consultancy Ltd

GEOPHYSICAL SURVEY:
HOUGHTON GRANGE
HOUGHTON
CAMBRIDGESHIRE

on behalf of
Archaeological Field Unit
Cambridgeshire County Council

Alastair Hancock BSc PgDip

May 2006

Summary

Geophysical survey (detailed magnetometry) was carried out by ASC Ltd at the site of a disused government research centre located c.0.5km east of Houghton, Cambridgeshire. The area suitable for survey was constrained by the presence of extant buildings, areas of hardstanding, mature trees/thick undergrowth and metal fencing. Survey was undertaken in five discreet blocks spread across the site; all show a degree of magnetic disturbance caused by modern activity.

Blocks 1, 4 and 5 contain discrete areas of magnetic enhancement which could indicate the locations of archaeological pits/burials. However, the recent use of the site suggests that these areas are caused by modern intrusive activity. Parallel linear magnetic trends, consistent with the presence of vestigial remnants of ridge and furrow, and a positive linear magnetic anomaly identifying an infilled ditch are present in Block 2. The antiquity of the ditch is uncertain although it has a different orientation to the ridge and furrow and must pre or post date the remnants of this open field system.

C.1 Introduction

General

C.1.1 Archaeological Services and Consultancy Ltd (ASC) was commissioned by Cambridgeshire County Council Archaeological Field Unit (AFU), to carry out a programme of magnetometer (fluxgate gradiometer) survey on behalf of the Biotechnology and Biological Sciences Research Council. The survey took place on suitable locations within a 10.5 hectare parcel of land occupied by the disused site of Houghton Grange research centre, (NGR TL 2963 7210, site centre: Fig. 1). The project was carried out in accordance with methods set out in a specification for archaeological evaluation prepared by the AFU (Drummond-Murray 2006) and was undertaken to aid definition of the archaeological potential of the site in advance of proposed housing development (Planning App. Ref: 0212719/OUT).

C.1.2 Fieldwork commenced on the 16th May 2006 and was completed on the 17th May. The weather was fine during the first day of fieldwork although it was overcast with intermittent showers during the final day. Groundcover at the time of survey was short grass and stubble.

Location and Description

C.1.3 The majority of the site was located on the former grounds of Houghton Grange, a large extant house built during the late 19th century. The site covered a total area of c.10.5ha and was located c.0.5km east of the village of Houghton, which lies between the towns of Huntingdon and St Ives.

C.1.4 The main body of the survey area formed a rectangular parcel of land located in Houghton and Wyton CP although a curvilinear corridor extends eastward into Saint Ives CP. The survey area was delimited by the A1123 Houghton Road at the north and by fencing to the east, west and south. The 20m wide curvilinear corridor extending from the eastern edge of the main part of the site curved across pasture and an area of disused industrial buildings to eventually terminate at the A1123.

Existing Buildings and Access

C.1.5 Main access to the site was via a metalled driveway extending off the A1123 Houghton Road. Pre-fabricated buildings and metalled roads of the former research establishment were extant along the eastern and western boundaries of the site. At the centre of the site was an area of hardstanding and further isolated buildings of the research establishment. The late 19th century house and late 20th century concrete extensions to its eastern and western elevations were located at the southern end of the access driveway. Landscaped gardens lay south of the 19th century house although much of this area was overgrown or covered with mature trees.

Geology and Topography

C.1.6 The soils of the site are mainly of the Hanslope Association (Soil Survey, 1983, 411d), described as “slowly permeable calcareous clayey soils. Some slowly permeable non calcareous soils. Slight risk of water erosion”. The underlying geology consists of chalky till. The site exhibits a gentle north-south trending slope that descends from c.35m AOD to c.30m AOD.

Constraints

C.1.7 The presence of buildings, hardstanding and mature trees/thick undergrowth meant that much of the main body of the site was not suitable for geophysical survey. At least 60 per cent of the 20m wide corridor branching eastward from the main body of the site was similarly covered with disused buildings or barbed wire fencing and was also unsuitable for geophysical survey.

C.2 Aims, Methodology and Report Presentation

C.2.1 The aims and methods of the geophysical survey were set out in a specification for archaeological evaluation (Drummond-Murray 2006). In summary; the objectives of the survey were to determine the location and character of any geophysical anomalies caused by archaeological features and inform the layout of evaluation trenches.

C.2.2 The survey, report and archive format follow the recommendations outlined in English Heritage guidelines (David 1995) and AHDS guidelines (Schmidt, 2001) as a minimum standard. All figures reproduced from Ordnance Survey mapping are done so with the permission of the controller of Her Majesty's Stationery Office, © Crown copyright.

C.2.3 Figure 10 is a site location plan (1:5000) showing the boundaries of the survey area plus the location of the detailed survey blocks. The processed greyscale gradiometer data and accompanying interpretations are presented in Figures 11 to 14 at a scale of 1:1000. XY trace plots (1:500) of the unprocessed "raw" gradiometer data are presented in Figures 15 and 16.

C.2.4 Comprehensive technical details on the underlying principles of magnetic survey, the equipment used and general geophysical survey methodology are given in Appendix C.1. Details on data processing and display are also given in Appendix C.1. Survey location information is provided in Appendix C.22 and the composition of the archive is described in Appendix C.3.

C.3 Results and Discussion

Detailed magnetometer survey was undertaken in five blocks (Fig. 2). Isolated dipolar anomalies ("iron spikes" – Appendix 1) are evident in all survey blocks. These "iron spike" anomalies are usually indicative of ferrous objects or other magnetic material in the topsoil/subsoil and are often caused by modern cultural debris. Archaeological artefacts may cause them and significant clusters associated with other substantiating evidence may be included in the following discussion.

Block 1 (Figure 11 - 12)

C.3.1 Block 1 was surveyed on an artificially levelled lawn area located immediately south of the 19th century house.

C.3.2 A slightly overgrown modern cinder/gravel path was observed running north-south through the centre of the lawn during fieldwork. The north-south orientated positive linear magnetic anomaly at the centre of the survey block is caused by the magnetic properties of the material used to construct the path.

C.3.3 Two east-west aligned curvilinear clusters of discrete dipolar anomalies are present west of the modern path. The reason for the grouping of these anomalies is unclear although each individual anomaly is caused by a highly thermoremanent or ferrous

object. It is suggested that the clusters of anomalies indicate the presence of relatively modern garden features, result from garden landscaping or are the bases of ferrous fence posts.

C.3.4 The presence of cut and infilled archaeological features could be suggested by four discrete areas of magnetic enhancement. This area was incorporated into the formal garden of Houghton Grange and the four areas of enhancement more probably result from deposition of material during 19th century levelling of the lawn area.

Block 2 (Figure 11 – 12)

C.3.5 Block 2 was located in an open grassed field at the south of the site. Obvious landscaping was absent and construction of the 19th century house and later research establishment buildings may have had little impact in this area.

C.3.6 Large areas of magnetic disturbance are present adjacent to the eastern, western and northern perimeter of Block 2. The disturbance is caused by metal fencing at the perimeter of the field and by a metalled drive and building at the northwest of the survey block. A large discrete dipolar anomaly at the northwest of the main body of the block is caused by the presence of a modern ferrous object.

C.3.7 Several parallel, NNE-SSW orientated, weakly positive linear magnetic trends are identified at the centre of the survey block. This type of anomaly is characteristic of denuded ridge and furrow. Poorly preserved parallel NNE-SSW aligned linear earthworks were observed during the survey. The visual identification of the remains of ridges confirms that the magnetic anomalies are caused by vestigial remnants of the open field system.

C.3.8 A NNW-SSE aligned linear anomaly at the southwest of the block identifies the location of an infilled ditch. The antiquity of the ditch is uncertain although it runs across the ridge and furrow, which indicates that it pre or post dates the open field system.

Block 3 (Figure 11 – 12)

C.3.9 Block 3 was located at the centre of the site over a grassed area surrounded by hardstanding, research establishment buildings and metalled roads.

C.3.10 A north-south aligned linear dipolar anomaly at the south of the survey block defines the position of a modern ferrous service pipe or cable. A linear dipolar anomaly at the eastern edge of the block identifies the location of another modern ferrous service pipe or cable.

C.3.11 The magnetic background of the southern part of the block is disturbed and contains large discrete dipolar anomalies which identify the position of ferrous objects. Archaeological metalworking residues may cause this type of disturbance but the presence of the service pipe and proximity of other modern features suggests that modern landscaping/intrusive activities are the most likely origin.

C.3.12 Magnetic anomalies suggesting the presence of archaeological features are not identified in this block.

Block 4 (Figure 13 – 14)

C.3.13 The block was located at the north of the main body of the site on a grassed area of rough ground containing occasional clumps of waist high grass and nettle.

C.3.14 Magnetic disturbance is evident at the eastern perimeter of the block. The disturbance is caused by proximity of the eastern edge of the block to a chain link fence and a research establishment building.

C.3.15 A small number of discrete dipolar anomalies are visible in the western half of the block and could be caused by archaeological ferrous objects. However, significant grouping of the magnetic anomalies, which are more usually caused by modern ferrous objects incorporated into topsoil, is absent and a modern origin is more probable.

C.3.16 A discrete area of magnetic enhancement could define the position of an infilled pit. An archaeological origin for this anomaly is possible although its proximity to a research establishment building indicates that a modern origin is more probable.

Block 5 (Figure 13 – 14)

C.3.17 The block was located in the only area of the eastern curvilinear corridor suitable for geophysical survey. It traversed a pasture field bounded with metal fencing at its eastern and western perimeter.

C.3.18 A north-south aligned linear dipolar anomaly at the eastern end of the survey block defines the position of a modern ferrous service pipe.

C.3.19 Discrete dipolar anomalies and a variable magnetic background are visible at the eastern end of the block. The anomalous area is partly the result of proximity of the survey block to a barbed wire fence but is also characteristic of recently disturbed ground.

C.3.20 Magnetic disturbance is present adjacent to the western end of the block. The disturbance is caused by proximity of the survey block to a barbed wire field boundary.

C.3.21 A linear alignment of four areas of magnetic enhancement / disturbance is present in the eastern half of the survey block. Infilled archaeological pits could cause these anomalies although they lack the smooth sinusoidal shape of classic archaeological magnetic anomalies and a more modern origin is probable.

C.3.22 A group of four discrete areas of magnetic enhancement / disturbance are present in the western half of the survey block. The anomalies could be caused by infilled archaeological pits although they lack the smooth sinusoidal shape of classic archaeological magnetic anomalies and a more modern origin is probable.

C.4 Conclusions

C.4.1 Modern activity is illustrated by areas of magnetic disturbance present in all five survey blocks and modern service pipes or cables identified in Blocks 3 and 5. The disturbance appears most intense in the area surrounding the 19th century house.

C.4.2 The location of burials are difficult to define by geophysical survey as they are often shallow, and their fills frequently exhibit little contrast with the properties of the surrounding soil matrix. Discrete dipolar anomalies caused by ferrous grave goods are more easily discerned, but archaeologically significant clusters of this type of anomaly have not been identified.

C.4.3 Blocks 1, 4 and 5 contain a small number of discrete areas of magnetic enhancement that could be caused by archaeological features. However, the recent history of the site suggests that the enhancements is probably caused by modern activity.

C.4.4 The characteristic signature of denuded ridge and furrow is present in survey block 2 at the southeast of the site.

C.4.5 An infilled ditch is identified in survey block 2. It is unclear whether this is an archaeological or relatively modern feature although it cuts across the ridge and furrow and therefore pre or post dates the open field system.

C.4.6 The magnetic disturbance and extant buildings suggest that much of the site may have limited archaeological potential. The identification of an infilled ditch at the south of the site suggests that this area may have medium archaeological potential.

C.5 Acknowledgements

C.5.1 The author is grateful to James Drummond-Murray of Cambridgeshire County Council Archaeological Field Unit for commissioning this work and Bob Zeepvat BA MIFA for editing the report. The fieldwork team consisted of the author and Derek Watson BA, MSc, PhD.

5.2.4 Fieldwork

5.2.5 A Hancock BSc PgDip

5.2.6 D Watson PhD

5.2.7 Report

5.2.8 A. Hancock

5.2.9 Graphics

5.2.10 A. Hancock

5.2.11

5.2.12

C.6 Appendix C.1 : Magnetic Survey: Technical Information

1. Magnetic Susceptibility and Soil Magnetism

C.6.1 Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. These effects are often observable by measuring the magnetic susceptibility of the topsoil, which can enable identification of areas where human occupation or settlement has occurred by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently fills features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

C.6.2 In general, it is a contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of the surrounding matrix, i.e topsoils, subsoils and rocks, into which these features have been cut that causes the most recognisable archaeological responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been

backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes that intrude into the topsoil may give a negative magnetic response relative to the background level.

C.6.3 An alternative method of enhancement to the magnetic properties of soil or archaeological features is through sustained heating. This can lead to the detection of features such as hearths, kilns or burnt areas through thermoremanent magnetism.

2. Types of Magnetic Anomaly

C.6.4 In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background. Such negative anomalies are often very faint and are commonly caused by modern, non-ferrous, features such as plastic water pipes. Infilled natural features may also appear as negative anomalies on some geologies.

C.6.5 Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

C.6.6 It should be noted that anomalies that are interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

C.6.7 The types of response mentioned above can be divided into five main categories which are used in the graphical interpretation of the magnetic data:

- **Isolated dipolar anomalies (iron spikes)**

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

- **Areas of magnetic disturbance**

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. This type of anomaly is characterised by very strong, 'spiky' variations in the magnetic background. A modern origin is usually assumed unless there is other supporting information.

- **Linear trend**

This is usually a weak or broad linear anomaly of unknown cause or date. An agricultural origin, either ploughing or land drains is a common cause.

- **Areas of magnetic enhancement/positive isolated anomalies**

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an X–Y trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response

characteristic of an area of magnetic disturbance or of an 'iron spike' (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post holes or by kilns, with the latter often being characterised by a strong, positive double peak response. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

- **Linear and curvilinear anomalies**

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

3. Methodology

Gradiometer Survey

C.6.8 There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as scanning and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10-15m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey. In favourable circumstances scanning may be used to map out the full extent of features located during a detailed survey.

C.6.9 The second method is referred to as detailed survey and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.5m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

C.6.10 The Geoscan FM36 fluxgate gradiometer and ST1 sample trigger were used for the detailed gradiometer survey. Readings were taken, on the 0.1nT range, at 0.5m intervals on zig-zag traverses 1m apart within 20m by 20m square grids.

Data Processing and Presentation

C.6.11 The detailed gradiometer data has been presented in this report in X-Y trace and greyscale formats. The former option shows the 'raw' data with no processing other than grid biasing whilst in the latter the data has been selectively filtered to remove spurious errors such as striping effects and edge discontinuities caused by instrument drift and inconsistencies in survey technique caused by poor field conditions.

C.6.12 An X-Y plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the data has been clipped at 5nT. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the 'shape' of individual anomalies can be discerned and potentially archaeological anomalies differentiated from 'iron spikes'. Geoplot v3 was used to create the X-Y trace plots.

C.6.13 Geoplot v3 was used to process the data and produce the greyscale images and XY trace plots. All greyscale plots are displayed using a linear incremental scale.

C.7 Appendix C.2 :Survey Location Information

C.7.1 The survey blocks were established using a Trimble TS315 total station theodolite. Survey block points at 60m intervals were set out with the total station theodolite and points at 20m intervals were set out as required using 100m tapes.

C.7.2 The survey grids were superimposed onto an Ordnance Survey digital map base. Overall there was a good correlation between the local survey and the digital map base and it is estimated that the average 'best fit' error is better than ±2m. It should be noted that Ordnance Survey 1:2500 mapping data have an error of ±1.9m at 95% confidence. This potential error must be considered if co-ordinates are measured off for relocation purposes from points other than those listed below or if anomalies are relocated using GPS technology.

Station	Easting	Northing
A (metal pin)	529550.81	271932.19
B (metal pin)	529580.63	271975.29
C (fence post)	529615.33	271919.20
D (metal pin)	529685.95	271933.24
E (metal pin)	529617.37	272006.40
F (metal pin)	529640.71	272071.84
G (metal pin)	529626.24	272112.48
H (metal pin)	529671.99	272165.47
I (metal pin)	529694.85	272237.82
J (metal pin)	529781.16	272174.38
K (metal pin)	529846.31	272125.10

C.8 Appendix C.3 :Geophysical Archive

C.8.1 The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data; plot meshes and composites, report text (Word 2000), and graphics files (CorelDraw12 and AutoCAD 2000) files.
- a full copy of the report

At present the archive is held by ASC Ltd although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the relevant Sites and Monument Record Office).

C.9 Appendix C.4 :ASC OASIS Form

Appendix 5: ASC OASIS Form							
PROJECT DETAILS							
Project Name:	Geophysical Survey Houghton Grange, Houghton Cambridgeshire						
Short Description:	A magnetometer survey was carried out at the site of a disused government research establishment. Remnants of ridge and furrow plus an infilled ditch of unknown date were located						
Project Type: (indicate all that apply)	DBA	FW	**Geophys**	Survey	Bldg Rec	Post-Exc	
	WB	Strip&Rec	Trenching	Test pits	Exc	Other	
Site status: (eg. none, SAM, Listed)	None		Previous work: (eg. SMR refs)	None			
Current land use:	Disused research establishment		Future work: (yes / no / unknown)	Yes			
Monument type:	na		Monument period:	na			
Significant finds: (artefact type & period)	Ditch						
PROJECT LOCATION							
County:	Cambridgeshire		OS reference: (to at least 8 figures)	TL 2963 7210			
Site address: (with postcode if known)	Houghton Grange, Houghton, Cambridgeshire						
Study area: (sq. m. or ha)	10.5 ha		Height OD: (metres)	*c.* 30m			
PROJECT CREATORS							
Organisation:	Archaeological Services & Consultancy Ltd						
Project brief originator:	Project design originator:		James Drummond-Murray				
Project Manager:	B Zeepvat		Director/Supervisor:	A. Hancock			
Sponsor / funding body:	Cambridgeshire County Council Archaeological Field Unit						
PROJECT DATE							

Start date:	16th May 2006	End date:	17th May 2006
PROJECT ARCHIVES			
Location (Accession no.)		Content (eg. pottery, animal bone, files/sheets)	
Physical:	None	None	
Paper:	ASC Ltd	Fieldwork report	
Digital:	ASC Ltd	Report text, geophysical data, illustrations, basemap	
BIBLIOGRAPHY (Journal/monograph, published or forthcoming, or unpublished client report)			
Title:	Geophysical Survey, Houghton Grange, Houghton, Cambridgeshire		
Serial title & volume:	Unpublished client report		
Author(s):	A Hancock		
Page nos	1 - 27	Date:25th May 2006	

APPENDIX D. BIBLIOGRAPHY

Brooks, A	2005	An Archaeological Guide to British Ceramics in Australia, 1788-1901. The Australasian Society for Historical Archaeology, Sydney, and the La Trobe University Archaeology Program, Melbourne.
David A	1995	*Geophysical Survey in Archaeological Field Evaluation.* English Heritage (London).
Drummond-Murray, J.	2008 (revised ed.)	Specification for Archaeological Evaluation: Houghton Grange
Drummond-Murray, J.	2006	Specification for Archaeological Evaluation: Houghton Grange, Cambridgeshire County Council
Gdaniec, K.	2006	Brief for Archaeological Evaluation: Houghton Grange, Houghton Road, St Ives, Cambridgeshire
Schmidt A	2001	Geophysical Data in Archaeology: a Guide to Good Practice. Archaeology Data Service. http://adsahdsacuk/project/goodguides/geophys/

Other Sources Consulted

www.map.live.com

www.old-maps.co.uk

APPENDIX E. OASIS REPORT FORM

All fields are required unless they are not applicable.

Project Details

OASIS Number: oxfordar3-49871

Project Name: Evaluation at Houghton Grange, Houghton, Cambridgeshire

Project Dates (fieldwork) Start: 15-09-2008 Finish: 01-10-2008

Previous Work (by OA East): No Future Work: Unknown

Project Reference Codes

Site Code	HOUHOG06	Planning App. No.	0212719OUT
HER No.	ECB 2283	Related HER/OASIS No.	n/a

Type of Project/Techniques Used

Prompt: Direction from Local Planning Authority - PPG16

Development Type: Rural Residential

Please select all techniques used:

- ☐ Aerial Photography - interpretation
- ☐ Aerial Photography - new
- ☐ Annotated Sketch
- ☐ Augering
- ☐ Dendrochronological Survey
- ☐ Documentary Search
- ☒ Environmental Sampling
- ☐ Fieldwalking
- ☒ Geophysical Survey
- ☐ Grab-Sampling
- ☐ Gravity-Core
- ☐ Laser Scanning
- ☐ Measured Survey
- ☐ Metal Detectors
- ☐ Phosphate Survey
- ☐ Photogrammetric Survey
- ☐ Photographic Survey
- ☐ Rectified Photography
- ☐ Remote Operated Vehicle Survey
- ☒ Sample Trenches
- ☐ Survey/Recording Of Fabric/Structure
- ☐ Targeted Trenches
- ☐ Test Pits
- ☐ Topographic Survey
- ☐ Visual Inspection (Initial Site Visit)

Monument Types/Significant Finds & Their Periods

List feature types using the NMR Monument Type Thesaurus and significant finds using the MDA Object type Thesaurus together with their respective periods. If no features/finds were found, please state "none".

Monument	Period	Object	Period
ridge and furrow	Post Medieval 1540 to 1901	pottery	Post Medieval 1540 to 1901
drainage ditch	Post Medieval 1540 to 1901	CBM	Post Medieval 1540 to 1901
boundary ditches	Uncertain		Select period...

Project Location

County: Huntingdonshire

District: Houghton and Wyton

Parish:

Site Address (including postcode if possible): Houghton Grange, Houghton Road, Houghton, Cambridgeshire, PE28 2BZ

HER: ECB 2283

Study Area: c.3 hectares

National Grid Reference: TL 2963 7210

☒ Text ☒ Survey

Project Originators

Organisation	OA EAST
Project Brief Originator	Cambridgeshire County Council
Project Design Originator	James Drummond-Murray
Project Manager	James Drummond-Murray
Supervisor	Taleyna Fletcher

Project Archives

Physical Archive	Digital Archive	Paper Archive
Cambs County Store	OA East	Cambs County Store
HOU HOG 06	HOU HOG 06	HOU HOG 06

Archive Contents/Media

	Physical Contents	Digital Contents	Paper Contents
Animal Bones	☐	☐	☐
Ceramics	☒	☐	☐
Environmental	☒	☐	☐
Glass	☐	☐	☐
Human Bones	☐	☐	☐
Industrial	☐	☐	☐
Leather	☐	☐	☐
Metal	☐	☐	☐
Stratigraphic		☐	☒
Survey		☒	☒
Textiles	☐	☐	☐
Wood	☐	☐	☐
Worked Bone	☐	☐	☐
Worked Stone/Lithic	☐	☐	☐
None	☐	☐	☐
Other	☐	☐	☐

Digital Media	Paper Media
☐ Database	☐ Aerial Photos
☐ GIS	☒ Context Sheet
☒ Geophysics ☒ Images	☒ Correspondence ☐ Diary
☒ Illustrations	☒ Drawing
☐ Moving Image ☐ Spreadsheets	☐ Manuscript ☐ Map
☒ Survey	☐ Matrices
☐ Virtual Reality	☐ Misc.
	☒ Research/Notes ☒ Photos
	☒ Plans
	☒ Report ☒ Sections

Notes:

Drawing Conventions

Plans

Limit of Excavation

Deposit - Conjectured

Natural Features

Sondages/Machine Strip

Intrusion/Truncation

Illustrated Section S.14

Archaeological Deposit

Excavated Slot

Modern Deposit

Cut Number 118

Sections

Limit of Excavation

Cut

Cut-Conjectured

Deposit Horizon

Deposit Horizon - Conjectured

Intrusion/Truncation

Top Surface/Top of Natural

Break in Section/
Limit of Section Drawing

Cut Number 118

Deposit Number 117

Ordnance Datum 18.45m OD

Inclusions

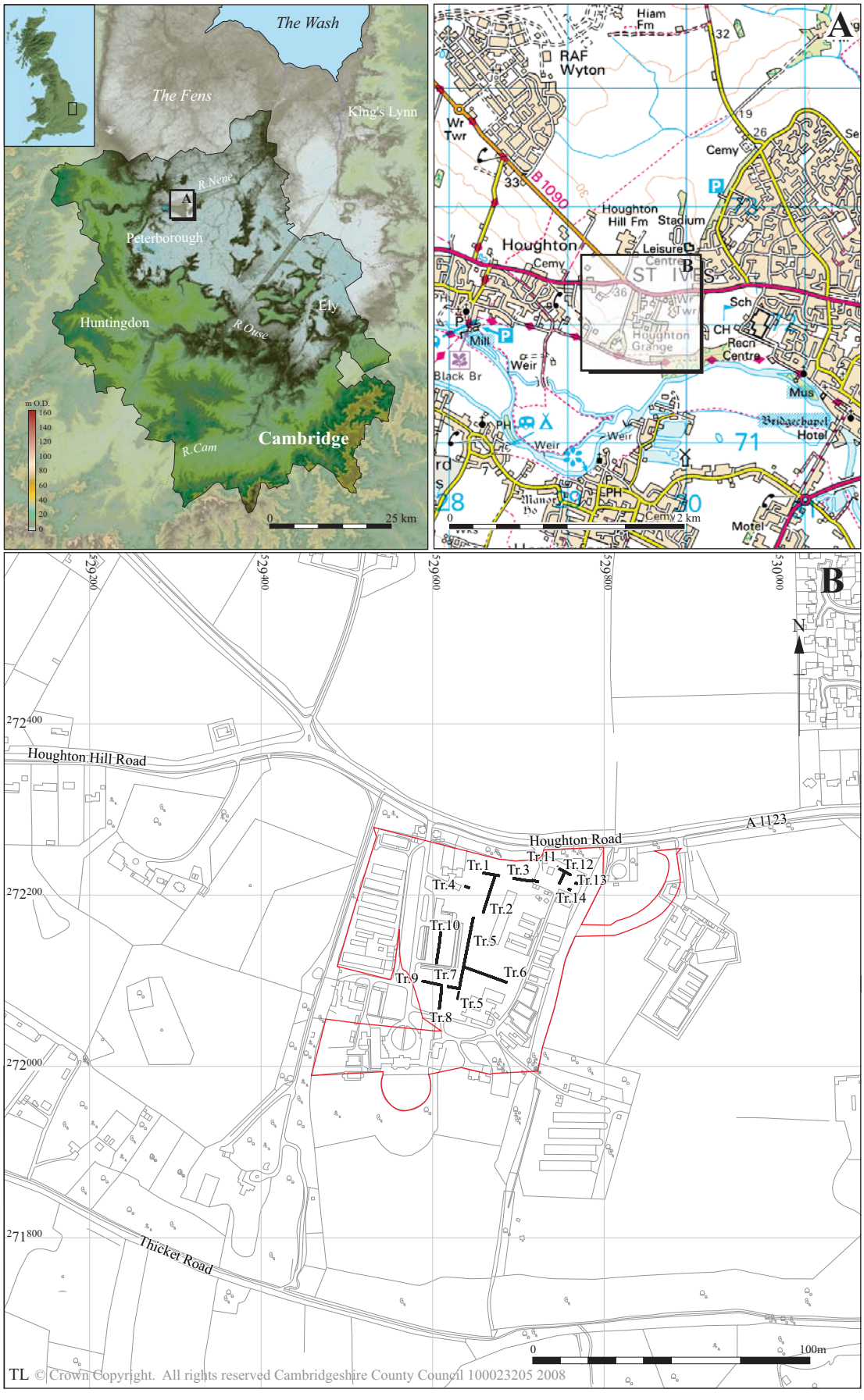

Figure 1 Location of trenches with the development area outlined (red)

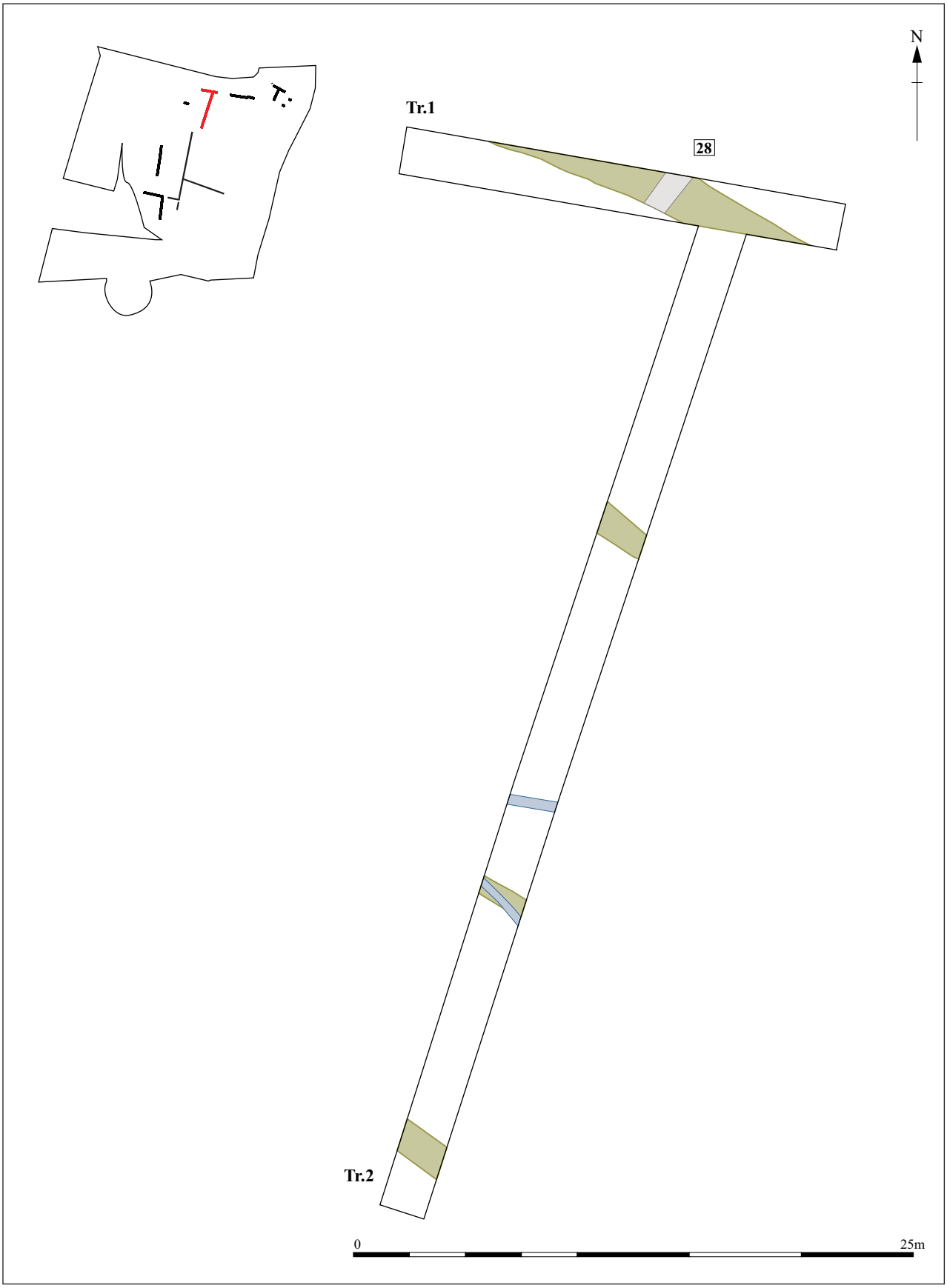

Figure 2: Plan of trenches 1 & 2 at 1:250

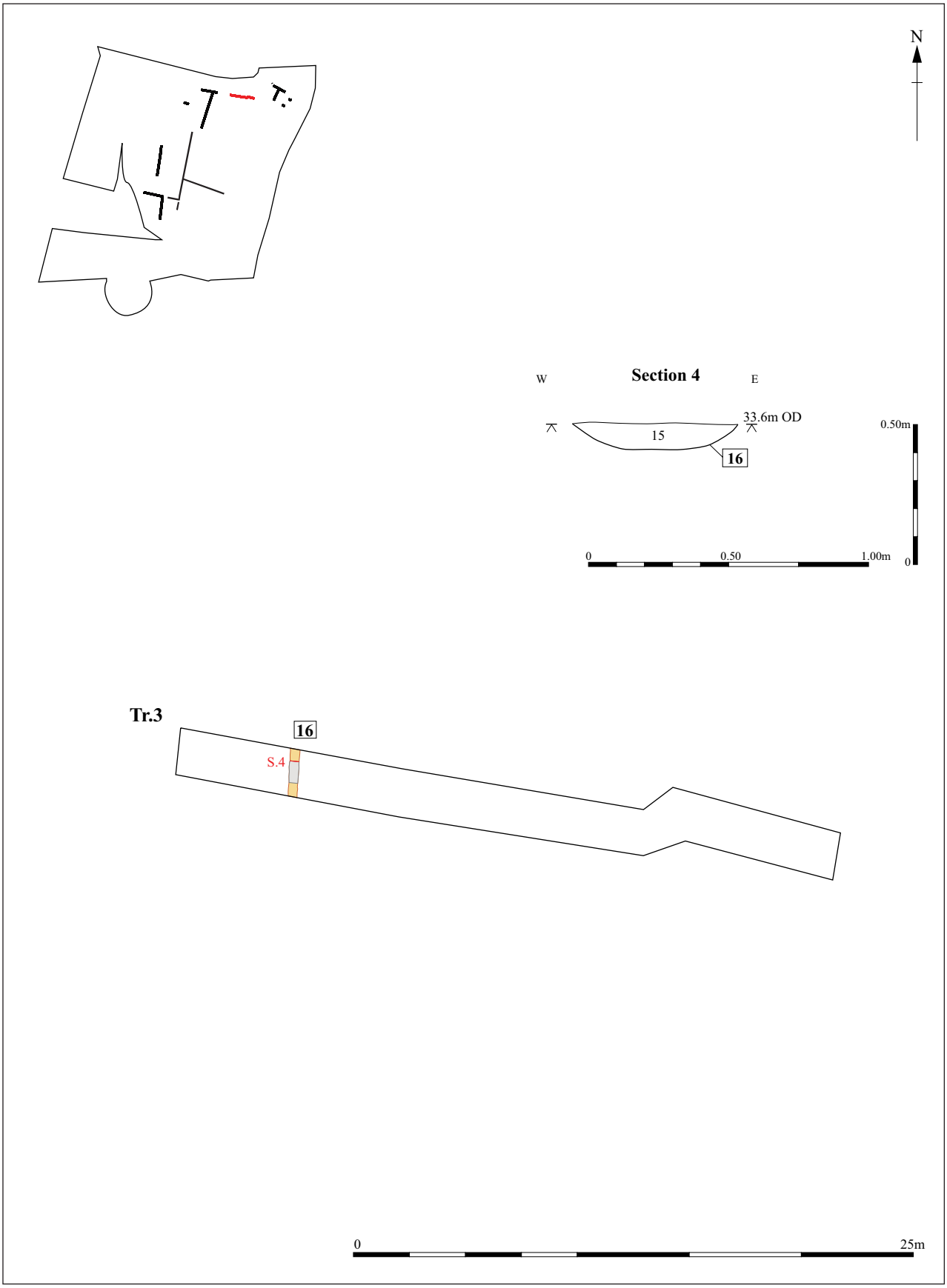

Figure 3: Plan of Trench 3 at 1:250 and Section 4 at 1:20

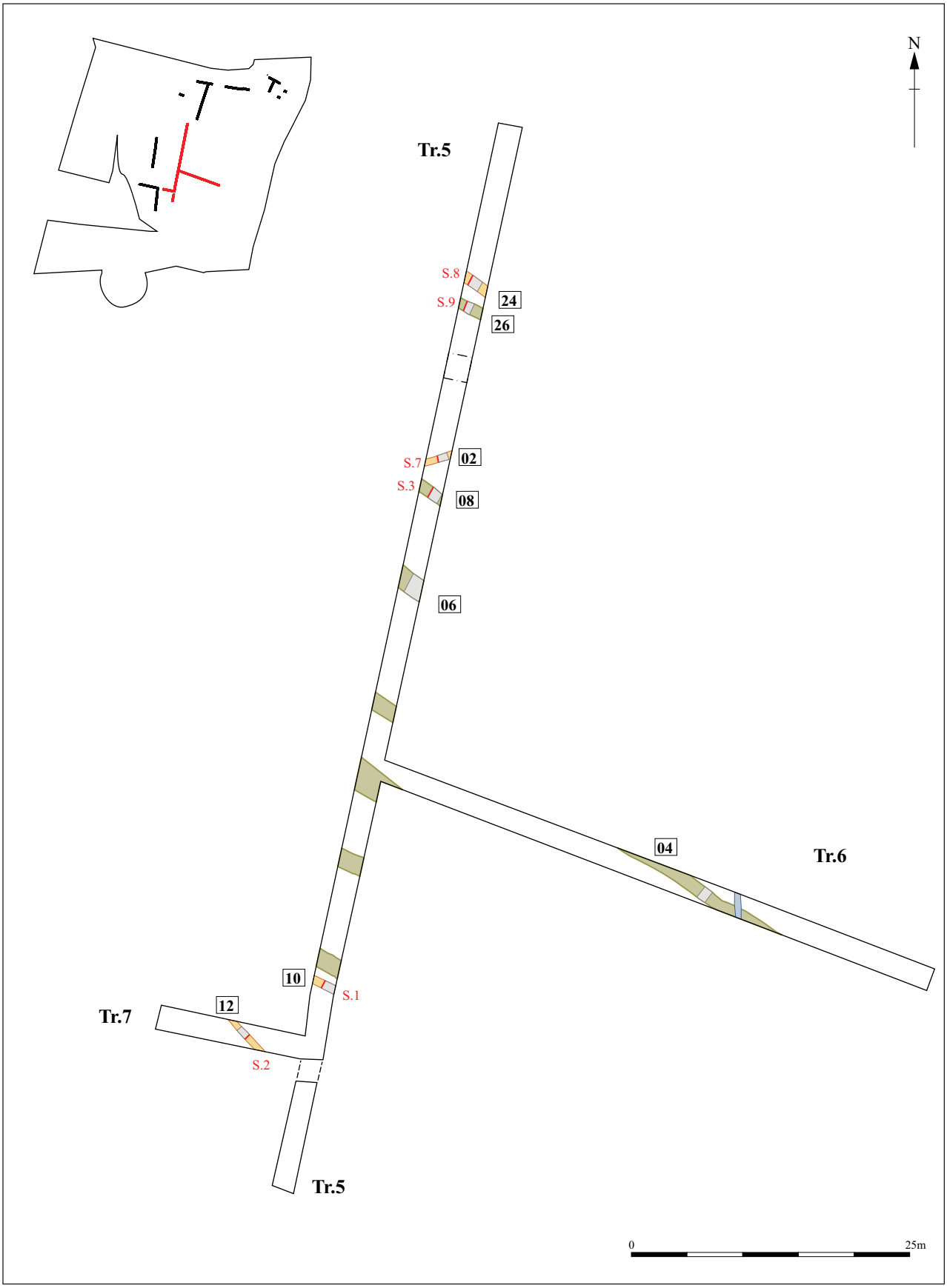

Figure 4: Plan of trenches 5, 6 and 7 at 1:500

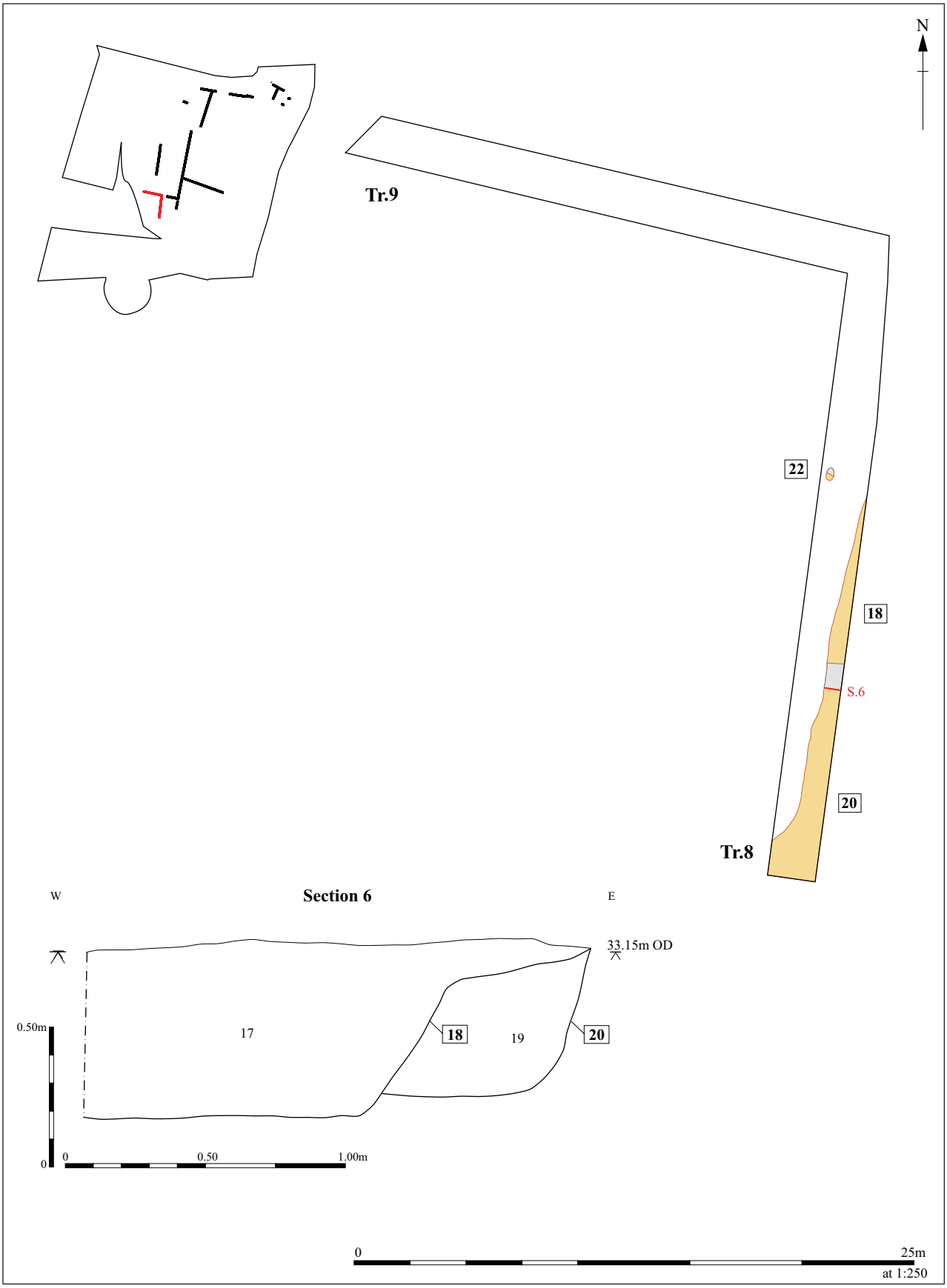

Figure 5: Plan of trenches 8 & 9 at 1:250 and Section 6 at 1:20

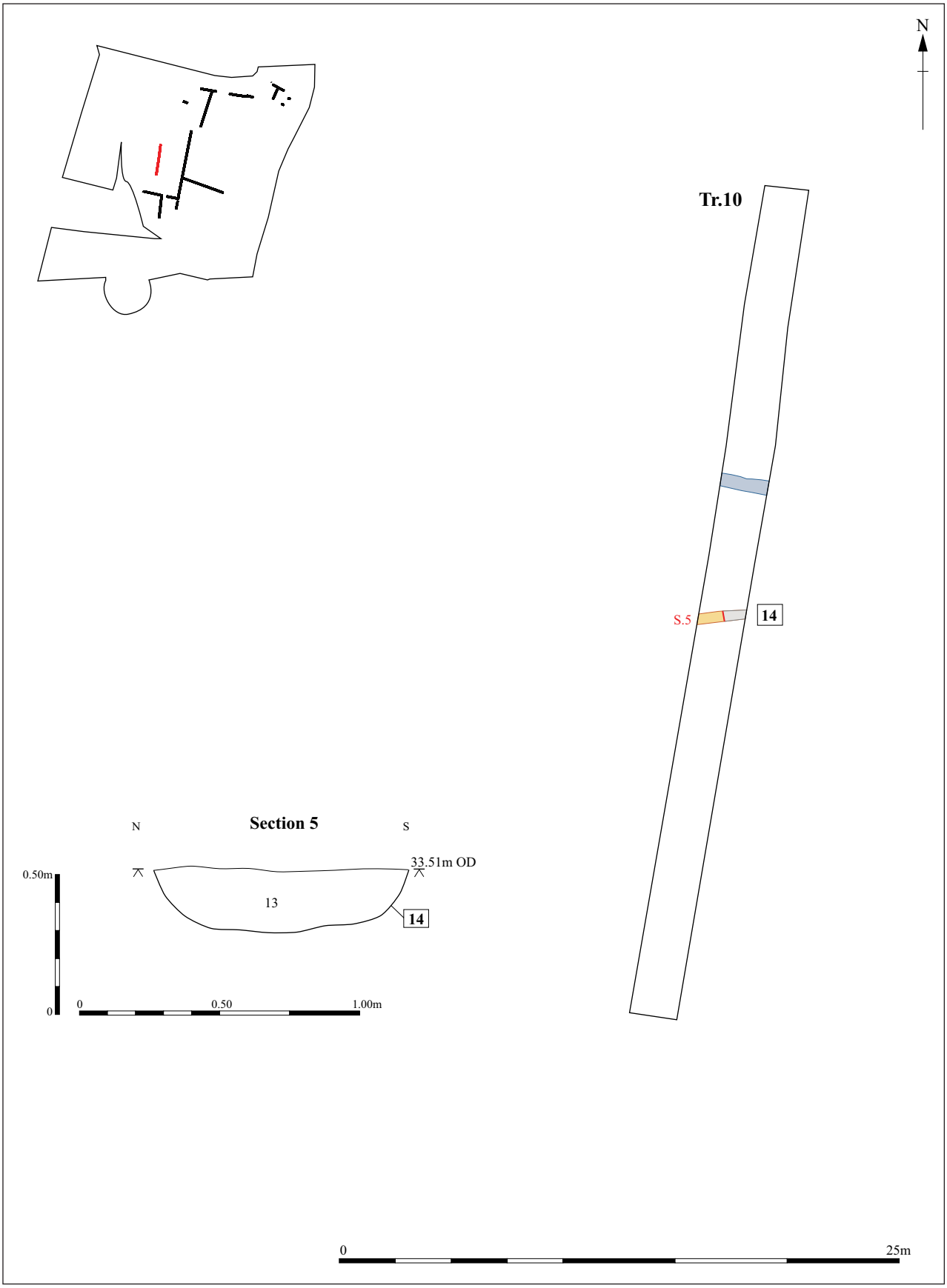

Figure 6: Plan of Trench 10 at 1:250 and Section 5 at 1:20

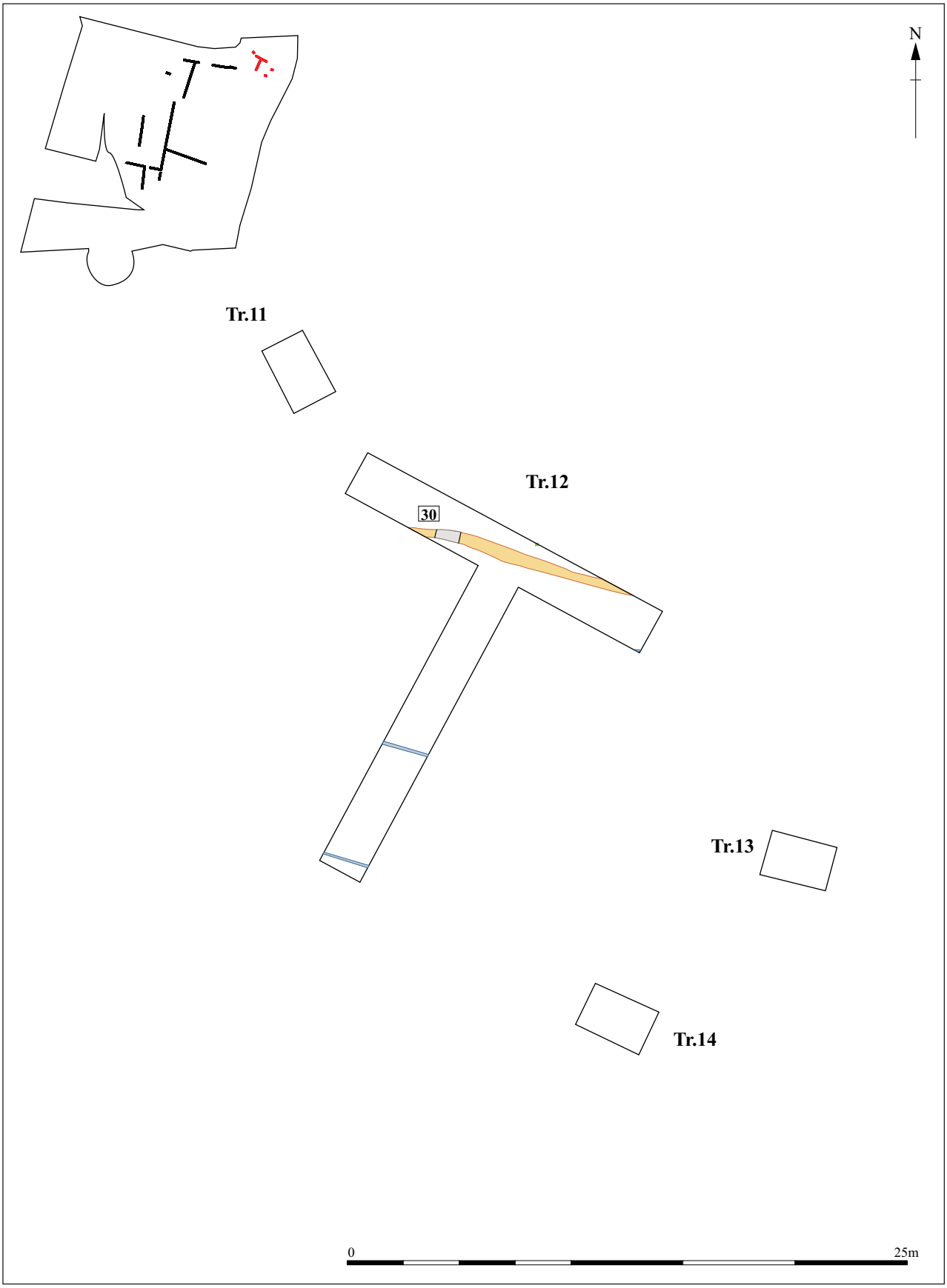

Figure 7: Plan of Trenches 11 - 14 at 1:20

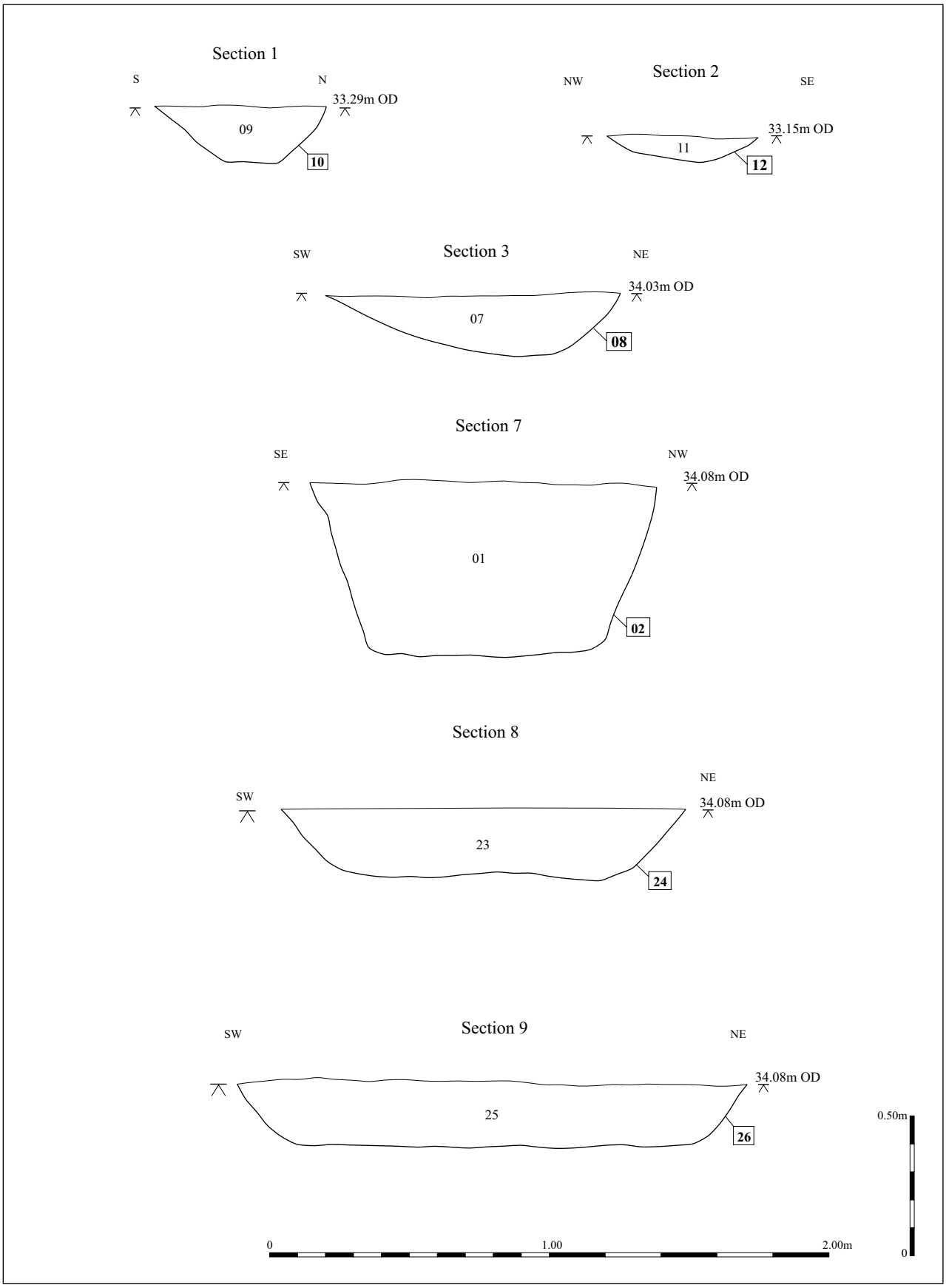

Figure 8: Sections 1-3 and 7-9 shown at 1:20

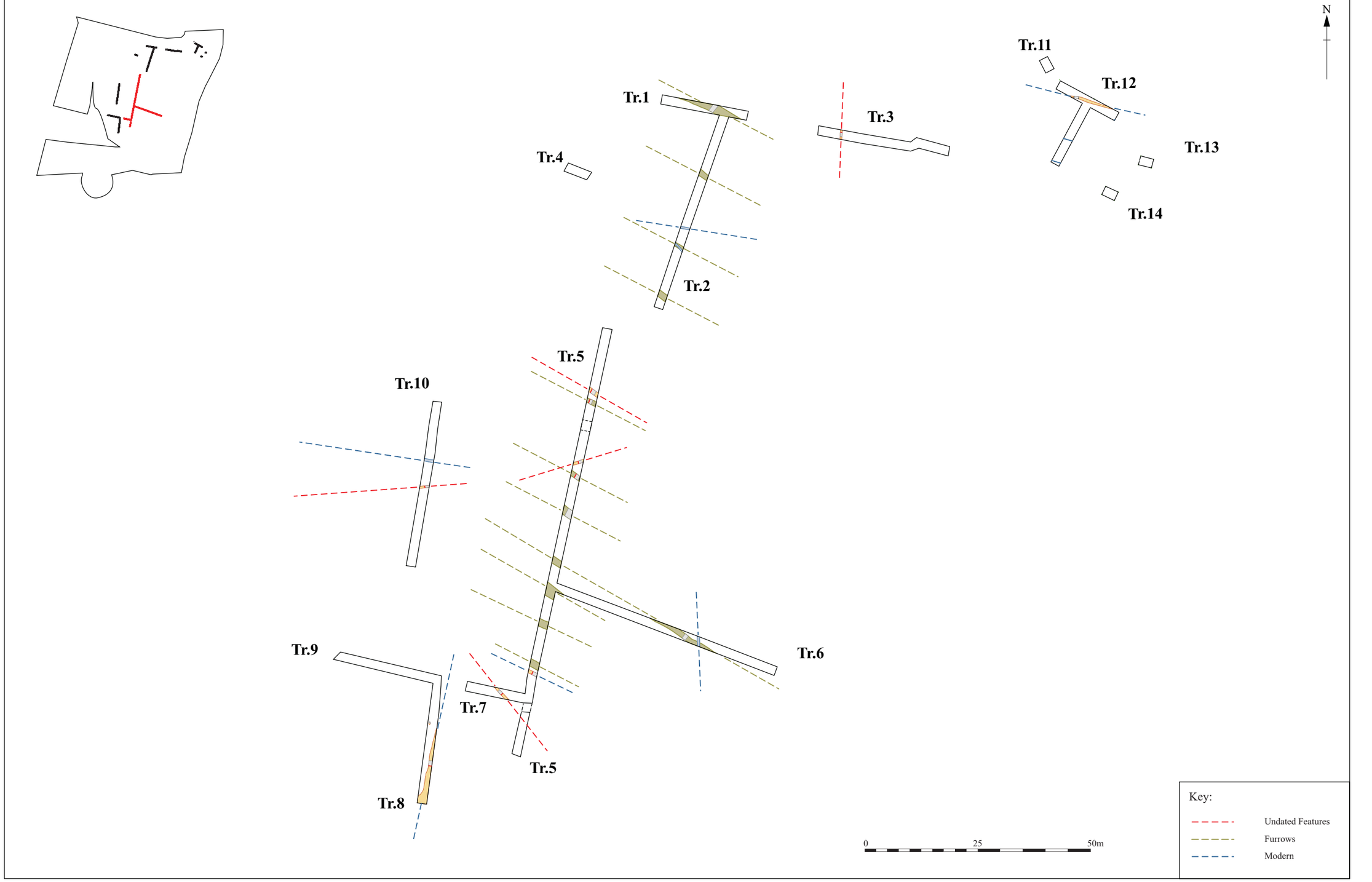

Figure 9: Projected continuation of features at 1:750

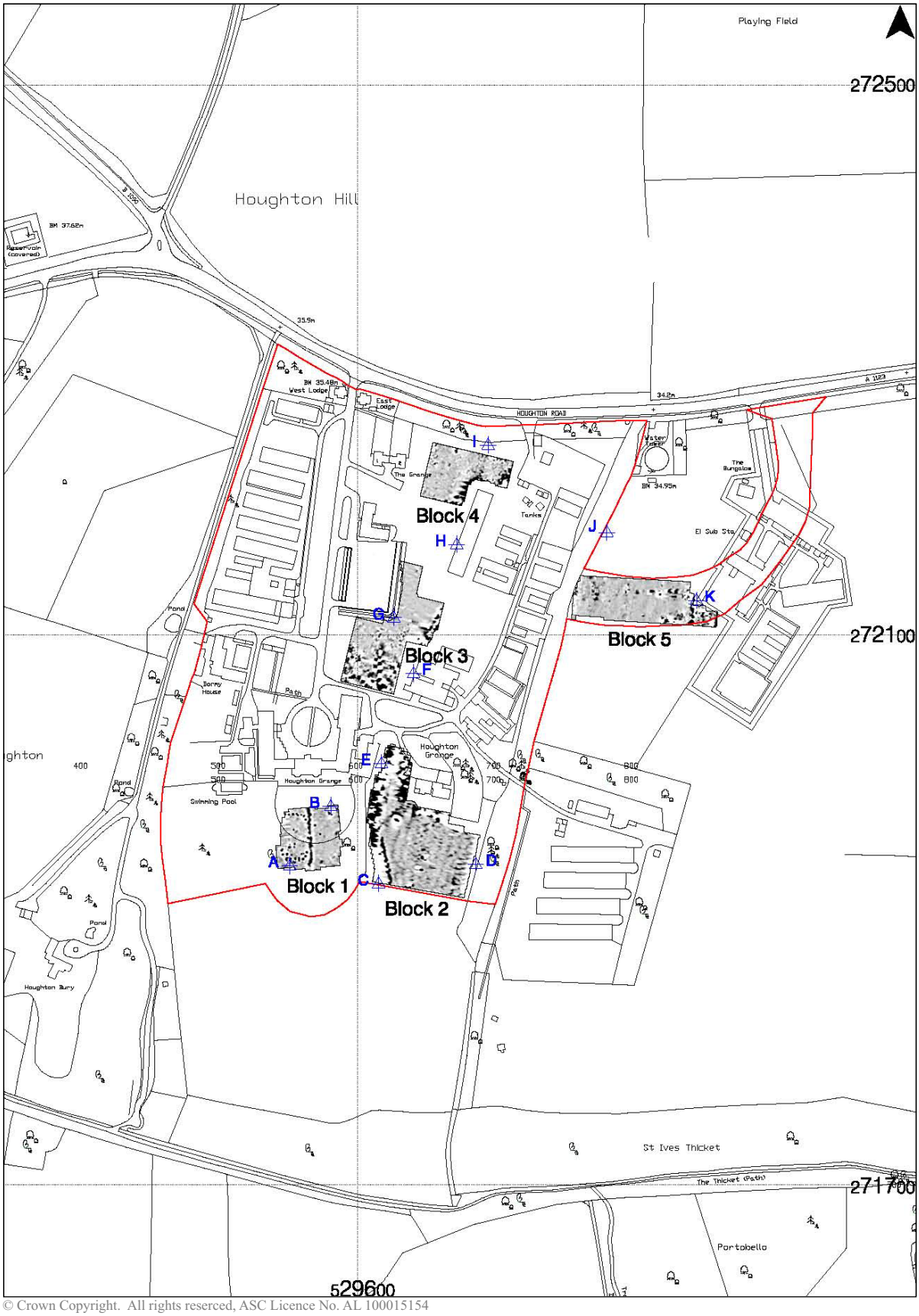

Figure 10: Location of site and detailed geophysics survey blocks

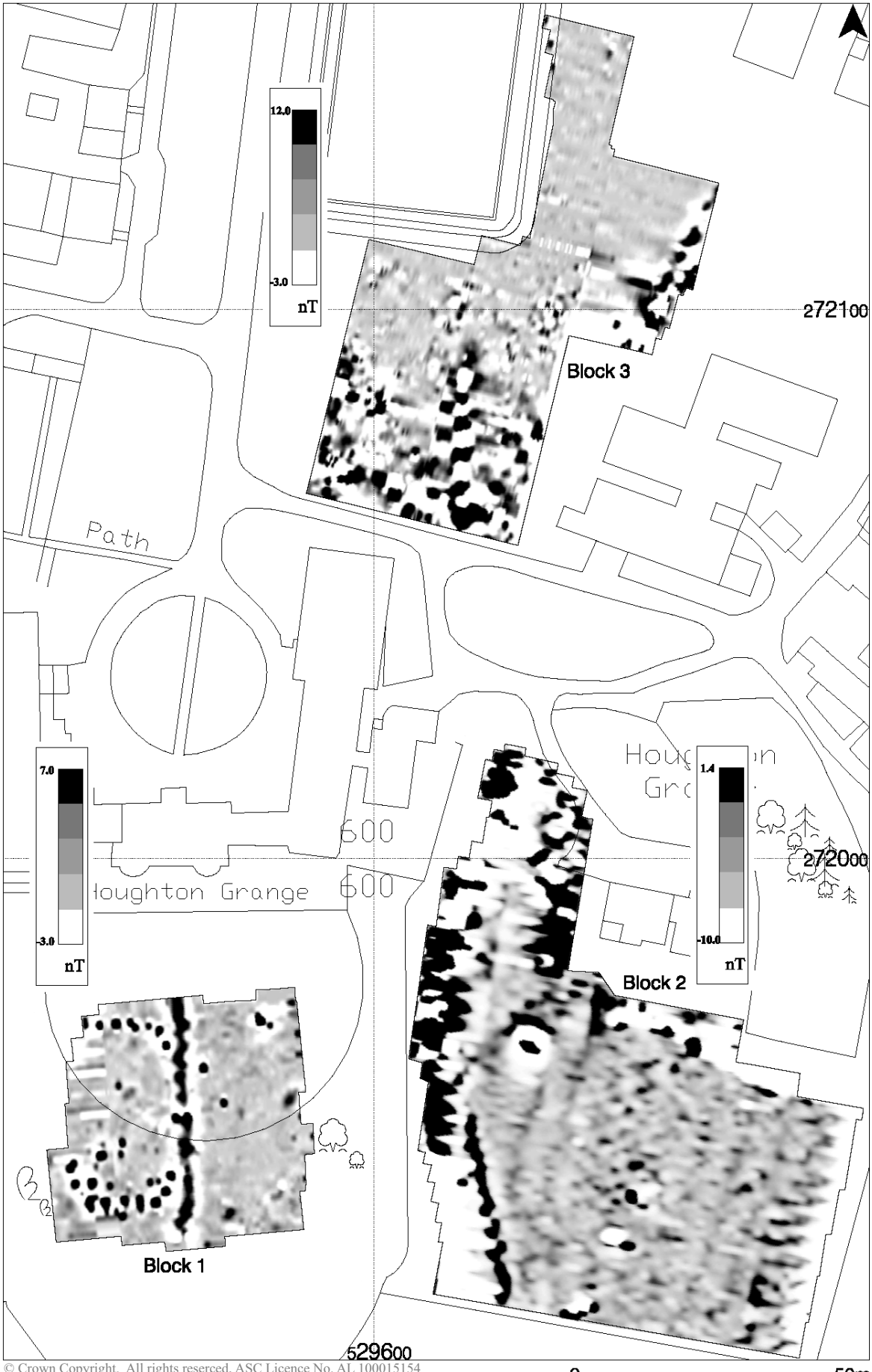

Figure 11: Greyscale plot of gradiometer data; Blocks 1, 2 and 3

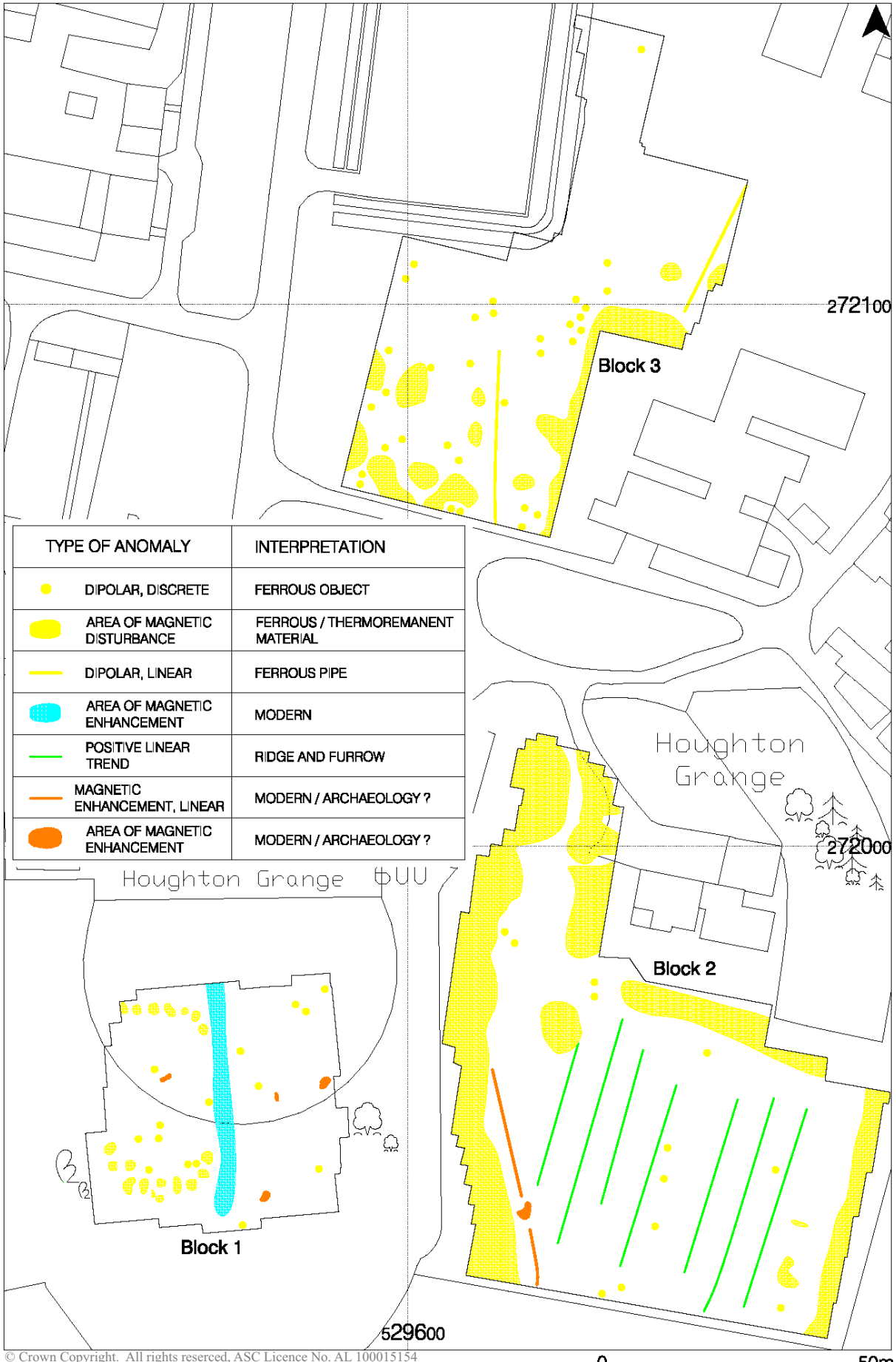

Figure 12: Interpretation of gradiometer data; Blocks 1, 2 and 3

Figure 13: Greyscale plot of gradiometer data; Blocks 4 and 5

Figure 14: Interpretation of gradiometer data; Blocks 4 and 5

Figure 15: XY trace plot of raw gradiometer data; Blocks 1, 2 and 3

Figure 16: XY trace plot of raw gradiometer data; Blocks 4 and 5

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