



CCC AFU Report Number 903

Cambridge Guided Busway

Soil profiling test pits

Mo Jones

September 2006

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Summary

The Cambridge Guided Busway is to provide high quality, reliable and frequent local public transport along the A14 corridor.

Buses will travel on a guideway along the disused railway line from St Ives to Cambridge. They will continue through Cambridge on normal roads and rejoin the guideway at Cambridge Railway Station to travel through to Addenbrooke's Hospital and Trumpington Park & Ride.

Soil profiling was undertaken at various locations along the alignment of the guideway of the Cambridgeshire Guided Busway by means of hand dug test pits. The aim of the test pits was to determine the depth of top and subsoil but not to excavate archaeological features at this stage.

The programme was generally successful, apart from one area adjacent to the A14 where there was extensive modern disturbance (Area M). Area D was removed from the programme as the mitigation strategy has changed.

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1 Introduction

This soil profiling test pit programmes was undertaken in accordance with a Brief issued by Arup, supplemented by a Specification prepared by Cambridgeshire County Council Archaeological Field Unit (CCC AFU).

The work was designed to assist in defining the depth of the top and sub soils overlying the potential archaeological resources at various locations along the route of the proposed Cambridge Guided Busway, in accordance with the guidelines set out in *Planning and Policy Guidance 16 - Archaeology and Planning* (Department of the Environment 1990). The data derived from this activity will be used to design with ecological and landscape mitigation to enable the preservation in situ of the archaeological resource.

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

2 Geology and Topography

The geology of the route is variable spanning, as it does, the topographic zones of the Great Ouse valley, the Cam valley and all the country along the fen edge between. For the most part, however, the archaeologically significant zones lie on River Terrace Gravels.

3 Archaeological and Historical Background

A report on the CAU's evaluation trenching programme exists (Cessford and Mackay 2004) and this has been used as the primary basis for estimation and interpretation in this document. In all 18 sites were evaluated between Swavesey and Trumpington, the majority yielding negligible archaeological remains, but with sites from several periods recognised. Late Bronze Age/Early Iron Age features were discovered at Longstanton Park and Ride and Balancing Pond 4 and Iron Age/Roman-British features were found at Construction Route 4, Balancing Pond 7 and the Addenbrooke's Link. Medieval features were found at Swavesey Track North, Swavesey Kiss and Ride and Histon Stables Access. The most significant sites are the Late Bronze Age/Early Iron Age ditches at Balancing Pond 4, the 2nd to 4th century settlement at Addenbrooke's Link, which compliments the recently excavated Late Iron Age/Early Roman site at Downing College Sports Field, the medieval activity at Swavesey, which partially relates to the Priors and has waterlogged remains, and possibly the medieval burial and well at Histon Stables Access.

4 Methodology

The objective of the test pitting programme was to provide data relating to the depth of the soils overlying the potential archaeological resources including both topsoil and any subsoils.

The Brief required that:

All test pits be hand dug. No archaeological features were to be investigated at this juncture but their presence or absence was to be noted.

Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits.

The early phases of the work were undertaken in conditions of extreme heat with the ground very hard as a consequence.

5 Results

5.1 Area C

Introduction

Work commenced on Area LEM C on 22nd August and ended on 23rd August. All twelve pits were excavated. The test pits were located by eye with reference to the un-scaled plan provided by ARUP (Drawing number LEM-M06900-02000S). After excavation, the location of each pit was surveyed using a Leica GPS 1200 System.

Results

Topsoil and subsoil deposits were encountered throughout the area. The topsoil (21) was dark grey brown silty clay and had an average depth of 0.29m. The subsoil (22) was mid orange grey silty clay with an average depth of 0.22m. The natural (23) was mid brownish orange sandy clay, which changed to mid grey and red brown sand. The geology of the site suggests this change in colour marks the change from the Boulder clay on the higher, northern edge of the area, to the Amphill clay (British Geological Survey Sheet 187 1975).

A possible pit or posthole (25) was identified in Test Pit 58. It was located in the north corner and extended beyond the edge of excavation. It had a diameter of 0.30m+ and had an unknown depth.

Additional deposits were seen in the base of Test Pits 55 (26) and 62 (27). Layer (26) was mid orange brown silty clay and measured 0.15m deep. It is of unknown function and origin and contained no finds. Layer (27) was mid greyish brown silty clay and may be a variation in natural deposit (23).

Test Pit 56 contained a ceramic field drain, oriented N-S, of post-medieval origin.

No finds were recovered from any deposit in this area.

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (mOD)
55	0.27	0.18	11.97
56	0.18	0.22	11.16
57	0.28	0.08	10.42
58	0.25	0.28	9.36
59	0.36	0.27	10.11
60	0.31	0.16	9.32
61	0.25	0.20	8.46
62	0.30	0.17	8.40
63	0.28	0.17	7.76
64	0.39	0.32	7.41
65	0.30	0.29	7.47
66	0.32	0.24	7.23
Total	3.49	2.58	-

Table 1: Topsoil and subsoil depths across Area LEM C with Ordnance Datum heights (top of Test Pit)

5.2 Areas E and F

Introduction

Work commenced on Areas LEM E and F on Monday 14th August and ended on Tuesday 22nd August.

The test pits were located by eye with reference to the un-scaled plan provided by ARUP (Drawing number LEM-M09300-02002S). After excavation, the location of each pit was surveyed using a Leica GPS 1200 System.

Conditions for excavation were good as the ground had been softened slightly by the increased recent rainfall. Access to the area remained a problem throughout with vehicular access not possible along the railway line or across Striplands Farm.

A meeting was held on Monday 14th on site with Kate Priestman from ARUP with regard to possible badger activity on the land. Kate undertook a visual survey of both areas and informed CCC AFU of the 'at risk' areas in which badger activity had been identified. These areas were declared 'exclusion zones' and no excavation took place within these 'zones'. The pits nearest the exclusion zones were only excavated under the supervision of Kate Priestman at ARUP's request.

As a result only one pit (52) was excavated in Area F and all but two (38 and 39) in Area E.

No finds were recovered from any deposit in this area.

Results LEM E

Topsoil and subsoil were encountered in all the excavated Test Pits. The topsoil was dark brown clay silt (12) and had an average depth of 0.28m. The subsoil (13) was mid yellowish brown sandy clay and had an average depth of 0.22m. No features of archaeological significance were identified, although a small circular feature, **17**, was recorded at the north-west edge of Test Pit 36 which was cut from below topsoil (12). It is thought to be late- or post-medieval in date and may relate to the construction of the railway line to the north.

At least three types of natural geological layers were identified:

Layer (14) - mid yellowish brown silty clay which appeared in Test Pits 28 and 36, and layer (18) - compact brownish silty clay, probably a variation within (14), seen in Test Pit 36 only. As these layers were similar and located too far apart to be related it is likely that they are both variations in the natural (15).

Layer (15) - Ampthill Clays (Test Pit 28, 29 and 30)

Layer (19) - Tertiary river terrace gravels (Test Pit 35).

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (m OD)
25	0.29	0.20	9.50
26	0.28	0.18	9.11
27	0.28	0.28	8.95

28	0.27	0.32	8.73
29	0.22	0.12	8.65
30	0.26	0.34	8.62
31	0.22	0.32	8.48
32	0.26	0.11	8.35
33	0.34	0.20	8.14
34	0.34	0.23	8.22
35	0.28	0.20	8.60
36	0.34	0.13	8.54
37	0.28	0.19	8.52
38	N/A	N/A	N/A
39	N/A	N/A	N/A
Total	3.66	2.82	-

Table 2: Soil depths with m OD height at top of Test Pit

Results LEM F

Only Test Pit 52 was excavated in this area due to restrictions relating to badger activity. It contained topsoil (39) dark brown sandy silt and subsoil (40) mid orange brown silty sand. The natural (41) was mid brownish orange sandy silt with gravels (as 19 in Area E).

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (m OD)
40	N/A	N/A	N/A
41	N/A	N/A	N/A
42	N/A	N/A	N/A
43	N/A	N/A	N/A
44	N/A	N/A	N/A
45	N/A	N/A	N/A
46	N/A	N/A	N/A
47	N/A	N/A	N/A
48	N/A	N/A	N/A
49	N/A	N/A	N/A
50	N/A	N/A	N/A
51	N/A	N/A	N/A
52	0.44	0.20	7.98
53	N/A	N/A	N/A
54	N/A	N/A	N/A
Total	0.44	0.20	-

Table 3: Topsoil and subsoil depths across Area LEM F

5.3 Areas G and H

Introduction

Work commenced in LEM Areas G and H on the 23rd August and ended on the 29th August 2006. The test pits were located by eye with reference to the un-scaled plan provided by ARUP (Drawing number LEM-M09300-02003S). On 29th and 30th August, Areas C, G and H were surveyed using the Leica GPS 1200 System and subsequently backfilled.

Results LEM G

The expected stratification of natural, subsoil and topsoil layers was identified across both areas. Features were identified in Area G only, consisting of two possible ditches and one possible pit.

Pit **38** in Test Pit 78 was located in the south corner and measured 1m+ by 0.80m+. It had three fills. Fill 35 was mid brownish grey silty clay and was centrally located within the pit. Fill 36 was probably the middle fill and was mid greyish brown silty clay. Possible primary fill 37 was dark brownish grey clay silt with frequent charcoal. No finds were recovered from this feature.

Ditch **34** was found in Test Pit 72 and oriented E-W. It was filled by 33, dark grey clay. No finds were recovered from this feature.

Ditch **32** was located in Test Pit 67 and was oriented SE-NW. It had one fill (31) mid grey clay silt. No finds were recovered from this feature.

The natural (30) in this area was mid greyish yellow silty clay and was seen in all test pits. Overlying this was subsoil (29), mid greyish brown clay silt. It was seen in all test pits with the exception of 75 and 78. The average subsoil depth was 0.17m. Finally, the topsoil (28) was also seen in every test pit and was dark brownish grey silty clay. The average topsoil depth measured 0.31m. No finds were recovered from the topsoil or subsoil.

Test Pit	Topsoil depth	Subsoil depth	Level (m OD)
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	(m)	(m)	
67	0.33	0.32	5.55
68	0.35	0.18	5.40
69	0.28	0.32	5.52
70	0.32	0.10	5.40
71	0.35	0.09	5.41
72	0.32	0.14	5.53
73	0.34	0.22	5.32
74	0.32	0.19	5.49
75	0.31	N/A	5.34
76	0.26	0.15	5.47
77	0.17	0.06	5.31
78	0.37	N/A	5.26
			-

Table 4: Topsoil and subsoil depths across Area LEM G

Results LEM H

Only topsoil (42), subsoil (43) and natural (34) were seen in Area H. The natural was similar to that seen in Area G. Overlying this was the subsoil (43), mixed yellowish brown clay silt with an average depth of 0.36m. It was not seen in Test Pit 79. The topsoil was the same as that in Area G but had an average depth of 0.14m.

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (m OD)
79	0.54	N/A	5.46
80	0.50	N/A	5.39
81	0.40	0.13	5.48
82	0.43	0.12	5.33
83	0.36	0.16	5.41
84	0.16	0.25	5.27
85	0.33	0.16	5.34
86	0.30	0.10	5.21
87	0.38	0.14	5.32
88	0.34	0.14	5.30
89	0.33	0.18	5.33
90	0.25	0.06	5.24

Table 5: Topsoil and subsoil depths across Area LEM H

Area K

Introduction

Work commenced on Area K on Thursday 20th July and ended on Wednesday 26th July.

As previously, the test pits were located by eye with reference to the plan provided by ARUP (Drawing number LEM-M13500-02006S). As the plan provided was not to the scale noted and because the site was overgrown, the location of each pit may vary. Each pit was surveyed during excavation using as before, a Leica GPS 1200 System.

Results

Topsoil (5), subsoil (6) and natural (7) were seen in all pits with the exception of Test Pit 13, which contained topsoil and alluvial layers (see below).

The topsoil (5) was recorded as dark greyish brown silty clay and varied in depth from 0.22m – 0.30cm deep. It contained five post-medieval pottery/tile sherds and one animal bone fragment (Test Pit 16 and 24).

Pottery sherds were also recovered from the subsoil (6). Test Pit 24 contained three sherds of medieval pottery, all dated circumspectly to the 14th and 15th century (Richard Mortimer, pers. comm.). Test Pit 15 contained a single sherd of hand-made pottery that has been tentatively dated to the Iron Age. All dates are to be confirmed. Subsoil was described as mid yellowish brown sandy silt and measured 0.10m – 0.36m deep.

As expected, the natural (7) varied slightly from test pit to test pit, but was mainly pale yellowish orange silty clay with occasional gravels and was encountered at depths between 0.38m and 0.58m.

A possible feature **9** measuring 0.70m by 0.75m was identified in Test Pit 16 and appeared to be a ditch or pit truncating natural (7). The fill, (8), was a mid yellowish brown silty clay with frequent angular flint gravels and pebbles. It was indistinct in plan due to the very dry nature of the soil but appeared to curve from south to east.

Test Pit 13 was located at the bottom of a short slope near Beck Brook at the south end of site. It contained no subsoil (6) and natural (7) was not encountered. Instead, Test Pit 13 shows a series of up to three alluvial layers. The latest, (10) was compact mid orange grey silty clay; below this was (11) mid yellowish grey silty clay. Neither contained finds. Excavation halted at the base of (11) at approximately 0.70m where another alluvial layer was encountered (not recorded) which

contained a high density of what appeared to be crushed or decomposed chalk.

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (m OD)
13	0.18	N/A	7.81
14	0.28	0.18	8.14
15	0.24	0.26	8.40
16	0.24	0.08	8.40
17	0.22	0.32	8.75
18	0.26	0.20	8.34
19	0.22	0.28	8.39
20	0.22	0.18	8.26
21	0.26	0.20	8.74
22	0.26	0.20	8.09
23	0.20	0.34	8.72
24	0.24	0.20	8.21

Table 6: Topsoil and subsoil depths across Area K

Area M

Introduction

Work commenced on area LEM M on Monday 17th July and ended on Thursday 20th July.

The test pits were located by eye with reference to the plan provided by ARUP (Drawing number LEM-M18300-02007S). After excavation, the location of each pit was surveyed using a Leica GPS 1200 System.

Due to the hot, dry weather conditions and the severely compacted nature of the ground, all Test Pits were dug to approximately 0.50m deep, with the exception of Pits 2 and 8 which were fully excavated in order to determine the level at which natural occurred.

Results

A similar sequence of soils was identified in each test pit with variations in depth and in some places form, across the area. They consisted of

topsoil (1), subsoil (2), made-ground (3) and natural (4). Only the topsoil and made-ground layers were identified in each test pit.

A deposit identified as topsoil (1) was seen in each test pit. It was pale grey brown silty clay and varied in depth from 0.04m to 0.16m thick. Underlying this was the made-ground deposit (3) consisting of up to four layers of dumped material, including very compact grey clay, loose clean gravels and a layer similar to crushed concrete. Depth varied from 0.20m (Test Pit 11) to 0.70m (Test Pit 8).

Subsoil layer (2) was identified in Test Pits 6, 10 and 11 only and was friable mid-orange brown sandy silt. No natural was identified here as the subsoil depth extended beyond the 0.50m limit of excavation.

Natural (4) was seen in Test Pits 2 and 8 only (see above) and was mid brownish orange sandy clay with occasional patches of gravel. No features were identified in either pit.

Test Pit	Topsoil depth (m)	Subsoil depth (m)	Level (m OD)
1	0.11	N/A	10.57
2	0.06	0.60	10.51
3	0.08	N/A	10.48
4	0.12	N/A	10.52
5	0.08	N/A	10.59
6	0.11	N/A	10.56
7	0.06	N/A	10.59
8	0.08	0.72	10.60
9	0.06	N/A	10.51
10	0.14	N/A	10.51
11	0.10	N/A	10.58
12	0.10	N/A	10.43

Table 7: Topsoil and subsoil depths across Area M

6 Discussion

Area C

Test pitting south of the village of Over, in LEM Area C has shown that the majority of the area of investigation contained no archaeological remains, except for a possible posthole (25) of unknown date in the north-west corner in Test Pit 58. The potential for further remains is low.

Areas E and F

The test pitting on Areas LEM E and F, near Longstanton, has demonstrated that no archaeological remains are present, but that there may be some post-medieval activity nearby. The ground appears to be largely undisturbed and has probably been under agricultural use for some quite considerable time.

An aerial map of the area (Google Earth) was examined prior to excavation commencing. It showed a potential curvilinear depression crossing Area E from the north-west to south, running into the reed bed area to the east and emerging near the west end of Area LEM F. It was not identified during the evaluation, however more extensive investigations may reveal its location and determine its nature.

The potential for archaeological activity in this area is low.

Areas G and H

The features identified in Area G suggest there is a low level of archaeological activity occurring. Their date is unknown however, as no pottery was recovered. Only further investigation will resolve speculation about the nature and type of archaeological activity in Area G.

Although no features were identified in Area H, there may be potential for archaeological remains because of the proximity to Area G. Further investigation should include this area.

Overall there is a low to medium potential for further archaeological remains in Areas G and H.

Area K

Test Pits 14 to 24 all displayed the normal sequence of soils expected in a rural area, that is, topsoil, subsoil and natural. The finds, particularly the pottery recovered from Test Pit 24 suggest that some medieval activity occurred nearby. The pit was located in the north-east corner of the area close to Water Lane, the road that leads west into Oakington, and close to the site of Westwick Hall, a medieval manor house. The pottery may have been derived from activity along Water Lane or activity related to the Hall.

Although no Saxon pottery or features have as yet been identified, it is possible that Saxon activity may be present in this area because of the proximity of an Early Saxon cemetery (CCC AFU 2006) and cropmarks (MCB 10744) to the south-west. The latter shows an extensive field system in the area of investigation and in the two fields to the south-west running up to the location of the cemetery. It would not be unusual for these cropmarks to suggest Saxon activity as settlements would often be at some distance, perhaps 100 to 200m, from a cemetery (Jones and Mortimer, 2006).

Pit or ditch **9** identified in Test Pit 16 may relate to features seen in the aforementioned cropmarks. Alternatively, it may have been a variation in the natural (7).

The alluvial layers encountered in Test Pit 13 were almost certainly deposited by the Beck Brook. They were laid down during repeated flooding episodes and as they were quite thick (up to 0.32m) may indicate that the brook was once a bigger watercourse than it is presently.

In conclusion, Area LEM-M has a good depth of both topsoil and subsoil and a medium potential for the presence archaeological activity. Alluvial layers show there have been flooding events in this area although they appear not to be extensive. It is possible they mask further archaeology.

Area M

The test pits in area LEM M all show that the ground surface has been levelled and almost certainly raised, probably from the construction of the railway to the point at which the area was used as a compound. Judging by the finds recovered from the topsoil (1) and made-ground layer (3) including plastic fencing fragments, car parts and wire netting, most of this activity probably took place very recently. This is supported by the thin nature and pale colour of the topsoil that suggests it was formed very recently, that is, after the compound went out of use.

The subsoil deposit (2) seen only in the south-east corner of the area may indicate that any earth moving activity has not occurred here, or at least not to the extent seen in the rest of the area. If this is a true subsoil and not a buried soil layer it would appear that the land has been lowered towards the embankment of the A14, presumably as part of construction or repair works. As no subsoil occurs in test pits 2 and 8, it is not possible to state categorically where the true level of the natural occurs. This may have been destroyed prior to the deposition of the made-ground layer.

No archaeology was identified in any test pit.

7 Conclusions

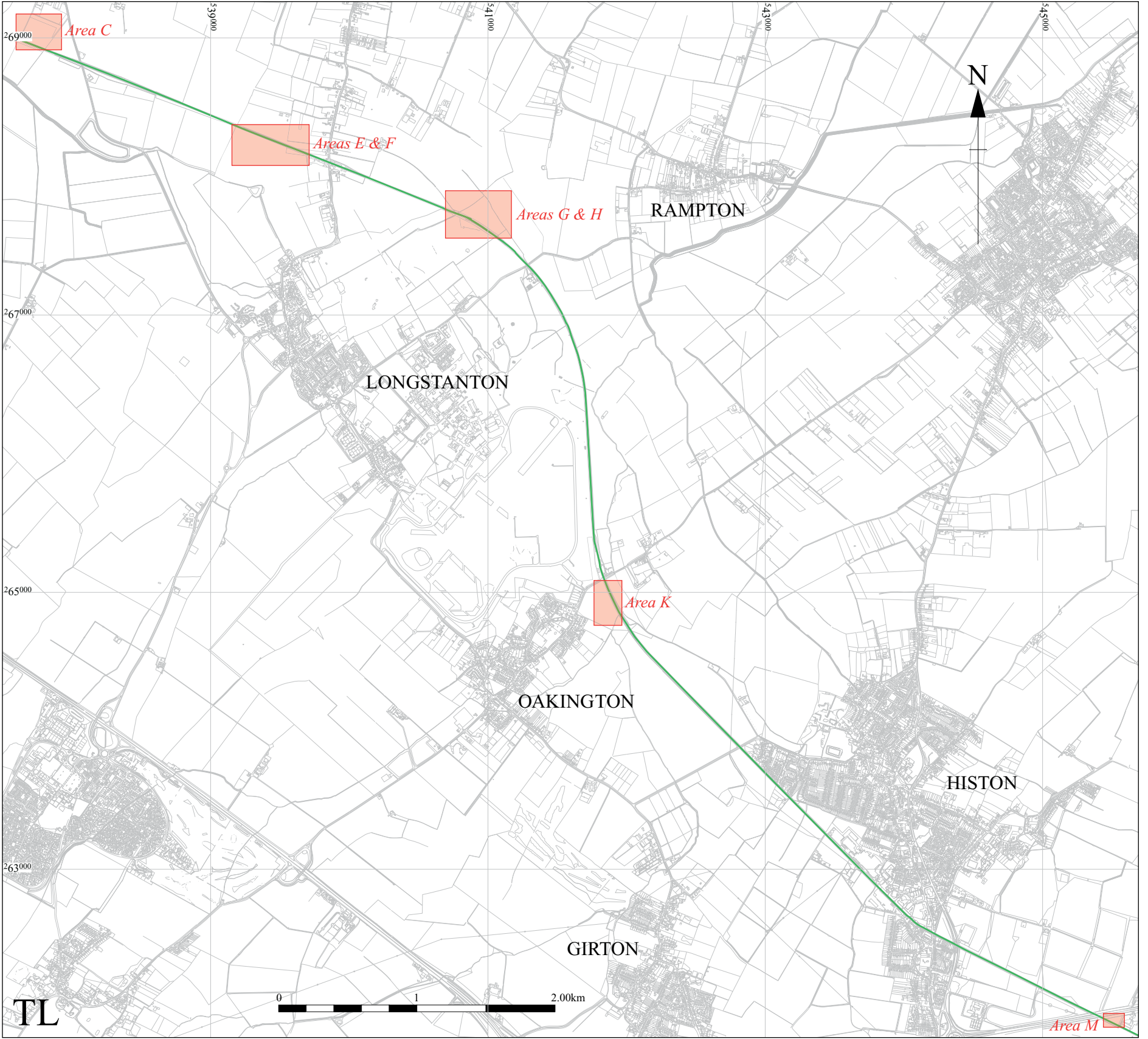
The soil profiling exercise was generally successful except for Area M where extensive modern disturbance meant natural was not recorded in most of the test pits. Elsewhere the objectives of the programme were achieved.

Acknowledgements

The author would like to thank Arup who commissioned and funded the archaeological work. The project was managed by James Drummond-Murray.

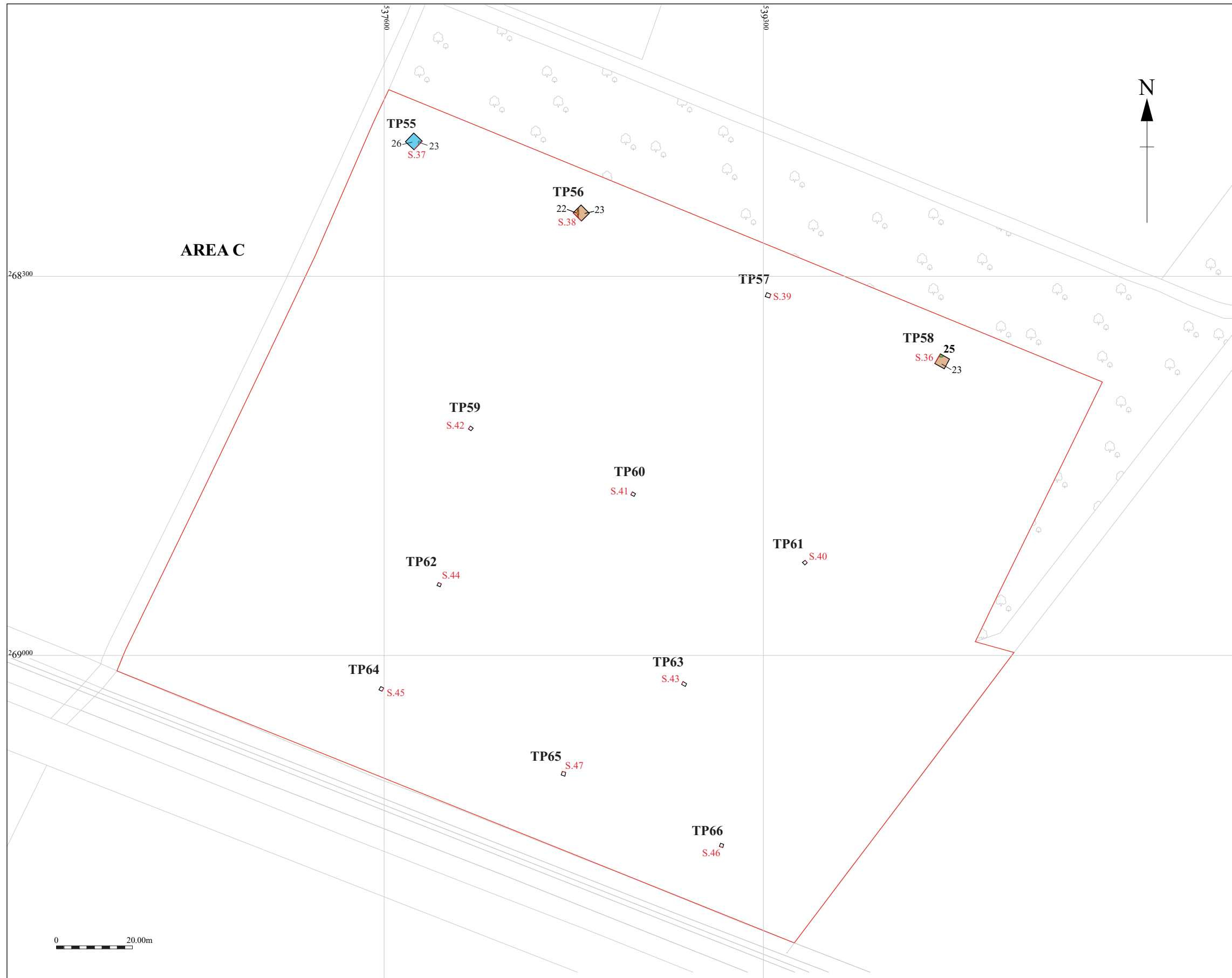
Drawing Conventions

Sections	Plans
Limit of Excavation	Limit of Excavation
Cut	Deposit - Conjectured
Cut-Conjectured	Natural Features
Deposit Horizon	Sondages/Machine Strip
Deposit Horizon - Conjectured	Intrusion/Truncation
Intrusion/Truncation	Illustrated Section S.14
Top Surface/Top of Natural	Archaeological Deposit
Break in Section/ Limit of Section Drawing	Archaeological Feature
Natural Deposit	Excavated Slot
Cut Number	Field Drain
Deposit Number 117	Cut Number 118
Ordnance Datum $\frac{18.45m}{\wedge}$ OD	
Inclusions	



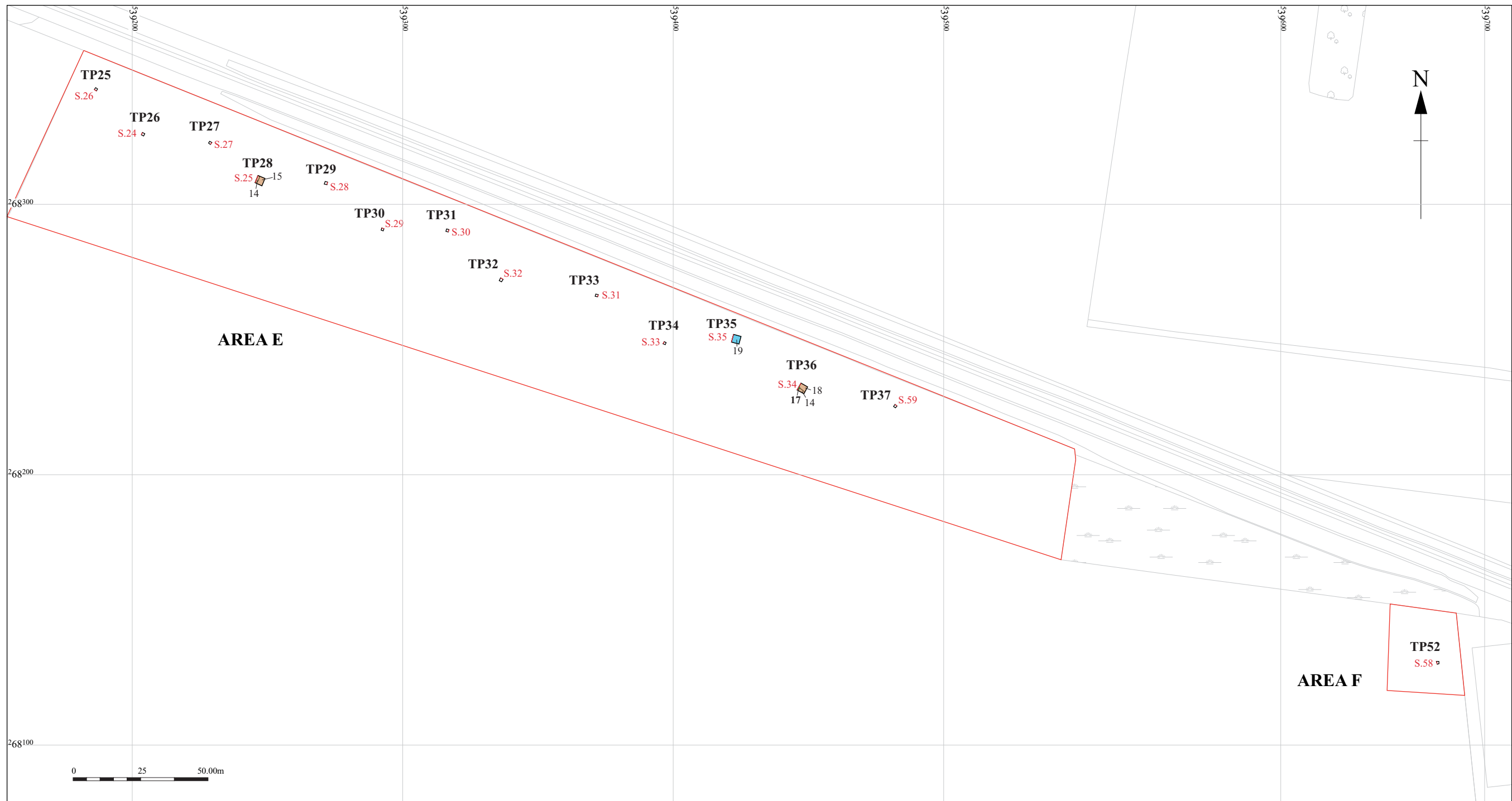
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Figure 1: Location of the excavated areas (red) with the busway route (green)



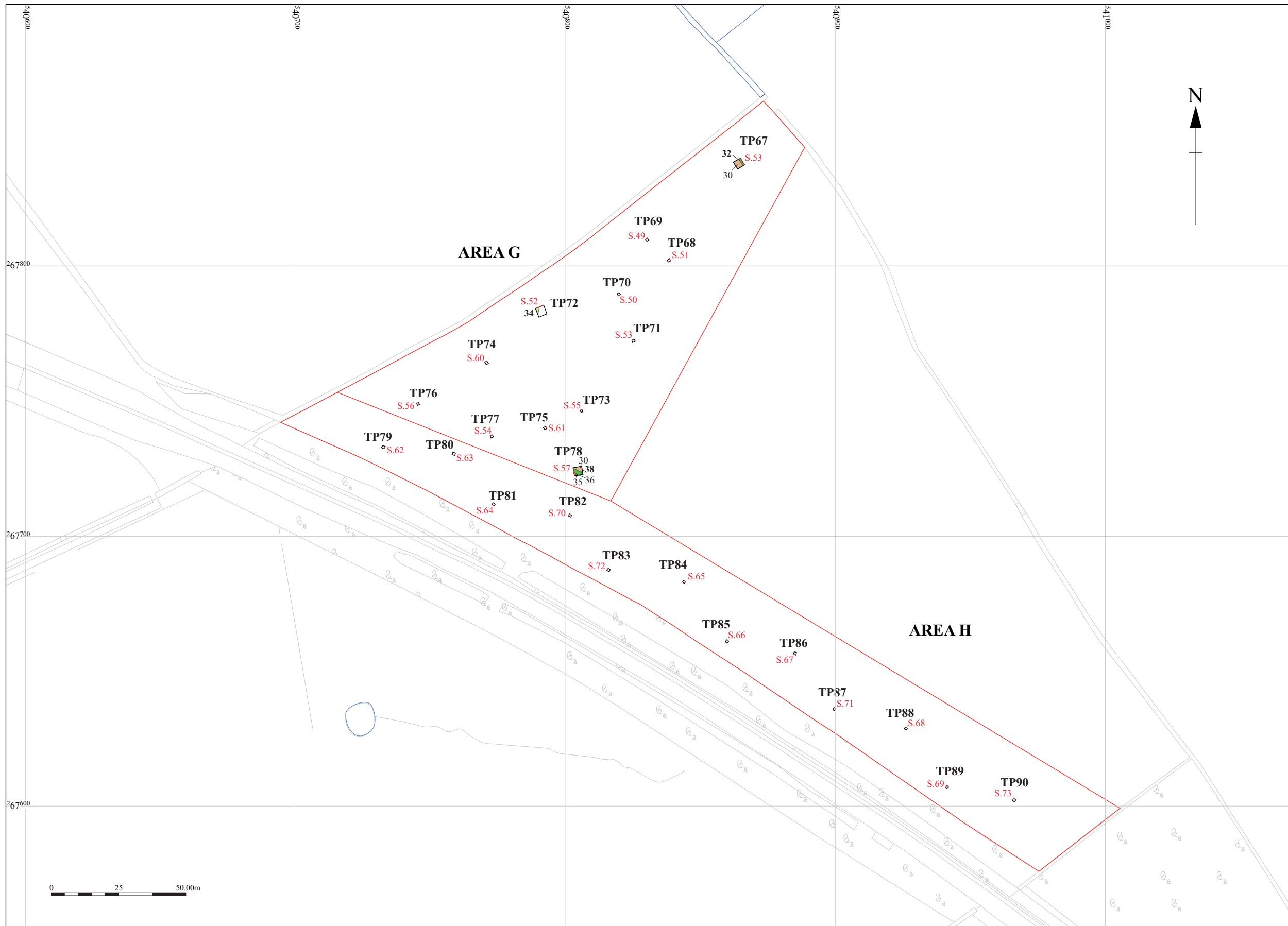
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Figure 2: Location of test pits in area C



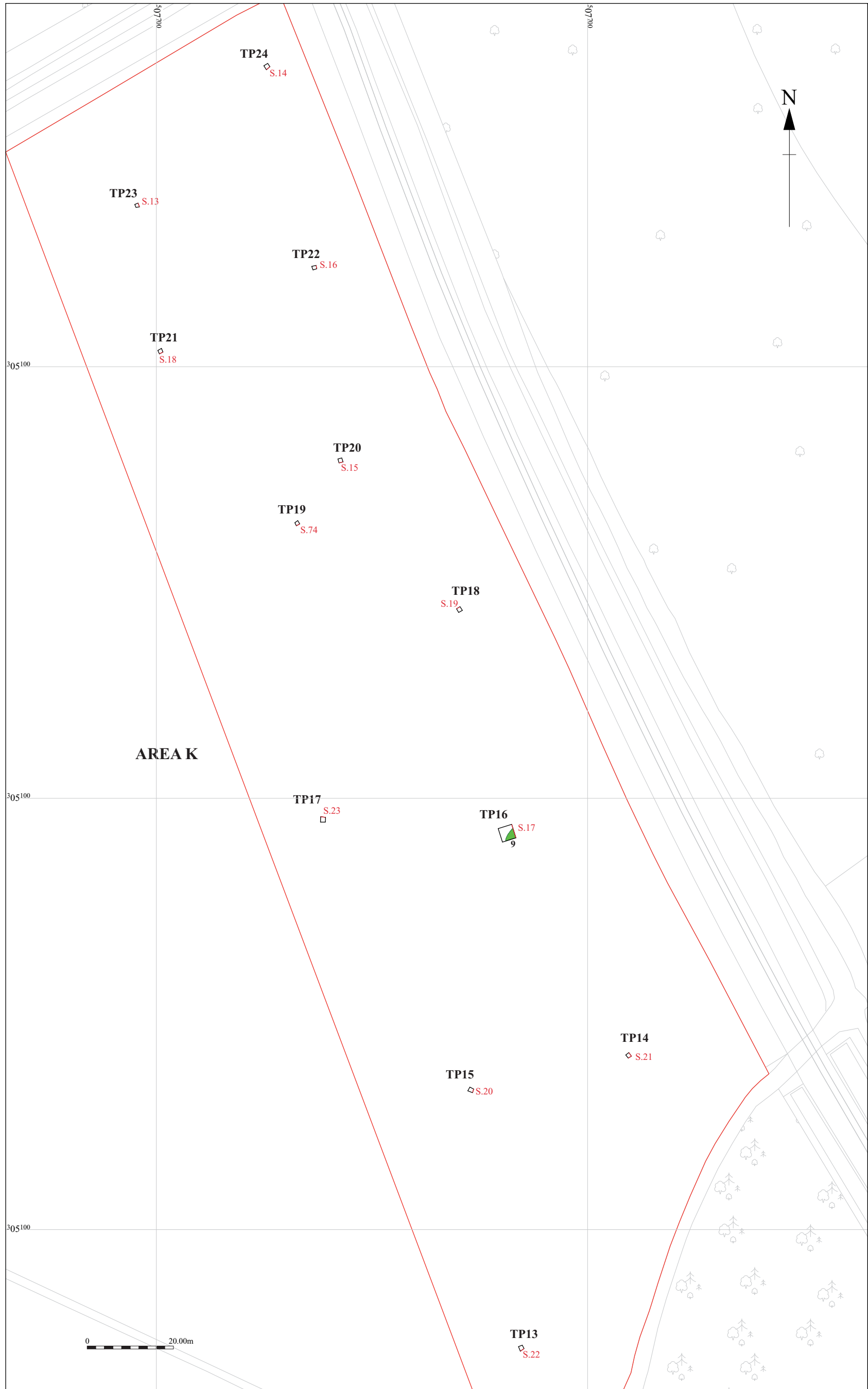
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Figure 3: Location of test pits in areas E & F



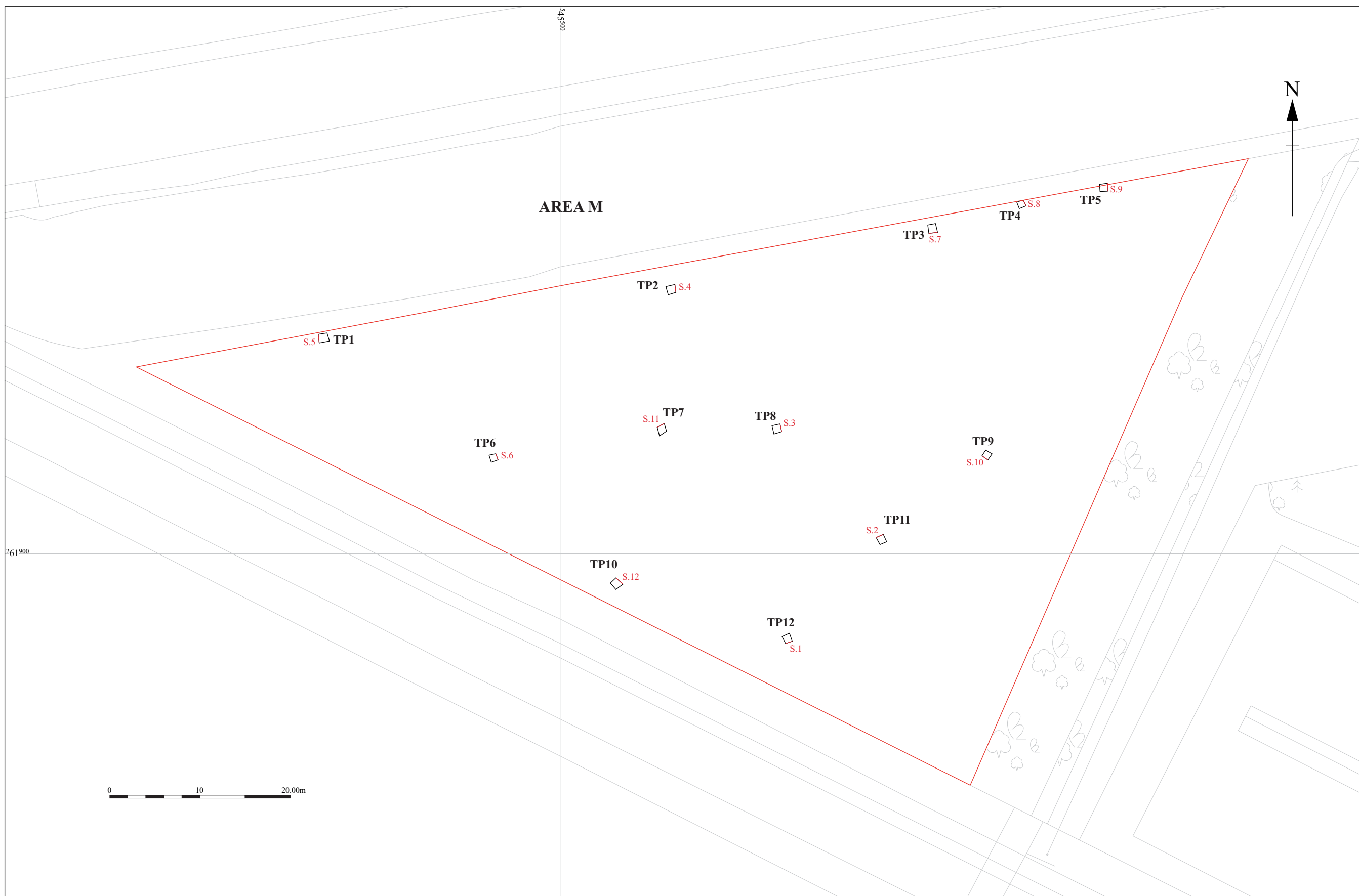
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Figure 4: Location of test pits in areas G & H



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Figure 5: Location of test pits in area K



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Figure 6: Location of test pits in area M

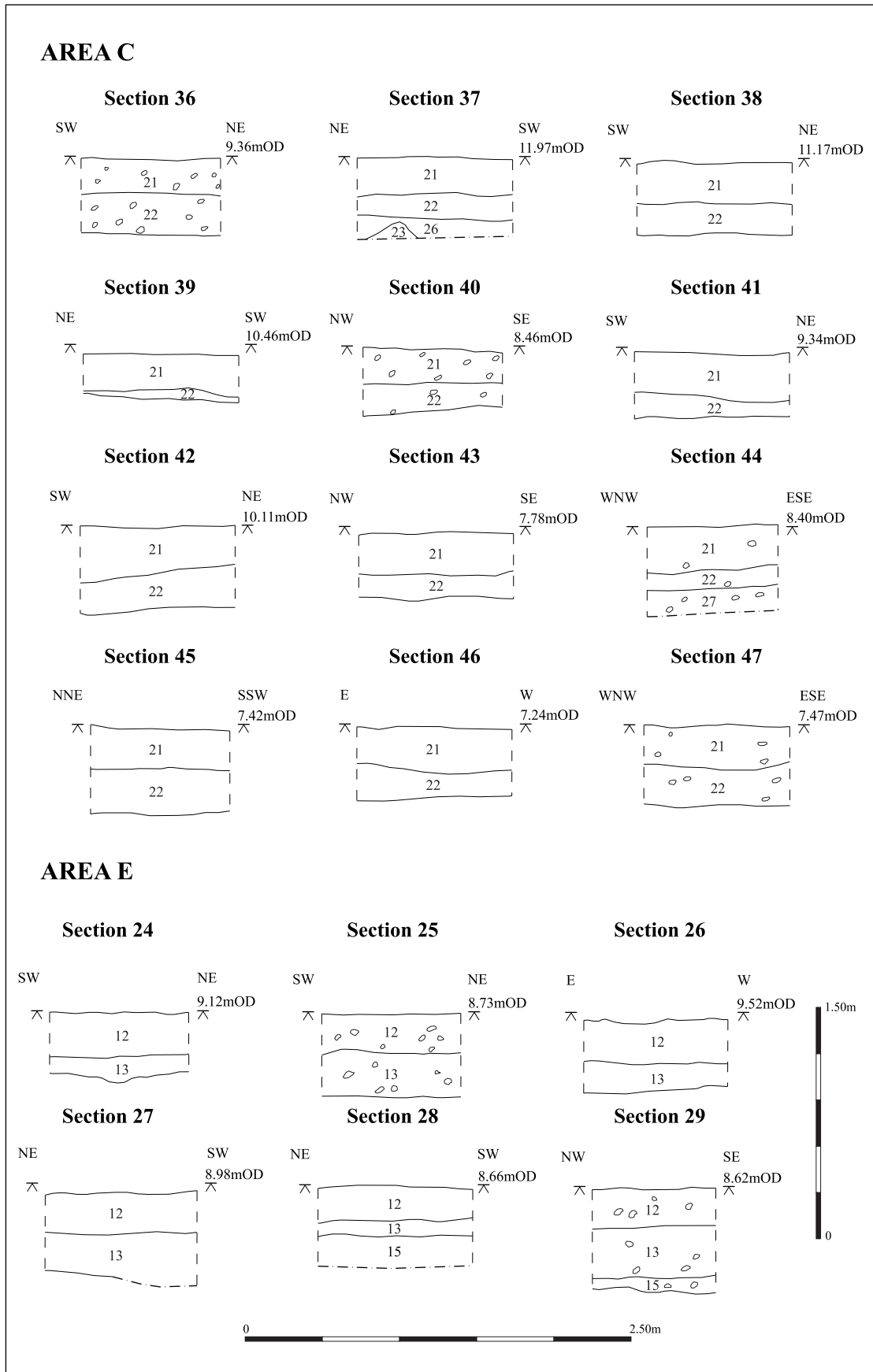


Figure 7: Section drawings of areas C and E

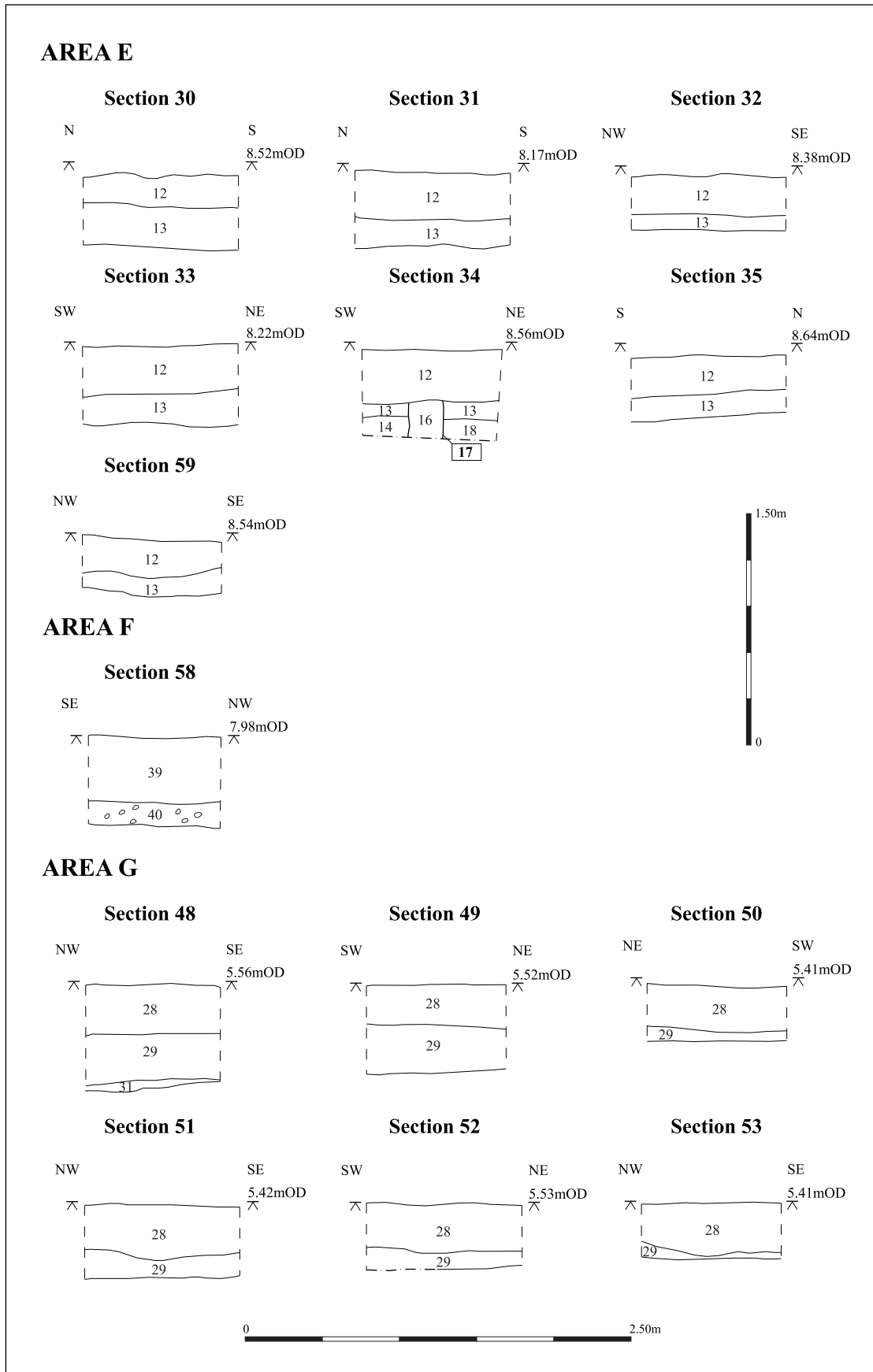


Figure 8: Section drawings of areas E (cont.), F and G

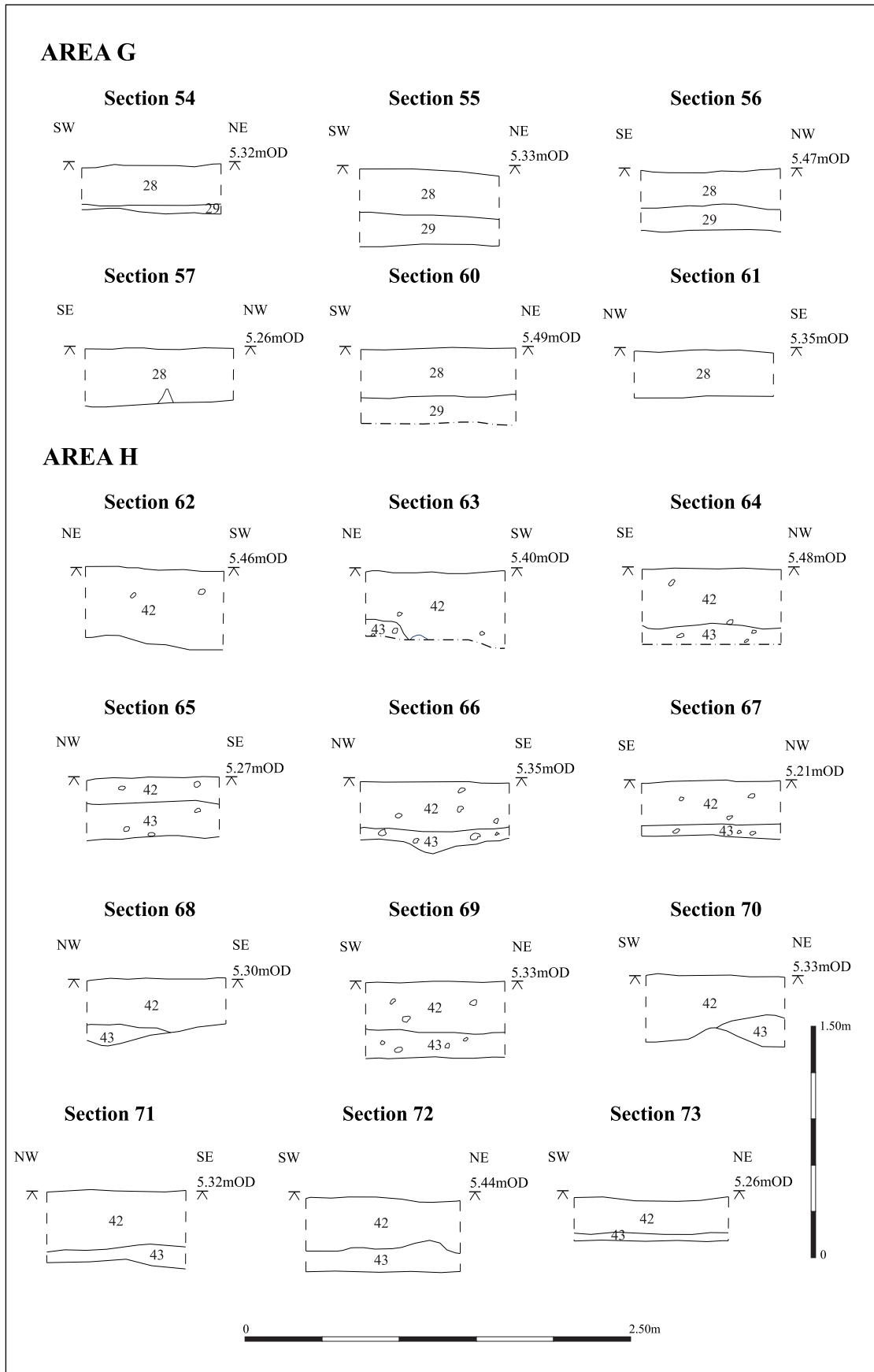


Figure 9: Section drawings of areas G (cont.) and H

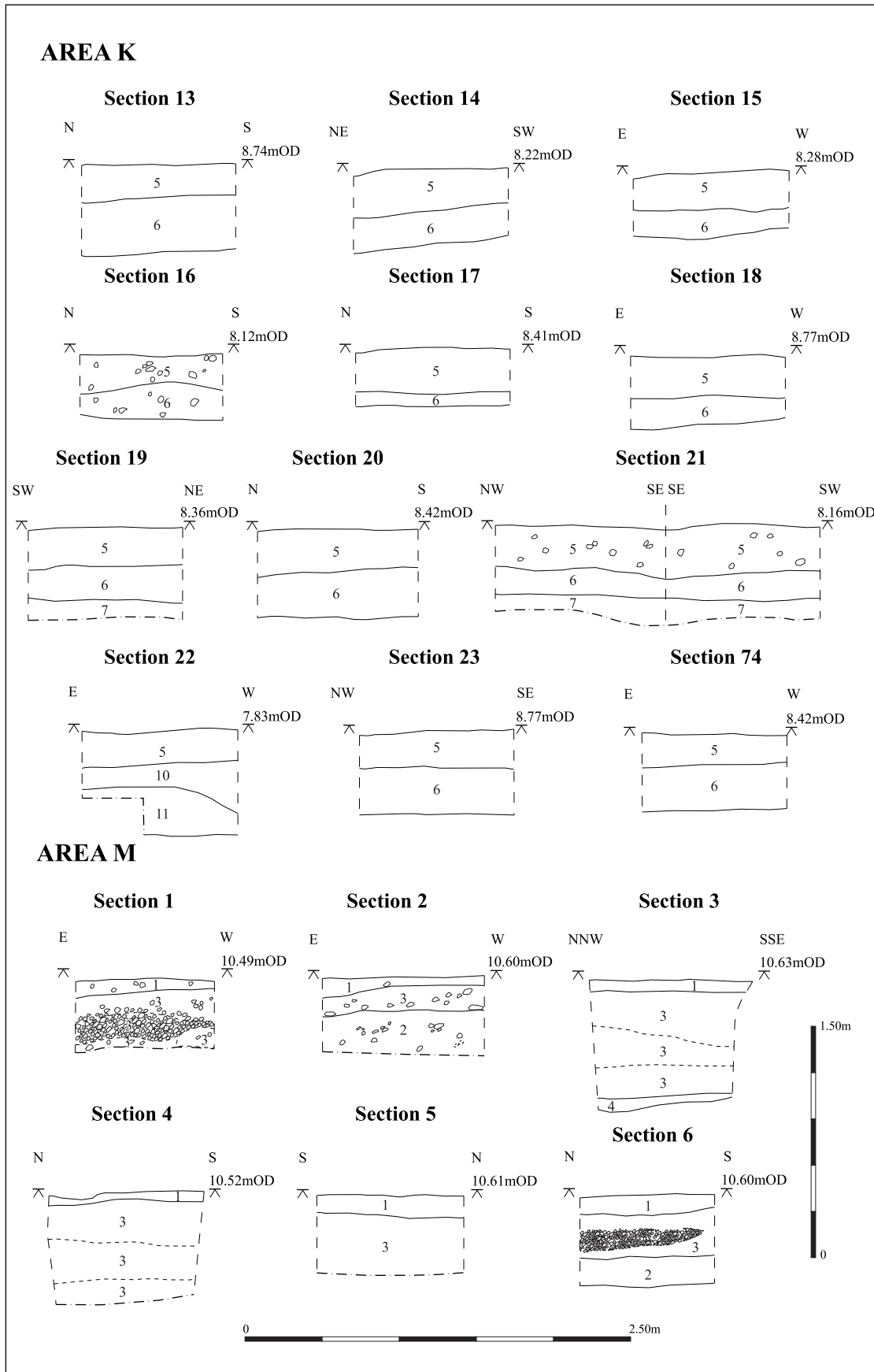


Figure 10: Section drawings of areas K and M

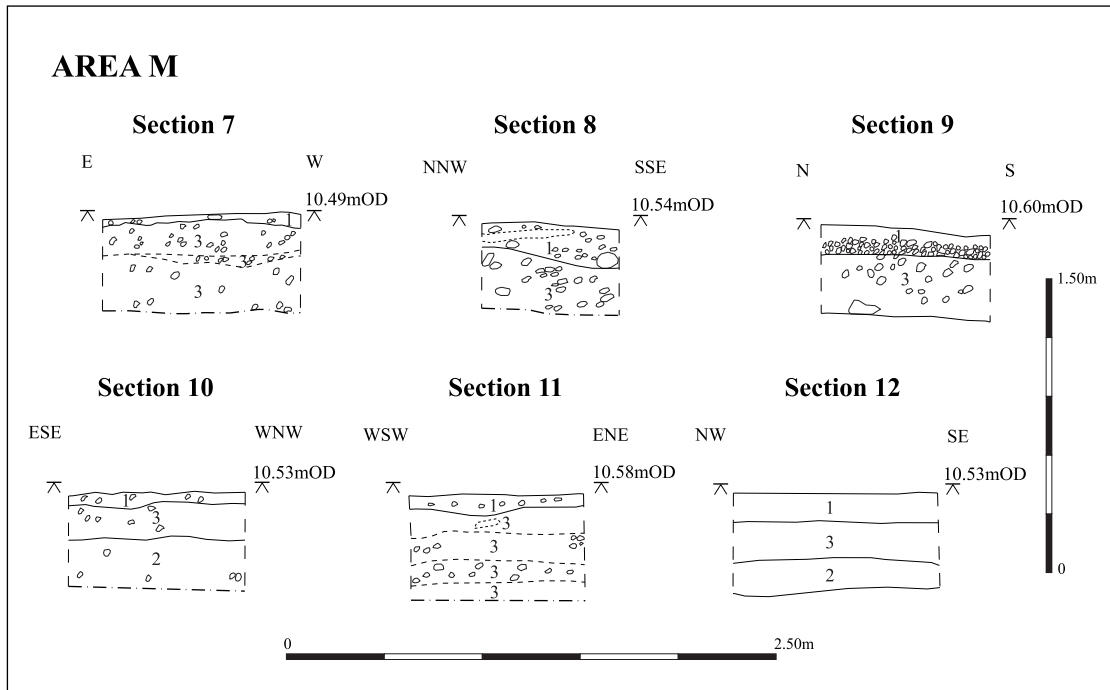


Figure 11: Section drawings of area M (cont.)



INVESTOR IN PEOPLE



2004-2005
Better Local Public Transport
2005-2006
Asset Management

Cambridgeshire County Council's **Archaeological Field Unit** undertakes a wide range of work throughout the county and across the eastern region.

Our key purpose is to increase understanding of the rich heritage of the region.

We are keenly competitive, working to the highest professional standards in a broad range of service areas. We work in partnership with contractors and local communities.

We undertake or provide:

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- heritage and conservation management
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