Little Sydenham Farm, near Bridgwater Somerset

Interim
Geoarchaeological **A**ssessment **R**eport

November 2007

CONTENTS

LIST OF FIGURES

Summary

Oxford Archaeology (OA) was commissioned by CgMs Consultants, on behalf of Hallam Land Management Ltd, to carry out a field investigation at Little Sydenham Farm, Bridgwater, Somerset (NGR ST 313389). The work was carried out as a condition on a planning application for warehouse development, associated offices and car parking facilities. The work was carried out in October 2007.

The assessment comprised a two-stage field investigation of the proposed site. The first stage consisted of a geophysical conductivity and auger survey of the underlying alluvial sequence, in order to identify and map the main sediment zones across the site. The survey results provided baseline data on the sequence, to help inform the location and scope for the next phase of targeted archaeological field investigation.

The survey identified four distinct zones of sedimentation. Two major tidal channels (Zones A and C) and two channel edge environments (Zone B and D) were identified. The augerhole sampling has confirmed the presence of peat horizons within the southeastern corner of the site. The results suggest that Zone D represents a true marsh environment, and to a lesser extent Zone B, which were more likely to have been the focus for early prehistoric activity.

Evidence of early occupation activity within the area of the Somerset Levels has been previously recorded, represented by Mesolithic flints and wooden trackways within the peat deposits leading to 'islands' of the floodplain. The possibility that prehistoric remains may be present sealed within these peats can not be discounted. The regional evidence demonstrates extensive exploitation of the wet marshland environment, which would have existed at this time by hunter-gatherers and later farming communities.

There is also low to moderate potential for identified remains dating to the Saxon, medieval and post Medieval periods within localised areas of the study site sealed underneath the topsoil.

Based on the survey results 10 boreholes and 6 test pits have been proposed across the four identified sedimentary zones, in order to assess the archaeological and palaeoenvironmental potential of these deposits.

Little Sydenham Farm, near Bridgwater Somerset

NGR: ST313389

Interim Geoarchaeological Assessment Report

1 INTRODUCTION

1.1 Scope of Work

1.1.1 Oxford Archaeology (OA) was commissioned by CgMs Consulting Ltd. to a prepare an interim statement following the completion of stage one of a geoarchaeological assessment of a120 ha proposed development at Little Sydenham Farm, near Bridgwater, Somerset. The work was undertaken as part of a two-stage evaluation strategy for the proposed development.

1.1.2 The main object of the assessment is to determine the archaeological and palaeoenvironmental potential of the floodplain sequence at the site. The first stage of the assessment has now been completed, which comprised a geophysical and auger survey of the main sediment sequence and sub-surface topography of the floodplain. This survey will provide baseline data for the second phase of targeted archaeological evaluation of any sub-surface features, or significant deposits, such as palaeochannels or island of higher ground that may have been the focus for human activity. A palaeoenvironmental and geoarchaeological assessment of the sequence will also be undertaken as part of the final assessment in order to interpret the changing floodplain environment and identify any evidence of anthropogenic impacts. This work will ultimately assess the archaeological potential of the site, and help identify what if any further mitigation may be required.

1.2 Location, Geology and Topography

1.2.1 The site lies to the north of the town of Bridgwater (NGR: ST313389), within the valley of the river Parrett. The river Parrett runs *c* 300 m to the west (Figure 1). Most of the area is currently under pasture, with 20 ha used for light industrial activity to the southwest.

1.2.2 The site is within the Somerset Levels (Horsley Levels), an area of a low-lying topography at about 6 m OD south of the Polden Hills. The ground level rises gently to the south with the area around Sydenham Manor lying at approximately 8 m OD.

1.2.3 The underlying geology of the site is identified as deposits of Upper Keuper Marl and alluvium (BGS, 295). The levels are composed of thick peat deposits (previously recorded to a depth of 7 m) overlain by marine and estuarine alluvium and bands of riverine alluvium. The area also contains occasional islands of raised beach deposits, as a result of eustatic uplift.

2 BACKGROUND

2.1 Environmental and archaeological background

2.1.1 In order to understand fully the character and distribution of archaeological sites in the Somerset Levels, and the reasons behind major changes in settlement patterns in the past, it is necessary to understand the changing nature of the estuary itself. The Severn Estuary has the second highest tidal range in the world, a maximum of 14.8 m at Avonmouth, creating an exceptionally full and complex Holocene sedimentary sequence.

2.1.2 The Holocene sediments in the area consist of complex sequences of estuarine alluvium and organic clay and peats, deposited in a variety of environments representing, alder carr, fen, reedswamp, intertidal saltmarsh and mudflats. The currently adopted stratigraphic sequence for the Severn is based on work undertaken by Allen (1987 and 1990a) and Allen and Rae (1987). The deposits are macrotidal and well-mixed sediments, receiving fine sediment from many sources. At least four discrete lithostratigraphic formations, predominantly of sandy to silty clay, have been identified along the shores of the estuary in the intertidal zone, to depths up to 20 m.

2.1.3 The sediment sequence identified within the area of the site is comparable to the Wentlooge Formation and has been broadly divided into three main lithological units. The Lower Wentlooge Formation consists of estuarine and marine sands that would have been deposited during the early Holocene. The Middle Formation is characterised by silty clay alluvium and peat that reflect periods of changing sea level and river flooding. The Upper Formation consists of pale green estuarine silty clays that began to accumulate 2500-3000 years ago, and ceased to form in the Roman and post-Roman period. Reclamation during the Roman period is thought to have isolated the Wentlooge Surface in large areas of tidal wetland in the lower estuary. The soil that developed on this surface is recognised as the Wentlooge palaeosol which was protected by the post-Roman breaching of the Roman Sea defences led to a resumption of tidal sedimentation, helping to bury and protecting this surface. The overlying, thick, largely pink sandy to silty clays, termed the Rumney Formation, began to form at times ranging from the Saxon to the early modern periods. The present landscape developed following the later reclamation of the Levels that began in the medieval period.

2.1.4 No prehistoric or Roman remains are known within the site area and only limited Roman settlement is know from the wider area. The paucity of early archaeological evidence within the area is possible due to its proximity to the river Parrett and its

situation within the floodplain. The River Parrett, which is still tidal, is known to have been unstable and prone to channel shifting (Gathercole, 2001). Low-lying areas would have made it prone to flooding and possibly less favourable for settlement.

2.1.5 Topographic features like river terraces, islands of higher elevation and channel edges, may therefore have provided attractive locations to exploit the rich resources of the floodplain in the past. Since the end of the last glaciation sea level has been gradually rising, submerging former low-lying areas that could have been the focus for prehistoric activity. It is likely that evidence of early archaeological activity is buried underneath the alluvium, and difficult to detect by traditional archaeological evaluation techniques.

3 AIMS

3.1.1 The main objective of the assessment will be to identify the main sediment packages and sub-surface features within the floodplain sequence, assess its archaeological significance and to compare against the Lidar and geophysical surveys.

3.1.2 The main aims of the assessment will be to;

- Characterise the sediments and patterns of accumulation across the floodplain sequences, including the depth and lateral extent of major stratigraphic units, and the character of any reclaimed land surfaces pre-dating these sediments;
- Identify significant variations in the deposit sequence indicative of localised features such as topographic highs or palaeochannels; the Lidar data has already identified at least three palaeochannels within the site area.
- Identify the location and extent of any waterlogged organic deposits and address the potential and likely location for the preservation of archaeological and palaeoenvironmental remains;
- Clarify the relationships between alluvial/fluvial sediment sequences and other deposit types, including periods of 'soil' development, peat growth and archaeological deposits;
- To identify any archaeological remains (if present) or deposits that the development may remove or impact during the construction of the scheme;
- Attempt to develop a comprehensive overview of these sequences that brings together the changing sedimentary, environmental and anthropogenic evidence of the site;
- Establish a chronology framework for the sequence using radio-metric techniques;
- To assess the archaeological significance of the sequences and whether further work should be recommended;

4 METHODOLOGY

4.1 **General**

4.1.1 As part of a geoarchaeological assessment of a proposed site on initial geophysical survey was undertaken, in order to identify and map the major sediment zones within the site and help identify deposits and areas for further targeted geoarchaeological

investigation. Only 70 ha out of the 120 ha site area could be included in the survey due to issues of land access.

4.1.2 An EM31 magnetometer was used to rapidly map the sediment sequence across the site. This consists of a transmitter and receiver coils mounted within a unit that is carried across the site. The position of the unit is recorded at all times by a GPS located within a backpack. The depth of the penetration is about 3-6 m depending on ground conditions, and therefore suitable for mapping of near surface deposits rather than detailed detection of archaeological features or bedrock topography. This also included 6 hand augered samples in order to ground truth the geophysical data, provide more detailed sediment descriptions and probe areas where locally the alluvium extends to a greater depth.

4.1.3 The geophysical survey provided rapid electromagnetic measurements of the electrical conductivity (the reverse of resistivity) of the floodplain sequence, which varies according to the different composition and moisture content of the sediment sequence. This provided a cost efficient method of mapping the 120 ha site area and identifies sub-surface features and areas of different sediment deposition that may have been the focus for activity in the past.

5 STAGE 1 RESULTS: GEOPHYSICAL CONDUCTIVITY SURVEY

5.1 Introduction

5.1.1 The site area has been divided up into four main sediment zones based on the geophysics results. The plot of the conductivity survey can be seen in Figure 2 and plotted against the Lidar survey within Figure 3.

5.1.2 Zones A and C were identified as low conductivity, while B and D as high. Critically the auger holes indicate that Zone D contains a sequence of clay-silts with intercalated peats in places.

5.2 Zone A

5.2.1 Zone A was characterised by a zone of low conductivity representing a major channel area with laminated tidal deposits. The sediment sequence is likely to consist of well-laminated clay-silt and sands. The more recent remnants of a larger channel can be identified within the Lidar plot of the area.

5.3 Zone B

5.3.1 Elements of tidal channels and possible marsh sequences may be present in Zone B. the sequence consisted of clay-silts with some laminated sands and silts at depth.

5.4 Zone C

5.4.1 Zone C contains sediments that are dominated by very well laminated clay-silts and sands throughout (with the exception of the upper 1.5 m of clay-silt). These appear to

be tidally deposited sediments in active channels or sub-tidal situations. The more recent remnants of a larger channel sequence can be identified within the Lidar plot of the area.

5.5 Zone D

5.5.1 Zone D was identified as a zone of high conductivity most likely associated with the presence of organic deposits. Auger hole 1 revealed a sequence of grey clayey silt between -5.59 m and -3.70 m in depth, overlain by thin brown woody peat at -3.60 m and sealed by several deposits of grey clay-silt and a thin modern topsoil. The presence of peat represents a true marsh sequences at the edge of a major tidal channel (Zone C).

6 STAGE 2: PROPOSED TARGET FIELD INVESTIGATIONS

6.1 Introduction

6.1.1 A targeted approach on localised sub-surface features and deposits, identified within the geophysical survey, is likely to be the most effective method of archaeological evaluation for a site of this nature and size. Based on the survey results a combination of 10 boreholes and 6 trial pits could be used to evaluate and sample the four different sediment zones. The proposed locations shown in Figure 4 were selected in order to provide samples for detailed sediment descriptions, and palaeoenvironmental assessment. All locations and methods will be agreed with the County Archaeological Officer before work commences. The use of each technique will be dependent on the depth of the sub-surface features identified; its nature and practical considerations like flooding and land access.

6.2 Boreholes

6.2.1 The 10 boreholes will be located within the four zones and are targeted on specific deposits and sub-surface features (i.e. the thickest peat deposits or deepest channel sequence). They are as listed below:

- Borehole OA1 - located within a main tidal channel (Zone A);
- Borehole OA2 - located on the channel edge deposits (Zone B);
- Borehole OA3 - located within a marsh environment (Zone B);
- Borehole OA4 - located within a small tidal channel (Zone B);
- Borehole OA5 - located within a channel edge environment (Zone B);
- Borehole OA6 - located within a channel edge environment (Zone B);
- Borehole OA7 - located within a main tidal channel (Zone C);
- Borehole OA8 - located within a main tidal channel (Zone C);
- Borehole OA9 - located within the marsh environment (Zone D);
- Borehole OA10 - located within the marsh environment (Zone D);

6.3 Trial pitting

6.3.1 Trial pitting will comprise the excavation of up to six 1.5 m wide by 5 m long by 5 m maximum deep trenches with a JCB excavator. The location of the test pits will be

targeted on marsh and channel edge deposits that may reflect a higher archaeological potential. They are as listed below;

- Trial pit OA1 - located on the channel edge deposits (Zone A);
- Trial pit OA2 - located within a marsh environment (Zone B);
- Trial pit OA3 - located within a marsh environment (Zone B);
- Trial pit OA4 - within the marsh environment (Zone D);
- Trial pit OA5 - within the marsh environment (Zone D);
- Trial pit OA6 - located within the marsh environment (Zone D);

6.3.2 The boreholes and test pits will be monitored and recorded as set out within the WSI (OA, 2007) by a suitably qualified geoarchaeologist. Should any archaeological remains be encountered within any of the trial pits, then OA standard archaeological methodology will form the basis of any excavation and recording.

6.4 Palaeoenvironmental and geoarchaeological assessment

6.4.1 A geoarchaeological assessment will be undertaken following the completion of the field investigation, in order to determine the distribution and depth of the sub-surface stratigraphy, to assess the palaeoenvironmental potential of the sequence and identify any archaeological sites or deposits buried by alluvium. The assessment will be based on the information provided by the monitoring and recording of boreholes and test pits. The investigation would focus on the potential of the floodplain sequences and would aim to provide detailed information on the archaeological significance of these deposits.

6.4.2 The palaeoenvironmental assessment will assess the potential preservation from one borehole sequences for pollen, waterlogged plant remains, and diatom and/or snail samples where appropriate. Radiocarbon dates will be used if required to help correlate the sequence with previous palaeoenvironmental studies. Further sequences may be recommended for assessment and dating depending on the significance of the deposits and nature of any archaeology uncovered.

6.4.3 This work will help to bring together the changing sediment sequence, the vegetation history and identify anthropogenic impacts within the sequences. It will also help to place known or newly discovered archaeological sites within a wider landscape context. The work will provide an evidence-base for decision making about the nature and value of this resource, and enable further assessment of the potential development impacts to be considered.

7 CONCLUSIONS AND DISCUSSIONS

7.1 Sedimentary sequence

7.1.1 The interim assessment has successfully identified four distinctive zones of sedimentation. Two areas of major tidal channels (Zones A and C) and two channel edge environments (Zones B and D) have been identified. The auger hole sampling has confirmed the presence of peat horizons within the southeastern corner of the

site. On the results of the survey it looks like Area D represents the true marsh sequences.

7.1.2 The character of the sediment sequences overlying the Mudstone is consistent in terms of lithology and elevations with those previously identified along the Severn. On a broader level they are comparable to many sequences investigated in the Severn Estuary by numerous workers. With reference to the model proposed by Allen (1987 and 1990a) it is likely that the peat units relate to the development of wetland systems during the Bronze Age and Iron Age. This period saw the development of marshland systems, and large expanses of alder carr and reedswamp, dissected by areas occupied by eroding channels. The height data for the peat unit, occurring at elevation of +2.49 m OD, is comparable to other Bronze Age sequences in the Severn Estuary.

7.1.3 Regional models of this kind tend to look at the broader pictures of estuary development that may be recorded in a mid floodplain situation, but ignore the very complex situations at the margins of floodplains and around tributaries: where edge effects come into play. Bates *et al* (1995) suggests that in such situations small variations in sub-surface topography may result in peat formation in one area when much of the remaining area was subject to minerogenic deposition. This may have implications for detecting region-wide environmental events associated with fluctuations in river levels, and therefore is worthy of more detailed study.

7.2 Archaeological potential

7.2.1 The survey has confirmed that the archaeological potential of the site is generally low, as indicated in the desk-based assessment. A low to moderate potential is identified for remains dating to the Saxon, medieval and post medieval periods in localised areas of the study site sealed underneath the topsoil.

7.2.2 The one notable exception is the peat remains buried at -3.60 m (2.49 m OD) by later alluviation within the southeastern edge of the development (Zone D), and to a lesser extent within Zone B. Evidence of early occupation activity within the area of the Levels has been previously recorded, represented by Mesolithic flints and wooden trackways within the peats leading to 'islands' within the floodplain (Coles & Coles, 1986). The possibility that prehistoric remains may be present sealed within these peats can not be discounted. The regional evidence demonstrates extensive exploitation of the Somerset Levels during the early prehistoric period.

7.2.3 The paucity of evidence for more extensive occupation activity of this period within the site is likely due to its close proximity to the River Parrett and situation within the floodplain. The River Parrett, which has two former meanders running across the site, and the low-lying nature of the area would have made it prone to frequent inundation and as such less favourable to settlement. Exploitation of resources within this wetland environment during this period is likely to have been focussed around the higher ground overlooking the Levels.

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Appendices

APPENDIX 1 AUGERHOLE LOGS

Augerhole	Grid reference	Depth from top of borehole (m)	Lithology
1	ST 31686 39016	0.00 – 0.20	Topsoil
		0.20-0.50	Light brownish-yellow silt. Structureless and dense
		0.50-0.70	Grey-brown with red-brown mottles, occasional soil carbonate nodules.
		0.70-2.70	Grey clay-silt. Very dense and compact. With depth thin seams of sand appear.
		2.70-3.30	Dark grey clay-silt with peaty material.
		3.30-3.40	Yellow-brown silt with some organic matter.
		3.40-3.60	Grey clay-silt.
		3.60-3.70	Brown woody peat.
		3.70->5.50	Grey clay-silt with black flecks.
			---base of augerhole 5.50m---
2	ST 31517 39269	0.00 – 0.15	Topsoil
		0.15 – 1.70	Yellow-brown clay-silt. Dense and compact. Occasional soil carbonate nodules.
		c.1.05 -	As above but with some fine sand present.
		1.70 – 2.60	Grey-brown very fine laminated sand and silts. Laminae typically 2-4mm thick, sub-horizontal and red-brown stained in places.
		2.60 -	Grey clay-silt with occasional sand laminations becoming very well laminated with depth.
			---base of augerhole 5.0m---
3	ST 31325 39503	0.00 – 0.15	Topsoil
		0.15 – 2.45	Grey-brown clay-silt with occasional soil carbonate nodules. Red-brown mottles present.
		c.1.20m	Some fine sand present
		c. 2.20m	Strong red-brown mottles noted
		2.35 – 2.60	Becoming grey clay-silt.
		2.60 – 3.80	Brown clay-silt with red-brown mottles. Becoming grey with depth and soft.
		3.80 -	Grey laminated clay-silts and coarse sand.
			---base of augerhole 5.0m---

4	ST 31283 39549	0.00 – 0.20 0.20 – 2.70 c. 1.80m 2.70 – 3.40 3.40 – 4.95 4.95 -	Topsoil Yellow-brown clay-silt with red-brown mottles. Soil carbonate nodules present. Unit is dense and compact Occasional sand laminations appear Well laminated sands and silt. Yellow brown becoming grey with depth. Grey sand with some silt. No structure. Grey clay-silt. ---base of augerhole 5.25m---
5	ST 31226 39311	0.00 – 0.20 0.20 – 1.00 c.0.85m 1.00 -	Topsoil Yellow-brown silt (clay-silt). Structureless and massive. Some very fine sand present. Laminated sands and clay-silts. Laminae 4-5mm thick. Laminae coarsen with depth. ---base of augerhole 4.5m---
6	ST 31385 39599	0.00 – 0.30 0.30 – 3.80 c.1.55m 3.80 -	Topsoil Dark yellowish-brown clay-silt with soil carbonate nodules. Mottled with red brown mottles. Dense and compact. Occasional sand laminae present Yellow-brown clay-silt with strong brown mottles. Compact and firm. ---base of augerhole 4.0m---

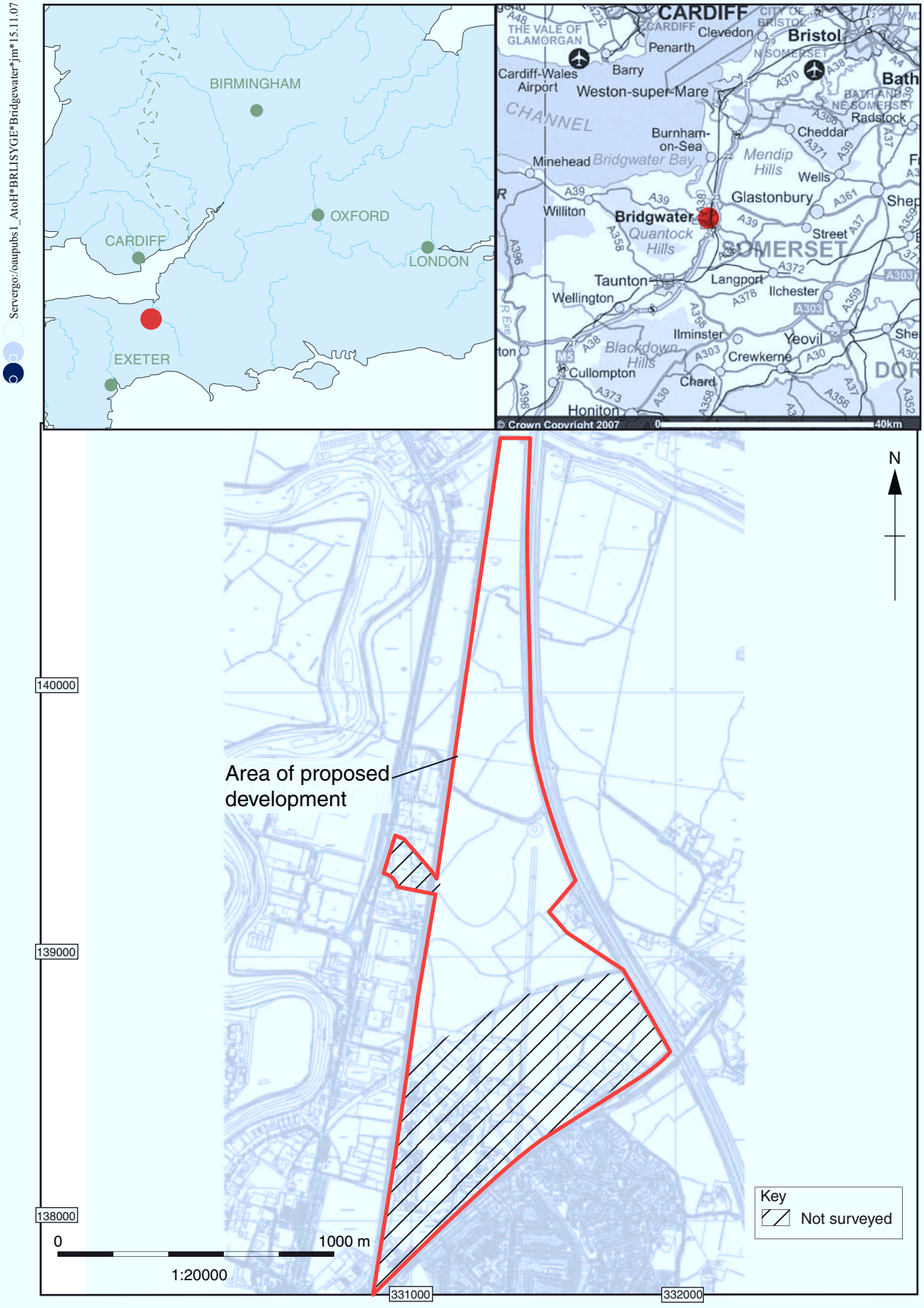


Figure 1: Site location

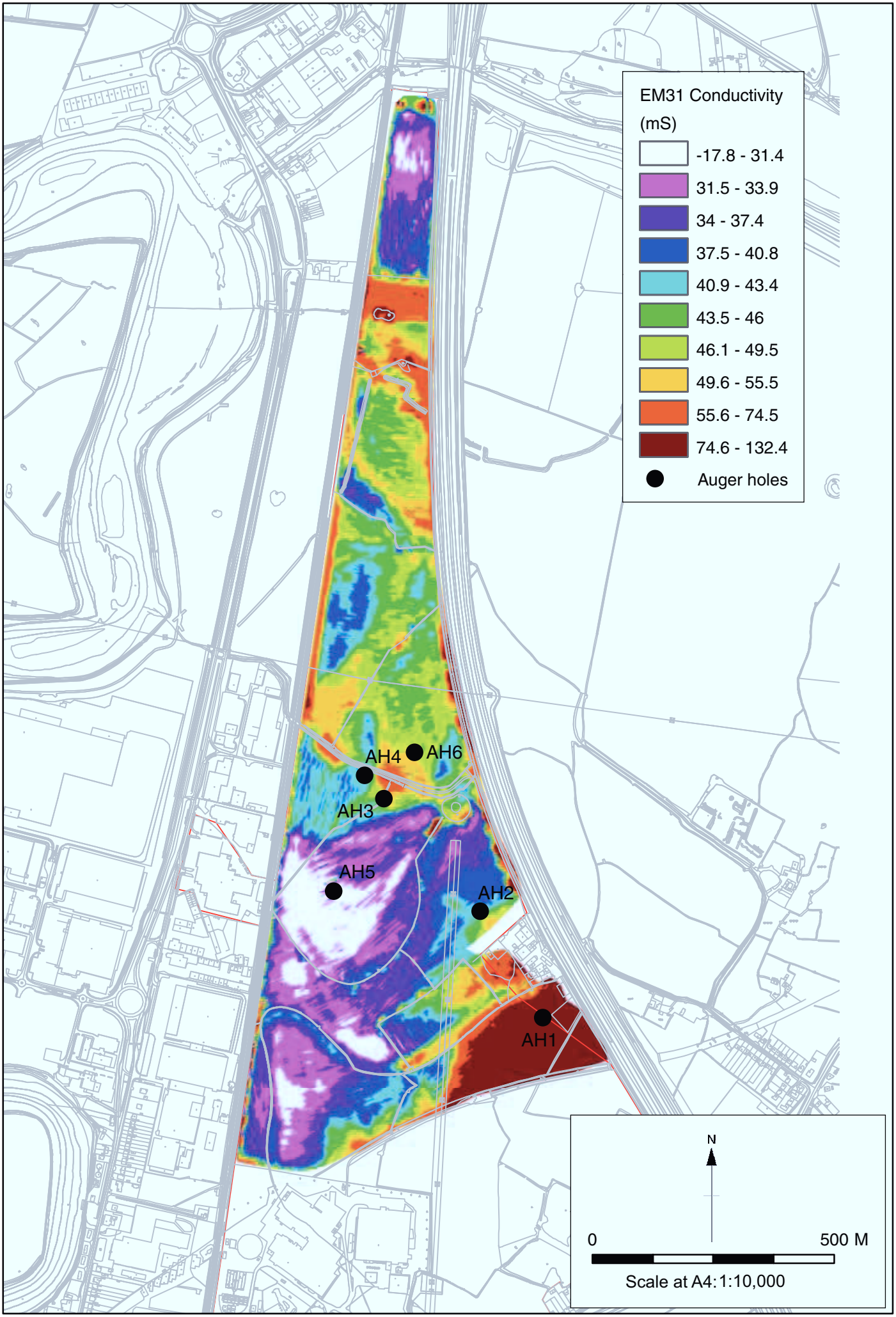
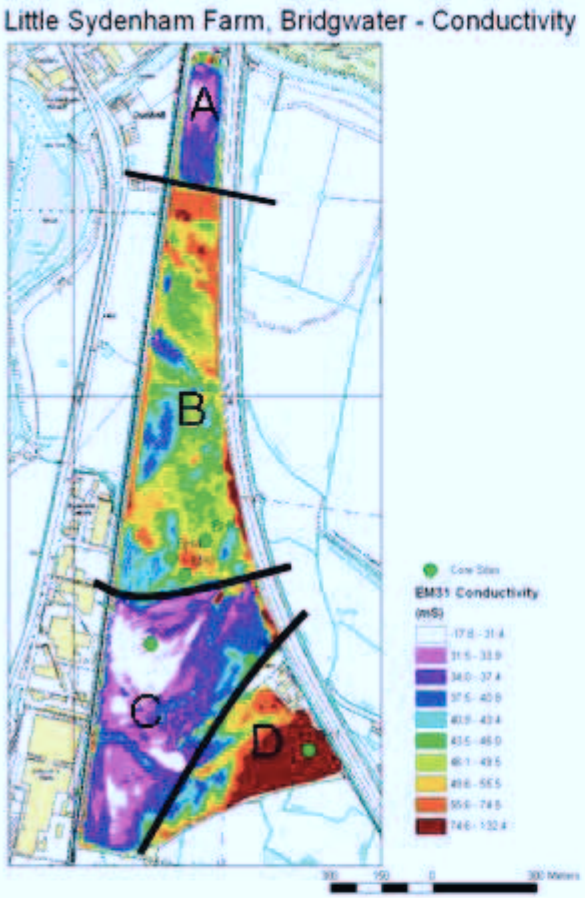


Figure 2: Conductivity survey



A-D sediment zones

Figure 3: Conductivity and lidar survey with sediment zones

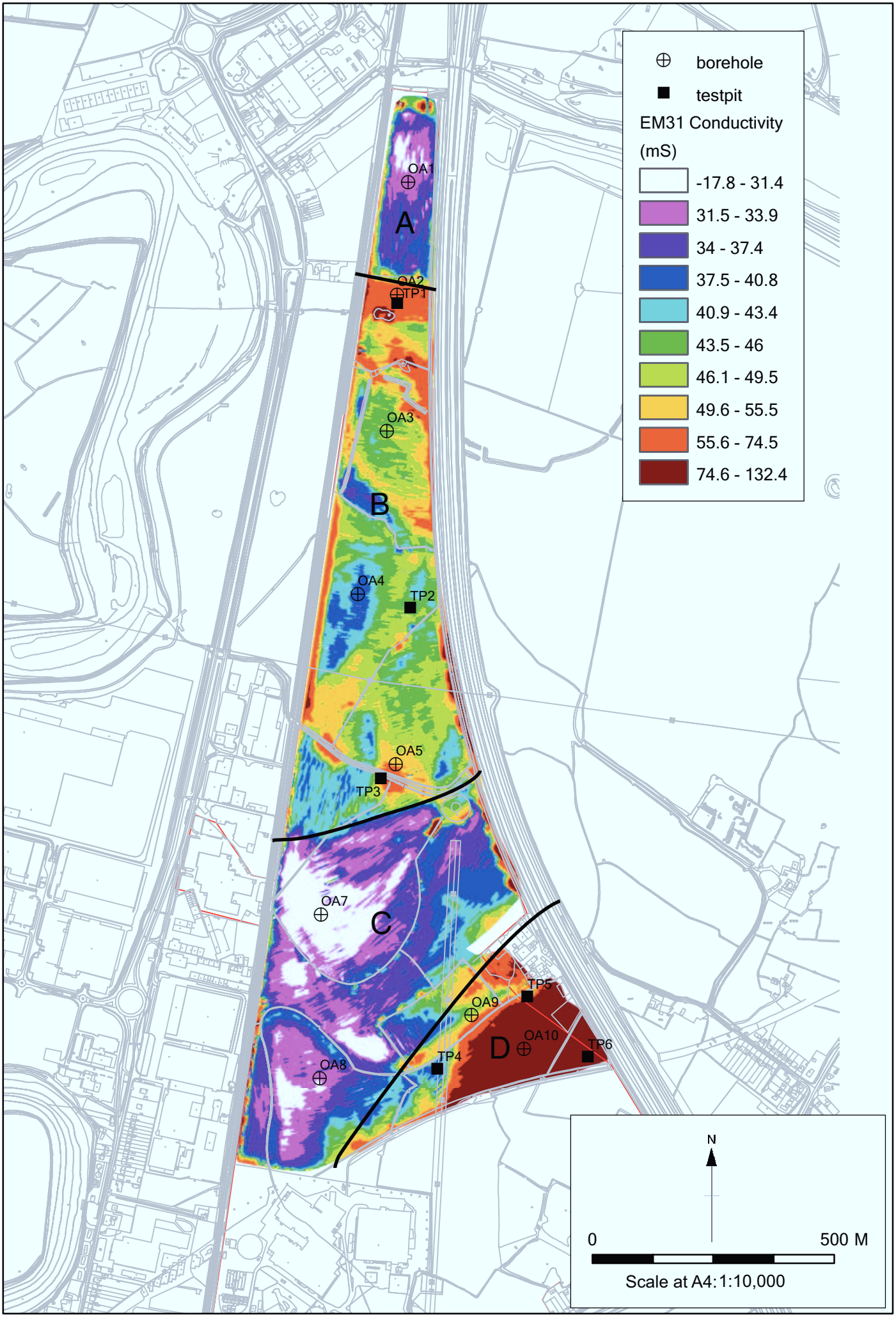


Figure 4: Proposed borehole and test pit locations