

**Summary Report on the results of Geoarchaeological assessment of
core material / borehole logs from a site at Watchester Lane, Minster**

NGR 630655 164195

**ASE Project no. 3156
ASE Report no. 2008115**

M. R. Bates & C. A. Pine

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1.0 Introduction

- 1.1 This summary report has been produced at the request of Archaeology South East (ASE) in order to comment on the nature and significance of sedimentary sequences present within an area in which new structures are to be developed by Southern Water at Watchester Lane, Minster (Figure 1).
- 1.2 The report summarises key background information for the region in order to highlight certain key points of interest. This information is subsequently used to contextualise the observations made on the basis of borehole samples drilled specifically for geoarchaeological purposes.
- 1.3 Extensive reviews of the geoarchaeological potential of the eastern end of the Wantsum Channel have recently been produced by Corcoran (2003) and Spurr (2005) and this report draws on these documents and the authors own familiarity with the study area.

2.0 Background

- 2.1 The study site / area lies on the northern margin of the Wantsum Channel within an area known as Minster Marshes. Bedrock consists of Thanet Sand with the Seaford Chalk Formation and Margate Chalk Formation lying to the north of the study site. Superficial deposits (Figure 2) consist of alluvium and Head deposits with the site lying close to the boundary of these two deposits.
- 2.2 Little is known regarding the Pleistocene history of the Wantsum Channel although patterns of fluvial gravels in the Blean area north of Canterbury attest to a northwards flowing Stour through much of the Pleistocene. Drainage reversal in the late Pleistocene is attested to by the presence of deeply buried channel deposits beneath the Stonar Bank (Shephard-Thorn, 1988) suggesting a shift in the Stour drainage basin axis from north to south. Other Pleistocene sediments within the vicinity of the study area include the important loess deposits at Pegwell Bay (Murton *et al.*, 1998) and possible raised beach deposits at Betteshanger Colliery (Shephard-Thorn, 1988). Head deposits have been mapped by the BGS (Figure 2) just to the north and these deposits may well extend beneath the floodplain alluvium.
- 2.3 Marine flooding of the Wantsum area probably commenced around 6,000 B.P. and the creation of extensive marine sand bodies at the eastern end of the channel has been attested by numerous works in the area (Spurr, 2005; John Whittaker *pers. comm.*, January 2007). The sands represent deposition in active marine environments with relatively high energy. These are often replaced up-sequence by silts and sands indicating a shift towards reduced marine conditions and increasing estuarine ones. Finally organic silty-clays cap the sequence and are probably indicative of a final infilling of the area and a transition to fluvial conditions (Figure 3).
- 2.4 Relevant to the present study are the observations made by Hearne *et al.* (1995) at Weatherlees Hill Waste Water Treatment Plant (TR TR32925 62775). Here bedrock Thanet Sand was encountered within 4m of ground level at -2.5m O.D.

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- A sequence of alluvial and estuarine sediments were encountered with the basal deposits radiocarbon dated to 4640 ± 60 B.P. and 4630 ± 70 B.P. The underlying bedrock surface therefore represents the Holocene land surface until sometime in the Neolithic period.
- 2.5 Thicker sequences are found within the main area of the channel, for example at the former Astra Pyrotechnics Factory on Ramsgate Road (TR 33300 61500) (Pratt *et al.*, 2000) and to the south at the former Brown and Mason Yard (TR 33300 61000) (Spurr, 2005). In both cases thick sediment sequences (in excess of 14m thick) have been encountered consisting of marine sands and gravels being overlain by sands/silts/clays and finally organic silts. At the Brown and Mason Yard (Spurr, 2005) these sequences have been shown to contain foraminifera indicating a progressive up-sequence shift from high energy beach situations through estuarine mud and sand flats to low salt marsh and finally high salt marsh (John Whittaker *pers. comm.*, January 2007).
- 3.0 Borehole investigation**
- 3.1 Two boreholes progressed using a driven window sampler rig [ABH 1 and ABH4] were drilled for geoarchaeological purposes. The locations are shown at Figure 4. Full details of the sequences are provided in Appendix 1.
- 3.2 In addition to examination of retained window sampler sleeved cores the factual ground investigation report for the site area produced by Bureau Veritas was made available for review [Williams 2008] the recorded logs / sequences shown in the geotechnical boreholes are considered stratigraphically equivalent to the two purposive geoarchaeological boreholes recorded in this report
- 3.3 Both geoarchaeological boreholes were drilled to a maximum depth of 5m. Sediments in both boreholes were dominated by silts and sands. In borehole ABH 1 silty clay rested on a soft silty clay with pebbles at 1.70m depth (+0.38m O.D.). This in turn rested on sediments interpreted as a terrestrial soil development (top of soil -0.02m O.D.). This part of the sequence therefore probably represents the buried land surface of earlier Holocene age developed in either bedrock Thanet Sand or Head deposits consisting of reworked Thanet Sand.
- 3.4 A similar sequence was noted in ABH 4 where silty clay overlay sediments with pebbles at the base (base of unit +0.62m O.D.). This in turn rested on sediments thought to be a terrestrial soil. This part of the sequence therefore probably represents the buried land surface of earlier Holocene age developed in either bedrock Thanet Sand or Head deposits consisting of reworked Thanet Sand.
- 4.0 Discussion:**
- 4.1 The evidence from the two boreholes suggests a relatively simple succession of events is recorded at the site. Soil formation in either *in situ* Thanet Sand or head deposits consisting of reworked Thanet Sand is noted in both boreholes. The surface of the soil lies between -0.02m and +0.62m O.D. This appears to be

-
- overlain by silts with gravel clasts at the base indicative of low energy estuarine deposition (perhaps with a marginally higher energy event at the base).
- 4.2 The age of the onset of sedimentation across the surface remains to be determined. However from the information at Weatherlees Hill Waste Water Treatment Plant where the basal deposits radiocarbon dated to 4640 ± 60 B.P. and 4630 ± 70 B.P. at -2.5m O.D. would indicate a more recent date would be likely here.
- 4.3 It remains to be determined but an initial onset of sedimentation may have occurred in the Roman or even post Roman periods. Given that the channel was navigable by ships until the Medieval period onset of sedimentation could have been very recent indeed. This buried surface represents an important horizon as this horizon would have formed the land surface for most of the Holocene period.
- 4.4 The nature of the post-inundation sequences probably represents very low energy estuarine, mudflat or marginal wetland situations.
- 5.0 Recommendation for further work:**
- 5.1 The evidence suggests that at both locations a buried Holocene land surface is present beneath the marsh surface at around 2m of depth. As this surface forms the land surface for much of the Holocene archaeological material may be anticipated to rest on this surface and therefore consideration of monitoring excavations to such a depth should be considered.
- 5.2 Additional work on samples taken would perhaps be restricted to assessing the molluscs present (see descriptions) as well as forams/ostracods present within the top 2m of the sequence. This would provide confirmation on the nature of the depositional processes responsible for sequence formation. If suitable samples were to become available in the future dating the onset of sedimentation above the soil horizon would be useful (given the absence of organic material this might have to be undertaken using OSL dating).








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Appendix 1:

Core descriptions for ABH 1 and ABH 4

ASE
Borehole: ABH 1 [GL at + 2.08m OD]

SAMPLE N°	SAMPLE TYPE	DEPTH (Meters)	MUNSELL COLOUR	MUNSELL CODE & COLOUR	DEPOSIT DESCRIPTION	UNIT	INTERPRETATION/ COMMENTS
1	Core	1.0 - 1.70		2.5Y 5/2 Greyish Brown	Firm silty clay. Massive structure. Diffuse contact horizon.	1	Terrestrial soil development.
		- - - - 2.0		2.5Y 5/1 Grey	Soft silty clay. Massive structure Very occasional [<2%] unevenly distributed medium granule sized angular calcite mollusc shell fragments. Occasional sub-rounded medium sized pebble clasts. Sharp contact horizon.	2	Low energy estuarine /intertidal sediment deposition.
2	Core	2.10 - - - - 2.55		10YR 5/6 Yellowish Brown	Soft very fine sandy silt. Massive structure Frequent poorly sorted granule sized fragments of calcite mollusc shell. Occasional sub-rounded medium sized pebble clasts. Sharp contact horizon.	3	Terrestrial soil development.
		- - - 2.75		5Y 6/2 Light Olive Grey	Firm silty very fine sand Massive structure. Sharp contact horizon	4	Low energy estuarine /intertidal sediment deposition.
3	Bulk	- 3.0 - 3.50		Gley 1 4/1 10Y Dk Greenish Grey	Firm silty very fine sand Massive structure Disturbed contact horizon	5	
		- - - - -4.0	 	2.5Y 5/4 Light Olive Brown 5Y 6/2 Light Olive Grey	Firm silty very fine sand. Massive structure Very occasional unevenly distributed poorly sorted granule sized fragments of calcite mollusc shell. Mottling: [5Y 6/2] Common [20%] medium sized [5-15mm] Prominent contrast, Sharp colour boundaries.	6	Low/medium energy estuarine/intertidal sediment deposition.
4	Core	- 5.0					

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Borehole: ABH 4 [GL at + 2.72 m OD]

1.0 -2.0m



2.0 -3.0m



3.0 -4.0m









BULK SAMPLE
ONLY
Refer to description
table

4.0 -5.0m



ASE

Borehole: ABH 4 [GL at + 2.72 m OD]

SAMPLE N°	SAMPLE TYPE	DEPTH (Meters)	MUNSELL COLOUR	MUNSELL CODE & COLOUR	DEPOSIT DESCRIPTION	UNIT	INTERPRETATION/ COMMENTS
1	Core	1.0 - - - - 1.80	 	2.5Y 5/2 Greyish Brown 10YR 4/6 Dark Yellowish Brown	Firm silty clay Massive structure Mottling: 50/50% of indicated colours. Irregular shaped Prominent contrast Sharp colour boundaries Diffuse texture horizon at [c. 1.30m] = soft silty clay.	1	Terrestrial soil development.
		- - - - 2.0	 	2.5Y 5/1 Grey Gley 1 4/1 10Y Dk Greenish Grey	Soft silty clay. Massive structure. Mottling: 50/50% of indicated colours diffuse grading toward dominant dark GLEY. Very occasional [<2%] unevenly distributed medium granule sized angular calcite mollusc shell fragments. Occasional sub-rounded medium sized pebble clasts. Sharp contact horizon.	2	Low energy estuarine /intertidal sediment deposition.
2	Core	- 2.10					
		- - 2.15		2.5Y 5/2 Greyish Brown	Soft clayey silt. Massive structure. Sharp contact horizon.	3	Leached mineral horizon.
		- - - 2.80		10YR 5/6 Yellowish Brown	Soft very fine sandy silt. Massive structure Frequent poorly sorted granule sized fragments of calcite mollusc shell. Occasional sub-rounded medium sized pebble clasts. Sharp contact horizon.	4	Terrestrial soil development.
3	Core	- 3.0 - - - 4.0	 	2.5Y 5/4 Light Olive Brown 5Y 6/2 Light Olive Grey	Firm silty very fine sand. Massive structure. Very occasional unevenly distributed poorly sorted granule sized fragments of calcite mollusc shell. Mottling: [5Y 6/2] Common [20%] medium sized [5-15mm] Prominent contrast, Sharp colour boundaries.	5	Low/medium energy estuarine/intertidal sediment deposition.
4	Core	- 5.0			As above with increased frequency of mollusc shell		

ASE
Borehole: ABH 1

1.0 – 2.0m



2.0 – 3.0m

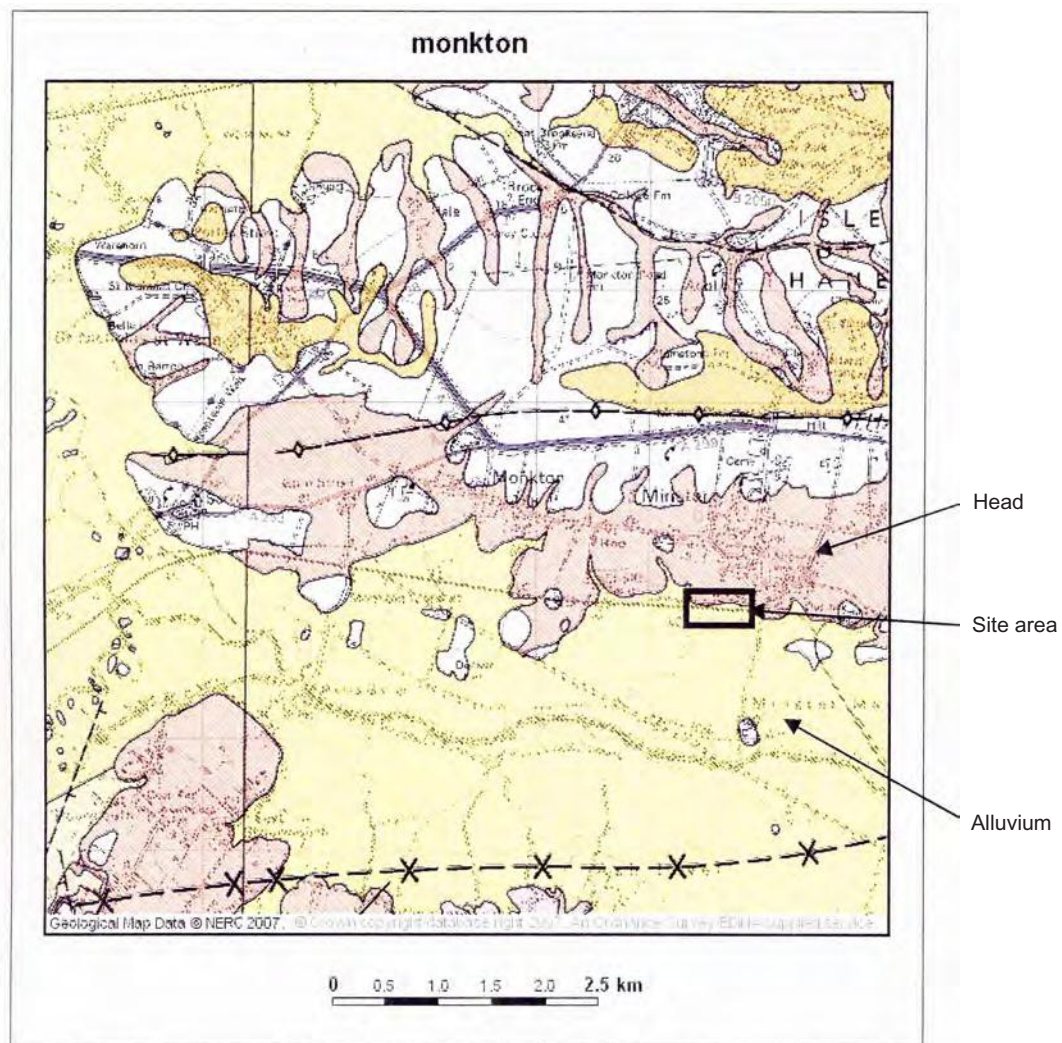


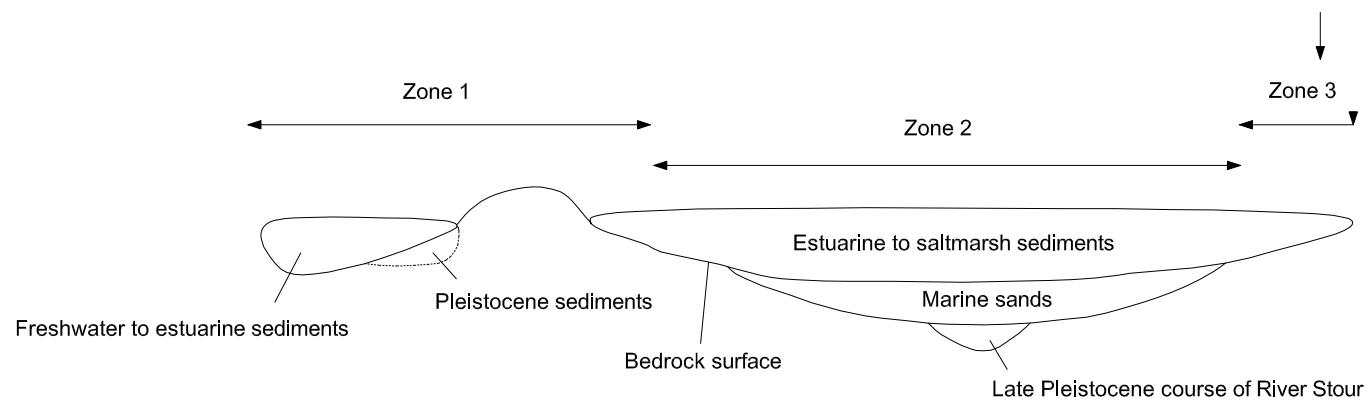
3.0 – 4.0m

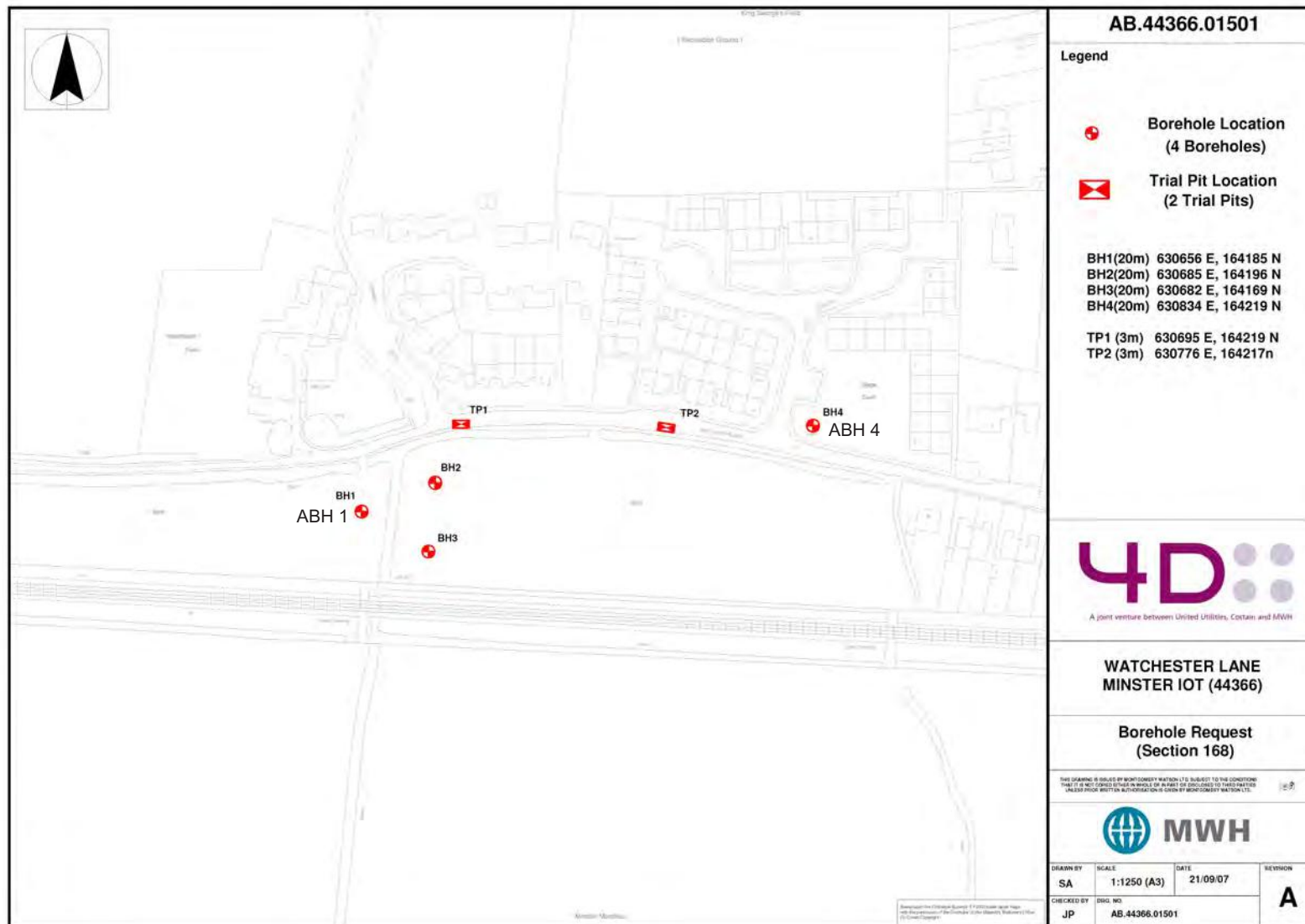


4.0 – 5.0m









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Locations of ABH 1 (630656E, 164185N) and ABH 4 (630834E, 164219N).
 (Note refer to Williams L. 2008 for results of geotechnical survey)

Fig. 4

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