ARCHAEOLOGICAL EVALUATION REPORT

UNIVERSITY CAMPUS SUFFOLK
PHASE 1 – NEPTUNE QUAY
(HER Ref. IPS 500)

INCLUDES THE RESULTS OF ARCHAEOLOGICAL MONITORING AND ASSESSMENT OF THE PALAEOENVIRONMENTAL CORE SAMPLES

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SCCAS REPORT No. 2007/34
OASIS ref. Suffolkc1-22849

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HER Information

Planning Application Number:	IP/06/00838/FUL
Date of Fieldwork:	Jan 2007 (Evaluation) and May 2007 (Monitoring)
National Grid Reference:	TM 1700 4405
Funding Body:	University Campus Suffolk
OASIS ref.:	Suffolkcl-22849

ARCHAEOLOGICAL EVALUATION REPORT
UNIVERSITY CAMPUS SUFFOLK
PHASE 1 – NEPTUNE QUAY

County HER Ref. IPS 500 (Ipswich. HER ref. IAS 6605); OASIS ref. Suffolkc1-22849

SCCAS Report No. 2007/34

Summary: *An archaeological evaluation was undertaken during January 2007 to assess the nature of land reclamation and to investigate the potential for buried archaeology within an area adjacent the River Orwell on land situated on the corner of Coprolite Street and Fore Street, Ipswich (NGR ref. TM 1700 4405), in advance of the proposed University Campus Suffolk development. Two linear trenches were machine excavated within which natural silting and reclamation deposits in excess of 3m deep were recorded. These deposits overlay dense grey river silt indicative of salt marsh and tidal mudflats. Other than the remains of a post-medieval cellar associated with a structure fronting onto Fore Street, no significant archaeological features were noted in either trench. It was expected that an earlier quay wall would be encountered but the area where it was predicted to be had been heavily disturbed by the extensive foundations of a 1950s silo structure. The presence of services and other 1950s building foundations precluded a relocation of the trench. This evaluation is recorded on the County HER, reference no. IPS 500. The evaluation was undertaken by the Suffolk County Council Archaeological Service Field Team who were commissioned and funded by the main building contractor, Willmott Dixon, on behalf of their client, University Campus Suffolk.*

Following the evaluation a programme of archaeological monitoring was undertaken during the removal of the massive modern concrete foundations and the piled ground works for the USC building but no deposits of archaeological interest were revealed (See Appendix III for the Monitoring Report)

Results of the palaeoenvironmental assessment of samples taken during the evaluation indicate that an organic-rich sand unit encountered at site accumulated within a small tributary or man-made drainage ditch, sometime between the late Medieval and early post Medieval periods (See Appendix IV for the full report).

1. Introduction

A university has been proposed for the county of Suffolk to be known as the University Campus Suffolk (UCS). It is to be built in Ipswich on land around the present Suffolk College and on addition land adjacent to the nearby Wet Dock. Phase 1 of the UCS development is to be built on an area of vacant land that was until recently an overflow car park for the college. It is bounded by Fore Street to the north, Coprolite Street to the southeast, the Wet Dock to the southwest and the existing Neptune Quay residential development to the west (See figure 1). The National Grid Reference for the approximate centre of the evaluation area is TM 1700 4405.

The site lies on what was formerly the northern bank of the River Orwell but this area of the river was enclosed in the 1830s to create the Wet Dock with the river being diverted through a newly created channel away to the southwest. The site is close to the Saxon and medieval core of Ipswich although it is located outside the town's defensive earthworks. To the west of the site evidence for earlier activity in the form of quays and associated structures dating from the Saxon and medieval periods has been recorded. Within the Neptune Quay residential development immediately adjacent the site a 17th century stone built quay wall was located (Boulter, 2000 SCCAS Report 2000/44) suggesting there was a potential for further similar remains to exist within the UCS site.

The evaluation that is the subject of this report forms part of a programme of archaeological works undertaken as part of the planning process. The first stage was a Desk Based Assessment of the archaeological potential of the site through the examination of existing records held in the Suffolk Record Office or by the Suffolk County Council Archaeological Service (SCCAS), and through the examination of available map data (Sommers, 2006 SCCAS Report No. 2006/137).

The Desk Based Assessment confirmed that there was potential for archaeological remains to exist within the UCS site. The available documentary evidence indicated that the site was unlikely to yield significant Saxon remains as it probably consisted of low lying marsh or tidal mudflats at that time but that from the medieval period onwards the land in this area was reclaimed and raised through the dumping of material, probably waste from the town. It was noted that an early 17th century building fronting onto Fore Street stood to the northeast of the UCS site and that it was likely that further similar structures would have fronted Fore Street.

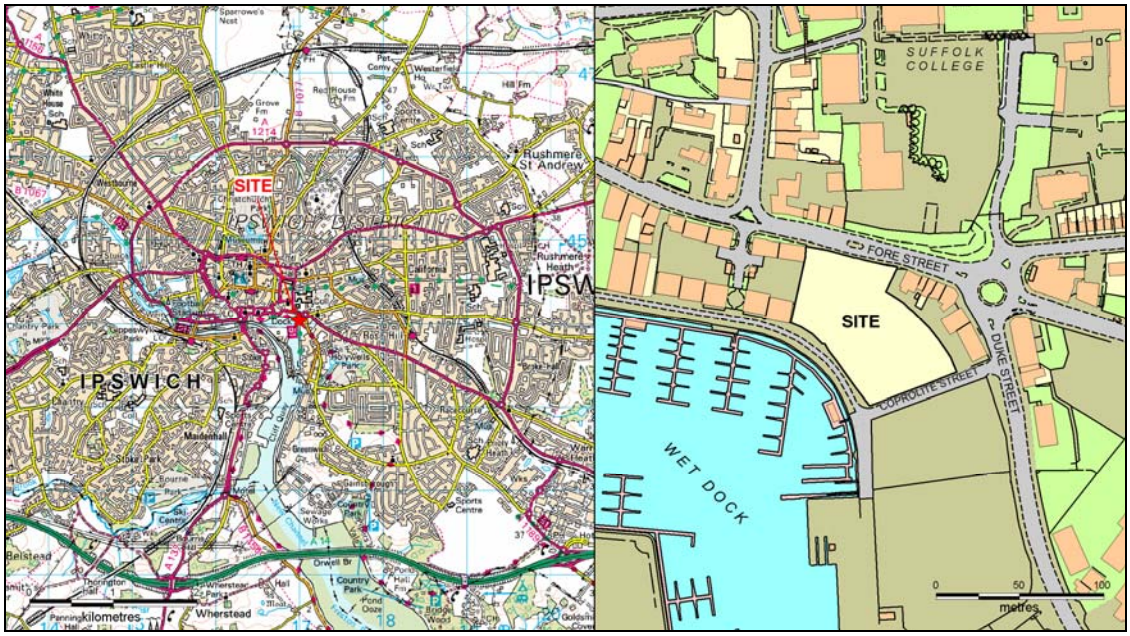

Figure 1: Location Plan

Having identified a potential for archaeological remains to be present within the site the further stage of the programme of archaeological work was to undertake field evaluation through the excavation of a series of test trenches across the site. The aims of the trenched evaluation, as identified in the Desk Based Assessment, are as follows:

1. Is there evidence of 16th/early 17th century buildings in the upper levels of the Fore Street frontage (similar to the standing 17th century building on Fore Street alongside the site)?

2. Is there evidence of medieval stone quays parallel to Fore Street as at the adjacent Neptune Quay site?

3. Is there any medieval reclamation/occupation evidence in the upper levels fronting Fore Street?

4. Does the 17th century quay, found on the Neptune Quay site, continue into the campus site?

To fulfil these aims it was proposed to mechanically excavate two trenches, one along the Fore Street frontage to address aims 1 and 3 and another across the site running between Fore Street and the Wet Dock in order to address aims 2 and 4. A Brief and Specification was produced by Mr Wade of the Suffolk County Council Archaeological Service Conservation Team (see Appendix I) detailing the work required.

The archaeological evaluation was commissioned and funded by the main contractor, Willmott Dixon, on behalf of their client, University Campus Suffolk. The evaluation was undertaken by the Field Projects Team of the Suffolk County Council Archaeological Service. The archive of the work is lodged with the Suffolk County Council Archaeological Service at its Bury St. Edmunds office under the Historic Environment Record reference, IPS 500 (details are also recorded on the Ipswich HER under the reference IAS 6605). A summary of this project has been entered onto OASIS, the online archaeological database, under the reference suffolkc1-22849.

2. Methodology

Trial trenches were to be machine excavated in two specific locations within the site. The first trench was to be excavated close to and parallel with the Fore Street frontage of the site. It was hoped to excavate this trench down to the level of the natural subsoil, which was expected to be encountered at a depth of *c.* 1.5m. The second trench was to be excavated perpendicular to the first and was to run from the close the Fore Street frontage across the site towards the Wet Dock. It was expected that the natural subsoil would rapidly dip as the trench progressed away from Fore Street and that it would not be practicable to reveal it along the entire length of the trench. Consequently it was proposed to only excavate this trench to a maximum depth of *c.* 2m which would have been sufficient to reveal any earlier quay walls that may be present and to assess the nature of the land reclamation in this area.

The excavation was undertaken using a 360º tracked excavator. Initially it was fitted with a 'pecker' as all areas of the proposed trenching were under a concrete slab that required breaking out. The broken concrete was then removed using an narrow toothed bucket. Once this stage had been completed the trenches were excavated using a toothless ditching bucket approximately 1.8m wide.

The trenches were positioned in accordance with an approved plan as illustrated in figure 1 of the Method Statement (Gardner, 2006 SCCAS Report No. 2006/221). A slightly different trenching plan was initially proposed, as illustrated in figure 13 of the Desk Based Assessment (Sommers, 2006 SCCAS Report No. 2006/137), but this was amended to avoid foundations associated with a former feedmill and silos built during the 1950s and the fuel storage tanks of a service station that formerly fronted onto Fore Street (figure 2).

The machining of the trenches was closely observed throughout in order to record any significant features that may be revealed and to recover artefacts. Any features revealed were to be hand excavated and recorded through scale plans and sections but in the event no significant features were identified. It was hoped to construct scale drawings recording the soil profiles as revealed by the trenches but this was not possible due to their great depth. Consequently the recording was achieved by

photographically recording trenches using a 4 megapixel digital camera and 2m scales rods divided into 0.5m sections combined with taped measurement of depths related to the ground surface (*c.* 3.4m O.D. in vicinity of trenches). Context numbers were issued as required commencing at 0002, 0001 being reserved for unstratified finds from the site.

To aid interpretation of the deposits revealed in the evaluation trenches two core samples were taken by an archaeo-environmental specialist (Dr T. Hill, University of Birmingham). For this two test pits were machine excavated to the top of the pre-modern made ground deposits. From the base of these test pits bores were driven and a complete column through the deposits to a depth of *c.* –1m O.D. was taken for laboratory analysis. The preliminary results are presented in Section 3.2 of this report.

Following archaeological investigation the trench and core locations were recorded using a Total Station and plotted on a scale plan of the site. Upon completion of the fieldwork the trenches and test pits were backfilled.

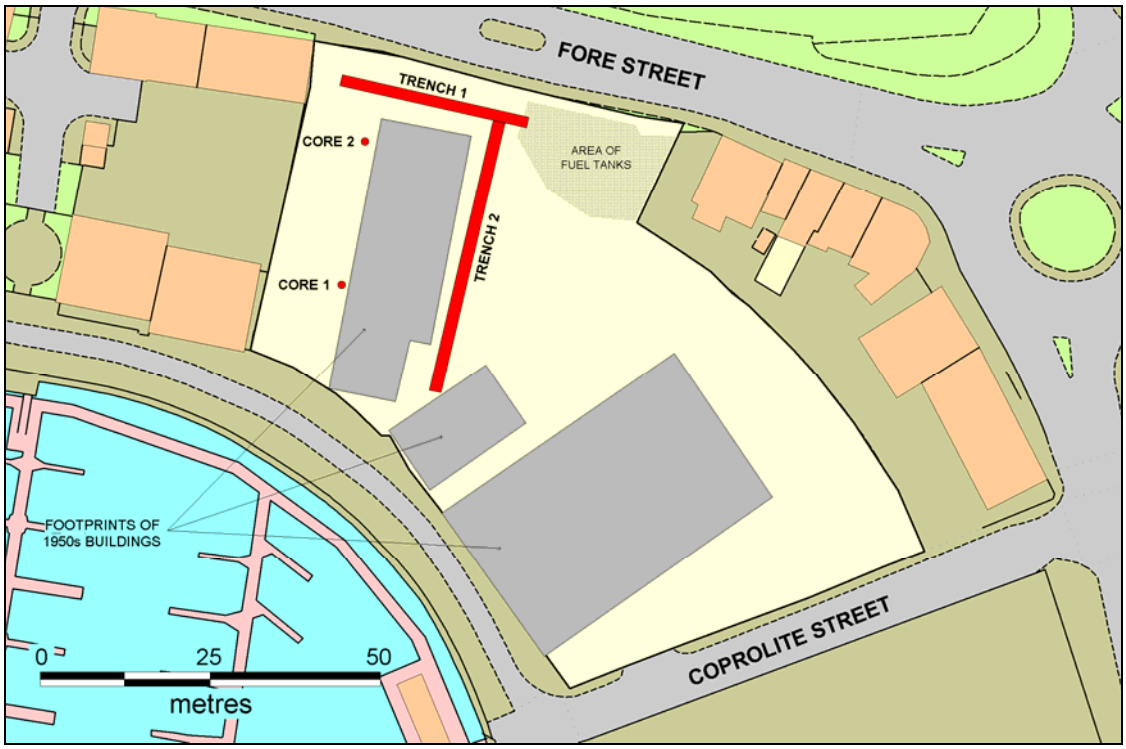

Figure 2: Trench and Core Sample Location Plan

3. Results

3.1 Trial Trenches

Two trenches totalling 69m in length were excavated across the development area; see figure 2 above for a plan of their location.

Trench 1 was approximately 28m in length and ran parallel with Fore Street but set back *c.* 4m from the edge of the roadway. The trench was excavated to a depth of 2m revealing three distinct deposits. The upper deposit, which was encountered immediately beneath the concrete slab, primarily comprised late 19th century rubble to a depth of *c.* 0.7m (numbered 0007). Beneath this was a *c.* 0.5m thick layer of brown

sand and gravel (0008) which was relatively clean apart from very occasional small fragments of crushed red brick or tile. This in turn overlay deposit of dark brown to black sand with a high organic content (0005). Finds from within this layer consisted of occasional animal bones and numerous oyster shells but no datable artefacts were noted.

Within this trench a test excavation to the base of the dark brown to black sand layer was carried out at a point *c.* 8m from the west end of the trench which revealed it to be *c.* 2m thick in this particular area. Beneath this a deposit of light grey clay and silt was present. The thickness of this deposit was not established as it was not possible to further deepen the excavation.

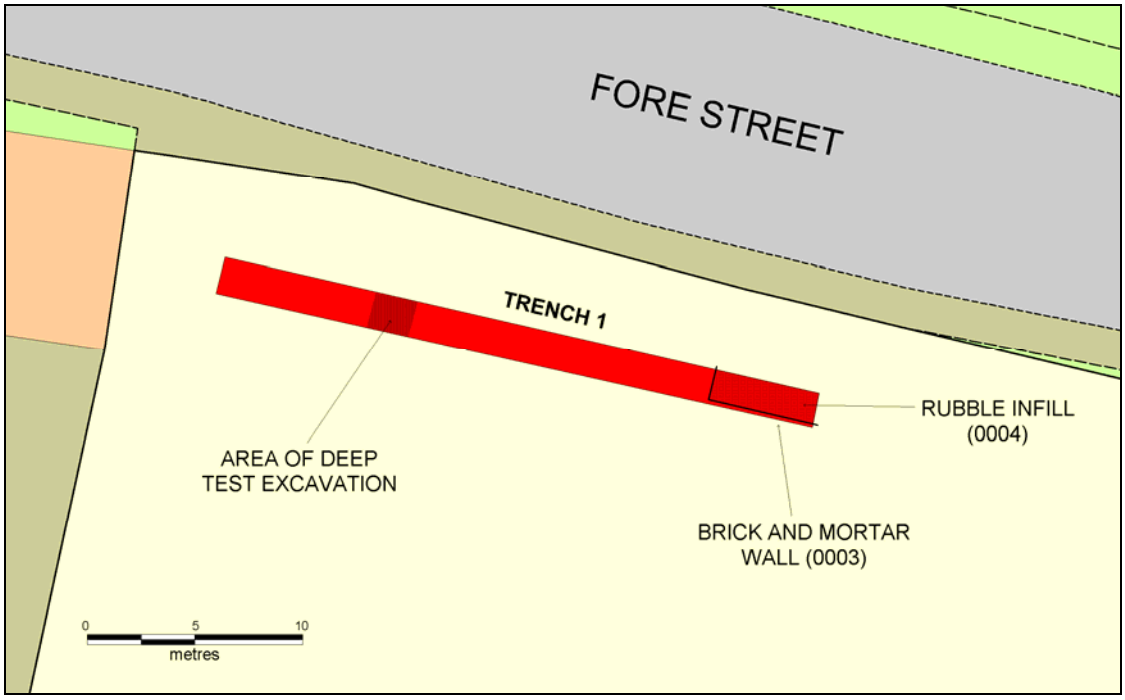

Figure 3: Trench 1 Detail

At the eastern end of this trench a red brick and mortar wall was encountered (0003). It ran perpendicular across nearly the full width of trench, turned 90º to the east and continued for 4.5m along the trench's southern face before running beyond the eastern end of the trench.

Plate I: Trench 1 - Remains of Cellar

The top of the wall was flush with the base of the concrete surface slab. The

bottom of the wall was at a depth of 1.1m below ground level (Plate I). It has been interpreted as the remains of a cellar associated with a structure fronting Fore Street. The cellar had a floor comprising a thin layer of concrete over a thin spread of gravel which was laid directly onto the dark brown to black sand layer. The cellar was filled with brick rubble (0004) within which was a thick deposit of crushed mortar and plaster. Fragments of plain wall plaster were also visible within the fill.

Despite the great depths achieved in this trench no problems were encountered with the ingress of water.

Trench 2 was approximately 41m in length and was excavated perpendicular to Trench 1. The results were similar to those of Trench 1 with the same three main deposits as described above being present for which the same context numbers continued to be used. The trench was excavated to a depth of 1.4m throughout the majority of its length, cutting into the top of the dark brown to black sand layer by *c.* 0.2m. At this depth groundwater seeped into the trench and filled it to a depth of *c.* 0.05m. A small deep test hole was excavated in an area *c.* 8m from Fore Street revealing the fine grey estuarine silt seen in Trench 1 at a depth of *c.* 3.8m. This was rapidly filled before too much water collected within.

Plate II: Trench 2 - sample section (eastern side of trench)

The only significant difference noted between the deposits recorded in both trenches was that a spread of chalk some 0.05 to 0.10m thick was present on the surface of the brown sand and gravel layer (0008) within Trench 2. It was also noted within this trench that the interface between 0008 and the underlying dark brown to black sand layer (0005) was very abrupt suggesting a possible truncation of the lower layer prior to the importation of the brown sand and gravel.

It had been hoped to extend this trench to the southern edge of the site where it was expected that the remains of an earlier quay wall would probably be encountered. Unfortunately a series of substantial concrete foundations were encountered. Attempts were made to break through these but were thwarted by its great thickness and the large amount of thick steel reinforcement present within the concrete. The foundations were associated with a large seven-storey silo that formerly stood on this site and were likely to be deep enough to have destroyed all earlier deposits. The presence of known services (electric cable and nearby gas main) precluded safe excavation elsewhere within the southern edge of the site.

3.2 Core Samples

Two core samples were obtained from areas adjacent trenches 1 and 2 by Dr Tom Hill, Archaeo-Environmentalist (Institute of Archaeology and Antiquity, University of Birmingham). The locations from which the samples were obtained are illustrated in figure 2. During the machine excavation of the upper levels in the vicinity of Core 2 three fragments of leather were recovered from spoil that had originated from the dark brown to black sand layer (0005).

Further analysis of the samples obtained is to be undertaken although Dr Hill's summary and assessment is reproduced below. It is intended that the recommended analysis will be undertaken and the results included in the relevant monitoring report for this site.

3.2.1. Core sampling - Introduction

Deposits of potential palaeoenvironmental value were discovered during ground investigations by Suffolk County Council Archaeological Services at a proposed University site proximal to the Ipswich Docks. The site is located at the junction between Fore Street and Coprolite Street and overlooks Neptune Quay to the south. Two large trenches were excavated within the site: one running north-south through the centre of the site and one running east-west along the northern site boundary, parallel to Fore Street. Organic-rich sediments were identified from *c*. 1.6m below ground level (bgl). As the original trenches had already been back-filled, two smaller trenches were excavated in close proximity to where the deposits of palaeoenvironmental potential had been discovered. A site visit was undertaken on 16th January 2006, during which sedimentary coring was undertaken within the two trenches.

The deposits overlying the organic sediments within Trench 1 were excavated to a depth of c. 1.60m, with the surface of the trench being levelled to 3.35m O.D. The majority of the overlying deposits were Made Ground, consisting of mixed layers of concrete, tarmac, and brick. At c. 1.60m depth (1.75m O.D.), dark brown-black organic sands were encountered (context number 0005). A core taken from the centre of the trench established that this unit continued to a depth of c. 2.98m (0.37m O.D.). The unit was comprised predominantly of medium sands with humic (very well decomposed) organic remains and occasional pebbles, bone and disarticulated shells fragments (including oyster). A leg bone of the common goose (*Anser anser*) was present at 2.94m (David Brown, *pers.comm.*). From 2.98m to *c*. 4.31m (-0.96m O.D.) light grey silts and clays were encountered, with occasional pebbles and organic mottling. Grey sands were present from 4.31m to 4.36m (-1.01m O.D.). Below this depth no sediment could be extracted within the coring chamber, due to the saturated nature of the deposits when coring below the water table.

The second trench was levelled to 3.34m O.D. and contained Made Ground to a depth of *c*. 2.10m (1.24m O.D.). Organic sands, similar to those encountered in Trench 1, were present to a depth of 2.89m (0.45m O.D.) with occasional disarticulated shell fragments and small pebbles present. This unit was underlain by light grey silts and clays to 4.05m (-0.71m O.D.), which included occasional plant remains and sparse thin (<1cm) sand horizons. Sands were once again encountered below the clays and silts to a depth of 4.12m (-0.78m O.D.). Below the sands sample extraction was again not possible due to the saturated nature of the underlying deposits.

3.2.2. Preliminary Conclusions

From the initial site assessment and visual analysis of the sedimentary cores, it is suggested that the organic deposits underlying both trenches are from the same sedimentary unit. The unit is slightly thicker in the southern trench (*c*. 1.38m thick), but the base of the unit is positioned at similar depths in both trenches (0.37m and 0.45m O.D.). It is unclear at present what type of depositional environment was responsible for the development of the organic sand unit. Preliminary results would suggest that the unit is either a water-lain deposit or a fill which has accumulated as a result of human activity (eg. dumping). Whilst the latter cannot be discounted, the relatively well sorted nature of the sands would indicate an environment with a relatively constant depositional energy. In addition, there was a relative absence of artefacts such as pottery within the unit during initial trial trenching (Mark Sommers, *pers. comm.*). The dominance of sand within the unit, along with very well humified organic remains, occasional bone, shell and gravel components, could be indicative of a unit that developed in a fluvial

system, possibly within a small tributary stream; Common Geese are found in fluvial wetlands as well estuarine lowlands. The alternative explanation however would be that the unit developed in and around a man-made drainage channel or ditch. Due to the relative proximity of the site to the Ipswich Wet Dock and the tidally influenced River Orwell, the light grey clays and silts underlying the organic unit are likely to have been deposited under estuarine conditions. The relatively sharp boundary between the silts and clays and the overlying organic sand also suggests a possible erosive boundary.

3.2.3. Recommendations

To fully investigate the environmental record preserved at the University site, a number of recommendations can be made relating to further palaeoenvironmental analyses. It has been suggested that the organic sands present within the two trenches are from the same sedimentary unit. Therefore palaeoenvironmental analysis needs to be undertaken on only one of the cores. Due to the thicker organic sand unit evident within the first (southern) trench, Core 1 has been chosen for analysis. Coleoptera (beetle) analysis should be undertaken on bulk samples from the top, middle and bottom of the organic sand (3 samples). This would assist in the identification of the type of depositional conditions present during the development of the organic sand unit. As the organic content of the sand is relatively low and the material that is present appears highly decayed, pollen analysis is unlikely to prove useful and hence is not recommended. Radiocarbon dating of the top and base of the organic sand unit is also suggested to understand the timing of the onset and cessation of deposition. The presence of the *Anser anser* bone proximal to the base of the unit would be suitable for radiocarbon dating to establish when deposition of the organic sand began. A bulk sample is recommended from the top of the organic-sand to ensure enough organics are present for successful dating.

To identify the environmental conditions present during the deposition of the underlying light grey silts and clays, diatom analysis it recommended. This would establish whether estuarine conditions were indeed present. Analysis should be undertaken at the top, middle and bottom of the silt and clay unit, whilst on one further sample should be assessed for diatoms at the transition from the organic sand and underlying silts and clays (4 samples in total).

4. The Finds

Finds recovered during the evaluation comprise brick samples from the remains of the cellar within Trench 1 and three fragments of leather recovered during removal of the overburden for Core 2. Full analysis of these finds has yet to be completed but the initial conclusions are as follows:

The brick recovered from the cellar wall (0003) is probably of mid 19th century date whilst the brick from the rubble infill of the cellar would appear to be earlier, possibly 17th century in date.

The leather fragments recovered from layer 0005 comprise two soles, both post-medieval, or at least post Tudor, and one leather strap (a belt?) with decorated ?copper alloy buckle still in-situ. One sole is thought to be probably 19th century in date and the other earlier, possibly 17th century. The buckle and strap may be of 16th/17th century date (Richenda Goffin, *pers.comm.*).

5. Discussion

The results of the evaluation indicate that prior to the extensive land embankment and land reclamation that has occurred throughout this area of the Ipswich waterfront the area of the this site would have undoubtedly been part of the inter-tidal zone along the bank of the River Orwell and would have comprised an area of mudflats and marsh as indicated by the presence of the fine grey estuarine silts noted within the two deeper test excavations. These are likely to have been exposed at low tide and covered when the tide was high.

These mudflats have become buried beneath the thick deposit of dark brown to black sand (layer 0005) which has been interpreted as a possible deliberate effort to raise

the land levels with the ultimate aim of extending the area of dry usable land. This material is similar to infill deposits noted at the adjacent Neptune Quay site to the west and the Neptune Marina development to the south. This material appears to be water sorted. This is probably due to tidal action but it may also be caused by a small steam that possibly flowed down from higher ground to the north carrying material that had been dumped in it as it flowed past the town. As the stream encountered the river its mouth may have widened causing the flow to weaken resulting in the material being laid down. This could explain why no datable artefacts (namely ceramics) have been found within this layer whereas frequent animal bone and oyster shell was present.

It is unusual that the estuarine deposits are so deep adjacent Fore Street as it has been assumed that Fore Street was a strand-line road and that the river bank would slope away gently. It is possible that due to the bend in the river channel at this point that water erosion had created a relatively steep bank on the outer edge of the curve, or possibly even a small sand cliff. Alternatively these deep deposits could be a result of the possible stream which may have opened out into its own 'tidal estuary' in this area. Examination of the area to the north of Fore Street at this point may help answer this question.

The brown sand and gravel layer (0008) is likely to represent a deliberate importation of dry material to firm up what would have been the relatively soft ground. No dating evidence was recovered from this material but it is probably of a 17th-18th century date and is probably related to an earlier quay wall. No quay walls were noted in either trench although the expected location of the pre-Wet Dock quay was not trenched due to the presence of substantial concrete foundations. There is conclusive documentary evidence for a quay wall having existed prior to the construction of the Wet Dock in the form of Edward Caley's illustrations of 1837 (reproduced in SCCAS Report No. 2006/137), which clearly indicate a revetment of the quayside and numerous timber buildings standing within the site. The chalk surfaces noted within Trench 2 are possibly associated with one of the structures illustrated in Caley's drawings.

No building remains fronting Fore Street other than cellar which from initial analysis would appear to be of a 19th century origin and matches the location of a structure marked on the 1st, 2nd and 3rd edition Ordnance Survey maps of the area (see figure 4). It is unlikely that buildings similar to the 17th structure east of the site (nos. 132-138, Fore Street) did not line Fore Street but that much of the evidence was within the upper layers and has been lost through later activity.

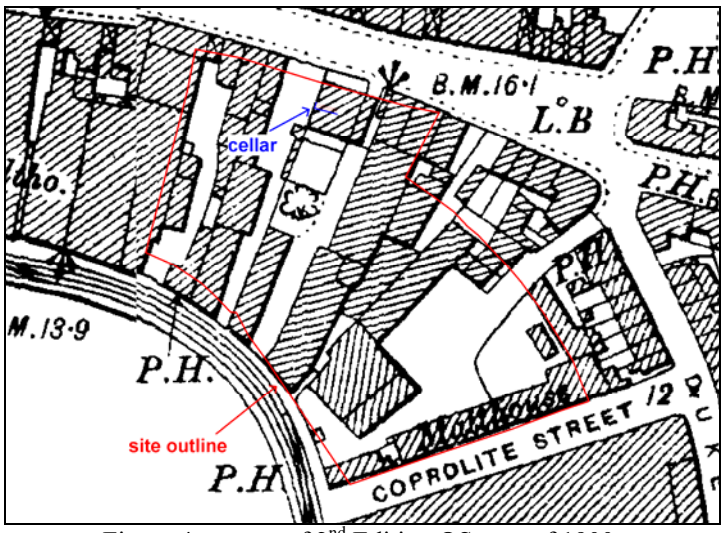

Figure 4: extract of 2nd Edition OS map of 1900 showing location of cellar noted within Trench 1

The upper layer, located immediately beneath the concrete slab, contained a very large proportion of 19th century brick rubble. It is likely to represent the demolition of 19th century warehouses and maltings (numerous malting floor bricks were noted within this upper layer) that formerly stood on this site and the spreading of the resultant rubble in order to prepare for the construction of the 1950s feed mill and silos.

6. Recommendations for Future Work

The results of the evaluation suggest there are no significant archaeological remains or deposits under threat from the proposed development and that large-scale open excavation is unwarranted for this site. It was not possible to identify any earlier quay wall structures and no significant structural remains were noted fronting onto Fore Street.

The proposed University Campus building will come right up to the southern and southwestern boundaries of the site in the area adjacent to the Wet Dock and it is possible that remains of the earlier quay wall may be encountered during the initial groundworks. It is also possible that small localised areas of archaeological remains could exist between the piled foundations of the 1950s structures that previously occupied this site. Consequently, in order to mitigate against the loss of any archaeological evidence that may be revealed during groundworks it is proposed that a programme of archaeological monitoring be implemented during the early phases of construction.

It is also proposed that further analysis and scientific dating of the palaeoenvironmental core samples be undertaken in order to fully understand the nature of the river edge deposits.

M. Sommers 26th January 2007
Suffolk County Council, Field Projects Team

References

Boulter, S. 2000 *Neptune Quay, Ipswich: A Record of an Archaeological Excavation*, SCCAS Report No.2000/44

Gardner, R. 2006 *University Campus Suffolk, Phase 1 – Neptune Quay: Safety and Method Statement for Archaeological Evaluation,* SCCAS Report No. 2006/221

Sommers, M. 2006 *Archaeological Desk-Based Assessment: University Campus Suffolk, Phase 1 – Neptune Quay,* SCCAS Report No. 2006/137

APPENDIX I

SUFFOLK COUNTY COUNCIL
ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Brief and Specification for an Archaeological Evaluation

FORMER EASTERN COUNTIES FARMERS, FORE STREET, IPSWICH

The commissioning body should be aware that it may have Health & Safety and other responsibilities, see paragraphs 1.7 & 1.8.

1. Background

This is the brief for the first part of a programme of archaeological work. There is likely to be a requirement for additional work, this will be the subject of another brief.

1.1 A planning application has been submitted for the erection of a seven storey Education Building for University Campus, Suffolk on the former Eastern Counties Farmers site in Fore Street, Ipswich (IP/06/00838/FUL).

1.2 The Planning Authority has been advised that any consent should be conditional upon an agreed programme of archaeological work taking place before development begins (PPG 16, paragraph 30 condition). **An archaeological evaluation of the application area will be required as the first part of such a programme of archaeological work; decisions on the need for, and scope of, any further work will be based upon the results of the evaluation and will be the subject of additional briefs.**

1.3 A desk-top assessment of the potential archaeological significance of the site was undertaken by Suffolk County Council Archaeological Contracting Service (SCCAS Report No 2006/137). This concluded that the site had potential as follows:

a) Prehistoric and Roman: very low.
b) Medieval: moderate.
c) Post Medieval: high.

1.4 On the basis of prior knowledge gained from archaeological work on adjacent sites, the following deposit model is likely:

1. The entire site was originally part of the inter-tidal zone of the Orwell - going from dry ground along Fore Street (the Strand line road) at 3m OD with the river bed sloping down southwards to *c*. -3m OD against the present dock road (current ground water levels are *c*. 1.0-2.0m OD).

2. Successive waterfronts were constructed further and further out from Fore Street and towards the river in the Anglo-Saxon, medieval and post medieval periods. The 17th century quay wall, which runs just inside the southern boundary of the site, was replaced by the current Wet Dock wall in 1842.

3. The area behind each new waterfront was then raised by the dumping of rubbish to provide useable reclaimed land.

4. Occupation of reclaimed land along the Fore Street frontage could have started as early as the 14th century, and definitely occurred in the early 17th century (including the extant timber-framed 132-138 Fore Street) - but was restricted to a 10-12m zone from Fore Street. The major expansion, associated with the 17th century quay allowed the entire site to be developed

and was covered with a succession of substantial buildings between the 17th and 20th centuries.

1.5 All arrangements for the field evaluation of the site, the timing of the work, access to the site, the definition of the precise area of landholding and area for proposed development are to be defined and negotiated with the commissioning body.

1.6 Detailed standards, information and advice to supplement this brief are to be found in *Standards for Field Archaeology in the East of England*, East Anglian Archaeology Occasional Papers 14, 2003.

1.7 In accordance with the standards and guidance produced by the Institute of Field Archaeologists this brief should not be considered sufficient to enable the total execution of the project. A Project Design or Written Scheme of Investigation (PD/WSI) based upon this brief and the accompanying outline specification of minimum requirements, is an essential requirement. This must be submitted by the developers, or their agent, to the Conservation Team of the Archaeological Service of Suffolk County Council (Shire Hall, Bury St Edmunds IP33 2AR; telephone/fax: 01284 352443) for approval. The work must not commence until this office has approved both the archaeological contractor as suitable to undertake the work, and the PD/WSI as satisfactory. The PD/WSI will *provide the basis for measurable standards* and will be used to establish whether the requirements of the planning condition will be adequately met.

1.8 Before any archaeological site work can commence it is the responsibility of the developer to provide the archaeological contractor with either the contaminated land report for the site or a written statement that there is no contamination. The developer should be aware that investigative sampling to test for contamination is likely to have an impact on any archaeological deposit which exists; proposals for sampling should be discussed with this office before execution.

1.9 The responsibility for identifying any restraints on field-work (e.g. Scheduled Monument status, Listed Building status, public utilities or other services, tree preservation orders, SSSIs, wildlife sites &c.) rests with the commissioning body and its archaeological contractor. The existence and content of the archaeological brief does not over-ride such restraints or imply that the target area is freely available.

2. Brief for the Archaeological Evaluation

2.1 Establish whether any archaeological deposit exists in the area, with particular regard to any which are of sufficient importance to merit preservation *in situ* [at the discretion of the developer].

2.2 Identify the date, approximate form and purpose of any archaeological deposit within the application area, together with its likely extent, localised depth and quality of preservation.

2.3 Evaluate the likely impact of past land uses and natural soil processes. Define the potential for existing damage to archaeological deposits. Define the potential for colluvial/alluvial deposits, their impact and potential to mask any archaeological deposit. Define the potential for artificial soil deposits and their impact on any archaeological deposit.

2.4 Establish the potential for waterlogged organic deposits in the proposal area. Define the location and level of such deposits and their vulnerability to damage by development where this is defined.

2.5 Provide sufficient information to construct an archaeological conservation strategy, dealing with preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

2.6 This project will be carried through in a manner broadly consistent with English Heritage's *Management of Archaeological Projects,* 1991 (*MAP2*), all stages will follow a process of

assessment and justification before proceeding to the next phase of the project. Field evaluation is to be followed by the preparation of a full archive, and an assessment of potential. Any further excavation required as mitigation is to be followed by the preparation of a full archive, and an assessment of potential, analysis and final report preparation may follow. Each stage will be the subject of a further brief and updated project design, this document covers only the evaluation stage.

2.7 The developer or his archaeologist will give the Conservation Team of the Archaeological Service of Suffolk County Council (address as above) five working days notice of the commencement of ground works on the site, in order that the work of the archaeological contractor may be monitored.

2.8 If the approved evaluation design is not carried through in its entirety (particularly in the instance of trenching being incomplete) the evaluation report may be rejected. Alternatively the presence of an archaeological deposit may be presumed, and untested areas included on this basis when defining the final mitigation strategy.

2.9 An outline specification, which defines certain minimum criteria, is set out below.

3. Specification for Field Evaluation

3.1 Linear trial trenches are to be excavated to particularly answer the following questions:

1. What evidence for medieval and 16th/17th century buildings survives (in the zone 12 metres wide) fronting Fore Street?

2. Is there evidence of medieval (wood or stone) quays parallel to Fore Street (in the 12 metre zone)?

3. Locate and fully record the 17th century quay wall (just inside the southern boundary of the site).

4. Evaluate the potential of the waterlogged deposits for preserved organic artefacts and ecofacts.

3.2 The layout of trenching is suggested in Figure 1. The presence of sub-surface foundations may render this layout impractical and decisions over the precise locations should be made on site to maximise information recovery.

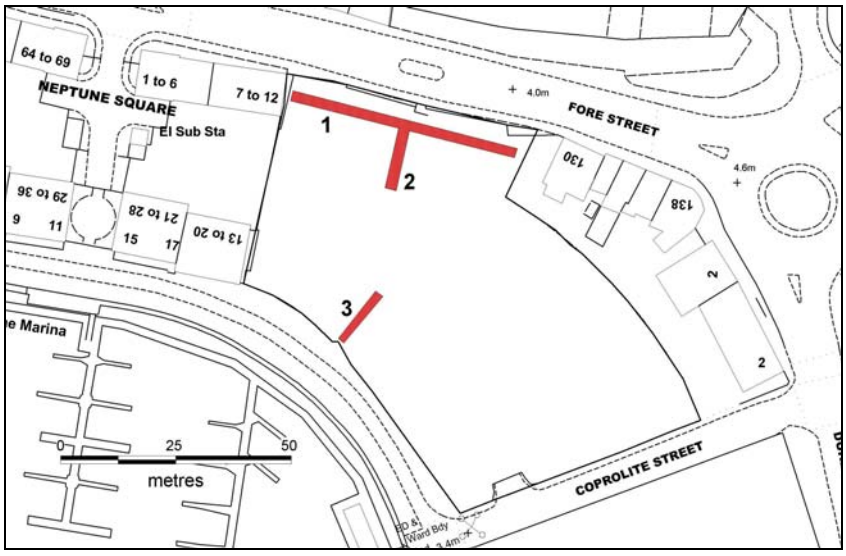

Figure 1: Suggested Trench layout

3.3 Trenches are to be a minimum of 1.8m wide unless special circumstances can be demonstrated. If excavation is mechanised a toothless 'ditching bucket' must be used. The

trench design must be approved by the Conservation Team of the Archaeological Service before field work begins.

3.4 The topsoil may be mechanically removed using an appropriate machine fitted with toothless bucket and other equipment. All machine excavation is to be under the direct control and supervision of an archaeologist. The topsoil should be examined for archaeological material.

3.5 The top of the first archaeological deposit may be cleared by machine, but must then be cleaned off by hand. There is a presumption that excavation of all archaeological deposits will be done by hand unless it can be shown there will not be a loss of evidence by using a machine. The decision as to the proper method of further excavation will be made by the senior project archaeologist with regard to the nature of the deposit.

3.6 In all evaluation excavation there is a presumption of the need to cause the minimum disturbance to the site consistent with adequate evaluation; that significant archaeological features, e.g. solid or bonded structural remains, building slots or post-holes, should be preserved intact even if fills are sampled.

3.7 There must be sufficient excavation to give clear evidence for the period, depth and nature of any archaeological deposit. The depth and nature of colluvial or other masking deposits must be established across the site.

3.8 The contractor shall provide details of the sampling strategies for retrieving artefacts, biological remains (for palaeoenvironmental and palaeoeconomic investigations), and samples of sediments and/or soils (for micromorphological and other pedological/sedimentological analyses. Advice on the appropriateness of the proposed strategies will be sought from J Heathcote, English Heritage Regional Adviser for Archaeological Science (East of England). A guide to sampling archaeological deposits (Murphy and Wiltshire 1994) is available.

3.9 Any natural subsoil surface revealed should be hand cleaned and examined for archaeological deposits and artefacts. Sample excavation of any archaeological features revealed may be necessary in order to gauge their date and character.

3.10 All finds will be collected and processed (unless variations in this principle are agreed with the Conservation Team of SCC Archaeological Service during the course of the evaluation).

3.11 Human remains must be left *in situ* except in those cases where damage or desecration are to be expected, or in the event that analysis of the remains is shown to be a requirement of satisfactory evaluation of the site. However, the excavator should be aware of, and comply with, the provisions of Section 25 of the Burial Act 1857. *"Guidance for best practice for treatment of human remains excavated from Christian burial grounds in England" English Heritage and the Church of England 2005* provides advice and defines a level of practice which should be followed whatever the likely belief of the buried individuals.

3.12 Plans of any archaeological features on the site are to be drawn at 1:20 or 1:50, depending on the complexity of the data to be recorded. Sections should be drawn at 1:10 or 1:20 again depending on the complexity to be recorded. Any variations from this must be agreed with the Conservation Team.

3.13 A photographic record of the work is to be made, (both monochrome and colour).

3.14 Topsoil, subsoil and archaeological deposit to be kept separate during excavation to allow sequential backfilling of excavations.

4. General Management

4.1 A timetable for all stages of the project must be agreed before the first stage of work commences, including monitoring by the Conservation Team of SCC Archaeological Service.

4.2 The composition of the project staff must be detailed and agreed (this is to include any subcontractors).

4.3 A general Health and Safety Policy must be provided, with detailed risk assessment and management strategy for this particular site.

4.4 No initial survey to detect public utility or other services has taken place. The responsibility for this rests with the archaeological contractor.

4.5 The Institute of Field Archaeologists' *Standard and Guidance for Archaeological Field Evaluations* should be used for additional guidance in the execution of the project and in drawing up the report.

5. Report Requirements

5.1 An archive of all records and finds must be prepared consistent with the principles of English Heritage's *Management of Archaeological Projects*, 1991 (particularly Appendix 3.1 and Appendix 4.1).

5.2 The data recording methods and conventions used must be consistent with, and approved by, the County Sites and Monuments Record.

5.3 The objective account of the archaeological evidence must be clearly distinguished from its archaeological interpretation.

5.4 An opinion as to the necessity for further evaluation and its scope may be given. No further site work should be embarked upon until the primary fieldwork results are assessed and the need for further work is established

5.5 Reports on specific areas of specialist study must include sufficient detail to permit assessment of potential for analysis, including tabulation of data by context, and must include non-technical summaries.

5.6 The Report must include a discussion and an assessment of the archaeological evidence. Its conclusions must include a clear statement of the archaeological potential of the site, and the significance of that potential in the context of the Regional Research Framework (*East Anglian Archaeology*, Occasional Papers 3 & 8, 1997 and 2000).

5.7 Finds must be appropriately conserved and stored in accordance with *UK Institute of Conservators Guidelines*. The finds, as an indissoluble part of the site archive, should be deposited with the County SMR if the landowner can be persuaded to agree to this. If this is not possible for all or any part of the finds archive, then provision must be made for additional recording (e.g. photography, illustration, analysis) as appropriate.

5.8 The site archive is to be deposited with the County SMR within three months of the completion of fieldwork. It will then become publicly accessible.

5. 9 Where positive conclusions are drawn from a project (whether it be evaluation or excavation) a summary report, in the established format, suitable for inclusion in the annual 'Archaeology in Suffolk' section of the *Proceedings of the Suffolk Institute for Archaeology*, must be prepared. It should be included in the project report, or submitted to the Conservation Team, by the end of the calendar year in which the evaluation work takes place, whichever is the sooner.

5.10 County SMR sheets must be completed, as per the county SMR manual, for all sites where archaeological finds and/or features are located.

5.11 At the start of work (immediately before fieldwork commences) an OASIS online record http://ads.ahds.ac.uk/project/oasis/ must be initiated and key fields completed on Details, Location and Creators forms.

5.12 All parts of the OASIS online form must be completed for submission to the SMR. This should include an uploaded .pdf version of the entire report (a paper copy should also be included with the archive).

Specification by: Keith Wade

Suffolk County Council
Archaeological Service Conservation Team
Environment and Transport Department
Shire Hall
Bury St Edmunds
Suffolk IP33 2AR Tel: 01284 352440

Date: 18 October 2006 Reference: /Former Eastern Counties Farmers

This brief and specification remains valid for 12 months from the above date. If work is not carried out in full within that time this document will lapse; the authority should be notified and a revised brief and specification may be issued.

If the work defined by this brief forms a part of a programme of archaeological work required by a Planning Condition, the results must be considered by the Conservation Team of the Archaeological Service of Suffolk County Council, who have the responsibility for advising the appropriate Planning Authority.

APPENDIX II

IPS500 (Evaluation phase) - Context List

Context No.	Location	Description
0001	whole site	unstratified finds
0002	Trench 1	Fine grey estuarine silt noted at base of test excavation within trench 1
0003	Trench 1	Brick built structure – interpreted as a cellar
0004	Trench 1	Rubble infill of cellar 0003
0005	Trenches 1 & 2	Dark brown to black sand layer containing much organic material – present across all areas of site trenched in a layer ranging from 1.4m to 2m in thickness. Situated beneath 0008
0006	Trenches 2	Fine grey estuarine silt noted at base of test excavation within trench 2
0007	Trenches 1 & 2	Layer of mixed soils containing a large proportion of 19th century rubble comprised of brick, tile and mortar. Located immediately beneath concrete surface slab
0008	Trenches 1 & 2	Layer of brown sand and gravel, interpreted as imported material for reclamation of site. Beneath 0007, over 0005

APPENDIX III

ARCHAEOLOGICAL MONITORING REPORT

Introduction

Archaeological monitoring of the initial groundworks phase of the construction of the University Campus building was undertaken primarily in order to examine the areas close to the southern and southwestern boundaries of the site where it was possible that remains of the early quay wall may be encountered.

Methodology

Regular visits were made to the site whilst excavation for the pile caps were underway during which time all newly exposed levels and stratigraphy were examined for significant archaeological remains. All spoil was removed from site although during monitoring visits any spoil tips that were present were briefly walked over in an attempt to recover significant artefacts. Recording was achieved through the taking of numerous digital photographs of the areas of potential interest.

Results

The site was visited on a number of occasions during May 2007. All excavations for the pile caps were examined revealing the same deposits noted in the evaluation trenches. In the excavations closest to the southern/southwestern boundary only large blocks of reinforced concrete and rubble were noted. No evidence for the earlier quay wall was identified.

Discussion

No evidence for the quay wall was noted. It is possible that the quay wall lies just outside the southern/southwestern boundary and would not have been encountered in the monitored excavations or that it simply does not extend this far to the east but as the small area in which it may have been encountered showed evidence of substantial later disturbances no real meaningful conclusions can be drawn.

Plate I: Pile Cap Against SW boundary
View facing SE

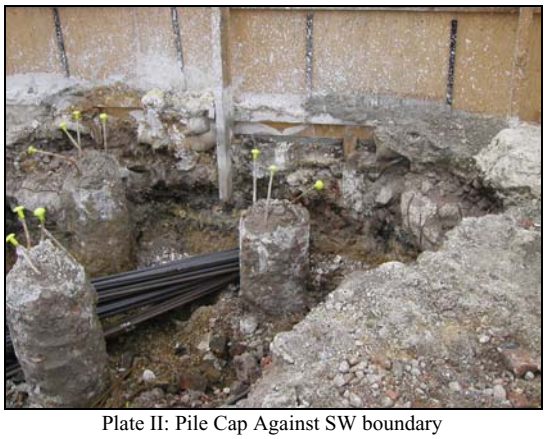

Plate II: Pile Cap Against SW boundary
View facing SE

M. Sommers
Suffolk County Council, Field Projects Team

22nd May 2008

APPENDIX IV

University Site, Ipswich: a palaeoenvironmental assessment of deposits encountered during ground investigations

Client: Suffolk County Council Archaeological Service

April 2007

By

Dr Tom Hill & Dr Emma Tetlow

SCCAS-31-07

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BIRMINGHAM ARCHAEO-ENVIRONMENTAL BAE

SUMMARY

- Birmingham Archaeo-Environmental was subcontracted by Suffolk County Council Archaeological Service to undertake a palaeoenvironmental assessment of organic-rich deposits encountered during ground investigations at University Site, Ipswich.

- This report represents the results of the fieldwork and palaeoenvironmental assessment undertaken. Initial stratigraphic analysis identified one core for palaeoenvironmental assessment: an organic-rich sand unit, underlain by blue grey silts and clays. This core was subsampled for beetles and diatoms, whilst two suitable organic samples were submitted for radiocarbon dating in order to provide a chronostratigraphic framework.

- Estuarine silts and clays were accumulating across the site prior to the deposition of the organic-rich sand unit. Diatom preservation was good within most of the samples assessed and the majority of species encountered thrive in marine and brackish water environments. It was therefore inferred that the development of the silts and clays occurred within an estuarine environment where tidal inundation was common. Variations in diatom assemblages within the samples suggest the influence of marine conditions varied over time, possibly as a consequence of changes in relative sea level or palaeo-land surface elevation.

- The organic-rich sand unit probably accumulated either within a small stream or man-made drainage channel, which subsequently became infilled. Beetle assemblages were found to be well preserved within the unit, with high species abundance and diversity. There is evidence for human occupation proximal to the site, with assemblages indicative of deposits of urban waste, rubbish and squalid flooring. In addition, beetle taxa suggestive of an abundance of decaying wood may suggest subsequent settlement abandonment.

- Radiocarbon dating of samples from the top and base of the deposit produced dates of *c*. 370 ± 40 BP and 350 ± 40 BP.

- The assessment therefore concludes that the organic-rich sand unit encountered at University Site, Ipswich, accumulated within a small tributary or man-made drainage ditch, sometime between the late Medieval and early post Medieval periods. The subsequent rapid infilling of the depositional setting may have been a consequence of site abandonment and settlement neglect.

- No further diatom or beetle analyses are recommended on the samples presently available from the site. However, should greater quantities of the organic-rich sand be available at any point during subsequent ground investigations, full beetle analysis is strongly recommended.

1. INTRODUCTION

Deposits of palaeoenvironmental potential were discovered during ground investigations at a proposed University site proximal to the Ipswich Docks (TM 617003 244046). The site is located at the junction between Fore Street and Coprolite Street and overlooks Neptune Quay to the south (Figure 1). Two large trenches were excavated within the site: one running north-south through the centre of the site and one running east-west along the northern site boundary, parallel to Fore Street. Organic-rich sediments were identified under Made Ground from *c*. 1.6m below ground level (bgl). As the original trenches had already been back-filled, two smaller trenches were excavated in close proximity to the original excavations. Birmingham Archaeo-Environmental were sub-contracted to undertake the coring and subsequent stratigraphic and palaeoenvironmental analysis.

This report presents the results of palaeoenvironmental investigations (manual coring, recording, sampling and palaeoenvironmental assessment) associated with this scheme of work.

The aim of the work was threefold:

- To identify, record, characterise and sample organic deposits, encountered during previous geoarchaeological surveys.

- To assess this material for biological preservation (beetles and diatoms) and identify suitable samples for radiocarbon dating.

- To provide a detailed understanding of the subsurface stratigraphy of the organic-rich deposits and the underlying fine grained silts and clays, which might aid in the development of archaeological prospection strategies.

2. METHODOLOGY

2.1 Coring Survey

At the time of the fieldwork, the site was derelict. No buildings were present on the land under development although the site was capped with concrete. A site visit was undertaken on 16th January 2006, during which sedimentary coring was undertaken within the two excavated trenches. Made Ground was found to overlie the natural strata and varied in thickness to between 1.60m in Trench 1 (Figure 2) to the south of the site and 2.10m in Trench 2 (Figure 3) to the north. Cores were extracted using a manual gauge 'Eijkelcamp' corer. Coring continued until bedrock or basal gravels were encountered. Samples were extracted in 1.0m length sections within the corer and transferred into 1.0m lengths of guttering for storage and transport.

2.2 Stratigraphic Analysis

Whilst an initial assessment of the sedimentary archive was made on-site, detailed stratigraphic analysis of the sedimentary sequences from cores 1 and 2 were undertaken at the Birmingham Archaeo-Environmental laboratory at the University of Birmingham. Each 1.0m section of sample was carefully opened ensuring the enclosed stratigraphy remained intact prior to recording and sampling. Sediments

were recorded using the Troels-Smith (1955) classification scheme. The scheme breaks down a sediment sample into four main components and allows the inclusion of extra components that are also present, but that are not dominant. Key physical properties of the sediment layers are also identified according to darkness (Da), stratification (St), elasticity (El), dryness of the sediment (Dr) and the sharpness of the upper sediment boundary (UB). A summary of the sedimentary and physical properties classified by Troels-Smith (1955) and the nomenclature used is provided in Table 1. A full stratigraphic breakdown of the cores is provided in Appendix I.

The ground surface of Trench 1 was levelled to 3.35m O.D. The deposits overlying the organic sediments within the trench were excavated to a depth of *c*. 1.60m, and were composed of Made Ground, consisting mixed layers of concrete, tarmac, and brick. At *c*. 1.60m depth (1.75m O.D.), dark brown-black organic sands were encountered. A core taken from the centre of the trench established that this unit continued to a depth of *c*. 2.98m (0.37m O.D.). The unit was comprised predominantly of medium sands with humic (very well decomposed) organic remains and occasional pebbles, bone and disarticulated shells fragments (including oyster). A leg bone of the common goose (*Anser anser*) was present at 2.94m (David Brown, *pers. comm.*). From 2.98m to *c*. 4.31m (-0.96m O.D.) light grey silts and clays were encountered, with occasional pebbles and organic mottling. Grey sands were present from 4.31m to 4.36m (-1.01m O.D.). Below this depth no sediment could be extracted within the coring chamber. This is likely to be due to the saturated nature of the deposits when coring below the water table

The second trench was levelled to 3.34m O.D. and contained Made Ground to a depth of *c*. 2.10m (1.24m O.D.). Organic sands, similar to those encountered in Trench 1, were present to a depth of 2.89m (0.45m O.D.) with occasional disarticulated shell fragments and small pebbles present. This unit was underlain by light grey silts and clays to 4.05m (-0.71m O.D.) that included occasional plant remains and sparse thin (<1cm) sand horizons. Sands were once again encountered below the clays and silts to a depth of 4.12m (-0.78m O.D.). Below the sands sample extraction was not possible due to the saturated nature of the underlying deposits.

From the initial stratigraphic analysis and visual assessment of the sedimentary cores, it was suggested that the organic deposits underlying both trenches represent the same sedimentary unit. The unit is slightly thicker in the southern trench (*c*. 1.38m thick), but the base of the unit is positioned at similar depths in both trenches (0.37m and 0.45m O.D.). It was therefore recommended that palaeoenvironmental analysis was undertaken on only one of the cores. Due to the thicker organic sand unit evident within Trench 1, Core 1 was been chosen for palaeoenvironmental assessment. A summary of the stratigraphy encountered in Core 1 is provided in Table 2.

Degree of Darkness	
nig.4	black
nig.3	
nig.2	
nig.1	
nig.0	white

Degree of Stratification	
strf.4	well stratified
strf.3	
strf.2	
strf.1	
strf.0	no stratification

Degree of Elasticity	
elas.4	very elastic
elas.3	
elas.2	
elas.1	
elas.0	no elasticity

Degree of Dryness	
sicc.4	very dry
sicc.3	
sicc.2	
sicc.1	
sicc.0	water

	Sharpness of Upper Boundary
lim.4	< 0.5mm
lim.3	< 1.0 & > 0.5mm
lim.2	< 2.0 & > 1.0mm
lim.1	< 10.0 & > 2.0mm
lim.0	> 10.0mm

	Sh	*Substantia humosa*	Humous substance, homogeneous microscopic structure
I Turfa	*Tb*	*T. bryophytica*	Mosses +/- humous substance
	Tl	*T. lignosa*	Stumps, roots, intertwined rootlets, of ligneous plants
	Th	*T. herbacea*	Roots, intertwined rootlets, rhizomes of herbaceous plants
II Detritus	*Dl*	*D. lignosus*	Fragments of ligneous plants >2mm
	Dh	*D. herbosus*	Fragments of herbaceous plants >2mm
	Dg	*D. granosus*	Fragments of ligneous and herbaceous plants <2mm >0.1mm
III Limus	*Lf*	*L. ferrugineus*	Rust, non-hardened. Particles <0.1mm
IV Argilla	*As*	*A.steatodes*	Particles of clay
	Ag	*A. granosa*	Particles of silt
V Grana	*Ga*	*G. arenosa*	Mineral particles 0.6 to 0.2mm
	Gs	*G. saburralia*	Mineral particles 2.0 to 0.6mm
	Gg(min)	*G. glareosa minora*	Mineral particles 6.0 to 2.0mm
	Gg(maj)	*G. glareosa majora*	Mineral particles 20.0 to 6.0mm
	Ptm	*Particulae testae molloscorum*	Fragments of calcareous shells

Table 1 Physical and sedimentary properties of deposits according to Troels-Smith (1955)

2.3 Palaeoenvironmental Analysis

In order to utilise the sedimentary archive preserved at University Site, Ipswich, beetle and diatom assessments were recommended, supported by radiocarbon dating of suitable organic samples. This was to enable an assessment to be made as to whether the site preserved an archive of significant palaeoenvironmental potential. A summary of the proxy analytical techniques applied to Core 1 is summarised in Table 3.

Depth (m)	***m (O.D.)***	***Stratigraphic summary***
0.00-1.60m	3.35 to 1.75m	Made Ground
1.60-2.98m	1.75 to 0.37m	Dark brown organic sand with occasional gravel, shell fragments, wood, bone
2.98-3.73m	0.37 to -0.38m	Light grey clayey silt with occasional pebble and organic mottling
3.73-4.31m	-0.38 to -0.96m	Light grey silty clay with organic mottling
4.31-4.36m	-0.96 to -1.01m	Grey-brown sand
Below 4.36m	Below -1.01m	Sands encountered but unable to be extracted

Table 2: Summary of Core 1 Stratigraphy

Depth (m)	***m (O.D.)***	***Stratigraphic summary***	***Beetle Analysis (bulk samples)***	***Diatom Analysis***	***Radiocarbon Dating***
0.00-1.60m	3.35 to 1.75m	Made Ground	n/a	n/a	n/a
1.60-2.98m	1.75 to 0.37m	Dark brown organic sand with occasional gravel, shell fragments, wood, bone	1.60m to 2.05m (1.75m to 1.30m O.D)		1.65m depth (1.70m O.D)
			2.05m to 2.50m (1.30m to 0.85m O.D.)		
			2.50m to 2.98m (0.85m to 0.37m O.D.)	2.97m (0.38m O.D.)	2.94m depth (0.41m O.D.)
2.98-3.73m	0.37 to -0.38m	Light grey clayey silt with occasional pebble and organic mottling		2.99m (0.36m O.D.)	
				3.65m (-0.30m O.D.)	
3.73-4.31m	-0.38 to -0.96m	Light grey silty clay with organic mottling		4.30m (-0.95m O.D.)	
4.31-4.36m	-0.96 to -1.01m	Grey-brown sand			

Table 3: Summary of proxy assessment techniques applied to Core 1

2.3.1 Beetle Assessment

Coleoptera (beetle) assessments were undertaken on bulk samples from the top, middle and bottom of the organic sand unit from Core 1. All three samples were processed using the standard method of paraffin flotation as outlined in Kenward *et al.* (1980). This paraffin flot was then sorted and identified where possible under a binocular microscope. The system for "scanning" faunas as outlined by Kenward *et al.* (1985) was followed in this assessment. When discussing the faunas recovered, two considerations were taken into account:

1) The identifications of the insects present were provisional. Many of the taxa present could be identified down to species level during a full analysis, producing more detailed information. As a result, the data presented should be regarded as preliminary.

2) The various proportions of insects are subjective assessments. Minimum numbers of individuals can be obtained through a full sample analysis.

2.3.2 Diatom Assessment

To identify the environmental conditions present during the deposition of the light grey silts and clays that underlie the organic sands, diatom analysis was recommended. If present, an assessment of diatom assemblages would establish the type of sub-aqueous depositional conditions likely to have been responsible for the development of the unit. Analysis was therefore undertaken on one sediment sample from the transition from the organic sand and underlying silts and clays, whilst three further samples were assessed for diatoms from the top, middle and bottom of the underlying silt and clay unit.

0.5cm^3 of sediment from each sample was prepared for diatoms following the standard procedure as described by Plater *et al*. (2000). Diatom samples were mounted on slides with naphrax and species were identified with reference to Hendy (1964) and van Der Werff & Huls (1958-1974). Attempts were made to count a minimum of 100 diatom valves within in each sample.

2.3.3 Radiocarbon Dating

Radiocarbon dating of the top and base of the organic sand unit was also recommended to understand the timing of the onset and cessation of deposition. The presence of the *Anser anser* bone proximal to the base of the unit was suitable for AMS dating to understand when deposition of the organic sand began. A wood sample from the top of the organic-rich sand was also submitted for AMS dating to identify when organic sedimentation stopped on site.

3. RESULTS

3.1 Beetle Analysis

The insect taxa recovered from the flots are listed in Appendix II for reference. All three samples contained well-preserved insect remains. Species abundance and diversity was also found to be good, particularly within the basal assemblage of the organic-rich sand unit at 2.50-2.98m. Smaller, more restricted assemblages were recovered from 2.05m-2.50m depth and 1.60-2.05m depth. The level of species abundance and diversity encountered is especially high when the relatively small sample sizes available through sedimentary coring are taken into consideration (typical beetle assessments utilise 10litre bulk bag samples).

The sample obtained from 2.50-2.98m depth (0.85-0.37m O.D.) contained a diverse and well-preserved assemblage. Direct evidence of the vegetation in the environment proximal to the where the deposit accumulated is restricted to the basal sample and is limited to specimens of the curculionid family, *Sitona* spp. This family of weevils is associated with a variety of plants commonly found in both meadows and disturbed ground, including vetches (*Vicia* spp.), clovers (*Trifolium* spp.) and trefoils (*Lotus* spp.) (Koch 1992). Scarabaeidae or 'dung' beetles were also recovered from this sample. However, although dung beetles commonly indicate that grazing of the land surrounding the site was taking place, this does not seem likely when taking into account the full beetle assemblage encountered.

The sample also contained a suite of synanthropic taxa that are closely associated with human habitation. These include the colydiid, *Aglennus brunneus*, the endomychid, *Mycetaea hirta,* the ptinid, *Ptinus fur*, and the common woodworm, the anobiid, *Anobium punctatum*. All these taxa form part of Kenwards 'House Fauna' (Hall and Kenward 1990, Kenward and Hall 1997, Kenward and Hall 1995) and are associated with accumulations of foul and rotting material. Such taxa have also been recovered in the archaeological record from deposits of urban waste, rubbish and squalid flooring (eg. Kenward & Hall 1995).

At 2.05-2.50m depth (1.30-0.85m O.D.), the sample produced a restricted but nonetheless well-preserved beetle assemblage. Indicators of fresh dung such as *Aphodius* spp. or *Geotrupes* spp. are absent and have been replaced by species such as the scarabaeid*, Oxyomus sylvestris*. This species indicates accumulations of rotting manure and vegetation and *not* fresh dung in pasture or meadowland (Jessop 1996, Koch 1989).

Whilst several indicators of diseased wood were also recovered from all three samples, Lignacious and saproxylic taxa are particularly prolific in this sample. For example the anobid, *Xyletinus* spp., is commonly found on powdery, decaying oak and elm (Hyman 1992). In addition, the scolytid, *Leperisinus* spp., is generally found on dead ash, whilst the tenebrionid, *Hypophloeus* spp., is a family found on a variety of decaying wood. These species are not associated with living trees and instead are more often found with dead, diseased or rotting wood. It therefore seems unlikely that they are derived from nearby woodland from which timber has been used for construction or firewood.

The upper sample from 1.60-2.05m depth (1.75-1.30m O.D.) also produced a restricted but well-preserved assemblage. The scarabaeids, or 'dung beetles' reappear in this sample, whilst the staphylinid, *Oxytelus rugosus*, associated with dung and accumulations of rotting, organic material (Tottenham 1954), is recorded.

3.2 Diatom Analysis

Diatoms were found in all four samples, with high species abundance and diversity throughout. In addition, frustule preservation was good, assisting species identification. Therefore, counts of at least 100 diatom frustules were achieved in all samples. Figure 4 summarises the key diatom species encountered within each sample under assessment. The majority of species were either 'polyhalobous' or 'mesohalobous' species, which require predominantly marine and brackish waters (salinity ranging from over 30g l^{-1} to 0.2g l^{-1} respectively) for optimal frustule growth. Species are presented as raw counts and not as percentages of total diatom valves (%TDV) as no qualitative or quantitative interpretations of diatom assemblages are required at this assessment stage.

The diatom sample taken from 4.30m depth (-0.95m O.D.) towards the base of the silty clay unit was dominated by the planktonic polyhalobous species *Paralia sulcata*, with the mesohalobous benthic species *Diploneis didyma*, *Nitzschia punctata* and *Nitzschia navicularis* also recorded. The diatoms *Rhophalodia gibberula* and *Cocconeis placentula* ('oligohalobian indifferent' species), requiring predominantly freshwater environmental conditions to survive are also present, although in lower abundances.

At 3.65m depth (-0.30m O.D.), within the clayey silts, *Paralia sulcata* continues to dominate, again supported by *Diploneis didyma*, *Nitzschia punctata* and *Nitzschia navicularis*. The mesohalobous species *Achnanthes brevipes* is also present . There is however an increase in abundance of species requiring freshwater depositional conditions to survive, including the oligohalobian indifferent species *Rhophalodia gibberula* and *Synedra capitata*. The 'oligohalobian halophilous' species *Epithemia turgida*, although present in low numbers, is restricted to freshwater environments and is not tolerant of brackish and marine waters.

The remaining two samples were taken from the top of the clayey silt unit (2.99m depth; 0.36m O.D.) and from the base of the overlying organic-rich sand (2.97m depth; 0.38m O.D.). Similar species were again encountered, with *Paralia sulcata* dominating and *Diploneis didyma*, *Nitzschia punctata* and *Nitzschia navicularis* contributing. The mesohalobian species *Campylodiscus echeneis*, *Achnanthes brevipes* and *Diploneis interrupta* were also present. Although the diatom assemblages were broadly similar within the two samples, there was an overall subtle increase in the influence of species requiring freshwater-dominated conditions within the overlying organic-rich sands (in evidence through the presence of *Cocconeis placentula* and *Hantzschia amphioxys*). Diatom preservation was found to be poorer within the organic-rich sand, with frustule disarticulation commonly hindering species identification. This was likely a consequence of the higher energy depositional environment required for the transportation and development of the coarser grained organic-rich unit.

3.3 Radiocarbon Dating

One wood sample and one bone fragment was submitted to Beta Analytic, Florida, for AMS radiocarbon dating. The results are set out in Table 4 (see also Appendix III). Calibration was undertaken using INTCAL98 (Stuiver and Van der Pilcht 1998). All samples provided sufficient carbon for accurate measurement and analyses are reported as having proceeded normally.

Sample	Code	Altitude (m O.D.)	Sample description	Sample pre-treatment	C13/C12 Ratio	Conventional radiocarbon age	Calibrated range BC/AD (2 sigma - 95% confidence)
UNIIPS-1.65m	Beta-226829	1.70m	wood	acid/alkali/acid	-25.9 o/oo	350 +/- 40 BP	1450-1650 Cal. AD
INIIPS-2.94m	Beta-226830	0.41m	Bone collagen	Collagen extraction: with alkali	-22.1 o/oo	370 +/- 40 BP	1440-1640 Cal. AD

Table 4: Results of the radiocarbon dates from Core 1

4. INTERPRETATION

The diatom assessment has identified that estuarine depositional conditions were responsible for the development of the basal clays and silts that underlie the organic-rich sand unit. This is further supported by the relative proximity of the site to the Ipswich Docklands and the tidally-influenced River Orwell, and perhaps by the presence of a leg bone fragment of *Anser anser* toward the base of the organic-rich sand (common goose are commonly found in estuarine lowlands). Frustule preservation was good throughout the samples, and species abundance and diversity was high. The fine-grained nature of the sediment, combined with the diatom species encountered, suggests deposition occurred predominantly on upper tidal flats and lower saltmarshes.

The overall dominance of *Paralia sulcata* throughout the samples indicates tidal inundation dominated the depositional environment, enabling the accumulation of the marine planktonic diatom species. Although the planktonic nature of the species can sometimes result in its over-representation within diatom assemblages, the abundance of *Paralia sulcata* may in fact indicate that the site was located within a tidal inlet of the River Orwell (Vos & deWolf, 1988).

There are subtle fluctuations in the influence of freshwater diatom species within the diatom assemblages, which could be inferred as a possible indicator of changes in the influence of relative sea level on lowland coastal evolution. The basal silty clay assemblage for example (4.30m depth) contains less freshwater-influenced species than the diatoms present within the overlying clayey silts at 3.65m depth. The diatom assemblage from 2.99m depth, in turn, contains fewer freshwater species than that at 3.65m depth. Therefore, whilst tidally-controlled sedimentation is likely to have dominated the depositional environment, variations in freshwater influence, probably in response to variations in the influence of sea level or palaeo-land surface elevation, can be inferred.

The final diatom assemblage, sampled from the base of the organic-rich sand (2.97m depth), contained lower species abundances with frustule disarticulation common. The sharp lower unit boundary of the organic-rich silt combined with the dominance of marine diatom species within the underlying clayey silt, suggests an erosive episode occurred prior to sedimentation of the organic-rich sand. The diatoms within the organic-rich sand however continue to be dominated by *Paralia sulcata*, which therefore suggests episodic tidal submergence continued, at least during the initial onset of organic-rich sand sedimentation. The presence of aerophilous species such as *Diploneis interrupta* and *Hantzschia amphioxys* however, indicates that deposition occurred higher up the tidal frame than previously due to the need for prolonged periods of tidal emergence for these species to survive.

Radiocarbon dating indicates the onset of organic-rich sand deposition occurred *c.* 370 ± 40 BP (Beta-226830). The insects found at 2.50-2.98m depth are derived from a relatively restricted and specific range of environments associated with human habitation and activity, and suggests episodes of dumping of housing waste on the sampling site. Further evidence, in the form of dung beetles and other taxa associated with accumulations of rotting waste, may also indicate the dumping of stabling material. It is therefore possible that the organic-rich sand deposit represents a

combination of both types of material. It is also possible that the basal sample represents an episode of increased human activity at the site. This might have been, for example, the construction of a small homestead or farm, which was subsequently abandoned, and the structure left to rot. This is supported by the declining 'House Fauna' component in the upper two assemblages. Whilst dung beetles associated with fresh dung are absent from the middle sample, indicators persist for decaying manure and dung heaps. In the upper sample, indicators of fresh dung return, which perhaps indicates that animals were once again kept in the close vicinity of the sampling site.

Whilst it cannot be discounted that the deposits are some form of ditch fill, the relatively well-sorted nature of the sands would indicate accumulation in an environment with a maintained depositional energy. In addition, there was a general absence of artefacts such as pottery within the unit during initial trial trenching (Mark Sommers, *pers. comm.*). The dominance of sand within the unit, along with very well humified organic remains, occasional bone, shell and gravel components, could be indicative of sediment deposition in a fluvial system, possibly within a small tributary stream. Alternatively, the organic-rich sand unit may have accumulated within a man made drainage channel. What is clear is that the feature was taking flow, whether as part of a minor tributary system or an artificial drainage channel. The feature's proximity to an area of human occupation explains the incorporation, whether deliberate or accidental, of beetle assemblages indicative of settlement, agricultural activity and eventual site abandonment.

The radiocarbon dates from the top and base of the unit are statistically inseparable. A relatively a rapid period of sedimentation may explain the narrow age range provided, in which the water feature became infilled, possibly even as a consequence of settlement abandonment and site neglect (as suggested by the beetle assemblages). Alternatively, the wood fragment dated from the upper unit boundary may have been reworked material, which had been eroded and subsequently redeposited further downstream. However, the dates confirm that the organic-rich sand unit developed some time between the late Medieval and early post-Medieval periods.

5. RECOMMENDATIONS FOR FURTHER ANALYSIS

Diatom assessment has confirmed the influence of estuarine conditions on the development of the deposits preserved at University Site, Ipswich. Considering the impact of estuarine environments on the development of the coastal lowlands of East Anglia, relatively little palaeoenvironmental work has been undertaken on such coastal sequences. The influence of relative sea-level change on coastal settlements during the historic period is likely to be high, suggesting such archives should be considered for further analysis. Any further ground investigations in the regions proximal to the Suffolk coastal lowlands should be considered for geoarchaeological assessment and analysis, in order to contribute to the developing picture of coastal evolution in East Anglia. However, it is recommended that no further diatom analysis be undertaken on the stratigraphic archive of the University Site.

Further beetle analysis of the organic-rich sand sampled during the palaeoenvironmental assessment is also not recommended. This is due to the relatively small size of the samples obtained during sedimentary coring. However, should greater quantities of the organic-rich sand be available at any point during subsequent ground investigations, full analysis is strongly recommended. Likewise, any future archaeological investigations in this area should consider sampling deposits for palaeoenvironmental assessment of the kind detailed in this report.

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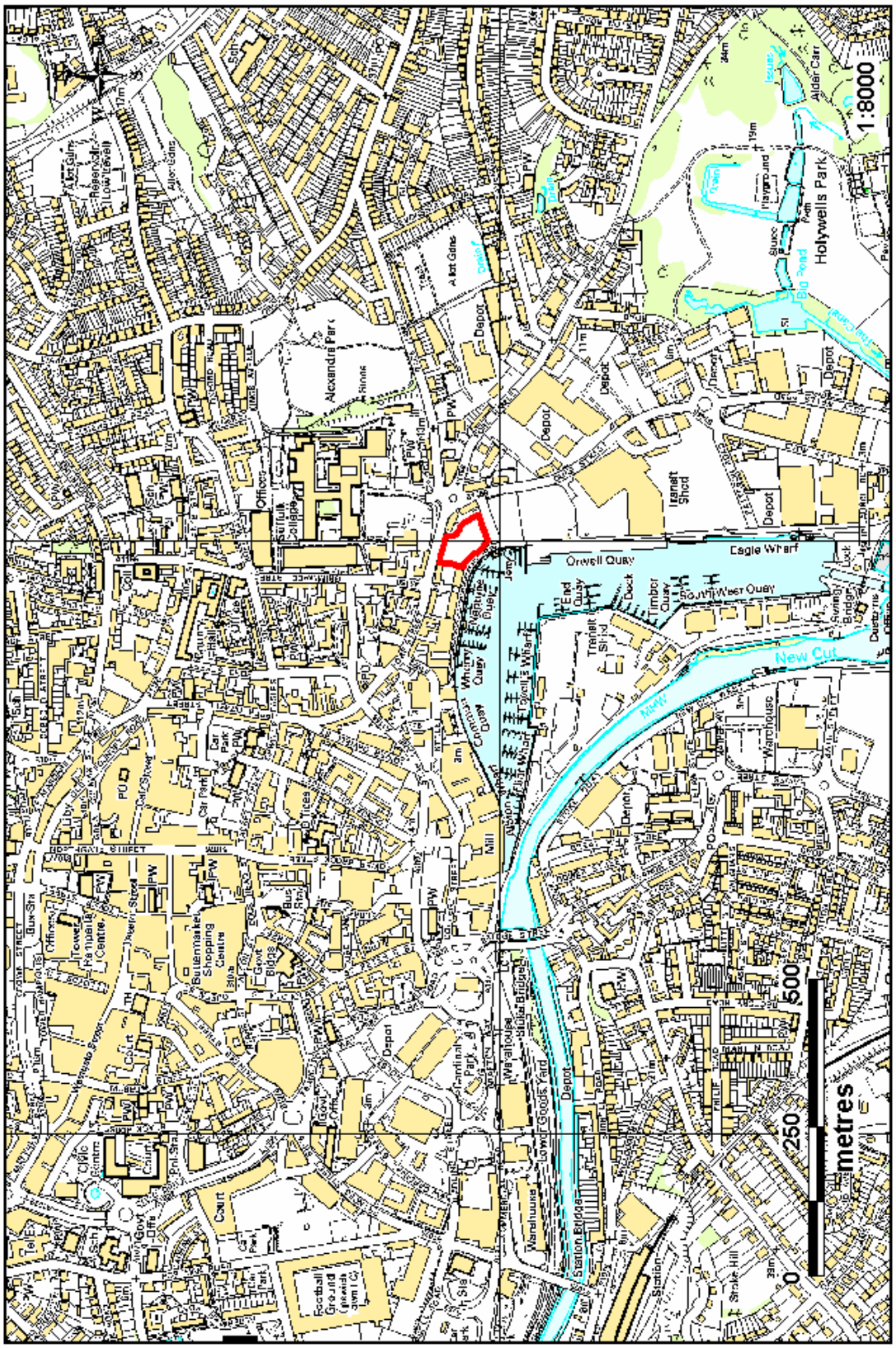


Figure 1: Location of University Site in Ipswich, highlighted in red

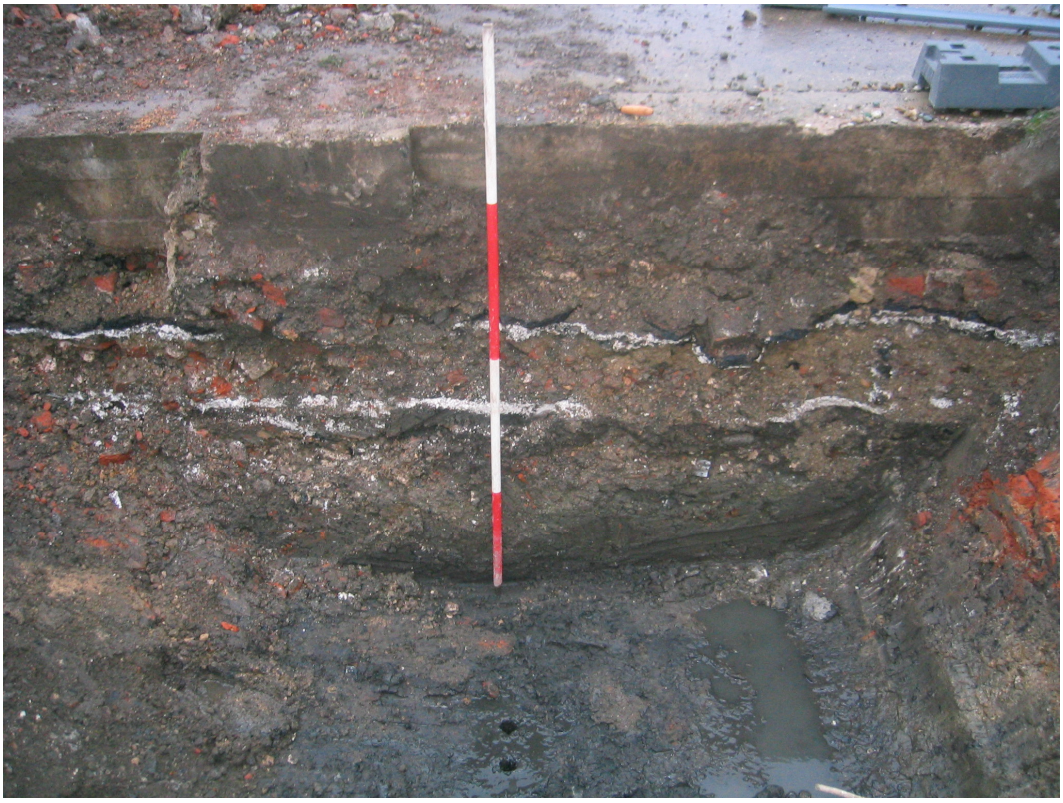


Figure 2: Photograph of Trench 1, facing east. Sample core taken from the centre of the trench

Figure 3: Photograph of Trench 2 facing north. Sample core taken from the centre of the trench

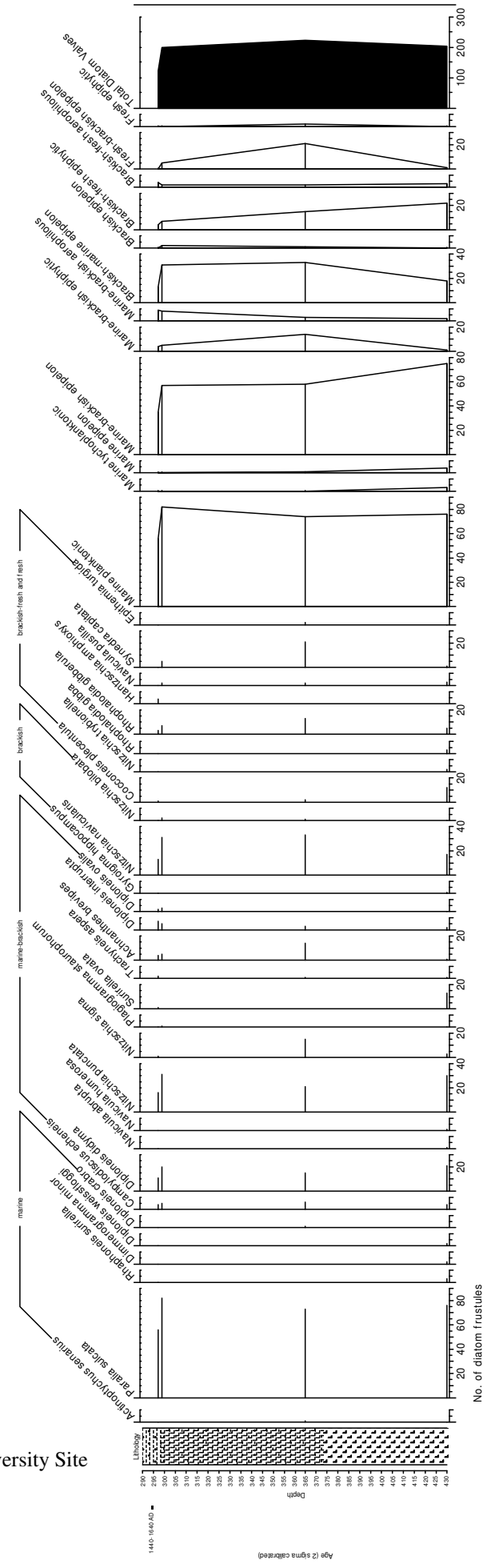


Figure 4: Diatom assemblages encountered within Core 1, University Site Ipswich

APPENDIX I

CORE STRATIGRAPHY

Core Stratigraphy

Troels-Smith (1955) sedimentary classification scheme used for stratigraphic descriptions. Refer to Table 1 for summary of classification scheme.

Core 1

Ground level: 3.35m O.D.

3.35m to 1.75m O.D.	MADE GROUND
1.75m to 0.37m O.D.	Da St El Dr UB 3 0 0 1 - Ga2, Sh1, Ggmin1, Ggmaj+, As+, Dh+, Dl+, Th+ *Dark brown organic sand with occasional gravel, shell fragments, oysters, bone, wood and pebbles (quartz, flint).* *Bone (Anser anser) at 0.41m O.D.*
0.37m to -038m O.D.	Da St El Dr UB 1+ 0 0 0 2 Ag3, As1, Sh+, Ggmin+, Th+, Dh+ *Light grey clayey silt with occasional pebbles ad organic mottling*
-0.38m to -0.96m O.D.	Da St El Dr UB 1+ 0 0 0 1 Ag2, As2, Sh+, Ggmin+, Dh+ *Light grey silty clay with organic mottling*
-0.96m to -1.01m O.D.	Da St El Dr UB 2 0 0 0 3 Ga4+, Ag+, Ggmin+ *Grey-brown sand*
Below -1.01m O.D	***Sands encountered but could not be extracted***

Core 2

Ground level: 3.34m O.D.

3.34m to 1.24m O.D.	MADE GROUND				
1.24m to 0.45m O.D.	Da	St	El	Dr	UB
	3	0	0	1	-
	Ga2, Ag1, Sh1, Dh+, Th+, Ggmin+, Ggmaj+				
	Dark brown organic silty sand with occasional gravel, shell fragments				
0.45m to -0.71m O.D.	Da	St	El	Dr	UB
	1+	0	0	1	1
	Ag2,As2, Ga+, Dh+				
	Light grey silty clay, with occasional plant remains and thin sand horizons				
-0.71m to-0.78m O.D.	Da	St	El	Dr	UB
	2	0	0	0	1
	Ga4, Ag+				
	Grey-brown sand				
Below -0.78m O.D.	***No sediment extracted, although sands encountered***				

APPENDIX II

BEETLE ASSEMBLAGE LIST

Sample depth	1.6-2.05m	2.05-2.50m	2.5-2.98m
Volume (l)			
Weight (kg)			
COLEOPTERA			
Hydrophilidae			
Cercyon spp.			*
Histeridae			
Acritus nigricornis (Hofm.)			**
Staphylinidae			
Oxytelus rugosus (F.)	**		**
Xantholinus spp.	*	*	
Aleocharinae gen. & spp. Indet.		**	
Lathridiidae			
Encimus minutus (L.)	**	**	*
Corticaria spp.		*	
Colydiidae			
Aglennus brunneus (Gyll)			**
Endomychidae			
Mycetaea hirta (Marsh.)			**
Anobiidae			
Anobium punctatum (Geer.)			**
Xyletinus spp.		**	*
Ptinidae			
Ptinus fur			**
Tenebrionidae			
Hypophloeus spp.		*	**
Scarabaeidae			
Oxyomus sylvestris		**	
Aphodius spp.	****		****
Chrysomelidae			
Phyllotraeta spp.			
Scolytidae			
Scolytus spp.	*		
Leperisinius spp.		*	
Curculionidae			
Sitona spp.			**

APPENDIX III

RADIOCARBON DATING CERTIFICATES

FROM: Darden Hood, Director (mailto:mailto:dhood@radiocarbon.com)
(This is a copy of the letter being mailed. Invoices/receipts follow only by mail.)

March 5, 2007

Mr. Thomas Hill
University of Birmingham
Birmingham Archaeology
Edgbaston
Birmingham B15 2TT, UK

RE: Radiocarbon Dating Results For Samples UNIIPS-1.65m, UNIIPS-2.94m

Dear Dr. Hill:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of the analysis was charged to the VISA card provided. A receipt is enclosed. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Mr. Thomas Hill

Report Date: 3/5/2007

University of Birmingham

Material Received: 1/30/2007

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 226829	360 +/- 40 BP	-25.9 o/oo	350 +/- 40 BP
SAMPLE : UNIIPS-1.65m			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal AD 1450 to 1650 (Cal BP 500 to 300)			
Beta - 226830	320 +/- 40 BP	-22.1 o/oo	370 +/- 40 BP
SAMPLE : UNIIPS-2.94m			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali			
2 SIGMA CALIBRATION : Cal AD 1440 to 1640 (Cal BP 510 to 310)			

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.9:lab. mult=1)

Laboratory number: **Beta-226829**

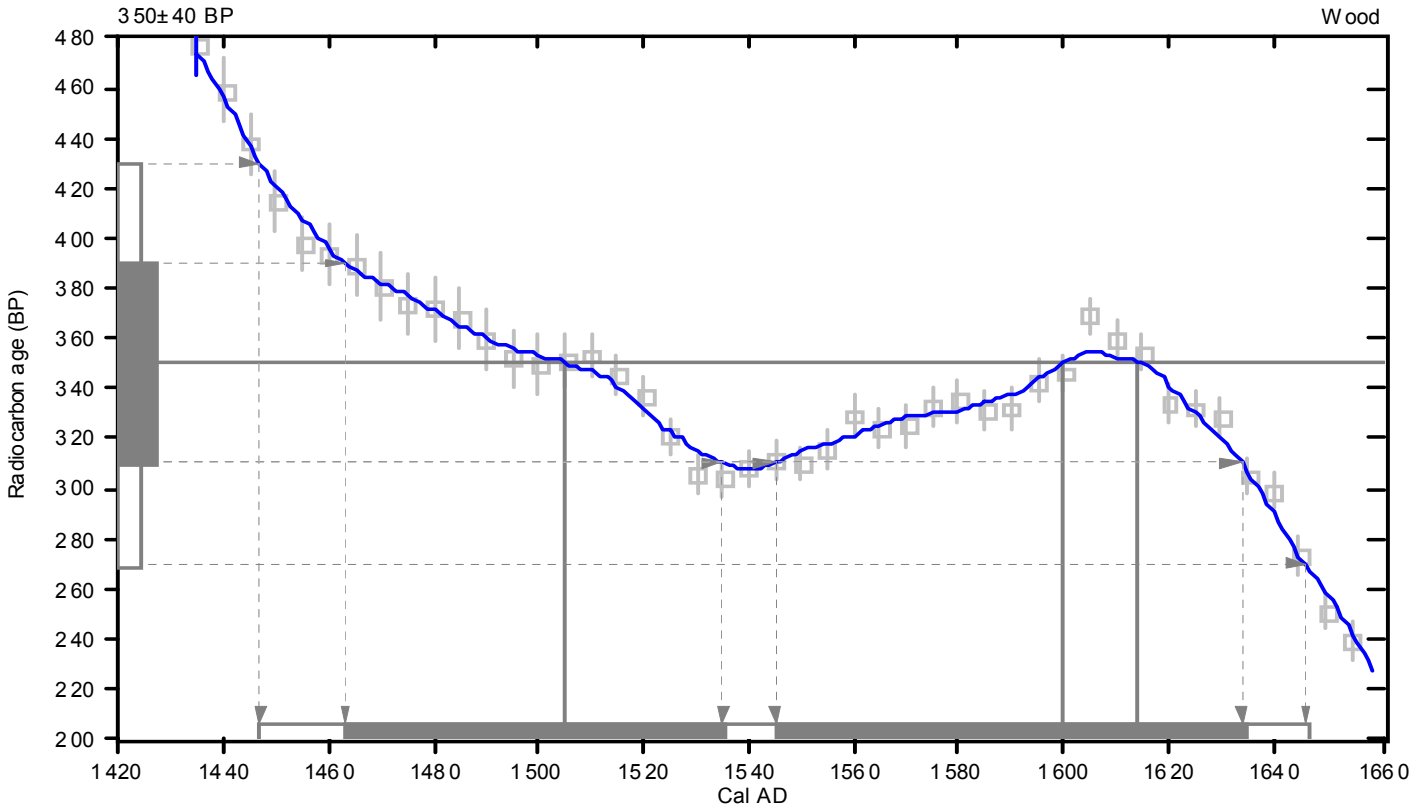
Conventional radiocarbon age: **350±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1450 to 1650 (Cal BP 500 to 300)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1500 (Cal BP 440) and
Cal AD 1600 (Cal BP 350) and
Cal AD 1610 (Cal BP 340)

1 Sigma calibrated results: (68% probability) Cal AD 1460 to 1540 (Cal BP 490 to 420) and
Cal AD 1540 to 1630 (Cal BP 400 to 320)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.1:lab. mult=1)

Laboratory number: **Beta-226830**

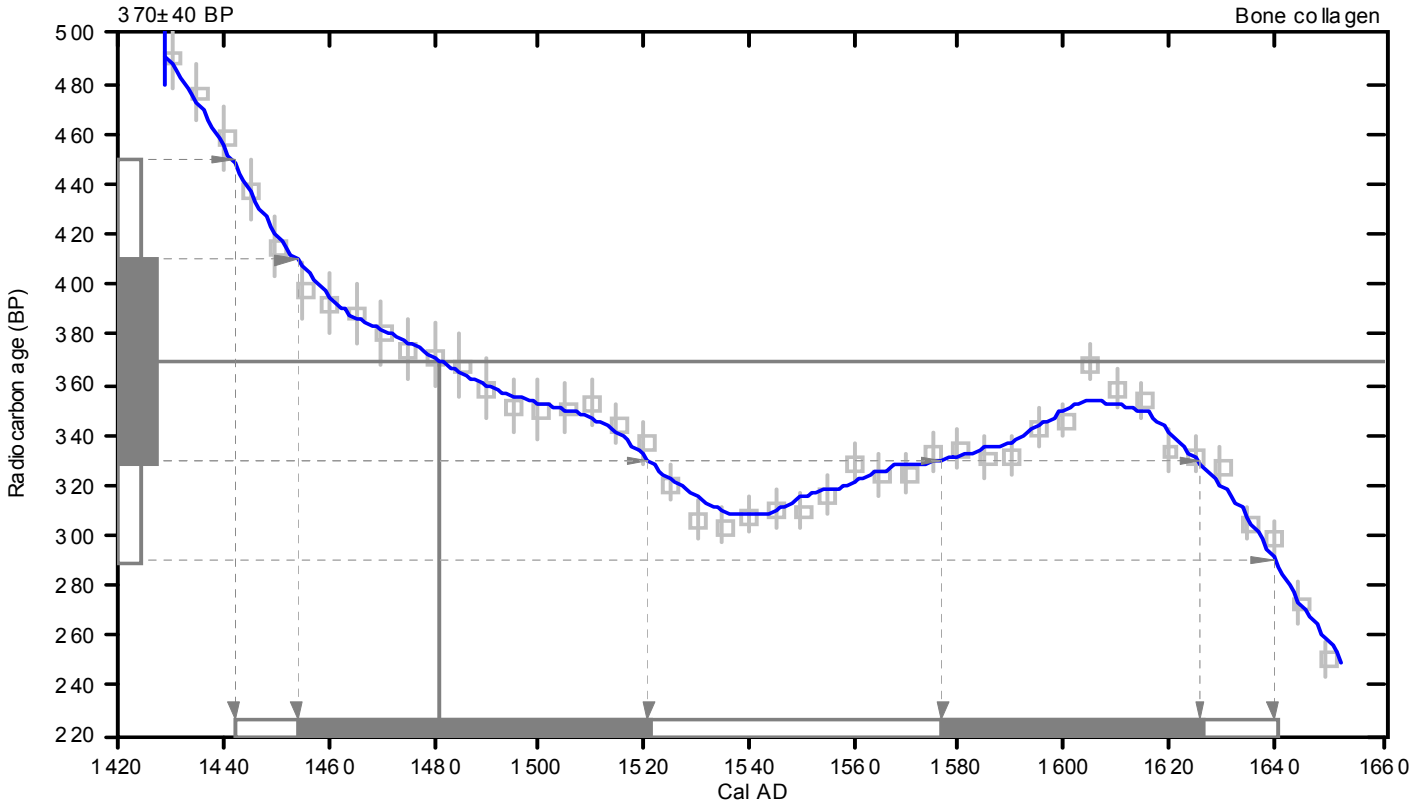
Conventional radiocarbon age: **370±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1440 to 1640 (Cal BP 510 to 310)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1480 (Cal BP 470)

1 Sigma calibrated results: (68% probability) Cal AD 1450 to 1520 (Cal BP 500 to 430) and Cal AD 1580 to 1630 (Cal BP 370 to 320)



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