



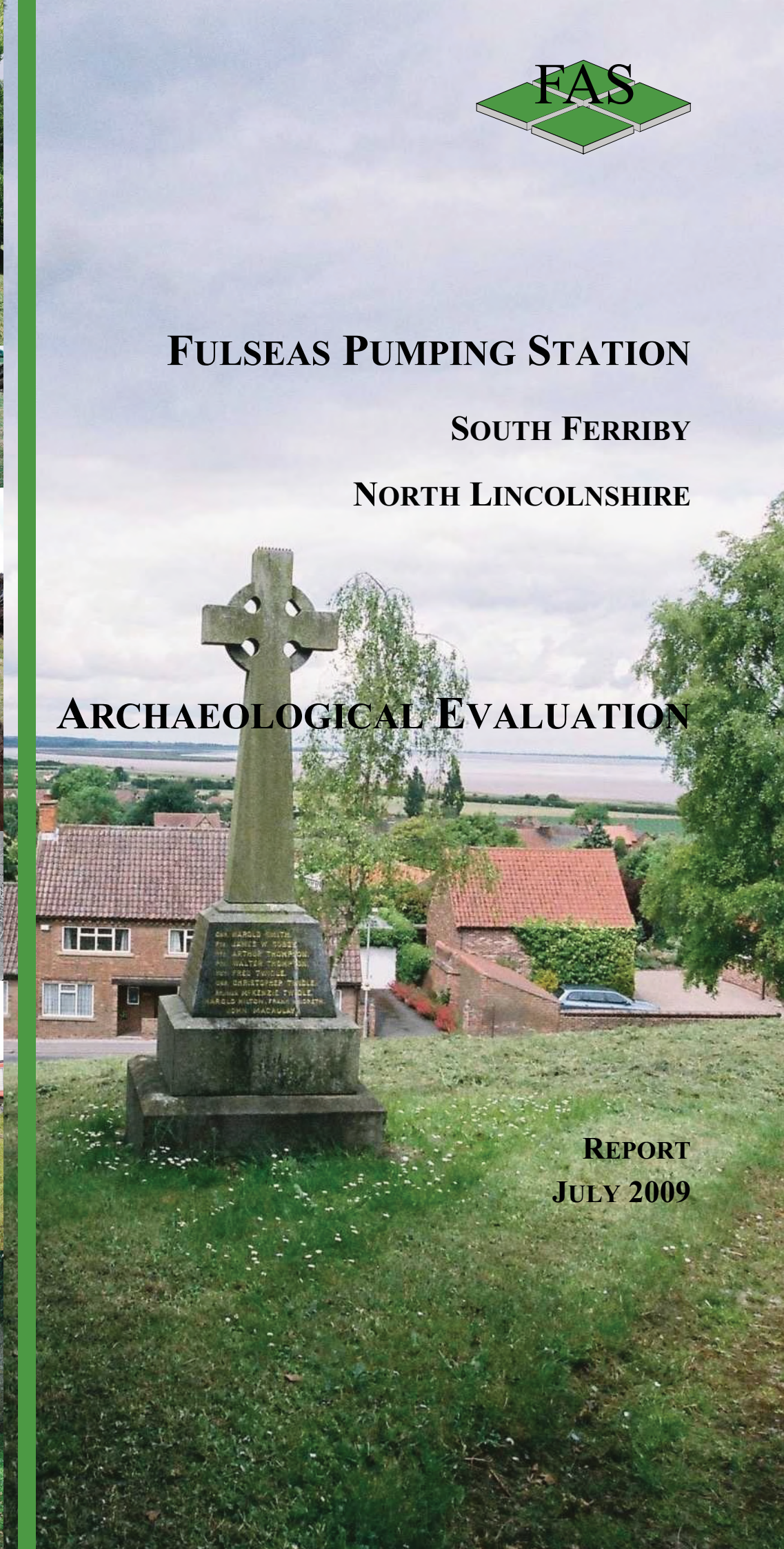
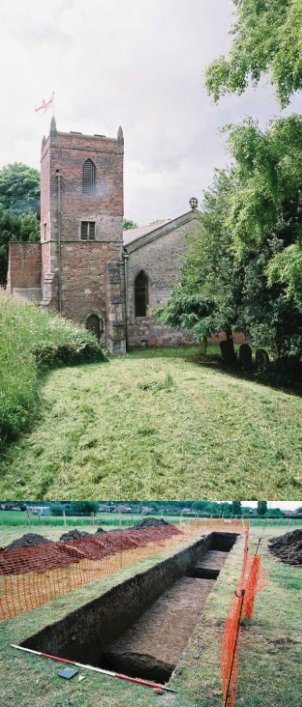
FULSEAS PUMPING STATION

SOUTH FERRIBY

NORTH LINCOLNSHIRE

ARCHAEOLOGICAL EVALUATION

REPORT
JULY 2009





ARCHAEOLOGICAL EVALUATION
FULSEAS PUMPING STATION
SOUTH FERRIBY
NORTH LINCOLNSHIRE

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REPORT
July 2009



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Summary

This document reports on the results of a programme of archaeological evaluation at land west of Elm Farm, Sluice Road, South Ferriby, North Lincolnshire (NGR: SE 9839 2118) undertaken by Field Archaeology Specialists (FAS) Ltd. The evaluation was carried out in support of a planning application for the construction of a new land pumping station and associated pipes and groundworks by JBA Consulting for the Ancholme Drainage Board. Fieldwork took place between the 26th May and the 11th June 2009.

The evaluation programme was informed by a desk-based assessment of the area and consisted of two stages. Stage 1 (Intervention 1) consisted of a borehole transect undertaken west-east along the northern boundary of the proposed pumping station development area. The transect measured 150m and was designed to broadly characterise the nature of archaeological and palaeoenvironmental deposits within the area of the proposed pumping station. Secondly, based on the results of the Stage 1 borehole transect, a single trial trench (Intervention 2) was excavated measuring 2m x 20m to further characterise and explore the deposits within the footprint of the proposed pumping station development.

The borehole transect was oriented west-east and consisted of nine boreholes sunk to a depth of 7-8m below ground level. The westernmost three boreholes were over the position of an earthwork channel thought to represent the relict course of the River Ancholme. The sequence of strata recorded identified broadly homogenous deposition across the site consisting of the upper levels of a peat-like deposit at between 4.20 and 3.20m -OD. Palaeoenvironmental assessment of the layer identified plant detritus and insect remains suggestive of formation in reed marsh. The peaty layer was overlain by a series of grey estuarine clays with low organic content. The area of the relict river channel yielded a deposit with terrestrial and aquatic insects species as well as plants from fresh to brackish-water habitats and evidence for meadow grazing nearby. No material suitable for dating was identified.

The single evaluation trench was excavated to a depth of *c.*2.25mAOD with three sondages (north, centre and south) excavated to a depth of *c.*1.25mAOD. The sequence encountered within the trench reflected the upper sequence of estuarine clay encountered within the borehole transect.

The results of the evaluation programme have been used to inform archaeological mitigation for the proposed pumping station development.

Acknowledgements

FAS are grateful to Paul Jones and Laura Hicks, JBA Consulting for their assistance and cooperation during fieldwork. We are also grateful to Alison Williams, Sites and Monuments Officer, North Lincolnshire Council for her advice and guidance.

1.0 INTRODUCTION

This document reports on a programme of archaeological evaluation, undertaken to support a planning application for a land drainage pumping station with associated pipes and works at land west of Elm Farm, Sluice Road, South Ferriby (Ref PA/2009/0295). The fieldwork was carried out by Field Archaeology Specialists (FAS) Ltd on behalf of JBA Consulting for the Ancholme Internal Drainage Board. Fieldwork took place between the 26th May and the 11th June 2009.

1.1 LOCATION AND LAND USE

The site of the proposed drainage works lies to the west of the village of South Ferriby, to the immediate south of the floodbanks of the Humber Estuary (NGR: SE 9839 2118; Figure 1). The site is bounded to the east by Fulseas Drain, to the north by the flood defence, to the south by Sluice Road and by residential properties to the west. At the time of the evaluation, the site was under pasture.

1.2 SUMMARY OF PROPOSED WORKS

The proposed drainage works lie to the west of Fulseas Drain. The main elements of the pumping station construction require:

- construction of a new access track;
- excavation of a new approach channel, *c.*22m long by 3.5m wide;
- construction of a new steel sheet piled and reinforced concrete pump sump, to a maximum depth of 4.5m below ground level;
- construction of new steel sheet piled and reinforced concrete discharge chamber and improvements to discharge bay;
- installation of two submersible pumps;
- installation of pump discharge network;
- clay core replacement in flood embankment;
- filling and forming of ramps to floodbank and raised control house area;
- construction of new control house;
- infill of existing soak drain and diversion pipeline;
- installation of an automatic (turret type) weedscreen cleaner;
- installation of security fencing.

Those elements which will have an impact on below-ground deposits are the approach channel, pump sump, discharge chamber and pipe network; most of the remaining works will impact the extant floodbank.

1.3 AIMS AND OBJECTIVES

The programme of archaeological evaluation was informed by a desk-based assessment of the Fulseas area (FAS 2007). The aim of the evaluation was to gather sufficient information to establish the extent, condition,



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Location map

Scale 1:20000



Figure 1



character and date of any archaeological and palaeobotanical remains that may be adversely affected by the proposed drainage works. The information gained will allow an informed decision to be made regarding the planning application, and to assist in the design of an appropriate mitigation strategy to be implemented during the proposed works.

1.4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

An archaeological desk-based assessment of the area was undertaken in 2007 (FAS 2007), which identified activity of prehistoric to modern date within the surrounding area. Finds of prehistoric date are represented by flint artefacts, with palaeoenvironmental evidence provided by peat deposits within the valley of the River Ancholme. Finds of Mesolithic to Neolithic date were concentrated primarily to the south of South Ferriby, suggesting that activity would have been focussed on higher, drier ground. This trend continued into the Iron Age; hoards of coins have been found near South Ferriby, with ceramic and metalwork, and nine Iron Age inhumation burials were encountered, suggesting settlement of this date in the area.

Retreating sea levels during the Roman period would have made more of the area suitable for agriculture, and evidence indicates widespread settlement and land divisions from the 1st century AD onwards. Evidence for settlement, in the form of structures and finds have been found to the northeast of South Ferriby and to the south of Ferriby Sluice. The remainder of the area appears to have been given over to agriculture, with widespread field systems visible as cropmarks.

During the early medieval period, the archaeological evidence is again focussed around South Ferriby, in the form of *grubenhauser* of 5th- to 6th-century date. Much of the area would have been unsuitable for agriculture during this period, however, and programmes of fieldwalking have not recorded remains of this date on the low-lying ground.

Villages continued to develop through the medieval period, and ridge and furrow has been identified in the wider area. To the west of the proposed drainage works, cropmarks and earthworks revealed a previous course of the river leading into the estuary (Plate 1); in 1983 a medieval bridge was excavated c.350m to the southwest. This is believed to have been the general location of a medieval haven.

Subsequent post-medieval activity in the area is characterised by the implementation of major drainage programmes, which saw the construction of the New River Ancholme, with associated drains and sluices. The settlements of Horkstow and South Ferriby saw continued development, with the construction of country houses and farm buildings during the 17th and 18th century. Industrial activity is represented by extensive brickworks, which developed alongside the New River in the 19th century, involving quarrying of clay from the immediate area.



Plate 1 Aerial view of development area (right) showing possible relict River Ancholme

The drainage of the area continued throughout the modern period; the landscape is now dominated by a cement factory.

2.0 FIELDWORK METHODOLOGY

2.1 EVALUATION STRATEGY

The archaeological evaluation was designed as a two-stage investigation. Stage 1 consisted of a 150m long borehole transect allocated Intervention 1. The east end of the transect began at the site of the proposed drainage works and extended westwards across the adjacent pasture. The borehole survey was undertaken in accordance with a Project Design prepared by FAS and approved by Alison Williams, Sites and Monuments Officer, North Lincolnshire Council (Appendix A).

Following the results of the Stage 1 borehole transect a trial trench was designed to investigate deposits in the area of the new pumping station. Stage 2 (assigned Intervention 2) involved the excavation of a 20m x 2m trial trench on a north-south alignment, within the site of the proposed pumping station and associated channels (Figure 2). The trial trench was undertaken in accordance with a Project Design prepared by FAS and approved by Alison Williams (Appendix B).

2.2 BOREHOLE METHODOLOGY

A series of small-core boreholes was undertaken along a 150m west-east transect across the site, with boreholes taken at intervals of approximately 20m (see Figure 2). Where the river channel was noted as an earthwork at the west end of the transect, the frequency of boreholes was increased. Boreholes were taken using a Dando Terrier 2002 DCP/Window Sampling Rig to a depth of at least 7.0m (102mm diameter). Cores were retrieved, opened on site, and appropriate recording and sediment sampling undertaken (Plate 2).

2.3 EXCAVATION METHODOLOGY

A single evaluation trench was excavated, on an approximate north-south alignment and measuring 20.0m x 2.0m. The trench was excavated to a maximum depth of 1.2m, with three 2.0m x 2.0m sondages excavated to 2.2m to test deposits at greater depth (Plate 3).

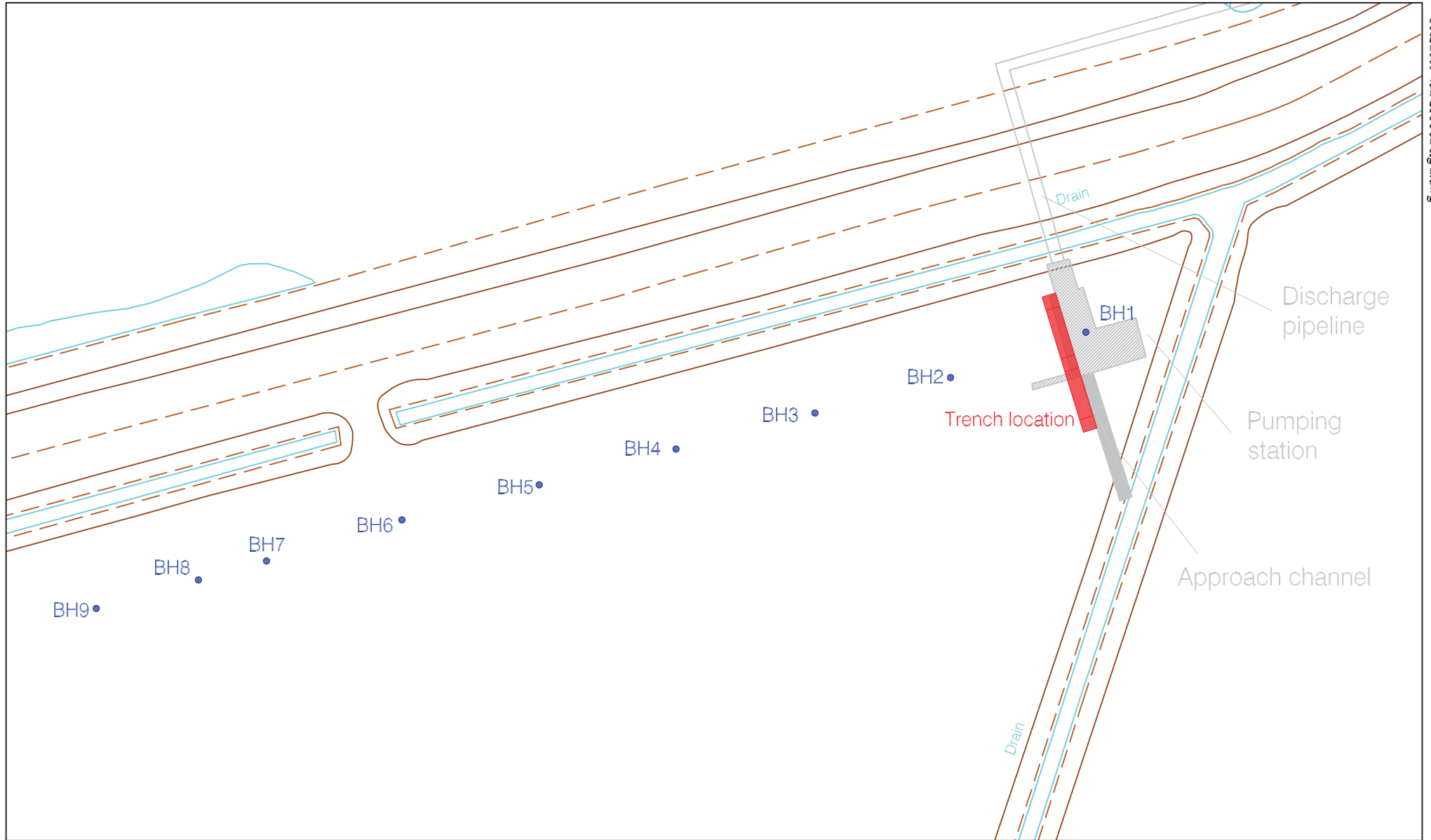
The evaluation trench was excavated using a tracked mechanical excavator fitted with a wide toothless ditching bucket. In all instances, mechanical



Plate 2 Borehole survey



Plate 3 Supervised machine-excavation of evaluation trench



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Location of boreholes and evaluation trench

Scale 1:750



Figure 2

excavation was undertaken under strict archaeological supervision, in a controlled and stratigraphic manner.

The sondages were machine-excavated and photographed from ground level for safety reasons.

2.4 RECORDING METHODOLOGY

A site grid was established, and rectified to the Ordnance Survey Grid and Ordnance Survey Datum prior to the evaluation. Survey stations have been set out around the site using a total station theodolite to facilitate archaeological recording.

A full written, drawn and photographic record was made during the course of the evaluation. Archaeological deposits were recorded using a standard system of context record forms. A series of indexes, capable of interrogation, was maintained for all site records. Sections were recorded at a scale of 1:10. The photographic record consists of 35mm colour and monochrome photography. Monochrome photography was undertaken using silver-based film to ensure archival stability.

2.5 ENVIRONMENTAL STRATEGY

The principal aim of the evaluation was to assess the value, range, quality and potential of palaeoenvironmental remains within the sediments encountered. It was anticipated that the evaluation could encounter up to two peat horizons, with an intervening layer of estuarine clay containing well-preserved rootlets. The sampling strategy aimed to characterise the nature of deposits, and to assess the plant macrofossils and insect remains preserved within them, drawing comparison with the results of the Humber Wetland Project.

The sampling strategy was implemented in accordance with *Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation* (English Heritage, Centre for Archaeology Guidelines 2002) and *Environmental Archaeology and Archaeological Evaluations: Recommendations concerning the environmental archaeology component of archaeological evaluations in England* (Association of Environmental Archaeology 1995).

2.6 FINDS RECOVERY AND TREATMENT

All finds were to be hand-collected during the evaluation. No finds were recovered within the deposits encountered.

3.0 FIELDWORK RESULTS

3.1 STAGE 1 - INTERVENTION 1

The Stage 1 borehole transect encountered a consistent sequence across the site. The earliest deposit consisted of a basal peat at 7.8 to 6.6m below ground level (4.26m -OD and 3.24m-OD)(C1005, C1014, C1023, C1029,

C1032)(Appendix C; Figure 3). This deposit had also been encountered in two site investigation boreholes carried out at the site prior to the archaeological evaluation, at 6.8m BGL (Langdale Smith & Co. 2008).

One of the principal aims of the evaluation was to assess the deposits across the site for their palaeoenvironmental potential and identify any material suitable for scientific dating. Accordingly, samples were taken and submitted to Dr Allan Hall and Dr Harry Kenward, Department of Archaeology, University of York for assessment of plant and insect remains (Table 1)(Appendix D). More specifically samples from the earliest layer encountered, C1014, C1023 and C1029 were sampled and assessed. The layer contained plant detritus with identified specimens of orache (*Atriplex*), bulrush (*Scirpus lacustris sensu lato*) and rush seeds indicative of aquatic conditions. More specifically the layer yielded quantities of roots and rhizome fragments suggesting it had supported reed swamp plants.

Table 1 Sample summary

Context	Borehole	Identity	Quantity
1002	BH1	Grey alluvial clay	1 litre
1014	BH5	Peat deposit	1 litre
1023	BH7	Peat deposit	1 litre
1025	BH8	Very dark grey clay silt	1 litre
1026	BH8	Very dark grey, laminating clay	1 litre
1027	BH8	Very dark grey, laminating clay	1 litre
1029	BH8	Peat deposit	1 litre

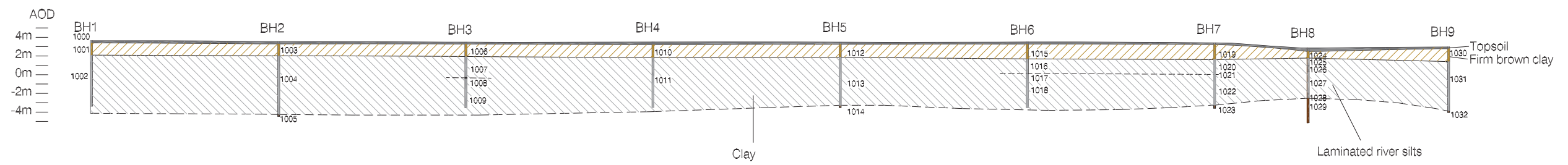
Overlying the peat horizon, a deep, homogenous deposit of grey estuarine clay was encountered (Plate 4). To the east, this deposit was observed to maximum depths of 6.30m (C1002, C1004, C1011, C1013), with the upper interface between 1.70m and 2.10m AOD. In three boreholes, the clay was interrupted at *c.*0.00m OD by a thin lens of sterile, very dark grey silt. Samples were retrieved from C1002, C1026 and C1027 and processed yielded little by way of identifiable plant remains.

To the west of the survey area, a more complex sequence was encountered in Borehole 8, situated centrally within an earthwork channel thought to represent a relict course of the River Ancholme. A sequence of laminating silt deposits was encountered, with some survival of organic material between *c.*1.05m and 1.75m AOD. C1025 was sampled and found to contain the remains of a range of plants and insect remains. The identifiable specimens included terrestrial and aquatic examples and together pointed to deposition in watery conditions with meadow grazing, probably for large herbivores, nearby.



Plate 4 Grey alluvial clay borehole core

A firm, plastic brown clay was encountered across the whole of the area, measuring between 1.30m and 1.60m



Stage 1 - borehole profile and deposit model

Scale 1:500

Figure 3

in depth, apart from a shallower area within the earthwork channel to the west of the site. This deposit was overlain directly by an homogenous, dark brown friable sandy clay topsoil, measuring an average 0.20m, reaching 0.35m in depth to the west of the site.

3.2 STAGE 2 - INTERVENTION 2

Following the results of the Stage 1 borehole transect a single trial trench was designed to investigate the deposits in the location of the pumping station development to explore the potential for archaeological horizons of activity in the estuarine clay (Plate 5).

The results of the archaeological evaluation were consistent with the results of the borehole survey. A total of three deposits were encountered within the excavated trench (Table 2; Figure 4).



Plate 5 Intervention 2 looking north (scale 1.0m)

Table 2 Summary of contexts

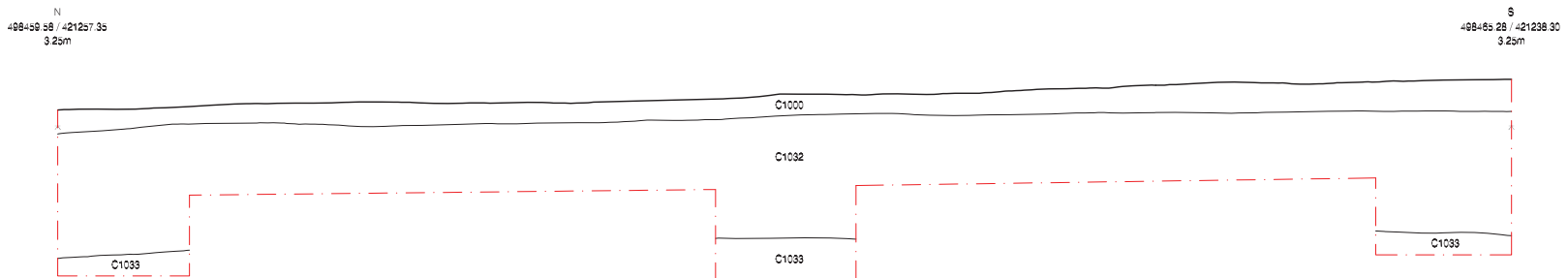
Context	Identity	Depth	Description
1000	topsoil	0 - 0.35m	Very dark brown friable sandy clay topsoil
1032	layer	0.35m - 1.70m	Plastic brown clay
1033	layer	1.70m +	Grey estuarine clay

The earliest deposit encountered was a grey estuarine clay (C1033), encountered at *c.*2.0m below ground level being *c.*2.25mAOD and continuing beyond the excavated depths of the sondages (below 0.75mAOD) (Plate 6). This deposit was equivalent to grey estuarine clays encountered across the borehole transect, and allocated C1002, C1004, C1011, C1013.



Plate 6 Intervention 2 central sondage looking east (scale 1.0m)

The grey clay was overlain by *c.*1.35m of firm, plastic brown clay, equivalent to similar deposits encountered in all nine boreholes (C1001, C1003, C1006, C1010, C1012, C1015, C1019, C1024, C1030). This in turn was sealed by a consistent topsoil (C1000), consisting of a dark brown friable sandy clay topsoil up to 0.35m in depth.



Stage 2 - west-facing section

Scale 1:100

Figure 4

4.0 DISCUSSION

The results of the evaluation (Stage 1 and 2) indicated a consistent sequence of deposits across the site, consisting of a shallow topsoil, with deposits of estuarine clay to depths of *c.* 7.0m BGL overlying a layer of reed peat. The only variation occurred to the far west of the borehole transect, where laminating silts were defined within the vicinity of a relict channel of the River Ancholme with an associated assemblage of well-preserved plant and insect remains.

4.1 HUMBER WETLANDS TRANSECT

The sequence of deposits encountered during the evaluation can be compared with a transect undertaken as part of the Humber Wetlands Project (HWP), 350m inland and spanning a width of 2.69km, covering the maximum extent of alluviation within the Ancholme valley (Neumann 1998, 91). A lower layer of woody peat was identified at -2.5m to -3.5m OD, resting on a sandy loam; this became progressively shallower towards the eastern edge of the transect (*ie.* closer to South Ferriby), where the lower peat occurred at 2m AOD. The woody peat gave way to reed peat with a transitional layer of peaty clay, before giving way to a grey clay deposit which measured between 2.5m and 3.0m thick, containing well-preserved rootlets. Within the central area of the channel (west of the proposed drainage works), deeper deposits were encountered, with a black peat encountered at -5.9m OD (8.5m below ground level).

Palaeoenvironmental assessment identified the peat deposit encountered during evaluation as lithologically similar to the reedswamp peat defined by the HWP (see Appendix D). The overlying grey clay deposits also appear to represent the same sequence in both transects.

Notably, within the HWP transect, the grey clays were succeeded by a second phase of peat development, encountered at 1 to 2m AOD, forming an almost horizontal level across the floodplain. This peat was overlain by another grey clay, merging to pink/beige clay *c.* 1m below ground level. In some areas, the depth of alluvium was reduced to only 2.1m, overlying gravelly sand, belying the presence of a gravel ridge rising to at least 1.7m AOD. This upper peat deposit was not identified during the present evaluation.

The deposits encountered within the HWP transect provided valuable palynological evidence, and material suitable for radiocarbon-dating, which returned dates between 5060-4780 cal BC and 900-790 cal BC. The inferred sequence from the results suggested channel aggradation followed by floodplain aggradation, first by organic (basal peat) and then by minerogenic (grey estuarine clay) deposits. The onset of peat development becomes younger towards the edges of the valley (4000-900 cal BC); the infill of the main channel was complete by the mid-Holocene, followed by the formation of mire across the valley floor from 3800 BC onwards, reaching a maximum extent at the Bronze Age/Iron Age transition (1000-790 cal BC) (Neumann 1998, 96). The central part of the valley saw the deposition of marine clay at 700-800 cal BC.

Elsewhere in the Ancholme valley, evidence for a Roman period marine regression resulted in the formation of an upper deposit of peat, before being sealed by further alluvial deposits in the 3rd century AD. Adjacent to the new River Ancholme, evidence for Roman occupation was encountered beneath alluvial deposits. The

borehole transect and trial trench demonstrated that neither the upper peat nor equivalent archaeological horizons survive within the area of the proposed drainage.

5.0 IMPACT ASSESSMENT

The elements of the proposed drainage works that will impact on below ground deposits inside the floodbank include the excavation of a pumping station and pump sump (maximum depth 4.5m BGL, -0.10m AOD), discharge pipe (to 2.3m AOD), and new approach channel (to 1.8m AOD). The discharge pipeline will be excavated through the floodbank, to the discharge chamber on the estuary side of the defences.

The deposits to be disturbed by the discharge pipeline within the floodbank were encountered within the evaluation trench, and found to consist of topsoil and estuarine clays. The impact of this element of the groundworks on the archaeological resource is therefore deemed negligible.

The deposits to be impacted by the new approach channel were contacted within the sondages and the boreholes, and again appear to represent topsoil and estuarine clays. However, it cannot be stated with certainty that chance finds of waterlogged wooden artefacts and structures will not be encountered beyond the areas observed, or at greater depths, and so while the potential for archaeological discoveries would seem low, the impact cannot be assessed with certainty.

6.0 ARCHAEOLOGICAL MITIGATION

Given the unpredictable nature of waterlogged wooden structures and finds within the Ancholme valley, it is likely that an archaeological watching brief will be required on those groundworks that exceed 1.20m in depth. Groundworks achieving that depth consist primarily of the pump sump, new approach channel, discharge pipeline and discharge chamber. Given safety issues related to excavation to this depth, a methodology would be proposed whereby archaeological deposits were recorded photographically and by written record from ground level, and samples and artefacts recovered by machine as appropriate. Should any artefacts or structures of national significance be observed, then groundworks would cease to allow consultation with North Lincolnshire Council regarding appropriate recording and investigation procedures.

7.0 ARCHIVE

A paper and electronic (PDF) version of this report will be submitted to the North Lincolnshire Sites and Monuments Record (NLSMR). An electronic (PDF) version of the report will be submitted to Dr Andy Hammon, English Heritage Regional Science Advisor.

The paper, physical and digital archive relating to the evaluation will be deposited with the North Lincolnshire Museum, with two further copies of the report, under the North Lincolnshire Museum site code SFAT.

A note will be prepared on the results of the evaluation for publication in a local journal as appropriate. An *Online Access to Index of Archaeological Investigations* (OASIS) form will be submitted for the project.

References

- FAS. 2007. 'Archaeological desk-based assessment: Fulseas Outfall South Ferriby North Lincolnshire' (unpublished report FAS2007 362 SFF314)
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APPENDIX A STAGE 1 PROJECT DESIGN

Field Archaeology Specialists

1.0 INTRODUCTION

This document represents a Project Design (PD) for a proposed archaeological evaluation to be undertaken to support a planning application for a land drainage pumping station with associated pipes and works at land west of Elm Farm, Sluice Road, South Ferriby (Ref PA/2009/0295). The PD has been prepared in consultation with Alison Williams, North Lincolnshire Council, by Field Archaeology Specialists (FAS) Ltd on behalf of JBA Consulting for the Ancholme Internal Drainage Board.

1.1 SUMMARY OF PROPOSED WORKS

The proposed drainage works lie to the west of Fulseas Drain. The main elements of the project will include:

- Construction of a new access track
- Excavation a new approach channel, *c.*22m long by 3.5m wide
- Construction of a new steel sheet piled and reinforced concrete pump sump, to a maximum depth of 4.5m below ground level
- Installation of x2 submersible pumps
- Construction of new steel sheet piled and reinforced concrete discharge chamber and improvements to discharge bay
- Installation of pump discharge network
- Clay core replacement in flood embankment
- Filling and forming of ramps to floodbank and raised control house area
- Construction of new control house
- Infill of existing soak drain and diversion pipeline
- Installation of an automatic (turret type) weedscreen cleaner
- Installation of security fencing

Those elements to disturb below-ground deposits directly are the new approach channel, pump sump, discharge chamber and pipe network. Most of the remaining works will impact the extant floodbank.

1.1 LOCATION AND LAND USE

The site of the proposed works lies to the west of the village of South Ferriby, to the immediate south of the floodbanks of the Humber Estuary (NGR: SE 9839 2118; Figure 1). The site is bounded to the east by Fulseas Drain, to the north by the flood defence, to the south by Sluice Road and by field boundaries to the west.

1.2 AIMS AND OBJECTIVES

The aim of the evaluation is to gather sufficient information to establish the extent, condition, character and date of any archaeological remains that may be adversely affected by the proposed drainage works. The information gained will allow for an informed decision to be made regarding the planning application, and the need for any archaeological mitigation during the proposed works.

1.3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

An archaeological desk-based assessment of the area was undertaken in 2007 (FAS 2007), which identified activity of prehistoric to modern date within the surrounding area. Finds of prehistoric date are represented by flint artefacts, with palaeoenvironmental evidence provided by peat deposits within the valley of the River Ancholme. Finds of Mesolithic to Neolithic date were concentrated primarily to the south of South Ferriby, suggesting that activity would have been focussed on higher, drier ground. This trench continues into the Iron Age; hoards of coins have been found near South Ferriby, with ceramic and metalwork, and nine Iron Age inhumation burials have been encountered in South Ferriby, suggesting settlement of this date in the area.

Retreating sea levels during the Roman period would have made more of the area suitable for agriculture, and evidence indicates widespread settlement and land divisions from the 1st century AD onwards. Evidence for settlement, in the form of structures and finds have been found to the northeast of South Ferriby and to the south of Ferriby Sluice. The remainder of the area appears to have been given over to agriculture, with widespread field systems visible as cropmarks.

During the early medieval period, the archaeological evidence is again focussed around South Ferriby, in the form of *grubenhauser* of 5th- to 6th-century date. Much of the area would have been unsuitable for agriculture during this period, however, and programmes of fieldwalking have not recorded remains of this date on the low-lying ground.

Villages continued to develop through the medieval period, and ridge and furrow has been identified in the wider area. To the west of the proposed drainage works, cropmarks reveal a previous course of the river leading into the estuary (Plate 1); in 1983 a medieval bridge was excavated *c.*350m to the southwest. This is believed to have been the general location of a medieval haven.

Subsequent post-medieval activity in the area is characterised by the implementation of major drainage programmes, which saw the construction of the New River Ancholme, with associated drains and sluices. The settlements of Horkstow and South Ferriby saw continued development, with the construction of country houses and farm buildings during the 17th and 18th century. Industrial activity is represented by extensive brickworks, which developed alongside the New River in the 19th century, involving quarrying of clay from the immediate area.

The drainage of the area continued throughout the modern period; the landscape is now dominated by the still-extant cement factory.

1.3.1 Deposit model

The PD has been informed by deposits models deriving from a borehole transect undertaken some 350m to the south of the proposed works by the Humber Wetlands Project, and two boreholes carried out at the site as part of the site investigation for the proposed works.

Humber Wetlands Transect

The Humber Wetlands transect spanned a width of 2.69km, covering the maximum extent of alluviation within the Ancholme valley (Neumann 1998, 91). A lower layer of woody peat was identified at -2.5m to -3.5m OD, resting on a sandy loam; this became progressively shallower towards the eastern edge of the transect (*ie.* closer to South Ferriby), where the lower peat occurred at 2m AOD. The woody peat gave way to reed peat with a transitional layer of peaty clay, before giving way to a grey clay deposit which measured between 2.5m and 3.0m thick, containing well-preserved rootlets. Within the central area of the channel (west of the proposed drainage works), deeper deposits were encountered, with a black peat encountered at -5.9m OD (8.5m below ground level).

The grey clay was succeeded by a second phase of peat development, encountered at 1 to 2m AOD. This formed an almost horizontal level across the floodplain. This peat had been overlain by another grey clay, merging to pink/beige clay c.1m below ground level. In some areas, the depth of alluvium was reduced to only 2.1m, overlying gravelly sand, belying the presence of a gravel ridge rising to at least 1.7m AOD.

The deposits encountered within this transect provided valuable palynological evidence, and material suitable for radiocarbon-dating, which returned dates between 5060-4780 cal BC and 900-790 cal BC. The inferred history from the results suggested channel aggradation followed by floodplain aggradation, first by organic (basal peat) and then by minerogenic (grey estuarine clay) deposits. The onset of peat development becomes younger towards the edges of the valley (4000-900 cal BC); the infill of the main channel was complete by the mid-Holocene, followed by the formation of mire across the valley floor from 3800 BC onwards, reaching a maximum extent at the Bronze Age/Iron Age transition (1000-790 cal BC)(Neumann 1998, 96). The central part of the valley saw the deposition of marine clay at 700-800 cal BC. Marine regression in the Roman period resulted in the formation of the upper peat deposits; this was short-lived and the deposition of marine clays continued within the Roman period.

Site investigation boreholes

Two boreholes were sunk at the site as part of the current works (Langdale Smith & Co. 2008), to depths of over 20m. One borehole was situated to the north of the flood defences, the second on the landward side of the defences, close to the proposed pumping station location.

The boreholes encountered a fibrous peat deposit was encountered at 7.8m to 8.1m below ground level (-4m OD), sealed by 6.8m of sandy clay (estuarine), before a 1m layer of silty clay.

Anticipated deposit model

Based on these results, it can be postulated that the site has the potential for lower (differentiated) and upper peat deposits, interspersed with grey clay deposits. Notably, however, no upper peat was encountered during the borehole investigations, which may indicate that the Roman marine regression did not extend this far. The lower peat was encountered at 7.8m BGL, suggesting that it occurs at greater depth towards the estuary. The area to the west of the proposed drainage works has the potential to contain remains of a former channel of the River Ancholme.

2.0 METHODOLOGY

2.1 FIELDWORK PROCEDURE

The evaluation will be undertaken in two phases. The first phase will involve a borehole transect across the field to the west of Fulseas Drain, encompassing the site of the proposed works and extending westwards. The second phase will involve the excavation of one or two trial trenches at the site. The layout of these trenches will be informed by the results of the borehole transect.

2.1.1 Stage 1 - Borehole Methodology

A series of small-core boreholes will be undertaken along a 150m transect across the site, with boreholes taken at intervals of 20m (Figure 2). Boreholes will be taken using a Dando Terrier 2002 DCP/Window Sampling Rig to a depth of approximately 7.0m (102mm diameter). Closed-cores will be retrieved, opened on site, and appropriate recording and sediment sampling undertaken.

2.1.2 Stage 2 - Excavation Methodology

The position, number and size of trial trenches will be agreed with Alison Williams on completion of the Interim Report on Stage 1 investigations.

The evaluation trench(es) will be excavated using a mechanical excavator fitted with a wide toothless ditching bucket. In all instances, mechanical excavation will be undertaken under strict archaeological supervision. Excavation will be undertaken in a controlled and stratigraphic manner. The trench(es) will be stepped in to ensure that no excavation edge exceeds 1.2m in depth.

If human burials are encountered, the remains will be recorded and where possible left *in situ*. The provisions of Section 25 of the Burial Act (1857) will be complied with.

2.1.3 Recording Methodology

A site grid rectified to the Ordnance Survey Grid and Ordnance Survey Datum will be established. Survey stations will then be set out around the site using a total station theodolite to facilitate archaeological recording.

A full written, drawn and photographic record will be made of all material recovered during the course of the evaluation. Archaeological deposits, features and structures will be recorded using a standard system of context and other record forms. A series of indexes, capable of interrogation, will be maintained for all site records. A stratigraphic site matrix will be compiled during the course of the evaluation. The planning of features will be at scales of 1:10 or 1:20; sections will be recorded at a scale of 1:10. The photographic record will consist of 35mm colour and monochrome photography. Monochrome photography will be undertaken using silver-based film to ensure archival stability.

2.1.4 Environmental Evaluation Strategy

The principal aim of the Environmental Evaluation Strategy will be to assess the value, range, quality and potential of palaeoenvironmental remains within the sediments encountered. It is anticipated that the proposed evaluation may encounter up to two peat horizons, with an intervening layer of estuarine clay containing well-preserved rootlets. A sampling strategy will therefore be undertaken to characterise the nature of deposits, and to assess the plant macrofossils and insect remains preserved within them, drawing comparison with the results of the Humber Wetland Project.

The Environmental Evaluation Strategy will be implemented in accordance with *Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation* (English Heritage, Centre for Archaeology Guidelines 2002) and *Environmental Archaeology and Archaeological Evaluations: Recommendations concerning the environmental archaeology component of archaeological evaluations in England* (Association of Environmental Archaeology 1995).

2.1.5 Finds Recovery and Treatment

Any finds encountered within the cores will be hand-collected and processed. Finds treatment will be undertaken in accordance with guidelines set down in *First Aid for Finds* (Watkinson and Neal 1998). Archive preparation will be undertaken in accordance with *Guidelines for the preparation of excavation archives for long-term storage* (Walker 1990).

All wet-preserved artefacts will be treated in accordance with *First Aid for Finds* (Watkinson and Neal 1998), *Guidelines for the care of waterlogged archaeological leather* (1995) or *Waterlogged wood, guidelines on the recording, sampling, conservation and curation of structural wood* (1990).

The terms of the Treasure Act 1996 will be followed with regard to any finds which might fall within its purview. Any such finds will be removed to a safe place and reported to the local coroner as required by the procedures as laid down in the "Code of Practice". Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the finds from theft.

2.2 REPORTING PROCEDURE

2.2.1 Interim reporting

On completion of the Stage 1 fieldwork, an interim report will be prepared, consisting of a written descriptions of sediments encountered, and a profile of deposits across the site. This will be submitted to North Lincolnshire Council, to inform the design of Stage 2 trial trenching.

On completion of the Stage 2 fieldwork, summary results will be provided to North Lincolnshire Council, including location plan, written description of the archaeological sequence encountered, and summary of any finds or samples recovered. This will include a preliminary impact assessment of the proposed drainage works on the archaeological resource, and should allow a strategy relating to any necessary mitigation work to be agreed promptly.

2.2.2 Final report

Upon completion of trial trenching, all finds, samples and stratigraphic information will be assessed for their potential for further analysis. An Evaluation Report will be prepared and will include the archaeological background, fieldwork procedure, the results of the evaluation, the results of the specialist assessment, interpretation and phasing, illustrations (photographs, plans and sections) and assessment, conclusions and recommendations. All figures will be reproduced at an appropriate scale, and will accurately geo-referenced with the appropriate National Grid vertices labelled.

2.3 ARCHIVE

2.3.1 Archive preparation

On completion of the field investigation (Stage 1 and 2) all records and material will be indexed, ordered, quantified and checked for consistency. Context, finds, sample and other paper-based records will be transferred to an integrated computer based system. The drawn record will be digitised in an appropriate format that will permit the output of standard AutoCAD type DXF files.

The archival record will include all material relating to the site and its evaluation including correspondence, written, drawn and computerised records. As part of the preparation for the post-excavation programme, the artefactual, ecofactual and samples will be quantified and described. In addition the stratigraphic matrix and a site summary will be prepared.

The digital archive will be provided in a non-magnetic storage medium using generic file formats including PDF.

Preliminary conservation and stabilisation of objects will be undertaken prior to an assessment of long-term conservation and storage needs.

2.3.2 Archive deposition

A paper and electronic (PDF) version of the final evaluation report will be submitted to the North Lincolnshire Sites and

Monuments Record (NLSMR). The NLSMR is licensed to use the report for reference purposes, on the understanding that the licence does not cover commercial use of the material by NLSMR or any third party. FAS and JBA Consulting (on behalf of the Ancholme Internal Drainage Board) retain the right to be identified as the originators of the project.

A paper copy will be submitted to Dr Andy Hammon, English Heritage Regional Science Advisor.

The paper, physical and digital archive relating to the evaluation will be deposited with the North Lincolnshire Museum, with a further copy of the report.

3.0 PUBLICATION AND DISSEMINATION

A note will be prepared on the results of the evaluation for publication in local journal as appropriate. If the results of the work merit it, a full paper will be proposed for publication in the relevant journal.

An *Online Access to Index of Archaeological Investigations* (OASIS) form will be submitted for the project.

4.0 PROJECT SPECIALISTS

Allan Hall and Harry Kenward (Environmental Consultants)

Krish Seetah (Zooarchaeology)

Jane Young and Ian Rowlandson (Pottery)

Karen Barker (Conservation)

Cecily Spall (Small Finds)

Katie Tucker (Human Remains)

Hugh Willmott (Glass)

5.0 MONITORING ARRANGEMENTS

The work will be monitored by North Lincolnshire Council, who will be notified prior to each stage of work.

6.0 HEALTH & SAFETY

FAS will operate with due regard for Health and Safety regulations, and will ensure that all relevant requirements are met with regard both to site personnel and to members of the public. A Risk Assessment will be prepared, in accordance with the Health and Safety at Work Regulations prior to the start of the site investigation.

7.0 INSURANCE

FAS carry appropriate levels of Public Liability, Employers Liability and Professional Indemnity insurances.

8.0 PROPOSED TIMETABLE

The proposed timetable for the evaluation works is as follows:

Date	Task
18th - 22nd May	Formalisation of Stage 1 Project Design
26th - 29th May	Stage 1 Fieldwork

Date	Task
1st - 5th June	Submission of Stage 1 interim report, formalisation of Stage 2 Project Design
8th - 19th June	Stage 2 Fieldwork
22nd - 26th June	Submission of Stage 2 interim report
End July	Submission of full Evaluation Report

References

- FAS. 2007. 'Archaeological desk-based assessment: Fulseas Outfall South Ferriby North Lincolnshire' (unpublished report FAS2007 362 SFF314)
- Langdale Smith & Co. 2008. 'Ground investigation for the proposed new pumping station at Fulseas Drain, South Ferriby'
- Neumann, H. 1998. 'The palaeoenvironmental survey of the Ancholme Valley in Van de Noort, R. and Ellis, S. (eds.) 1998. *Wetland Heritage: An archaeological assessment of the Humber Wetlands* (Kingston upon Hull)

APPENDIX B STAGE 2 PROJECT DESIGN

Field Archaeology Specialists

1.0 INTRODUCTION

This document represents a Project Design (PD) for Stage 2 of an archaeological evaluation to be undertaken to support a planning application for a land drainage pumping station with associated pipes and works at land west of Elm Farm, Sluice Road, South Ferriby (Ref PA/2009/0295). The PD has been prepared in consultation with Alison Williams, North Lincolnshire Council, by Field Archaeology Specialists (FAS) Ltd on behalf of JBA Consulting for the Ancholme Internal Drainage Board.

1.1 SUMMARY OF PROPOSED WORKS

The proposed drainage works lie to the west of Fulseas Drain. The main elements of the project will include:

- Construction of a new access track
- Excavation of a new approach channel, *c.*22m long by 3.5m wide
- Construction of a new steel sheet piled and reinforced concrete pump sump, to a maximum depth of 4.5m below ground level
- Installation of x2 submersible pumps
- Construction of new steel sheet piled and reinforced concrete discharge chamber and improvements to discharge bay
- Installation of pump discharge network
- Clay core replacement in flood embankment
- Filling and forming of ramps to floodbank and raised control house area
- Construction of new control house
- Infill of existing soak drain and diversion pipeline
- Installation of an automatic (turret type) weedscreen cleaner
- Installation of security fencing

Those elements to disturb below-ground deposits directly are the new approach channel, pump sump, discharge chamber and pipe network. Most of the remaining works will impact the extant floodbank.

1.1 LOCATION AND LAND USE

The site of the proposed works lies to the west of the village of South Ferriby, to the immediate south of the floodbanks of the Humber Estuary (NGR: SE 9839 2118; Figure 1). The site is bounded to the east by Fulseas Drain, to the north by the flood defence, to the south by Sluice Road and by field boundaries to the west.

1.2 AIMS AND OBJECTIVES

The aim of the evaluation is to gather sufficient information to establish the extent, condition, character and date of any archaeological remains that may be adversely affected by the proposed drainage works. The information gained will allow for an informed decision to be made regarding the planning application, and the need for any archaeological mitigation during the proposed works.

1.3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

An archaeological desk-based assessment of the area was undertaken in 2007 (FAS 2007), which identified activity of prehistoric to modern date within the surrounding area. Finds of prehistoric date are represented by flint artefacts, with palaeoenvironmental evidence provided by peat deposits within the valley of the River Ancholme. Finds of Mesolithic to Neolithic date were concentrated primarily to the south of South Ferriby, suggesting that activity would have been focussed on higher, drier ground. This trench continues into the Iron Age; hoards of coins have been found near South Ferriby, with ceramic and metalwork, and nine Iron Age inhumation burials have been encountered in South Ferriby, suggesting settlement of this date in the area.

Retreating sea levels during the Roman period would have made more of the area suitable for agriculture, and evidence indicates widespread settlement and land divisions from the 1st century AD onwards. Evidence for settlement, in the form of structures and finds have been found to the northeast of South Ferriby and to the south of Ferriby Sluice. The remainder of the area appears to have been given over to agriculture, with widespread field systems visible as cropmarks.

During the early medieval period, the archaeological evidence is again focussed around South Ferriby, in the form of *grubenhauser* of 5th- to 6th-century date. Much of the area would have been unsuitable for agriculture during this period, however, and programmes of fieldwalking have not recorded remains of this date on the low-lying ground.

Villages continued to develop through the medieval period, and ridge and furrow has been identified in the wider area. To the west of the proposed drainage works, cropmarks reveal a previous course of the river leading into the estuary (Plate 1); in 1983 a medieval bridge was excavated *c.*350m to the southwest. This is believed to have been the general location of a medieval haven.

Subsequent post-medieval activity in the area is characterised by the implementation of major drainage programmes, which saw the construction of the New River Ancholme, with associated drains and sluices. The settlements of Horkstow and South Ferriby saw continued development, with the construction of country houses and farm buildings during the 17th and 18th century. Industrial activity is represented by extensive brickworks, which developed alongside the New River in the 19th century, involving quarrying of clay from the immediate area.

The drainage of the area continued throughout the modern period; the landscape is now dominated by the still-extant cement factory.

1.3.1 Deposit model

The PD has been informed by a borehole transect undertaken as Stage 1 of the current evaluation (FAS 2009). In addition deposit models deriving from a borehole transect undertaken some 350m to the south of the proposed works by the Humber Wetlands Project, and two boreholes carried out at the site as part of the site investigation for the proposed works have been used.

Stage 1 borehole transect results

The Stage 1 borehole transect consisted of 9 boreholes excavated along a 150m east-west alignment. A consistent sequence was encountered, comprising a basal peat at 7.8 to 6.6m below ground level (4.26m -OD and 3.24m-OD). This deposit would appear to correspond with the lower peat deposits encountered during the Humber Wetlands Project, although occurring approximately 1.0m deeper in this area.

Overlying the peat horizon, a deep, homogenous deposit of grey estuarine clay was encountered. To the east, this deposit

was observed to maximum depths of 6.30m, with the upper interface between 1.70m and 2.10m AOD. In three boreholes, the clay was interrupted at *c.*0m OD by a thin lens of sterile, very dark grey silt.

To the west of the survey area, a more complex sequence was encountered in Borehole 8, situated centrally within an earthwork channel thought to represent a relict course of the River Ancholme. A sequence of laminating silt deposits was encountered, becoming more reminiscent of the peat deposits at depth.

A firm, plastic brown clay was encountered across the whole of the area, measuring between 1.30m and 1.60m in depth, apart from a shallower area within the earthwork channel to the west of the site. This deposit was overlain directly by an homogenous, dark brown friable sandy clay topsoil, measuring an average 0.20m, reaching 0.35m in depth to the west of the site.

Humber Wetlands Transect

The Humber Wetlands transect spanned a width of 2.69km, covering the maximum extent of alluviation within the Ancholme valley (Neumann 1998, 91). A lower layer of woody peat was identified at -2.5m to -3.5m OD, resting on a sandy loam; this became progressively shallower towards the eastern edge of the transect (*ie.* closer to South Ferriby), where the lower peat occurred at 2m AOD. The woody peat gave way to reed peat with a transitional layer of peaty clay, before giving way to a grey clay deposit which measured between 2.5m and 3.0m thick, containing well-preserved rootlets. Within the central area of the channel (west of the proposed drainage works), deeper deposits were encountered, with a black peat encountered at -5.9m OD (8.5m below ground level).

The grey clay was succeeded by a second phase of peat development, encountered at 1 to 2m AOD. This formed an almost horizontal level across the floodplain. This peat had been overlain by another grey clay, merging to pink/beige clay *c.*1m below ground level. In some areas, the depth of alluvium was reduced to only 2.1m, overlying gravelly sand, belying the presence of a gravel ridge rising to at least 1.7m AOD.

The deposits encountered within this transect provided valuable palynological evidence, and material suitable for radiocarbon-dating, which returned dates between 5060-4780 cal BC and 900-790 cal BC. The inferred history from the results suggested channel aggradation followed by floodplain aggradation, first by organic (basal peat) and then by minerogenic (grey estuarine clay) deposits. The onset of peat development becomes younger towards the edges of the valley (4000-900 cal BC); the infill of the main channel was complete by the mid-Holocene, followed by the formation of mire across the valley floor from 3800 BC onwards, reaching a maximum extent at the Bronze Age/Iron Age transition (1000-790 cal BC)(Neumann 1998, 96). The central part of the valley saw the deposition of marine clay at 700-800 cal BC. Marine regression in the Roman period resulted in the formation of the upper peat deposits; this was short-lived and the deposition of marine clays continued within the Roman period.

Site investigation boreholes

Two boreholes were sunk at the site as part of the current works (Langdale Smith & Co. 2008), to depths of over 20m. One borehole was situated to the north of the flood defences, the second on the landward side of the defences, close to the proposed pumping station location. The boreholes encountered a fibrous peat deposit was encountered at 7.8m to 8.1m below ground level (-4m OD), sealed by 6.8m of sandy clay (estuarine), before a 1m layer of silty clay.

2.0 METHODOLOGY

2.1 EXCAVATION METHODOLOGY

A single evaluation trench will be excavated, on an approximate north-south alignment and measuring 20m x 2m (Figure

2). The trench will be excavated to a maximum depth of 1.2m. Three 1.2m x 1.2m sondages will be excavated to 2.2m to test deposits at greater depth; these will be machine-excavated, photographically recorded and backfilled on the same day. For health and safety reasons, staff will not enter trenches greater than 1.2m in depth; samples and finds will be recovered using the mechanical excavator where appropriate.

The evaluation trench will be excavated using a 360 degree mechanical excavator fitted with a wide toothless ditching bucket. In all instances, mechanical excavation will be undertaken under strict archaeological supervision. Excavation will be undertaken in a controlled and stratigraphic manner.

If human burials are encountered, the remains will be recorded and where possible left *in situ*. The provisions of Section 25 of the Burial Act (1857) will be complied with.

2.1.1 Recording Methodology

A site grid rectified to the Ordnance Survey Grid and Ordnance Survey Datum has been established. Survey stations have been set out around the site using a total station theodolite to facilitate archaeological recording.

A full written, drawn and photographic record will be made of all material recovered during the course of the evaluation. Archaeological deposits, features and structures will be recorded using a standard system of context and other record forms. A series of indexes, capable of interrogation, will be maintained for all site records. A stratigraphic site matrix will be compiled during the course of the evaluation. The planning of features will be at scales of 1:10 or 1:20; sections will be recorded at a scale of 1:10. The photographic record will consist of 35mm colour and monochrome photography. Monochrome photography will be undertaken using silver-based film to ensure archival stability.

2.1.2 Environmental Strategy

The principal aim of the environmental strategy is to assess the value, range, quality and potential of palaeoenvironmental remains within the sediments encountered. A series of environmental samples were retrieved during the borehole survey, and have been submitted for assessment. Should any deposits with further potential be encountered, a suitable sampling strategy will be implemented.

The sampling strategy will be implemented in accordance with *Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post-excavation* (English Heritage, Centre for Archaeology Guidelines 2002) and *Environmental Archaeology and Archaeological Evaluations: Recommendations concerning the environmental archaeology component of archaeological evaluations in England* (Association of Environmental Archaeology 1995).

2.1.3 Finds Recovery and Treatment

All finds will be hand-collected during the excavation. On completion of the investigation, finds will be cleaned, marked and catalogued, before being submitted for specialist assessment.

Finds treatment will be undertaken in accordance with guidelines set down in *First Aid for Finds* (Watkinson and Neal 1998). Archive preparation will be undertaken in accordance with *Guidelines for the preparation of excavation archives for long-term storage* (Walker 1990).

All wet-preserved artefacts will be treated in accordance with *First Aid for Finds* (Watkinson and Neal 1998), *Guidelines for the care of waterlogged archaeological leather* (1995) or *Waterlogged wood, guidelines on the recording, sampling, conservation and curation of structural wood* (1990).

The terms of the Treasure Act 1996 will be followed with regard to any finds which might fall within its purview. Any such finds will be removed to a safe place and reported to the local coroner as required by the procedures as laid down in the 'Code of Practice'. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the finds from theft.

2.1.4 Scientific dating

Where encountered and where appropriate, samples will be recovered from primary deposits for scientific dating.

2.2 REPORTING PROCEDURE

2.2.1 Interim reporting

An Interim Report was prepared for Stage 1 of the fieldwork, and has been used to inform the current Project Design.

On completion of the Stage 2 fieldwork, summary results will be provided to North Lincolnshire Council, including location plan, written description of the archaeological sequence encountered, and summary of any finds or samples recovered. This will include a preliminary impact assessment of the proposed drainage works on the archaeological resource, and should allow a strategy relating to any necessary mitigation work to be agreed promptly.

2.2.2 Final report

Upon completion of Stage 2, all finds, samples and stratigraphic information will be assessed for their potential for further analysis. A full Evaluation Report will be prepared and will include the archaeological background, fieldwork procedure, the results of the evaluation, the results of the specialist assessment, interpretation and phasing, illustrations (photographs, plans and sections) and assessment, conclusions and recommendations. All figures will be reproduced at an appropriate scale, and will be accurately geo-referenced with the appropriate National Grid vertices labelled.

2.3 ARCHIVE

2.3.1 Archive preparation

On completion of the field investigation all records and material will be indexed, ordered, quantified and checked for consistency. Context, finds, sample and other paper-based records will be transferred to an integrated computer based system. The drawn record will be digitised in an appropriate format that will permit the output of standard AutoCAD type DXF files.

The archival record will include all material relating to the site and its evaluation being written, drawn and computerised records. As part of the preparation for the post-excavation programme, the artefactual, ecofactual and samples will be quantified and described.

The digital archive will be provided in a non-magnetic storage medium using generic file formats including PDF.

Preliminary conservation and stabilisation of objects will be undertaken prior to an assessment of long-term conservation and storage needs.

2.3.2 Archive deposition

A paper and electronic (PDF) version of the final evaluation report will be submitted to the North Lincolnshire Sites and Monuments Record (NLSMR). The NLSMR is licensed to use the report for reference purposes, on the understanding that the licence does not cover commercial use of the material by NLSMR or any third party. FAS and JBA Consulting (on behalf of the Ancholme Internal Drainage Board) retain the right to be identified as the originators of the project.

An electronic (PDF) version of the report will be submitted to Dr Andy Hammon, English Heritage Regional Science Advisor.

The paper, physical and digital archive relating to the evaluation will be deposited with the North Lincolnshire Museum, with two further copies of the report.

3.0 PUBLICATION AND DISSEMINATION

A note will be prepared on the results of the evaluation for publication in a local journal as appropriate. If the results of the work merit it, a full paper will be proposed for publication in a relevant journal.

An *Online Access to Index of Archaeological Investigations* (OASIS) form will be submitted for the project.

4.0 PERSONNEL

4.1 KEY PROJECT STAFF

Project Manager	Nicola Toop BA MA PhD MifA
Fieldwork Director	Cecily Spall BSc MA MifA
Project Assistant	Richard Jackson BA

4.2 PROJECT SPECIALISTS

Allan Hall and Harry Kenward (Environmental Consultants)
Krish Seetah (Zooarchaeology)
Jane Young and Ian Rowlandson (Pottery)
Karen Barker (Conservation)
Cecily Spall (Small Finds)
Katie Tucker (Human Remains)
Hugh Willmott (Glass)

5.0 MONITORING ARRANGEMENTS

The work will be monitored by North Lincolnshire Council, who will be notified prior to each stage of work.

6.0 HEALTH & SAFETY

FAS will operate with due regard for Health and Safety regulations, and will ensure that all relevant requirements are met with regard both to site personnel and to members of the public. A Risk Assessment will be prepared, in accordance with the Health and Safety at Work Regulations prior to the start of the site investigation.

7.0 INSURANCE

FAS carry appropriate levels of Public Liability, Employers Liability and Professional Indemnity insurances.

8.0 PROPOSED TIMETABLE

The proposed timetable for the evaluation works is as follows:

Date	Task
8th - 19th June	Stage 2 Fieldwork
22nd - 26th June	Submission of Stage 2 interim report
End July	Submission of full Evaluation Report

References

- FAS. 2007. 'Archaeological desk-based assessment: Fulseas Outfall South Ferriby North Lincolnshire' (unpublished report FAS2007 362 SFF314)
- FAS. 2009. 'Archaeological evaluation: Fulseas Pumping Station: Interim Report'
- Langdale Smith & Co. 2008. 'Ground investigation for the proposed new pumping station at Fulseas Drain, South Ferriby'
- Neumann, H. 1998. 'The palaeoenvironmental survey of the Ancholme Valley in Van de Noort, R. and Ellis, S. (eds.) 1998. *Wetland Heritage of the Ancholme and Lower Trent Valleys* (Kingston upon Hull)

APPENDIX C SUMMARY OF CONTEXTS

Context	Borehole	Description	Munsell	Sample
1000	All	Dark brown friable sandy clay topsoil	7.5YR3/2	
1001	1	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1002	1	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	✓
1003	2	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1004	2	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1005	2	Very dark brown waterlogged peat deposit, twigs and wood fragments	7.5YR2.5/2	1 litre
1006	3	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1007	3	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1008	3	Black alluvial silt with frequent organic remains	Gley 1 2.5/N	
1009	3	Dark grey alluvial silt with occasional preserved organic strands	2.5Y4/1	
1010	4	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1011	4	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1012	5	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1013	5	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1014	5	Dark grey alluvial silt, rich in plant remains. Stiffer than overlying clay	2.5Y4/1	✓
1015	6	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1016	6	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1017	6	Very dark grey compact silt with dense organic preservation	2.5Y3/1	
1018	6	Very dark greyish-brown silty clay, with black organic strands, and frequent lenses of compact wet silt	2.5Y3/2	
1019	7	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1020	7	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1021	7	Very dark grey compact silt with dense organic preservation	2.5Y3/1	
1022	7	Very dark greyish-brown silty clay, with black organic strands, and frequent lenses of compact wet silt	2.5Y3/2	
1023	7	Dark olive brown clay silt, rich in organic matter, similar to C1005, C1014	2.5Y3/3	✓
1024	8	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1025	8	Dark greyish-brown clay silt, with black organic material and occasional shell fragments	10YR4/1	✓
1026	8	Very dark grey silt, laminating	2.5Y3/1	✓
1027	8	Greyish-brown silt, similar to overlying C1026, lighter in colour	10YR5/2	✓
1028	8	Very dark grey silt, laminating, similar to C1026	2.5Y3/1	
1029	8	Dark greyish-brown silty clay, laminating but with frequent organic remains throughout. Similar to C1014 and C1023	2.5Y4/2	✓

Context	Borehole	Description	Munsell	Sample
1030	9	Brown plastic clay, mottled with blue veins	7.5YR4/4	
1031	9	Dark grey sticky clay, with streaks of possible organic material, becoming wetter towards its base. Rootlets preserved lower down	10YR4/1	
1032	9	Dark greyish-brown silty clay, laminating but with frequent organic remains throughout. Similar to C1014 and C1023	2.5Y4/2	

APPENDIX D ASSESSMENT OF PLANT AND INVERTEBRATE REMAINS

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1.0 MATERIAL AND METHODS

Seven samples of natural Holocene estuarine/fluviatile sediments from boreholes in the area of the proposed Fulseas Pumping Station at South Ferriby were submitted to the authors by Field Archaeology Specialists for assessment of their content of plant and invertebrate macrofossils.

The material examined is listed in Table 1, together with a brief sediment description made in the laboratory (some of the colours noted in the field will have changed through oxidation after exhumation). Subsamples were disaggregated in the laboratory using the methods of Kenward *et al.* (1980) but with the use of repeated treatments with dilute sodium pyrophosphate solution in each case to assist disaggregation of the rather intractable clays and silts.

2.0 RESULTS

Notes on the plant and invertebrate remains observed in the samples are given in Table 1.

It is clear that only one of the deposits sampled (peaty clay C1025) yielded interpretatively useful assemblages of both plant and invertebrate remains. For the rest, the organic content was very low (clays C1002, C1026, C1027) or there was a large organic content with very few identifiable remains other than vegetative plant fragments ('peats' C1014, C1023 and C1029). Of the last three, two (C1014, C1029) seem to have consisted primarily of roots and rhizomes and are therefore presumably layers into which reedswamp plants growing above were rooted, while C1023 was also rich in (fine) roots.

C1025, apparently from the fill of a palaeochannel, gave an assemblage of plants and invertebrates which, not surprisingly pointed to aquatic deposition, consistent with formation in such a channel close to the confluence with the Humber, and with evidence for meadows, perhaps grazed by livestock, nearby.

3.0 COMPARISON WITH EARLIER STUDIES

The present boreholes extend across land previously studied in a borehole survey by Neumann (1998), sited a little further inland from the present one and stretching much further to the west (and a little also to the east). The Neumann boreholes relevant to the present study are probably those in the lower half of her Figure 6.10 (p. 93) running from the fourth from the left to the fifth from the right. These boreholes revealed a wood peat at a depth of about -2m to +1 mOD which was not – lithologically, at least – matched in the sequence at the present site. A higher peaty (reedswamp) deposit at about 1.5-2mOD therefore seems to be the stratigraphic equivalent to C1014, C1023 and C1029.

There seems to be no direct equivalent to the deposit recorded here as C1025 in the Neumann sequence, but this may be explained through the position of the older transect somewhat further inland where, by this point in the depositional sequence, there was no great depth of water in the channel in which this deposit evidently formed, the channel by this time having largely infilled.

4.0 MATERIAL FOR DATING

Very little of the organic material recovered is suitable for dating. Most of the larger plant remains are from subterranean organs and therefore would not necessarily date directly the layer from which they were obtained. The few woody remains all appeared to be roots too. It would require a lot of effort to extract fruits and seeds of *terrestrial* plants from C1025 for

dating by Accelerator Mass Spectrometry – and a much larger sample than that examined so far would be needed.

5.0 REQUIREMENT FOR FURTHER WORK

There is probably no case for pursuing further analysis of the plant remains either through the samples in hand or through further fieldwork. Work on the insect remains from C1025 is not a priority unless a considerably larger subsample is available and dating is reasonably close; in that case, it would be possible to work towards a reconstruction of local terrestrial habitats, and in particular to confirm the apparent implication of the beetles that the deposit reflects grazing land.

References

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Table 1

Context/ sample	Subsample size (kg)/(l)	Laboratory sediment description	Notes of material recorded
1002	1.72/1.0	dark grey sticky to plastic clay silt	There was a very small residue of barely 50 cm ³ of herbaceous detritus with some scraps of insect cuticle; single propagules of the salt-marsh plants, sea arrow-grass, <i>Triglochin maritima</i> L. and annual seablight, <i>Suaeda maritima</i> (L.) Dumort.; traces of two terrestrial mosses, <i>Hylocomium brevirostre</i> (Brid.) Br. Eur. and <i>Sphagnum</i> Section <i>Acutifolia</i> , and a single oak (<i>Quercus</i>) bud-scale, all likely to have been inwashed; some somewhat damaged snail shells perhaps of the salt-marsh taxon <i>Hydrobia</i> .
1014	0.92/0.5	dark grey plastic and slightly sticky, somewhat humic silt clay with some plant detritus	The rather large residue of about 450 cm ³ consisted of plant detritus in all fractions, much of it comprising fine rootlets; a very low concentration of seeds with single specimens of orache (<i>Atriplex</i>), bulrush (<i>Scirpus lacustris sensu lato</i>), sea milkwort (<i>Glaux maritima</i> L.), and blackberry/raspberry (<i>Rubus</i> sp.) representing a range of terrestrial and aquatic (freshwater and brackish) habitats; the rush seeds, which were rather more frequent, included <i>Juncus inflexus</i> L./ <i>effusus</i> L./ <i>conglomeratus</i> L. from wet meadows and <i>J. cf. gerardi</i> , which – if it is this species – represents upper salt-marsh communities.
1023	1.11/0.75	crumbly, working plastic, light grey-brown to mid grey peaty silty clay, the plant detritus apparently in lenses	This subsample yielded a large residue of nearly 800 cm ³ (when disaggregated) of plant detritus, much of it <2mm and much of that comprising fine rootlet fragments; there were very few identifiable plant remains (single specimens of Chenopodiaceae and <i>Scirpus</i> sp. with traces of <i>Juncus</i> cf. <i>gerardi</i>) and only scraps of insect cuticle.
1025	0.93/0.6	mid olive grey-brown to grey, slightly crumbly, working plastic, silty clay to clay silt, with patches of peaty detritus and red iron-rich ?root channels	The modest-sized residue of about 150 cm ³ was mainly plant detritus, though still with a little undisaggregated silt/clay even after four pyrophosphate treatments. Obvious in the coarsest fraction were some large caddis larval-cases with crusts including ostracods and some fruit/seeds. Ostracods were abundant more generally, too, as noted during examination of the flot from paraffin flotation (see below). A modest range of identifiable plant remains was present, including

Context/ sample	Subsample size (kg)/(l)	Laboratory sediment description	Notes of material recorded
			<p>some fruits of pondweeds, <i>Potamogeton</i>, some of which were identified as curled pondweed <i>P. crispus</i> L., and nutlets of the salt-tolerant sea club-rush, <i>Scirpus maritimus</i> L. and there were some vegetative remains which may have been from <i>Potamogeton crispus</i> (a species of freshwater bodies of various kinds where the nutrient status is moderate to high). Together with these indicators of fresh to brackish-water habitats there was a modest range of terrestrial plants including dandelion (<i>Taraxacum</i>), cats-ear (<i>Leontodon</i>), and thistle (<i>Carduus/Cirsium</i>), perhaps from salt-marsh or river-bank meadows. A few non-marine snails and bivalve shells, mainly broken, were also noted.</p> <p>The residue was subjected to paraffin flotation to recover insect and other invertebrate remains and the flot, of modest size, was rich in fragments of invertebrates. Preservation was rather good, with little to suggest that any remains had been lost to decay. Adult beetles and bugs were present in quite small numbers, but formed two principal recognisable ecological components. The first was the aquatics, which together with many hundreds of fragments of insect immatures (including chironomid midge and caddis fly larvae and a case embedded with ostracods), perhaps over a thousand ostracods, and considerable numbers of <i>Daphnia</i> ephippia, clearly indicate formation in a body of still or slowly-moving water. The most abundant aquatics among the beetles and bugs were a small <i>Helophorus</i> sp. and unidentified corixids (water boatmen), and there were single individuals of an <i>Ochthebius</i>, <i>Hydrobius fuscipes</i> (Linnaeus), and a few others. There were no insects associated with aquatic and emergent vegetation, waterside mud or litter, although the possibility that this is a result of the smallish assemblage size rather than the absence of these habitats in the surroundings cannot be ruled out.</p> <p>The second component was a range of terrestrial species which seems to indicate herbaceous vegetation, together with some dung beetles. The plant feeders included three <i>Apion</i> species and a <i>Sitona</i>. Many <i>Apion</i> are found on vetches and their relatives, although some others have different hosts, while the <i>Sitona</i> was certainly one associated with plants of the pea family, Fabaceae (Leguminosae). The dung beetles were species which occur commonly, and often in abundance, in grazing land – <i>A. contaminatus</i> (Herbst), <i>A. ?ater</i> (Degeer) and <i>A. prodromus</i> (Brahm) or <i>sphacelatus</i> (Panzer). Together they suggest the dung of larger herbivores. Two larger ground beetles were present: <i>Pterostichus melanarius</i> (Illiger) and <i>Nebria brevicollis</i> (Fabricius). Both are fairly often found in natural habitats, but a rather characteristic of areas disturbed by people. The only possible tree-associate was a prothorax of what appeared to be a scolytid (bark beetle), but it was very pale and could not be identified within the constraints of assessment.</p> <p>The insects do not include any obvious indicators of salinity, but the ostracods represent a potential resource for the investigation of water</p>

Context/ sample	Subsample size (kg)/(l)	Laboratory sediment description	Notes of material recorded
			quality including haline influences.
1026	1.76/1.0	very dark bluish-grey to black clay silt to silty clay	There was a residue of a few cm ³ of slightly fibrous fine plant detritus, all the material somewhat stained black with iron sulphide; as far as invertebrates are concerned, there were no more than scraps of beetle. The only identifiable specimen was a leaf of the moss <i>Sphagnum</i> Section <i>Acutifolia</i> .
1027	1.74/1.0	slightly crumbly working plastic medium grey-brown silty clay to clay silt	The tiny residue of a few cm ³ comprised slightly fibrous fine plant detritus with scraps of beetle, and a few damaged non-marine molluscs. The only identifiable plant remains were a single <i>Triglochin maritima</i> fruit, a fragment of moss, not identified with certainty, and leaves of <i>Sphagnum</i> , at least one of which was the raised-bog forming species <i>S. imbricatum</i> Hornsch. ex Russ., perhaps washed in from peatlands upstream of the site. Mites and foraminiferans were also noted.
1029	1.24/1.0	dark grey peaty silty clay (internally more or less olive grey-brown) with ? <i>Phragmites</i> rhizome	There were still large clasts of unwashed sediment after three treatments with pyrophosphate, so a 'washover' of lighter organic material was made from that portion of the subsample which had disaggregated (perhaps about half by volume). This indicated that overall there would be a large residue of monocotyledonous rhizome (presumably mostly reed, <i>Phragmites</i> , but certainly not all of it this plant). There were rather frequent seeds of rushes, <i>Juncus</i> of which most seemed to be <i>Juncus inflexus/effusus/conglomeratus</i> but also with some <i>J. cf. gerardi</i> . There a few well-preserved but fragmentary insect remains and it was not thought worthwhile to subject the sample to paraffin flotation.



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