CROWLE DRAINAGE IMPROVEMENTS, ISLE OF AXHOLME NORTH LINCOLNSHIRE

ARCHAEOLOGICAL MONITORING AND RECORDING

Planning Ref.:	N/A
NGR:	SE 81327 12719 – SE 85085 15336
PCAS Site code:	CDSM 14
PCAS Job No:	1188
NLM Site code:	CWDI

Report prepared for

Lindsey Marsh Drainage Board

by

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Summary

Pre-Construct Archaeological Services Ltd. (PCAS) was commissioned by the Lindsey Marsh Drainage Board to undertake a programme of archaeological monitoring and recording during the 14km groundworks associated with improvements to the drainage system around Crowle in the Isle of Axholme, North Lincolnshire (NGR: SE 81327 12719 – SE 85085 15336).

The drains involved in the scheme were situated in a low lying are in the Isle of Axholme, from the River Trent across the Isle and partially surrounding Crowle, branching southwards towards Keadby. The affected drains were Pauper's Drain, Old River Drain and Wrays Drain. All of these were originally constructed in the early to mid 19th century to increase the quality of the land. The Drainage Improvement Scheme involved clearing vegetation from the sides of the drains, and excavating to increase depths and widths.

During this extensive programme of monitoring and recording, one undated linear feature was identified. No finds predating the modern era were observed, and no significant timbers or other objects were identified during this work.

Fig. 1: Site location map. Monitored works highlighted yellow. Scale 1:50 000.

1 Introduction

Pre-Construct Archaeological Services Ltd (PCAS) was commissioned by the Lindsey Marsh Drainage Board to undertake a programme of archaeological monitoring and recording during improvement works around, and to the east of, Crowle, in the Isle of Axholme, North Lincolnshire.

The drainage improvement works extended approximately 14km across the Isle of Axholme and were focused on Pauper's Drain, Old River Drain, and a short section of Wrays Drain.

The programme of archaeological work was undertaken in accordance with a Specification for a Scheme of Archaeological Monitoring and Recording (PCAS 2014) approved by the Planning Archaeologist for North Lincolnshire Council.

2 Site Location and Description (Figures 1 and 2, Plate 1)

Pauper's Drain stretches from Pauper's Pumping Station (NGR SE 85085 15336) on the west bank of the River Trent north of Amcotts towards Crowle, where it meets Old River Drain (SE 76836 14159), which extends along the west side of Crowle.

Wrays Drain extends from Old River Drain (SE 76721 12690) to Windsor Lane on the southwest side of Crowle.

The drains affected by the improvement works cross five civil parishes; Crowle, Eastoft, Luddington and Haldenby, Keadby with Althorpe, and Amcotts.

Crowle is the largest settlement within the immediate area of the improvement scheme. It is a small town and parish, lying approximately 12km west of Scunthorpe. The town lies a little over 6km west of the River Trent, and 9km south of the River Ouse.

3 Geology and Topography

Bedrock geology for the entire route of the scheme is recorded as Mercia Mudstone Group; commonly red mudstone and subordinate siltstone with halite (rock salt) occurring in natural hollows.

The drift geology is more complicated. At the east end of the route this is recorded as WARP – artificially induced alluvium. Multiple layers of alluvium deposited where the river was encouraged to flood the surrounding agricultural land, improving the quality of the soils, common in the post-medieval and modern periods. This geology encompasses the majority of Pauper's Drain, and all of Sewer Drain.

Almost directly south of Eastoft, the drift geology changes to natural alluvium, commonly silty clay with layers of silt, sand, peat and gravel. This alluvium was deposited during successive phases of natural flood events. The natural alluvium extends around the north and west sides of Crowle, encompassing the west end of Pauper's Drain and most of Old River Drain. The short stretch of Wrays Drain included in this scheme lies in an area where the drift geology is recorded as Sutton Sand Formation, a fine grained silty sand, also known as windblown sand (http://mapapps2.bgs.ac.uk/geoindex/home.html).

A narrow finger of peat extends from a basin of peat between Crowle and Sandtoft towards Crowle, but the drains affected by the current scheme do not extend to this recorded deposit.

The Isle of Axholme is formed by a series of low-lying mounds, around which runs an extensive network of natural streams and rivers. The flat, low-lying area was frequently flooded in the past, and layers of peat are commonly found below deposits of warping as a result.

The entirety of the route lies below 10m OD. The majority of the area is agricultural land, with multiple bisecting drains. Crowle itself lies on the western edge of a natural sand bank, which peaks at a little over 20m OD. Pauper's Drain cuts across this bank, where sand was clearly visible in the drain even before vegetation stripping.

4 Planning Background

Potentially, the proposed works may have impacted on a number of heritage assets identified by an archaeological Desk-based Assessment (PCAS 2013) which indicated activity in the Roman, medieval and post-medieval periods, evidenced by cropmarks and finds spots. Additionally, the local prehistoric peat deposits would potentially contain important ecofactual resources relating to past environmental change and land-use.

5 Archaeological and Historical Background

A full assessment of the archaeological potential of the area affected has been completed previously (PCAS 2013) and is summarised here.

The majority of the Isle of Axholme was either under water or marshland for the majority of the prehistoric period. A small number of worked flints of this period have been found sporadically within the surrounding parishes, including a possible flint knapping site on the sand dune east of Crowle. Evidence from the area suggests that occupation here was transitory or perhaps seasonal (PCAS 2013).

The formation of peat was actively occurring during this period and evidence of this has been obtained from borehole records and archaeological investigations. Recent monitoring of groundworks for nearby Keadby Wind Farm recovered fossilised wood from the peat (Headland Archaeology Ltd 2013), indicating the necessary preservation conditions for further bog oaks and potentially other organic artefacts to have survived within the acidic conditions of the peat. The accumulated peat may also have sealed prehistoric occupation layers (*ibid*.).

Roman occupation along the route of the improvement works appears to have been concentrated around Crowle. A settlement grew here on the banks of the River Don, which was navigable by boat until the medieval period. It is suggested that the settlement grew as a trading post; domestic features have been revealed here as well as agricultural enclosures. Further evidence of occupation is anticipated on the summit of the sand dune east of Crowle; aerial photography has revealed cropmarks in this area thought to be Roman, and cropmarks of a trackway with associated enclosure close to Leam Farm are associated with a concentration of Roman pottery recovered during fieldwalking (*ibid*.).

The post-Roman period appears to have been characterised by instability initially the area ultimately formed the northern most boundary of the Saxon kingdom of Mercia after many years of conflict with the rival kingdom of Northumbria. After the late 8th century a succession of Danish invasions plagued the region with its numerous waterways that afforded access to the interior of the region. Danish dominance of the region was ended in the early 11th century when Æthelred 'entering Lindsey, revenged himself severely upon the inhabitants, by burning the country and putting them to death' (Stonehouse 1839:16).

Saxon occupation along the route is represented by two 9th-10th century pits identified in Crowle Market Place. Prior to the conquest the Domesday Book records that in 1086 the lord of the manor was Geoffrey de la Guerche, of Selby St German Abbey. Only a small proportion of the land associated with the manor was ploughland, with 30 acres of meadow a small amount of woodland and 31 fisheries, which indicates the main economies were fishing and pastoral farming (*ibid*.).

The local marshland landscape was not suited to arable farming and only the small islands of higher ground were used for settlement and subsistence arable agriculture. Apart from pastoral farming and fishing, hemp production was common in the Isle of Axholme. By the 14th century, the lower reaches of the River Don had silted up and had become impassable to river traffic trying to trade along the Humber and its tributaries (Van de Noort 2004).

Major improvement works to drain the marshlands began in the 17th century by the Dutch engineer Cornelius Vermuyden. However these early efforts were unpopular with the local communities that relied on the marshland for a livelihood. The project was interrupted by the English Civil War, although land improvement continued after the war and the enclosure of the Isle began in the late 18th century (PCAS 2013). The parish of Crowle was enclosed in 1813, and a separate act for the construction of drains was passed in the same year. The act stated:

"lands in the present state are totally unfit for tillage, but the said lands may be rendered highly productive... if properly drained, embanked and warped. And where it may be necessary that a new sea sluice should be built or made, at or near a place called North Sewer Sluice ... in Amcotts, and that a new cut or rain should be made to communicate with the said River Trent ... shall be continued through Amcotts, across Eastoft Moors into the parish of Crowle ... and that divers other also in Crowle ... and in Luddington, Belton, Althorpe and Aldingfleet" (Warping and Drainage Award 1862. Lindsey Award 164).

The record of the works lists details of not only Pauper's Drain, but also Sewer Drain, Old River Drain and Wrays Drain, concluding that all the drains involved with the current drainage improvement scheme were first constructed in the same development in the 19th century. Since the introduction of the drains to the Isle, arable farming has become the primary land use. Where possible, the land has been repeatedly warped, deliberately allowing the river to flood farmland in order to deposit a rich silt to improve the quality of the arable soils (PCAS 2013).

6 Methodology

The drainage improvement programme was envisaged to take place in two stages:

- A vegetation strip along one side exposed side of the drain. It was anticipated that up to 100m of the drain would be vegetation stripped per day.
- The excavation of a "wedge" from the working side, to increase the width and depth of the drains by 0.50m. This stage followed the route taken during the vegetation strip, and was expected to progress at a rate of 30m – 50m per day.

Correspondingly the archaeological monitoring was initially split into two phases. The vegetation strip was observed from the opposite side of the drain being cut back with a view to identifying any potentially significant archaeological horizons, features, deposits or fossilised timbers. This initial phase of monitoring included the areas of known cropmarks indicating archaeological activity and recorded peat layers with potential archaeological significance.

The above methodology allowed for a second phase of monitoring, targeted on those locations and features identified during the vegetation strip as having archaeological potential. All excavations within the targeted archaeologically significant zones were subject to constant archaeological monitoring, in order to identify, assess and record horizons/features. All timbers identified during this scheme were assessed for their suitability for dendrochronological dating. Spoil and upcast peat material from the excavations was also monitored in order to recover artefacts.

Work commenced on 25th February 2014 and was completed on 30th July 2014, with monitoring taking place on nineteen separate occasions, principally by Rachel Savage and occasionally by Simon Savage.

7 Results (Figures 3 and 4, Plates 2-9)

The monitoring scheme identified no specific heritage assets during the drainage improvement works, excluding the ubiquitous ancient peat deposits which are common to the Isle of Axholme.

The scheme recorded only two possible archaeological features. One of these [020] was an undated ditch, aligned approximately north to south and slightly oblique in section, located as ditch D7 on Figure 2. Based on the diffuse horizon and mottled nature of its fill, the other feature [029] resembled little more than tree rooting, and is located as ditch D8 on Figure 2.

The scheme generated a small archive consisting of mostly photographs and GPS located points. A total of 104 GPS points were logged. A total of 153 photographs were taken recording:

58 images of general landscapes and site workings

53 images of specific layers or deposits

12 images of preserved wood

26 images of identified features (mostly considered to be from the industrial/modern period)

4 images of individual objects (recording two modern objects).

A total of 34 context numbers were issued, recording two cut features and 30 layers/deposits. Apart from the two recorded cut features, no other site drawings were produced.

Photographed features included an additional six other cut features, which were not issued with context numbers and not otherwise recorded. The remains of seven brick built structures and one concrete footing were also photographed.

No finds predating the modern era were observed, and no timbers suitable for dendrochronology were identified during this work. A single environmental sample was taken from a peat deposit, which was analysed and shown to contain humified vegetative material and a prevalence of pine remains.

8 Discussion and Conclusion

The possibility that the drainage improvement works would have some impact on archaeologically sensitive areas was real, and had been identified prior to the monitoring programme. However, such an impact was not evidenced, as any archaeology that may once have been present had already been disturbed by initial drain construction.

Some brick remains of industrial age and modern bridges were identified, along with a small number of modern cut features. On the basis of the colour and firmness of their inner parts, the timbers found in the peat appeared to be the roots of trees which were located above the peat layer; therefore not contemporary with the peat.

Effectively, nothing of archaeological significance was encountered during the work.

9 Effectiveness of Methodology

The adopted methodology was appropriate in order to identify, assess and record the horizons and features exposed.

10 Acknowledgements

Pre-Construct Archaeological Services Ltd. would like to thank the Lindsey Marsh Drainage Board for this commission.

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1863 Plan of the Warping and Drainage Act. Lincolnshire Archive ref: Lindsey Award 164

12 Site Archive

The documentary and physical archive for this scheme is currently in the possession of Pre-Construct Archaeological Services Ltd. This will be deposited at North Lincolnshire Museum (Scunthorpe) within six months of completion of this report under the archive accession reference CWDI.

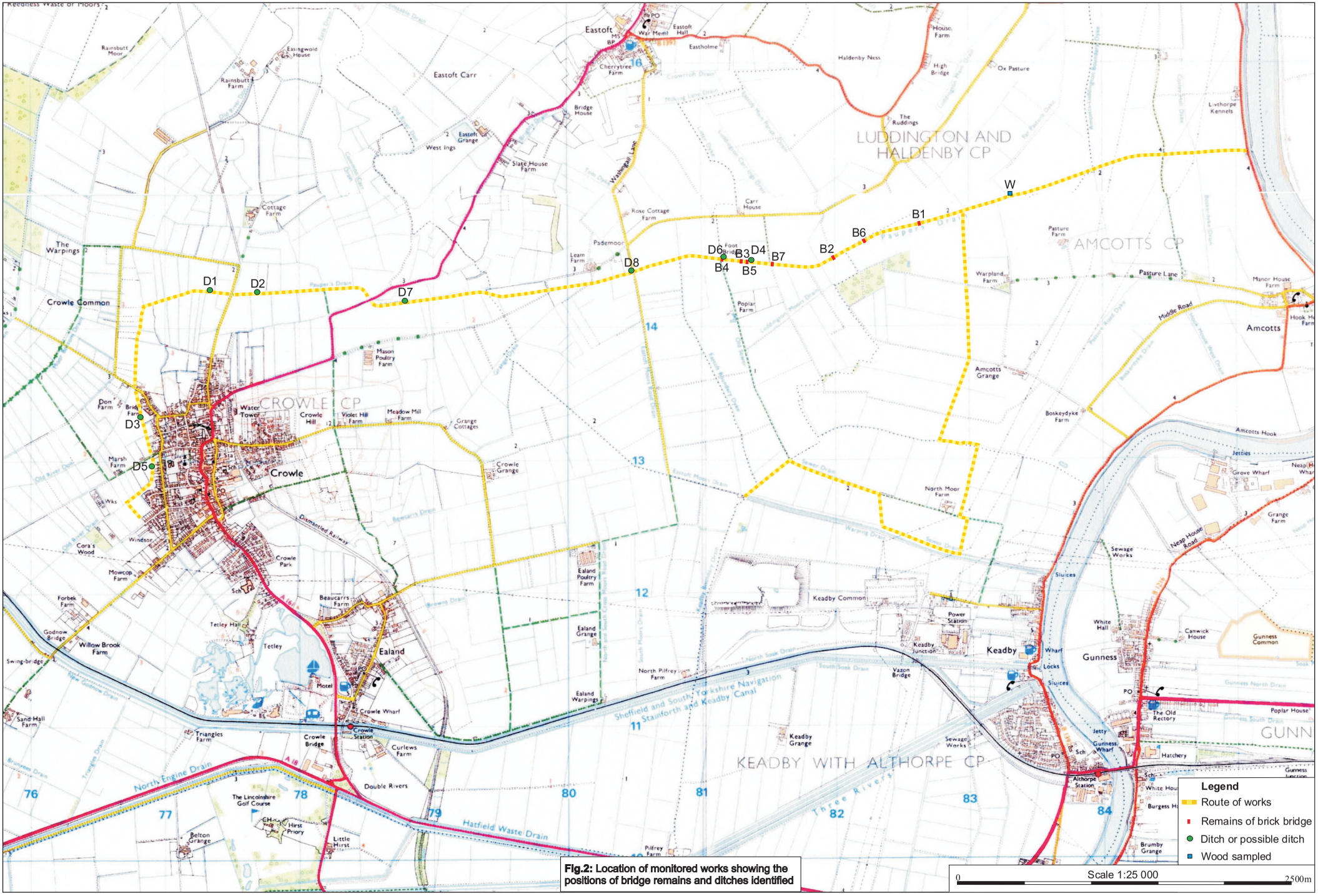

Fig.2: Location of monitored works showing the positions of bridge remains and ditches identified

Colour Plates

Plate 1: The drain being widened. This view was from a footbridge, but the monitoring took place from the opposite bank

Plate 2: Ditch [020] looking north. The ditch appears to have been cut at an oblique angle

Plate 3: Feature [029] as seen from the south. The diffuse horizon to the natural (028) suggests this is the result of tree rooting

Plate 4: General view of the peat band looking south-east

Plate 5: The remains of bridge B1 looking south. This may have been on the same line as a previous pathway

Plate 6: The remains of Bridge B2 can be seen next to the present structure

Plate 7: The remains of Bridge B6 can be seen in the side of the drain bank. There is no further indication of any previous path or field boundary along its line

Plate 8: The remains of Bridge B7 can made out, but the current road follows the course of an earlier trackway

Plate 9: Bridge B3 is one example of three along the route where the remains are very patchy

Appendix 2: Context descriptions

Context	Type	Description	Finds/Dating
001	Layer	Mid brown-grey clayey fine sand. 0.75m thick.	
002	Layer	Black-brown silty peat with reed fragments and occasional pine cones. 2.5m thick.	
003	Layer	Light brown silt. 3.5m thick.	
004	Layer	Light yellow-grey losse sand.	
005	Natural	Light grey/ blueish grey siltstone/mudstone with lenses of red-brown clay.	
006	Layer	Mid brown-grey fine sandy silt. 0.5m thick.	
007	Layer	Dark brown silt loam. 0.5m thick.	
008	Layer	Mid brown with yellow-brown laminated bands of clayey fine sand. 0.8m thick.	
009	Layer	Mid yellow and grey-yellow fine sand.	
010	Layer	Dark brown-grey silty clay. 0.7m thick.	
011	Layer	Mid red-brown with laminated bands of light yellow-grey, grey and brown-yellow silt.	
012	Layer	Light grey fine sand.	
013	Layer	Mid yellow with lenses of grey and light grey sand.	
014	Layer	Mid brown silty fine sand. 0.4m thick.	
015	Layer	Mid brown silty fine sand. 0.6m thick.	
016	Layer	Dark grey-brown with lenses of light grey sand. 1.6m thick.	
017	Natural	Light grey/ blueish grey siltstone/mudstone with lenses of red-brown clay.	
018	Layer	Mid brown with lenses of light grey sand. 2.5m thick.	
019	Layer	Mid grey-brown clay. 1.3m thick.	
020	Cut	Ditch? With variable angled sides and a concave base. 1.7m wide x 1m deep.	
021	Fill	Fill of [020]. Light brown-grey fine silt. 1.7m wide x 1m deep.	
022	Layer	Black-brown with lenses of brown silt and small wood fragments. 1.5m thick.	
023	Layer	Dark brown-grey clayey fine sand. 0.45m thick.	
024	Layer	Mottled mid brown – orange-brown sand. 0.4m thick.	
025	Layer	Dark grey clayey silt. 0.25m thick.	
026	Layer	Dark grey-brown fine sandy silt with occasional stone fragments and pebbles.	
027	Layer	Mottled mid brown-grey and orange-brown clayey fine sand. 0.5m thick.	
028	Layer	Graduated colours varying from light grey to mid yellow-brown fine sand.	
029	Cut	Probable tree rooting with steep sides and a concave base. 0.92m wide x 0.64m deep.	
030	Fill	Fill of [029]. Mottled light, mid and dark grey silty fine sand. 0.92m wide x 0.64m deep.	
031	Layer	Dark grey clayey silt. 0.1m thick.	
032	Layer	Mid grey-brown silty fine sand. 0.45m thick.	
033	Layer	Dark brown sandy loam. 0.4m thick.	
034	Layer	Brownish black with laminated bands of black organic material and brown clay.	

Appendix 3: Location of Identified Features.

Brick structures

Feature No.	Location
B1	82614 – 14768 Ground level 1.79m OD
B2	81975 – 14515 Ground level 1.76m OD
B3	81281 – 14488 Ground level 1.29m OD
B4	81145 – 14502 Ground level 1.34m OD
B5	81325 – 14483 Ground level 1.38m OD
B6	82203 – 14634 Ground level 1.51m OD
B7	81517 – 14463 Ground level 1.12m OD

Cut features

Feature No.	Location
D1	77275 – 14283 Ground level 1.87m OD
D2	77682 – 14263 Ground level 1.77m OD
D3	78762 – 13589 Ground level 1.83m OD
D4	81364 – 14479 Ground level 1.34m OD
D5	76899 – 12883 Ground level 2.11m OD
D6	81155 – 14502 Ground level 1.31m OD
D7	78763 – 14176 Ground level 3.49m OD
D8	80462 – 14406 Ground level 2.09m OD

Wood sampled

Feature No.	Location
W	83638 – 12092 Ground level 2.28m OD

ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
Pre-Construct Archaeological Services Ltd

Crowle Drainage Improvement Scheme
Isle of Axholme
Lincolnshire

palaeoenvironmental assessment

report 3608
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Durham University

Contents

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1. Summary

The project

1.1 This report presents the results of palaeoenvironmental assessment of a bulk sample taken during archaeological works in association with the Crowle Drainage Improvement Scheme, Isle of Axholme, Lincolnshire.

1.2 The works were commissioned by Pre-Construct Archaeological Services Ltd (PCAS), and conducted by Archaeological Services Durham University.

Results

1.3 The peat layer comprised humified vegetative material, heather twigs, beetles, freshwater snails and a small assemblage of waterlogged seeds. Remains of pine (wood, charcoal, cones and seeds) were common, with fruitstones of yew and bramble present in lower numbers. The peat probably accumulated under fen woodland conditions, but the dating of its formation is unclear.

Recommendations

1.4 Palaeoenvironmental studies undertaken as part of the Humber Wetlands Project have highlighted the importance of the area as a rich wetland heritage resource (Lillie & Neumann 1998). Radiocarbon dating of the pine charcoal is recommended in order to establish the origin of the peat layer and dating of the anthropogenic activity. No further analysis is recommended for the palaeoenvironmental remains from this bulk sample. Although this peat deposit may contain pollen which could provide information about the vegetation history and land use of the area, this would only be appropriate if a continuous radiocarbon-dated sequence from a core or monolith section was available. If additional work is undertaken at the site, the results of this assessment should be added to any further palaeoenvironmental data produced.

2. Project background

Location and background

2.1 Archaeological works were conducted by PCAS in association with the Crowle Drainage Improvement Scheme, Isle of Axholme, Lincolnshire. This report presents the results of palaeoenvironmental assessment of a bulk sample of undated peat.

Objective

2.2 The objective of the scheme of works was to assess the palaeoenvironmental potential of the sample, establish the presence of suitable radiocarbon dating material, and provide the client with appropriate recommendations.

Dates

2.3 The sample was received by Archaeological Services on 3rd November 2014. Assessment and report preparation was conducted between 7th November and 8th December 2014.

Personnel

2.4 Assessment and report preparation was conducted by Dr Charlotte O'Brien. Sample processing was by Lorne Elliott.

Archive

2.5 The site code is **CDSM14**. The flots are currently held in the Environmental Laboratory at Archaeological Services Durham University awaiting collection. The charcoal and uncharred seeds will be retained at Archaeological Services Durham University.

3. Methods

3.1 The bulk sample was manually floated and sieved through a 500μm mesh. The residue was examined for shells, fruitstones, nutshells, charcoal, small bones, pottery, flint, glass and industrial residues, and was scanned using a magnet for ferrous fragments. The flot was examined at up to x60 magnification for charred and waterlogged botanical remains using a Leica MZ7.5 stereomicroscope. Identification of these was undertaken by comparison with modern reference material held in the Environmental Laboratory at Archaeological Services Durham University. Habitat classifications follow Preston *et al.* (2002). Plant nomenclature follows Stace (1997).

3.2 Selected charcoal fragments were identified, in order to provide material suitable for radiocarbon dating. The transverse, radial and tangential sections were examined at up to x600 magnification using a Leica DMLM microscope. Identifications were assisted by the descriptions of Schweingruber (1990) and Hather (2000), and modern reference material held in the Environmental Laboratory at Archaeological Services Durham University. Freshwater snails were identified using the descriptions of Macan (1977).

3.3 The works were undertaken in accordance with the palaeoenvironmental research aims and objectives outlined in the regional archaeological research framework and resource agendas (Monckton 2006).

4. Results

4.1 The bulk sample comprised humified vegetative material, beetle remains, common reed leaves, heather twigs and a small assemblage of freshwater snails including *Bithynia tentaculata* (Müller) and the bivalve *Pisidium* sp. A small quantity of wood and charcoal was present, with all identified fragments of these being pine. Pine cones, bracts and seeds were the most frequently recorded plant macrofossils in the sample. Other tree/shrub remains were yew and bramble fruitstones. Heather flowers, prickly sow-thistle achenes, lesser spearwort achenes and grass caryopses were present in low numbers.

4.2 The sample comprises material suitable for radiocarbon dating. The results are presented in Appendix 1.

5. Discussion

5.1 The fibrous peat accumulated in marshy conditions with evidence for stands of pine and yew growing locally. The humified nature of the deposit may reflect dry climatic conditions as it accumulated, or that the deposit was subject to frequent episodes of drying out as a result of local hydrological conditions. Although yew is today mainly found on well-drained calcareous soils (Preston *et al.* 2002), pollen and plant macrofossil records show that it was formerly a common component of fen woods (Godwin 1975). In early prehistory, Scots pine was native throughout the British Isles, but underwent a large-scale decline in the mid-Holocene to the point where it was almost extinct from most areas except Scotland. Pine was re-introduced in many areas in the historic period.

5.2 The pine charcoal in the sample may reflect human activity in the form of woodland clearance of the area. Radiocarbon analysis would be necessary in order to provide close dating for this activity as the palaeoenvironmental remains cannot provide a chronology.

6. Recommendations

6.1 Palaeoenvironmental studies undertaken as part of the Humber Wetlands Project have highlighted the importance of the area as a rich wetland heritage resource (Lillie & Neumann 1998). Radiocarbon dating of the pine charcoal is recommended in order to establish the origin of the peat layer and dating of the anthropogenic activity. No further analysis is recommended for the palaeoenvironmental remains from this bulk sample. Although this peat deposit may contain pollen which could provide information about the vegetation history and land use of the area, this would only be appropriate if a continuous radiocarbon-dated sequence from a core or monolith section was available. If additional work is undertaken at the site, the results of this assessment should be added to any further palaeoenvironmental data produced.

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Appendix 1: Data from palaeoenvironmental assessment

Sample		**1**
Context		**2**
Feature		**Layer**
Material available for radiocarbon dating		✓
Volume processed (l)		15
Volume of flot (ml)		7600
Flot matrix		
Beetle		++
Charcoal		++
Heather twigs (uncharred)		++
Humified vegetative material (uncharred)		++++
Shell (freshwater)		+
Wood		+
Waterlogged remains (abundance)		
(h) *Calluna vulgaris* (Heather)	flower	2
(r) *Sonchus asper* (Prickly Sow-thistle)	achene	2
(t) *Pinus sylvestris* (Scots Pine)	cone / bract	3
(t) *Pinus sylvestris* (Scots Pine)	seed	2
(t) *Rubus fruticosus* agg. (Bramble)	fruitstone	1
(t) *Taxus baccata* (Yew)	fruitstone	1
(w) *Phragmites australis* (Common reed)	leaf / culm node	2
(w) *Ranunculus flammula* (Lesser Spearwort)	achene	3
(x) Poaceae undiff. >1mm (Grass family)	caryopsis	1
Identified charcoal (✓presence)		
Pinus sp (Pines)		✓

[h-heathland; r-ruderal; t-tree/shrub; w-wet/damp ground; x-wide niche.
(+): trace; +: rare; ++: occasional; +++: common; ++++: abundant
Waterlogged remains are scored from 1-5 where 1: 1-2; 2: 3-10; 3: 11-40; 4: 41-200; 5: >200]

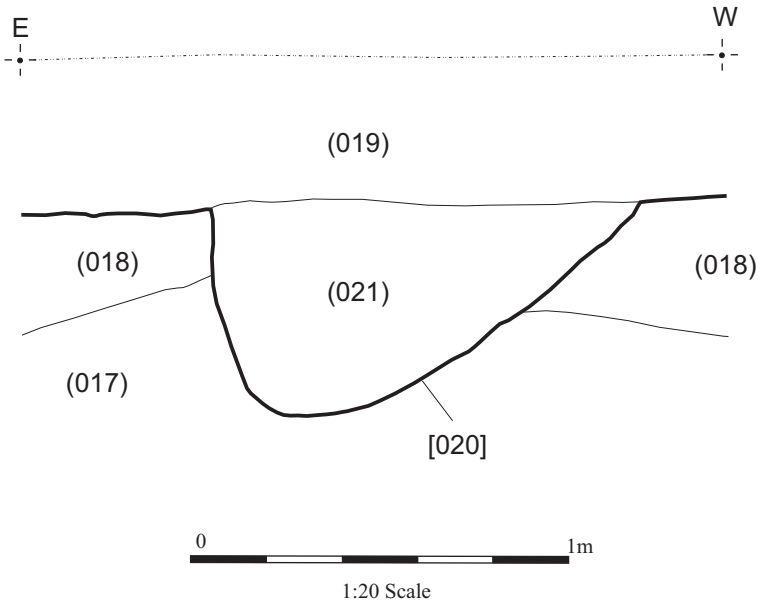

Fig. 3: N facing section of Ditch [020] - D7

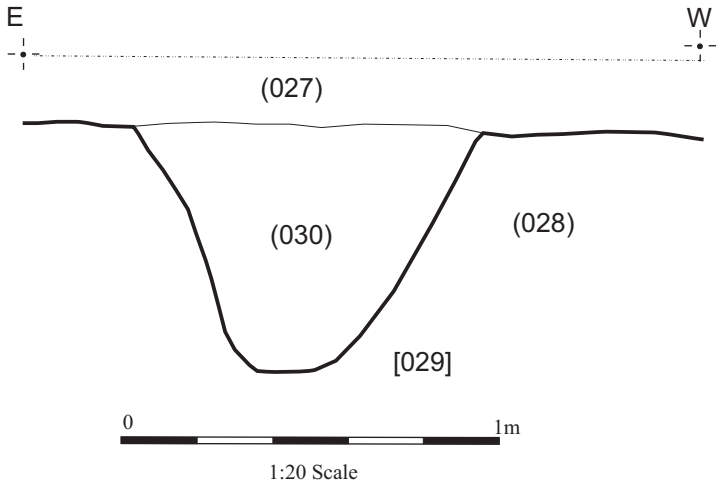

Fig. 4: N facing section of Feature [029] - D8