National Grid

River Eden Pipeline Diversion

Archaeological Mitigation Fieldwork

MARCH 2015

RSK

RSK GENERAL NOTES

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Date:	23rd March 2015		

CONTENTS

Figures List

Appendix 2

Summary

National Grid is replacing a short section of gas transmission pipeline crossing beneath River Eden, west of Low Crosby, Cumbria (National Grid Reference 343715, 559301).

This document describes the results of archaeological mitigation fieldwork, comprising a strip, map and sample excavation of defined working areas of archaeological sensitivity, in a field to the north of the River Eden, carried out between 29th September – 26th October 2014.

In total, 30% of the agreed areas of archaeological sensitivity were investigated.

A number of linear features interpreted as former field boundaries were identified which pre-date the earliest mapping viewed (1868). The field boundaries are likely to be post-Roman in date, although one is potentially prehistoric. Interpretations are based on orientation, as no dating evidence was recovered from the features.

Cobbles were identified in the vicinity of a former water course. The precise origin and function of these is unknown, but it was possibly another field boundary or a trackway assisting access through waterlogged/wet areas of the former (post-Roman) field system.

The archaeological mitigation method employed has been successful in preserving the encountered remains by record.

No further archaeological works are required in relation to the current scheme.

1 INTRODUCTION

1.1 Preamble

National Grid is replacing a short section of gas transmission pipeline crossing beneath River Eden (**Figure 1**), west of Low Crosby, Cumbria. The development included the establishment of a working area in a field to the north of the River Eden, centred on National Grid Reference 343715, 559301.

Previous desk-based assessment identified the projection of a potential Roman Road within the working area (see **Figure 26**). A subsequent programme of evaluation by archaeological trial trenching identified no Roman road, but did identify archaeological remains on a plateau of higher-ground to the north of the site.

Through agreement with the archaeological advisor to Cumbria County Council (CCC), a programme of archaeological mitigation comprising 'strip, map, and sample' excavation across two defined areas of 'archaeological sensitivity' (**Figure 2**) was defined, concentrated on the previously identified archaeological remains. The methodology was defined in a written scheme of investigation (WSI) (RSK, September 2014).

This document describes the results of the fieldwork, carried out between 29th September – 26th October 2014, and has been prepared by RSK Environment Ltd (RSK) on behalf of National Grid Gas Plc ("National Grid").

1.2 Project description

The 550m pipeline diversion will run between NGR co-ordinates 343727, 559341 and 343926, 558901 (**Figure 1**). The pipeline, the subject of the mitigation works, begins on the north bank of the river, with a Horizontal Directional Drill (HDD) made under the River Eden to a compound on the south side. The replacement pipeline will be pulled through from the south side and from each end of the HDD a short section of pipeline will be constructed using an open cut technique to a tie-in pit located above the existing pipeline.

1.3 Standards

RSK is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA). RSK's work is undertaken to the highest professional standards: this document has been prepared with reference to CIfA's *Standard and Guidance for Archaeological Excavation* (2014) and *Code of Conduct* (2014).

RSK operate a quality management system, which enables it to qualify for ISO 9001.

National Grid's commitments for all UK projects are set out in their Stakeholder, Community and Amenity Policy. These require National Grid to do what it reasonably can when formulating relevant proposals, to mitigate the potential environmental effects of its operations.

1.4 Monitoring

Method statements in the WSI (RSK, September 2014) were approved by CCC in advance of works.

In accordance with the WSI notification of the start of site works was made to CCC by RSK to arrange opportunities to visit the works. CCC were suitably informed of progress throughout the fieldwork.

CCC visited the fieldworks on 7th October 2014.

1.5 Acknowledgements

Fieldwork was carried out by Gerry Martin (Gerry Martin Associates (GMA)). Biological assessment was carried out by John Carrott (Palaeoecology Research Services Ltd). This report was prepared by Owen Raybould (RSK). Technical review was by Laurence Hayes (RSK). Cubby Construction provided plant.

RSK would like to thank Mark Whittaker (National Grid) for Project Management, and Conrad Rees (National Grid) for site supervision.

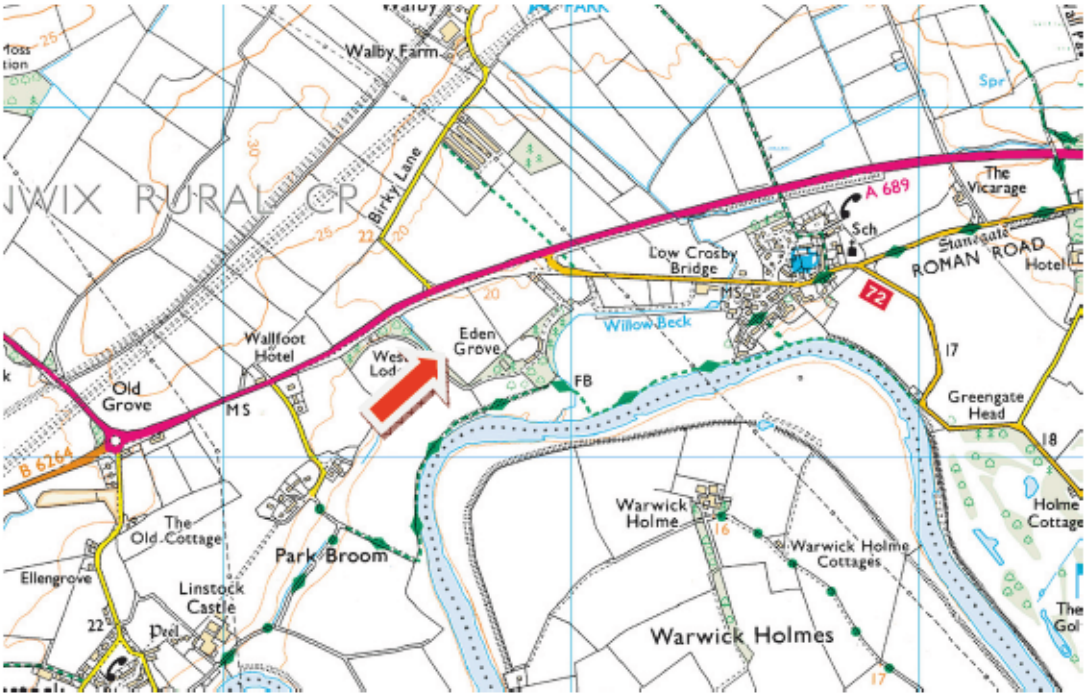

Figure 1. Site location (red arrow). Note proximity to Stanegate Roman road (east) and Hadrian's Wall (north). River Eden to south.
OS data reproduced under licence number 100014807.

Legend :

- Proposed Temporary Working Area
- Area Not Used
- Archaeological Feature [20]
- Trench location
- Existing 900NB Carlisle to Samlesbury HP Pipeline
- Proposed Diversion
- 2 Trench Number

Rev	Date	Description	Drn	Chk	App
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River Eden

RSK

Title :

Figure 2:
Excavation Results

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2 SITE BACKGROUND

2.1 Site description

The general topography of the site is 'shelf-like'; the northern portion of the site adjacent to the current road (A689) overlooks the southern portion of the site, adjacent to the River Eden, with a relatively steep drop between the levels around halfway across the field. This is considered to be a naturally-formed river terrace.

The site lies at between 18.7m AOD (north of site) and 16.0m AOD (south of site). Current land use is pasture.

2.2 Geology

The British Geological Survey website (http://www.bgs.ac.uk/) records the solid geology at the site as a combination of the Kirklinton Sandstone Formation and the St Bees Sandstone Formation, as detailed below:

- The Kirklinton Sandstone Formation forms part of the Sherwood Sandstone Group, has a thickness of up to 90 metres and comprises fine to medium grained red, locally white, strongly cross-bedded sandstone with abundant 'millet-seed' sand grains; and
- The St Bees Sandstone Formation forms part of the Sherwood Sandstone Group and has a recorded thickness of between 340 and 627 metres. It is described as red-brown, very fine to medium grained, commonly micaceous sandstones, generally cross bedded with some parallel lamination.

Drift geology at the site consists of fluvial alluvium deposits, which are normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel.

A recent stage of geotechnical site investigations confirmed the drift stratigraphy as light brown silty sand overlaying light brown grey gravelly sand (Jacobs a, b, 2014).

3 ARCHAEOLOGICAL BACKGROUND

An Environmental Report (RSK, March 2014) identified the archaeological potential of the site, which was predominantly based on the projected line of a Roman road shown on First Edition (1868) 1:10,560 Ordnance Survey mapping potentially passing through the site (see **Figure 26**).

A subsequent archaeological evaluation by trial-trenching (RSK, July 2014) disproved the presence of a Roman road, but defined two particular areas of archaeological sensitivity: one located adjacent to a palaeochannel (0.27ha); and one on top of a natural terrace alongside the modern road (0.59ha) (**Figure 2**).

Previous activity was identified in the form of field boundaries and possible associated features, but their age and origin were not defined and further mitigation fieldwork was thus required. The remainder of the site was demonstrated to be archaeologically sterile, probably due to its location on a flood-plain and therefore unsuitable for permanent settlement or activity (*Ibid.*). The extent of archaeological remains identified during the evaluation are outlined below.

3.1 Remains recorded during preceding field evaluation

Archaeological remains identified on the higher-ground to the north of the site during the previous stage of trial trenching comprised undated simple non-intersecting negative features (see **Figure 2**). There was no evidence in the form or fill of the recorded cut features to suggest a specific historic land-use. No artefactual material was recovered and there were no remains to indicate waste disposal into the features or deliberate back-filling. Overall, these features appear to have infilled naturally.

A linear feature was recorded in Trench 11. The feature was interpreted as a former field boundary; although it does not correspond with any former field boundaries shown on historic mapping. Given the feature's alignment respecting that of Hadrian's Wall, it is as assumed to have been of post-Roman date.

Shallow gully features in Trenches 2 and 11 were interpreted as likely animal burrows.

A pit was recorded in Trench 10 was interpreted as a site of possible sand extraction.

Trench 7, excavated through a meandering linear hollow, exposed the full profile of a deep silted palaeochannel, a tributary of the River Eden. There were no remains to indicate waste disposal into the feature or deliberate back-filling and the palaeochannel appears to have infilled naturally, perhaps from the post-medieval period onwards.

The evaluation report concluded with options for archaeological mitigation comprising preservation in situ, or advance 'strip, map, and record', and thereby 'preservation by record' of any further archaeological remains within the working area.

4 METHODOLOGY

4.1 Scope

In consultation with the Historic Environment Officer, archaeological advisor to Cumbria County Council (CCC), in July 2014 it was agreed that two areas should be subject to archaeological strip, map, and sample excavation in order to mitigate the potential direct impacts to the archaeological resource arising from the construction stage of the project.

The extent of the two areas of archaeological sensitivity, measuring 0.59ha and 0.27ha respectively, is shown on **Figure 2**.

A contingency option was agreed with CCC whereby the methodology was reviewed once 25% of the agreed area(s) (at the archaeologists' discretion) had been topsoil stripped.

4.1.1 Definition

The aim of the mitigation was to preserve by record archaeological remains that may be altered, damaged or destroyed by construction works.

Archaeological strip, map and sample excavation aims to remove overburden (both topsoil and subsoil) to the intended archaeological/natural horizon in areas identified for topsoil stripping in the construction programme, under the direction of a suitably qualified archaeologist.

The reason for strip, map and sample is to allow the monitoring archaeologist an unobscured view of previously undisturbed horizons which may reveal archaeological features, sites, artefacts or structures, and to provide an opportunity for their excavation and recording.

4.2 Objectives

The objectives of the programme of archaeological mitigation were to:

- Identify any archaeological remains, through archaeological monitoring within the two areas of archaeological sensitivity, that could be impacted upon during the course of the construction works;
- Ensure the development and implementation of appropriate mitigation measures for all archaeological remains revealed to be excavated and recorded ('preservation by record'); and
- Prepare an archaeological archive of the site, that is reporting and publication of the assessment and mitigation phase, including the treatment and preservation of any finds, deposition of the archive at an agreed repository or repositories, and the detailed analysis and publication of results to an appropriate level.

4.3 Fieldwork methodology

Fieldwork was assigned the code LC14.

The areas of archaeological sensitivity were physically set out using a Leica Smartnet GPS unit tied to Ordnance Survey National Grid coordinates. The excavation areas were scanned using a Cable Avoidance Tool (CAT) by accredited RSK personnel prior to excavations.

Stripping of overburden was carried out by a 360° excavator equipped with a toothless ditching bucket, and under constant archaeological supervision (GMA). Excavation was directed by the monitoring archaeologists and proceeded in spits to the depth of potential archaeological survival; i.e. all turf, topsoil and subsoil was removed to the first archaeological horizon or underlying naturally deposited geological material, whichever was encountered first.

Where exposed, archaeological remains were excavated and recorded stratigraphically, and all relationships investigated. Sufficient of any archaeological features or deposits were hand excavated in order to characterise their form and, where possible, date, and to recover sediment samples.

Each context was recorded on a *pro-forma* context sheet by descriptive and measured description.

All archaeological deposits were recorded on drawn plans (scale 1:20 or 1:50 as appropriate) and sections (scale 1:10 or 1:20 as appropriate).

The Ordnance Datum height of all principal features and levels was calculated and plans and sections are annotated with Ordnance Datum heights.

A full photographic record (digital SLR) was maintained in order to record each feature, the site, and landscape context, including an appropriate scale measure.

The treatment of artefacts and biological samples was in accordance with the CIfA's *Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials* (CIfA Finds Group 2014).

4.4 Biological remains

Assessment methodology for preserved biological remains is presented in the full assessment report which is included as Appendix 1.

4.5 Reinstatement

The investigation areas were all fully backfilled during and following the works.

5 RESULTS

5.1 Area of investigation

The extent of the archaeologically investigated area is depicted on **Figure 3**.

An initial 25% of the agreed areas of archaeological sensitivity were stripped of overburden. In order to provide a full understanding and exposure, the areas were stripped as a series of large 'trenches' at regular intervals within the agreed mitigation areas. These trenches were numbered in sequence ('Trenches 12 – 19'), following on from the previous evaluation phase.

Following a site inspection monitoring visit by CCC an approximate further 5% of overburden was removed in order to fully define archaeological features that had been partially exposed, and clarify relationships. In eventuality therefore, 30% of the agreed areas of archaeological sensitivity were stripped of overburden.

Only remains of low archaeological significance (described below) or land-drainage features were exposed in each of the Trenches 12 - 19.

It was determined, in agreement with CCC, that the archaeological potential of the area had been fully defined and recorded and any likely impacts fully mitigated, without the need to fully remove the entire remaining 70% of overburden.

Figure 4. General post-excavation site shot showing 30% sample areas. Looking south towards River Eden.

5.2 General findings

5.2.1 Cobbled 'surfaces'

A cobbled area [120] with likely associated drainage ditches [121] and [122] was identified at the eastern limit of the site in Trench 12, within the side of the previously identified palaeochannel. A possible continuation was observed to the west in Trench 14.

Interpretations for the cobbled surface and flanking ditches include a trackway and the remnants of a field boundary. The features are believed to relate to a field boundary depicted on late nineteenth century Ordnance Survey mapping (shown in **Figure 26**).

5.2.2 Negative features

Numerous ditched linear features were exposed running across the investigation areas. All but one are roughly aligned with Hadrian's Wall and interpreted as post-Roman period field boundaries. Parallel ditches [121] and [122] (described above) and also [160] and [161] may each represent a double ditch/hedge bank or a boundary redefinition. Based on its orientation, ditch [200] may be of an earlier or later date.

5.2.3 Existing gas main

Disturbance caused by construction (in 1974) of the existing high-pressure gas main running across the site and intentionally avoided in definition of the areas of archaeological sensitivity was identified in the edge of Trench 12.

The virtual absence of inclusions in the topsoil has led to the theory that, following construction of the gas main, the topsoil of the whole field was subject to post-construction grading.

5.2.4 Land drainage

Frequent land-drainage was observed across the open areas, installed beneath the topsoil within the natural horizon. These were not assigned context numbers, nor were they hand-excavated. Their locations are shown on **Figure 3**.

The frequency of land-drainage is indicative of the high water table, unsuitability of the site for permanent settlement, and likely justification for previous ditched (draining) field boundaries (see above). Wet/waterlogged ground was also indicated through the assessment of environmental samples (Palaeoecology Research Services Ltd).

5.2.5 Artefacts

Other than a modern wooden plank from a 'land-slip' layer (127) sealing trackway ditch [121], no stratified dating evidence was retrieved from any of the archaeological features excavated and recorded.

Two pieces of unstratified worked flint were retrieved from topsoil during the stripping works (see Appendix 2). The first (**Figure 27**) is a waste flake of likely later prehistoric date. The second (**Figure 28**) is a broken biface kite-shaped arrowhead of early Neolithic date.

5.3 Trenches

5.3.1 Trench 12

Topsoil was stripped from the trench area which gently sloped down to the south, exposing, in the most part, sterile bright orange sand with outcrops of pink boulder clay. 0.25m topsoil at the northern end of the trench, and up to 0.50m depth at its southern end (approaching the centre of the palaeochannel [70]). Topsoil was brown silt-sand virtually free of stone inclusions.

The sparse remains of an apparent cobbled linear surface [120] was exposed adjacent to the eastern trench edge, with a flanking ditches to the south [121] and north [122] and contained within the sloped northern side of a silted palaeochannel. Palaeochannel [70] is visible on the ground surface, and was fully investigated during the previous evaluation phase. Results of assessment of environmental samples retrieved from the palaeochannel have suggested that it was extant until the post-medieval period.

The cobbled surface was flat (i.e. no camber) and appeared to be set within a terrace; this could have been naturally eroded through much earlier fluvial action of the palaeochannel.

The 3.90m long north east – south west orientated surface [120] comprised a heavily denuded spread of rounded pebbles and small cobbles up to 10cm diameter within a yellow sandy-clay matrix, measuring 6cm deep and 2.15m in width.

Figure 5. Cobbled surface [120] with flanking ditches [121] to south (left of shot) and [122] to north. Looking west. 2m scales.

The cobbles [120] petered out to the west, and also to the north where they may have been truncated by ditch [122]. Definition of the surface [120] was clear to the south, with

flanking ditch [121]. Orientated north east – south west, ditch [121] measured over 8.6m in length and 1.0m in width. The profile exhibited a steep concave northern side with sharp break of slope at the edge of the surface [120], a less steep southern side, and a rounded base. The ditch measured 0.5m in depth. Like the adjacent surface, the ditch petered out to the west, in the direction of the existing high pressure gas pipe easement.

Ditch [121] was filled with a basal deposit of mid light grey sand (129), 0.10m deep, beneath 0.20m of mixed dark grey silty-sand and compact red-orange coarse grain sand with frequent rounded pebbles and cobbles (125), presumably fallen from [120] above.

During/immediately following the use-life of the surface [120 a layer of clean, pink plastic clay (124), 0.20m deep sealed the cobbles and pebbles.

A ditch [122] on a similar alignment to [120] and [121] was then excavated through (124). This may also have truncated away the northern edge of surface [120]. The ditch itself was subsequently truncated by ploughing and was only 0.10m in depth. It measured at least 28m in length (i.e. the length of Trench 12) and was 1.50m wide at the top with a flat base. Ditch [122] was filled with dark brownish-grey sandy-silt (123).

Due to the location of the sequence on the sloping side of the former water course, the area subsequently became covered with landslip (127) observed in opposing trench sections, a mid-dark grey sandy-silt 0.15m deep.

A wooden plank <19> recovered from landslip (127) was a piece of tropical hardwood (Tyers, Dendrochronological Consultancy Ltd, *Pers. Comm.*) of modern origin and likely originates from construction works for the adjacent 1974 gas pipeline.

Figure 6. Modern plank <19> from (127).

At the western limit of the trench a 0.5m swathe of disturbance from the construction easement of the 1974 existing gas main was observed.

5.3.2 Trench 13

Topsoil was stripped from the generally flat trench area, exposing in the most part sterile orange sand with occasional outcrops of pink boulder clay.

In the north of the trench area two almost parallel linear features were recorded. No relationship existed between the features, which may have crossed beneath the easement of the 1974 gas main. Although they both ran in the direction of Trench 16, it is uncertain whether either of the two linears recorded in Trench 13 are the same as those in Trench 16.

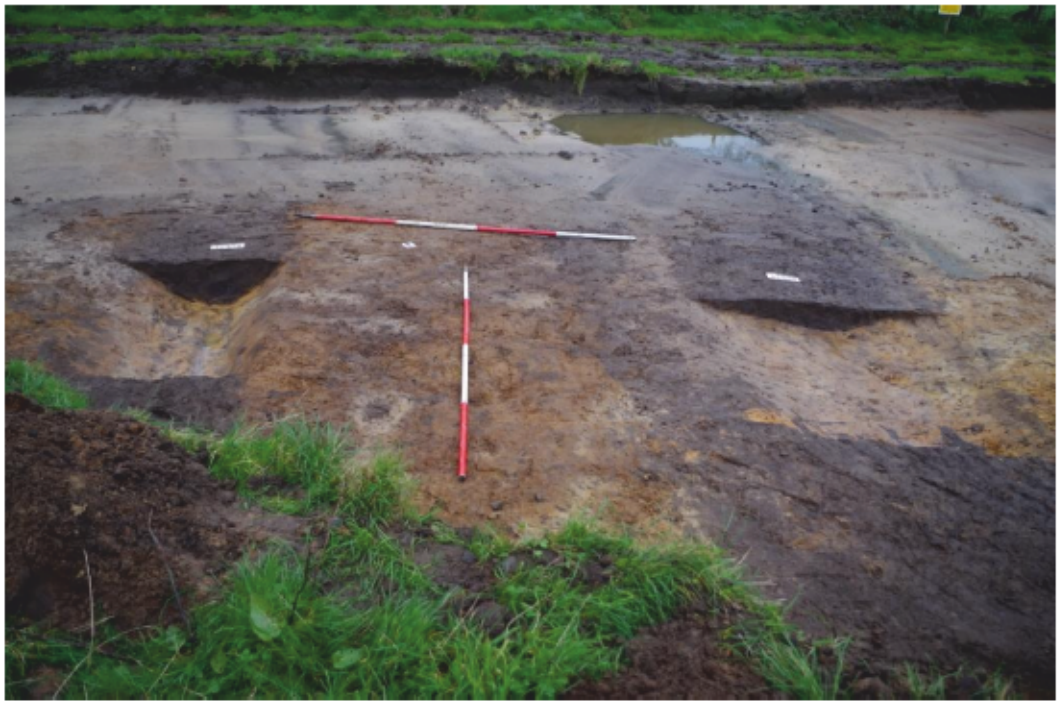

Figure 9. Parallel linear features [130] to north (left of shot) and [131] to south. Looking east. 2m scales.

The northerly and wider of the two [130] was orientated east – west, heavily truncated with virtually no sides and only the shallow concave base surviving, measuring 1.5m in width and 0.16m in depth. It ran across the width of the trench over a distance of 9.0m and was filled by (133), mid grey silt-sand with no inclusions.

The southerly ditch [131] was orientated ENE-WSW with steep sides and sharp breaks of slope at the flat base. It measured 0.94m in width and 0.29m in depth and it also ran across the width of the trench over a distance of 9.0m. This was filled by (132), mid/dark grey silt-sand with no inclusions.

The features are interpreted as former field boundaries, possibly demarcating the alignment for a central hedge.

A modern sheep burial was also removed by machine (location indicated on **Figure 3**).

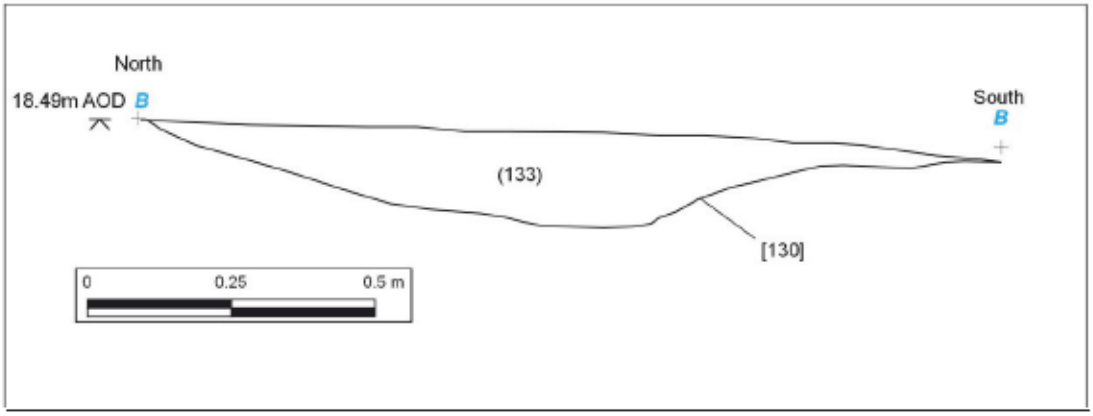

Figure 10. West facing section of ditch [130].
Section location shown on Figure 3.

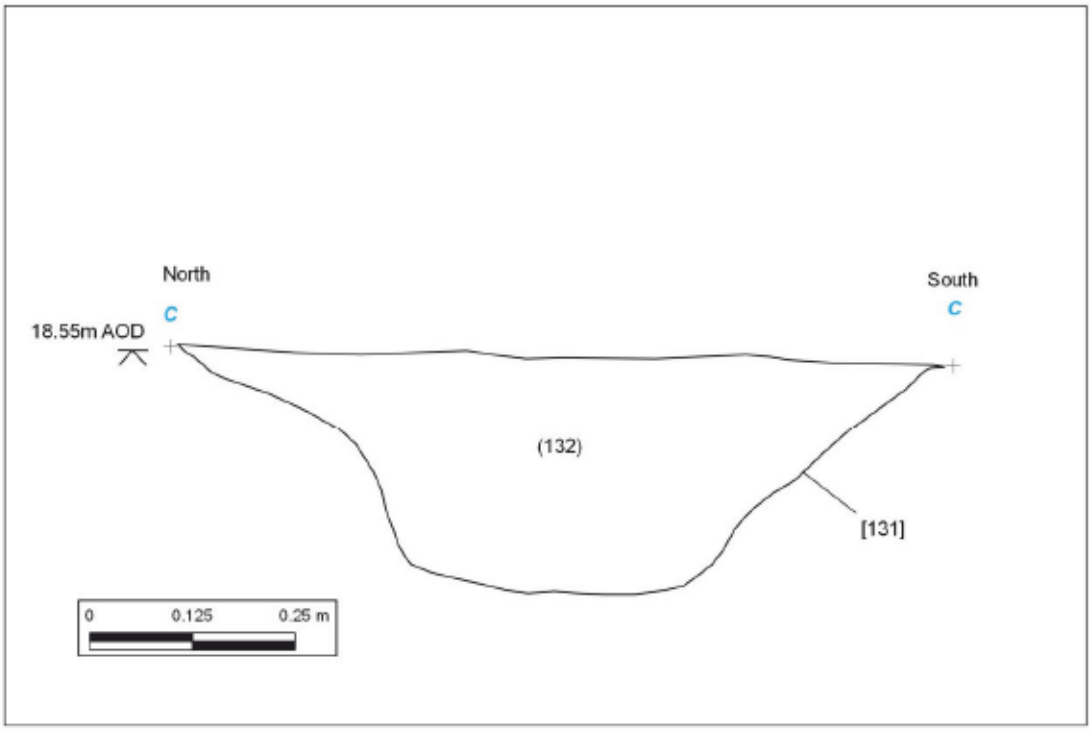

Figure 11. West facing section of ditch [131].
Section location shown on Figure 3.

5.3.3 Trench 14

Brown silt-sand topsoil (0.35m) was stripped from the trench area on the edge of the 'plateau' forming the northern half of the field, thus with ground level falling down towards the west and south, exposing in the most part sterile light yellow sand at its eastern end and yellow clay in its western end.

Figure 12. Pre-excavation shot of possible denuded surface [140] to west (right of shot) flanked by ditch [141] to east. Looking south east. 2m scales.

A possible continuation of the cobbles [120] recorded in Trench 12 was identified in this trench. A similarly denuded pebble surface [140] was exposed, the remains of which ran on a roughly north west – south east alignment, however, the denudation was such that the alignment could not be defined. The 3.0m wide surface of small rounded pebbles within a fine orange sandy clay matrix lay 0.10m deep and ran 6m across the width of the trench. There was no apparent bedding or foundation, comprising only pebbles pressed into the underlying clay.

The interpretation of the surface [140] as a track is suggested by a possible flanking ditch on a similar east – west alignment [141] to its northern edge. The ditch was also truncated, 0.2m deep with a flat/concave base, measuring 0.94m in width and ran over 11m across the width of the trench. Fill (142) was brown sand-silt-clay with accumulated small rounded pebbles at its base.

If [140] was a track it had likely been truncated, or was the result of an ad hoc effort to stabilise boggy ground adjacent to the former water course.

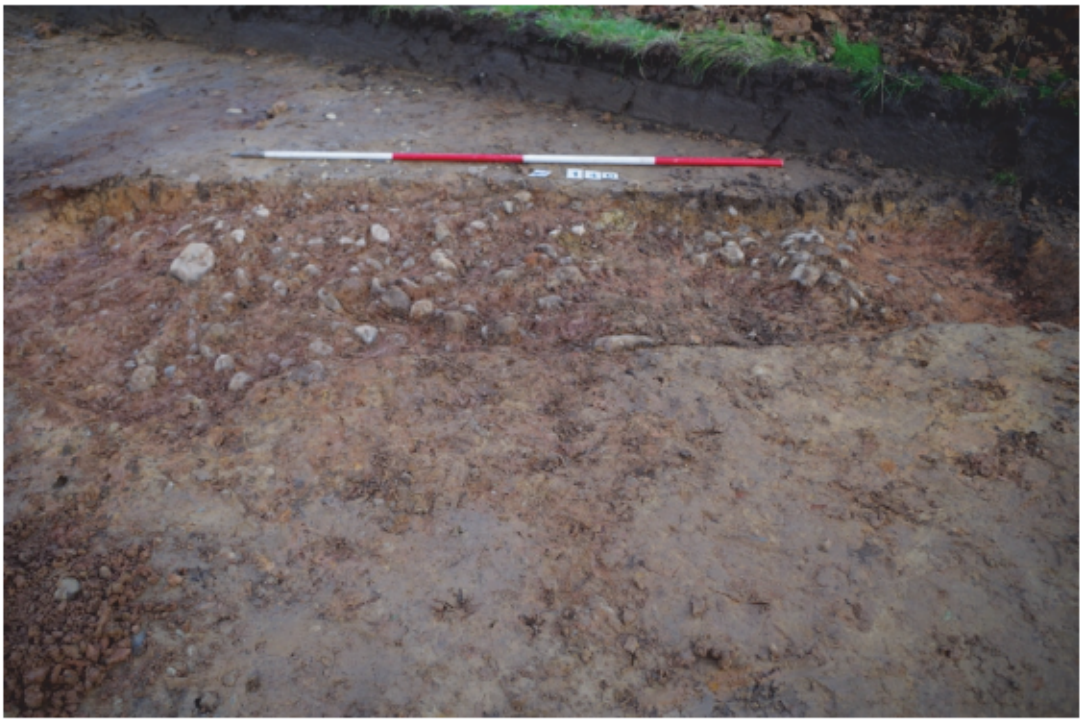

Figure 13. Post-excavation shot of possible denuded surface [140]. Looking south east. 2m scale.

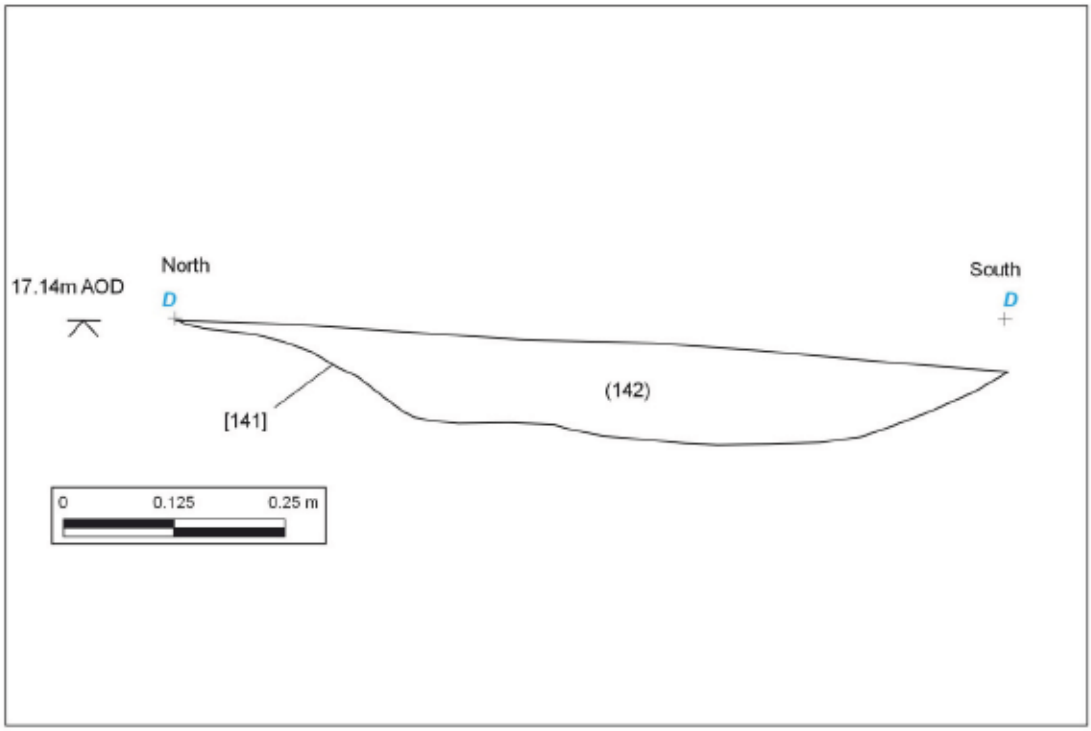

Figure 14. West facing section of ditch [141]. Section location shown on Figure 3.

5.3.4 Trench 15

Stone-fee brown silt-sand topsoil (0.35m) was stripped from the trench area with ground level falling down towards the west, exposing sterile light yellow sand at its eastern end and yellow clay in its western end. Trench 15 was archaeologically sterile.

5.3.5 Trench 16

Stone-free brown silt-sand topsoil (0.30m) was stripped from the generally flat trench area, exposing in the most part sterile orange sand.

As in Trench 13, two parallel linear features were recorded. No relationship existed between the features, which may have crossed beneath the easement of the 1974 gas main to the east. Although they both ran in the direction of Trench 13, it is uncertain whether either of the two features recorded in this trench are the same as those in Trench 13.

Figure 15. Pre-excavation shot of parallel ditches [160] to north (right of shot) & [161] to south. Looking WSW.

The wider northerly ditch [160] was orientated ENE-WSW with a shallow north side and more pronounced south side and flat/concave base. It measured 2.10m in width and 0.42m in depth and ran across the length of the trench over a distance of 31m. This was filled by (167), dark brown silt-sand with no inclusions. The fill was sampled for environmental analysis <30> (see Part 5.4 below).

The southerly ditch [161] was also orientated ENE-WSW with gently sloping sides and concave base measuring 0.75m in width and 0.18m in depth. It ran over a distance of 35m but petered out to the west, a grey stain suggesting its continuation (i.e. no terminal). This was filled by (164), stone-free mid-dark brown/dark grey silt-sand with occasional redeposited yellow clay-sand. The fill was sampled for environmental analysis <29> (see Part 5.4 below).

Figure 16. Post-excavation shot of parallel ditches [160] & [161], with [161] petering out towards the west (foreground). Looking ENE. Scale 2m.

The shallow depth of both the ditches [160] & [161] suggests they have been truncated, probably through ploughing. Between the two ditches a series of tree boles were identified, which may have been coincidental, or suggestive of a double-ditch either side of a hedge/tree line. This is supported by the environmental analysis (Part 5.4).

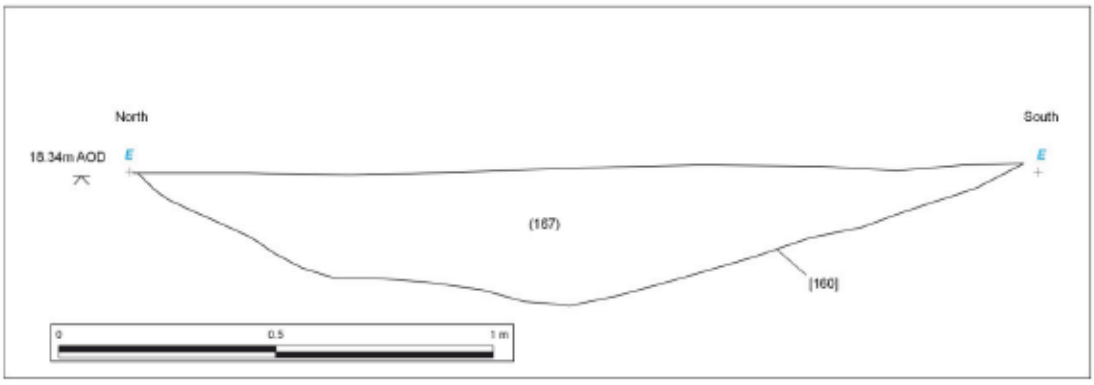

Figure 17. West facing section of ditch [160].
Section location shown on Figure 3.

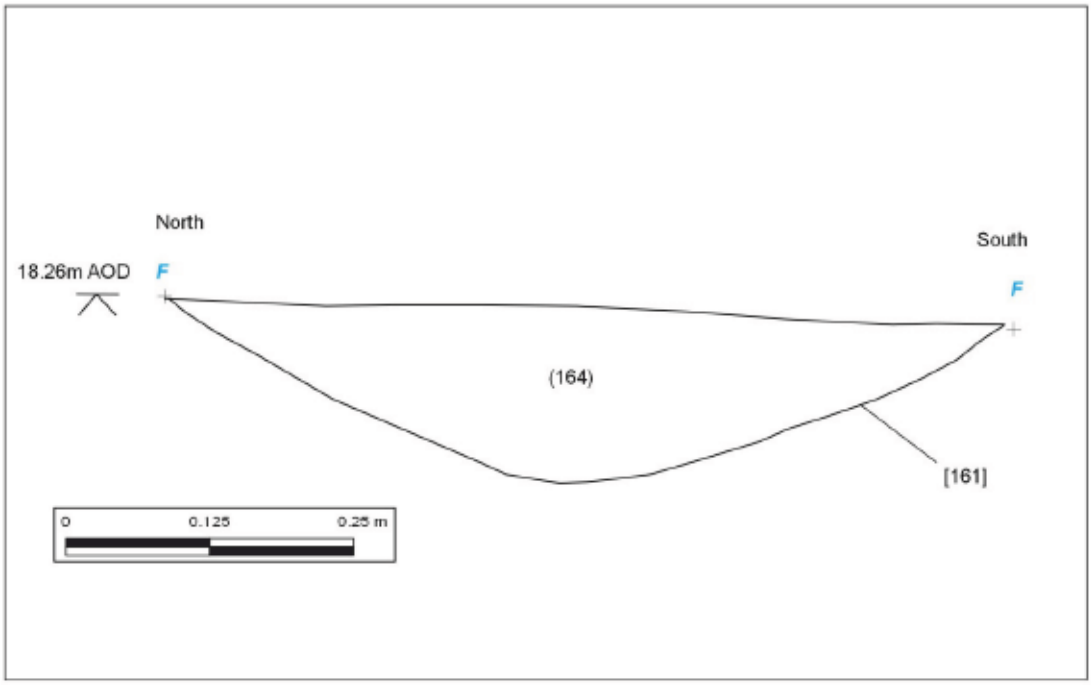

Figure 18. West facing section of ditch [161].
Section location shown on Figure 3.

5.3.6 Trench 17

Stone-free brown silt-sand topsoil (0.25-0.30m) was stripped from the trench area, a plateau at its eastern end and dropping off gradually to the west, exposing in the most part sterile orange sand.

Linear features

The full extent of ditch [170] was exposed (identified in Trench 11 and recorded as [110] during the preceding evaluation phase). The ditch was orientated ENE-WSW with a more westerly alignment towards its western end. It had shallow sides with a flat base and a slight central gully. It measured 1.10m in width and 0.34m in depth.

It was visible over a distance of 45m but petered out to the west, a grey stain suggesting its continuation (i.e. there was no terminal). There was therefore no relationship with [200] to the north.

The primary fill was (176), a thin layer of clean brown sand likely formed as a result of water flowing along (and eroding) the gully in the base of the ditch. This was covered by (177), a deposit of deep stone-free dark grey/brown silt-sand up to 0.34m deep. The fill was sampled for environmental analysis <25> (see Part 5.4 below).

Figure 19. Post-excavation shot of ditch [170]. Looking ENE. Scale 1m.

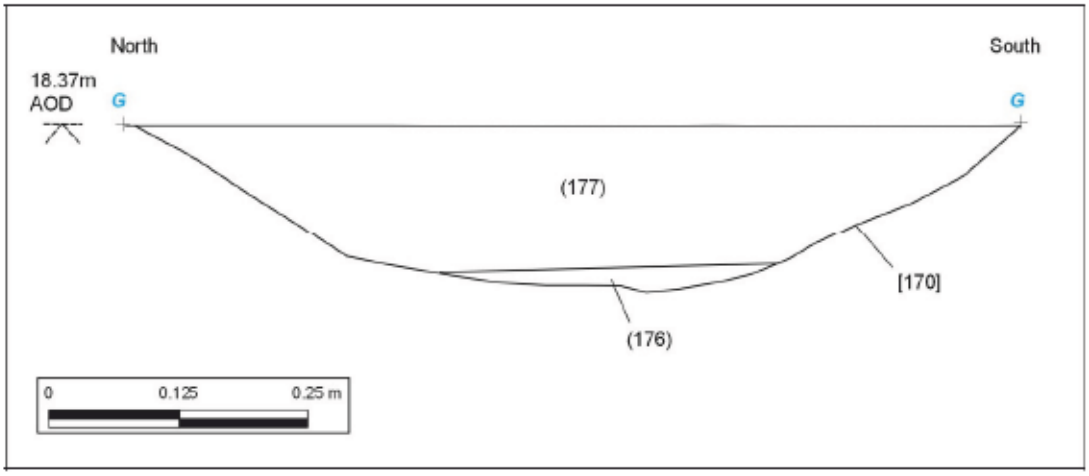

Figure 20. West facing section of ditch [170]. Section location shown on Figure 3.

Discrete features

Three discrete features were investigated in Trench 17, comprising two tree boles [172] and [173], and a pit [171].

The pit [171] was rectilinear, measuring 1.46 x 1.07m in plan, with a vertical western side 0.19m deep and diffuse edges to the east and south. The base was level, but sloping down towards the west giving the appearance of a slot, but this may be the result of severe truncation of an uneven based pit.

The pit was filled with (181), a stone-free 0.19m deep dark brown silt-sand.

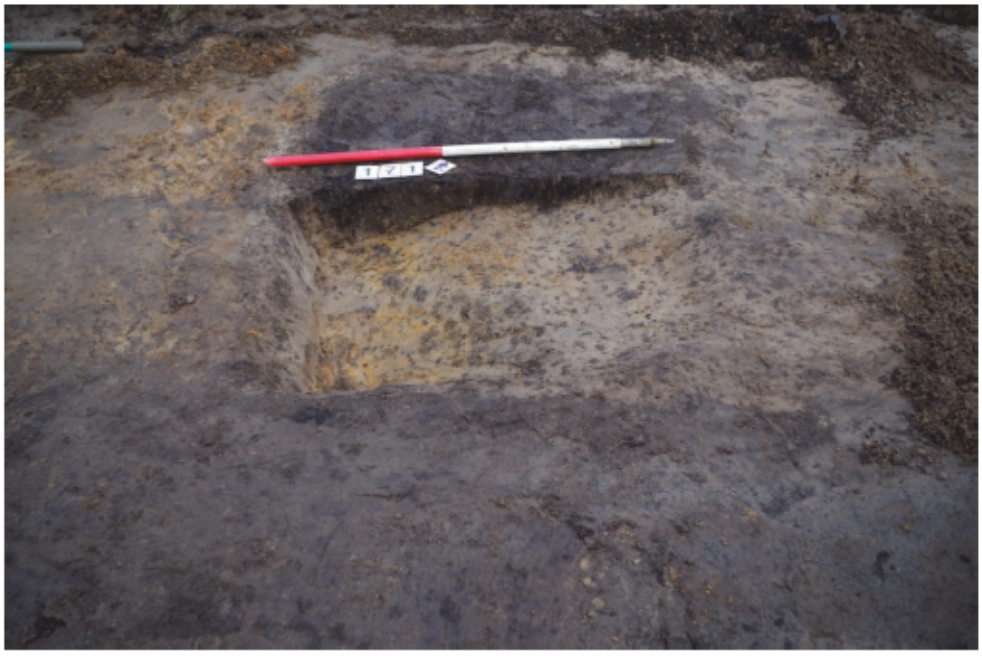

Figure 21. Post-excavation shot of pit [171]. Linear [170] in foreground. Looking north. Scale 1m.

The pit [171] appeared to respect linear [170], being positioned alongside the ditch but with no intersecting relationship. The function of the pit is unknown.

5.3.7 Trench 18

Stone-free brown silt-sand topsoil (0.30m) was stripped from the generally flat trench area at the top of the site plateau, exposing in the most part sterile yellow and orange sand.

Ditch [200] was exposed at the western end of the trench. The trench was then extended to the north east, exposing the feature which continued to the site's northern boundary and apparently passed beneath the course of the modern A689.

Ditch [200] was aligned north east – south west. The exposed length was 44m, and the ditch had a concave profile 0.70m wide and 0.24m deep. Fill (202) was homogenous dark grey silt-sand with no inclusions. The fill was sampled for environmental analysis <22> (see Part 5.4 below).

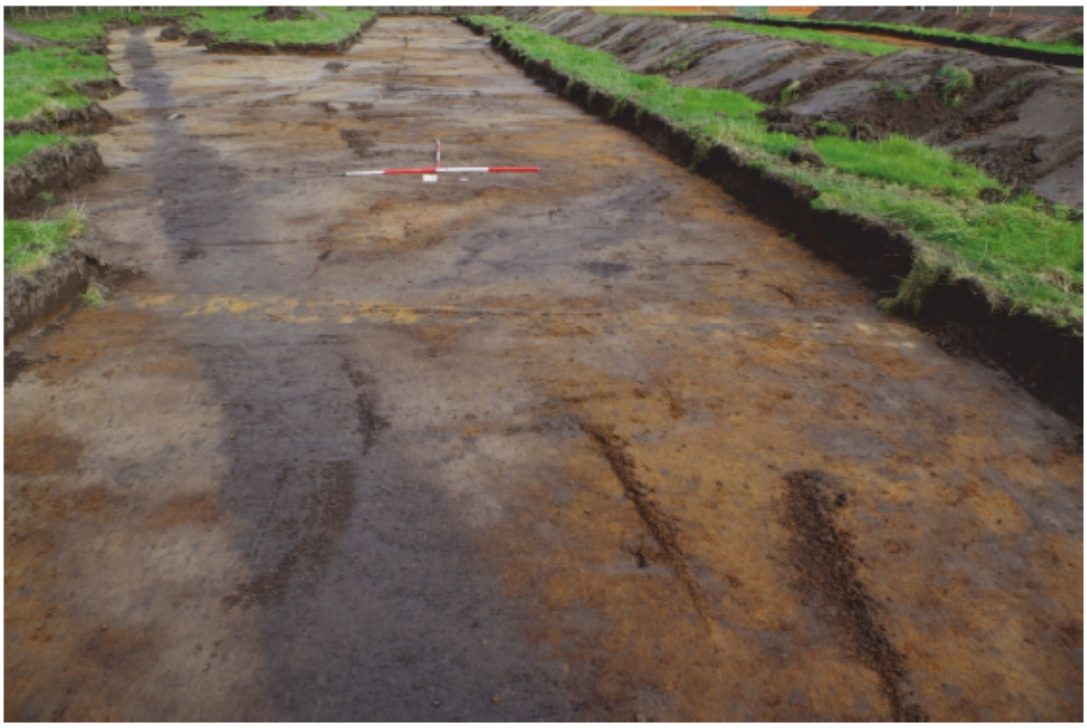

Figure 22. Pre-excavation shot of ditch [200]. Looking ENE. Scales 2m.

Figure 23. Post-excavation shot of ditch [200]. Looking north east. Scales 1m / 0.20m.

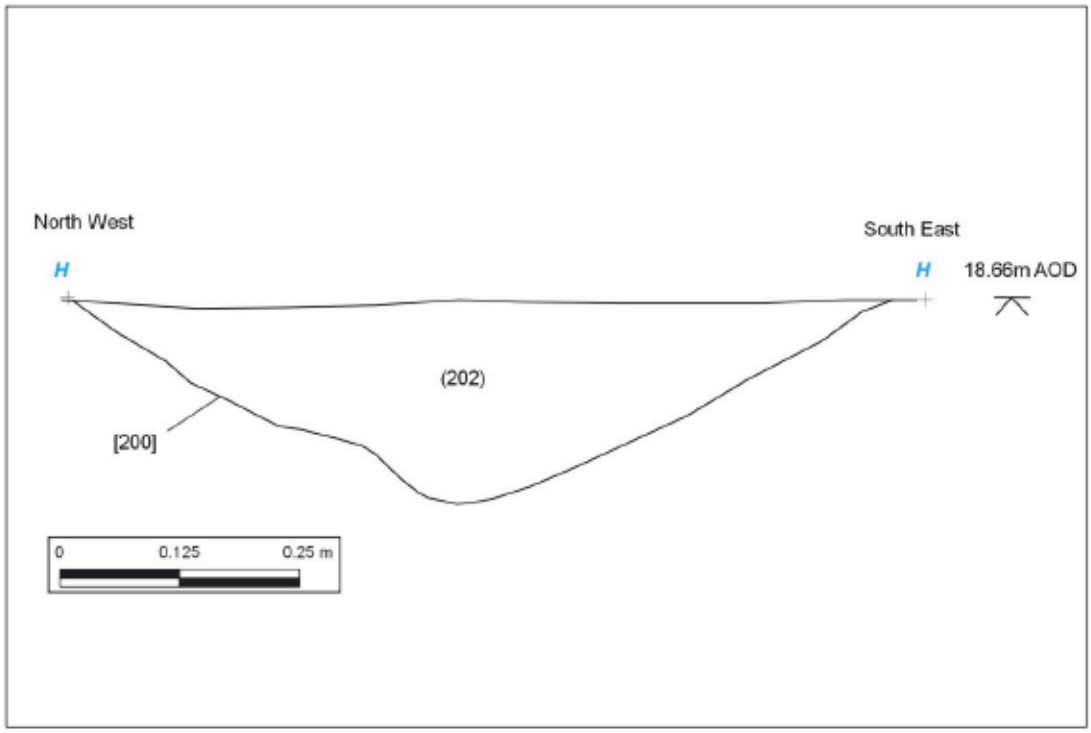

Figure 24. South west facing section of Ditch [200]
Section location shown on Figure 3.

The alignment of ditch [200] is counter to the prevailing north east-south west land organisation based on the orientation of Hadrian's Wall and vallum, leading to the speculative hypothesis that the feature is of a different period to the other boundaries identified during the works. No artefactual evidence was retrieved from five x 1.0m slots cut through the ditch.

5.3.8 Trench 19

Stone-free brown silt-sand topsoil (0.25m) was stripped from the flat trench area as close to the current A689 as possible, exposing yellow sand, a land-drain, and four tree boles.

Figure 25. Trench 19. Looking north east. Scales 2m.

The purpose of the trench was to test whether remains of a Roman road which may have once ran alongside the line of the current A689 are preserved. No surface or flanking ditch was identified, suggesting any such road lay beneath the current A689, or further north between the road and Hadrian's Wall.

5.4 Assessment of biological remains

Four bulk sediment samples ('GBA'/'BS' *sensu* Dobney *et al.* 1992) were submitted to Palaeoecology Research Services Limited, Kingston upon Hull, for assessment of their bioarchaeological potential from the following ditch fills:

- Trench 16 <30> (167) - fill of ditch [160]
- Trench 16 <29> (164) - fill of ditch [161]
- Trench 17 <25> (177) - fill of ditch [170]
- Trench 18 <22> (202) - fill of ditch [200]

The full assessment report by John Carrott, Palaeoecology Research Services (PRS) Ltd is included as Appendix 1, and the discussion and statement of potential reproduced here:

Macrofossils

Ancient macrofossil remains recovered from the samples from the fills of ditches [160], [161], [170] and [200], were restricted to traces of charred plant remains in the form of indeterminate charcoal (largely less than 2 mm) of no interpretative value, together with very small quantities of waterlogged plant and invertebrate remains; although the latter may in fact be modern contaminants or intrusions given that such material was certainly present in the form of modern rootlet, earthworm egg capsules and live soil-dwelling worms.

The few invertebrate remains present that could be of ancient origin were too poorly preserved for positive identification and the plant macrofossils were also only present in small numbers, providing little more than a consistent indication of wet/waterlogged ground (rush seeds were present in all of the samples), together with grassland/waste ground (all samples) and a suggestion of hedgerow/scrub in the vicinity of ditches [160] and [170] from the presence of a few blackberry fruit stones (Contexts 167 and 177).

Microfossils

Microfossil remains were also rather few, being confined to small numbers of poorly preserved pollen grains and spores (and a single broken and unidentifiable diatom frustule from Context 178) and, other than indicating the presence of ferns (Contexts 164, 167 and 202), ?alder (Context 202) and ?hazel (Contexts 177 and 202) at the time of the formation of the ditch fills, similarly lacking in interpretative potential.

Artefactual material

No artefactual material was recovered (other than the trace levels of charcoal and cinder) and there were no remains to indicate waste disposal into the features (e.g. bones of domestic animals) or deliberate back-filling (e.g. larger stones/rubble).

Overall, these features appear to have infilled naturally, and gradually given the very fine-grained nature of the deposits, and were probably located at some remove from any contemporary human habitation; consistent with the findings of the previous assessment (Carrott 2014) and the excavator's interpretation at that time that "…the focus of any previous activity was on higher ground…" (RSK, July 2014).

Charcoal

Although the trace levels of charcoal recovered from each of the deposits could provide sufficient charcoal for dating (via AMS) this material was poorly preserved and none was identifiable or of determinable age of wood growth.

Charcoal of indeterminate species and wood age cannot be recommended for radiocarbon dating as the associated 'old wood' problems may result in a radiocarbon date significantly earlier (but by an unknown amount) than the charring event being returned. Concerns regarding the presence of intrusive/contaminant material (e.g. rootlet, live worms) within the deposits, and the likely consequent bioturbation and possible displacement of such small quantities of fine remains, also add considerable uncertainty to the validity of extending any dates returned from occasional charred plant remains to the deposits as a whole.

6 DISCUSSION

Evaluation retrospective

Frequent animal burrowing was observed in the open area excavation, reinforcing the non-anthropogenic interpretation for the gullies recorded during previous evaluation works in Trenches 2 and 11.

No further pits were exposed in the vicinity of the 'lozenge'-shaped feature previously recorded during the evaluation phase (in Trench 2) suggesting this was not part of a pit-alignment, and most likely, as concluded at the time, the result of a single sand extraction event.

Cobbled 'surfaces'

The observed spread of cobbles [120] in Trench 12 was linear in form and interpreted as most likely relating to a former field boundary shown on historic Ordnance Survey mapping (see **Figure 26**) until 1971, at which time internal field boundaries were removed.

The cobbles could have resulted from stone-picking following ploughing, with larger stones deposited in the adjacent extant field boundary. Alternatively, the cobbles may be the remains of an ad hoc or truncated trackway which once followed the edge of the land parcel, alongside the established field boundary.

Proximity of the site to the River Eden (and the presence of a palaeochannel), evidence for water filled ditches forming previous land divisions, environmental indication of wet/waterlogged ground (rush seeds were present in all of the samples), and a network of modern land-drainage are all demonstrative of the waterlogged nature of the site.

The cobbles [140] in Trench 14 do not respect the mapped field boundary, but may still represent efforts to stabilise boggy ground by creating a surface, and their orientation is not inconsistent with the line of the 'ancient road' annotated on historic Ordnance Survey mapping (see **Figure 26**). There was no evidence for the date of origin of the cobbles, if anthropogenic; it is acknowledged that the cobbles may, in fact, be a natural band of pebbles within natural clays.

Former field boundaries

Linear features crossing the mitigation area on similar alignments without returning were exposed and archaeologically investigated in Trenches 12, 13, 14, 16, and 17. These have been interpreted as former field boundaries, at least dating to the post-Roman periods.

The cobble and ditch sequence in Trench 12 aligns with the former field boundary described above (**Figure 26**).

Although the other boundaries identified in Trenches 13 – 17 are not evident on historic mapping, it is entirely likely that a (?Medieval or later) strip field system existed prior to the mapping event, and which were consolidated some time before 1868, leaving only the boundary identified in Trench 12 remaining. This field system fits in with the wider

pattern of fields locally respecting the orientation of Hadrian's Wall and vallum to the north.

The double ditch in Trench 16 may represent a redefinition, or else a hedge bank. The presence of tree boles between these linear features suggests that the boundaries were drains with an internal/adjacent hedgerow. This interpretation is supported by the palaeoenvironmental evidence which has confirmed the presence of blackberry fruit stones in ditches [160] and [170] (Contexts 167 and 177).

An interpretation for the shallow ditch [200] in Trench 18 is based on its slightly differing alignment. Non-accordance with the landscape grain in respect of Hadrian's Wall and vallum suggests that this linear feature may be either prehistoric or modern. Nevertheless, the feature is insubstantial and of low significance.

None of the archaeological features have been dated through artefactual evidence, although unstratified prehistoric flint was recovered (Appendix 2) to suggest a pre-Roman site presence.

Overall these features appear to have infilled naturally and gradually, given the very fine-grained nature of the fill deposits, and were probably located at some remove from any contemporary human habitation.

7 CONCLUSIONS / RECOMMENDATIONS

7.1 Conclusions

The methodology for archaeological mitigation employed during this phase of work has been successful in meeting the specified aims.

The extent, nature, and significance of archaeological remains present within the defined areas of archaeological sensitivity have been determined. These remains, comprising a possible former trackway adjacent to a palaeochannel and field boundary ditches, have been fully recorded. The production of this report, along with the site archive, represents preservation by record of the remains.

Overall the features identified within the excavated areas are considered to be of low significance. The possible trackway does not appear to relate to Roman activity and a military presence at Hadrian's Wall, but may be considered part of the historic landscape associated with the relict watercourse and field systems to the north of the River Eden.

The majority of the excavated field boundary ditches fall within a wider pattern of fields coaxial with the alignment of Hadrian's Wall 0.45km to the north of the site. A single ditch/gully at the northern limit of the site appears to fall outside this pattern; its orientation is at odds with the adjacent boundaries. This may suggest a pre-Roman date for the feature, or a much later date, however as with all features on the site, no dating evidence has been recovered either through excavation or detailed sampling. The evidence suggests a remote rural location with no direct indicators of settlement nearby.

The archaeological evaluation, and subsequent mitigation here reported, have provided no conclusive evidence that a Roman road ran within the site boundary. A spread of cobbles identified in Trench 14 [140] do not align with former field boundaries and may therefore represent the preserved remains of an 'ancient road' annotated on 1868 1:10560 OS mapping. If so, the date of origin and significance of this track remain unknown. The assumed line of any ancient road is preserved to the east and west of the site and is available for future research.

7.2 Recommendations for further work

No further study of the organic remains present in the deposits reported here is warranted and retrieved charcoal samples are not recommended for radiocarbon dating.

In accordance with advice sought from the Historic Environment Officer at Cumbria County Council, no further archaeological works are required in relation to the River Eden crossing scheme.

8 STORAGE AND CURATION

8.1.1 Retention and disposal

The washovers from the processed subsamples, remaining unprocessed sediment, and residue fractions may be discarded.

8.1.2 Archive

Digital copies of this report in PDF format will be deposited with the Client and CCC.

The project archive will consist of all relevant original records, artefacts, ecofacts/samples and documentation that relates to the archaeological works. Copies of the method statement and any relevant correspondence will be included.

The archive will be prepared according to the methodology set out in The Management of Archaeological Projects (MAP2, English Heritage 1991), as updated by MoRPHE (Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide, English Heritage 2008).

The archive will comply with the United Kingdom Institute for Conservation (Archaeology Section) Guidelines for the Preparation of Excavation Archives for Long-Term Storage (1990), and the Society of Museum Archaeologists Towards An Accessible Archive (1995) and to the reasonable requirements of the recipient museum (to be established).

The archive will be deposited within twelve months of the completion of the site works, with the agreement of the Client.

All biological material is currently stored by Palaeoecology Research Services (Unit 4, National Industrial Estate, Bontoft Avenue, Kingston upon Hull), pending return to the excavator or permission to discard, with paper and electronic records pertaining to the work described here.

8.1.3 Copyright

RSK will retain full copyright of any commissioned reports, tender documents or other project documents, under the Copyright, Designs and Patents Act of 1988 with all rights reserved; RSK will provide an exclusive licence to the Client for the use of such documents by the Client in all matters directly relating to the project.

9 REFERENCES

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United Kingdom Institute for Conservation (Archaeology Section), 1990, *Guidelines for the Preparation of Excavation Archives for Long-Term Storage*

APPENDIX 1
BIOLOGICAL ASSESSMENT

Palaeoecology Research Services

Assessment of biological remains from sediment samples recovered during further excavations associated with the River Eden Pipeline Diversion, west of Low Crosby, Cumbria (site code: LC14)

***PRS* 2015/06**

Assessment of biological remains from sediment samples recovered during further excavations associated with the River Eden Pipeline Diversion, west of Low Crosby, Cumbria (site code: LC14)

by

John Carrott and Angela Walker

Summary

Four sediment samples from features encountered during further excavations on land west of Low Crosby, Cumbria, were submitted for an assessment of their bioarchaeological potential. The additional trial trenches encountered a number of ditches within Trenches 16, 17 and 20. No dating evidence was recovered from the features.

Ancient macrofossil remains recovered from samples from the fills of four ditches were restricted to traces of charred plant remains in the form of indeterminate charcoal (largely less than 2 mm) of no interpretative value, together with very small quantities of waterlogged plant and invertebrate remains; although the latter may in fact be modern contaminants or intrusions given that such material was certainly present in the form of modern rootlet, earthworm egg capsules and live soil-dwelling worms. The few invertebrate remains present that could be of ancient origin were too poorly preserved for positive identification and the plant macrofossils were also only present in small numbers, providing little more than a consistent indication of wet/waterlogged ground, together with grassland/waste ground and a suggestion of hedgerow/scrub in the vicinity of two of the ditches.

Microfossil remains were also rather few, being confined to small numbers of poorly preserved pollen grains and spores (and a single broken and unidentifiable diatom frustule from one deposit) and, other than indicating the presence of ferns, ?alder and ?hazel at the time of the formation of the ditch fills, similarly lacking in interpretative potential.

No artefactual material was recovered (other than trace levels of charcoal and cinder) and there were no remains to indicate waste disposal into the features or deliberate back-filling

No material suitable for submission for radiocarbon dating was recovered.

No futher study of the organic remains from these deposits is warranted.

KEYWORDS: RIVER EDEN PIPELINE DIVERSION; LAND WEST OF LOW CROSBY; CUMBRIA; FURTHER ASSESSMENT; UNDATED; PLANT REMAINS; CHARRED PLANT REMAINS; CHARCOAL (TRACE); INVERTEBRATE REMAINS (TRACE); MICROFOSSILS; POLLEN GRAINS; SPORES; DIATOMS (TRACE)

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13 March 2015

Assessment of biological remains from sediment samples recovered during further excavations associated with the River Eden Pipeline Diversion, west of Low Crosby, Cumbria (site code: LC14)

Introduction

A further archaeological evaluation associated with the River Eden Pipeline Diversion was undertaken by RSK Environment Ltd (RSK) on land west of Low Crosby, Cumbria (approximate centre NGR NY 437 594), in 2014. The works were necessitated by National Grid's replacement of a short section of gas transmission pipeline crossing beneath the River Eden.

Additional trial trenches were excavated encountering a number of ditches within Trenches 16, 17 and 20. No dating evidence was recovered from the features.

Four bulk sediment samples ('GBA'/'BS' *sensu* Dobney *et al.* 1992), one each from fills of ditches [160], [161], [170] and [200], were submitted to Palaeoecology Research Services Limited, Kingston upon Hull, for an assessment of their bioarchaeological potential.

Methods

The lithologies of the samples were recorded, using a standard *pro forma*. A small subsample (~5 ml) was extracted from each for examination for microfossils (see below) prior to the processing of subsamples for the recovery of plant and invertebrate macrofossils, broadly following the techniques of Kenward *et al.* (1980). Before processing for macrofossil recovery the sediments were disaggregated in water for 24 hours or more and the sample volumes recorded in a waterlogged state.

The residues were primarily mineral in nature and were dried and weighed prior to the recording of their components. To facilitate recording, the residues were separated into two fractions using a 1 mm sieve. Sorting for all remains, including artefacts, was undertaken to 1 mm. Residue less than 1 mm was retained unsorted. The residue fractions (including those less than 1 mm) were scanned for magnetic material.

Each of the washovers contained at least some organic material that was not charred and all were examined wet.

The processed sample fractions were examined for plant, invertebrate and vertebrate remains using a low-power binocular microscope (x7 to x 45). All of the components of the washovers and residues were recorded using a five-point semi-quantitative scale; fractions were generally scanned until no new remains were observed and a sense of the abundance of each taxon or component was achieved. The abundance scale employed was: 1 – few/rare, up to 3 individuals/items or a trace level component of the whole; 2 – some/present, 4 to 20 items or a minor component; 3 – many/common, 21 to 50 or a significant component; 4 – very many/abundant, 51 to 200 or a major component; and 5 – super-abundant, over 200 items/individuals or a dominant component of the whole. The abundance of recovered organic and other remains within the sediments as a whole may be judged by comparing the washover volumes and the quantity of remains recovered from the residues with the size of the processed sediment subsamples.

Plant macrofossil remains were identified to the lowest taxon necessary to achieve the aims of the project by comparison with modern reference material (where possible) and the use of published works (e.g. Cappers *et al.* 2006). Invertebrate remains were identified

with reference to published works (e.g. for beetles, Lindroth 1974; Harde 1984) and within the constraints of an assessment. Nomenclature for plant taxa follows Stace (1997) and insects follow Kloet and Hincks (1964-77).

Wood and charcoal identifications were attempted for a small number of larger fragments (all over 4 mm). The fragments were broken to give clean cross-sectional surfaces for anatomical structures to be initially examined using a low-power binocular microscope (x7 to x45) and subsequently (where necessary) at higher magnifications (x60 to x600). In the event, all of the material examined was very fragile and crumbled – failing to provide clean surfaces – and none could be identified.

No shell, bone or artefactual material was recorded from any of the processed subsample fractions.

The microfossil subsamples were examined using the 'squash' technique of Dainton (1992), originally designed specifically to assess the content of eggs of intestinal parasitic nematodes; however, this method routinely reveals the presence of other microfossils, such as pollen and diatoms, which were the primary focus of the examinations here. The assessment slides were scanned at x150 magnification and at x600 where necessary. Provisional identifications for pollen grains and spores were made by comparison with modern reference material and the use of published works (principally Moore *et al.* 1991). Semi-quantitative abundances were recorded as outlined above for the macroscopic remains.

During recording consideration was given to the suitability of macrofossil remains for submission for radiocarbon dating by standard radiometric technique or accelerator mass spectrometry (AMS).

Results

The results of the investigations of the samples are presented below in context number order by trench. Archaeological information, provided by the excavator, is given in square brackets. A brief summary of the processing method and an estimate of the remaining volume of unprocessed sediment follows (in round brackets) after the sample numbers.

TRENCH 16

Context 164 [fill of ditch 161]
Sample 29/T (11.75 kg/10 litres sieved to 300 microns with washover and microfossil 'squash'; approximately 7 litres of unprocessed sediment remain)

Moist, mid to mid/dark grey-brown (mottled on mm- and cm-scales with light/mid brown), unconsolidated with some crumbly lumps (working slightly soft), sandy silt. Modern rootlets were present.

The small washover (45 ml) was predominantly of approximately equal parts root material, plant epidermis and sand (all abundance score 5). Fine charcoal (to 2 mm) was also abundant (score 5) but larger fragments (to 7 mm) were less frequently recorded (score 3); most of the fragments were coated in orange (?iron-rich) sediment and crumbly – none could be identified. Small lumps of undisaggregated sediment (to 1 mm) and coal (to 5 mm) were frequent records (score 4) and there was a little cinder (to 2 mm; score 2) and some waterlogged plant macrofossils including rush (*Juncus* sp.) seeds (score 3), small (to 2 mm) grass (Poaceae) caryopses (score 2), a few crowfoot/buttercup (*Ranunculus* sp.) achenes and clover (*Trifolium* sp.) seeds (both of the two last score 1). Invertebrate remains were restricted to occasional earthworm egg capsule fragments (score 2; probably representing modern intrusions into the deposit) and fragments of beetle sclerites (score 2; including one heavily eroded elytron fragment from a small Hydrophilidae species (water scavenger beetles – perhaps *Cercyon analis* (Paykull) or *Megasternum obscurum* (Marsham)).

The relatively small residue (dry weight 1429.3 g) was mostly sand (<1 mm; 1401.7 g), with the greater than 1 mm sieve fraction consisting mainly of stones (to 10 mm), together with occasional sediment concretions (also to 10 mm) – combined weight 27.6 g. No biological or artefactual remains were recovered and there was no magnetic material present.

The 'squash' subsample was almost entirely inorganic, with a little organic detritus (score 2). Some fragments of fungal hyphae (score 2) were noted and there were

also some rather poorly preserved (eroded) fern (*Polypodium*) spores (score 2). No eggs of intestinal parasites were present.

Context 167 [fill of E/W aligned ditch 160]
Sample 30/T (10.25 kg/10 litres sieved to 300 microns with washover and microfossil 'squash'; approximately 10 litres of unprocessed sediment remain)

Moist, mid/dark brown to grey-brown, unconsolidated with some crumbly lumps (working slightly soft), sandy silt. Modern rootlets were present.

The small washover (35 ml) was predominantly of approximately equal parts root material, coal (to 6 mm), and sand (all abundance score 5). Fine charcoal (to 2 mm) was also abundant (score 5) with larger fragments (to 9 mm) present in lesser numbers (score 4); the fragments were very fragile and crumbly – none could be identified. Plant epidermis also formed an appreciable proportion of the washover as did sediment concretions (to 10 mm) – both score 4 – and there was some cinder (to 2 mm; score 3). Plant macrofossils included rush seeds (score 2), small grass caryopses (score 2), spurrey (*Spergula* sp.) seeds (score 2), blackberry (*Rubus fruticosus* L. agg.) fruit stones (score 1), orache/goosefoot (*Atriplex/Chenopodium*) seeds (score 1) and knotweed (*Persicaria* sp.) achenes (score 1). Invertebrate remains were restricted to occasional earthworm egg capsule fragments (score 1; probably representing modern intrusions into the deposit) and 'scraps' of indeterminate insect cuticle (score 1), together with some live soil-dwelling worms (score 2).

The relatively small residue (dry weight 1362.3 g) was mostly sand (<1 mm; 1331.6 g), with the greater than 1 mm sieve fraction consisting entirely of stones (to 10 mm; 30.7 g). No biological or artefactual remains were recovered and there was no magnetic material present.

The 'squash' subsample was almost entirely inorganic, with a trace of organic detritus (score 1). A few fragments of fungal hyphae (score 1) were noted and there were also a few (score 1) rather poorly preserved (eroded and mostly broken) pollen grains/spores, including one fern spore. No eggs of intestinal parasites were present.

TRENCH 17

Context 177 [basal fill of heavily truncated ditch 170]
Sample 25/T (11.25 kg/10 litres sieved to 300 microns with washover and microfossil 'squash'; approximately 8 litres of unprocessed sediment remain)

Moist, mid/dark grey-brown to dark grey (with occasional streaks of mid brown), unconsolidated with some crumbly lumps, silty sand. Modern rootlets were present.

The small washover (65 ml) was predominantly of approximately equal parts root material, coal (to 14 mm), sand and sediment concretions (to 6 mm); all abundance score 5. Fine charcoal (to 2 mm) was again abundant (score 5) with larger fragments (to 6 mm) present in lesser numbers (score 4); most of the fragments were coated in sediment and crumbly – none could be identified to species but there was a single piece of charred root (to 10 mm). Plant epidermis also formed an appreciable proportion of the washover (score 4) and there was a trace of fine cinder (to 1 mm; score 1). There was a slightly more diverse assemblage of waterlogged plant macrofossils but each taxon was represented by no more than a few remains (all score 1) –seeds of rush, orache/goosefoot seeds, clover and spurge (Euphorbiaceae sp.), blackberry fruit stones, crowfoot/buttercup and fumitory (*Fumaria* sp.) achenes and trigonous sedge (*Carex*) nutlets, were all recorded. Invertebrate remains comprised occasional earthworm egg capsule fragments (score 1; probably representing modern intrusions into the deposit) and 'scraps' of indeterminate insect cuticle (score 2), together with some live soil-dwelling worms (score 2).

The relatively small residue (dry weight 1366.0 g) was mostly sand (<1 mm; 1338.9 g), with the greater than 1 mm sieve fraction consisting entirely of stones (to 10 mm; 27.1 g). No biological or artefactual remains were recovered and there was no magnetic material present.

The 'squash' subsample was almost entirely inorganic, with a little organic detritus (score 2). A few fragments of fungal hyphae (score 1) and a single broken diatom frustule were noted and there were also some (score 2) very poorly preserved (heavily eroded and mostly broken) pollen grains/spores, including one tentatively identified as ?hazel (cf. *Corylus*). No eggs of intestinal parasites were present.

TRENCH 20

Context 202 [fill of ditch 200]
Sample 22/T (10.75 kg/10 litres sieved to 300 microns with washover and microfossil 'squash'; approximately 18 litres of unprocessed sediment remain)

Moist, mostly mid grey-brown (mottled with light/mid grey and brown on a cm-scale), unconsolidated with some crumbly lumps (working somewhat soft), ?slightly humic, sandy silt, with occasional clay lumps (to 30 mm). Modern rootlets were present.

The small washover (65 ml) was predominantly of approximately equal parts root material, sediment concretions (to 7 mm), and fine (to 2 mm) charcoal (all

abundance score 5). Larger charcoal fragments (to 5 mm) were present in lesser numbers but still common (score 3); the fragments were very fragile and crumbly – none could be identified. Plant epidermis formed an appreciable proportion of the washover as did sand and coal (to 3 mm) – all score 4 – and there was a little cinder (to 2 mm; score 2). The few plant macrofossils recorded comprised rush seeds (score 2), small grass caryopses (score 1) and crowfoot/buttercup achenes (score 1). Invertebrate remains were restricted to occasional earthworm egg capsule fragments (score 1; probably representing modern intrusions into the deposit).

The relatively small residue (dry weight 1201.8 g) was mostly sand and fine 'crumbs' of concreted sediment (<1 mm; 1142.7 g), with the greater than 1 mm sieve fraction consisting of approximately equal parts of stones (to 11 mm) and ?iron-rich (orange/red-brown in colour) sediment concretions (to 19 mm) all of the larger fragments of which were clearly root cast – combined weight 59.1 g. No biological or artefactual remains were recovered and there was no magnetic material present.

The 'squash' subsample was almost entirely inorganic, with a little organic detritus (score 2). A few fragments of fungal hyphae (score 1) were present and there were also some (score 3) very poorly preserved (heavily eroded and mostly broken) pollen grains/spores, including fern spores (score 1) and tentatively identified pollen grains of ?alder (*Alnus*) and ?hazel (abundance scores 2 and 1, respectively). No eggs of intestinal parasites were present.

Discussion and statement of potential

Ancient macrofossil remains recovered from the samples from the fills of ditches [160], [161], [170] and [200], were restricted to traces of charred plant remains in the form of indeterminate charcoal (largely less than 2 mm) of no interpretative value, together with very small quantities of waterlogged plant and invertebrate remains; although the latter may in fact be modern contaminants or intrusions given that such material was certainly present in the form of modern rootlet, earthworm egg capsules and live soil-dwelling worms. The few invertebrate remains present that could be of ancient origin were too poorly preserved for positive identification and the plant macrofossils were also only present in small numbers, providing little more than a consistent indication of wet/waterlogged ground (rush seeds were present in all of the samples), together with grassland/waste ground (all samples) and a suggestion of hedgerow/scrub in the vicinity of ditches [160] and [170] from the presence of a few blackberry fruit stones (Contexts 167 and 177).

Microfossil remains were also rather few, being confined to small numbers of poorly preserved pollen grains and spores (and a single broken and unidentifiable diatom frustule from Context 177) and, other than indicating the presence of ferns (Contexts 164, 167 and 202), ?alder (Context 202) and ?hazel (Contexts 177 and 202) at the time of the formation of the ditch fills, similarly lacking in interpretative potential.

No artefactual material was recovered (other than the trace levels of charcoal and cinder) and there were no remains to indicate waste disposal into the features (e.g. bones of domestic animals) or deliberate back-filling (e.g. larger stones/rubble). Overall, these features appear to have infilled naturally, and gradually given the very fine-grained nature of the deposits, and were probably located at some remove from any contemporary human habitation; consistent with the findings of the previous assessment (Carrott 2014) and the excavator's interpretation at that time that "…the focus of any previous activity was on higher ground…".

Although the trace levels of charcoal recovered from each of the deposits could provide sufficient charcoal for dating (via AMS) this material was poorly preserved and none was identifiable or of determinable age of wood growth. Charcoal of indeterminate species and wood age cannot be recommended for radiocarbon dating as the associated 'old wood' problems may result in a radiocarbon date significantly earlier (but by an unknown amount) than the charring event being returned. Concerns regarding the presence of intrusive/contaminant material (e.g. rootlet,

live worms) within the deposits, and the likely consequent bioturbation and possible displacement of such small quantities of fine remains, also add considerable uncertainty to the validity of extending any dates returned from occasional charred plant remains to the deposits as a whole.

Recommendations

No further study of the organic remains present in the deposits reported here is warranted.

Retention and disposal

Unless required for purposes other than the study of biological remains, the processed fractions from the assessment subsamples and all of the remaining unprocessed sediment may be discarded.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 4, National Industrial Estate, Bontoft Avenue, Kingston upon Hull), pending return to the excavator or permission to discard, with paper and electronic records pertaining to the work described here.

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APPENDIX 2
UNSTRATIFIED FINDS

Figure 27. Unstratified worked flint waste flake of likely later prehistoric date from topsoil

Figure 28. Unstratified broken flint biface kite-shaped arrowhead of early Neolithic date from topsoil