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ARCHAEOLOGICAL EXCAVATION OF A BRICKWORK PLAN FIELD SYSTEM AT CATESBY BUSINESS PARK, BALBY CARR, DONCASTER, SOUTH YORKSHIRE, 2002

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with major contributions by Rowena Gale, James Greig, David Smith and Emma Tetlow
and other contributions by Lynne Bevan, Annette Hancocks and Emma Hancox

Client: B & Q PLC

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SUMMARY

A sequence of ditched rectilinear field enclosures and ditched droveways was excavated at Catesby Business Park, Balby Carr, Doncaster, South Yorkshire, in advance of a retail development. Two phases of ditch construction were identified. The field enclosures were part of a complex of 'brickwork plan' field systems similar to those previously identified, to the south of the site, by aerial photography.

An unfinished Neolithic flint arrowhead was recovered, redeposited within the recut of one of the ditches. No pottery and very little bone was recovered from the enclosures and droveway ditches, during the excavation. Radiocarbon dating of waterlogged wood recovered from the ditch fills indicates the site dates from the mid to late Iron Age to the early Romano-British period.

The environmental evidence from the site suggests that the fields may have been used as pasture, with no evidence for the cultivation of crops on the low-lying waterlogged site itself. However, crops may have been cultivated locally on better drained drier areas of land. The surrounding landscape was probably mainly cleared of woodland with fields and copses of managed woodland.

INTRODUCTION

In July and August 2002 Birmingham University Field Archaeology Unit (BUFAU, now Birmingham Archaeology) carried out an archaeological excavation of land at Catesby Business Park, Balby Carr, Doncaster, South Yorkshire (Fig. 1, hereafter referred to as the site). The work was commissioned by B & Q PLC, in advance of the development of the site, comprising of the construction of a new retail store and associated access roads. The excavation was recommended as a condition of planning consent, by South Yorkshire Archaeology Service (SYAS), archaeological advisors to Doncaster MBC.

The underlying geology of the site is drift deposits consisting of alluvial clay. Below these are solid deposits comprising the Bunter Sandstone of the Permo-Triassic (British Geological Survey, 1:50,000 map sheet 88). Under these are Carboniferous rocks, including productive Coal Measures.

ARCHAEOLOGICAL BACKGROUND

An archaeological desk-based assessment of the site was carried out by BUFAU (Watt 2002a) and this included the results of an aerial photographic study (Cox 2002). The findings of the assessment were that although no finds or features of archaeological interest were known within the site itself, a high concentration of occupation sites dating to the late Iron Age and Romano-British periods, visible on aerial photographs as crop marks, exist near to the site. These crop marked sites include enclosures and extensive 'brickwork' pattern field systems first recognised by the late Derrick Riley (Riley 1980). The 'brickwork' pattern field systems are present throughout the landscape across much of South Yorkshire and North Nottinghamshire. Finds of Romano-British artefacts have also been recorded close to the site. An undated soil-mark was visible, on an aerial photograph, in a field immediately to the east of the site. This soil-mark may be interpreted as either part of a ditched enclosure, a drainage feature or boundary feature. Given this concentration of sites nearby, the proximity of the Roman town of *Danum* and the presence of Romano-British pottery kiln sites in the surrounding area, the nearest being at Rossington, it was thought that there was potential for the existence of significant archaeological features within the site.

Subsequent geophysical survey (GSB 2002) revealed no clearly defined anomalies suggestive of buried archaeological remains, although a few pit-like anomalies were noted, which could possibly be of archaeological origin.

Following on from this work an archaeological evaluation was recommended by SYAS, on behalf of Doncaster MBC. The results of the evaluation (Jones 2002a), which involved the excavation of 18 trial-trenches, revealed that several possible field boundary ditches, or perhaps enclosure ditches, not detected by geophysical survey or visible as crop-marks, existed within the site. These possible field boundary ditches appeared to be concentrated in the southern part of the site. In the other parts of the site the trenches proved to be either archaeologically sterile or contained drainage and/ or boundary features of probable post-medieval date. There was little dating evidence, but one ditch contained a fragment of waterlogged wood, from which a radiocarbon date was obtained. The radiocarbon date suggested this ditch was of Iron Age or Romano-British date. It was thought that some or all of the other possible field boundary or enclosure ditches could be a continuation of the network of Iron Age or Romano-British field boundary ditches and enclosures, present to the north and south of the site, highlighted in the desk-based assessment, and/ or a continuation of the undated soil mark feature visible on aerial photographs to the east of the site.

It was concluded that the site is of local and regional archaeological importance and, as such, an archaeological mitigation strategy, by a scheme of archaeological excavation and recording in the southern part of the site was recommended by SYAS, on behalf of Doncaster MBC.

EXCAVATION METHODOLOGY

A Project Design (BUFAU 2002) was agreed with SYAS detailing the excavation methodology. An area of approximately 3 hectares. (Fig. 1) was stripped of topsoil and recent overburden by tracked 360° mechanical excavators, fitted with toothless ditching buckets. Machining was monitored by a qualified archaeologist at all times. The topsoil strip was down to the top of the uppermost archaeological deposit or to the top of the natural subsoil.

Following completion of the topsoil and overburden stripping a site plan depicting all archaeological features on site was produced using a Nikon C-100 total station in conjunction with 'Fastmap' and 'Penmap' digital mapping software. This site plan was used to inform the sampling strategy. An on-site meeting was held with the archaeologist from SYAS and BUFAU's site director to formulate a sampling strategy.

A program of manual sample excavation was then undertaken. Subsequent cleaning and excavation, was by hand. Discrete archaeological features, such as pits were half sectioned, in the first instance. This was increased to full excavation of pits, where appropriate. This was decided in consultation with SYAS and BUFAU. Generally a minimum of 20% of the length of linear features, or a minimum of a 1m sample section, if the feature was less than 10m in length, was sample excavated although this amount varied, subject to consultation with SYAS. In particular, terminals and junctions of linear features were sample excavated to determine the stratigraphic relationships between features.

Archaeological features were assigned consecutive numbers from F1 onwards and contexts were numbered from 1010 onwards during the excavation. Where more than one section was excavated through a feature it was assigned a construct number: LD (linear ditch, greater than 0.50m wide), CD (curvilinear ditch, greater than 0.50m wide) or CG (curvilinear gully, less than 0.50m wide).

A representative sample of datable archaeological features was selected for the collection of 20 litre soil samples for the recovery of archaeobotanical material (pollen and plant macrofossils) and micro-fauna. Suitable samples were taken for scientific dating.

Following the completion of the excavation a post-excavation assessment of the potential of the structural data, the artefactual and environmental material for further study was carried out and an updated project design was produced (Jones 2002b).

EXCAVATION RESULTS (Fig. 2)

It proved difficult to assign every feature to a precise phase due to the lack of finds, the few stratigraphic relationships between features and the relatively wide chronological range of radiocarbon dates. However, an attempt has been made to assign features to phases on the basis of radiocarbon dates, the few observed stratigraphic relationships and the physical relationships between features.

The underlying natural subsoil was mainly yellow alluvial clay (1012). Tree boles and tree root holes, containing peaty soils, disturbed the surface of the natural subsoil. A series of archaeological features cut the natural 1012, forming a rectilinear pattern overall.

PHASE 1- MID TO LATE IRON AGE TO EARLY ROMANO- BRITISH (Fig. 3)

The most northerly feature was an east-west aligned linear ditch (LD 1, Plates 1 and 2) which extended beyond the edges of the excavation. Ditch LD 1 was 0.95-1.70m wide and 0.42-0.65m deep and its profile varied significantly, but was generally either steep sided with a narrow slightly rounded base or steep sided with a flat base (Fig. 4, F71 and F98). Generally the fill of the ditch was a greyish silty clay with some waterlogged organic inclusions.

Parallel to LD 1, to the south, was another linear ditch (LD 2), was 0.70-1.70m wide and 0.32-0.76m deep, with steep sides and a flat base (Fig. 4; F1, F1701 and F1804). The fill of this ditch varied, but was generally a greyish silty clay with some waterlogged organic inclusions. A fragment of waterlogged wood (alder or birch), with a humanly made cut at one end, was recovered from the fill of ditch LD 2, during the evaluation trial-trenching. A calibrated radiocarbon date of 400BC-350AD (Wk 10973; 1999 $\pm$ 123 BP) was obtained from the waterlogged wood.

A short curvilinear ditch (CD 2; Fig.4, F47 and F48, Fig. 5a) was located between ditches LD 1 and 2. Ditch CD 2 was 8.50m x 0.50-0.72m wide and 0.12-0.22m deep, and was filled with greyish brown silty clay.

PHASE 2- LATE IRON AGE TO EARLY ROMANO- BRITISH (Fig. 3)

The primary cut of linear ditch LD 1 was cut by a curvilinear ditch (CD 1; Fig. 4, F65 and F56, Plate 3), extending beyond the edge of excavations. Ditch CD 1 was 1.50-1.80m wide and 0.70-0.90m deep with steep sides and a slightly rounded base. Its primary fill was a grey clay, which was sealed by a peat-rich fill containing waterlogged organic material including some large fragments of wood. A fragment of waterlogged wood (alder), was recovered from the fill at the base of ditch and a calibrated AMS radiocarbon date of 50BC- AD130 (Wk 12978; 1968 $\pm$ 43 BP) was obtained from it. Another fragment of waterlogged wood recovered from the top of the ditch gave a calibrated AMS radiocarbon date of 100BC- AD130 (Wk 12979; 1989 $\pm$ 43 BP).

There was evidence of a recut of the ditch LD 1, 0.50-2.20m wide and 0.30-0.62m deep (Fig. 4; F70 and F91 and Plate 2), in most of the excavated sections, often containing a peat-rich fill which was dark brown or black and was rich in waterlogged organic material. This recut appeared to terminate to the east of ditch CD 1 and may have formed the north ditch of a rectilinear ditched enclosure (EN 1). The EN 1 enclosure ditch was 0.40-1.24m wide and 0.25-0.50m deep, with steep sides and a rounded base (Fig. 4, F46 and F1802). It was filled mainly with a grey silty clay, but in a few places the fill was a dark brown or black, peat- like context which was rich in waterlogged organic material. There was evidence of a recut of the ditch (Fig. 4, F1801), which usually contained a dark brown or black peat-rich fill which was rich in waterlogged organic material. The west side of EN 1 may have been formed by ditch CD 1. The EN 1 enclosure ditch terminated at the northeast corner of the enclosure, forming an entrance. The earlier short curvilinear ditch CD 2 was cut by the eastern ditch of enclosure EN 1 (Fig. 4, F46 and Fig 5a).

As with LD 1 to the north, evidence of the recutting of the ditch LD 2 was recorded in many places (Fig. 4, F1700 and F1803). To the west the recut ditch deviated from the course of the primary ditch, where it curved to the northwest. The ditch recut was 0.70-1.40m wide and 0.30-0.62m deep and often contained a dark brown or black peat-rich fill. It was rich in waterlogged organic material and contained an unfinished Neolithic flint arrowhead. This recut was orientated parallel with the southern ditch of enclosure EN 1 to the north, possibly forming a double- ditched trackway or droveway (Plate 4). Part of the recut of ditch LD 2 also formed the north ditch of a rectilinear ditched enclosure (EN 2). The east ditch of EN 2 terminated at the northeast corner of the enclosure, forming a narrow entrance. The east and west ditches of enclosure EN 2 (Fig. 4, F14 and F41) were 0.70-1.20m wide and 0.30-0.58m deep with a profile that was either 'U'-shaped or steep sided with a narrow slightly rounded base. These ditches were filled with a grey silty clay and, in some sections, a dark brown or black peat-rich fill which contained waterlogged organic material. Any putative south ditch of EN 2 may be located beyond the edge of excavation.

A linear ditch (LD 3; Fig. 4, F21) was located at right angles to, and terminated close to the west side of enclosure EN 2, possibly forming further enclosures beyond the area of excavation. Ditch LD 3 was 0.75-1.14m wide and 0.36-0.48m deep, with steep sides and a flat or slightly rounded base. It was filled with a grey silty clay and in some sections a peat-rich fill which was dark brown or black and contained waterlogged organic material.

To the west of ditch CD 1, and possibly associated with it, was a short stretch of north-south orientated ditch (LD 4), at least 10m long x 0.60m wide and 0.60m deep. It contained a peat-rich fill which was not fully excavated as it partly lay beyond the west edge of excavations.

PHASE 3- LATE IRON AGE TO POST- MEDIEVAL (not illustrated)

The nature of the fills of these features, which cut Phase 2 features, was similar to the fills of those features described above and this suggests that they could also date to the late Iron Age Age or Romano-British period, although they could be of later date. A Curvilinear gully (CG 1; Fig 4, F49, F51 and Fig. 5a) 4.0m x 0.40-0.50m wide and 0.10-0.20m deep, which was filled with greyish brown silty clay, cut earlier Phase 1 and 2 ditches CD 2 and EN 1.

Phase 2 enclosure ditch EN 1 was cut by a large pit (F37, Figs. 4 and 5b), extending beyond the west edge of excavation. Pit F37 was 3.10m x at least 1.90m and approximately 0.90m deep, the base and lower sides of the pit were disturbed by tree roots and it was not fully excavated for safety reasons. It contained three silty fills, all rich in waterlogged roots and wood.

PHASE 4- POST- MEDIEVAL (not illustrated)

The natural subsoil at the extreme south part of the site was overlain by a layer of dark brown silty clay (1011) containing sherds of late 18^{th} or 19^{th} century pottery. The presence of this layer may possibly be associated with the construction of the adjacent Division Drain during the post-medieval period.

Post-medieval drainage features (Plate 1) were present in the form of similarly aligned regularly spaced linear ditches on mainly northeast-southwest alignments. These drainage features cut the Phase 1 and 2 features described above and layer 1011. Several of these drainage features were sample excavated during the evaluation, and were found to have mainly vertical sides, with generally flat bases and had identical peaty loam fills.

Layer 1011 and natural subsoil 1012 were sealed by dark brown sandy clay topsoil (1010), 0.15-0.35m deep.

UNPHASED

South of the Phase 1 ditch LD 2 was a sub-circular pit (F117, Figs. 4 and 5c), 1.40m x 1.56m and 0.52m deep, with steep sides and a slightly rounded base. It was filled with a primary deposit of silty grey clay and a final fill of black sandy silt. The nature of the fills of this feature, which was similar to the fills of the Phase1-3 features, suggests that it may date to the Iron Age or Romano-British period.

THE FINDS

FLINT
Lynne Bevan

An unfinished pre-form for a leaf-shaped arrowhead of Neolithic date, with extensive pressure flaking on the ventral surface, was recovered from the recut of ditch LD 2 (F9, 1025). The raw material used is a good quality translucent light brown flint.

POTTERY
Annette Hancocks

The pottery assemblage consisted eleven sherds (45g) of post-medieval pottery, recovered from layer 1011, modern plough furrows or from tree boles. Diagnostic pieces were rare, although blue and white transfer printed wares and a large fragment of manganese ware were recognised. These were dated to the late 18^{th} or 19^{th} century.

ANIMAL BONE
Emma Hancox

Context 1099 (F64, LD 1) contained poorly preserved fragments of animal bone: a probable long bone and jaw bone, although these were not identifiable to species. A few unidentifiable fragments of animal bone were also recovered from the post-medieval drainage features.

THE ENVIRONMENTAL EVIDENCE

RADIOCARBON DATING

Laurence Jones

Samples were taken from three ditch fills and submitted to the University of Waikato Radiocarbon Dating Laboratory for radiocarbon dating. The results are shown in Table 1.

Table 1: Radiocarbon dating results

context/ feature/ construct	**lab code**	**material**	**conventional age**	**1 sigma cal. (68.2 % probability)**	**2 sigma cal. (95.4 % probability)**
17004 F1700 LD 2	Wk-10973	wood (*Betula/ Alnus*)	1999±123 B.P.	180 BC – 140 AD	400 BC – 350 AD
1100 F65 (top) CD 1	Wk-12979	wood fragment	1989±43 B.P.	50 BC – 70 AD	100 BC – 130 AD
1101 F65 (base) CD 1	Wk-12978	wood (*Alnus*)	1968±43 B.P.	40 BC – 30 BC (3.1%) 20 BC – 10 BC (4.6%) 01 AD – 80 AD (60.5%)	50 BC – 130 AD

WATERLOGGED WOOD

Rowena Gale

Introduction

This report presents the identification of wood samples recovered from fills of ditches LD1, LD2, LD3 and CD1, and pit F37. The samples were assessed for their potential to provide suitable material for C14 dating.

Method

The samples contained roundwood. Preservation varied from fairly firm to very degraded; some samples retained bark. The samples were prepared using standard methods (Gale and Cutler 2000). The anatomical structures were examined using transmitted light on a Nikon Labophot-2 compound microscope at magnifications up to x400. The taxa identified were matched to prepared reference slides of modern wood. When possible stem diameters and the number of growth rings were recorded.

Results

The taxa identified are presented in Table 2, which also records the diameters and ages of the stems. Classification follows that of *Flora Europaea* (Tutin, Heywood *et al* 1964-80). Group names are given when anatomical differences between related genera are too slight to allow secure identification to genus level. These include members of the Pomoideae (*Crataegus, Malus, Pyrus* and *Sorbus*) and Salicaceae (*Salix* and *Populus*). Where a genus is represented by a single species in the British flora this is named as the most likely origin of the wood, given the provenance and period, but it should be noted that it is rarely possible to name individual species from wood features, and exotic species of trees and shrubs were introduced to Britain from an early period (Godwin 1956; Mitchell 1974). The anatomical structure of the charcoal was consistent with the following taxa or groups of taxa:

Betulaceae. *Alnus glutinosa* (L.) Gaertner, European alder

Corylaceae. *Corylus avellana* L., hazel

Rosaceae. Subfamily Pomoideae, which includes *Crataegus* sp., hawthorn; *Malus* sp., apple; *Pyrus* sp., pear; *Sorbus* spp., rowan, service tree and whitebeam. These taxa are anatomically similar; one or more taxa may be represented in the charcoal.

Salicaceae. *Salix* sp., willow, and *Populus* sp., poplar. In most respects these taxa are anatomically similar, although in this instance the heterocellular ray cells suggest willow as the more likely.

Ditch LD 1

This ditch was aligned east-west and was the most northerly ditch excavated. A sample was examined from context 1128 (F83, LD 1). The sample included two very degraded pieces of alder (*Alnus glutinosa*).

Ditch LD 2

Ditch LD 2 ran parallel to, and south of, ditch LD 1. Samples were examined from F11, F45 and F85. A relatively large number of alder (*Alnus glutinosa*) roundwood fragments were present in 1014 (F11, LD 2), close to the eastern edge of the excavations. These ranged in diameter from 8- 25 mm and in age from 2- 7 years. A few pieces had retained bark but most were degraded. Two of the wider fragments bore oblique tool-marks at one end. A piece of hazel roundwood was also recorded (diameter 12mm, 4 growth rings).

Samples from F45 and F85 were from the primary cut of ditch LD 2. The sample from 1069 (F45, LD 2) consisted of a single piece of very degraded roundwood that measured about 35mm in diameter and was provisionally identified as a member of the hawthorn/ *Sorbus* group (Pomoideae). The sample from 1130 (F85, LD 2) contained a piece of alder (*Alnus glutinosa*) about 30mm in diameter, with an oblique tool-mark at the upper end.

Ditch LD 3

This ditch was orientated parallel to LD1 and LD2. The sample from 1039 (F22, LD3) contained a single piece of willow (*Salix* sp.) or poplar (*Populus* sp.) (most likely willow) with a diameter of 25mm and about 16 growth rings. Oblique tool-marks were recorded at each end.

Ditch CD 1

This curvilinear ditch was located at the western boundary of the site and cut ditch LD1. An assemblage of roundwood was recovered from 1102 (F66, CD1). Eight pieces were identified as alder (*Alnus glutinosa*), measuring from 15-50mm in diameter and from 5- 10 years in age. Most of these were fairly fast-grown and four pieces included wide annual rings in the first two or three years growth, which could implicate origins from coppiced stock.

Pit F37

Pit F37 was located on the western boundary of the site. A large piece of very degraded roundwood, measuring about 60mm in diameter, was identified as a member of the hawthorn/ *Sorbus* group (Pomoideae).

Discussion

Fragments of wood from the base of two of the ditches provided a radiocarbon dates of 400 BC-350 AD (Wk 10973; 1999 ± 123 BP 400) for ditch LD 2 and 50 BC-130 AD (Wk-12978; 1968 ± 43 BP) for ditch CD 1. Associated features were thus attributed to the Iron Age/ Romano-British period.

Waterlogged roundwood was examined from ditches LD1, LD2, LD3 and CD1, and pit F37. The species identified included alder (*Alnus glutinosa*), willow (*Salix* sp.) or poplar (*Populus* sp.), hazel (*Corylus avellana*) and member/s of the hawthorn/ *Sorbus* group (Pomoideae) (see Table 2). The origin of the roundwood is unknown and, while some may represent fallen tree/ shrub debris, slash marks recorded on alder and willow/ poplar (probably willow) attest to either the clearance of scrub or wood collection (see Table 2).

The analysis of pollen and plant macrofossils suggests that waterlogging was frequent at the site (see Greig below) and this is supported by the name of the site. The dominance of alder in the wood samples correlates with these findings. Alders and other wetland species, e.g., willow, may have grown alongside the ditches or on wet ground nearby. Growth rates were rather variable and although conspicuously fast-growth was noted in alder stems from F66 could indicate coppicing or managed woodland, rapid growth such as this could also result from particularly favourable growing conditions. Hazel and hawthorn/ *Sorbus*, however, require dryer soils.

Conclusions

Samples of waterlogged roundwood collected from ditches and a pit associated with Iron/ Age and Romano-British field systems were identified as predominantly alder (*Alnus glutinosa*), but also included willow (*Salix* sp.) and poplar (*Populus* sp.), hazel (*Corylus avellana*) and member/s of the hawthorn/ *Sorbus* group (Pomoideae). The dominance of wetland species (e.g. alder), was in keeping with the character of the environment as indicated by the analysis of pollen and plant macrofossils. Oblique tool-marks were recorded on several pieces of roundwood.

Table 2: Identified waterlogged wood

Context	Feature	Construct	Taxon identified	Round-wood	No. of growth rings	Diameter (mm)	Comments
1014	F11	LD2	alder (*Alnus glutinosa*)	Yes	2	8	Bark absent
			alder (*Alnus glutinosa*)	Yes	4	15	Bark absent
			alder (*Alnus glutinosa*)	Yes	5	25	Bark retained. Oblique tool-mark
			alder (*Alnus glutinosa*)	Yes	-	-	Fragment
			alder (*Alnus glutinosa*)	Yes	-	-	Fragment
			alder (*Alnus glutinosa*)	Yes	-	-	Fragment
			alder (*Alnus glutinosa*)	Yes	-	25	Very degraded
			alder (*Alnus glutinosa*)	Yes	5	20	Bark retained. Tool-mark at one end
			alder (*Alnus glutinosa*)	Yes	3	8	A collection of narrow and rather degraded roundwood
				Yes	4	8	
				Yes	6	10	
				Yes	7	15	
				Yes	6	12	
			hazel (*Corylus avellana*)	Yes	4	12	-
1039	F22	LD3	willow (*Salix* sp.) or poplar (*Populus* sp.)	Yes	*c.*16	25	Oblique tool-marks at each end
1102	F66	CD1	alder (*Alnus glutinosa*)	Yes	10	15	Bark retained.
				Yes	6	20	Very degraded
				Yes	9	20	-
				Yes	7	21	Early growth rings wide
				Yes	8	21	Early growth rings wide
				Yes	5	22	-
				Yes	5	25	Early growth rings wide
				Yes	10	50	Bark retained. Early growth rings wide
1057	F37	Pit	*cf.* hawthorn/ *Sorbus* group (Pomoideae)	Yes	-	60	Very degraded. Outer surface abraded
1069	F45	LD2	*cf.* hawthorn/ *Sorbus* group (Pomoideae)	Yes	*c.*16	35	Very degraded
1128	F83	LD1	alder (*Alnus glutinosa*)	?	-	-	Two very degraded fragments
1130	F85	LD2	alder (*Alnus glutinosa*)	Yes	-	*c.* 30	Bark retained but in poor condition. Oblique tool mark at upper end.

POLLEN AND PLANT MACROFOSSILS

James Greig

The environmental work aims to discover the occupation history of the area and the development of the landscape as a result of it.

The main features exposed by excavation were ditches which often had peaty or organic fills, which were bulk sampled as part of the normal excavation work. The site was visited by the writer on August 22nd 2002 and three of these features were sampled, mainly for pollen, at an interval of 2.5 cm. A single sample from a fourth feature F93 (LD 2) was obtained at a later date. Samples from three of these features were analysed at an interval of 2.5 cm, mainly for pollen. Ditch F65 (CD 1) was 0.80 cm deep and the lower 0.50 cm was sampled in monolith boxes. Ditch F79, (EN 1) was 0.45 cm deep, ditch F98 (LD 1) was also 0.45 m deep and ditch F93 (LD 2) was 0.70m deep.

Methodology

Pollen analysis

Samples were prepared for pollen analysis from F65 every 10 cm from 0-80 cm, from F79 samples from 10 cm, 20 cm and 40 cm and from F98 samples from 10 cm, 20 cm and 40 cm were prepared.

The pollen samples were processed using the standard method; about 1 cm^3 sub-sample was dispersed in dilute NaOH and filtered through a 70μm mesh to remove coarser material, which was then scanned under a stereo microscope, providing a few macrofossil identifications. The finer organic part of the samples was concentrated by swirl separation on a shallow dish. Fine material was removed by filtration on a 10μm mesh. The material was acetolysed to remove cellulose, stained with safranin and mounted on microscope slides in glycerol jelly. Counting was done with a Leitz Dialux and HM Lux microscopes. Identification was using the writer's pollen reference collection, seen with a Leitz Lablux microscope. Standard reference works were used, notably Fægri and Iversen (1989) and Andrew (1984). The pollen diagram was calculated and drawn up using the TILIA and TILIA.GRAPH programmes (Grimm 1986).

Macrofossil analysis

Sub-samples were taken from bulk samples. Small samples of 75-100 cm^3 were measured out and dispersed in water. The organic material was separated from sand by washing over from one container into another. The fine material was removed by sieving on a mesh of about 0.5 mm, and the material was sorted in water and identifiable remains identified, with the aid of a PZO stereo microscope.

Results

Pollen

The material was mainly organic and peaty, with a little sand. There was usually very little organic residue from the samples on the 70μm mesh, although a few seeds and insect remains were present. Pollen was abundant and very well-preserved in all the samples, except F79 at 40 cm and F65 at 80 cm. In order to obtain the maximum useful information, small pollen counts have been done on many samples, to obtain a sequence from F65, which has been drawn up as a pollen diagram (Fig. 6). The other samples have been looked at, and are similar in pollen content.

Macrofossils

Samples from 1101 and 1100 (F65, CD 1), 1139 (F98, LD 1) and 1141 (F93, LD 2) have been examined for macrofossils, which are listed in Table 3.

Discussion

All the pollen and macrofossil results can be discussed together in terms of their relevance to the interpretation of the site, as they seem to tell parts of the same story.

The pollen results from the ditches CD 1 (F65, Fig. 6), EN 1 (F79) and LD 1 (F98) are rather similar, with large amounts of *Alnus* (alder), Poaceae (grasses) and Cyperaceae (sedges), and the macrofossil results also show large amounts of alder and plants of marshes and wetlands, and some grassland plants.

Trees, scrub, heathland

The pollen shows that there was carr woodland with *Alnus* (alder) and *Salix* (willow) at Balby Carr. This was confirmed by very abundant alder seeds and catkin remains, and some willow buds. Alder pollen was so abundant as potentially to distort the other results, so it was left out of the pollen sum, used for calculating the percentages, but reaches values of 50-150%. The signs of alder and willow carr are strongest in the lower part of the profile, from 70-50 cm. There are various indications of other plants of carr, thorny scrub or hedgerow, such as *Crataegus* (hawthorn) and *Rhamnus catharticus* (buckthorn) pollen, and seeds of *Rubus Glandulosus* (bramble), *Rosa* (wild rose).

The record of Ericales (heathers) shows that there was some heathland or moorland. Other woodland with *Fagus* (beech), *Quercus* (oak), *Tilia* (lime) and *Fraxinus* (ash) may have grown on less wet land further away. The most likely area for such woodland near to Balby Carr is the limestone to the west through which the River Don has cut a gorge. A sample collected during the earlier evaluation of the site (17003, F1700, LD 2) showed more signs of substantial woodland with *Quercus* (oak), *Tilia* (lime) and *Ulmus* (elm) and rather less of local alder carr than the present series (Greig 2002), so the alder may have grown in patches.

Swamp

The records of wetland plants are very abundant as is normal for waterlogged deposits, and show that there was local reedswamp, at least in and along the ditches, with Cyperaceae (sedges etc.), *Sparganium* tp. (bur-reed), *Filipendula* (meadowsweet) and a range of other wetland plants in the pollen record. The ditches were water-filled, as shown by floating aquatic plants such as *Ranunculus* subg. *Batrachium* (water crowfoot) pollen and very abundant seeds, and records of *Myriophyllum* (milfoil), *Zannichellia* (horned pondweed), and the floating grass *Glyceria* (sweetgrass). *Oenanthe* (water dropwort) and *Apium* (marshwort) correspond with the Apiaceae pollen record, and would have grown with *Sparganium* (bur-reed) in or beside a wet ditch. Although some of these plants could have grown under alder carr, it seems more likely that the trees were growing up to the ditches, or as a row along them, leaving plenty of open space for the swamp plants to grow in.

Grasslands

Plants of open land amount to about 75% of the pollen, so the landscape does not seem to have been densely wooded. Some records such as Poaceae (grasses) could represent a range of habitats, including grassland, but there are a number of grassland plants that can be identified from the pollen record. The macrofossils tend to give a much more local picture than pollen, and only the sample from 1141 (F93, LD 2) provided much macrofossil evidence of what was happening on dry land. Some of the grassland seems to have been damp, with *Filipendula* (meadowsweet), *Carex* (sedge), *Cirsium* (marsh thistle), growing perhaps in damper places or closer to the ditches, and characteristic of the recent appearance of Balby Carr. Other plants seem to show meadow or pasture with *Ranunculus* (buttercup), *Trifolium repens* (white clover), *Prunella vulgaris* (self-heal), *Plantago lanceolata* and *P. major* (ribwort and greater plantains), *Centaurea nigra* (knapweed), *Leontodon* sp. (hawkbit) (the latter corresponding to the Lactuceae pollen record) identified from pollen or seeds.

Possible arable land

There is a small but consistent record of Cerealia type pollen. This pollen type overlaps in size with *Glyceria* (sweet-grass) which was present. *Secale* type (possible rye) was also present. However, there does seem to be an indication of some cultivated land in the general area. The records of cereal pollen are constant throughout, and suggest a steady level of human activity, if not directly on the spot. Samples from 1141 (F93, LD2) and from 17003 (F1701, LD 2), collected during the earlier evaluation, contained charcoal, which indicates human activity there.

A grassland landscape with hedges and patches of wood?

The likeliest interpretation of the landscape of Balby Carr from these results seems to be of grasslands ranging from drier to damper in nature, bordered by water-filled ditches which probably had hedgerows running beside them, perhaps to divide the land and to keep stock in particular parts, or for drainage. There may also have been some carr woodland and/ or scrub, perhaps if there were phases with less intense occupation of the area. This agrees with the idea of essentially open landscapes with farmsteads interspersed with fields and copses of managed woodland (Buckland 1986).

Some slight evidence of change with time can be seen in the reduction in alder and willow between 50 and 40 cm (Fig. 6), suggesting that some of the alder carr might have been cleared. At the same time there is an increase in the records of many land herbs, which is probably a response to this opening up.

Correlation with other sites

The results from Balby Carr seem to be comparable with those from some other Iron Age sites. At Dragonby, near Scunthorpe, Lincolnshire (Holland 1975 and Hayes 1996), there were roughly contemporary clearances of woodlands, indicating increases in occupation pressure. On the sandy land there, woodland was replaced by heathland, not seen to the same extent at Balby Carr, but ditch fills contained signs of alder carr which seem very similar to the results obtained from Balby Carr. At Iron Age Tattersall Thorpe, Lincolnshire, (Chowne, Girling and Greig 1986), a ring ditch fill also showed signs of grassland, and beetle remains gave evidence of pasture. A number of other Iron Age sites, mainly on river floodplains, have given such a picture. The consistent evidence for cattle meadows is not surprising, for waterlogged remains are mainly found in somewhat damp, low-lying places, and these in turn have always been more suitable for grassland than arable farming. Cereals were grown together with a range of other crops in the Iron Age, but on somewhat drier soils where mainly charred remains are preserved. It is hard to say whether the economy was really a mixed one, or mainly based on stock rearing.

Table 3: Plant macrofossils identified

Context	1101	1100	1139	1141	
Feature/ construct	F65/ CD 1	F65/ CD 1	F98/ LD 1	F93/ LD 2	
Sample size	100 ml	<100 ml	50 ml	100 ml	
Ranunculus sect. *Ranunculus*	-	-	-	3	buttercups
Ranunculus flammula L.	-	-	-	10	lesser spearwort
Ranunculus subg. *Batrachium*	15	-	1	307	water crowfoot
Ranunculus sceleratus L.	1	-	-	-	celery-leaved buttercup
Urtica dioica L.	-	1	-	-	common nettle
Alnus glutinosa (L.) Gaertner seed	5	72	-	-	alder
Alnus glutinosa (L.) Gaertner catkin	1	11	-	-	alder
Chenopodium cf. *ficifolium* Smith	-	-	-	2	stinking goosefoot
Montia fontana subsp. *minor* Hayw.	-	-	-	1	blinks
cf. *Cerastium* sp.	-	1	-	1	mouse-ear chickweed
Persicaria cf. *hydropiper* (L.) Spach	-	-	-	1	water-pepper
Rumex sp.	2	-	-	7	dock
Rumex acetosella L.		1	-		sheep's sorrel
Salix sp. bud	2	-	-	1	willow
Rubus cf. sect. *Glandulosus*	7	47	-	1	bramble
Rosa/Rubus thorn	2	33	-	-	bramble or rose
Potentilla anserina L.	-	-	-	3	silverweed
Rosa sp. rosehip, seed	-	4	-	-	wild rose
? *Ilex aquifolium* L. (leaf)	-	1	-	-	holly
Hydrocotyle vulgaris L.	2	-	-	-	marsh pennywort
Oenanthe cf. *aquatica* (L.) Poiret	19	5	-	-	water dropwort
Apium nodiflorum/inundatum	9	-	-	-	marshwort or fool's water-cress
Prunella vulgaris L.	-	-	-	1	self-heal
Plantago major L.	-	-	-	4	greater plantain
Cirsium cf. *palustre* (L.) Scop	1	-	-	3	mash thistle
Cirsium vulgare or *arvense*	-	-	-	1	spear or creeping thistle
Leontodon sp.	-	-	-	1	hawkbit
Sonchus asper (L.) Hill	-	-	-	2	prickly sow-thistle
Eupatorium cannabinum L.	3	-	-	-	hemp agrimony
Alismataceae	2	-	-	4	water plantain
Zannichellia palustris L.	-	-	-	1	horned pondweed
Carex subg. *Vignea*	2	-	-	3	sedge
Carex subg Carex	7	-	-	2	sedge
Glyceria sp.	-	1	-	2	sweet-grass
Poaceae nfi	-	-	-	1	grasses
Sparganium sp.	6	1	-	-	bur-reed

THE INSECT REMAINS

David Smith and Emma Tetlow

Introduction

Four soil samples were collected from the organic fills of three ditches (CD 1, LD 2 and EN 1. It was hoped that the analysis of the insect remains from these deposits might provide information as to the use of the landscape surrounding the ditches when this ditch system was active.

Methods and analysis

The samples were processed using the standard method of paraffin flotation as outlined in Kenward *et al.* (1980) and sorted and identified under a low-power binocular microscope.

Where achievable the insect remains were identified to species level by direct comparison to specimens in the Gorham and Girling insect collections housed in the Institute for Archaeology and Antiquity, University of Birmingham.

The taxa recovered are presented in Table 4. The nomenclature follows that of Lucht (1987). The majority of the taxa present are beetles (Coleoptera) with only a limited number of caseless caddis flies (Tricoptera).

In order to aid interpretation the taxa present have been assigned to ecological groupings following a simplified version of the scheme suggested by Robinson (1981; 1983). The affiliation of each species to a particular ecological grouping is coded in the second column of Table 4. The meaning of each ecological code is explained in the key at the base of Table 4. The occurrence of each of the ecological groupings is expressed as a percentage in Table 5. The pasture/ grassland, dung and woodland/ timber species are calculated as percentages of the number of terrestrial species, as opposed to the whole fauna.

Column four in Table 4 indicates those species of beetle that are associated with specific plants. The ecology for this information is mainly derived from Koch (1989, 1992).

Results

The four insect faunas recovered from the ditch fills at the site are very similar in their overall nature and will be discussed together.

<u>The environment of the ditches</u>

The insect faunas recovered are relatively large and diverse but are dominated by taxa which are either associated with slow flowing bodies of water or with watersides. This is clearly demonstrated by the fact that ecological groupings 'a' (aquatic) and 'ws' (waterside) when combined account for between 50% and 75% of all individuals recovered (Tables 4 and 5). This suggests that the vast majority of the insect faunas recovered are very local in origin and probably come from the ditches rather than the surrounding landscape. From the ecology of the species of water beetle recovered it is clear that all the ditches contained bodies of slow flowing, and probably stagnant, water filled with aquatic vegetation. This is clearly suggested by the presence of a number of species such as *Hygrotus inaequalis, Hydroporus dorsalis, H. palustris, Porhydrus lineatus, Noterus crassicornis, Hudreana testacea, Octhebius minimus, Hydrochus carinatus, H. brevis, Coelostoma orbiculare, Limoxenus niger, Cymbiodyta marginella* and *Chaetarthria seminulum* (Holmen 1987; Nilsson and Holmen 1995).

A number of the phytophage (plant feeding) species recovered, such *as Tanysphyrus lemnae,* suggest that areas of the ditches were covered in floating vegetation such as duck weed (*Lemna* species). Areas of the ditch system also contained reed beds and stands of other waterside vegetation. These stands were composed of species such as *Phragmites communis* (common water reed), *Sparganium* ramosum (branched bur reed), *Glyceria maxima* (reed sweet grass) and *Scirpus* (rushes). These are the food plants of *Plateumaris braccata, Donacia marginata, Notaris acridulus* and *N. scirpi* respectively (Koch 1992).

Several of the species of Carabidae 'ground beetles' recovered are also associated with waterside environments with wet ground, muddy areas and stands of dense vegetation. This is particularly the case with species such *Elaphrus cupreus*, *Poecilus cureus* and the various *Pterostichus species* (Lindroth 1974).

Past landscape and land use

One of the main problems in interpreting the insect faunas recovered from the site is that, since the majority of the taxa , appear to be very local to the ditches, there are proportionally very few taxa that are indicative of the surrounding wider environment. As a result, these insect faunas may not give a complete or total reconstruction of the use of this landscape. However, there is a suggestion that grazing and pasture were present in the area. All of the four samples produced small faunas of *Aphodius* 'dung beetles' and other species such as *Sphaeridium bipustulatum and Platystethus arenarius* that are associated with the dung of large grazing animals. Equally, also present are a limited fauna of species that are associated with plants such as *Rumex* (dock), *Plantago* (plantain) *and Urtica dioica* (stinging nettle). These are all species of plant which are relatively common in grasslands, pastures and disturbed ground.

It would also seem that the landscape was essentially clear of woodland and forest. There are very few taxa which are associated with trees or rotting wood (see ecological grouping 't' in Tables 4 and 5) but like *Phylodecta and Rhamphus pulicarius* they are associated with *Salix* (willow) or *Alnus* (alder) both species of tree which could have grown along the banks of the ditch system. The only species which might represent some woodland in the area is the scolytid *Lepresinus* varius which is associated with *Fraxinus* (ash).
This reconstruction is broadly in line with the results of the pollen analysis from these deposits by Grieg (above).

Discussion

It is clear, from the ecology of the species recovered, that the Iron Age and Romano-British ditch system at Balby Carr was set in an essentially cleared landscape, which was probably dominated by pasture land. Whether the reconstruction of weed filled ditches containing slow flowing water relates to the period of the time of use of these ditches or after their abandonment is not clear.

In terms of comparable archaeological sites to that at Balby Carr there are no insect faunas from this type of deposit and period in the area around Doncaster and South Yorkshire in general. Most insect analysis in the county has concentrated on earlier glacial deposits (i.e. Buckland and Sadler 1985) or the Bronze Age forests on Thorne and Hatfield Moors (Buckland 1979, Whitehouse 1997, 2004).

The faunas recovered from Balby Carr compare well with a number of Iron Age field systems from other areas of Britain. For example those at Farmoor (Robinson and Lambrick 1979) and Mingies Ditch, Oxfordshire (Robinson 1993). Though at present unpublished, insect faunas from Romano- British period field systems at Little Paxton Cambridgeshire (Smith 2003), Rectory Farm, Lincolnshire (Smith 1996a), Blaco Hill, Nottinghamshire (Smith 1996b), Covert Farm, Northamptonshire (1998) and Whitemore Haye, Staffordshire (Smith 2000) confirm the same pattern of land use as those from Balby Carr.

The insect faunas recovered from Balby Carr, therefore, fit with the suggestion that by late prehistory many river valleys in Britain were thoroughly cleared of forest and had become a predominantly mixed agricultural landscape of which pasture or meadow was a common component (Robinson 1978). The faunas from Balby Carr also confirms that the community of insects and beetles commonly associated with cultivated ground and farmland today was fully developed by this time.

Table 4: The insect remains

Context number	Ecology	1087	1088	1141	1148	Host plants
Feature number		F56	F56	F93	F99	
Construct number		CD1	CD1	LD2	EN1	
Carabide						
Leistus sp.		-	-	1	-	
Elaphrus cupreus Duft.	ws	-	-	1	-	
Dyschirius globosus (Hbst.)		-	1	1	-	
Trechus rivularis (Gyll.)	ws	1	-	-	-	
Trechoblemus micros (Hbst.)	ws	-	1	-	3	
Bembidion semipunctatum (Donov.)	ws	1	-	-	-	
B. spp.		2	2	2	3	
Bradycellus sp.		1	-	-	-	
Acupalpus sp.		1	2	-	-	
Harplus spp.		1	-	-	1	
Poecilus cupreus (L.)	ws	-	1	-	-	
Pterostichus nigrita (Payk.)	ws	1	-	3	-	
P. minor (Gyll.)	ws	2	2	1	3	
P. dilgens (Sturm)		-	-	2	-	
Agonum spp.	ws	1	-	3	2	
Amara spp.		1	1	-	1	
Chlaenius sp.	ws	-	-	1	-	
Dromius quadrimaculatus (L.)	t	2	-	-	1	
Halipidae						
Haliplus spp.	a	-	7	-	-	
Dytiscidae						
Hygrotus inaequalis (F.)	a	3	11	-	-	
Hydroporus dorsalis (F.)	a	-	3	-	-	

H. palustris (L.)	a	-	2	-	-	
H. planus (F.)	a	1	2	-	-	
H. spp.	a	-	4	-	-	
Porhydrus lineatus (F.)	a	1	1	-	-	
Noterus crassicornis (Müll)	a	-	-	-	1	
Agabus bipustulatus (L.)	a	1	-	-	-	
A. spp.	a	3	1	-	-	
Colymbetes fuscus (L.)	a	1	-	1	-	
Dytiscus sp.	a	1	-	-	-	
Gyrinidae						
Gyrinus spp.	a	2	-	1	1	
Hydraenidae						
Hydraena spp.		6	-	-	3	
H. testacea Curt.	a	-	4	1	-	
H. spp.	a	-	-	1	3	
Ochthebuis minimus (F.)	a	7	17	1	-	
O. spp.	a	68	72	10	14	
Limnebius spp.	a	1	11	6	-	
Hydrochus carinatus Germ.	a	1	5	-	-	
H. brevis (Hbst.)	a	-	-	1	1	
H. spp.	a	1	8	-	-	
Helophorus spp.	a	3	-	-	-	
Hydrophilidae						
Coelostoma orbiculare (F.)	a	1	-	6	-	
Sphaeridium bipustulatum F.	d	-	-	1	-	
C. analis (Payk.)	d	-	-	1	-	
C. tristis (Ill.)	a	-	1	6	-	
C. sternalis shp.	a	1	-	3	1	
Megasternum boletophagum (Marsh.)		-	-	3	-	
Hydrobius fuscipes (L.)		1	3	1	-	
Limnoxenus niger (Zschach)	a	-	-	1	-	
Enochrus spp.	ws	-	8	1	-	
Cymbiodyta marginella (F.)	ws	3	5	1	-	
Chaetarthria seminulum (Hbst.)	ws	-	-	1	-	
Histeridae						
Onthophilus striatus (Forst.)	d	-	-	1	-	
Hister cadaverinus Hoffm.	d	-	1	-	-	
Silphidae						
Thanatophilus rugosus (L.)	-	-	1	-	-	
Clambidae						
Clambus sp.	-	1	-	-	-	
Scydmaenidae						
Scydmaenidae gen. & spp. indet.	-	1	-	-	-	
Orthoperidae						
Corylophus cassidoides (Marsh.)	ws	12	-	1	-	
Ptiliidae						
Ptiliidae gen. & spp. indet.		1	-	-	-	
Staphylindae						
Micropeplus staphylinoides (Marsh.)		1	-	-	-	
Olophrum piceum (Gyll.)	ws	2	-	-	-	
Lesteva longelytrata (Goeze)	ws	-	-	1	-	
Trogophloeus bilineatus (Steph.)	ws	-	-	1	-	
T. corticinus (Grav.)	ws	2	-	-	-	
Aploderus caelatus (Grav.)		1	-	-	-	
Oxytelus rugosus (F.)	d	4	1	-	-	
O. nitidulus Grav.	d	-	1	-	-	
Platystethus arenarius (Fourcr.)	d	-	1	-	-	
P. capito Heer	ws	-	1	-	-	
P. nitens (Sahlb.)	ws	-	-	1	-	

Stenus spp.		5	3	1	3	
Paederus spp.	ws	1	-	-	-	
Stilicus orbiculatus (Payk.)		-	1	-	-	
Lathrobium spp.		1	-	1	4	
Xantholinus spp.		1	3	5	-	
Neobisnius spp.		-	1	-	-	
Philonthus spp.		4	3	1	-	
Mycetoporus sp.		1	-	-	-	
Tachinus rufipes (Geer)		-	-	1	-	
Tachinus spp.		1	-	-	-	
Aleocharinae Gen. & spp. indet.		10	1	4	1	
Pselaphidae						
Rybaxis spp.		1	-	-	-	
Trissemus impressus (Panz.)		1	-	-	-	
Elateridae						
Ctenicera pectinicornis (L.)		-	1	-	-	Larvae normally in turf
Athous haemorrhoidalis (F.)	g	1	-	1	-	Larvae normally in turf
Throscidae						
Throscus spp.	t	-	-	4	-	In rotting wood
Helodidae						
Helodidae (?Cyphon spp.)	ws	5	-	10	-	
Dryopidae						
Dryops spp.	ws	7	3	1	1	
Heteroceridae						
Heterocerus spp.	ws	-	1	-	-	
Nitidulidae						
Cateretes spp.	g	3	1	1	-	
Brachypterus urticae (F.)	g	1	-	1	-	On *Urtica* species
Meligethes spp.	g	1	-	2	-	
Cryptophagidae						
Cryptophagus sp.		1	-	-	-	
Phalacridae						
Phalacurus substriatus Gyll.	ws	1	-	1	1	Often on smutted *Carex*
Stilbus spp.	ws	1	-	-	-	
Lathridiidae						
Lathridius spp.		1	1	-	-	
Corticaria/ corticarina spp.		2	-	-	-	
Colydiidae						
Cerylon sp.	t	-	-	-	1	In rotting wood
Anobiidae						
Anobium punctatum (Geer)	t	-	-	1	-	In rotting wood of various hard wood trees
Scarabaeidae						
Aphodius fossor (L.)	d	-	1	-	-	
A. sphacelatus (Panz.) or *A. prodromus* (Brahm.)	d	-	3	4	-	
A. fimetarius (L.)	d	-	1	-	-	
A. ater (Geer)	d	-	-	3	1	
A. spp.	d	2	-	-	-	
Phyllopertha horticola (L.)	g	1	1	1	-	Turf in pastures and meadows
Chrysomelidae						
Donacia marginata Hoppe	ws	1	-	-	-	*Sparganium ramosum*
Plateumaris braccata (Scop.)	ws	1	-	-	-	*Phragmites communis*
Chrysomela polita (L.)	g	-	1	-	-	*Mentha aquatica* and other *labiate* taxa
Gasroidea polygoni (L.)	g	-	-	1	-	*Rumex* and *Polygonum* species

Phyllodecta spp.	t	-	1	-	-	Often on *Salix* or *Alnus*
Phyllotreta spp.	-	1	6	-	-	
Haltica sp.	t	1	-	1	-	
Crepidodera sp.	g	-	-	1	-	
Chalcoides sp.	g	-	-	1	-	
Chaetocnema spp.		-	-	2	-	
C. spp.						
Scolytidae						
Leperisinus varius (F.)	t	1	-	1	-	Mainly on *Fraxinus*
Curculionidae						
Apion pomonae (F.)	g	1	-	1	-	On *Vicia species*
A. spp.	g	5	1	8	2	
Barynotus obscurus (F.)	g	-	-	-	1	On *Rumex* species
Sitona spp.	g	1	2	1	-	
Bagous spp.	ws	1	6	-	1	
Tanysphyrus lemnae (Payk.)	a	6	-	2	-	On *Lemna* species
Notaris scirpi (F.)	ws	-	-	1	-	*Scirpus* and *Carex* species
N. acridulus (L.)	ws	-	-	3	-	*Glyceria maxima*
Thyrogenes sp.	ws	-	-	-	3	
Ceutorhynchus spp.		-	-	-	1	
G. pascuorum (Gyll.)	g	1	-	-	-	*Plantago* species
G.	g	-	-	-	-	*Plantago* species
Rhamphus pulicarius (Hbst.)	t	1	-	-	-	*Alnus* species

Ecological groupings

a - aquatic species
ws - waterside species either from muddy banksides or from waterside vegetation
d - species associated with dung and /or foul matter
g - species associated with grassland and pasture
t - species either associated with trees or with woodland in general

Table 5: The statistics for the insects recovered

	1087	1088	1141	1148
Total number of individuals	219	223	133	58
Total number of species	74	52	63	26
% aquatic species (a)	46.6%	66.8%	30.1%	36.2%
% waterside species (ws)	19.6%	13.0%	24.1%	24.1%
% dung and foul matter species / number of terrestrial (d)	8.1%	20.0%	16.4%	4.3%
% grassland species / number of terrestrial (g)	20.3%	15.6%	31.1%	13.0%
% woodland and tree species / number of terrestrial (t)	6.8%	0.0%	11.5%	8.7%

DISCUSSION

DATING AND CHRONOLOGY

The residual find of an unfinished flint arrowhead of Neolithic date, recovered from one of the later ditch fills, provided evidence for early prehistoric activity. Although no pottery which could date the features was recovered, the site was probably first occupied during the mid to late Iron Age and was in use until at least 50 BC- 130 AD, on the basis of the radiocarbon dating of waterlogged wood recovered from ditch fills. This is consistent with a provisional late Iron Age date for similar ditches, excavated at land adjoining the site to the west, during 2003 and 2004, by West Yorkshire

Archaeological Services (WYAS 2003 and pers. comm. Dr Jane Richardson, Fig. 7). The lack of datable artefacts from the site at Balby Carr may be due to the fact that the site does not appear to have been used for domestic settlement and bone does not appear to survive well. The field enclosure system revealed during the excavation is a part of a landscape of 'brickwork' type enclosures in South Yorkshire. This is visible as a pattern of cropmarks on aerial photographs. These field enclosure systems are termed 'brickwork' pattern because they consist of many parallel boundaries dividing the land into long strips which are cut into rectangles by short cross boundaries (Riley 1977). The field enclosure system appears to have been added to over time and was not constructed during one period. At least two phases of enclosure ditch construction were identified.

THE FIELD SYSTEM

The two parallel ditches LD 1 and LD 2 (Fig. 3, Phase 1) appear to be part of the first phase of a field system probably constructed between the mid to late Iron Age and the early Romano-British period. These ditches may have been part of an elongated rectangular enclosure with the east and west sides presumably lying beyond the edges of the excavation. This morphology is similar to the field systems indicated by cropmark features to the south (Fig. 7), where linear boundaries appear to be cut into rectangles by shorter cross boundaries to form elongated rectilinear fields.

In the second phase of ditch construction (Fig. 3, Phase 2), in the late Iron Age or early Romano-British period, it is probable that the ditched rectilinear enclosures EN 1 and EN 2 were added to the field system. During this phase, between 50 BC- AD 130, the primary cut of Phase 1 ditch LD 1 was cut by curvilinear ditch CD 1 and evidence from the WYAS excavations (pers. comm. Dr Jane Richardson, Fig. 7) suggests this ditch formed the west side of subrectangular enclosure EN 1. This enclosure would have been approximately 52m north-south by 70m east-west, with a possible entrance at the northeast corner. The north side of enclosure EN 1 was formed by part of the recut of ditch LD 1, which appears to have terminated to the west, just short of ditch CD1, possibly forming another entrance at the northwest corner of the enclosure. In some places the east and south ditches of EN 1 showed evidence of a later episode of clearing out or recutting.

Provisional information from the WYAS excavation (pers. comm. Dr Jane Richardson, Fig. 7) suggests ditch CD 1 may have formed the east ditch of a possible droveway or trackway with ditch LD 4 forming the west ditch of this droveway.

Enclosure EN 2 may have been constructed at the same time as EN 1 or perhaps slightly later. As with EN 1, enclosure EN 2 had a possible entrance located at a corner. The north ditch of EN 2 was formed by part of the recut ditch of ditch LD 2 and this recut followed the same alignment as the south ditch of EN 1, curving to the northwest and forming a droveway or trackway about 4m wide, between the two enclosures. This droveway or trackway could be a continuation of that formed by ditches CD1 and LD 4, suggesting that it continued northwards, beyond the excavation, and around the west side of enclosure EN 1. Alternatively, there could be two separate droveways on different alignments. These droveways running between field enclosures, would probably have been used to move animals to other fields or perhaps to smaller stock enclosures, as was the case at Pickburn Leys, Doncaster (Sydes 1993).

Perhaps at the same time as enclosure EN 2 was constructed , or slightly later, ditch LD 3 may have been dug. Ditch LD 3 was at right angles to the west side of enclosure EN 2 and probably formed part of additional enclosures to the west.

The digging of a large pit and a curvilinear gulley provided evidence for a third phase of activity. Although this phase is more likely to be of late Iron Age or early Romano-British date, it could date to any period between this period and the post- medieval period.

Evidence from other sites in South Yorkshire and North Nottinghamshire is beginning to suggest that the origins of the 'brickwork' type field systems is earlier than previously thought (Chadwick 1997, 3). The enclosure set within a field system at Warning Tongues Lane, Bessacarr (Atkinson and Merrony 1994), 4km to the east of the site, could have had Iron Age origins, as could be the case at Edenthorpe (Atkinson 1994 and Chadwick 1995), 7 km to the northeast of the site. At Dunstan's Clump, Nottinghamshire (Garton 1987) some parts of the field system may date to before the late first century AD. Further evidence of a pre Roman date for the origin of the field systems comes in the form of Roman roads and forts which can be seen to cut across earlier cropmark field systems, as at Rossington (Riley 1980), 4km to the southeast of Balby Carr.

The evidence from environmental analysis could indicate that the large quantity of wood debris in the water-filled ditches may have been derived from hedges and trees growing adjacent to the ditches. There was no clear evidence of a bank running alongside the ditches found during the excavation. However, the field enclosure ditches would probably have had a bank, as was the case with two enclosures trial- trenched during an evaluation at Carr Lodge Farm (JSAC 2001), 1km to the south (Fig. 7, SMR 2134), which had upstanding earthworks. The banks, formed from the upcast from the digging of the ditches, would probably have had hedgerows growing on top of them. The ditches would have functioned as drainage and together with a bank and hedge would have formed a highly visible barrier, keeping stock in particular areas. These barriers may also have reflected ownership of the landscape and social relationships as recognised by Chadwick 'In a region of often gentle topography, especially to the south and east of Doncaster, ditches and associated banks and hedges would have been highly visible forms of discourse, with active roles in the reproduction of social relationships' (Chadwick 1997, 5).

The rectilinear field enclosure ditches and possible droveways revealed during the excavation appear to be similar in morphology to the cropmark features identified by aerial photography by Riley (1980), to the south of the site on the low-lying Loversall and Potteric Carr (Fig. 7) and are probably a continuation of them. These cropmark features formed a field system, similar to the 'brickwork' pattern field enclosures visible on aerial photographs of land across South Yorkshire and North Nottinghamshire. Riley, noted that these features on Loversall and Potteric Carr were of a slightly different morphology to elsewhere, being less regular. The soil-mark visible, on an aerial photograph, in a field immediately to the east of the site (Fig. 7, Cox 2002) is probably also a continuation of these cropmark features and may be a continuation of the ditches excavated on the site.

As mentioned above two enclosures to the south of the site have been the subject of geophysical survey and trial-trenching (Fig. 7, SMR 2134, JSAC 2001). This work suggested that the enclosures, which contained no artefacts, were used for seasonal containment of stock and had banks and hedges alongside them. Evidence of a double-ditched settlement enclosure (SMR no. 2135, Fig. 7), containing possible settlement features, can be seen amongst the cropmark field system to the south. The enclosure contained a circular feature and other internal features and was intersected by possible field boundaries and droveways.

FARMING AND LAND USE

No evidence of settlement enclosures, structures, crop-processing or storage facilities was encountered during the excavation. Presumably this is due to the wet low-lying nature of the site in the Iron Age and Romano-British periods and these features may be present on drier, better drained ground in the locality.

It is not clear to what extent the economy of the people who utilised the site depended on arable crops or animal husbandry. The existence of a probable droveway between enclosures suggests that livestock were being herded between enclosures and fields. The location of entrances at corners of the enclosures may suggest the enclosures were constructed to contain stock (Pryor 1998, 101). However, only a few fragments of unidentifiable animal bone were recovered from the site. This may be due to the poor survival of the bone in the acidic soil. There is little environmental evidence of arable farming on the site itself, although there does seem to be a suggestion from the pollen analysis of some cultivated land in the general area.

The evidence from the insect remains is compatible with a landscape of cleared forest and a mainly mixed agricultural landscape, of which pasture or meadow was a common part (Robinson 1978). It is probable that the wet low-lying nature of the site means the site was unsuitable for growing of crops and was used for pasture as suggested by the presence of insects species that are associated with the dung of large grazing animals.

The presence of fast growing alder in the water-logged remains could be evidence of coppicing or managed woodland, however rapid growth could also result from particularly favourable growing conditions. Oblique tool-marks were recorded on several pieces of roundwood and this could also be evidence of coppicing.

The analysis of the pollen and insect remains suggests that the local environment was mainly grassland and the landscape consisted of fields separated by ditches, banks and hedgerows. There would also appear to be signs of areas of woodland, some of it managed. The enviromental evidence from Balby Carr indicates that the local environment was wet and more likely to have been pasture than arable, with the fields probably being utilised on a seasonal basis. Crops are more likely to have been grown on drier ground and there is some evidence, in the form of small amounts of cereal pollen, of cultivated land in the general area. This view of the landscape corresponds with evidence emerging from other sites in the area (Buckland 1986: 4, and Chadwick 1997) of a landscape where large amounts of wildwood had already been cleared and farmsteads were set amongst fields and areas of managed woodland.

The site was probably waterlogged marshland during the medieval period and during much of the post-medieval period. Leland, in about 1540, noted that the Carr was a largely impenetrable morass of bog and fen (Evans 1973). Documentary evidence (Watt 2002) suggests that throughout the post- medieval period, various attempts were made to drain the Carr. By the late 18th century and early 19th century, when the Carr was enclosed, long deep drains had been cut and these are still extant today. The post-medieval drainage ditches recorded on site were probably cut at this time, as they are on identical alignments to the existing late 18th or early 19th century field boundaries depicted on an early 19th century tithe map (Watt 2002). An archaeological assessment of the area around Carr Lodge Farm (Cumberpatch *et al* 1998), directly south of the site found that the area lay on fen peat which appeared to have been drained in the post-medieval period and subsequently used as farmland. This appears to be the case with this site, although the only remaining traces of peat are contained in the fills of archaeological features and post-medieval drainage features.

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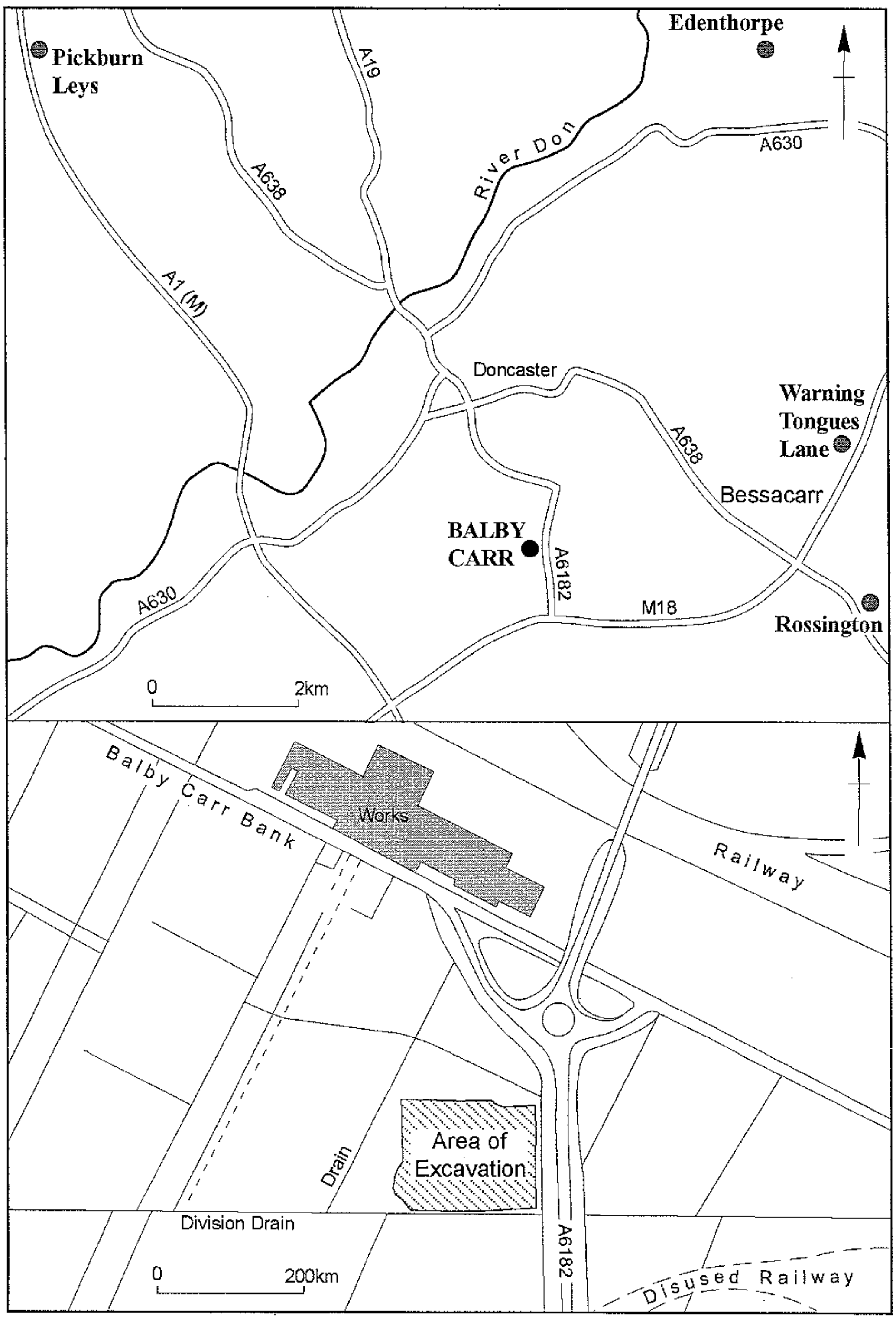

Pickburn Leys
Edenthorpe
A19
A638
River Don
A630
A1 (M)
Doncaster
Warning Tongues Lane
A638
Bessacarr
BALBY CARR
A6182
A630
M18
Rossington
0
2km
Balby Carr Bank
Works
Railway
Drain
Area of Excavation
Division Drain
A6182
0
200km
Disused Railway

Fig.1

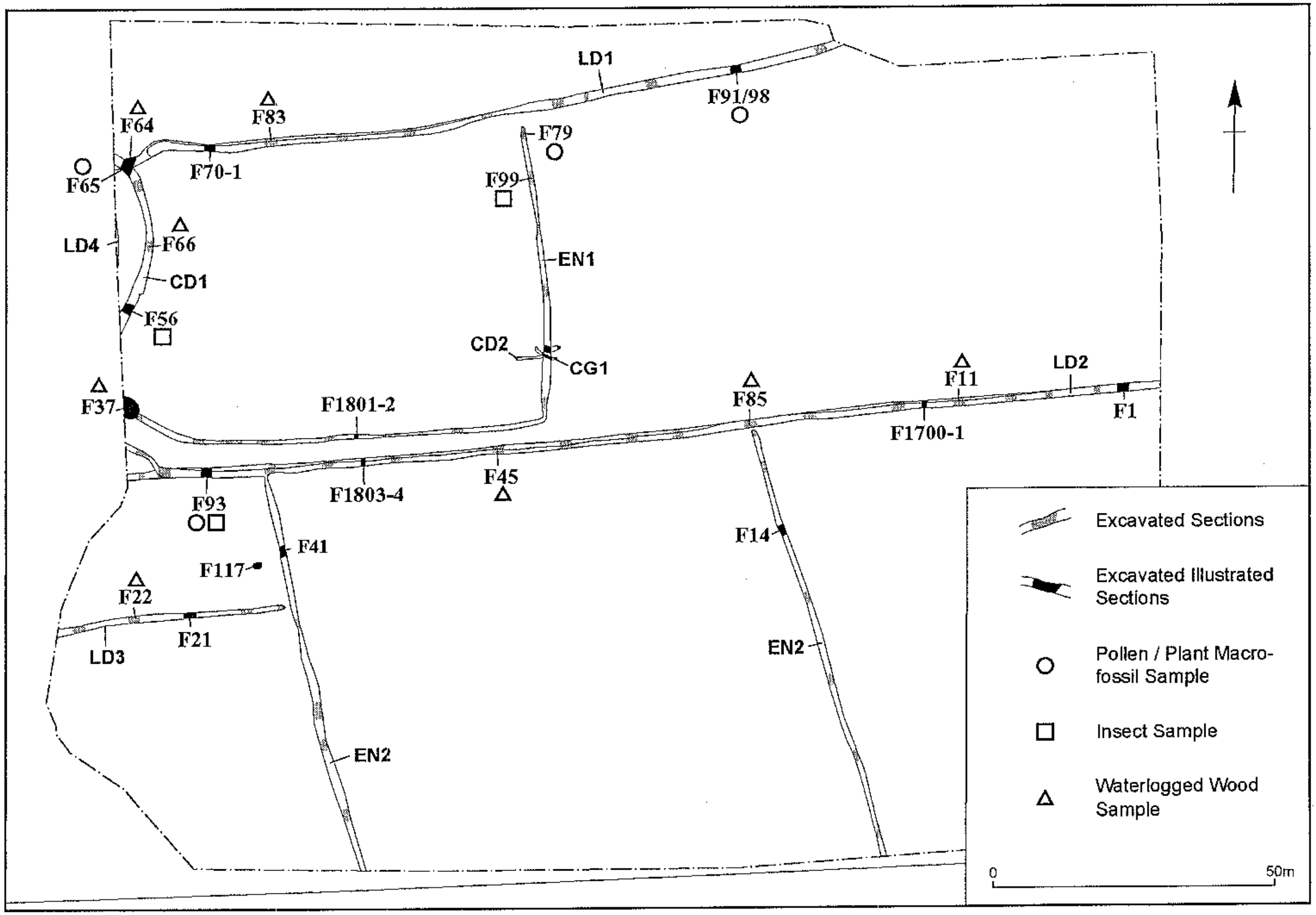

LD1
F91/98
F83
F64
F79
F65
F70-1
F99
LD4
F66
CD1
EN1
F56
CD2
CG1
LD2
F11
F37
F85
F1801-2
F1
F1700-1
F45
F93
F1803-4
F14
F41
F117
F22
F21
LD3
EN2
EN2
Excavated Sections
Excavated Illustrated Sections
Pollen / Plant Macro-fossil Sample
Insect Sample
Waterlogged Wood Sample
0
50m

Fig.2

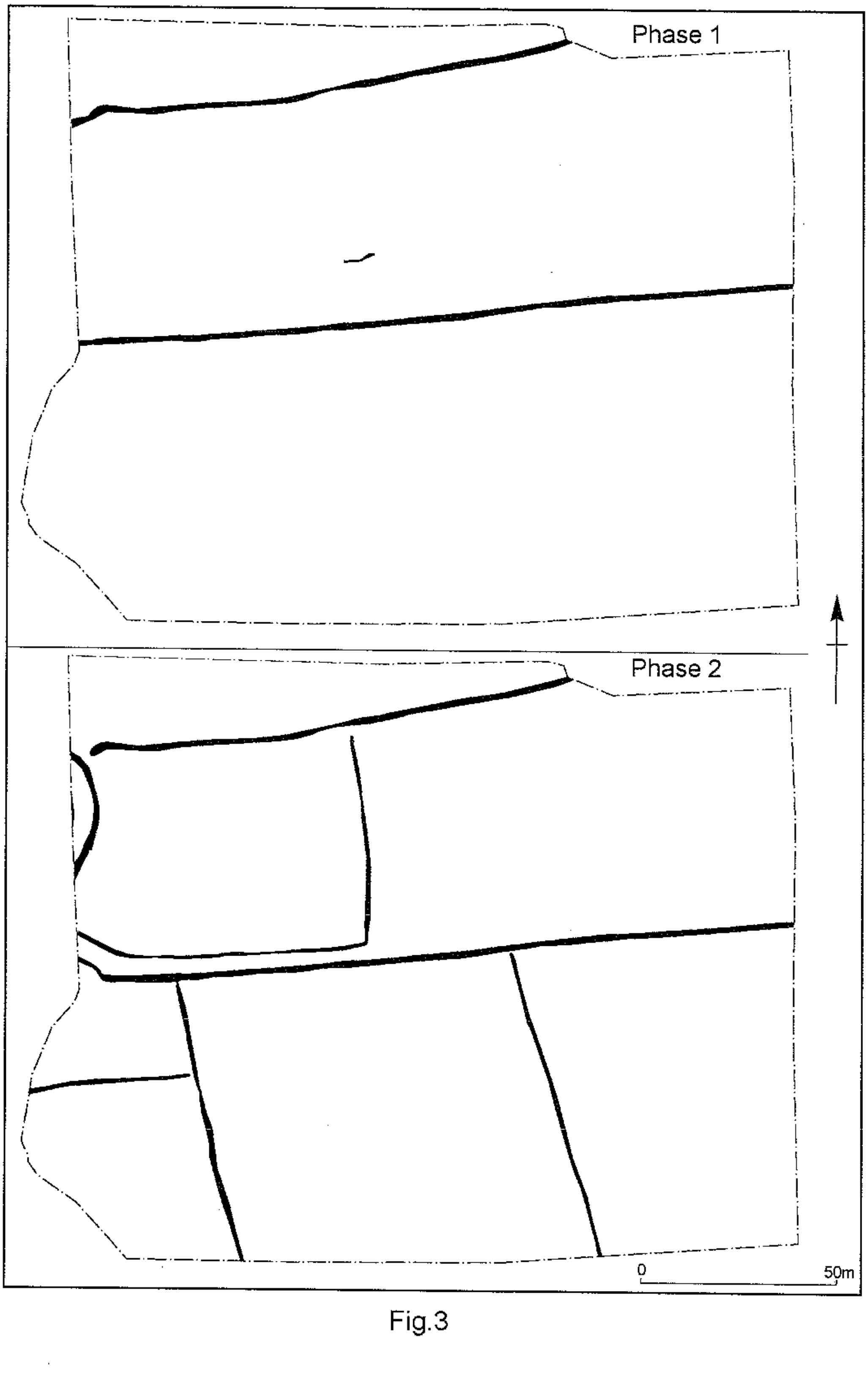
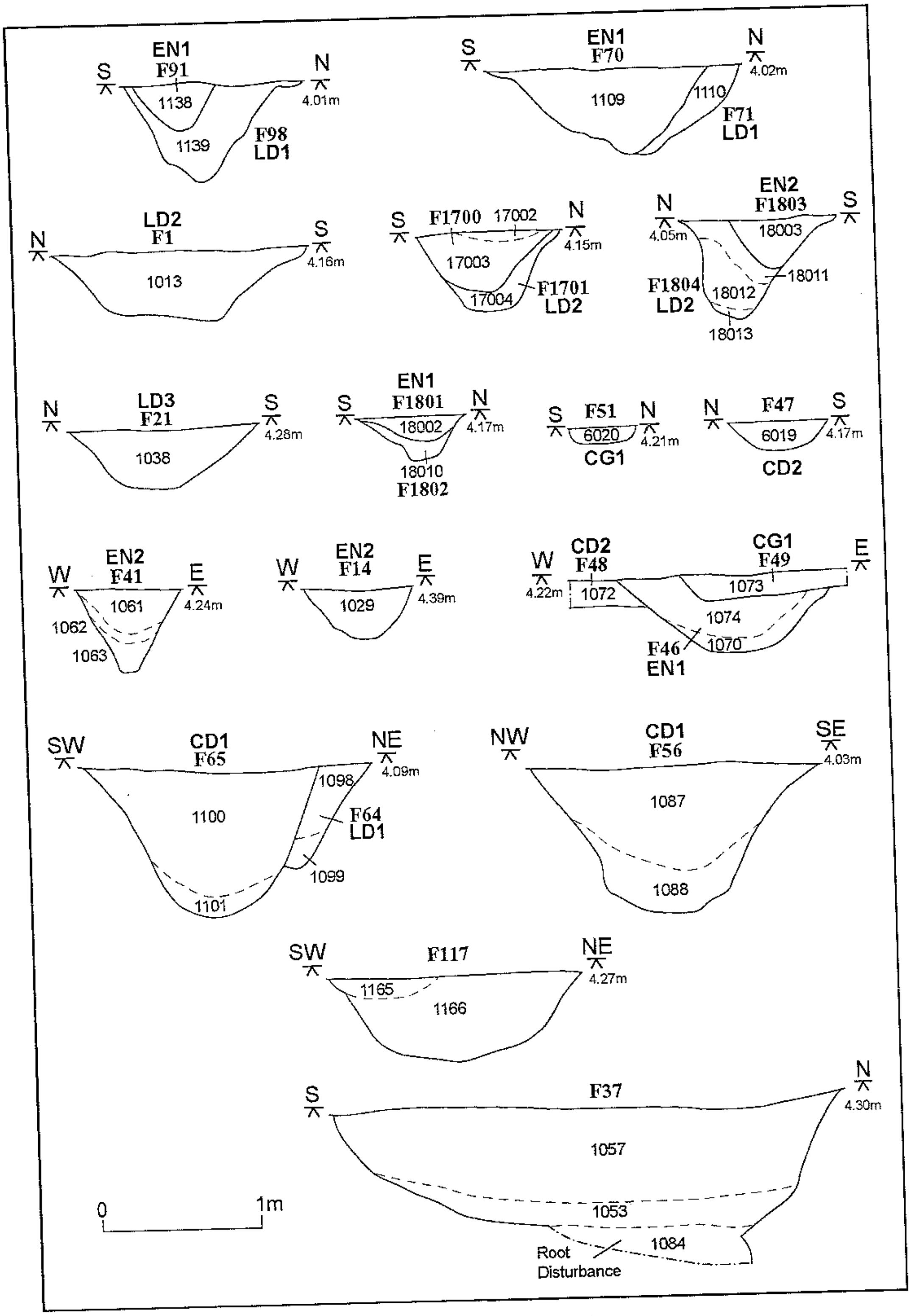


Fig.3



EN1
F91
S
N
4.01m
1138
1139
F98
LD1
EN1
F70
S
N
4.02m
1109
1110
F71
LD1
LD2
F1
N
S
4.16m
1013
S
F1700
17002
N
4.15m
17003
17004
F1701
LD2
EN2
F1803
N
S
4.05m
18003
18011
F1804
LD2
18012
18013
LD3
F21
N
S
4.28m
1038
EN1
F1801
S
N
4.17m
18002
18010
F1802
S
F51
N
6020
4.21m
CG1
N
F47
S
6019
4.17m
CD2
EN2
F41
W
E
4.24m
1061
1062
1063
EN2
F14
W
E
4.39m
1029
CD2
F48
W
4.22m
1072
CG1
F49
E
1073
1074
1070
F46
EN1
CD1
F65
SW
NE
4.09m
1100
1098
F64
LD1
1099
1101
CD1
F56
NW
SE
4.03m
1087
1088
F117
SW
NE
4.27m
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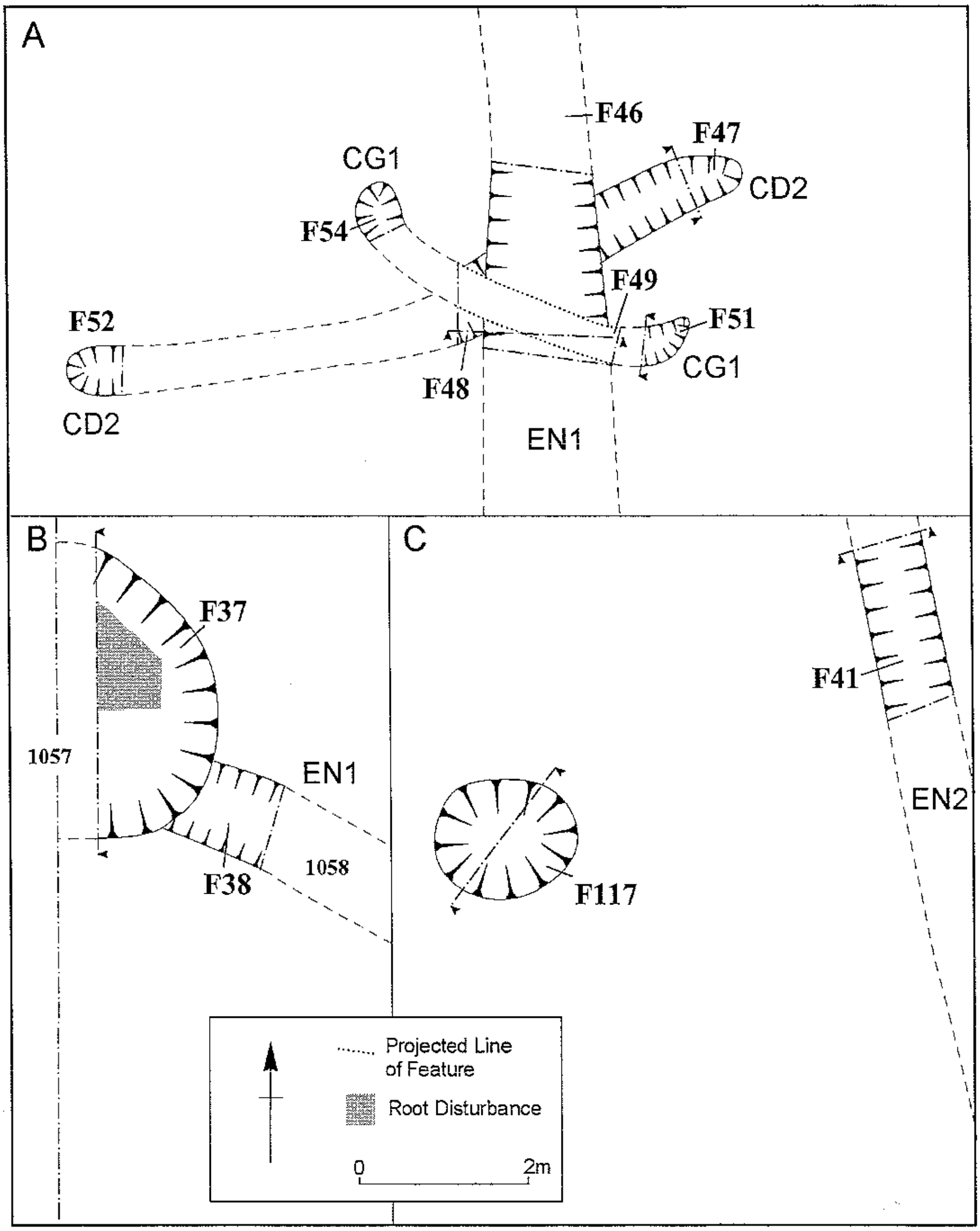
1166
F37
S
N
4.30m
1057
1053
1084
Root
Disturbance
0
1m

Fig.4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CG1
CD2
EN1
B
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C
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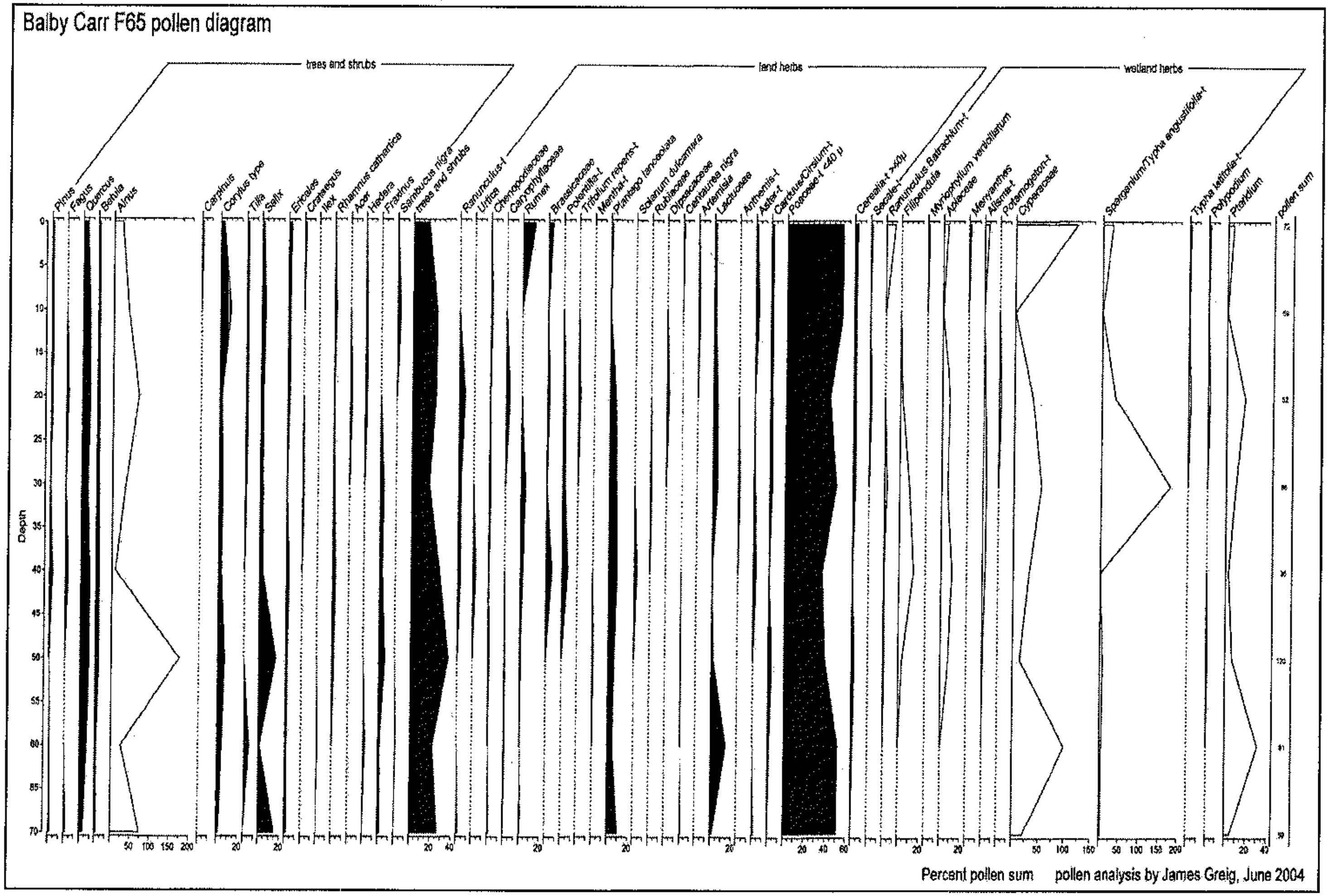
EN2
F117
Projected Line
of Feature
Root Disturbance
0
2m

Fig.5



Balby Carr F65 pollen diagram
trees and shrubs
land herbs
wetland herbs
Pinus
Fagus
Quercus
Betula
Alnus
Carpinus
Corylus type
Tilia
Salix
Ericales
Crataegus
Ilex
Rhamnus cathartica
Acer
Hedera
Fraxinus
Sambucus nigra
trees and shrubs
Ranunculus-t
Urtica
Chenopodiaceae
Caryophyllaceae
Rumex
Brassicaceae
Potentilla-t
Trifolium repens-t
Mentha-t
Plantago lanceolata
Solanum dulcamara
Rubiaceae
Dipsacaceae
Centaurea nigra
Artemisia
Lactuceae
Anthemis-t
Aster-t
Carduus/Cirsium-t
Poaceae-t <40 μ
Cerealia-t >40μ
Secale-t
Ranunculus Batrachium-t
Filipendula
Myriophyllum verticillatum
Apiaceae
Menyanthes
Alisma-t
Potamogeton-t
Cyperaceae
Sparganium/Typha angustifolia-t
Typha latifolia-t
Polypodium
Pteridium
pollen sum
Depth
Percent pollen sum
pollen analysis by James Greig, June 2004

Fig.6

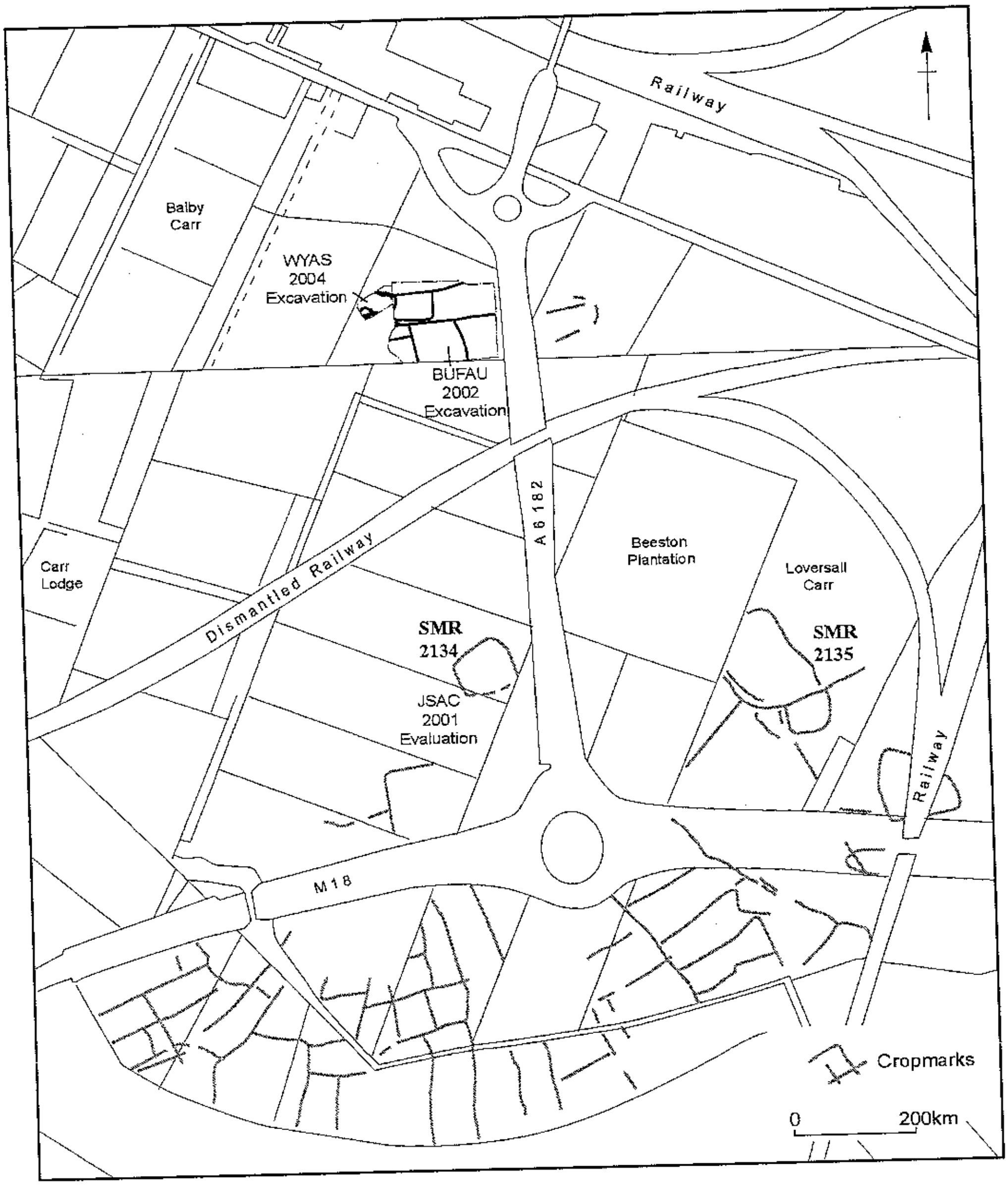

Railway
Balby Carr
WYAS 2004 Excavation
BUFAU 2002 Excavation
A 6182
Beeston Plantation
Loversall Carr
Carr Lodge
Dismantled Railway
SMR 2134
SMR 2135
JSAC 2001 Evaluation
Railway
M 18
Cropmarks
0
200km

Fig.7

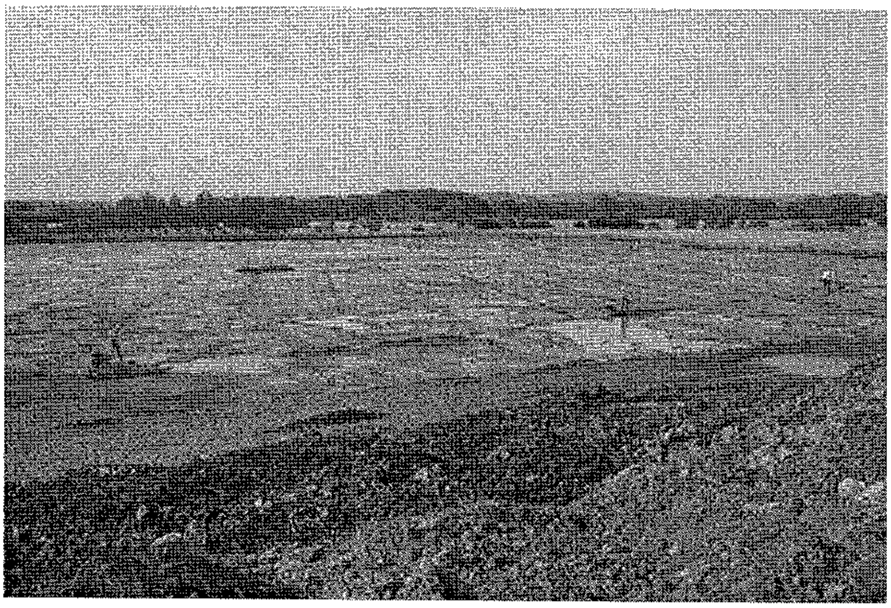


Plate 1: Linear ditch LD1 under excavation with regularly spaced post-medieval ditches visible, looking south

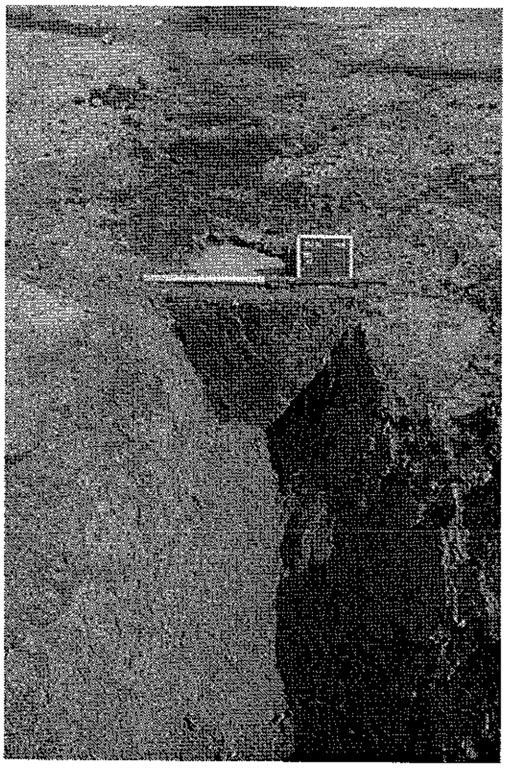


Plate 2: Linear ditch LD1 showing recut, west facing section

Plate 3: Curvilinear ditch CD2 cutting linear ditch LD1, looking south

Plate 4: Possible droveway between EN1 and LD2, looking east