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Excavation of a double-ditched enclosure at Winchburgh, West Lothian

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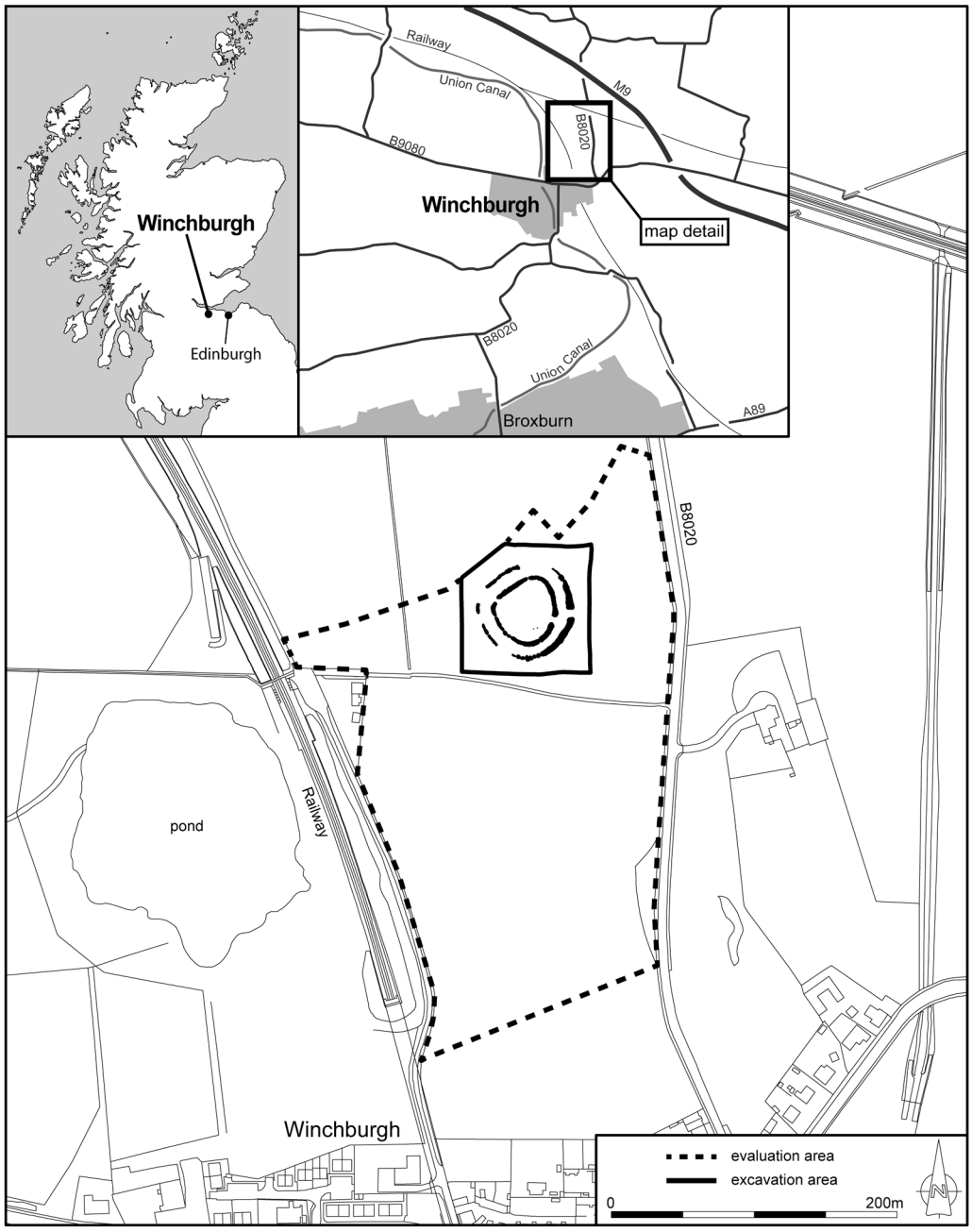
1. ABSTRACT

A sub-circular double-ditched enclosure, visible as a cropmark on aerial photographs, was excavated by CFA Archaeology Ltd in 2013. The enclosure had an inner ditch with two possible entrances and an intermittent outer ditch. The inner ditch measured up to 4.65m wide and survived to a maximum depth of 1.4m. Artefactual and ecofactual assemblages were limited, with the most significant finds being evidence of shale working. Soil micromorphological analysis indicates that both ditches silted up gradually, with their fills derived from re-deposited upcast as well as soil eroding from the surroundings. Radiocarbon dates from waterlogged wood and animal bone found within the ditch fills produced a date range of 1608–204 BC. The paucity of material makes it difficult to be certain of the date and function of the enclosure.

2. INTRODUCTION

This report provides the results of a programme of archaeological field investigation and post-excavation work undertaken by CFA Archaeology Ltd (CFA), in advance of the construction of a housing development forming part of the Winchburgh Masterplan area. The site was situated approximately 0.5km north-east of Winchburgh, West Lothian and north-west of Niddry Mains House (NGR: NT 0909 7547) (Illus 1).

A double-ditched enclosure (NRHE Site No. NT07NE 127) was identified from aerial photography, the details of which were provided by the West of Scotland Archaeology Service (WoSAS) (Illus 2). An evaluation was undertaken by CFA in April 2013 ahead of the housing development in order to confirm the presence of the enclosure (Glendinning 2013). Sixty-three trenches (8% of the total development area of 6.62ha) were excavated within the development area. Eleven trenches were positioned to investigate the



Illus 1 Location map. © CFA Archaeology Ltd

Illus 2 Aerial photograph showing enclosure. Taken from the north-east. © RCAHMS. Licensor www.rcahms.gov.uk

double-ditched enclosure. The investigation confirmed the presence, nature and extent of the ditches, leading on to a further programme of open area excavation between July and October 2013.

The project was funded by Winchburgh Developments Ltd (formerly Regenco Trading Ltd) and was overseen by WoSAS on behalf of West Lothian Council.

2.1 Location, topography and geology

The development site lies within a relatively well wooded, rolling agricultural landscape, with valleys and ridges running in an east/west direction. The site is bounded on the eastern side by the B8020 and by the main Glasgow–Edinburgh rail line on the western side. The enclosure occupied locally high ground (*c* 72m AOD) within a gently undulating arable landscape that generally sloped down from south to north. The British Geological Survey (BGS) classifies the local geology as the Hopetoun Group of sedimentary rocks of the Carboniferous Period. Collectively this amounts to a wide suite of different lithologies including sandstones, mudstones and grey siltstones attributed to the so-called West Lothian Oil-Shale Formation. The superficial geology (drift deposits) includes Quaternary age lacustrine clay, silt and sand deposits.

2.2 Archaeological background

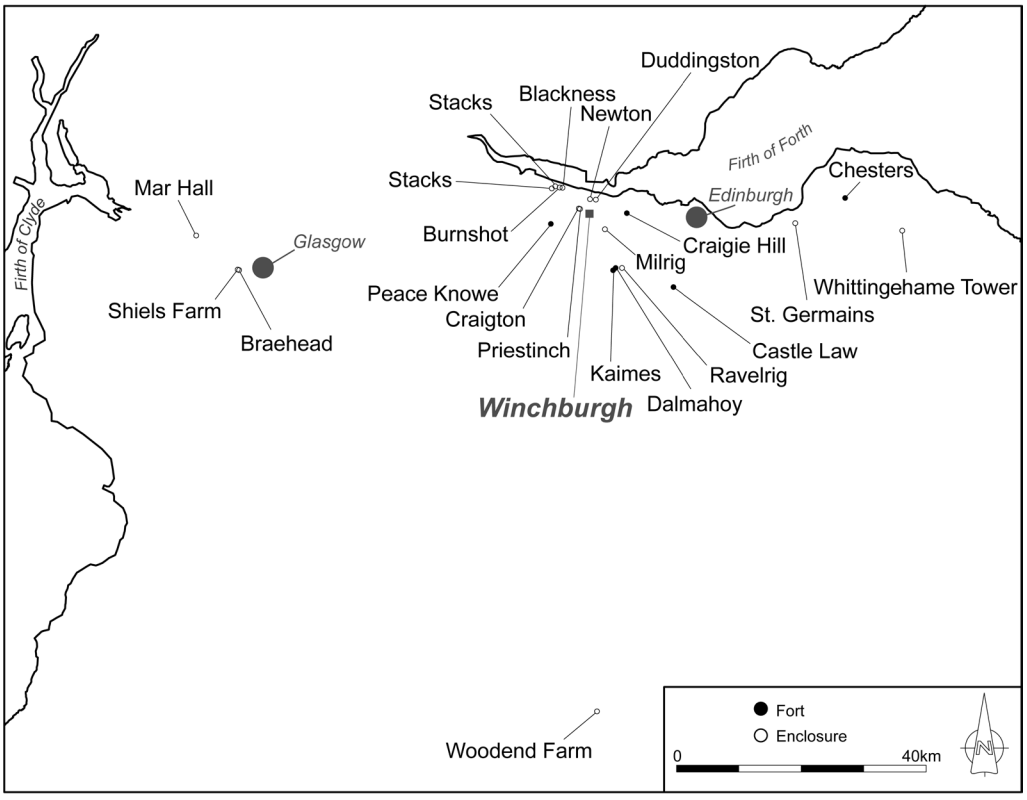
Most of the recorded archaeological sites within the vicinity of Winchburgh consist of post-medieval farmsteads and the remains of a highly industrialised landscape. However, there are a number of hillforts within a 10km radius of the site (Illus 3) which include Kaimes (Simpson et al 2004), Peace Knowe (NRHE Site No. NT07SW 7), Dalmahoy (NT16NW 1) and Craigie Hill (NT17NE 12). Kaimes is the only one which has been excavated

and radiocarbon dating of wood recovered from the core of Ramparts 1 and 2 provided a *terminus post quem* for their construction some time after 380 cal BC (Rampart 1) and 390 cal BC (Rampart 2), both at the 95.4% confidence level (Simpson et al 2004: 91). In addition to the known hillforts within the immediate vicinity, there are a number of circular enclosures, many of which have been discovered as a result of aerial reconnaissance. These include Blackness (NRHE Site No. NT07NW 54), Stacks (NT07NW 49, NT08SW 26 and NT08SW 25) and Burnshot (NT07NW 48). Examples at Stacks (NT08SW 49 and NT07NW 26) and Burnshot have ditches which enclose an internal area of approximately 0.07ha, 0.13ha and 0.16ha, respectively, roughly the same as the internal area of Winchburgh (0.16ha). However, none of these has been excavated, so their date and function are unknown. The Early Iron Age palisaded homestead at Ravelrig Quarry (Rennie 2013), dated to 600–400 BC at the 95.4% confidence level, is an excavated example nearby.

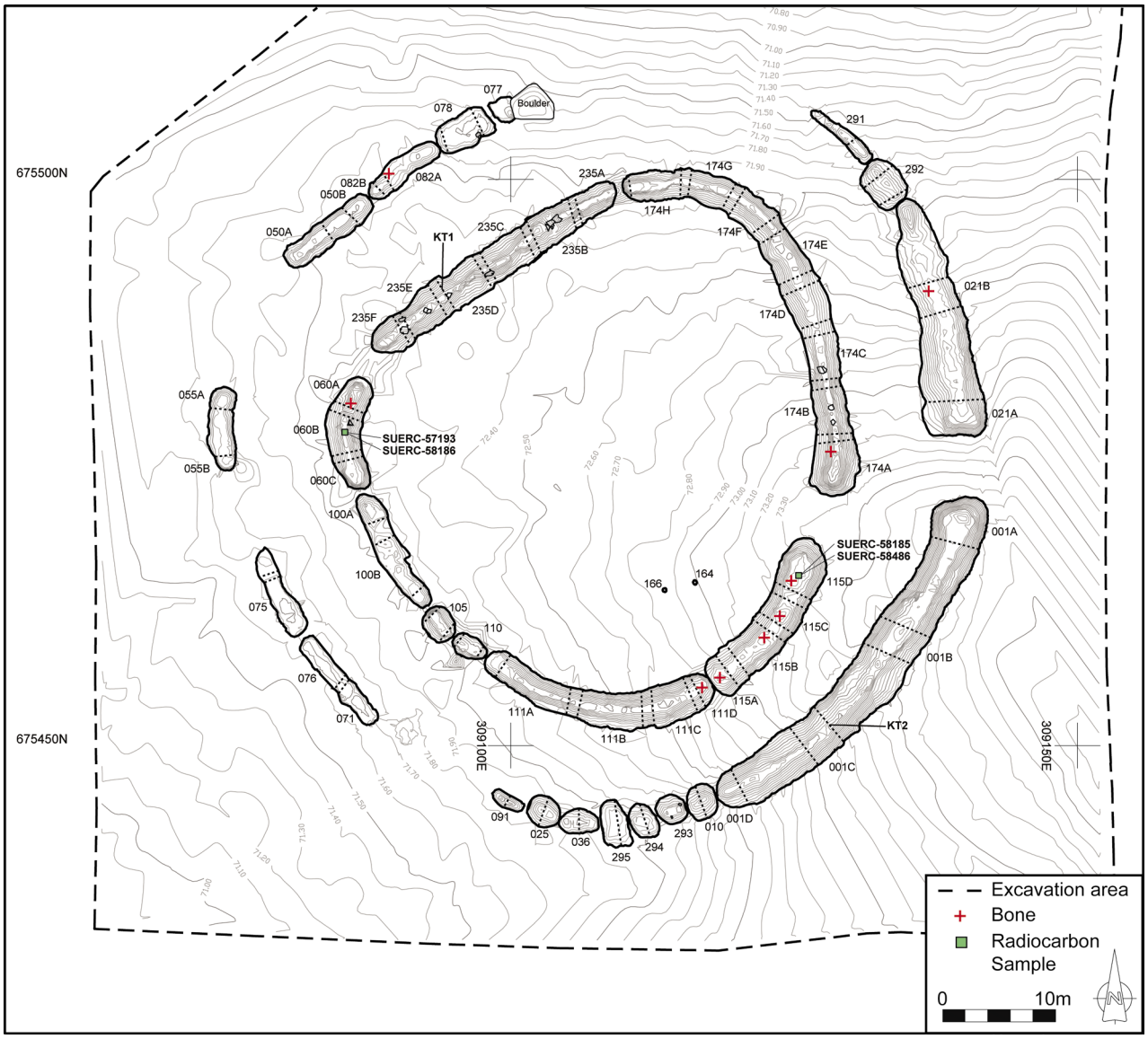
From the 12th century until the late 17th century, the area lay within the barony of Winchburgh (or Niddry) with the family seat located at Niddry Castle. Roy's Military Survey of Scotland (1747–55) records an open landscape of rig cultivation and fermtouns, such as Auldcathie. From the mid-18th century onwards the proprietors of the Hopetoun Estate considerably reorganised the nature of its farmlands and land tenure (Leslie 1759). This led to the replacement of the open rig cultivation and fermtoun landscape with one characterised by large farm steadings set within enclosed rectilinear fields. This improved farmland landscape remains a key characteristic of the present surroundings.

2.3 Methodology

The objectives of the project were to establish the nature, character, age and extent of the surviving remains and to preserve the site by record. A trench with an area of 0.77ha was excavated by a mechanical excavator equipped with a smooth ditching bucket, and the trench was then cleaned by hand. The discontinuous ditches were excavated in 1–5m lengths or slots along their circuits, with each slot assigned an alphanumeric indicator. The



Illus 3 Map showing the sites mentioned in the text. © CFA Archaeology Ltd



Illus 4 Site plan with contours, showing the position of excavated slots. © CFA Archaeology Ltd

numerical code referred to the individual segments of the ditches and the alphabetical one designated the individual sections excavated within the larger segments of ditch (Illus 4). Initially, a strategy of 100% excavation was required by WoSAS but excavation was halted, in agreement with WoSAS, at 95% excavation. In addition, given the paucity of artefacts recovered from the upper fills, it was agreed that the substantial baulks within the eastern lengths of the outer ditch could be removed by machine down to their primary fills.

Wherever possible, bulk soil samples were taken from deposits most likely to provide uncontaminated palaeoenvironmental evidence. Deposits such as sealed primary ditch fills were sampled. Soil profile samples were obtained using Kubiena tins.

3. ARCHAEOLOGICAL RESULTS

The development area was improved arable fields which had been subject to regular ploughing. The homogeneous topsoil ranged between 0.3m and 0.4m in depth, overlying a clayey-silt subsoil which varied in depth between 0.1m and 0.3m. The natural substrate consisted of light brown to grey sandy clays and clayey sands, often with large sub-angular to rounded stones and shale present. A number of clay pipe field drains, orientated north/south, crossed the site at regular intervals. Evidence of rig-and-furrow cultivation was identified during both the excavation and the evaluation (Glendinning 2013); cultivation furrows, aligned north-east to south-west and between 0.8m and 1.5m wide, were observed overlying part of the south-western corner of the inner and outer ditches, extending to the south-western trench edge. Adverse weather conditions during the second half of the excavation led to severe waterlogging of the site and frequent flooding within the ditches.

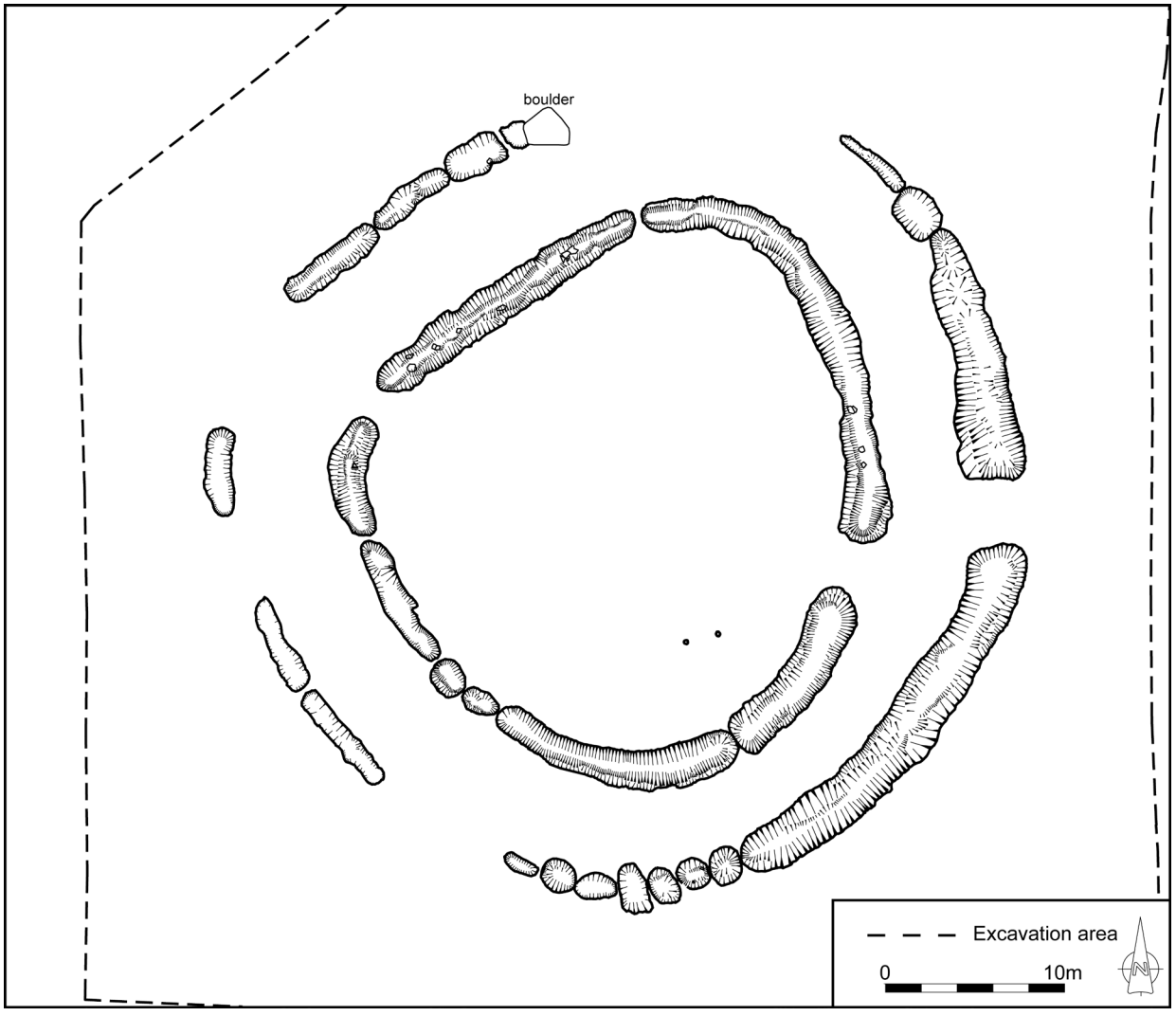
Illus 5 Aerial photograph showing locations of baulks and waterlogging. © West Lothian Archaeological Trust

The excavation revealed the remains of a sub-circular, double-ditched enclosure which measured 64m from north-west to south-east and 65m transversely, enclosing an area of approximately 3,000m^2 (0.3ha) (Illus 5). The internal enclosure ditch was set 7–8m inside the outer ditch and enclosed an area *c* 46m north-east to south-west by 44m transversely, an area of approximately 1,600m^2 (0.16ha).

3.1 Outer ditch

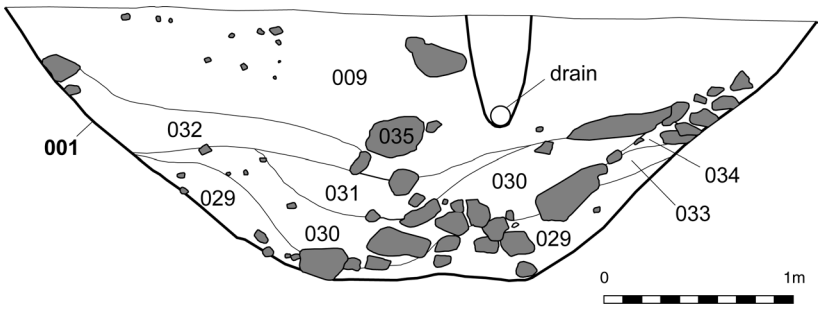
Of the two ditches, the outer exhibited the greater variability in its form around its circuit and was far more discontinuous than the inner ditch (Illus 6). The most complete lengths of ditch were to be found on the eastern and southern sides (Contexts 001, 021, 291 and 292). There were large gaps in the ditch along the northern and western portion of its circuit. Apart from the eastern side, most of the ditch consisted of a number of isolated or conjoined pits or scoops (Contexts 010, 025, 036, 050, 055, 071, 075, 076, 077, 078, 082, 091, 293, 294 and 295). The depth and width of the outer ditch ranged between 0.2–1.4m and 1.0–4.65m respectively. The deepest and widest segments were found on the eastern side and the features became progressively shallower from east to west.

An entrance through the outer ditch, situated on the east side, was approximately 5.5m wide. Its southern terminus was *c* 4.2m wide and 1.4m deep with steep sloping sides and a flat base (Illus 7 & 8). The northern terminus was 4.3m wide and 1.05m deep with steep sides and a flat base (Illus 9).

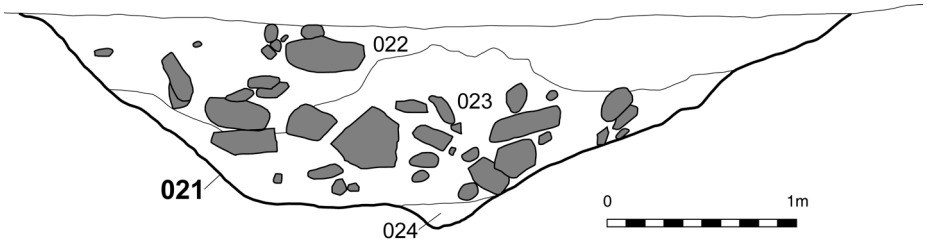


Illus 6 Site plan showing hachures. © CFA Archaeology Ltd

Illus 7 View from southern terminus of outer ditch showing Slot 001. © CFA Archaeology Ltd

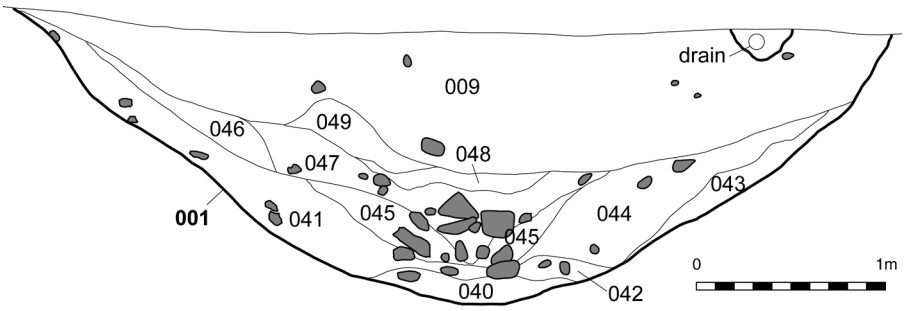


Illus 8 North-facing section of Slot 001A. © CFA Archaeology Ltd

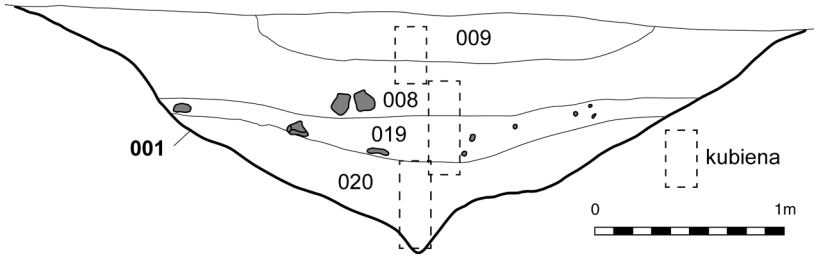


Illus 9 South-facing section of Slot 021A. © CFA Archaeology Ltd

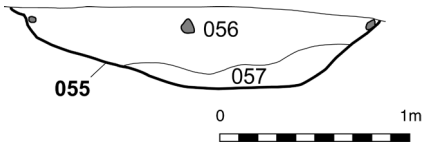
The fills of the outer ditch were, by and large, similar in appearance, texture and compaction. The primary fills generally consisted of firmly compacted brown/grey clays (Contexts 030, 040, 051 and 057), or orange/brown/grey silty clays (Contexts 020, 041, 042, 052, 053 and 056). These were overlain by fills which generally consisted of sandy clays (Contexts 031, 032 and 043) and silty clays (Contexts 041, 042, 044 and 045), varying in colour from mid-brown/orange to orange/grey and which were loose or moderately compacted (Illus 10). The outer ditch generally contained four to five separate fills in the larger, deeper eastern side components, whereas the shallower western ditch segments contained two to three separate fills on average (Illus 9–13).



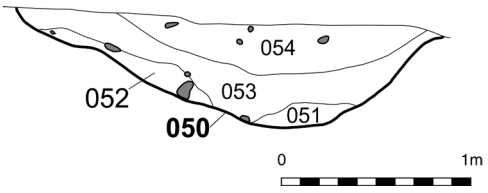
Illus 10 North-east-facing section of Slot 001B. © CFA Archaeology Ltd



Illus 11 South-west-facing section Slot 001C. © CFA Archaeology Ltd



Illus 12 North-facing section of Slot 055A. © CFA Archaeology Ltd



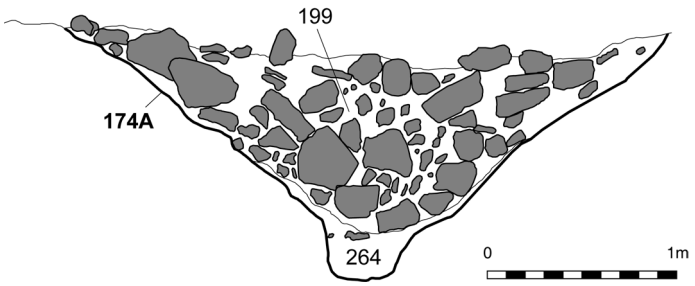
Illus 13 North-east-facing section of Slot 050A. © CFA Archaeology Ltd

3.2 Inner ditch

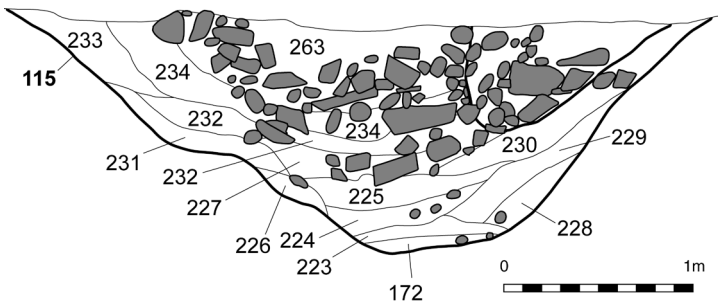
The inner ditch was more regular in shape and form and more continuous than the outer ditch. Similarly to the outer ditch, the inner ditch consisted of a series of conjoined pits or scoops (Contexts 060, 100, 105, 110, 115, 174 and 235). The depth and width of the inner ditch ranged between 0.35–1.3m and 2.5–3.7m respectively, and its overall dimensions were fairly consistent around its circuit, apart from the south-western length which varied between 0.35m and 0.6m deep.

The entrance through the inner ditch, which measured *c* 4.1m wide, was offset from the corresponding entrance in the outer ditch, being located slightly to the south of it on an east-south-east alignment. Like the outer ditch, the deepest and widest segments of ditch were the northern and southern termini of the entrance. The northern terminus measured *c* 4m wide and 1.3m deep with a V-shaped profile. The southern terminus measured *c* 4.1m wide and 1.2m deep and had a more U-shaped profile. There was another possible entrance opposite the east-south-eastern entrance, which measured *c* 3m wide. Its northern terminus measured 2.8m in width by 1.3m deep with a V-shaped profile (Illus 14). The southern terminus measured 3.7m wide by 1.2m deep with a flat base (Illus 15). The inner ditch side was steeper than the outer at *c* 60° and 45° respectively.

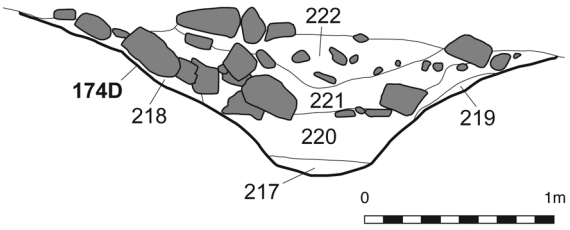
The primary fills within the inner ditch varied along the circuit but generally consisted of clays (Contexts 217, 264, 270), sandy clays (Contexts 269, 272), silty clays (Contexts 172, 220, 279, 281) or loamy silts (C280) which varied in colour from blueish grey to mottled grey/orange (Illus 16–19). The primary fills were overlain by large stones (grey siltstones and mudstones) within a matrix of sandy or silty clays (Contexts 153, 221 and 278). A greater volume of stone was found within the eastern half, including termini of the eastern entrance (Slots 174A–H, 111A–D and 115A–D), decreasing in quantity elsewhere from east to west around the circuit (Illus 20 & 21). The final deposition of the stone occurred after another period of silting.



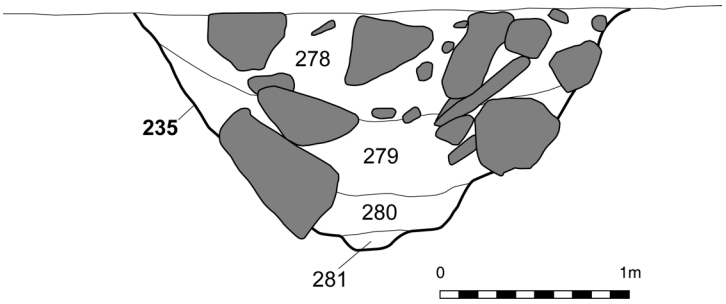
Illus 14 South-facing section of Slot 174A, northern terminus, inner ditch. © CFA Archaeology Ltd



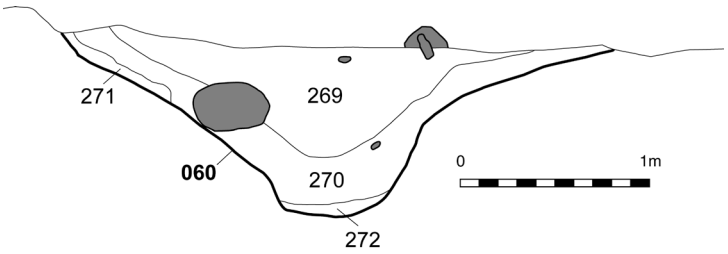
Illus 15 North-east-facing section of Slot 115D, southern terminus, inner ditch. © CFA Archaeology Ltd



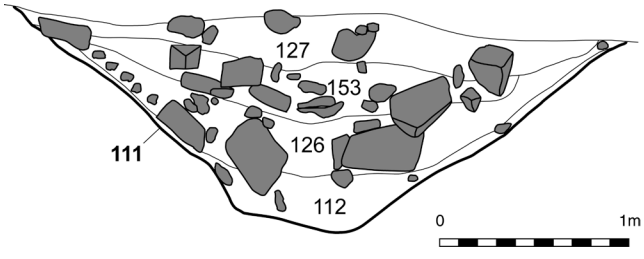
Illus 16 South-east-facing section of Slot 174D. © CFA Archaeology Ltd



Illus 17 South-west-facing section of Slot 235B. © CFA Archaeology Ltd



Illus 18 North-east-facing section of Slot 060A. © CFA Archaeology Ltd



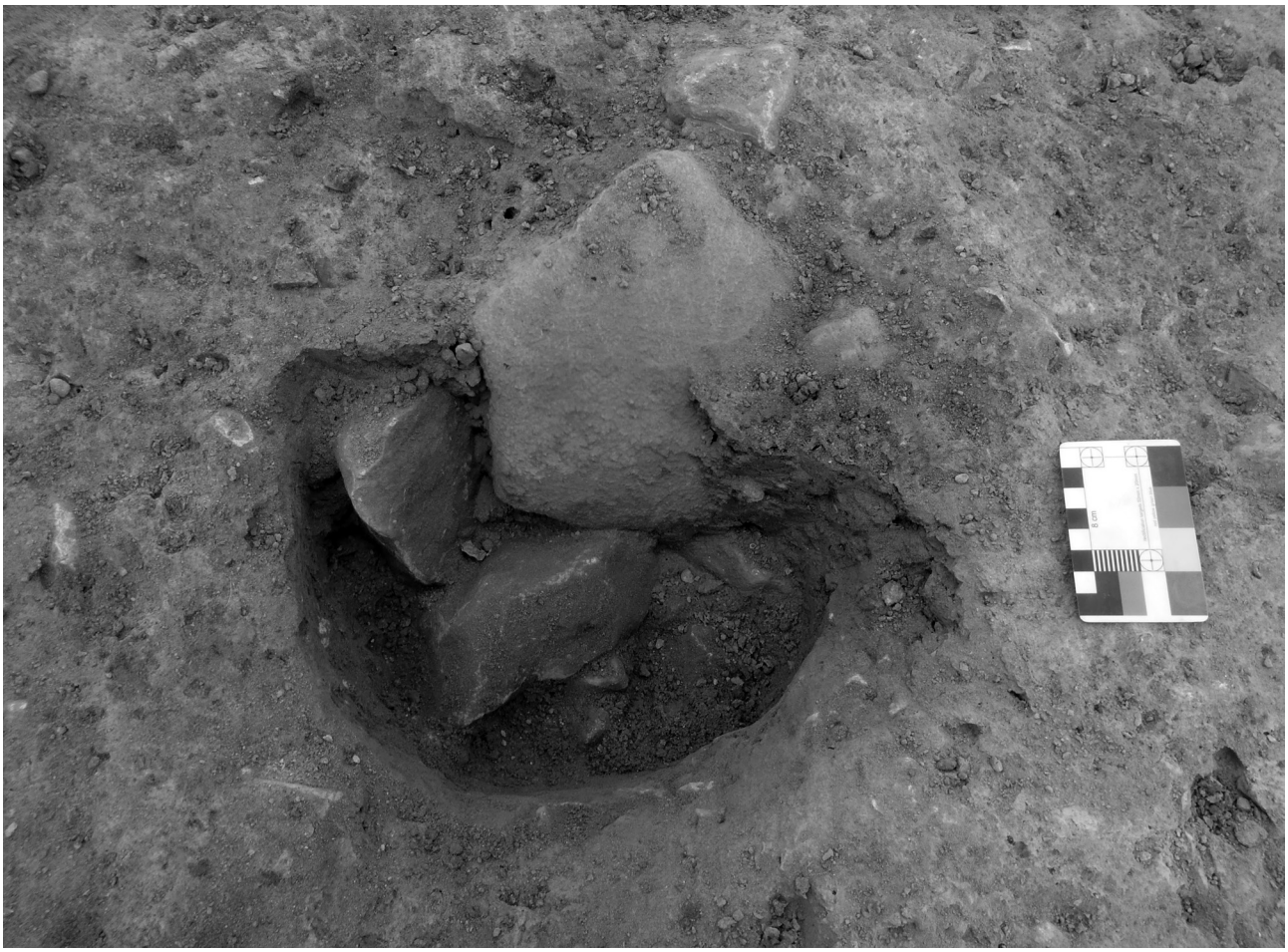
Illus 19 East-facing section of Slot 111C. © CFA Archaeology Ltd

Illus 20 View of north-west-facing section of Slot 174G. © CFA Archaeology Ltd

Illus 21 View of north-facing section of Slot 174B. © CFA Archaeology Ltd

3.3 Post holes/pits

Two small circular possible post holes (C164 and C166) were identified within the enclosure (Illus 6 & 22). The smaller of the two (C166) was roughly circular and had a diameter of 0.23m, survived to a depth of 0.15m and contained packing stones. The second feature (C164) was circular in shape and was slightly larger (0.25m in diameter and 0.14m deep). The fills of C164 and C166 were light brown sandy silt (C165) and dark brown sandy silt (C167) respectively.



Illus 22 Plan view of the half-sectioned possible post hole 166. © CFA Archaeology Ltd

4. THE FINDS

4.1 Worked shale

Fraser Hunter

Given the scale of excavation, the worked oil shale assemblage is notably small, but it is intriguing because it is so selective. Of the six clearly worked items, four are perforated roughouts for bangles or (in one case) a smaller piece of jewellery such as a ring-pendant; there is one block which has been shaped but not perforated; and one near-completed bangle fragment (Illus 23). Six further blocks or fragments of varying sizes could in theory represent blocks gathered for working, but none were clearly worked. Some showed surface abrasion, but as this was rarely noted on the certainly worked pieces it cannot be considered clear evidence of use. Several were also rather small, and they are not considered here as working evidence.

The assemblage is dominated by a single stage of the working process: the preparation and initial perforation of a block, with no further working to expand the perforation to the desired size. Not only that, but the blocks themselves are unusual; the perforations are not the usual raw, freshly worked form, but have been smoothed off. This suggests they represent a deliberate stage in the process of production, with the smoothing either occurring naturally from transporting them on a string or being a deliberate feature to improve the appearance. It suggests a distributed working system where different stages of the craft took place in different places. This is suggested also by the lack of working debris: none was collected in the field, and the samples from wet-sieving all appeared to be rounded natural flakes (C Hills, pers comm). This strongly indicates that working did not take place at the site to any significant degree. Instead, it seems part-worked material was brought there as discs or perforated roughouts, presumably for exchange when groups gathered at the site. The unfinished bangle SF27 is not inconsistent with this; in this condition, it was ready for finishing by abrasion and polishing, and could have been carried around by someone for working on as they had time.

This picture of a staged, distributed process has also been suggested from work at Braehead, Renfrewshire, where craft activity focused on initial preparation and perforation of blocks (Hunter 2007) – exactly the kind of products we see at Winchburgh in the process of exchange. The original source is likely to have been quite local. All the items were variants of oil shale, which is readily available locally, as the site sits in an area of West Lothian rich in oil shale deposits (Gibson 1922: 43–6). The degree of post-medieval mining of this material makes it hard to assess specifically where local outcrops might have occurred.

Only three fragments were found in context, two from the outer ditch (on the south and north-east) and one from the inner (on the south-west). There is no clear patterning in this small sample to allow any cogent arguments for structured deposition. It cannot be entirely ruled out – finds were otherwise so rare, so these pieces are exceptional – but all the items were damaged or incomplete in some way, and discard because of this seems the most likely interpretation.

4.1.1 Catalogue of illustrated shale finds (Illus 23)

4.1.1.1 Prepared roughouts

▸ **SF20**

Fragment of a prepared roughout which has split from a larger block. Sub-circular with around half the edge natural, the other half snapped to a circular shape. Grey-brown shale. 99 × 94 × 17mm. C152, Slot 105, basal fill of scoop in inner ditch on south-west side.

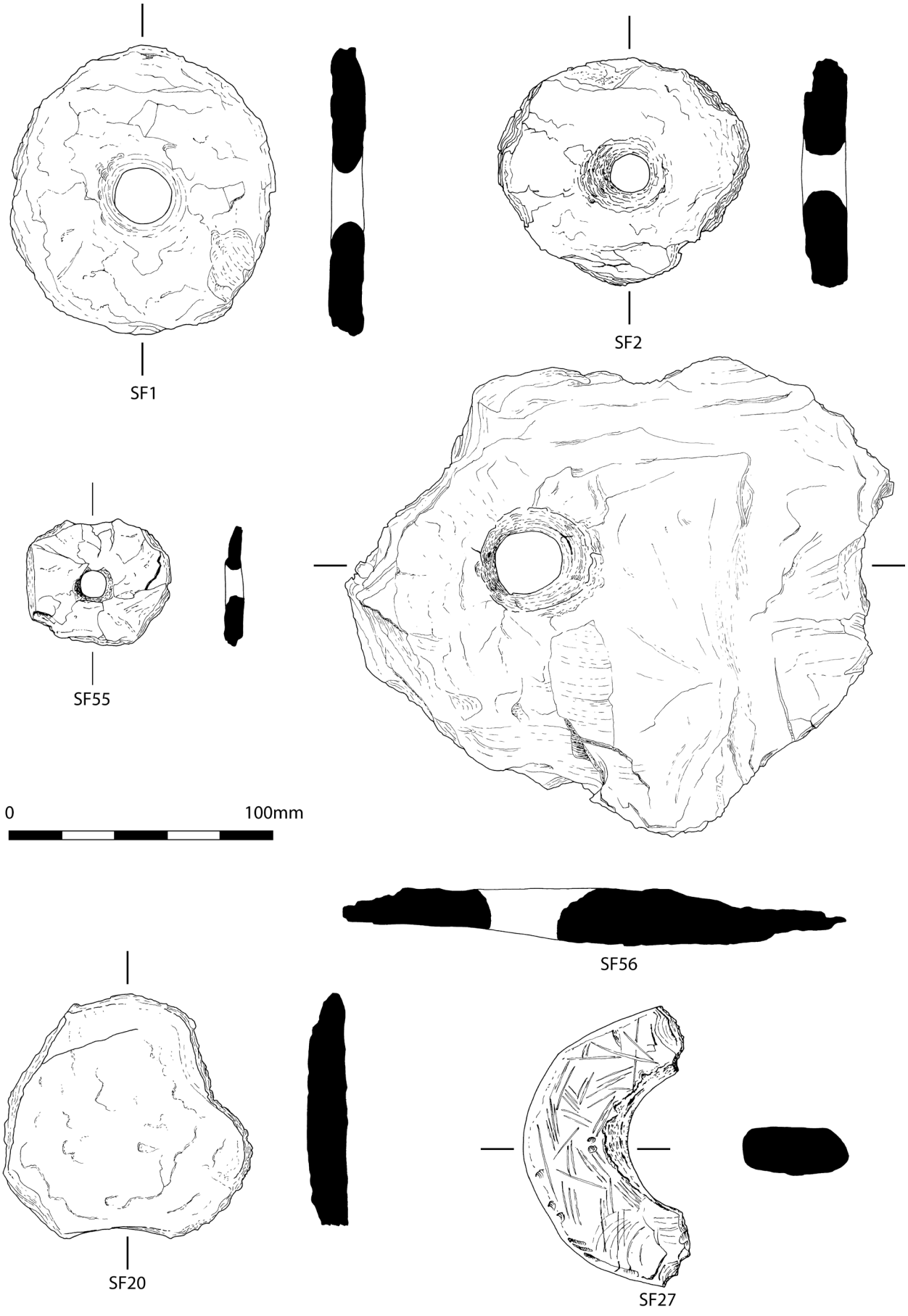
4.1.1.2 Perforated roughouts

▸ **SF01**

Well-formed circular roughout, flaked (predominantly unifacially) to shape. Biconical perforation (Diam: min 19, max 32) which is notably smoothed. Surfaces are either natural or carefully split; there are no toolmarks or abrasion. Loss from accidental flaking on one side. Dark grey shale. 110 × 108 × 16mm. C023, Slot 021, fill of outer ditch on north-east.

▸ **SF02**

Slightly irregular circular roughout, damaged in one area. Flaked bifacially to shape. Central biconical perforation (Diam: min 12, max 30), well-smoothed but with some circumferential toolmarks visible. Surfaces either natural or carefully split; a few stray



Illus 23 Shale finds. © CFA Archaeology Ltd

cutmarks on one surface. Grey-brown shale. 94 × 85 × 16mm. Pipe trench in Slot 025, south side of outer ditch circuit.

▸ **SF55**
Spalled upper surface from a circular roughout; some damage to edges, but it seems to be close to the original size as the flaked edges survive. Perforation is tapered (Diam: 9–12mm) as it survives, indicating it was originally biconical. Limited irregular abrasion towards one edge. Its small size suggests it was intended for a ring-pendant or similar. Black shale. 54 × 48.5 × 9mm. Surface find.

▸ **SF56**
Perforated roughout with one face spalled off and damage to the sides, making it unclear which edges were originally flaked or snapped to shape and which represent damage. The off-centre perforation indicates part of one side has been lost and spalls have been detached from the surface, but there is no sign of any surface preparation. Biconical perforation (Diam: min 24, max 45), smoothed to a fair degree. Black shale. 210 × 185 × 21mm. If the hole is assumed to be central, diameter would be *c* 280mm. Surface find.

4.1.1.3 Perforated roughout, finishing in progress

▸ **SF27**
Perforated roughout, near-complete, which has broken in half. Slightly irregular disc, the edges cut and abraded to shape. Some fine abrasion on the surface; biconical perforation, abraded to smooth it off, suggesting it was complete. Probably abandoned due to fracture and spalling of one surface, but its size is consistent with a bangle, of internal diameter 50–55mm in this condition. Black shale. External Diam: 101mm; Th: 28–40mm; H: 18.5mm. C239, Slot 235D, basal fill of ditch on north-west side.

4.2 Coarse stone

Ann Clarke

The coarse stone assemblage recovered from Winchburgh consisted of two plain hammerstones. One (SF45, Slot 115C, C147) is a simple oval cobble of quartzite with light pecking wear on either end. This was found together with animal bone in the inner ditch. The wear patterns are undeveloped and it is not clear to what use this hammerstone was put.

The other hammerstone (SF13, Slot 105, C152) is a small sub-angular cobble of coarse-grained sedimentary rock with pecked wear on three projecting corners. This sub-angular cobble must have been deliberately selected to use the projecting corners of the tool for delicate work. It was probably used to shape the shale blanks that were found in the same context (152).

4.3 Glass

Fraser Hunter

An annular black glass bead was recovered from sieving a soil sample from Context 103. The colour indicates it is post-medieval in date. Diam: 2.3mm; H: 1.3mm.

5. ENVIRONMENTAL ANALYSES

5.1 Animal bone

Jennifer Thoms

The assemblage comprised 1,501 fragments of bone, weighing 1.575kg. The bones had mainly been collected from secure, numbered contexts, with the exception of 21 fragments from surface finds and similar unsecure contexts. The material was collected by hand and from sample processing.

The bone fragments were a variety of sizes, with most being very small. The bones were mainly in poor condition; this has resulted in a preponderance of large teeth in the assemblage, due to the greater resistance of tooth enamel to decay in acidic soil conditions. The assemblage, therefore, cannot be expected to reflect the original buried assemblage, or tell us much about the animals living in and around the site at the time it was occupied. In addition, the animal bone tells us very little about the possible function of the enclosure.

The bones mainly came from cattle and horse (Table 1). There were 18 horse teeth present in the assemblage and a small fragment of femur from horse as well. Bone fragments identifiable as cattle included small pieces of femur, humerus and

Table 1 The identifiable bones

Context	Fill of	Find no.	Element	Species	Condition	Stain	Taphonomy
114	115	09	max molar	cattle	fair	yes	burnt
140	138B	18	tooth mand M1	horse	good	no	
140	138B	18	tooth mand M2	horse	good	no	
140	138B	18	tooth mand M3	horse	good	yes	
140	138B	18	tooth mand I3	horse	good	no	
140	138B	18	tooth mand I2	horse	good	no	
147	115C	24	femur	cattle	fair	yes	burnt
147	115C	48	femur	cattle	poor	yes	burnt
172	115D	26	humerus	cattle	poor	yes	burnt
172	115D	26	mandibular hinge	cattle	poor	yes	burnt
172	115D	26	max incisor tooth	horse	fair	yes	burnt
172	115D	26	maxillary molars × 11	horse	fair	yes	some burnt
223	115D	35	metapodial – distal end	cattle	poor	yes	burnt
224	115D	28	mandibular 3rd molar	cattle	good	no	
224	115D	32	humerus	large mammal	poor	yes	burnt
224	115D	38	humerus	horse/cattle	fair	yes	burnt
264	174A	41	metapodial – distal end	cattle	fair	yes	? burnt
264	174A	41	mand M3	horse	good	yes	
270	060A	42	femur	horse	fair	yes	? burnt
270	060B	50	metapodial	sheep/goat	good	yes	knife mark

metapodial as well as two teeth. One fragment of metapodial from a sheep/goat was present, as well as a rib from a sheep-sized mammal. The material was in poor condition with only the teeth being classed in good condition. Some of the bones appeared to have been burnt, and one displayed a knife mark. The burning and the knife mark hint at a domestic origin for at least some of the bone, although the horse teeth rather argue against this. The number and types of horse teeth could indicate the burial of an animal within the ditch terminus (Slot 115D), if one accepts the proposition that the remainder of the bones were not preserved due to soil conditions. The horse teeth were recovered from the primary fill (C172) at the base of the southern terminus of the east-south-eastern entrance of the inner ditch.

A similar suite of horse teeth was recovered from a pit below Rampart A at Eildon Hill North, which was thought to have been the remains of the burial of a partly cremated horse (Rideout et al 1992: 50). During the excavation of the western rampart and ditch at Blewburton Hill, Berkshire, Collins discovered the remains of a horse and associated rider (Collins 1953). The remains of two additional horses were discovered just inside the entrance at Blewburton during a later excavation in 1976 (Harding 1976). Therefore, it is possible that the posited horse burial at Winchburgh was a deliberate act, whether that was ritual or symbolic in nature.

It is highly probable that the assemblage has been affected by preservation bias, with soil conditions leading to smaller bones being destroyed completely, and only larger, denser bones surviving. A summary of the indeterminate fragments is provided in Table 2.

5.2 Waterlogged wood

Mike Cressey

A single fragment of waterlogged wood, recovered from the primary fill (602) of Slot 060B during the evaluation, was subjected to formal species identification. The wood was frozen for 24 hours and then thin sectioned using a razor blade. The thin sections were then mounted on a slide and examined under a microscope at ×100 magnification. Keys listed in Schweingruber (1992) and comparisons with in-house reference slides were used to aid identification.

The wood measured 60mm long by 9.4mm wide and was 9mm thick. It was identified as *Corylus avellana* (hazel). The morphological character of the wood confirmed that it had been created by splitting a piece of branchwood longitudinally. Its surface was devoid of any toolmarks or surface trimming. The wood had no identifiable function or diagnostic traits.

5.3 Archaeobotanical analysis

Mhairi Hastie and Mike Cressey

Thirty-seven bulk soil samples (ranging in volume from 5 to 40 litres) were retained for archaeobotanical assessment. Each sample was processed through a Siraf style flotation tank. The floating debris (flot) was collected in a 250µm sieve, and once dry, scanned using a binocular microscope. Any material remaining in the sieve tank (retent) was washed through a 1mm mesh and air dried, and it was then sorted for any archaeological material.

Charcoal identifications were carried out on only the >4–2mm sized charcoal fragments. Fragments smaller than 2mm are considered below the limit of identification due to the amorphous shape of the charcoal and the problems encountered with obtaining a transverse cross-section from such small fragments.

Identifications were carried out using bi-focal microscopy at magnifications ranging between ×50 and ×400. Anatomical keys listed in Schweingruber (1992) and in-house reference collections were used to aid identifications. The results are summarised below in Tables 3 & 4. A full inventory of the identified material is provided in the site archive.

5.3.1 Results

A small amount of carbonised plant remains was recovered from the samples, including cereal grain, nutshell and charcoal (Tables 3 & 4).

5.3.1.1 Cereal grain

Three poorly preserved and abraded charred cereal grains were recovered from the fill of a possible pit, or post hole (166). Only one of the grains was sufficiently well preserved to allow identification to species, with barley (*Hordeum* sp) identified.

Table 2 Indeterminate fragments

Context	Fill of	Find no.	Notes
114	115	07	small fragments
128	021	03	tooth enamel – large mammal
128	021	04	tooth enamel – large mammal
128	021	05	tooth enamel – large mammal
140	138B	18	horse tooth fragments
140	138	18	tooth enamel, from horse
147	115B	17	some large fragments
147	115C	24	some large fragments
147	115C	48	some large fragments, some burnt
147	115	08	burnt fragments, various sizes
147	115	12	burnt, fragments of large bone
147	115	10	burnt
147	115	11	burnt
147	115	15	small fragments, most burnt
149	115	06	tooth enamel – large mammal
163	115C	47	burnt, very fragmented and crumbly remains of large bone
163	115C	46	burnt
172	115D	25	some burnt
172	115D		burnt, large fragments, bone, not tooth enamel
223	115D	39	all small
223	115D	35	probably fragments of cattle metapodial
223	115D	29	clayey texture, heavy, brick coloured
224	115D	40	all small
224	115D	38	burnt, probably humerus fragments
226	115D	36	probably burnt
226	115D	37	small fragments
264	174A	41	tooth fragments, horse or cattle
264	174A	46	burnt, tiny fragments
264	174A	46	not burnt, small fragments
270	060B	49	not burnt, small fragments
280/281	235B	52	not burnt, small fragments
	115D		chemically altered

5.3.1.2 Nutshell
One small fragment of nutshell, probably hazelnut shell, was recovered from the fill (C264) of the inner ditch (Slot 235F).

5.3.1.3 Charcoal
The bulk of the charcoal assemblage was amorphous in character and included six retent samples dominated by fragments well below the limit of identification (BLOI). Two samples were found to contain vitrified charcoal, which is the product of serious alteration of the wood's vascular structure when wood is heated to temperatures greater than 800°C. Fragmentary and much abraded wood charcoal was recovered from seven samples, primarily from the fills of the inner ditch (including ditch segments 082, 100, 105, 111, 115, 174 and 235). Generally, the amount of wood charcoal recovered from these samples was particularly small, consisting only of one or two fragments; only one sample, the fill of the possible pit/post hole (166) contained large amounts of charcoal.

Fragments of burnt heather charcoal were present in two samples, the fill of the possible pit/post hole (166) and the inner ditch. As with the wood charcoal, this debris was generally abraded and only one or two fragments were recovered from each sample.

Little can be said about this charcoal assemblage other than that it is extremely poor. Although the shrubs hazel and heather are represented along with birch and oak charcoal, their frequency does not allow any meaningful discourse on whether the charcoal identified represents fuel residues or is possibly the result of natural fires. Given the scale and size of the excavation, it is very unusual not to have recovered a larger charcoal assemblage and it is assumed on this basis that only trace amounts of charcoal were present within the inner and outer ditches. They were certainly not the recipients of domestic refuse.

5.3.2 Discussion

Overall, the condition of the carbonised plant remains recovered from Winchburgh is poor. The fragmentary and abraded nature of the debris suggests that it has undergone much movement prior to final deposition. The modest quantity of material recovered does not allow for detailed discussion.

5.4 Soil micromorphology

Clare Ellis

Eight Kubiena tin samples were taken from the fills of the inner ditch (four from Slot 235D) and the outer ditch (four from Slot 001C, Illus 11). The objective of analysis was to characterise the nature of the sampled deposits and their mode of deposition and accumulation. The summary results are given below and full descriptions are contained in the site archive.

The samples were prepared for thin section analysis by G McLeod at the Department of Environmental Science, University of Stirling using the methods of Murphy (1986). Water was removed and replaced by acetone exchange and then impregnated under vacuum using polyester crystic resin and a catalyst. The blocks were cured for up to four weeks, sliced and bonded to glass and precision lapped to 30µm with a cover slip. The samples were assessed using a MEIJI ML9200 polarising microscope following the principles of Bullock et al (1985), Fitzpatrick (1993) and Stoops (2003). A range of magnifications (×40–×400) and constant light sources (plane polarised light – PPL, cross-polars – XPL, circular polarised light and oblique incident light – OIL) were used in the analysis.

5.4.1 Results

5.4.1.1 Summary description: inner ditch
The inner ditch fills were all apedal and comprised from the base upwards: poorly sorted silty clay; moderately sorted sandy clay; moderately sorted clay; and well sorted clay. The lowermost deposit (Context 243) has a massive microstructure with very few channels, while the overlying sampled contexts all displayed a channel microstructure, a result of the activities of soil biota including earthworms. The primary fills (C243) and (C239) contained laminations (bands of clay and silt) with some examples of a fining upwards sequence. The mineral content of the sampled contexts was dominated by sub-rounded to rounded quartz grains, with a few grains of plagioclase feldspar and rock fragments derived from a wide range of lithologies. The units all contained very few to few fragmentary biogenic

Table 3 Composition of retents (+ rare; ++ occasional; +++ common; ++++ abundant)

Context no.	Fill of	Context description	Sample no.	Pottery	Bead	Glass	Bone		Nutshell	Slag/fuel ash (poss)
							Unburnt	Burnt		
037	036	Terminus (basal fill)	21	Archaeologically sterile						
056/057	055	Outer ditch terminus	4	+						+
270	060B	North ditch inner enclosure	49				+			+
282	060C	North ditch inner enclosure	53							+
064	082	Ditch on outer circuit	5	Archaeologically sterile						
103	100	Inner ditch terminus	7		+ (×1)					
109		West terminus edge	10	Archaeologically sterile						
108	105	Inner ditch terminus (upper fill)	9	Archaeologically sterile						
151		Inner ditch terminus (secondary fill)	17	Archaeologically sterile						
106		Inner ditch terminus (basal fill)	8							+
152		Inner ditch terminus (basal fill?)	18	Archaeologically sterile						
112	111	Inner circuit	11	Archaeologically sterile						
112		Inner circuit	12	Archaeologically sterile						
126		Inner circuit	16	Archaeologically sterile						
147	115	Inner circuit	19	Archaeologically sterile						
114		Inner circuit (basal fill)	13	Archaeologically sterile						
114		Inner circuit (basal fill)	15	Archaeologically sterile						
159	115C	Post hole	20	Archaeologically sterile						
165	164	Possible post hole	22							+

Table 3 *cont*

Context no.	Fill of	Context description	Sample no.	Pottery	Bead	Glass	Bone		Nutshell	Slag/fuel ash (poss)
							Unburnt	Burnt		
167	166	Possible pit or post hole	23							++
264	174A	Inner ditch	46				+++	+	+ (×1)	
208	174C	Inner ditch (basal fill)	25							+
296	174C	Inner ditch	54							+
195/220	174F	Inner ditch	26	Archaeologically sterile						
249	174G	Inner ditch	30			+ (×1)				
262	174H	Inner ditch	44			+ (×1)				+
259/260		Inner ditch	45	Archaeologically sterile						
247	235A	Ditch	29	Archaeologically sterile						
278	235B	Ditch	50							+
279		Ditch	51							+
280/281		Ditch	52				+			
258	235C	Ditch	32	Archaeologically sterile						
243	235D	Ditch	27	Archaeologically sterile						
239		Ditch (basal fill)	28	Archaeologically sterile						
268	235F	Ditch	47	Archaeologically sterile						
274	235E	Ditch	48	Archaeologically sterile						

Table 4 Composition of flots (+ rare; ++ occasional; +++common ; ++++ abundant; sf = small fragments (<5mm in diam), vsf = very small fragments (<2mm in diam))

Context no.	Fill of	Context description	Sample no.	Flot vol (ml)	Cereal grain		Heather charcoal	Wood charcoal		Coal	Cinders	Shale
					Quantity	Ident		Quantity	AMS			
037	036	Terminus (basal fill)	21	<10							+ (vsf)	+
056/057	055	Outer ditch terminus	4	10				+ (vitrified: vsf)		++	+ (vsf)	++
270	060B	North ditch inner enclosure	49	10	Archaeologically sterile							
282	060C	North ditch inner enclosure	53	10	Archaeologically sterile							
064	082	Ditch on outer circuit	5	<10						++		++
103	100	Inner ditch terminus	7	<10				+ (vitrified: vsf)		++	+ (vsf)	++
109		West terminus edge	10	<10						+ (vsf)		
108	105	Inner ditch terminus (upper fill)	9	<10				+ (vsf)		+	+ (vsf)	+
151		Inner ditch terminus (secondary fill)	17	10								++
106		Inner ditch terminus (basal fill)	8	10				+ (sf)		+		++
152		Inner ditch terminus (basal fill?)	18	10								++

Table 4 *cont*

Context no.	Fill of	Context description	Sample no.	Flot vol (ml)	Cereal grain		Heather charcoal	Wood charcoal		Coal	Cinders	Shale
					Quantity	Ident		Quantity	AMS			
112	111	Inner circuit	11	<10				+ (vsf)				+
112		Inner circuit	12	10				+ (vsf)				++
126		Inner circuit	16	<10	Archaeologically sterile							
147	115	Inner circuit	19	10								++
115		Inner circuit (basal fill)	13	<10				+ (vsf)				
114		Inner circuit (basal fill)	15	<10								+
159	115C	Post hole	20	<10	Archaeologically sterile							
167	164	Possible post hole	22	10							+	++
165	166	Possible pit or post hole	23	30	+	Barley indet × 2 Cereal indet × 1	+ (vsf)	+++	Yes	+		+
264	174A	Inner ditch	46	<10	Archaeologically sterile							
208	174C	Inner ditch (basal fill)	25	10				+ (vsf)				++
296		Inner ditch	54	10	Archaeologically sterile							
195/220	174F	Inner ditch	26	10						+ (vsf)		++
249	174G	Inner ditch	30	<10			+ (sf)					+
262	174H	Inner ditch	44	<10	Archaeologically sterile							
259/260		Inner ditch	45	<10	Archaeologically sterile							
247	235A	Ditch	29	10						+ (vsf)		++

Table 4 *cont*

Context no.	Fill of	Context description	Sample no.	Flot vol (ml)	Cereal grain Quantity	Ident	Heather charcoal	Wood charcoal Quantity	AMS	Coal	Cinders	Shale
278	235B	Ditch	50	<10	Archaeologically sterile							
279		Ditch	51	20	Archaeologically sterile							
280/281		Ditch	52	10	Archaeologically sterile							
258	235C	Ditch	32	<10								+
243	235D	Ditch	27	10				+ (vsf)				+
239		Ditch (basal fill)	28	10								++
268	235F	Ditch	47	10	Archaeologically sterile							
274	235E	Ditch	48	10	Archaeologically sterile							

silica, such as phytoliths. The charcoal content of the ditch fills was minimal and some of the charcoal was rounded. Roots had penetrated the upper contexts. The ditch fills contained, in varying amounts, iron oxide mottles, nodules and hypo-coatings, indicative of repeated episodes of wetting and drying. Similarly the presence of clay, dusty clayey and silt coatings are indicative of clay illuviation by water moving down through the soil profile.

5.4.1.2 Summary description: outer ditch

The outer ditch fills were all apedal and comprised, from the base upwards, moderately sorted sandy clay and clay loam. The lowermost deposits (C020) had massive microstructures while the middle and upper fills (Contexts 019, 018, 009) had a channel microstructure, a consequence of post-depositional bioturbation. Laminations were observed only in the basal fill. As with the inner ditch fills, the mineral content of the sampled contexts was dominated by sub-rounded to rounded quartz grains, with a few grains of plagioclase feldspar and rock fragments from a wide range of lithologies; there was a decrease in the amount of rock fragments up the profile. Fragmentary phytoliths are common-to-frequent in all but the uppermost ditch fill. The charcoal content of the ditch fills was minimal and some of the charcoal was rounded. All the contexts had been affected by the impregnation of iron oxides and all had clay and dusty clay coatings.

5.4.2 Discussion

The inner ditch fills show a general decrease in grain-size up the profile. The primary fill was eroded into the ditch under natural forces such as gravity and rain run-off. The sharp boundary between the poorly sorted lower portion of Context 243 and the overlying clay laminations is indicative of a sudden change in weather conditions, such as a series of cloud bursts resulting in increased surface run-off. The mineral component of the ditch fill reflects the content of the unconsolidated sediments of the local area. Many of the larger fragments were rounded, indicating that they had been incorporated by wind action or at least had been within the sediment for some period of time. The source of the charcoal is not known, but the quantities are too small to indicate the deliberate incorporation

of hearth ashes or midden material into the ditch. The inclusion of fragmentary biogenic silica in all the ditch fills demonstrates the long-term presence of grasses (in the broadest sense); it is thought unlikely that the biogenic silica is residual hearth ash or domestic waste as there are no other indicators (micromorphological or other (see 5.3 'Archaeobotanical analysis')) that such material had been incorporated. All the inner ditch contexts have been reworked by the actions of soil biota which has largely destroyed the original sedimentary fabric. The bioturbation of the whole ditch profile suggests that the ditch filled up gradually; it does not appear to have been deliberately backfilled at any point. The whole ditch profile has been subjected to episodes of wetting and drying and these probably reflect seasonal fluctuations in the water table.

The outer ditch shows a decrease in grain-size up the profile, a consequence of it silting up under natural agencies such as gravity, wind and water. The primary fill (C020) accumulated at the base of the ditch in a series of erosional events, each capped by a thin layer of clay which settled out of suspension within a pool or puddle at the base of the ditch. Grassland immediate to the outer ditch is indicated by the relatively large content of fragmentary phytoliths. The minimal charcoal content indicates some localised burning, although the type and source of the burning is not known. In common with the inner ditch the domination of a channel microstructure in the middle and upper fills indicates that these sediments accumulated relatively slowly; unfortunately the bioturbation has destroyed the original fabric. The outer ditch has also been subject to episodes of wetting and drying.

5.4.3 Summary conclusions

The soil thin section analysis has shown that the outer and inner ditches silted up gradually and by natural means; they do not appear to have been deliberately backfilled. The fills of both of these ditches are derived from re-deposited upcast as well as eroding soil, and there are no definitive anthropic inclusions. With regard to the local environment, the relatively large proportion of phytoliths in the outer ditch fills indicates that there was grassland adjacent to the site.

5.5 Soil geo-archaeological analysis

Mike Cressey

Soil samples were retained from the same positions as the Kubiena tins processed for soil micromorphology within the inner and outer ditch fills, and were subjected to laboratory analysis to determine their remnant magnetic susceptibility (χ), percentage organic carbon, and soil pH. The work was carried out to support the soil micromorphology analysis (see 5.4 'Soil micromorphology') and to assess whether the ditch fills had received any anthropogenically derived fire residues, including ash or charcoal, that had decayed as a result of soil taphonomy.

Field sampling methodologies followed modified English Heritage (2007 and 2011) standards on sediment sampling. The soil samples were submitted to the Department of Biological & Environmental Sciences, University of Stirling for analysis. Samples for remnant magnetic susceptibility were measured using a Bartington Instruments MS2 and MS2B Dual Frequency Sensor. Soil pH was measured by a Hannah instruments laboratory bench pH meter, calibrated using pH 7 and 4 buffer solutions and normalised for room temperature. Percentage organic matter (%OM) was obtained by ignition in a muffle furnace to provide an estimate of the mineral content of the sample. Table 5 lists the results obtained from the laboratory analysis. The geological background of the site is discussed in 2.1 'Location, topography and geology' above.

5.5.1 Inner ditch fills

5.5.1.1 Magnetic susceptibility

The results of mass magnetic susceptibility on six samples provided fairly variable results ranging from between χ 10 × 10^{-3}SI units and χ 28 × 10^{-3}SI units and provided an average value of χ 19.6 × 10^{-3}SI units. The basal fills appear to be magnetically enhanced with values in the order of between 28 and 14 × 10^{-3}SI units. The higher basal values are possibly attributable to the increase in soluble magnetic iron (Fe) hydroxides that have percolated down through the ditch fill profile. The upper fills have slightly lower χ values, presumably due to a loss of Fe. One sample (Sample 3) returned a value of 573 × 10^{-3}SI units, which

Table 5 Soils analysis values for Magnetic Specific Susceptibility (Mag Sus), % LOI and soil pH (*values have not been included in the average)

Location	Sample position and context	Mag Sus (10^{-3} SI units)	% LOI	Soil pH
Inner ditch	Middle of tin C243	14.98	6.24	6.67
	S34 (C236) middle of tin	10.94	6.56	
	C241 top of tin	11.72	6.12	6.67
	C237 base of tin	11.03	6.45	
	C242 top of tin	15.28	5.15	
	C243 base of tin	28.02	6.03	
	C236 base sample			6.65
	Mean	**19.65**	**7.24**	**6.66**
Outer ditch	S1.1 base	73.79	5.23	7.1
	S1 30cm from base	20.20	5.66	
	S1 37cm from base	17.61	3.83	
	S1 46cm from base	112.00*	4.62	
	S2 4cm from base	13.37	4.39	
	S2 25cm from base	8.22	5.91	
	S2 45cm from base	28.90	5.91	
	S3 3cm from base	12.30	6.02	
	S3 12cm from base	573.30*	6.82	
	S3 21cm from base	46.61	5.68	
	S3.1 top of profile			6.73
	Mean	**14.83**	**12.57**	**6.9**

is highly anomalous and can only be explained by a very locally rich concentration of Fe. The ditch fills appear not to have been the recipient of burnt material (ash/charcoal), which would have manifested in both visible soil rubification with a coincident increase or enhancement of remnant soil magnetism values.

5.5.1.2 LOI

Loss on ignition values are all consistent with a mean of 7.2% OM, which is very low and emphasises the minerogenic nature (92%) of the fills.

5.5.1.3 pH

An average pH value of 6.6 was attained from the three samples tested. The results confirm that the soils are slightly acidic and sufficient to have led to the loss of bone. The pH value of the soil is due to the fairly high iron content of the fills.

5.5.2 Outer ditch fills

5.5.2.1 Magnetic susceptibility

The results of mass magnetic susceptibility on six samples provided fairly variable results ranging from between χ 4.6 and 176 × 10^{-3}SI units and provided an average value of χ 14.8 × 10^{-3}SI units. An anomalous value of 573.3 was obtained from Sample 3 (12cm from the base of the tin). This value is considered to be anomalous and possibly the result of high levels of Fe or super-enhancement caused by ferro-magnetic material of volcanic origin within the soil. Enhancement by ash/burning incorporated in the fill can be ruled out. In general the lower down the profile, the higher the χ values. As noted with the inner ditch fill, the outer ditch basal fills tend to have an increase in remnant magnetic susceptibility for reasons explained above. The potential for this increase may also lie in the proximity of the water

table that will promote increased Fe enhancement in the REDOX zone.

5.5.2.2 LOI

The percentage LOI values (mean 12.5% OM) for the outer ditch are the same as in the inner ditch and show the fills are inorganic (87%).

5.5.2.3 pH

An average pH value of 6.9 was obtained from the two samples tested.

5.5.3 Conclusion

The results of the magnetic susceptibility confirm that there is a general trend for an increase in natural remnant magnetic susceptibility enhancement towards the base of the inner and outer ditch profiles associated with the translocation of iron hydroxides down through the relatively free-draining fills. The high water table and the increase in soil REDOX potential close to the base of the ditches is also an influencing factor on higher χ values. The loss on ignition values confirm the soils are inorganic (*c* 80–90% mineral), while the soil pH confirms the fills are acidic as a result of the high iron content within the fills and the nature of the underlying natural soil.

The results confirm the presence of weak iron oxides in the clay-rich ditch fills. Importantly, the results also confirm that both ditches have received no anthropogenic derived material such as fire residue (ash and charcoal) that would have otherwise increased the presence of highly magnetic oxides through burning (Thompson & Oldfield 1986; Gale & Hoare 1991; Crowther 2003).

6. RADIOCARBON DATING

Twelve dating samples (GU-35961–66; GU-36500–05) were submitted to the Scottish Universities Environmental Research Centre (SUERC). Eight samples of animal bone proved to contain insufficient carbon to return dates, and replacement samples could not be supplied due to the poor nature of the bone assemblage.

Two viable samples, a piece of waterlogged hazel (SUERC-57193) and a fragment of horse femur (SUERC-58186), recovered from the southern terminus of the inner ditch's western entrance (Context 602 (Slot 060A) and Context 270 (Slot 060A; Illus 18) respectively), were dated (Table 6). C602 was the primary fill while C270 was the middle fill of the ditch. They provided dates of 387–204 BC and 406–233 BC respectively, correlating well with each other, and providing a *terminus post quem* of 204 BC for the infilling of the inner ditch.

The other two samples, a horse molar (SUERC-58185) and a burnt cattle mandibular hinge (SUERC-58486), recovered from the base of the southern terminus of the inner ditch's eastern entrance (both from Context 172, Slot 115D; Illus 15), returned dates of 799–545 BC and 1608–1433 BC respectively (Table 6). These dates have no overlap with each other and are also earlier than the dated samples retrieved from the western entrance. The dated samples provide a *terminus post quem* for the beginning of the infilling of the inner ditch, of 545 BC at the earliest.

On the basis of the dating evidence, little can be said with certainty about the date of the site apart from that the inner ditch probably began to silt up some time roughly within the third quarter of the first millennium BC. The only other evidence for dating the site is provided by the shale roughouts. Hunter (2007: 208) noted that the bulk of the shale material from Braehead could be broadly dated at 600–400 BC, which overlaps with three of the radiocarbon dates from Winchburgh; it can be assumed that the shale working at Winchburgh is from a similar period due to the similarities in the process and products.

Table 6 Radiocarbon dates (calibrated using OxCal v4.1.7)

SUERC lab no.	Context/ Slot	Species	Lab age BP	Cal date (1σ)	Cal date (2σ)	$\delta^{13}C$ ‰
57193	602/060A	Wood: *Corylus avellana* (hazel)	2234±30	372–211 BC	387–204 BC	-27.7
58186	270/060A	Animal bone: horse femur	2295±29	401–363 BC	406–233 BC	-22.0
58185	172/115D	Animal tooth: horse molar	2537±31	794–590 BC	799–545 BC	-23.2
58486	172/115D	Burnt animal bone: cattle mandibular hinge	3231±28	1529–1451 BC	1608–1433 BC	-16.1

7. SITE INTERPRETATION AND DISCUSSION

The near-complete excavation of the double-ditched enclosure at Winchburgh provided an excellent opportunity to investigate the character and nature of a cropmark site within the intensively farmed landscape of central Scotland, which has seen little modern research (Haselgrove et al 2001: 23; ScARF 2012). However, the excavation has thrown up as many questions as answers.

7.1 Classification

One of the key questions regarding Winchburgh is whether it should be classified as a hillfort, enclosed settlement or enclosure. Recent definitions of 'hillfort' (Ralston 2006: 12–13; Halliday & Ralston 2010) identify a number of key elements. These include at least one circuit of enclosing works, normally adapted to the topography, which may provide a degree of defensive advantage. The double ditches at Winchburgh were relatively substantial and certainly would have offered a degree of protection, especially along the eastern side, where the ditches survived to a depth of approximately 1.3m and width of 3.7m. However, the Winchburgh enclosure occupied an east/west-running ridge of locally higher ground at 72m AOD. It was only marginally higher than the lowland landscape and would have offered very little in the way of defensive advantage. The western side of the site could be approached with very little difficulty. However, it is possible that the surrounding landscape may have been subject to periodic flooding. Adverse weather conditions during the latter half of the excavation led to large areas of lying water in the adjacent fields and the ditches required constant emptying. Analysis of the ditch fills also suggested there had been repeated episodes of wetting and drying (see 5.4.2 'Discussion').

Ralston (2006: 13) suggests a lower limit of 0.25ha for monuments to be classed as hillforts, which has recently been revised to a lower limit of 0.2ha for inclusion within the *Atlas of Hillforts of Britain and Ireland* (Lock & Ralston 2017). The inner ditch at Winchburgh enclosed an area of *c* 0.16ha and the outer ditch enclosed a total area of *c* 0.3ha. Therefore, in terms of area, Winchburgh should be considered as an enclosure rather than a hillfort.

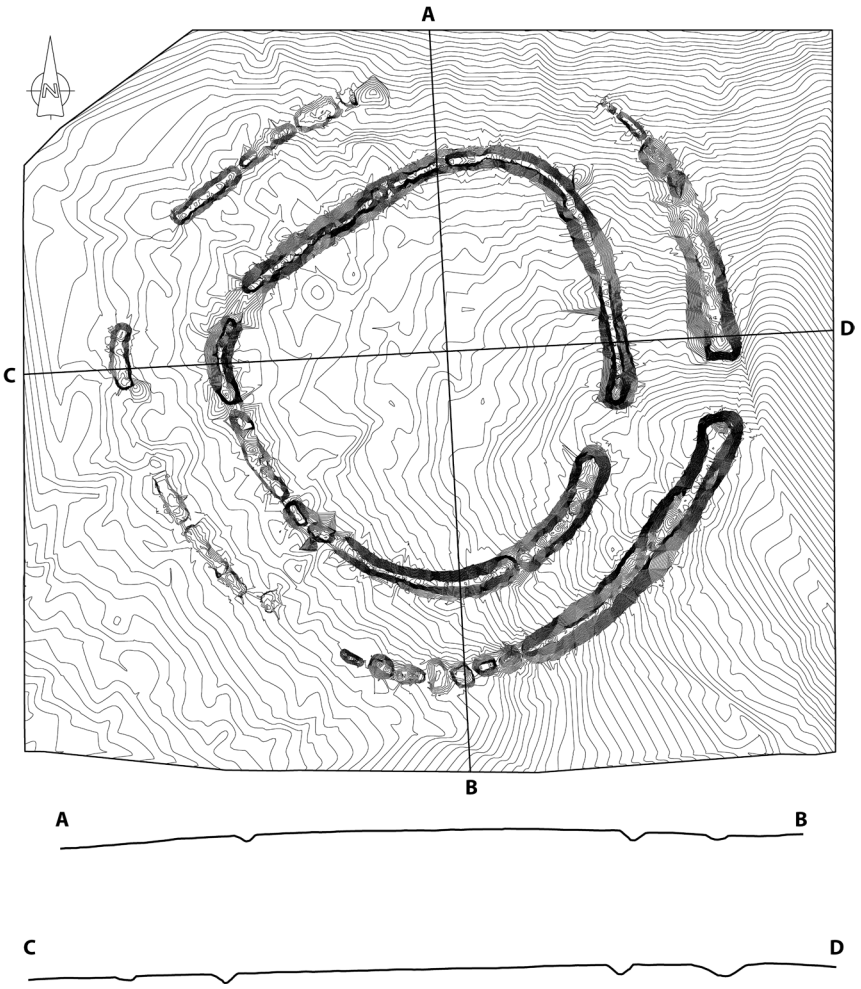
7.2 State of survival

One of the questions posed of the site is the extent to which the remains of the enclosure were subject to plough truncation, to provide an indication of the original depth of the ditches and whether there could have been truncation/removal of structures formerly present in the interior.

The depth of the inner ditch varied along its circuit, which could suggest that the ditch was constructed by digging a series of conjoined pits or lengths of ditch. However, most of the circuit of the inner ditch ranged between 0.75m and 1.3m deep, with most sections being on average 0.9m deep: to the west (see Illus 24), the ditch varied between only 0.35m and 0.6m deep (Slots 100B and 110, respectively) and so was significantly, and consistently, shallower.

The outer ditch exhibited far greater variability around its circuit, and only the eastern half formed a coherent, continuous ditch. The southern part consisted of a number of conjoined pits (Contexts 010, 025, 036, 091 and 293–5) as did the north-western quadrant (Contexts 050, 077, 078 and 080). The western/south-western part of the enclosing works consisted of four separate pits (Contexts 055, 071, 075 and 076) but there were large gaps between them. As in the inner ditch, the deepest and widest pits/segments were found on the eastern half. However, the outer ditch did not exhibit the same general decrease in depth from east to west.

The remains of rig-and-furrow cultivation were recorded overlying the western and south-western parts of the outer ditch during the topsoil stripping operations, while the evaluation trenches located over the western half of the enclosure recorded only topsoil (average 0.35m deep) and the evaluation trenches placed over the eastern half also contained a subsoil (0.1–0.2m deep). The topsoil and subsoil depths did not vary greatly across the evaluation (Glendinning 2013). Taking the hypothesis that the varying depths of the ditches is a proxy indicator of truncation, the western half of the site would appear to have suffered the most, but this cannot account for the incomplete nature of the outer ditch. One would assume, even taking into consideration the theory that the ditch segments were excavated by separate gangs of workers, that the ditch would still have survived as a continuous



Illus 24 Profiles across site. © CFA Archaeology Ltd

circuit if that was how it had been constructed, as the segments did not vary in depth to such a great degree. Since the enclosure was located on relatively flat ground at the end of a slight ridge which sloped down to the west, the greatest truncation should occur within the interior of the enclosure, with soil movement resulting in an accumulation in the lower-lying western half. No artefacts or evidence of domestic occupation were recovered from the subsoil within the western half of the site during topsoiling operations. In addition, assuming the inner ditch had been truncated to such a degree to account for the difference in depth from east to west, there was no evidence of the same volume of stone that was observed within the eastern half of the inner ditch.

It is highly unlikely that the site did not suffer some amount of truncation but, given the evidence presented above, it seems unlikely that truncation has resulted either in the complete destruction of some parts of the outer ditch or the partial reduction of the inner ditch to any substantial degree. Therefore, it remains more likely that the differences seen in the continuity of the ditch circuits are an original feature and that this was intended by the builders of the enclosure. There was also no evidence for internal structures, but buildings constructed on sleeper beams may have been preferred, leaving very few traces, rather than being evidence for the complete truncation of post-built structures, or indeed it could be the case that there never were any internal structures associated with the enclosure; it is highly unlikely that there was significant enough truncation to have erased all negative features associated with former structures within the interior of the enclosure.

7.3 Sequencing of the site

The distinct lack of intercutting features meant that any sequencing of the site would have to rely on finds or dating samples recovered from the fills of the ditches. Unfortunately, there was a paucity of finds from both the inner and outer ditches. The few samples of bone which returned radiocarbon dates were recovered from the inner ditch (see 6 'Radiocarbon dating' for discussion). All of the bone samples submitted for radiocarbon dating from the outer ditch failed to provide dates due to insufficient carbon content.

If there were two distinct phases of ditch construction, the concentricity of the ditches suggests the earlier ditch was extant and was respected during the construction of the second, although it is impossible to say which was dug first, or indeed whether they are contemporary and formed a coherent unit built at the same time. The differences in the radiocarbon dates from samples recovered from the ditch terminals may indicate that the process of silting up of the ditch took place over an extended period of time, or that the earliest date is residual material incorporated into the ditch fill. The dated material can at best provide only a *terminus post quem* for the infilling of the ditches.

7.4 Function of the site

Given the paucity of material remains recovered, elucidating the function of the site remains problematic. The only possible clues are provided by a few examples of shale roughouts. Similarly to Braehead (Ellis 2007), the examples predominantly consist of roughouts, or the preparation and initial perforation of a block. Winchburgh may have been the focus of a particular link in the *chaîne opératoire* of the shale jewellery manufacturing process, much as Hunter (2007) postulates for Braehead, with the initial processing of the shale carried out at Winchburgh, providing the blanks for further work and finishing elsewhere. Admittedly, the amount of shale roughouts recovered from the site is rather meagre, but intriguing nonetheless. Hunter (4.1 'Worked shale') notes that the assemblage is dominated by a single stage of the working process. The lack of débitage recovered suggests that material was part-worked elsewhere and brought to the site perhaps for exchange. Certainly, it would appear, given the lack of evidence for a domestic use of the site, that it had an alternative function, one of which may have been a meeting place to trade the partially finished products.

As mentioned previously, the lack of evidence for any internal structures, apart from the two possible post holes, may be an indication that Winchburgh never functioned as a domestic site. In addition to the lack of structures, there were practically no finds indicating a domestic occupation. In comparison to some other hillforts and enclosures, Winchburgh was practically bereft of finds. Only a few animal bones exhibited evidence of burning and only one displayed a knife mark (see 5.1 'Animal bone'). Similarly, the amounts of charcoal recovered from the ditch fills revealed that they had not been the recipients of domestic refuse (see 5.3.1.3 'Charcoal').

7.5 The enclosing works

As noted above, the inner ditch of Winchburgh was a complete circuit with an east-south-eastern entrance and another entrance in the west-north-west. The outer ditch consisted of a number of conjoined pits or scoops around most of the eastern section of the circuit. The remainder of the outer circuit was discontinuous and consisted of separate oblong pits. As suggested for Braehead (Ellis 2007: 253) and Port Seton (Haselgrove & McCullagh 2000: 81), the irregularity and segmental nature of the ditch segments at Winchburgh may reflect construction methods involving gangs, each working on separate segments of ditch.

There was no evidence of re-excavation or cleaning of the ditches at Winchburgh, and the results from the soil micromorphology suggest that there was no deliberate backfilling and that the fills were the product of natural accumulation (see 5.4 'Soil micromorphology'). Therefore this would suggest that the ditches were not maintained and were allowed to silt up naturally. No evidence of recutting was found at Braehead (Ellis 2007: 254) or Woodend (Banks 2000: 248) either, and differential upkeep of the ditches was noted at Fisher Road West, Port Seton (Haselgrove & McCullagh 2000: 77). However, it must be noted that only eight samples were taken using Kubiena tins (one from the inner ditch and one from the outer ditch) and it was not

possible to extract any samples from the terminals or the circuit of the eastern half of the inner ditch as the stone within the fills was too tightly compacted. The soil micromorphology, therefore, is not necessarily representative of the entire ditch circuit.

At Winchburgh there was very little silting up of the terminals of the eastern entrance of the inner ditch prior to the deposition of the slabs and rubble. In addition, there were very few voids within the matrix of stones, which is indicative of a rapid deposition of the stone within the inner ditch. If the stone had accumulated in the ditch over a longer period of time, one would expect far greater mixing of the rampart material. The sheer volume of stone recovered from the inner ditch, much of which consisted of large slabs, would seem to indicate the presence of an outer stone revetment to an earthen rampart. The largest, flattest slabs were recovered lying horizontally against the inner face of the eastern entrance terminals and more stone was recovered from the inner side than the outer of the fills. In addition, the fills of both ditches were derived from re-deposited upcast material as well as eroding soil (see 5.4 'Soil micromorphology'). Therefore, the most likely explanation is that the bank and revetment were located behind the scarp of the inner ditch. Two possible explanations for the slabs and stone lying horizontally in the scarp of the inner ditch are: (a) relatively shortly after its completion the revetment was deliberately destroyed or (b) the underlying edge of the ditch collapsed, causing the material to slump into the ditch.

The volume of stone within the inner ditch at Winchburgh decreased from east to west, which suggests that there was more revetting around the eastern entrance to the enclosure, also observed at St Germains (Alexander & Watkins 1998). This may indicate a greater adornment of the eastern entrance and that the remainder of the inner bank had a stone kerb or capping. This would explain the decreasing amount of stone recovered from the western half of the inner ditch. It would serve to emphasise the eastern approach to the enclosure. Certainly, the ditches at Winchburgh were far more substantial in the vicinity of the eastern entrances and this, coupled with a more extensively embellished entrance, would create an impressive visual effect.

Even assuming there was some degree of truncation of the site, it seems unlikely that this would have resulted in the incomplete nature of the western half of the outer ditch. Defensive considerations seem to be secondary to the visual aspect of the site. Indeed, there are many examples where it appears that defensive considerations were not the primary factor in the siting of the enclosure (ScARF 2012: 85). For example, both The Chesters, Drem (NRHE Site No. NT57NW 1) and Castle Law, Glencorse (NT26SW 2) are overlooked from higher ground, and the topographic setting of the recently evaluated multivallate lowland fort in Keir Wood, just across the Firth of Forth in Kincardine (Kirby 2014), does not offer much defensive advantage. The excavated enclosures at Mar Hall, Renfrewshire (Cavers et al 2012), St Germains, East Lothian (Alexander & Watkins 1998), Shiels Farm (Scott 1996) and Woodend Farm, Dumfriesshire (Banks 2000) all have fairly substantial ditches but their low-lying locations would tend to counteract any defensive aspect.

Recent theories have offered alternative explanations for the use of enclosing works. Enclosure could have had a wide range of social and symbolic meanings, such as outward displays of status, to provide a symbolic separation of 'insiders' and 'outsiders' (Hingley 1990; Ralston 2007: 11), while emphasising the importance of the site in the surrounding low-lying landscape (Bowden & McOmish 1987: 77). Hingley (1990) suggests that banks and ditches would have reflected social concepts such as the control or ownership of resources and land. The very act of construction may have served to structure people's ideas about community or to enhance the prestige of its inhabitants or provide a visible indicator of identity (Bowden & McOmish 1987: 77; Banks 2000; Ralston 2007: 11). Bowden & McOmish (1987) suggest that the act of digging the ditches would serve to enhance the status of the inhabitants (ibid), and the mobilisation of the required workforce would be an expression of power (Banks 2000; ScARF 2012: 75).

Another explanation for the incomplete nature of the ditches is that rather than having a defensive function they served to emphasise the main approaches to the site. The volume of stone recovered from the ditch fills decreased from east to west around the circuit of the inner ditch, perhaps suggesting that bank size too decreased from a focus near the entrance. As has been discussed above,

this is unlikely to have wholly been the result of truncation and may represent the remains of a revetment to a wall or bank which tapered from east to west, creating an impressive visual effect while emphasising the eastern entrance. Assuming this to be the case, the main approach to the enclosure would have been from the east, along the east/west-running ridges, and this emphasis on the east may explain why the ditches of the western half of the enclosure are less substantial and discontinuous.

Another consideration of the visual aspect of the site would be the presence of water within the ditches. During the excavation the ditches were frequently filled with water, which required emptying by means of a pump. Indeed, the water is still very apparent in the aerial photograph in Illus 5, which was taken after the excavation was finished. Standing water would have served to emphasise the ditches and could have acted as a symbolic separation as well as providing a defensive function. A similar theory was suggested for the enclosures at Shiels and St Germains (Alexander & Watkins 1998).

7.6 Regional context

There are a number of similar examples of enclosures within the Lothian Plain and Central Scotland. However, only a handful of these have been excavated, including Mar Hall, Renfrewshire (Cavers et al 2012), St Germains, East Lothian (Alexander & Watkins 1998), Shiels Farm, Glasgow (Scott 1996), Whittingehame Tower, East Lothian (Haselgrove et al 2009), Braehead, Glasgow (Ellis 2007) and Ravelrig Quarry, Edinburgh (Rennie 2013). Most of these have been thought to have had a domestic purpose, though, and have a longer lifespan than is postulated for Winchburgh. In addition to the excavated sites, there are many more crop mark sites which are reminiscent of Winchburgh but remain undated at present. These include Blackness (NRHE Site No. NT07NW 54), Stacks (NT07NW 49 and NT08SW 26), Burnshot (NT07NW 48), Priestinch (NT07NE 126), Duddingston (NT17NW 42), Craigton (NT07NE 41), Newton (NT07NE 39) and Milrig (NT17SW 170). Therefore, Winchburgh did not sit in splendid isolation but had its place within a plethora of contemporary Mid/Late Iron Age sites, including Kaimes hillfort which was probably occupied at the same time. Winchburgh can be seen to be a part of the continuum of enclosure, whether it was for defensive, symbolic or practical considerations, which is evident during the Later Bronze Age and throughout the Iron Age.

8. CONCLUSION

The excavations at Winchburgh achieved their primary objective, which was to mitigate the loss of archaeological features recorded as cropmarks ahead of the housing development. It adds to the growing corpus of evidence relating to late prehistoric palisaded and ditched enclosures from Southern Scotland, while offering tentative evidence of possible alternative uses for the enclosures rather than for purely domestic purposes. The lack of evidence for long-term domestic occupation of the site leads to the possibility that the site was used periodically or seasonally. Perhaps the site was used as a seasonal meeting place to trade goods, one of which may have been the shale roughouts. In addition, the site may have been in use for a relatively short time. Evidence for this is the lack of silting of the inner ditch prior to the deposition of the stone, the lack of any evidence of recutting or upkeep of the ditches and the sterility of the site. There is also the possibility the site was deliberately abandoned shortly after its construction, suggested by the compacted nature of the stones within the terminals of the eastern entrance through the inner ditch. If the site was left to decay slowly one would expect a more sorted deposit. Deliberate abandonment may have been precipitated by political or social upheaval at the time. Cavers et al (2012) have postulated the ephemeral use of Mar Hall, given the sterility of the site.

The horse teeth, which suggest a horse burial in the southern terminal eastern entrance of the inner ditch, point to a symbolic deposit. Animal burials have been noted at Broxmouth, Danebury, Eildon Hill North and Blewburton Hill (Collins 1953; Rideout et al 1992).

Winchburgh could have served to bind the community together. The act of digging the ditches may have helped to reinforce tribal affiliations and identities. The enclosing works would emphasise the difference between 'insiders' and 'outsiders', and Banks (2000) considered that multivallation may well reflect social rank rather than practical purposes, emphasising the control of the resources required to create such a monument. The stone recovered from the ditches did not derive from the immediate drift geology and had been purposely brought to site from further afield, although the source location is unknown.

Although merely speculative, it is tempting to view Winchburgh as an important meeting place where items were traded or exchanged and tribal bonds were strengthened and reinforced.

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The site archive will be deposited with the National Record of the Historic Environment. The finds assemblage will be disposed of through Treasure Trove procedures.

While thanks are due to the above, responsibility for the final form and content lies with CFA Archaeology Ltd and the authors.

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