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Kingsley Group

Whitbread Travel Inn Archaeological Excavations at Penhale Round, Cornwall 1996

Draft Report

prepared by

Babtie

Kingsley Developers Ltd

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WHITBREAD TRAVEL INN

ARCHAEOLOGICAL EXCAVATIONS AT PENHALE ROUND, CORNWALL, 1996

DRAFT REPORT

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1 INTRODUCTION

1.1 Babtie Group, acting on the instructions of Kingsley Developers Ltd, designed and implemented an archaeological excavation in response to a planning condition affecting part of an archaeological site known as Penhale Round. The project design was approved by the Cornwall Archaeological Unit (CAU), in accordance with the planning condition, and the work took place in December 1995 and January 1996.

1.2 Planning consent 95/06/01192, issued by Restormel Borough Council, was for the construction of a Travel Lodge and associated car park on the site of Penhale Round. The car park was designed in a manner approved by the CAU, to allow the preservation in situ of the majority of the round. Construction of the Travel Lodge was to affect an area of some 375m^2 in the north-eastern part of the round and adjacent to it, and the planning consent required the archaeological excavation of this area. At the request of the County Archaeologist, the excavation area was extended to include the proposed car park access to the immediate west of the building.

2 ARCHAEOLOGICAL BACKGROUND

2.1 Penhale Round is a later prehistoric Romano-Cornish enclosed settlement located near Fraddon, Cornwall (NGR SW 908573 centred; see Figure 1). Rounds are one of a number of types of enclosed or defended settlements in Cornwall which were occupied during the later Iron Age and Roman periods. Although these sites can be classified into a number of types, there is substantial variation of form, location and size within each type and considerable overlap between types. Some individual sites could therefore be classified as more than one type, depending on the weight placed on the various relevant criteria (Johnson and Rose 1982).

2.2 The larger sites include hillforts and cliff castles. The former are usually of multiple-enclosure type, with widely spaced ramparts, and are thought to have been permanent settlements. Their occupation has been dated to between about 400 BC and the Roman occupation (Quinnell 1986). Cliff castles are believed to have been of similar date and function. Smaller enclosed settlements in Cornwall take several forms, of which rounds are the most common, with an estimated 700 examples. Others include sub-rectangular enclosures, usually regarded as variants of rounds, and hillslope forts. The latter are of similar size to rounds, but excavation results suggest that they may be higher-status sites (Quinnell 1986). The numbers of known small enclosed settlements of all types in Cornwall have increased significantly in recent years, due to aerial photography (ibid).

2.3 Although there are substantial variations in form, rounds are typically univallate enclosures with shallow ditches (1.5m to 2.0m deep) and simple entrances without inturns. They are often located on sites which are not naturally defensive, such as hillslopes. Very few have been excavated, but the limited evidence, combined with aerial photography, suggests that they were internally organised with buildings around the periphery and centre of the enclosure and discrete areas set aside for agricultural and domestic purposes. Aerial photography has also identified a frequent association of rounds with field systems (ibid). As a type, they appear to have been occupied from the later Iron Age to around AD 600 (ibid), whereas the more heavily fortified sites went out of use at the start of the Roman occupation.

2.4 It has been suggested that rounds represented the settlements of landowning family groups which often existed in close proximity, supported by an economy based on arable agriculture (ibid). Prior to the Roman occupation, rounds must have had a socio-economic relationship with the larger hillforts which presumably represented a hierarchy controlling extensive areas and commanding allegiance from a number of smaller settlements.

2.5 The only round whose interior has been extensively excavated is Trethurgy, near St Austell, which was occupied from the 2nd to the 5th century AD (Miles and Miles 1973, Quinnell forthcoming). The site demonstrated the characteristic spatial zoning of the interior, with a number of sub-circular domestic structures set around the perimeter and areas for animal husbandry and other activities located either side of the entrance. The nature of the ceramic assemblage suggested that domestic refuse was regularly taken out for use as manure, resulting in a paucity of closely dateable assemblages, a phenomenon common to many Cornish sites.

2.6 Rounds have been compared to the raths of south-west Wales (Quinnell 1986), sites of similar size and form. However, no new earthworks were constructed at known rath sites during the Roman period, whereas in Cornwall existing rounds continued to be occupied and remodelled, and new ones were constructed during the Roman period. It has been suggested (Quinell 1986) that this difference reflects on the one hand the continuing Roman garrisoning of south Wales, and on the other hand the integration of local tradition in Cornwall.

3 THE SITE

3.1 Penhale Round was discovered through cropmark evidence in the 1950s. Previous investigations have included geophysical surveys of parts of the site and surrounding area, carried out in 1982, 1991 and 1994. Part of the site was excavated by the CAU in 1993 (Nowakowski 1994) in advance of the A30 Fraddon/Indian Queens Bypass (Figure 2). The 1993 excavations also investigated areas to the south of the round, and a watching brief took place during construction of the A30. An evaluation in 1994 (AC Archaeology 1994) in advance of the proposed business park and a subsequent watching brief during ground preparation by Babtie Group, investigated the areas to the north and east of the round.

3.2 The geophysical surveys revealed a complex oval multivallate enclosure, approximately 65m long and 53m wide within the inner ditch (giving an area of roughly 0.25 hectares, or 0.66 acres). There were two enclosure ditches on the south, west and north sides, but three on the east and north-east sides. The enclosure was surrounded by a landscape of ditched boundaries, some of which were potentially contemporary with the round, while others were clearly not contemporary. At least three possible round-houses were identified in the interior.

3.3 The CAU excavations identified pre-round activity, including a middle Bronze Age farming landscape comprising field ditches and one oval structure and a landscape of the later Iron Age including ditches and one structure. The evidence from these excavations suggested that the round was constructed in the late Iron Age and used up to the 3rd or 4th centuries AD, developing from simple univallate beginnings through a series of at least five major modifications to the entrance and enclosing ditches and ramparts.

3.4 The primary (inner) ditch was steep-sided with a V-shaped profile and up to 2m wide by 1.8m deep. The inner face of the ditch was revetted in places with stones. The base of an internal bank survived to a height of 0.2m and a width of 3-4m, with post-holes cut into it. The later ditches, which may have been contemporary with a recut of the inner ditch, were broader and shallower. A single oval structure was excavated in the interior, while other well-preserved features included palisade trenches, cobbled roadways, drains and gateways, mostly associated with the entrance.

3.5 Artefacts from the pre-round features were concentrated in discrete features and structures. Pottery associated with the round tended to be clustered either in features or in discrete zones in the enclosure ditches, with a tendency for distribution to fall off at a distance from the entrance. Animal bone generally had not survived. A number of stone objects were recorded but only a few pieces of metal work were recovered. The results of the assessment of environmental samples is understood to be incomplete at present; however, charred plant remains have been identified from several contexts. No comprehensive information on the results of the 1993 excavation was available for consideration in relation to the results of the 1995/6 excavation.

4 EXCAVATION METHODOLOGY

4.1 Aims and objectives

4.1.1 The proposals for excavation, recording and post-excavation assessment were set out in a written scheme of investigation submitted in support of the planning application and agreed with CAU. The aims of the recording action as set out in those proposals were:

to elucidate the stratigraphy, sequence and chronology of the banks and ditches to provide comparative data to the sequence recorded by the south entrance. The archaeological action will also clarify the sequence and relationships of any internal or external archaeological remains

within the footprint of the proposed development. It is anticipated that occupation areas and zones for different agricultural processes are located around the perimeter of the Round and thus the mitigation exercise may also provide data indicative of such activities. A programme for palaeo-environmental sampling may assist in elucidating agricultural activities such as crop and animal husbandry and crop pressing.

4.2 Site clearance

4.2.1 An area of 60 x 20m was stripped under archaeological supervision using 360° and JCB-type excavators fitted with toothless ditching buckets. Topsoil was removed from the site using lorries and trailers and stockpiled beyond the perimeter of the Round. Machinery was not permitted to track across stripped areas or the area of the Round. Topsoil and subsoil averaged 500mm in depth over the site. It was subsequently learnt that topsoil had been stripped from the field for sale in the past.

4.3 Hand excavation

4.3.1 Following stripping, areas of the site containing archaeological features were hand cleaned. Up to 40m of the three enclosure ditches were exposed, together with internal structural features characterised by a round house gully and post holes in the southwest corner of the site (Figure 3). Hand excavation and recording of features was carried out in accordance with the approved scheme, as modified at CAU monitoring visits held on 13 December 1995 and 20 December 1995. Sections were dug across the enclosure ditches, and all discrete features were excavated.

4.4 Environmental sampling

4.4.1 An environmental sampling programme was agreed during a monitoring visit, with the advice of Vanessa Straker of English Heritage. The programme provided for the retrieval of bulk samples of 40 litres target size from all cut features within the structure and the primary fills of the enclosure ditches. It was agreed that bulk samples would be floated and sieved to 1mm, with flots to be collected on 250 micron mesh. The samples would also be examined for evidence of metal working or other activities. A pollen column was taken from the gully structure fills by Vanessa Straker.

5 EXCAVATION RESULTS

5.1 Enclosure Ditches

5.1.1 Three concentric enclosure ditches were recorded. The outer ditch extended for about 40m within the excavated area, the middle ditch for about 35m and the inner ditch for about 30m. Although the geophysical survey had suggested some complexity in this area, with possible ditch intersections, the excavation demonstrated a simple concentric plan. No relationships between the three enclosure ditches were apparent within the excavated area, although the inner ditch had been recut.

5.1.2 The three enclosure ditches differed from each other in terms of their profile and depositional history. The outer two enclosure ditches 006 and 008 were considerably narrower than the inner ditch (Figures 3 and 4). Three 2m wide sections were dug across each of the outer two enclosure ditches, representing a sample of about 15% by length. No dating evidence was recovered from any of the sections. One small find, an unfinished shillet spindle whorl (SF3) was recovered from the middle ditch 006.

5.1.3 Two 4m wide sections were dug across the inner enclosure ditch, representing a sample of about 20% by length (Figure 3, A & B; Figure 4). Severe weather curtailed excavation of the lower part of Section B, and this section was not bottomed, with the agreement of the Cornwall Archaeological Unit. The sections revealed that the inner ditch 087/124 had been backfilled, and subsequently recut 004/125. Romano-Cornish pottery was recovered from the fills of both the earlier and later episodes. The lower excavated fills of the recut ditch from the western end of the excavated area (Section B) produced quantities of charcoal. One hundred and five sherds of later Romano-Cornish pottery were also recovered from one of these contexts (045), including body and rim sherds from

at least 15 domestic vessels. A fragment of shale bracelet (SF4) was also recovered from (045). The recovery of these finds from the inner enclosure ditch immediately adjacent to internal structures is of some interest. A second shillet spindle whorl (SF2) was recovered from the later recut ditch at section A.

5.1.4 Upper fills of the recut inner enclosure ditch in both sections A and B contained quantities of large stones up to 300mm across. The spread of the stones within the fills was suggestive of the collapse or possibly demolition of a stone revetment which probably faced an internal bank. Evidence of a revetted bank was recovered during CAU excavations at the entrance to the Round in 1993. Revetment stonework was particularly apparent in section A, where a distinct layer was concentrated in upper fill (095), suggesting that the enclosure ditch(es) was largely silted up at the time of the collapse/demolition of the revetment.

5.2 Internal structures

5.2.1 Evidence of internal structures was located at the south-western corner of the site, and consisted of part of a single hut gully and a group of post-holes. There was no evidence for partial stone construction, such as had been present in the internal building excavated in 1993. This group of features did not coincide with any of the possible round-houses identified by the geophysical survey. No evidence of external structures was identified. An absence of archaeological features immediately within the inner enclosure ditch may reflect the presence of a rampart, although no evidence of such a structure itself was apparent.

Hut Gully

5.2.2 The hut gully 038 was located in the extreme south-western corner of the site (Figure 3, C; Figure 5) Approximately 7m of the feature was present in the excavated area, presumably representing the north-eastern quadrant of a structure. A total of 5m of the hut gully was excavated. Up to 3 fills were present, the later fills containing quantities of charcoal. The nature of the fills suggests that the feature may have functioned as a drip gully. Five Romano-Cornish potsherds, none closely datable, were recovered from the feature. In addition to bulk environmental samples, a pollen column was taken from the hut gully. Analysis of the pollen has identified the presence of sphagnum moss on the site (Scaife below). It is possible that this may have been used as roofing or flooring material within this or an adjacent structure.

Post holes

5.2.3 A group of 27 intercutting post holes was excavated in the south-west corner of the excavated area. (Figure 3 D; Figure 5). Twenty-one of these post holes clearly lay within the hut gully, with a minimum gap of 0.6m between the gully and the nearest post-hole, suggesting that most (if not all) of them were contemporary with the use of the gully. The remaining post-holes were not contemporary with the gully; it cut one posthole 148 on its inner edge, while post hole 048 cut the gully, and was in turn cut by post hole 046. The latter was clearly part of a straight alignment of post holes (113, 136, 138, 046), the remainder of which lay outside the hut gully.

5.2.4 The only clear structural pattern which could be identified was the straight alignment of post holes outside and intersecting the hut gully, referred to above. Another post hole 163 and one cutting it 160 also lie on this line, but form part of the mass of post-holes within the hut gully. While a number of potential structural patterns could be tentatively picked out within the main group, an insufficient proportion of the area of the structure(s) was exposed to confirm any of them. One group of five post-holes (168, 170, 166, 060, 182) were appropriately positioned to form part of a post-ring roughly concentric with the gully and could all have been contemporary, but neither their contemporaneity nor their structural association could be confirmed.

5.2.5 Pottery, of 2nd to 4th century date, was recovered from only one post-hole 062, which also contained a fragment of granite quernstone (SF5) and a fragment of vessel glass (SF6).

5.2.6 Although there was a general absence of artefactual material in the post-hole fills, many of the features contained stone fragments suggestive of post packing 136 068 or post pads 055 082 070. Clay post packing was present in 084. Charcoal was present in the majority of fills to varying

degrees, being particularly apparent in 055 and 053. A patch of clay (065) and a patch of burnt stones (101) were present. The clay was directly above natural and was cut by post holes 180 and scoop 163. The burnt stones appeared to represent burning of the natural ground surface, and pre-dated the hut gully.

5.3 Pit complex

5.3.1 To the east of the structures, a group of intercutting pits and a gully was excavated (Figure 3, F; Figures 5 and 6). This consisted of at least five cut features and extended north-westwards from the southern edge of excavation for about 5m, forming a broadly linear complex. While they represented several phases of activity, their fills were mostly very similar (largely redeposited natural) and not all the relationships could be determined. This feature group had not shown up as a geophysical anomaly.

5.3.2 Pit 115 was a large flat-bottomed cut at the southern edge of the excavation, 0.75m deep, completely backfilled with natural shillet in a brown clay matrix (112). It must have been relatively steep-sided and not more than 2.3m wide, but its shape in plan could not be determined as all its edges within the excavated area had been removed by other features - a vertical sided slot 106 on the north-east side, and pit 110 to the west.

5.3.3 Slot 106 was 0.75m wide by 0.65m deep, with a length of 3m within the excavation; its rounded north-east end cut the fill (117) of pit 142. The edges of pits 110 and 142 could not be clearly defined in plan, while the shape of 142 in section suggested that it had originally extended further to the south. Given the fact that their fills were very similar, 110 and 142 could therefore be parts of the same feature.

5.3.4 The north-west side of pit 142 cut an earlier feature, 108, which formed the north-west end of the complex. The shape in plan of 108 suggested that it was a simple oval pit, approximately 1.8m long by 1.3m wide. However, the section showed that the pit had extended further to the south-east prior to being cut away by 142, suggesting a more elongated original shape (in a similar fashion to pit 142 itself).

5.3.5 No artefacts were recovered from the features except for a single undiagnostic Romano-Cornish potsherd from the upper fill of slot 106, probably the latest element of the complex. No charcoal or macroplant remains were recovered. Many of the fills were suggestive of deliberate backfilling, and most of the features had only a single homogenous fill. The function of the various elements of the complex remains enigmatic. While slot 106 was of a suitable shape to function as a large post-trench, there was no evidence in the form of post-pipes or post-packing to suggest that this was its purpose. There was even less evidence to suggest a function for the other features.

5.3.6 To the immediate east of the pit complex, an isolated sub-rectangular pit 030 of regular profile was identified, roughly coinciding with an amorphous geophysical anomaly. In contrast with the other pit group, it had five distinct fills (031, 032 and 034-6), which included dumps of clay and charcoal lenses, perhaps suggesting an industrial function; all of the fills also contained slag from iron smithing (Fitzpatrick 1998). Romano-Cornish pottery was recovered from three of the fills; in two cases the pottery is not closely dateable, but fill (032) contained two abraded sherds of 1st to 2nd century date - the only pottery from the excavation necessarily of early Romano-British date (Quinnell below). This feature also produced the largest assemblage of carbonised plant remains from the site (Scaife below) and significant quantities of charcoal, including the only heather charcoal from the site. The latter may also have some industrial significance (Gale below).

5.4 Late Features

5.4.1 Several features which appear to post-date the Round were recorded. A line of small tree holes (Figure 3, G) which coincided with an anomaly on an English Heritage geophysical survey was recorded cutting the fills of the outer two enclosure ditches. A single post hole was also observed to cut the fill of the outer enclosure ditch. Beyond the enclosure, an isolated small post-hole with a charcoal-rich fill was the sole feature recorded.

6 STRATIGRAPHIC PHASING

6.1 The remains in this northern part of the site were truncated to a substantially greater degree than in the southern area excavated in 1993, due to previous stripping of topsoil for sale. This had caused significant damage to the stratigraphy in this area, and reduced the degree to which the remains could be satisfactorily phased.

6.2 The presence of the recut of the inner ditch and the lack of any relationship between the inner, middle and outer ditches means that there could be between two and four phases of enclosure in this part of the site, depending on whether any of the ditches were excavated contemporaneously. However, the results of the CAU excavations in other parts of the site suggest that three or four phases are more likely than two. While the recut of the inner ditch is stratigraphically the latest identified phase, this need not mean that it actually post-dated the middle and outer ditches.

6.3 Although stratigraphic relationships between individual features could be demonstrated, no association with the hut gully or clear phasing of the post holes could be established on stratigraphic grounds. The 21 post holes enclosed by the hut gully and apparently respecting it clearly represented at least two structural phases, either or both of which could be contemporary with the gully. However, some of these features could also be contemporary with an earlier phase represented by the post hole and area of burnt natural which were cut by the gully, or with one of the later phases represented by two post-holes cutting the gully.

6.4 The straight post-hole alignment, which cut the gully, also post-dated pit 030 (the earliest element of the pit complex), while the pit complex itself demonstrated at least three phases. The isolated pit lying further to the west was not stratigraphically linked to any other feature.

6.5 While each of the main groups of features within the excavated area (enclosure ditches, hut gully and post holes, post alignment and pit complex) demonstrated the presence of between two and four stratigraphic phases, in no case was it possible to confirm the total number of phases within any group. The only stratigraphic link between groups which could be demonstrated was that the post alignment post-dated both the hut gully and the earliest element of the pit complex. None of the internal features could be linked to any phase of the enclosure ditches.

7 THE ARTEFACTS Henrietta Quinnell

7.1 Glass (Figure 7)

7.1.1 A single fragment (**SF6**) was recovered from 063, top fill of post hole 064, and was submitted to the Wiltshire Conservation Laboratory for conservation. The fragment, 76 x 25 x 3 mm, is of vessel glass in a blue/green metal with numerous oval bubbles, and most likely to be from a prismatic bottle. Such bottles were most common in the 1st -2nd centuries AD in Britain, but continued in used into the 3rd century (Fitzpatrick 1998). No glass was found during the 1993/4 excavations (Nowakowski forthcoming).

7.1.2 The piece comes from the wall of a bottle, probably from a square as opposed to a hexagonal prismatic type. Such bottles formed a significant proportion of the glass assemblage from the Greyhound Yard Site at Dorchester (Cool & Price 1993, 153) and at Exeter (Allen 1991). Dated contexts at Exeter are rare and range from the later 2nd to the later 3rd/earlier 4th centuries; bottles may have continued in use there later than elsewhere, and there is in addition evidence for the reworking of broken glass. Glass is rare at Exeter after the 2nd century (Allen 1991, 220), unlike Dorchester which reflects the national pattern with much 4th century material. In rural Devon glass occurs on those few sites with buildings in the Roman style, but is less common on enclosure sites without such buildings; compare its presence at Stoke Gabriel (D Harden in Masson Phillips 1966) to its absence at Hayes Farm (Simpson *et al* 1989). Glass occurs in small quantities on some Cornish enclosure sites, at Reawla (L & R Adkins in Appleton-Fox 1992), Trethurgy (J Price in Quinnell forthcoming), Carvossa (D Harden in Carlyon 1987), Grambla (Saunders 1972), Kilhallon (J Price in Carlyon 1982) but not at Trevisker, Shortlanesend or Carwathen (Carlyon 1995, 61-65); it is an occasional find at courtyard house sites (*ibid*) and on unenclosed coastal settlements (D Allen in Ratcliffe 1995). There is no overall summary for either county in which dates and quantities can be assessed against other factors such as site location or the size of excavation, but the

published glass from Cornwall indicates that it occurs throughout the Roman period, and does not reflect the unusual early pattern of deposition and possible use at Exeter.

7.2 Ironwork

7.2.1 Four fragments were present: two, one each from 045 in the recut inner ditch fill and 064 in posthole 062, were parts of hobnails; one, from 036 in pit 030, was from a nail; the final piece from 061 was not identifiable. Probable hobnails were found during the 1993/4 excavation (Quinnell in Nowakowski, forthcoming). Hobnails (cf Manning 1985, 136) are being increasingly recognised from Cornish sites as ironwork is more carefully studied. 115 were found at Trethurgy (Quinnell forthcoming), two from Duckpool, Morwenstow (Quinnell 1995a, 00), and others at Grambla, Wendron (Saunders 1972, 52) and at Nornour (Dudley 1968, 25 & Figure 10). These simple objects indicate the spread of a trend in footwear based on Roman fashions and techniques, as hobnails do not occur in pre-Roman Britain.

7.3 Stone artefacts

7.3.1 A single fragment of a shale bracelet (**SF4**, Figure 7) was found in 045, the Inner Ditch recut infill containing a 3rd/4th century pottery dump; this was submitted to the Wiltshire Conservation Laboratory for conservation. The fragment represented approximately 15% of an oval-sectioned bracelet, internal diameter 70 mm. It is of Greyhound Yard, Dorchester, Type 2, manufactured from the Iron Age throughout the Romano-British period (Mills & Woodward 1993). The most likely source of the shale is Kimmeridge, Dorset and it is likely that the bracelet was made in the Isle of Purbeck (Fitzpatrick 1998). No shale was found during the 1993/4 excavations.

Shale bracelets are not common in Roman Cornwall. They have otherwise been recorded from Trethurgy (Quinnell forthcoming), Grambla (Saunders 1972), Carvossa (M Irwin in Carlyon 1987) and Chysauster (Hencken 1933, 259), where they continue a sparse tradition of import from the Iron Age as at Castle Dore (Radford 1951, 70). A shale spindle whorl was also found at Trethurgy. Unlike glass there may be a connection with Exeter where the quantity of shale artefacts, mainly but not entirely bracelets, is commented upon as being unusually high (Allason-Jones 1991, 271), and probably connected to Exeter's coastal import of Dorset BB1 pottery (Holbrook & Bidwell 1991, 21) . Shale has also been found at Mount Batten, Plymouth, a bracelet, part of a possible vessel and a roughout suggesting that objects were made on the site; these finds are consistent with the role of Mount Batten as a port during the Roman period (Cunliffe 1988, 72). However a brief scan of the literature indicates that on rural sites in Devon shale objects are uncommon, even given the comparatively small amount of investigation carried out.

7.3.2 Two spindle whorls were recovered from Penhale (Figure 7). **SF1** came from 015, top level of infill in recut Inner Ditch Section A. Of local Devonian shale, roughly circular, 25 mm diameter and 5 mm thick, the hourglass type perforation is not central. Weight 6g, but part of edge chipped. Has probably been used a little.

SF3 From 022, from the infill of the Middle Ditch. Of local Devonian shale, unfinished, 42 mm in diameter and c. 12 mm thick; 41g weight. A start at boring the hole has been made on both sides.

Spindle whorls are almost ubiquitous on Roman period sites in Cornwall, and the widely outcropping Devonian shale, which breaks into thin even slabs along bedding planes, was very commonly used; several whorls of shale were found in the 1993/4 excavations. **SF1** is at the smallest end of the size range, **SF4** at the largest. The most sizeable group is that of 20 from Carvossa (M Irwin in Carlyon 1987).

7.3.3 One quern (**SF7**, Figure 7) was recovered from 064. About a quarter of an upper rotary quern of granite, c. 600 mm diameter, 45 mm thick, with the eye 100 mm across; variation in diameter suggests the original shape was oval rather than round. The underside is very worn with several pronounced grooves, and the eye shows wear. The nature of the wear indicates that the quern was turned in a clockwise direction. Even allowing for considerable loss of thickness during use, this quern is unusually thin and flat-topped. One break preserves one side of a slot. (The other break shows a regular, very fresh, chamfer, which could have been produced by machine damage on such soft granite). The slot may have been designed to hold a wooden or iron fixture (rynd) to

support the central spindle or could have been a feed hole. Macroscopic examination shows an absence of large feldspar crystals and the presence of pale mica, probably muscovite, which would best fit a source in the Tregonning Granite (Dr R T Taylor *per comm.*) Tregonning is about 35 km to the South West; greisen from the area was much used for objects such as mortaria (Quinnell 1993). Both rotary and saddle querns were in use in Cornwall throughout the Roman period (Quinnell 1986, 117). Pottery from this post hole is probably 3rd to 4th centuries but could just be as early as the 2nd.

All rotary querns so far recorded for Roman Devon and Cornwall are thick with conical or hemispherical grinding surfaces (eg Castle Gotha, M M Irwin in Saunders & Harris 1982), which are closely related to those in use during the Iron Age. **SF7** is of Curwen's (1937) disc type with almost flat grinding surfaces, considered to have developed from Roman querns with more sophisticated features. Curwen (*ibid*, 146) considered this type to date late in the Roman period but more recent work show them to be common from at least the 2nd century, as at Catsgore, Somerset, the nearest rural site in the South West to have produced querns in any quantity (Leech 1982, 129). The disc variant may well have developed from the forms in use by the Roman army: see the presentation by Welfare (1995) of the range from Usk in South Wales. There appears however no close parallel for the slot, set radially to the eye. Settings for a rynd are normally cut as extensions to the eye (eg Chew Valley Lake Nos 10 & 11 (Rahtz & Greenfield, 1977, Figure 96 & p202)). Separate cuts or slots tend to be interpreted as feed holes; the best comparanda are on flat querns from Voreda, Cumberland (North, 1936, Figure opposite p 132), Bromham, Beds (Tilson, 1973, Figure 31) and Bramley, Surrey (Rawnsley, 1927, 242); all except Bramley are smaller and all are set tangentially rather than radially. The unusual nature of this quern is appropriate for its suggested source in the Tregonning Granite, an area which produced a variety of innovative and sophisticated artefacts for exchange within Roman Cornwall. (The report on the quern is largely based on discussions with Sue Watts of Cullompton to whom I am much indebted).

7.4 Flints

7.4.1 Five flints were identified, an unworked piece from 121 in the middle ditch, two scraps from post-hole 049, and a core-trimming piece and a serrated blade, both of pebble flint, from inner ditch fill 045. The blade, 15 mm wide and surviving 37 mm long with both ends broken off, has deliberate serrations along both edges. Such serrated blades or flakes are generally regarded as one of the more distinctive forms in Earlier Neolithic assemblages, though not well represented in Cornwall (see discussion by Saville 1981, 144). Flints of Neolithic, as well as Mesolithic and Bronze Age, date were found at Penhale in the 1993/4 excavations as was Earlier Neolithic pottery (Quinnell in Nowakowski, forthcoming).

7.5 Bronze Age Pottery

7.5.1 Two sherds from 077 in the Inner Ditch have rock inclusions, probably serpentinite, and are typical of a Bronze Age fabric known as gabbroic admixture (Parker-Pearson 1990, 19). Considerable quantities of this fabric was found during the1993/4 excavations, in Trevisker forms which should be of Middle Bronze Age date, in contexts just outside the South of the Round.

7.6 Roman Period Pottery (Figure 8)

7.6.1 The assemblage consisted of 174 sherds; fabrics are described below. Minimum vessel numbers have been estimated very simply on variations in surviving pieces with distinctive aspects in form or fabric; they should be regarded as only a very rough guide.

Fabric	Sherds	Weight (g)	Minimum vessel numbers
Well-made gabbroic	1	1	1
Standard gabbroic	88	1188	13
Coarse gabbroic	5	280	2
Gabbroic LV	76	1824	12
SE Dorset BB1	3	52	2
Exeter Sandy Grey ware	1	16	1

Totals	174	3371	31

7.6.2 The fabrics

Gabbroic fabrics have most recently been described in the report on the round at Reawla (Quinnell 1992b). *Well-made* is compact, with most inclusions < 2 mm and carefully burnished surfaces; it was used during the Later Iron Age into the 2nd century AD. *Standard* is less carefully made, grits may be up to 5 mm and burnish is more sporadic; it is the fabric most frequently used during the 2nd and 3rd centuries. *Coarse* is a thick oxidised fabric with grits often > 5mm used for storage vessels. *Gabbro Late Variant (LV)* was first recognised during examinations of the ceramics from the 1993/4 excavations at Penhale carried out by the author (Quinnell in Nowakowski, forthcoming); this contains rounded as well as angular inclusions in a fabric which tends to be more open than *standard* and is used for a wide range of bowls and jars during the later 3rd and 4th centuries. A number of petrological studies have been carried out by Dr D F Williams (see Quinnell 1992b) which both confirm the likely source for gabbroic fabrics as the St Keverne area of the Lizard, and also the Dorset origin of BB1 material. Petrological work on the *gabbro LV* fabrics has not yet been carried out but macroscopic examination of later Roman period collections suggests its use is widespread. Gabbroic fabrics generally account for around 90% of Roman pottery in Cornwall. The next most common fabric, *South East Dorset BB1*, while present throughout the period, increases in the 3rd and 4th centuries (Quinnell 1986). The chronology and typology of *South East Dorset BB1* in the South West are fully discussed by Holbrook and Bidwell (1991) in their report on Roman finds from Exeter, which also covers *Exeter Sandy Grey ware* (*ibid* 154-5). The latter, Exeter fabric 151, was probably made somewhere in the vicinity of Exeter from c. AD60 to the late 2nd century. The only other Cornish site at which it has been recognised is Carvossa (P T Bidwell in Carlyon, 1987) where there were sherds of at least 20 vessels.

The present report makes use of the Cornish site by site summaries, prepared during the 1980s by Carlyon (1995), detailed work on the ceramics from Trethurgy Round (Quinnell, forthcoming) and the assessment of the ceramics from the 1993/4 excavations at Penhale (Quinnell in Nowakowski, forthcoming). Analysis of these excavations is expected to provide a range of radiocarbon dates which will have relevance to the material published here.

7.6.3 Details of ceramics by context and description of illustrated vessels

Inner enclosure ditch - Section A

The fills of the initial cut in Section A produced single gabbroic sherds from contexts 092 and 017. Neither was closely datable.

Larger quantities of pottery were recovered from the fills of the recut of the inner ditch. Single well-made gabbroic sherd (015), 4 gabbroic sherds (029, 005) including **P1**, 10 gabbroic LV (095, 015, 005), one BB1, **P2.** A minimum of 5 vessels are represented by **P1, P2** and other sherds with distinctive forms or fabric.

P1 (029): Small lug with vertical perforation; no known parallels but similarities in both gabbroic fabric and condition suggest that it is part of the site's Roman assemblage.

P2 (095; not illus, see **P6**): Rim/wall sherd from plain-rimmed dish in South East Dorset BB1; possible remnant of arcade decoration. Plain-rimmed dishes in South East Dorset BB1 occur at Exeter from the mid-2nd century and then are found throughout the Roman period; arcading or intersecting arc decoration occur throughout (Holbrook & Bidwell, 1991, 99-100). These dishes are common among 4th century BB1 material in Cornwall; there were 8 at Trethurgy (Quinnell, forthcoming).

Inner enclosure ditch - Section B

In the initial ditch cut, only 057, high in the fill, contained pottery: 7 gabbroic sherds including **P3**, 12 gabbroic LV including **P4, P5**; single BB1 sherd **P6**. A minimum of 6 vessels are represented by **P3-6** and other distinctive pieces.

P3 (057): Jar with simple rim, gabbroic, external black coating, incised line around girth. Such small jars tend to be earlier, rather than later, cf No 41 from Reawla (Quinnell 1992b,Figure 16, and discussion p 96).

P4 (057): Base angle of jar with cordons, gabbro LV. No immediate parallels but generally bases do not survive well in gabbroic assemblages (Quinnell forthcoming). However the survival of cordoned forms into the 4th century and beyond, consistent with the LV fabric variant, is now well established (Quinnell 1986, 120).

P5 (057): Bowl with conical flange in gabbroic LV; exterior black coating and burnish. Such bowls are thought to be copies of similar forms in BB1, which occur at Exeter from c. AD 270 throughout the 4th century (Holbrook and Bidwell, 1991, 98). This date range for gabbroic copies works well for all relevant Cornish sites and the form remains the most reliable chronological indicator for the later Roman period.

P6 (057): Rim/wall sherd from plain-rimmed dish in Dorset BB1with possible arcading; this joins with a sherd from recut infill 045; see **P2** for comments on date.

The fills of the recut of the ditch in Section B were much more productive. Contexts 076 and 077 in the middle fill contain 6 gabbroic and 2 gabbroic LV sherds. A minimum of 3 vessels represented, including two different rims from jars as **P7**.

Context 045 contains 105 sherds, many of them substantial, the largest assemblage on the site, weighing 2336g of the 3371g total weight of Roman period sherds. Forty-seven are gabbroic, including **P7, P13, P16,** 52 gabbroic LV including **P8, P9, P11, P12, P14, P15**; there are single sherds from a coarse gabbroic storage jar, of BB1 **P6**, and of Exeter Sandy Grey ware, from a large vessel, either a bowl or a lid. A minimum of 15 vessels are represented, and include one similar to **P18**. Because of the ditch sampling strategy, only part of this assemblage was retrieved. A number of base sherds from jars could not be linked definitely to enumerated vessels. What is unusual about the assemblage as retrieved is the lack of sherds from jar girths. Generally gabbroic jars used as cooking pots and continually reheated gradually crumble in their bottom halves. The condition of all sherds, rims, girths, bases, suggest that the pottery had not been extensively used before breakage, though sooting is present, showing that vessels had been used for cooking. This contributes to the comment about the tight nature of the assemblage as discussed below.

P7 (045): Jar with slight neck and simple out-turned rim; marks below groove around girth suggest a zone of hatching or other decoration (cf Quinnell forthcoming No 56). Roughly finished, with sooting. Jars of this type are generally considered to be early rather than late in the Roman period (Carlyon 1995, 8), for example P6 at Shortlanesend (Harris 1980, Figure 30) where occupation is assigned to the 2nd to 3rd centuries.

P8 (045): Jar with simple out-turned rim, gabbro LV but, unusually, with a burnished finish. Rim profile lacks neck and would generally be considered a 3rd to 4th century form (Carlyon 1995, 8).

P9 (045): Rim from jar with out-turned rim, gabbro LV; a large version of **P11**.

P10 (045): Part of base of large ? jar with angle suggesting an unusually globular body, gabbro LV, sooting. Study of published illustrations show that there is generally little information about the form of lower parts of jars.

P11 (045): Jar with out-turned rim and groove around girth, gabbro LV. Such jars may be influenced by late 3rd to 4th century versions of BB1 jars (Holbrook & Bidwell 1991, 95; Carlyon 1995, 8).

P12 (045): Body sherd with cordon, gabbro LV; sooting. Cordons on a variety of forms persist as long as the Roman gabbroic industries were active (Quinnell 1986, 120).

P13 (045): Bowl with flat grooved rim; sooting. If these bowls, as other distinctive types, copy South West Dorset BB1 forms and their chronology relates to that of that fabric at Exeter (Holbrook & Bidwell 1991, 98), a date range from the late 2nd to the late 3rd centuries would be probable. This date fits Cornish data for the introduction of the form, but it appears to have continued in use in gabbroic fabric alongside the later type with the conical flanged rim (cf occurrence in 3rd to 4th century contexts at Goldherring (Guthrie 1996, Figure 13); discussion in Quinnell forthcoming).

P14 (045): Bowl similar to but larger than **P13**, gabbro LV; sooting.

P15, P16 (P16 not illus) (045): Bowls with conical flanged rims, similar to **P5** but different vessels.

Discussion of pottery in the inner ditch

The presence of conical flanged **P5** in the fill of the initial cut indicates that this had not silted up before the late third century. The quantity of LV sherds suggest a late 3rd or 4th century date. 045 could be the equivalent of 015 in separate Sections, but no sherds from the same vessel could be identified in both, or indeed between any contexts whether in the same Section or not except for **P6**. The nature of the breaks in 045, many vessels with large sherds that join which most likely broke when thrown in, suggests dumping of the deposit at one go. The clear indications of post-breakage firing indicates this may have following an episode of general tidying up of rubbish from the interior. The 045 appears to be, even if small, one of the best closed contexts at present available in Roman Cornwall. The date of 045, as with all other material from the recut, is late 3rd or 4th century. The sherd of Exeter Sandy Grey ware, which is unlikely to have been made after the 2nd century, has abraded edges and is probably redeposited. There is medieval material in top of Ditch (see below).

Area of hut gully (038)

Gully fill 041 contained two gabbroic sherds, 050 four; none had distinctive features. 064 in post hole 062 contained four sherds from a coarse gabbroic jar **P17,** 063 two gabbroic sherds. Other contexts within the gully contained only non-distinctive gabbroic sherds, one from 061, 3 from 075, two from 086.

P17 (064): Base angle and body sherds from storage jar in coarse gabbro, possibly not the same vessel. Criss-cross decoration incised on wet clay; decoration survives close to base cf PM124 from Porthmeor (Carlyon 1995, Hirst 1937). Large storage jars tend to survive only in small fragments and in the past have usually not been recognised. The discussion on the type in the report on Trethurgy (Quinnell forthcoming) brings together what is now known about them. Generally in the South West the type is regarded as 3rd and 4th centuries. Storage jars occur at Exeter in Gritty Grey ware fabrics from the Antonine period until the 4th century (Holbrook & Bidwell 1991, 175). In gabbroic fabrics large storage jars in Cordoned ware probably continued to be made throughout the Roman period, thus influencing South Devon wares in which they also have a long life (Quinnell 1995b). While the type undoubtedly becomes more common in the 3rd and 4th centuries a 2nd century date is not impossible.

Features between the hut gully (038) and the inner ditch

Context 107 contained one gabbroic sherd; in isolated pit 030, fill 036 contained one gabbroic sherd, 035 a chunk of gabbroic base, and 032 two sherds including **P18**. A minimum of one vessel is represented.

P18 (032): Fragment from small jar with upright neck below out-turned rim. Such rims are commonly considered no later than 2nd century (compare examples in Group 3 from Castle Gotha where occupation probably ceased in the 2nd century (Saunders & Harris 1982)).

7.6.4 Discussion of Roman period pottery

Only the single well-made sherd from the Inner Ditch *could* be of pre-Roman date. The 1993/4 excavations indicated several phases of enclosure activity before the Roman period, although finds from ditch infills were sparse, and little pre-Roman or early Roman material was found in the interior. A little of the material published here from the interior *could* be of 2nd century date; further data is needed to refine the chronology of both storage jars and vessels with upright rims. Certainly the material associated with the ring Gully 038 would fit well into the later 3rd and 4th centuries as Cornish ceramics are currently understood.

The majority of sherds come from dumps high in the latest identified phase of the enclosure ditches. This matches the data from the 1993/4 excavations in which a dump of probable 4th century date was found high in the latest ditch fill. Both excavations therefore have produced ceramic assemblages in which the majority of material belong late in the Roman period; it should be stressed that, on present evidence, 4th century forms may well have continued in production into the 5th century (Quinnell forthcoming; 1986, 129). Given the difference between the chronological emphasis of the ceramic assemblages and the long range of activity at the Round as currently understood, differences in the quantity of pottery in use at different dates and in strategies for disposal of broken sherds must be taken into account. It is salutary to stress that, but for the 1993/4 excavations, Penhale Round would almost certainly have been ascribed in its entirety to the later Roman period.

The assemblage from 045 provides one of the most useful contexts so far identified in Roman Cornwall. Its minimum of 15 vessels show features which suggest dumping of broken pottery which had not in general had a great deal of use. Given the fact that 045 is high up in the recut Inner Ditch, and that the initial cut was not infilled until at least the late 3rd century, a date sometime during the 4th century seems reasonable. *If* the types present in 045 were in use together, the group provides two important strands of information. In regard to jars, those with upright necks and slightly out-turned rims were still in use together with the later types with definite out-turned rims. In regard to dishes and bowls, those with flat grooved rims, first introduced during the 2nd century AD, were still in use, and presumably in production, along side the conical flanged bowls of the late 3rd and 4th centuries. New bowl and jar types appear at much the same dates as do the proposed prototypes in BB1, but earlier types, contrary to BB1, remain in production or at least in use, along side later ones. There is no ready explanation for this situation, which implies a gradually increasing repertoire for gabbroic pottery production centres. However if it is substantiated by other closed finds, it provides helpful guidelines for the interpretation of other assemblages. Due account needs to be taken in future of the long-lived potential of forms which start in the 2nd century and continue into the 4th, especially on sites where only small quantities of material are found.

7.7 Medieval and Post-Medieval Pottery

7.7.1 Three sherds, from 005 cleaning over ditch fills and 031 top of pit 030, are from local medieval cooking pots, 12th to 14th centuries in date. Four from topsoil 001 and 071 in the top of pit 070, are North Devon ware of probable late 17th century date. Both medieval fabrics and the North Devon ware were found in larger quantities in the 1993/4 excavations where they were ascribed to scattering with manuring around Trewheela Farm (Nowakowski, forthcoming).

7.8 Daub

Fills 031, 032 and 034 in pit 107 contained c. 10 small pieces of daub totalling 60 g, and 064 in post hole 062 contained one piece 10g. These contain pieces of local shale. All are soft and friable and appear more likely to have come from a structural feature such as a wall or hearth, which has become burnt, than from an artefact such as a loom weight.

7.9 Acknowledgements

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8 THE CHARRED SEED REMAINS Robert G Scaife

8.1 Introduction

8.1.1 It has been suggested that rounds were foci of agricultural activity with buildings within the enclosure and surrounded by field systems which are presumed to have been for arable cultivation. However, such rounds have not previously been studied in detail in terms of their environment and agricultural function.

8.2 Methodology

8.2.1 A detailed sampling strategy was carried out on site to ensure that any available plant macrofossils would be recovered. A total of 40 bulk samples were taken from all of the principal contexts with particular attention being paid to the fills of the primary ditch and associated pits. These samples were processed 'off-site' in the Babtie Laboratory (Reading) by C. Chisham. A standard Siraf flotation tank was used for extraction with the flots collected on sieves of 1mm and 0.25mm mesh size. The resulting material was air dried. Initially, an assessment of the seed and charcoal content was made, high-lighting those samples which contained useful quantities of charred remains. On the basis of this examination, a total of 8 samples appeared to be rich in charred seed, largely the remains of cereal grain and chaff. Subsequently the flot was examined for its wood (charcoal) taxa by Rowena Gale. Sorting, identification and counting were carried out under a low power microscope (Wild M3c). Taxonomy follows that of Stace (1991).

8.3 The Data

8.3.1 The greatest numbers of identifiable plant remains are present in the fills of the pits. Samples 27 and 28 (context 031), and 29 and 30 (context 032) from pit 030 being most prolific. Samples from post-holes 26 (062) and other features such as the inner ditch generally contained charcoal but few cereal remains and weed seeds.

8.3.2 Pit 030

Contexts (31,32,35,36) within this pit contained substantial numbers of charred remains comprising charcoal, cereals and weed seeds. In some cases, the flot was rich enough to necessitate sub-sampling for analysis. Data from this analysis form the basis for reconstruction of the agriculture associated with occupation of the round. Dating of this feature is unclear; one abraded sherd of pottery suggested a 2nd century date (Quinnell above), but it could have been anything up to 4th century (see below). Small quantities of iron slag have been recovered during the processing of the bulk macrofossil samples from all of the contexts noted above. It has, therefore been suggested that iron smithing took place locally (Fitzpatrick 1998). It seems plausible, that the wood/shrub charcoal plus cereal and cereal chaff remains may have been fuel associated with this activity. Alternatively, the remains may simply be domestic waste from within the round. Whichever origin, the charred remains provide a clear insight into both the available woodland/fuel resource (see R. Gale) and evidence of the cultivated crops at this time.

A number of crops have been identified which include the wheats *Triticum spelta* L. (spelt), T. *dicoccum* Schubl. (emmer), *Triticum aestivum* type (hexaploid bread/club wheats), *Avena* (oats) and *Hordeum* (barley). The only other obvious food product identified was *Pisum sativum* (pea). Of these crops, the grain of spelt wheat and oats are the most frequent. Grain of these types has been identified as *Triticum spelta* type and *Avena/Bromus* type since there is morphological overlap with emmer in the former and *Bromus secalinus/mollis* in the latter. Chaff remains (especially glume bases) are the most diagnostic/identifiable remains and suggest the predominance of spelt wheat and oat grain. Emmer wheat chaff was also identified, so some of the grain within the spelt group is likely to be emmer; a small number of grains in the inner ditch recut (125) and post hole 58 had the typical tear drop shape. *Hordeum* sp. (barley) is present but in with relatively small numbers compared with spelt and oats. In pit 030, however, there are numerous chaff remains (rachis internodes)

and the importance of barley as a crop is indicated. The available grain and chaff have all been determined as two row, i.e. the grain is not twisted.

Glume bases and spikelet forks of spelt are abundant, with rare rachis internodes also present. A substantial number of unidentified glume bases and spikelet forks and *Triticum indet.* grain may also be attributable to spelt. A smaller number of glume bases of emmer (*T. dicoccum* Schubl.) was recovered, indicating presence but not necessarily significance as a crop. In spite of the good preservation of most of the material, palaea and lemma fragments are notable by their absence, as were the small quantities only of straw fragments and awns. It is possible that the lighter chaff elements may have been blown away/removed during winnowing. Of particular note, however, are the culm bases (especially in context 32) and some culm nodes. These may suggest harvesting by uprooting (Hillman 1981).

Due to the exigencies of human behaviour, the requirements of different crop processing activities and taphonomy in general, the relative importance of some crops cannot be gauged. The lesser numbers of emmer wheat, free threshing bread wheat and peas do not necessarily imply lesser importance than spelt, oats or barley. The former (emmer) being a glume wheat like spelt requires parching to release the grain from the ear. Thus, it is likely that this wheat would be more frequently represented since accidental charring was more likely to occur. It is suggested, therefore, that emmer was possibly a weed of other crops. Bread wheat (*T. aestivum* type) does not require parching and thus is less likely to be found be found charred unless waste was deliberately thrown on a fire. Bread wheat was present here and was, therefore possibly of greater importance than indicated by numbers of grain alone. The same argument applies to *Pisum sativum* L. (pea).

The numbers and taxonomic diversity of charred weed seeds is small. However, of specific importance are large numbers of *Raphanus raphanistrum* L. (wild radish). Other weeds typical of arable habitats comprise *Vicia/Lathyrus, Viola* sp., *Polygonum aviculare, Rumex* spp., *Valerianella locusta/dentata* and *Tripleurospermum inodorum* (scentless mayweed).

8.3.3 The Post Hole Contexts

Post holes 058 (sample 23), 062 (sample 26) and 136 (sample 54) produced useful remains and information which are comparable with that of pit 030 but with some notable difference.

Post Hole 058 (Context 59, Sample 23):

Small quantities of cereal remains were present, but possible caryopses and a glume base of *Triticum dicoccum* Schubl. are of note.

Post Hole 062 (Context 64, Sample 26):

Fortuitously, this post hole was one of the few dated contexts. Pottery of 3rd/4th Century AD and a quernstone provide a valuable date for the assemblage. Here, *Avena* grain predominates and some glume bases were adhering, in some cases to the grain, confirming that the grain is oat. *Triticum spelta* L. and *T. aestivum* type (bread/club wheat) are also present, the former identified by a small number of spelt glume bases and absence of emmer chaff. In contrast to assemblages from pit 30, is the absence of *Hordeum* (barley) and the infrequent numbers of weed seeds and cereal chaff debris.

Post Hole 136 (Context 77, sample 57):

This post hole forms part of an alignment of post holes, one of which cut the hut gully (038). It thus appears to be later than the main structural complex. Although this places the post hole in a stratigraphic context, absence of artefactual material precluded accurate dating. It appears, however, to be of late Romano-Cornish date.

This context produced substantial numbers of *T. spelta* glumes (80), some spikelet forks (9) and grain of spelt/emmer type. Although some emmer glumes (no grain) were also

identified (4) it is most probable that the grain can be referred to spelt wheat. Other crops present comprise *Triticum aestivum* tupe (4) and *Avena/Bromus* (35) grain and a small number of *Hordeum* rachis fragments (8). The latter are few in comparison with numbers obtained from the pit contexts. Wild Poaceae and *Polygonum aviculare* L. were the only weed seeds recovered from this post hole.

Archaeobotanically, the recorded assemblages from these post holes were not as rich as that of pit 030. However, they provide useful data which corroborate data from the other contexts discussed. Grain/caryopses are relatively fewer in number with *Avena/Bromus* (35) and *Triticum spelta* type (27) again the most important with small numbers of *T. aestivum* type and absence of *Hordeum*. There are, however, relatively greater numbers of chaff fragments in the fill of 062, *Triticum spelta* L. and spikelet forks and a small number of *Hordeum* rachis fragments. Weed seeds were almost absent except for *Polygonum aviculare* L. (knotgrass) and wild Poaceae (grasses).

8.3.4 The inner ditch

Two contexts from the inner ditch recut produced quantities of charred remains. Of these, sample 52 (context 76) was the most productive. Preservation of the grain was rather poor with a substantial number of indeterminable grain fragments. Identifiable caryopses comprised *Triticum spelta* type (spelt) and *Avena/Bromus* type. Chaff remains were also present and are also largely attributed to spelt although a few emmer caryopses with emmer type characteristics and some emmer glumes were present. *Hordeum* chaff was not present and only occasional grain was found.

8.4 Discussion of the crops

8.4.1 One of the principal environmental aims was to establish the nature of agricultural activity associated with the round. Absence of faunal remains due to soil acidity precluded one means of establishing whether mixed economy was practised. The charred cereal remains and pollen analysis (Scaife below) suggest that the environment was at least locally open as indicated by substantial herb pollen frequencies. Wood charcoal (Gale below), however, indicates the utilisation of wood/scrub as a fuel. Given the lack of pollen evidence for locally dominant woodland, this was presumably at some distance from and transported on to the round. The importance of arable cultivation in the landscape is established for the Romano-British period. There appears to be no late prehistoric or Iron Age material similar to that from earlier excavations at the round (Nowakowski 1994).

8.4.2 Overall, the crop assemblages recovered are typical of the Romano-British period with hulled spelt wheat (*T. spelta* L.) being especially diagnostic. Oats sp. (*Avena*), barley (*Hordeum* sp.), free threshing bread/club wheats (*Triticum aestivum* type) and emmer wheat (*T. dicoccum* Schubl.) are also in evidence as are a small number of cultivated peas (*Pisum sativum* type). The most important crops are discussed in more detail below.

8.4.3 *Triticum spelta* L.

There are now a number of sites which have late prehistoric records of spelt wheat. However, a major expansion in growth and importance of this winter hardy wheat is evidenced from the Iron Age and especially in the Romano British period (Helbaek 1952). Its representation on sites of this age is in part due to the fact that this is a glume wheat. That is, it requires parching on a heated floor or corn drying oven to release grain from the ear whilst threshing. It has also been suggested that drying of green/unripe grain or for pre-storage drying must be considered (Monk and Fasham 1980). The opportunity for accidental burning/charring is much increased by this process (Murphy 1977). There are now many records from southern Britain illustrating the predilection for spelt wheat during the Roman period (Helbaek 1952; Murphy 1977; Robinson in Lambrick and Robinson 1979; Monk and Fasham 1980; Scaife 1995, 1996).

8.4.4 *Avena* sp.

Some difficulties exist in differentiating *Avena* (oats) from *Bromus secalinus/mollis* (bromes) and also from primary, secondary and tertiary crops and wild oats. Here, there is some size variation with the majority of grains of larger size. This, plus the adhering glumes suggests cultivated oat (*Avena sativa* L.). Substantial numbers from all contexts examined suggests that this was an important local crop. There is some evidence from southern Britain that oats became important from the 1st Century onwards (Murphy 1977).

8.4.5 *Hordeum* sp.

Barley was present both as grain and chaff, the latter being the more numerous rachis internodes and internode fragments. There were no twisted grains present which might indicate six row, so two row barley seems to have been predominant. The relatively small number of caryopses relative to rachis internodes suggests that the latter were the waste products of successful grain processing which were subsequently burnt on available fires. Where grain was recovered there may have been the odd few caryopses left in the processing waste or from accidental burning during pre-storage drying. The importance of barley here is in accord with the generally accepted view that hulled barley increased at the expense of naked barley from the late Bronze Age onwards in southern England. That barley was an important crop may be of interest here, since it has been suggested that this crop is more suited to calcareous soils such as occur on chalk and limestone (Murphy 1977) whereas soils here are predominantly acidic. Carruthers (1989) points out that *Tripleurospermum maritimum* (scentless mayweed) occurs frequently in samples with barley due to preference of disturbed and friable soils. This appears to be the case here.

8.4.6 The lesser crop elements

It can be noted that no *Secale cereale* L. grain or chaff was found at this site. Other crops recorded include *Triticum aestivum* type (bread/club wheat) and *T. dicoccum* Schubl. (emmer). Free threshing bread or club wheat (*T. aestivum* type) with typical rounded/ plump caryopses was present in small quantities in all samples but with little evidence of chaff debris. It is likely that bread wheat is markedly under-represented in the assemblages since parching is not required in processing, and the possibility of charring is thus greatly reduced. The small quantities of grain present possibly represent deliberately burned waste. It does, however, clearly indicate its presence as a crop although its relative importance cannot be determined. *Triticum dicoccum* Schubl. (emmer) was present in most contexts which contained spelt. Identification and evidence of presence are based largely on glume and spikelet morphology although some grain with the typical emmer 'tear drop' shape (Jacomet 1987-J.R.G.Greig translation) was occasionally noted (eg post hole 58 and inner ditch 125). However, the problems of distinguishing possible tail grain of spelt from emmer precluded any real attempt at separation of the *Triticum spelta/T. dicoccum* grain. Emmer, like spelt, is a hulled wheat and requires parching to release grain from the ear, increasing the possibility of accidental charring. The small quantities found here therefore suggest that emmer wheat, although definitely present, was subordinate to spelt and was perhaps a weed of other crops.

8.5 Crop processing

8.5.1 The charred remains of crop plants which are found are not necessarily a true indication of the importance of a dietary component (Dennel 1972; Green 1981). Many chance variables may be involved in the preservation of such crop remains. These range from the vagaries of human nature as to what rubbish is burnt and where, to purely accidental burning in ovens and grain stores. Furthermore, the overall taphonomy of material once charred can be complex with variable representation in different contexts and preserving conditions (Monk in Fasham and Whinney 1991). At the basic level, the 'presence' of a type, whether a single caryopsis or a cache, is evidence of its presence or growth at some level of importance (assuming contemporaneity). However, absence of a taxon does not necessarily imply that the crop was not being grown or consumed. Within such a multiplicity of variables, however, is the underlying requirement of cereal/crop production and processing for domestic consumption.

8.5.2 A variety of crops is present at this site with spelt and oats being the predominant grain and with strong evidence of barley from the abundant rachis internodes and smaller numbers of caryopses. The possibility of bread wheat being a more important crop than indicated by numbers of grain has been discussed. Abundant chaff and grain of spelt wheat and the relative paucity of light chaff and small weed seeds suggest that the grain had been partially cleaned before parching which was most likely responsible for the charring process. It is interesting to note that a substantial number of culm bases with adventitious roots was found in pit 030. It is possible that harvesting by uprooting may have been practised (Hillman 1981). This would account for the paucity of seeds from small weeds which were left behind and also for the very substantial quantities of seeds of the larger plant, *Raphanus raphanistrum*. The relatively small numbers of culm bases may also suggest occasional accidental incorporation of cereal culms in later stages of grain processing along with heavier *Raphanus* seeds. Whether or not spelt grain was harvested and then transported as whole ears (Jones 1981) cannot be ascertained. However, cropping of the fields surrounding the round and local crop processing for consumption seems most plausible. If consideration is given to overall food requirements, the amount of grain found is small and cannot provide any real idea of the importance and extent of such arable cultivation, although presence and variety of crop types is clear evidence for the importance of cereals in the diet.

8.6 Conclusion

8.6.1 Post hole and pit contexts dated to the middle to late Romano-Cornish phases of the round have yielded significant quantities of charred cereal grain and chaff remains. The macro-remains suggest that spelt wheat was the predominant crop with barley and oats. The possible importance of bread/club wheat, also found, cannot be underestimated. Emmer wheat was also present but may have been a weed of the spelt crop. A small quantity of peas was the only other crop variety recorded. Notable by their absence were rye and celtic bean both of which might have been expected. This does not, however, preclude their growth during this period. Chaff debris and paucity of weed seeds indicate that the spelt had been partially cleaned and was accidentally charred perhaps during parching to release the grain. The presence of cereal culm bases (cf. spelt) may suggest harvesting by uprooting. Although it has been suggested that spelt may have been transported to the point of consumption as whole ears (Jones 1981), it seems more plausible to suggest that the crops noted were grown in the extensive field systems which surround the round.

8.7 Acknowledgements

8.7.1 I am grateful to C. Chisham of Babtie Group for the extraction of the charred plant remains and for her assistance with the this aspect of the project. I am particularly grateful to Alan Clapham for his advice on this work and for advice on certain of the crop elements (esp. *Hordeum*) and for help with identification of seeds.

Table 1: Macroplant remains in Pit 030

Sample	27	28	29	30	31	33	34
Context	31	31	32	32	32	35	36
Flot Weight (grammes)	23	28	36	14	25	10	10
Total Sample Size (litres)	20	20	20	10	10	1	20
Feature Pit 030	Pit	Pit	Pit	Pit	Pit	Pit	Pit
GRAIN							
Triticum aestivum type	11	3	15	14	5	2	4
Triticum cf aestivum type	1		1		4		2
Triticum spelta type	75	59	156	69	56	8	41
Triticum cf spelta type	4	3	8	11	21		11
Triticum indet	26	32	25	11	39	7	24
Hordeum sp.	14	12	21	2	17	16	7
Avena/Bromus	157	61	225	149	113	14	88
Bromus mollis/secalinus	5		1	3	4		
Indet. frags.	234	180	305	211	310	34	155

CHAFF							
gb. Triticum spelta	138	107	100	176	213	68	229
gb Triticum dicoccum	6	6	14	10	3	10	5
gb. Avena		1	4	4		1	1
gb. Indet frags.	43	46	127	26	76	26	30
sf.Triticum spelta	12	23	61	31	22	3	15
sf. Triticum dicoccum		1	2				
sf. Triticum indet.	28	20	57	32	49	9	24
int.Triticum spelta	5	1	7	3	10		7
ra. Hordeum sp.	56	96	279	54	152	5	57
Indet basal internode		1		1			
Internode Brittle Wheat						6	
Culms	7		21	3	10		4
Culm nodes	3	2	17	3	1		1
Awns			2	3		1	
Straw frags	2	1	18	8	1	8	1
Radicles	2		6	2		1	
OTHER CROPS							
Pisum sativum			1	3			
SEEDS							
Raphanus raphanistrum	37	49	126	52	74		27
Vicia/Lathyrus	1		4	8			3
cf. Melilotus							1
Viola sp.		2		1	1		1
Rubus sp.	1						
Corylus avellana (nut frag.)							3
Polygonum aviculare	3	10	5	2			3
Rumex sp.		1	1	1			5
Plantago lanceolata	1	2	1		2		2
Galium cf aparine		1	1	1			1
Valerianella sp.				1			2
Valerianella dentata		1					
Tripleurospermum cf. inodorum		1	3		1		
Poaceae (wild)	3		2	7	1	2	1
MISC.							
Arrhenatherum elatius (tuber)	1		9				
Rosa (thorn)					1		

Table 2: Macroplant remains in other contexts

Sample	23	26	53	51	52
Context	59	64	77	45	76
Flot Weight (grammes)	9	58	26	73	40
Total Sample Size (litres)	10	6	6	20	20
Feature	Post hole 58	Post hole 62	Post hole 136	Inner ditch recut 125	Inner ditch recut 125
GRAIN					
Triticum aestivum type		1	4	1	
Triticum cf aestivum type			1	1	1
Triticum spelta type		21	27	10	20
Triticum cf spelta type		5		1	4
Triticum cf dicoccum	2			1	1
Triticum indet		11	16		13
Hordeum sp.				2	2
Avena/Bromus	4	145	35	12	26
Bromus mollis/secalinus		1			
Indet. Frags.	3	81	48	6	101
CHAFF					
gb. Triticum spelta	3	8	80	2	19

gb Triticum dicoccum	1		4	1	1
gb Triticum cf dicoccum					2
gb. Avena		3	2		
gb. Indet frags.		4	16		7
sf.Triticum spelta		1	9	1	3
sf. Triticum indet.		1	8		17
int.Triticum spelta					2
ra. Hordeum sp.			8		
Culm bases					2
Culm nodes					1
Awns	1				
SEEDS					
Vicia/Lathyrus		1			1
Corylus avellana (nut frag.)	1				
Polygonum aviculare			3		
Poaceae (wild)		3	5		2
MISC.					
Prunus thorn					1
Slag frags.	*				

9 POLLEN ANALYSIS OF THE RING GULLY FILLS Robert G Scaife

9.1 Introduction

9.1.1 Pollen analysis has been carried out on the sediment fills of the ring gully in the interior of the Round. Analysis of such contexts has rarely been undertaken because of the problems of interpretation and apparent scepticism that such studies can produce useful information. It has, however, been shown that useful data on the use of adjacent fields can be obtained (Scaife fortchcoming). Furthermore, the regional pollen data which exist and which might provide useful comparative information are scarce and have concentrated on the analysis of deeper peat and lacustrine sequences.

9.1.2 The regional vegetation development was established initially by Conolly *et al.*(1950) at Hawks Tor and subsequently by Brown (1977) at Dozmary Pool on Bodmin Moor. However, these studies concentrated on early and middle Holocene vegetation development with little consideration given to changes occurring during the later Holocene. Brown (1977) did, however, establish that Bronze Age and Iron Age agriculture appeared to be largely pastoral, with some evidence of cereal cropping. Bell (1984,p53) recognised the need for archaeological, site-based studies which might establish the extent to which upland banked enclosures were used for pastoral and/or arable agriculture. Such information can only be gained by pollen analysis of buried soils and ditch fills. A small number of studies have been carried out but these relate solely to earlier, Bronze Age monuments (Dimbleby 1971; Justine Bayley 1975) and not to later structures such as Iron age and Romano-British rounds and associated field systems.

9.1.3 Many studies discuss the deforestation and depopulation of upland areas in relation to climatic changes in the late Holocene. However, no pollen data are available which provide direct evidence for the status of woodland and nature of land use after the Bronze Age. Whilst this study cannot bridge such a large gap in our knowledge, the analyses of pollen, plant macrofossils and charcoal (Rowena Gale, below) provide a useful insight into the local environment of this site at least. It was anticipated that if pollen and spores were preserved, useful information on the local vegetation and environment during the period of occupation might be obtained. In the event, pollen has been satisfactorily extracted and results of an analysis of the fills of the ring gully are presented here.

9.2 Methodology

9.2.1 Sequential samples were taken from the fills of round house gully by Vanessa Straker (Department of Geography Bristol University). A sampling interval of alternate 2cm was

adopted. Pollen was extracted using standard techniques (Moore and Webb 1978; Moore *et al.* 1991) in the Department of Geography, University of Southampton. Further details of these procedures are given in appendix 1. A sum of 400 pollen grains plus extant spores, unidentifiable/degraded pollen and marsh herbs was counted for each level where possible. Data are calculated as a percentage of this sum with spores of ferns and *Sphagnum* moss and wetland herbs as a percentage of this sum plus the respective sub-group. Absolute pollen frequencies were calculated using a known number of exotic markers (Stockmarr *Lycopodium*) to given volumes of sediment. These data are presented in pollen diagram form (Figure 9; not yet available).

9.3 The Pollen Data

9.3.1 Abundant pollen was found in the lower part of context 040 and in 041 but was more sparse in the lowest ditch fill (context 042). Pollen was absent in some levels of the latter. Absolute pollen frequencies were calculated and ranged from as low as 14000 grains per ml. in the poor basal levels (36-37cm) to 1,040,000 grains per ml at 12-13cm. Although abundant, there is a substantial number of degraded pollen grains and spores. These appear to have been microbially etched, thus making identification difficult and in some cases not possible with only the inner pollen exine wall remaining. This is attributed to preservation of pollen due to acid soil conditions, but in conditions where differing taphonomic processes were operating on the pollen assemblages. The very high APF values, however, resulted in many pollen grains and spores which were identifiable to normal pollen taxonomic groups and the data retrieved are summarised as follows:

9.3.3 The sixteen pollen levels and spectra examined are dominated throughout the profile by herbs (to 90% t.d.l.p.). Trees (<20%) and shrubs (to 35%) become progressively more important in the upper levels and contexts but remain subordinate to herbs throughout. There is a consistent presence of the spores of ferns and *Sphagnum* moss. Whilst there appears to be some variations in the pollen assemblages throughout the profile, these changes are minor and may be due to purely taphonomic/preservation processes rather than 'real' changes in vegetation ecology. Zonation of the diagram has not, therefore, been carried out and the characteristics of the pollen diagrams are described as a whole.

9.3.4 The Herb Flora

Poaceae (grasses) are dominant and average 60-70% of total pollen. In addition to the Poaceae, other herbs include Lactucae (dandelion types) which are more abundant in the upper and lower levels of the profile. This is, however, a reflection of the poor pollen preserving conditions and over-representation of this robust taxon. Of note is the consistent presence of cereal type (<5%) and sporadic occurrences of herbs which may be indicative of disturbed and arable ground - *Sinapis* type, *Spergula* type, *Convolvulus, Malva*,and *Plantago major* type. Other herbs include Ranunculus type, *Plantago lanceolata* (ribwort plantain), Polygonum sp. and Asteracea types which may be more typical of pasture.

9.3.5 The Woodland Elements

Quercus (oak; to 15%) is the main tree but with relatively small percentages (to 10%) and with minor expansion in upper levels/contexts. *Alnus* is also relatively important (to 15% t.d.l.p.+ marsh). Also present consistently but in only small numbers are *Betula* (birch), *Pinus* (pine; of long distant origin) and *Ulmus* (elm). A single grain of *Tilia* (lime/linden) was recorded at 8-9cm. Shrubs comprise *Corylus avellana* type (to 40%). *Corylus avellana* type is dominant but the group may include *Myrica gale*. Separation was not possible due to poor pollen preservation. Dwarf shrubs include *Calluna* (ling) which is present throughout (to 5%)and more sporadic *Erica*(heather).

9.3.6 Wetland Elements

This group is somewhat enigmatic given the character of the sample site (ie. ring gully ditch). Taxa include *Alnus* (alder) noted above. Cyperaceae (sedges) are consistent but in small

numbers (<5%). Spores of the fern *Osmunda regalis* (royal fern) and *Sphagnum* moss are of importance.

9.3.7 Spores of Ferns

These comprise largely monolete *Dryopteris* type (ferns), *Pteridium aquilinum* (bracken), *Polypodium* (polypody fern) and *Osmunda regalis*, a wetland element also noted above.

9.4 The Vegetation Environment

9.4.1 Given the small spatial extent of this archaeological feature, the majority of pollen contained in the sediment fills is likely to have derived from on or very near the site. Exceptions to this are wind pollinated taxa (anemophilous) which produce relatively large numbers of pollen grains which are dispersed over large distances and those taxa which relate directly to human activity such as crop processing, human waste and from building structure. The former group includes the trees *Betula, Alnus* and *Corylus avellana*. *Pinus* and *Betula* occur only sporadically and are of little significance. *Alnus* and *Corylus* are, however, of greater importance and were probably growing as stands of woodland in suitable habitats, the former being especially characteristic of valley mires and fringing streams. The latter may have formed local scrub or growth in hedgerows. It is relevant that hazel charcoal was identified by Rowena Gale (below) as one of the principal charcoal elements.

9.4.2 *Quercus* is the only tree which is represented in any quantity and even so appears subordinate to *Corylus* and the herbaceous flora. It is possible that the real importance of *Quercus* (and other trees) may be masked by the dominance of local/on-site Poaceae statistically 'swamping' the pollen spectra. Oak charcoal has similarly been identified by Rowena Gale (below) who suggests that it may not have been carried any great distance. Charcoal of *Fraxinus* was also recorded but was not present in the pollen assemblages. This is not unexpected given the relatively poor representation of trees in general and the typical under-representation of ash in pollen spectra (Andersen 1970,1973). From the pollen data and charcoal it may be suggested that woodland was not growing immediately on, or adjacent to the site but was, however, within easy walking distance, allowing its utilisation as a fuel resource. The extent of such woodland remains enigmatic and a near wetland/peat pollen profile would be invaluable as a comparison to the on-site data presented here.

9.4.3 *Calluna* (ling) and *Erica* (heather) are present consistently. These ericales are largely under-represented in pollen spectra and thus, the percentages recorded here imply that heathland was, perhaps, an important local community. This is not unexpected given the acidity of local soils. These data similarly correspond closely with the charcoal evidence for such plant communities which were also being utilised for fuel. Gorse was apparently an important fuel (Gale below) but was not represented in the pollen spectra. Again, this is not unexpected since both gorse and broom produce little pollen and are seldom found even in the pollen analysis of heathland podzolic soils.

9.4.4 Despite the pollen and charcoal evidence for trees and shrubs, herbs are clearly dominant in the pollen spectra. Poaceae (grasses) attain high values throughout and along with other characteristic herbs of grassland such as *Plantago lanceolata* (ribwort plantain), Asteraceae types (daisy family) and including Lactucae (e.g. dandelions, sow-thistles, hawkbits). This provides strong evidence for areas of open pasture/grassland in the proximity of the round. Given the harsh pollen preserving conditions in this feature (even though pollen was extremely abundant), it is possible that less robust taxa may have been differentially destroyed.

9.4.5 A further factor which should be considered is the possibilty that a proportion of this herbaceous pollen may be derived from secondary sources, that is, introduced with floor coverings and roofing and wall material for the adjacent hut. This may be especially pertinent since run-off from the roof of the hut (turf or thatch?) might be expected to contribute significantly to the pollen spectra. Such a taphonomic problem may also be relevant to the records here of *Osmunda regalis* (royal fern) and the substantial quantities of

Sphagnum spores. The most obvious explanation for their presence is their growth in the wet ditch(es) on this acid soil. However, Professor G.W. Dimbleby (pers. com.) has noted Royal Fern growing next to a domestic sink soakaway and it is possible that such a damp habitat may have caused a fringe of *Osmunda* around the hut. Given that the depositional context of the pollen is a soak-away gully around a hut, this seems a rather unlikely habitat. It seems more plausible that the spores of *Osmunda regalis*, *Sphagnum* and pollen of Cyperaceae derive from the building roof and/or floor materials brought onto the site from a local mire community. Certainly, the representation of *Osmunda regalis* here is unusual.

9.4.6 Analysis of the charred plant remains (Scaife above) indicates that cereals (spelt wheat, barley and oats) were important on the site. One of the questions posed by this palaeoenvironmental study was to determine if fields adjacent to the round were being used for arable or pastoral use, or mixed economy. Faunal remains were not preserved due to soil acidity and thus interpretation relies solely on botanical evidence. Only small numbers of cereal pollen and pollen of weeds of disturbed ground are recorded. This is, however, typical of the under-representation of arable activity in normal pollen spectra; that is, from local or regional growth as opposed to direct input of cereals into sediments in waste products such as animal dung. Thus, these percentages although relatively small compared with those pastoral elements noted, may indicate local arable cultivation. However, analysis of the plant macrofossil (charred seed remains) also shows that arable crop processing was taking place on-site. It must therefore be considered that cereal pollen and associated weed types may derive from these secondary cereal sources with pollen trapped in the cereal ears being liberated during threshing and winnowing (Robinson and Hubbard 1977; Robinson 1979). The combined pollen and macrofossil evidence suggests that arable agriculture was important. This, plus strong evidence for open grassland/pasture implies a mixed agricultural economy

9.5 Summary and Conclusions

9.5.1 Pollen analysis has rarely been carried out on such archaeological contexts, and although the taphonomical problems are complex compared with typical peat mire situations, they are outweighed by the value of information gained from analysis of on-site archaeological contexts. Despite the highly minerogenic sediment and an environment apparently unsuitable for the preservation of pollen, abundant pollen was recovered. A background vegetation of localised woodland copses and heathland has been suggested. This is in accord with evidence of wood and scrub which was gathered and burnt as fuel (see Rowena Gale, below). The dominance of herbs and especially grasses and grassland taxa suggests locally open grassland which is likely to have been used as pasture. However, the abundant charred cereal remains (Rob Scaife above) and the cereal pollen and weeds recorded also indicate local arable agriculture. On top of this basic interpretation is the possibility of pollen derived from secondary sources as roof and/or floor covering which was washed into the ring gully. These might include Royal fern (*Osmunda*), *Sphagnum* moss and also elements of the pasture group (grasses) noted above.

9.6 Appendix 1: Pollen Methodology

9.6.1 All samples were of an inorganic/minerogenic character and of acidic nature, being derived from granite. Given the minerogenic character of the samples, rigorous pollen extraction procedures were required. Extraction procedures followed those outlined by Moore *et al.* (1991) but with the addition of micro-mesh sieving (10u) for removal of the clay fraction. Samples were deflocculated with 8% KOH. Coarse debris was removed through sieving at 150u and clay by micro-mesh (10u). Remaining silica was digested with boiling 40% hydrofluoric acid. Erdtman's acetolysis was carried out for removal of cellulose. The concentrated pollen and spores were stained with safranin and mounted in glycerol jelly. Absolute pollen frequencies were calculated using Stockmarr *Lycopodium* tablets; that is the addition of a known number of exotic grains (*Lycopodium*) to a known sediment volume (Stockmarr 1971). In this case the volume was 3ml. Pollen was identified and counted with an Olympus biological research microscope with phase contrast facility at magnifications of x400 and x1000. These extraction techniques were successful and a preliminary pollen diagram based on a pollen sum of 100 pollen grains plus extant spores has been

constructed using *Tilia* graph and *Tilia* Plot in the Quaternary Environmental Change Research Centre of the Department of Geography, University of Southampton. Pollen is calculated as a percentage of total pollen and spores as a percentage of total pollen plus spores. Pollen taxonomy follows that of Moore and Webb (1978) modified according to Bennett et al. (1994).

10 CHARCOAL Rowena Gale

10.1 Introduction

10.1.1 Forty bulk soil samples from post holes and the hut gully from within the round, and from associated layers and ditch fills from the outer enclosure ditches, were processed by flotation at the Babtie Group laboratory to isolate organic plant remains. Charcoal was present in most samples, sometimes abundantly (eg in pit 30), and was separated from the charred seeds and macrofossils. Some features were dated by pottery to the early and late Roman period. Pollen analysis (by Rob Scaife) suggests that grassland dominated the landscape at this time, with only a small contingent of woodland taxa. The identification of the charcoal provided the opportunity to assess the character of the woodland and the use of woodland resources during the occupation of the Romano-Cornish round. Three samples were selected for C14 dating.

10.2 Materials and methods

10.2.1 Thirty seven samples were examined. The charcoal was generally fairly well preserved, although some fragments were friable or vitrified (the latter, characteristic of burning at high temperatures). Many samples contained narrow roundwood (ie diameter <20mm). Large samples of material were subsampled as follows: sample 26 (context 064) - 50%; sample 29 (context 32) - 50%; sample 34 (context 036) - 50%; sample 51 (context 045) - 25%.

10.2.2 The charcoal was prepared for examination using standard methods. The fragments from each sample were fractured to expose fresh transverse surfaces and sorted into groups based on the anatomical features observed using a X20 hand lens. Representative fragments from each group were selected for further examination under high magnification. Freshly fractured surfaces were prepared in the transverse, tangential and radial planes. The fragments were supported in sand and examined using a Nikon Labophot incident-light microscope at magnifications of up to X400. The anatomical structure was matched to reference material.

10.2.3 Where appropriate the maturity (ie. sapwood/ heartwood) of the wood was assessed. It should be noted that the measurements of stem diameters are from charred material; when living, these stems may have been up to 40% wider.

10.3 Results: overall taxonomical summary

10.3.1 The anatomical structure of the charcoal was consistent with the taxa (or groups of taxa) listed below. It was not usually possible to identify to species level. The anatomical similarity of some related species and/ or genera made it difficult to distinguish between them with any certainty, eg members of the Ericaceae, Leguminosae, Pomoideae and Salicaceae. Classification is according to *Flora Europaea* (Tutin, Heywood et al. 1964-80). The results are set out in full in Table 3, and the taxa present can be summarised as follows:

Betulaceae	*Alnus* sp., alder
	Betula sp., birch
	Caprifoliaceae *Sambucus* sp., elder
	Corylaceae *Corylus* sp., hazel
	Ericaceae *Calluna* sp., ling;
	Erica sp., heather.
	Many species of Erica are anatomically indistinguishable from Calluna.
Fagaceae	*Quercus* sp., oak
Leguminosae	*Ulex* sp. gorse and/ or *Cytisus* sp., broom
	These genera are anatomically similar.
Oleaceae	*Fraxinus* sp., ash

Rosaceae		
	Pomoideae	*Crataegus* sp., hawthorn *Malus* sp., apple *Pyrus* sp., pear *Sorbus* spp., rowan, service tree and whitebeam These genera are anatomically similar.
	Prunoideae	*Prunus* spp., which includes *P.avium*, wild cherry; *P.padus*, bird cherry; *P. spinosa*, blackthorn. The anatomical features of these genera are overlapping and it is sometimes difficult or impossible to differentiate between the species.
Salicaceae		*Salix* sp., willow *Populus* sp., poplar. These genera are anatomically similar.

10.4 Enclosure ditches 006, 008 and 125

10.4.1 Charcoal was examined from each enclosure ditch. Although sparse in the two outer ditches, oak (*Quercus*) heartwood was identified from 008; and from 006, gorse/broom (*Ulex/Cytisus*) and roundwood (diameter 10mm) from a member of the hawthorn group (Pomoideae).

10.4.2 Three samples (51, 52 and 53) were examined from the lower fills of the inner ditch 125. Charcoal was abundant and included a large quantity of narrow stem and twiggy material. The upper layers, (contexts 045, sample 51 and 076, sample 52), were fairly similar in content - predominantly oak (mostly fast-grown roundwood up to about 20mm in diameter but also some heartwood); also gorse/broom (roundwood up to 10mm in diameter), blackthorn/ cherry (*Prunus*) roundwood, hazel (*Corylus*), willow/poplar (Salicaceae) and member/s of the hawthorn group (Table 3). The underlying layer (context 077, sample 53) contained a narrower range of species - predominantly oak and gorse/broom with a very small quantity of willow/poplar.

10.5 Features within the enclosure: structures

10.5.1 Hut gully 038

The hut gully, interpreted as a drip gully, contained relatively large quantities of rather comminuted charcoal, particularly in the upper fills. Samples 42 and 43 included a wide range of taxa: alder (*Alnus*), birch (*Betula*), hazel (*Corylus*), hawthorn group (Pomoideae), blackthorn/ cherry (*Prunus*), oak (*Quercus*) sapwood, willow/poplar (Salicaceae), and gorse/broom (*Ulex/Cytisus*). Sample 44, from the lower fill, included a narrower range of taxa (Table 3).

10.5.2 Post holes

A group of post-holes lay close to, or enclosed by, the hut gully. Although many contained charcoal, dateable artefacts were rarely present and apart from post-hole 048, which appeared to be later than the gully, and post-hole 62, from which 3rd to 4th century pottery was recovered, it was difficult establish temporal relationships between the post-holes. Charcoal from 48 included hazel (*Corylus*), and oak (*Quercus*) sapwood. Charcoal was extremely abundant in post-hole 62 and was mainly composed of oak (both sapwood and heartwood); gorse/broom, blackthorn and willow/poplar were sparsely present.

Post-holes from within the enclosure from which charcoal was identified included 012, 040, 058, 060, 062, 066, 070, 074, 084, 104, 113, 147, 160, 164 and 168. The charcoal from these features was composed of small fragments and, with the exception of post-holes 012 and 041, most samples included narrow roundwood, often from a range of taxa (see Table 3). Oak was common to almost every sample; taxa more sporadically present included alder (*Alnus*), hazel (*Corylus*), ash (*Fraxinus*), Pomoideae, blackthorn/cherry (*Prunus*), willow/poplar (Salicaceae), gorse/ broom (Ulex/*Cytisus*). *Prunus* in post-hole 60 was almost certainly blackthorn, and Prunus root occurred in post-hole 58.

Post-hole 012 contained oak sapwood and heartwood and some unidentified bark. Post-hole 41 contained a very large quantity of narrow slivers of charcoal. These had burnt at temperatures high

enough to distort the cellular structure and cause a glassy appearance (vitrification). A large proportion of the fragments were too narrow to examine but of those identified all were oak (sapwood/heartwood), and the remainder appeared superficially similar. The form and consistency of the charcoal suggested a common source from a stem/ trunk mature enough to have formed heartwood. This would imply a possible origin from the remains of the post, burnt in situ in the post-hole.

Charcoal associated with a patch of burnt stones 101 on the natural ground surface prior to the construction of the hut included oak sapwood and gorse/ broom (*Ulex/Cytisus*). A small scoop 163 also included oak and gorse/ broom.

10.6 Features within the enclosure: Pits

10.6.1 A sub-rectangular pit 030 was sited to the east of the hut gully. The fill of the pit included dumps of clay and charcoal-rich lenses which, on excavation, were interpreted as industrial waste. Dating is unclear, but could be 2nd century AD or later. Eight samples of charcoal (samples 27 to 34) were examined and mostly consisted of narrow stems and roundwood from hazel (*Corylus*), heather (Ericaceae), gorse/broom (*Ulex/Cytisus*), and oak (*Quercus*); oak heartwood was also present. Ash (*Fraxinus*), hawthorn type (Pomoideae), blackthorn (*Prunus spinosa*) and elder (*Sambucus*) were less frequent.

10.6.2 It may be significant that this pit, interpreted as an industrial dump, was the only feature from which heather was identified. Apart from its value as a fuel, heather has traditionally been used as a packing material and to make ropes (Mabey 1996). Similar uses may have been employed at Penhale. The scope of industrial activities at Penhale is unknown but if it included, for example, pottery-making, heather could have been used for supporting or binding pots during firing or transportation.

10.7 Discussion

10.7.1 Origin of the charcoal

The features (post-holes, pits, the hut gully and ditches) from which charcoal was identified were mostly dated to the early centuries of the 1st millennium. The origin of the charcoal is unknown but most of it was probably domestic fuel debris either deposited in, or accumulated in, local hollows and depressions. There was some evidence to suggest that the charcoal from post-hole 104 may have resulted from an oak (*Quercus*) post burnt *in situ*. A large pit 30, sited between the hut and the inner boundary ditch, was dated by pottery to the 1st/2nd century and interpreted as a possible dump from (unknown) industrial waste. Its fill was rich in charcoal and pottery. The charcoal was predominantly oak (*Quercus*), gorse/ broom (*Ulex/Cytisus*), hazel (*Corylus*) and heather (Ericaceae). It is tempting to attribute the heather in this feature to a specific use (eg. fuel, packing or cordage) since it was not identified from any other context, and the pit's possible association with industrial use tends to support this suggestion.

10.7.2 Environment

Pollen analysis (by Rob Scaife) based on a sediment core taken from the hut gully indicates that grasses (70%) and heathland were dominant in the landscape. The arboreal components of the pollen comprised mostly of hazel (*Corylus*) and oak (*Quercus*) but also included ling (*Calluna*), heather (*Erica*), alder (*Alnus*), elm (*Ulmus*), birch (*Betula*), lime (*Tilia*), ivy (*Hedera*) and pine (*Pinus*). The charcoal deposits which almost certainly derived mostly from fuel gathered from trees and shrubs growing reasonably close to the site included many of those named above (from the pollen) and, in addition, ash (*Fraxinus*), hawthorn and/or other members of the Pomoideae, willow/poplar (Salicaceae), elder (*Sambucus*) and gorse/broom (*Ulex/Cytisus*). The evidence suggests that woodland and/or scrub was relatively common but probably grew in discrete areas or specific ecological zones eg, heathland, open woodland or boggy patches.

Oak (*Quercus*) and gorse (or broom) (*Ulex/Cytisus*) were most frequently represented in the charcoal. Hazel and blackthorn (*Prunus spinosa*) were also common (cherry is unlikely to have grown in this environment). Other taxa were less frequent and although their absence/presence in

the charcoal would have been influenced by species selection, the paucity of some taxa may also reflect their poor distribution in the area.

Isolated trees or stands of oak (*Quercus*) may have formed open woodland perhaps with hazel (*Corylus*), birch (*Betula*) and ash (*Fraxinus*). Gorse and broom are ubiquitous but are generally considered to be indicative of acid soils and heathland. Gorse is probably more likely to have been used but broom can not be ruled out. Gorse grows in dense thickets on open land or heath, or in smaller clumps in marginal woodland. In western Britain gorse was often planted on top of earth banks to make an effective barrier against livestock (Mabey 1996). Its frequency in the charcoal deposits suggests that gorse was common at the site. Ericaceous species made a significant contribution to the pollen record, although less so to the charcoal, and heathland supporting gorse and hazel scrub was probably common. Hawthorn (*Crateagus*) and blackthorn (*Prunus spinosa*) may also have formed thickets. Elder grows in a range of habitats since the seeds are distributed by birds but it flourishes particularly in nitrogen-rich areas around human habitation. Areas of damp or wet soils were indicated by alder (*Alnus*) and willow/poplar (*Salix/Populus*); birch also colonises damp soil providing it is not waterlogged.

Wide growth rings indicative of fast growth were noted in some fragments of oak but the evidence was too slight to confirm the use of coppiced wood.

10.7.3 Use of woodland resources

The settlement appears to have been well supplied with wood, both for building (indicated by postholes) and for fuel (as demonstrated by the rich charcoal deposits which almost certainly mostly derived mainly from domestic fuel debris).

Apart from post-hole 104 which may have contained the burnt remains of an oak (*Quercus*) post (see above), the timber used for construction is unknown. With the exception of oak and ash (*Fraxinus*), few of the taxa identified from the charcoal would have produced timber of sufficient size or strength. Elm (*Ulmus*) (represented by pollen) is strong and durable and although difficult to work (Edlin 1949) it may have been used, but lime (*Tilia*), also in the pollen record, is soft and perishable and unsuited to building work.

10.7.4 Fuel

The fuel residues consisted of charcoal and, in many contexts, cereal processing waste. Wood fuel mostly consisted of young stems of shrubs such as gorse (and possibly broom) (*Ulex* and *Cytisus*), hazel (*Corylus*), blackthorn (*Prunus spinosa*), hawthorn type (Pomoideae) and oak (*Quercus*). Oak heartwood was also present in many samples. The age at which heartwood forms in oak is variable; it can occur in trees as young as twenty years or less. Wood was occasionally collected from alder (*Alnus*), birch (*Betula*), willow/poplar (Salicaceae), elder (*Sambucus*), ash (*Fraxinus*) and heather/ ling (Ericaceae). The comparative paucity of these taxa in the charcoal could indicate either that they were relatively rare in the environment (eg ash and birch), or that preferential selection excluded the use of some taxa, eg alder and willow which provide low-energy firewood.

Dense woods, eg., oak, ash, gorse, blackthorn, hazel, and elder produce high-energy firewood (Edlin 1949; Porter 1990). Oak heartwood provides particularly efficient long-lasting fuel, and gorse, which has traditionally been used to fire kilns and bread ovens (Mabey 1996), burns with a fierce heat. Lightweight woods, eg alder, willow and poplar burn slowly emitting less heat than those above, whereas birch and heather burn away quickly but produce great heat. The latter has been valued particularly in areas devoid of other fuels (eg moorlands) (Mabey 1996).

10.8 Conclusions

Charcoal from the fills of numerous features associated with the Romano-Cornish round and its enclosure ditches probably originated mostly from domestic fuel debris. The taxa identified indicates that fuel was gathered from a wide range of trees and shrubs but predominantly from oak (*Quercus*), gorse (*Ulex*), and hazel (*Corylus*). When combined, the results of the charcoal and pollen analyses demonstrate that the environment supported a considerable diversity of trees and

shrubs, which represent specific ecological habitats. The pollen study (by Rob Scaife) suggests that grassland was probably the dominant feature in the landscape with areas of heather (*Calluna* and *Erica*) and woodland, composed mainly of hazel and oak. Although a common shrub of heathland, gorse pollen often degenerates in soil sediments and, as in this instance, it fails to appear in pollen records.

Many of the features were dated by pottery to the early first millennium AD and, although yet to be dated using suitable charcoal samples, the remaining features may have been contemporary. It appears that despite the widespread grassland/moorland, sufficient woodland and scrub existed to provide good quality wood fuel for use by the local community. This may have been managed to some extent, eg regular cropping of the gorse bushes, or oak/ hazel coppicing but evidence of this could not be substantiated from the charcoal.

Table 3: Charcoal - taxa identified

Key: *Samp: sample; Cont: context; Al: Alnus; Bet: Betula; Cor: Corylus*; Er: Ericaceae; *Frax: Fraxinus*; Pom: Pomoideae; *Prun: Prunus*; *Querc: Quercus*; Sal: Salicaceae; *Sam: Sambucus*; *U/C: Ulex/Cytisus*. r: roundwood (diameter <20mm); s: sapwood; h: heartwood; rt: root.

The number of fragments identified is indicated.

Samp	*Cont*	*Description*	*Al*	*Bet*	*Cor*	Er	*Frax*	Pom	*Prun*	*Querc*	Sal	*Sam*	*U/C*
1	011	p/h fill 012	-	-	-	-	-	-	-	41sh	-	-	-
23	059	p/h fill 058	-	-	-	-	-	-	3rt	13rsh	-	-	2r
24	061	p/h fill 060	?1	-	2	-	-	-	2	8rsh	3r	-	17r
25	063	p/h fill 063	-	-	2	-	-	-	-	48s	3	-	16r
26	064	p/h fill 062	-	-	-	-	-	-	2	79sh	18	-	3r
27	031	pit fill 030	-	-	24	10r	6	-	10	83rh	-	-	26r
28	031	pit fill 030	-	-	10	6r	6	1	4	13sh	-	1	18r
29	032	pit fill 030	-	-	2	2r	-	1	-	2sh	-	-	29r
30	032	pit fill 030	-	-	15r	6r	-	-	1	1s	-	-	21r
31	032	pit fill 030	-	-	23	2r	1	-	?1	9sh	-	-	34r
32	034	pit fill 030	-	-	-	-	-	-	-	7h	-	-	?1r
33	035	pit fill 030	-	1	3	-	-	-	-	2r	-	-	3r
34	036	pit fill 030	-	-	3r	?1	-	-	1	10sh	-	-	34r
35	067	p/h fill 066	-	-	1	-	-	-	?1	-	-	-	4
36	071	p/h fill 070	-	-	1	-	-	-	-	1	2	-	1
37	075	p/h fill 074	?1	-	?1	-	-	-	-	1h	-	-	16r
39	085	p/h fill 084	-	-	-	-	-	-	1	4	-	-	1
41	105	p/h fill 104	-	-	-	-	-	-	-	133sh	-	-	-
42	050	ditch fill038	1	-	2	-	-	1	1	3	1	-	5
43	051	ditch fill038	-	2	-	-	-	1	3	8rs	-	-	3
44	052	ditch fill038	-	-	?1	-	-	1	-	3s	-	-	3
45	049	p/h fill 048	-	-	1	-	-	-	-	4s	-	-	-
46	101	layer	-	-	-	-	-	-	-	1s	-	-	2
47	041	p/h fill 040	-	-	8	-	-	-	12	3s	-	-	10
48	114	p/h fill 113	-	-	-	-	-	?1	-	1s	-	-	-
49	118	ditch fill 008	-	-	-	-	-	-	-	1h	-	-	-
50	121	ditch fill 006	-	-	-	-	-	2r	-	-	-	-	1
51	045	layer 125	-	-	12	-	-	3	5r	70rs	-	-	18r
52	076	layer 125	-	-	8	-	-	4	6	49rh	2	-	29r
53	077	layer 125	-	-	-	-	-	-	-	56rs	1r	-	45r
54	137	p/h fill 136	-	-	-	-	-	-	-	3s	-	-	-
55	139	p/h fill 138	-	-	-	-	-	-	1	1	1	-	1
56	148	p/h fill 147	-	-	1	-	-	2	12	4sh	1	-	-
57	169	p/h fill 168	-	-	-	-	-	-	?1	2	-	-	-
58	165	p/h fill 164	-	-	-	-	-	-	2	1s	-	-	1
60	163	layer/ stream	-	-	-	-	-	-	-	7s	-	-	1
61	161	p/h fill 160	-	-	-	-	1	-	-	16s	-	-	1

11 DATING EVIDENCE

11.1 Radiocarbon dates

11.1.1 Three charcoal samples were submitted to the Scottish Universities Research and Reactor Centre for radiocarbon dating, with the following results:

AA-27530: Context 45, Sample 51 (*corylus*) - fill of inner ditch recut

Uncalibrated age range:	1σ	1715 ± 55 bp ($\delta^{13}C$ = -27.5%)
Calibrated age ranges:	1σ	cal AD 243-399, cal BP 1707-1551
	2σ	cal AD 147-430, cal BP 1803-1520

AA-27531: Context 64 Sample 26 (*salicaceae*) - fill of post-hole

Uncalibrated age range:	1σ	1755 ± 55 bp ($\delta^{13}C$ = -26.7%)
Calibrated age ranges:	1σ	cal AD 220-343, cal BP 1730-1607
	2σ	cal AD 120-410, cal BP 1830-1540

AA-27532: Context 32 Sample 29 (*corylus*) - fill of isolated pit

Uncalibrated age range:	1σ	1850 ± 55 bp ($\delta^{13}C$ = -28.0%)
Calibrated age ranges:	1σ	cal AD 84-231, cal BP 1866-1719
	2σ	cal AD 30-322, cal BP 1920-1628

11.1.2 The above uncalibrated radiocarbon ages are quoted in conventional years BP (before AD 1950). The errors are expressed at the one sigma level of confidence. The calibrated age ranges are determined from the University of Washington Quaternary Isotope Laboratory, Radiocarbon Dating Programme, 1987. The 20 year atmospheric calibration curve is used throughout and the calendar age ranges, obtained from the intercepts (method A) are expressed at both the one and two sigma levels of confidence. All the samples were measured at the University of Arizona AMS Facility.

11.1.3 While the radiocarbon dates support the overall Romano-British date indicated by the pottery for the occupation in this part of the site, the 2σ ranges (ie a 95% probability that the date falls within the quoted range) overlap too much and are too broad to be of much further help. The 1σ ranges, which provide a lower level of confidence, do provide a clear separation between contexts 045 (AD 243-399) and 032 (AD 84-231), while there is only a minimal overlap between the latter and context 064 (AD 220-343). In every case both ranges are consistent with the artefactual dating. The pottery and 1σ radiocarbon age range in combination would suggest a probable 2nd century date for context 032, making it the earliest dated context. However, this date hangs on a single potsherd; if this was residual, and the 2σ radiocarbon age range is used, the feature could be of any date up to the early 4th century.

11.2 Artefactual dating

11.2.1 The 1993 excavations (Nowakowski 1994) identified artefacts and/or features in the vicinity of Penhale Round dating to the Mesolithic, Neolithic and Bronze Ages, the middle to later Iron Age and the Romano-British and medieval periods, with the Round itself being occupied probably from the 1st century BC to the 3rd century AD. The features directly associated with the Round, however, were relatively sparse in dateable material (Quinnell above). The stratigraphic evidence indicated the development of the Round from simple univallate beginnings into a double-ditched enclosure, with at least five phases of alteration to the ditches and entranceway.

11.2.2 By contrast, while some prehistoric material (flint, bronze age pottery, one sherd of potentially late iron age pottery) was found in the 1996 excavations, all of it was in residual contexts and every feature which contained artefacts was clearly Romano-British in date. Much of the Romano-British pottery was of long-lived types which are hard to date, but among the more precisely dateable material, the great majority was of the 3rd to 4th centuries, including some types which could have remained current into the 5th century. The only earlier material which was not demonstrably residual was the single sherd from isolated pit 030. Every other feature which could be dated from artefactual evidence was of 3rd to 4th century date (including the fills of both the inner ditch and its recut). Although the number of intercutting features could be taken to suggest a long occupation, no features could be chronologically separated on the basis of their artefactual content.

11.2.3 Given the strong assumption that the primary cut of the inner ditch was the earliest enclosure feature, it is notable that the pottery suggests that it remained open at least into the late 3rd century (Quinnell above). Unfortunately, the pottery comes from one of the later fills (057), and there is no evidence to suggest a date for its original excavation. Pottery from an upper fill of the recut (context 045, described by Quinnell (above) as "one of the best closed contexts in Roman Cornwall") was also of late 3rd to 4th century date, suggesting that the recut had a relatively short life.

11.2.4 If the origins of the round are really as early as suggested by the 1993 excavations, the inner ditch must have silted up very slowly for several centuries, with very few artefacts finding their way into the lower fills. It then silted up, was recut and silted up again much more quickly, at least partly due to deliberate dumping of rubbish in the ditch, within the late 3rd to 4th centuries. The paucity of earlier artefactual material ties in with evidence from the interior, where virtually all the datable artefacts were of a similar date-range to the material in the inner ditch (although again including long-lived types which *could* be earlier). This apparent bias in the artefactual dating evidence (the results of the 1996 excavations, taken in isolation, would clearly imply that the site was of 3rd

century origin) implies a change in the habits of the occupants of the round in the late Romano-British period, which affected the way in which rubbish was either produced, disposed of or both. Unfortunately, the evidence is inadequate to determine the nature of the change, as the range of possible causes is vast, including changes associated with the identity of the occupants, their social status, the agricultural or other economic activities taking place, the prevalence of manuring from domestic middens, or social attitudes to refuse.

12 INTERPRETATION AND DISCUSSION

12.1 The enclosure

12.1.1 The part of the enclosure investigated in 1996 was defined by three closely-spaced concentric ditches, between which there were no stratigraphic links in the excavated area. Although there was sufficient space (2.6m) between the inner ditch and the nearest internal features for a small rampart to have been present, no evidence for such a feature survived in this area.

12.1.2 The middle and outer ditches were simple one-phase features, while the inner ditch was substantially larger and had been recut after being completely filled. The geophysical surveys and the 1993 excavations by the Cornwall Archaeology Unit (CAU) indicated that the outer ditch extends around only the east side of the enclosure, and appears to tie-in with at least one contemporary external boundary ditch, presumably part of a field system. Unfortunately, it was impossible to determine the chronological relationships between the ditches. There could be as few as two phases of enclosure (if more than one ditch was open simultaneously) or as many as four phases (if only one ditch was open at a time). While the inner ditch recut is the latest identified phase, this is simply because there is no evidence to demonstrate its relationship with the middle and outer ditches.

12.1.3 Penhale is unusual amongst rounds in the complexity of the development of its enclosing ditches. Rounds are normally simple, univallate enclosures. Where there are two ditches, as at Reawla (Appleton-Fox 1992) and Trevisker (ApSimon and Greenfield 1972), they are usually widely separated, the outer ditch representing a replacement of the inner when the enclosure was enlarged. Closely-spaced multiple ditches are rare. However, excavation at Threemilestone (Schwieso 1976) identified a small outer ditch (although the chronological relationship between the two ditches is unknown), and other multivallate rounds are known from cropmarks (Johnson and Rose 1982). It remains possible, therefore, that other unexcavated but apparently univallate rounds may have additional, undetected ditches, and Penhale's multivallate character may be less unusual than it at first appears.

12.1.4 If the Penhale ditches were a sequence of replacements, with only one being open at any time, this would be consistent with the commonly recognised univallate pattern of rounds. However, this was not the conclusion of the 1993 excavations, while the lack of identifiable intersections tends to suggest that the ditches were in use simultaneously. All three ditches have very different profiles, which tends to suggest that none of them were excavated at the same time, but this could just as easily represent a series of additions as a sequence of replacements. While the question of the enclosure sequence cannot be definitively resolved here (pending full publication of the 1993 excavations), it seems likely that the inner ditch was original, and that the middle and outer ditches were added at a later stage (or stages). Whether this was before, after or contemporary with the recut of the inner ditch remains unclear.

12.1.5 While the inner ditch (both the primary ditch and the recut) was large enough to form a significant obstacle and performed the function of defining the enclosure, the purpose of the middle and outer ditches is obscure. Because the ditches were closely-spaced, there would have been no benefit in terms of an increased enclosed area. Schwieso (1976) suggested that the small outer ditch at Threemilestone may have been intended to prevent stock from falling into the much larger inner ditch. However, the shallow U-shaped outer ditch at Penhale seems unlikely to have formed a significant obstacle to stock, while although the middle ditch was so narrow (1m) that it could be easily crossed it was also so steep-sided that it could have posed a risk of injury to stock. These ditches do not therefore seem to represent an efficient means of stock control. However, while it is very unlikely that any of the ditches were intended for defence in the military sense, they could have been intended as a defence or deterrent against thieves or bandits. While the middle and outer

ditches would have made only a limited contribution as real obstacles, they would have given the visual impression of a more strongly defended site, encouraging at least some potential attackers to go elsewhere. It is also possible that the increased depth of the 'defences' functioned at least partly as a status-symbol, making the site seem more impressive and implying that the wealth of the occupants was sufficient to require enhanced security measures.

12.2 Structural features

12.2.1 The ring-gully, although not a structural feature itself, defined the edge of a dense concentration of intercutting post-holes. It is therefore probable, although not certain, that it surrounded a house or other structure, which must have had at least two phases of construction. The gully has been interpreted as a drip-gully positioned under the eaves of this structure. Unfortunately, less than a quarter of the gully lay within the excavation, and although it appeared to be an arc of a circle, it could just as easily have been oval.

12.2.2 No structural pattern could be confidently discerned among the internal post-holes. Although five of them were positioned in roughly the right place to form part of an outer ring (or polygonal arrangement), some of these five could also fit alternative structural patterns, and they need not all be contemporary. Attempts to divide the post-holes into groups by size, shape, other physical characteristics and the limited stratigraphic phasing which was possible did not clarify matters. The nature, size and shape of the structures represented must therefore remain a matter of speculation. The only other excavated internal structure in the round was a small, stone-walled oval building near the entrance, excavated in 1993 (Nowakowski 1994), while the two unexcavated possible buildings shown on the geophysical survey plot also look more oval than circular. While the features under consideration did not show up as a geophysical anomaly, if the curve of the gully were projected as an oval it would enclose an amorphous anomaly and partly define its limits, suggesting that the anomaly represents features internal to the building. It therefore seems most likely that the ring-gully formed an oval enclosure surrounding post-built structures of more than one phase, at least one of which may have been an oval building.

12.2.3 This group of features clearly represent a structure or structures of very different construction from the stone-walled building excavated by the CAU, which may explain why it did not appear as a geophysical anomaly whereas the other excavated house did. However, structural techniques used for buildings inside rounds appear to have varied considerably, often within individual settlements. Walls at least partly of stone are one of the most common features, often but not always accompanied by amorphous groupings of post-holes or post-holes set very close to or in the inner wall faces (eg Trethurgy, Castle Gotha and Grambla; Quinnell 1986 p.126). Gullies are also very common, appearing as structural features, drip-gullies or drains. The Iron Age House 3 complex at Trevisker (ApSimon and Greenfield 1972) consisted of a group of post-holes with no discernible pattern, associated with internal drainage gullies, hearths and an oven, while House 1 at the same site, which could have been contemporary, was a classic double-ring round-house with an inner ring of posts, outer wall at least partly of stone and entrance post-holes.

12.3.4 The apparent arrangement of the buildings at Penhale (positioned around the edges of the enclosure, facing into the interior) also seems to be a common pattern, fitting in (among others) with Trethurgy (Miles and Miles 1973, Quinnell forthcoming), Trevisker (ApSimon and Greenfield 1972) and Threemilestone (Schwieso 1976). However, it has to be said that very few sites have been subjected to large-scale excavation of the interior, and in some cases this has concentrated near the periphery. At Penhale, while its position is consistent with the general layout suggested by the previous excavated and geophysical evidence, the structural group excavated in 1996 did not show on the geophysical survey; other, centrally-positioned buildings not identified by geophysical survey could therefore be present in the unexcavated areas. At Reawla (Appleton-Fox 1992), the phase 1 house was in a peripheral location, but the phase 2 houses and working areas were located close to the centre of the enlarged enclosure, while the only building identified at Shortlanesend (Harris 1980) was just off-centre in the enclosure.

12.3.5 A single straight alignment of four post-holes was identified outside the ring-gully. One of these (046) cut an earlier post-hole (048) which itself cut the gully; another pair in the interior of the ring-gully (182, cut by 160) could also be part of the alignment. The nature of the structure represented

remains obscure, although it could have been a screen or windbreak associated with an open-air working area, perhaps including pit 030 or other features outside the excavation.

12.4 The pits

12.4.1 The nature and purpose of the main group of intercutting pits lying east of the ring-gully remain very obscure. The fills were primarily composed of redeposited clay and shillet derived from the natural subsoil, while there was almost nothing in terms of artefacts, charcoal, macroplant material, industrial waste or other cultural debris to provide a basis for dating or interpretation. Whatever activity required the excavation of a large hole, followed fairly rapidly by its backfilling with the excavated material, it seems to have occurred several times at the same location. The slot 106 which formed the latest element of the complex seemed to be different in form, and could have been either a drain or a structural feature. Its fill, however, was similar to those of the pits, and there was no sign of silting in the base, as would be expected in a drain, or post-pipes or packing, which would be expected in a structural feature. It did have a lower fill, but this appeared to represent simply slumping of the sides before the feature was backfilled.

12.4.2 Pit 030 was very different in character. It was an isolated feature, with several fills, again poor in artefactual material but containing the richest charcoal, carbonised macroplant and industrial waste assemblages recovered in this excavation. None of this material appeared to have been burnt *in-situ*, however; it all appeared to have reached the pit as parts of dumps of material from elsewhere. The pit therefore appears to have been used for the periodic disposal of rubbish, although whether this was the original reason for its excavation remains unknown.

12.5 Economy and environment

12.5.1 The presence of arable agriculture is strongly suggested by the charred plant remains (Scaife above), which indicated local cultivation and on-site processing of a range of crops, dominated by spelt wheat, oats and barley. Although emmer and bread/club wheat were both present only in small quantities, a consideration of taphonomic processes suggests that the latter may be significantly under-represented, whereas this is unlikely for emmer, which may have been a weed of other crops rather than a crop in its own right. The presence of culm nodes cast some light on agricultural methods, suggesting that harvesting may have been by uprooting. The only non-grain crop identified was peas, in small quantities only.

12.5.2 The pollen evidence from the hut gully fill (Scaife above) tended to confirm that cereal cultivation had taken place locally, while there was also pollen evidence for mixed woodland and heathland species. However, herb pollen (particularly from grass species) was dominant, suggesting the presence of grassland, although it is unclear whether the pollen came from grassland adjacent to the site or from herbaceous material brought onto the site, possibly for roofing or flooring materials. Areas of grassland may have represented pasture, indicative of stock-raising, but in the absence of faunal remains (which could not survive the local soil conditions) this cannot be confirmed. The pollen from wetland species (including sphagnum moss and royal fern) was somewhat ambiguous. While there is some possibility that these plants had grown on-site, perhaps in the gully itself, it was more likely that they had been brought to the site from a local mire.

12.5.3 The charcoal evidence (Gale above) indicated the use of oak for structural timbers, with fuels dominated by gorse, hazel, blackthorn, hawthorn and oak. Smaller quantities of alder, birch, willow/poplar, ash and heather/ling were also used for fuel. This mix tends to confirm that although the occupants of the site had access to woodland resources, heathland was at least as important as a component of the local landscape and as a source of fuel.

12.5.4 The evidence for non-agricultural aspects of the site's economy is very limited. While some of the cereals identified (particularly spelt) could have been imports, Scaife (above) concludes that they are more likely to be locally grown. Small quantities of ironworking slag were recovered from redeposited contexts, primarily from pit 030, but no furnaces or forges were identified and the only conclusion possible is that blacksmithing took place during the lifetime of the site (Fitzpatrick 1998). The scale of this operation and its economic significance could not be determined. The only other 'craft' activity identified on site was spinning, which was implied by the presence of two spindle whorls (one of them unfinished). Such finds are very common in Cornwall, and could be taken to

support the tentative conclusion that the presence of grassland suggests stock-rearing, most likely sheep for wool production.

12.5.5 There is no evidence for local manufacture of pottery. The great bulk of the ceramic material was of gabbroic fabrics from the Lizard peninsula; this is a common feature of Cornish site of the Roman period (Quinnell above). Three sherds of BB1 ware from South-East Dorset and a single sherd of Exeter Sandy Grey ware were the only pottery finds from further afield. Other artefacts imported from outside Cornwall include single fragments from a glass bottle and a shale bracelet, both rare but not unknown in Cornish enclosure sites (Quinnell above). A disk-shaped rotary quern (Quinnell above) was of an unusual form for Roman Cornwall, but its probable source was nevertheless the Tregonning Granite, within Cornwall. Hobnails, of which two were found, are a characteristically Roman period innovation (Quinnell above), but there is nothing to indicate that they were imported.

13 CONCLUSIONS

13.1 Both the 1993 and 1996 excavations suggested that the site began as a typical univallate round, while evidence from 1993 suggests a date of foundation between the 1st century BC and the 2nd century AD. While the inner ditch remained the main enclosure barrier, at some stage or stages during its occupation the enclosure was elaborated by the addition of two much smaller ditches, for reasons about which we can only speculate. The character of the occupation seems to have changed in some respects in the later Roman period, in ways that led to the more frequent deposition of artefactual material both inside the enclosure and in the inner ditch. The inner ditch silted up rapidly in this period and was recut; it is possible that some of the other alterations to the enclosure itself are also associated with this change. Structural features in the interior indicate the presence of a probable building, with more than one phase of construction, which was built using different techniques and materials from the building excavated in 1993 but may have been similar in plan form (ie oval). This building was succeeded in part by a straight alignment of posts of unknown purpose. A complex of intercutting pits and related features with sterile fills of redeposited natural remain enigmatic in date and function, while a separate isolated pit was used for disposal of rubbish which included both crop-processing and industrial waste.

13.2 Although soil conditions precluded the survival of faunal remains, the combined macroplant, pollen and charcoal evidence has enabled some tentative reconstruction of the surrounding landscape and of some agricultural activities of the site's occupants. The site appears to have been surrounded by a predominantly open landscape, containing areas of grassland but also arable land in which a range of mainly cereal crops were grown. The balance of arable and grassland cannot be determined, but it is probable that mixed agriculture was practised. The occupants of the site had access to woodland resources within walking distance, but given the frequent use of gorse/broom as a fuel, and the smaller-scale use of heather/ling, heath may have been a more important component of the landscape than woodland. There was also at least one wetland site sufficiently close for its resources to be exploited.

13.3 The impression given by the combined environmental and artefactual evidence is of a settlement which either produced most of its own agricultural produce or obtained it very locally and processed it on site, while almost all non-agricultural products were obtained from within Cornwall. Although there was some evidence for the use of 'luxury' items from elsewhere, they were tiny in number and entirely from within the south-west peninsula. The only real sign of change in the round from pre-Roman times was a severely practical item, the introduction of hobnailed footwear. While there are signs of change in the later Roman period, they do not appear to constitute any increase in 'Romanisation'. The round therefore appears to represent an element of an extremely stable regional society, very little affected in the fundamentals of its way of life by the Roman occupation of Britain.

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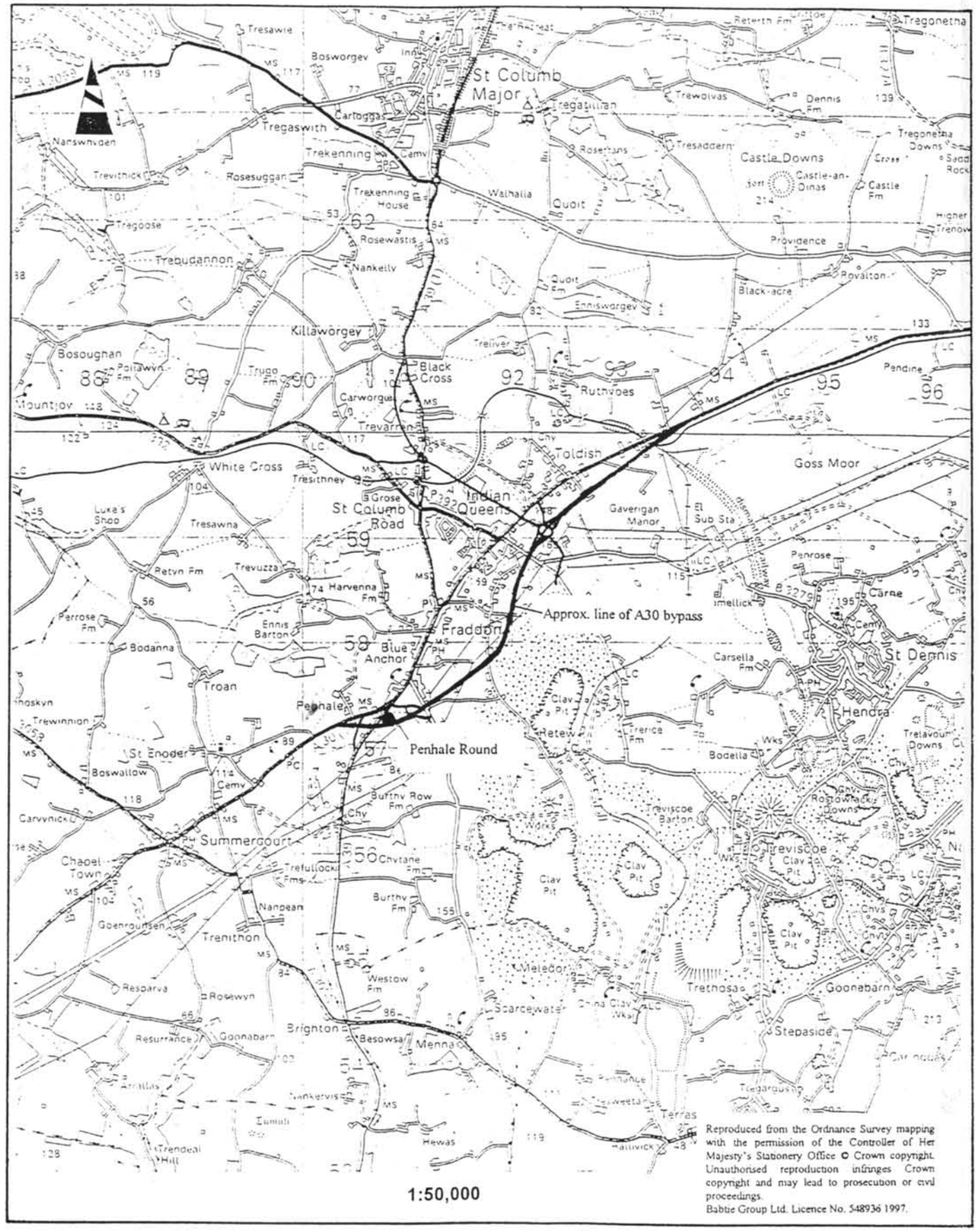
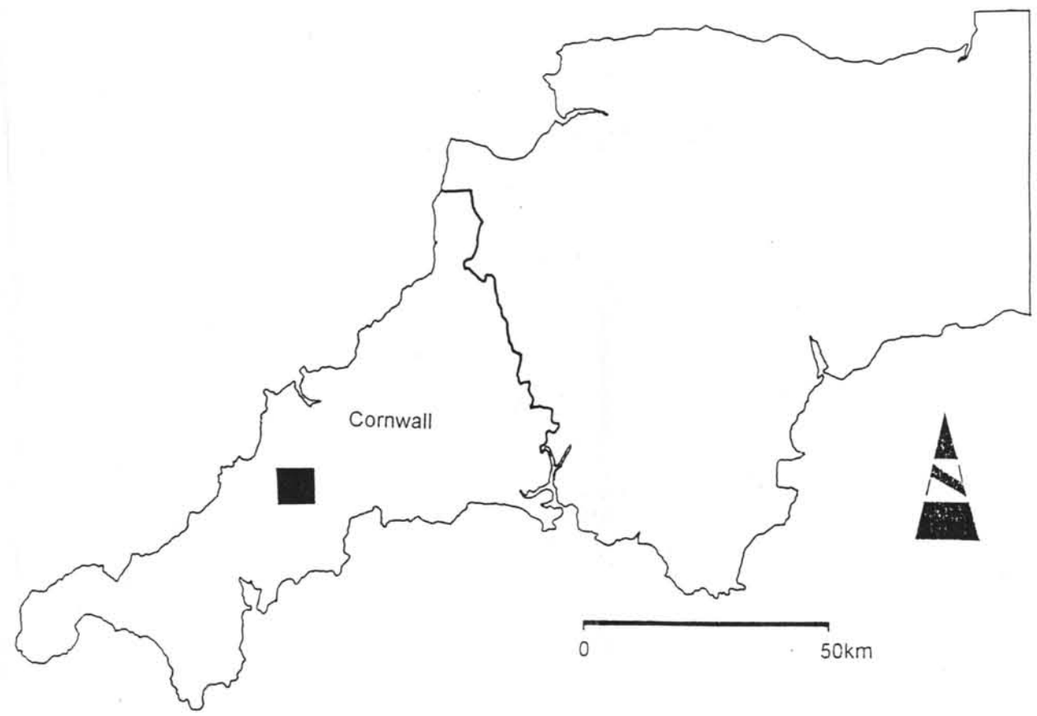
Job	Archaeological excavations at Penhale Round, 1996
Title	Figure 1: Site Location





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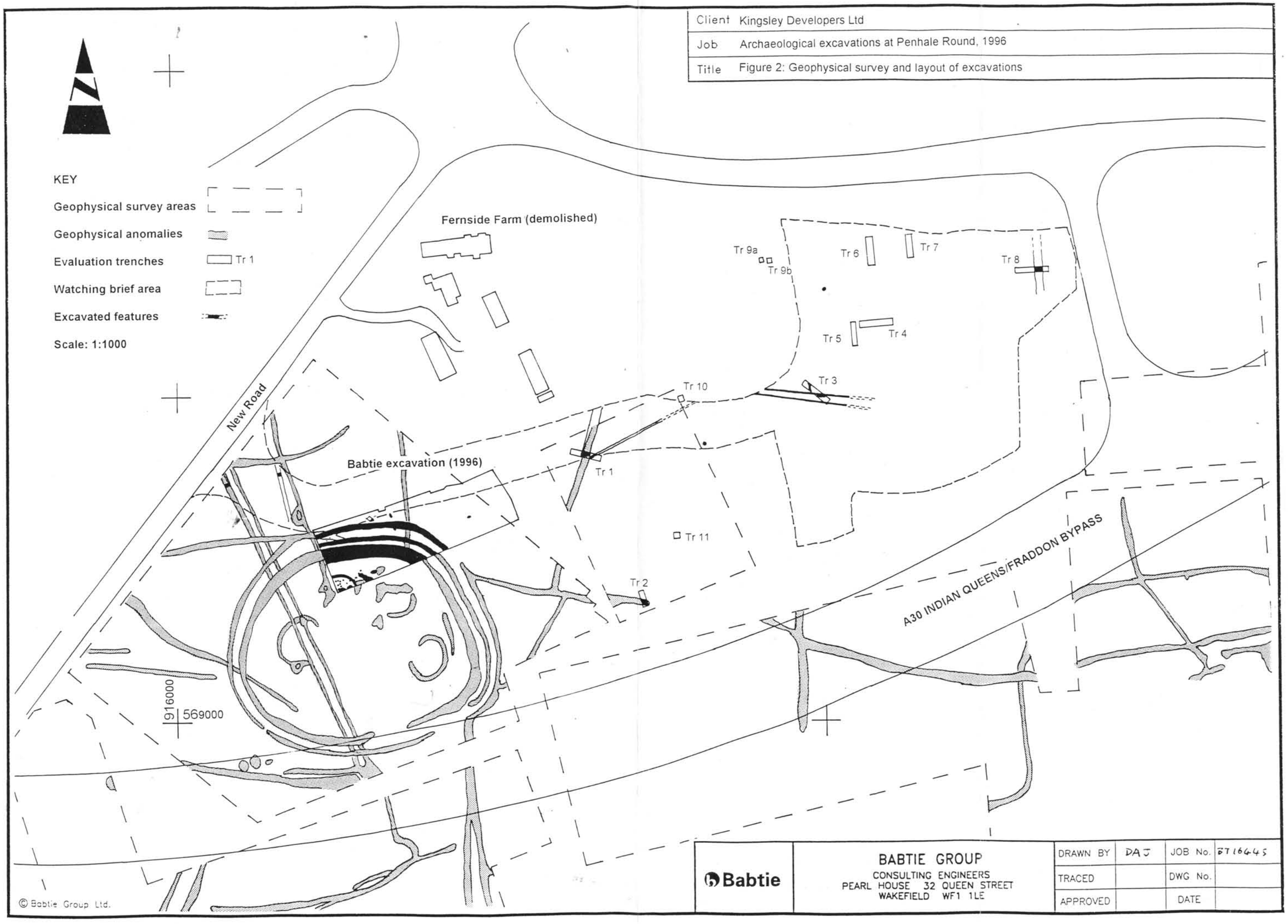
Client	Kingsley Developers Ltd
Job	Archaeological excavations at Penhale Round, 1996
Title	Figure 2: Geophysical survey and layout of excavations



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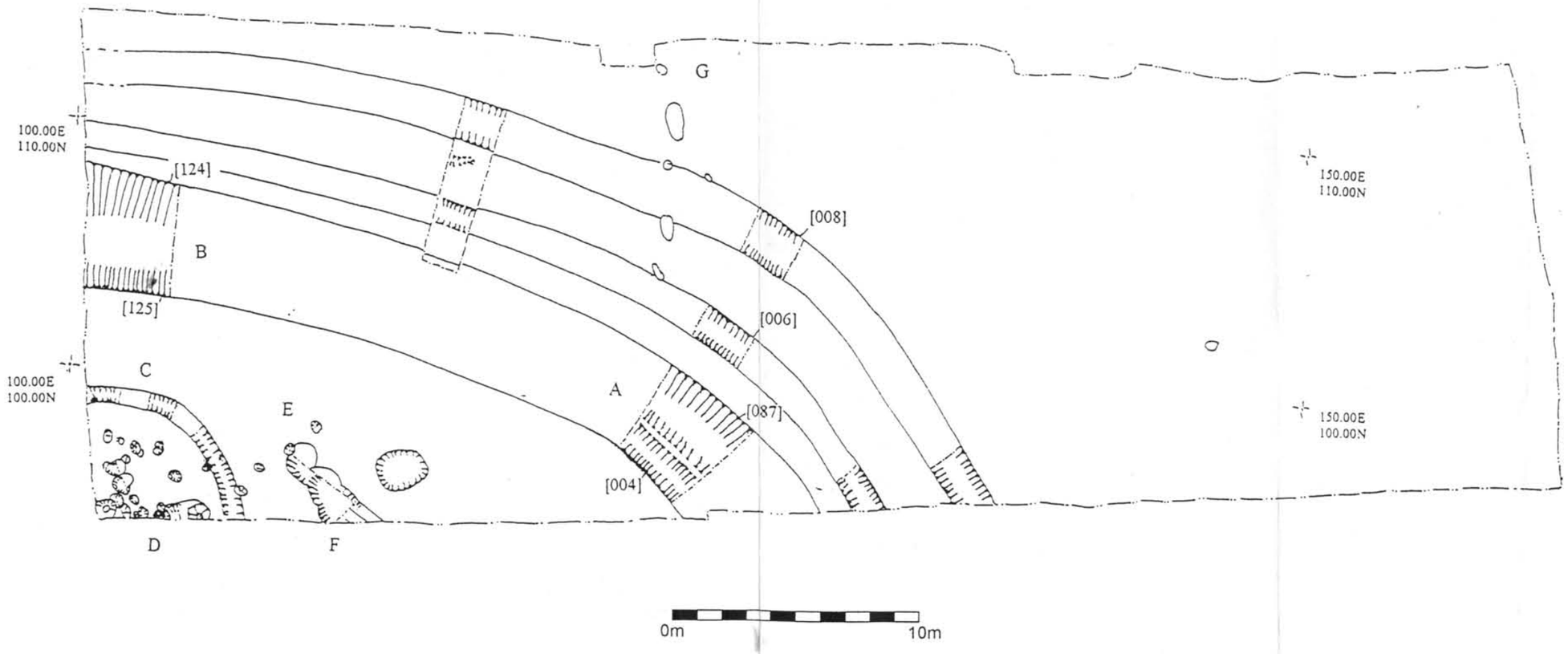
Client	Kingsley Developers Ltd
Job	Archaeological excavations at Penhale Round, 1996
Title	Figure 3: Plan of excavated area



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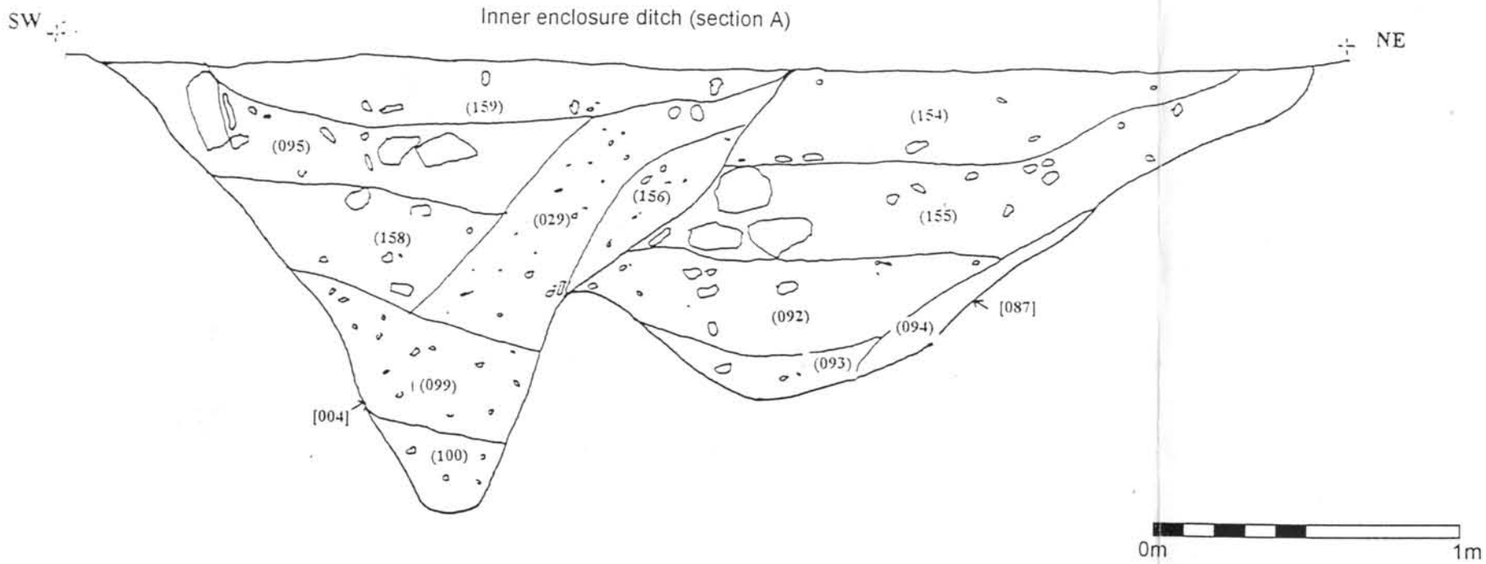
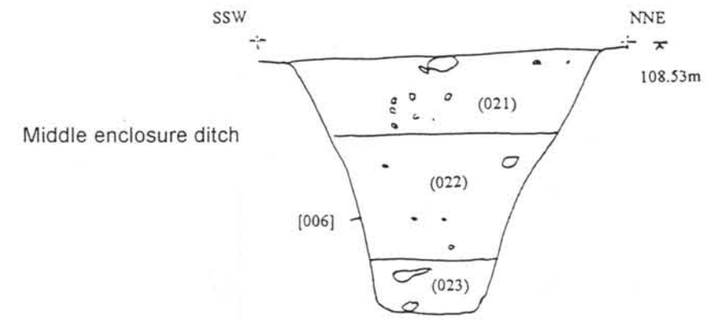
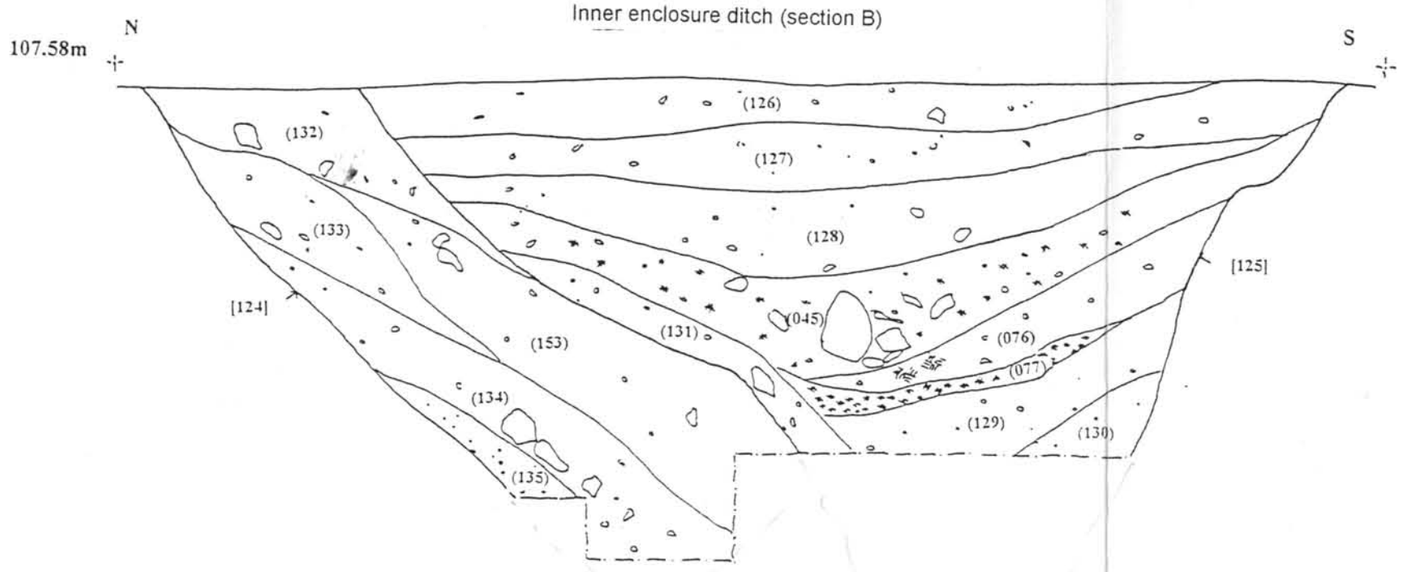
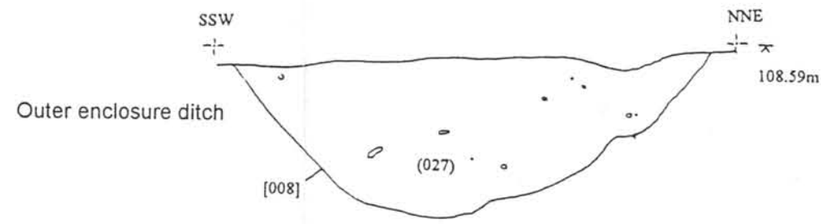
Client	Kingsley Developers Ltd
Job	Archaeological excavations at Penhale Round, 1996
Title	Figure 4: Sections of enclosure ditches









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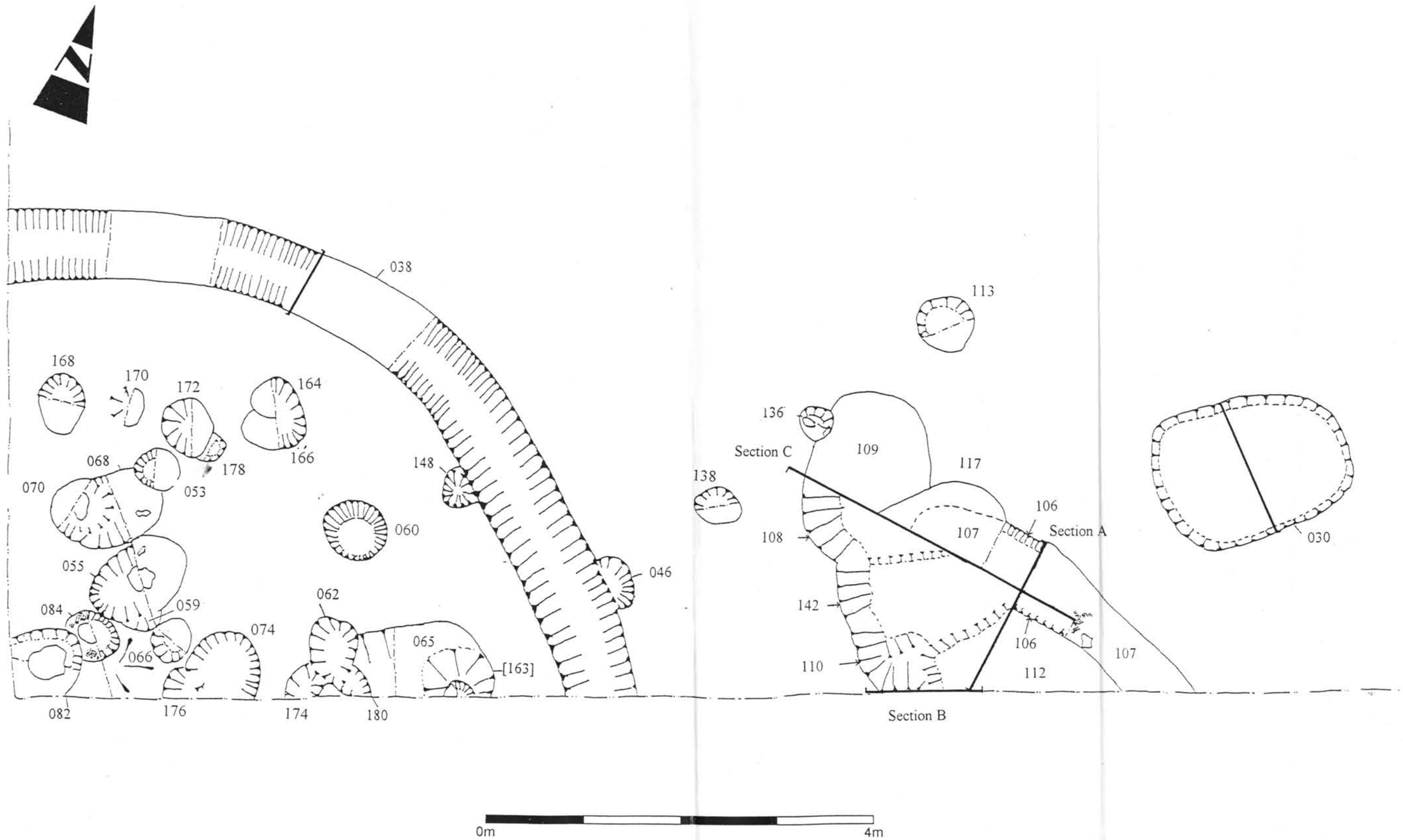
Client	Kingsley Developers Ltd
Job	Archaeological excavations at Penhale Round, 1996
Title	Figure 5: Plan of internal features



Sections A, B, C: see Figure 6

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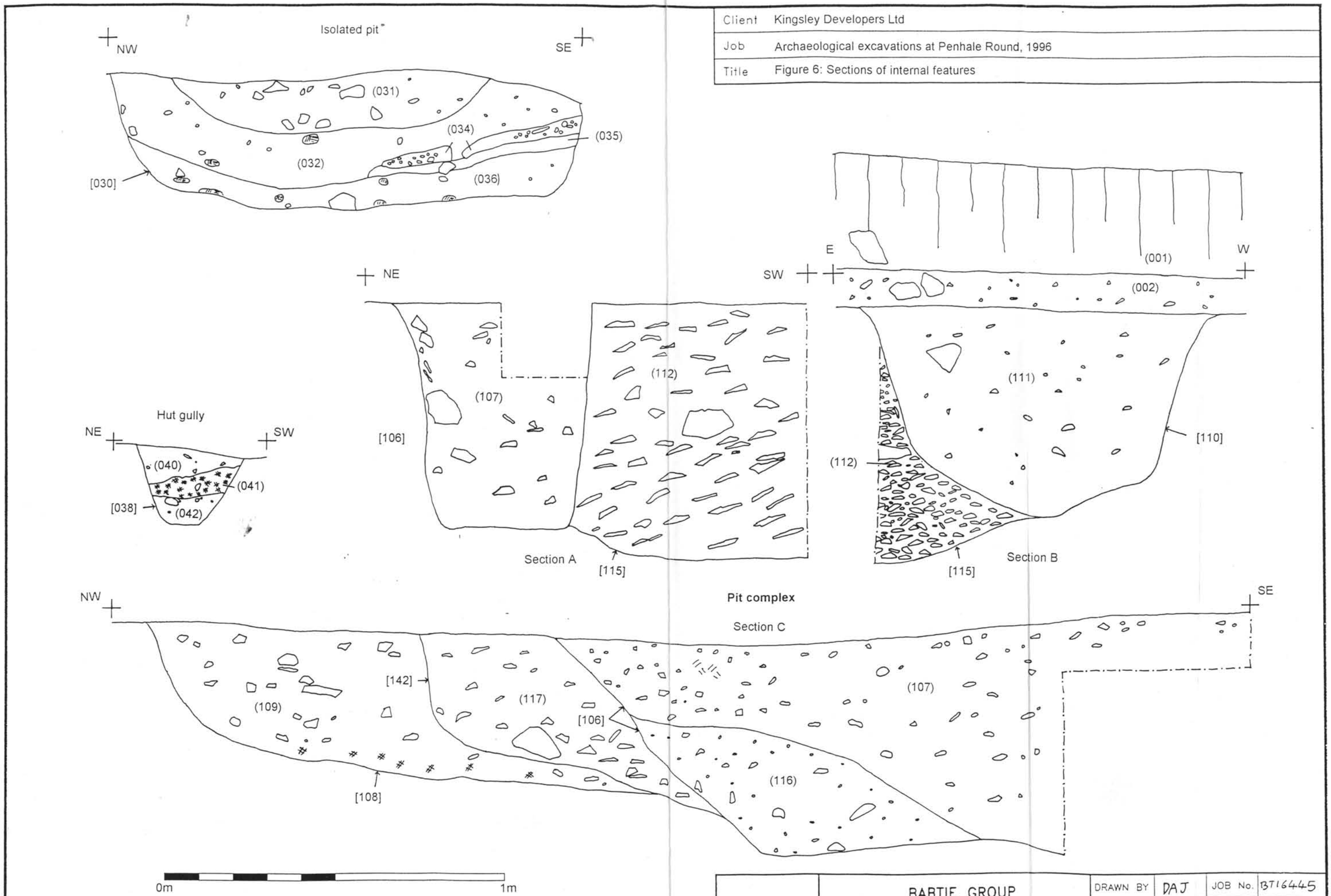
Title	Figure 6: Sections of internal features



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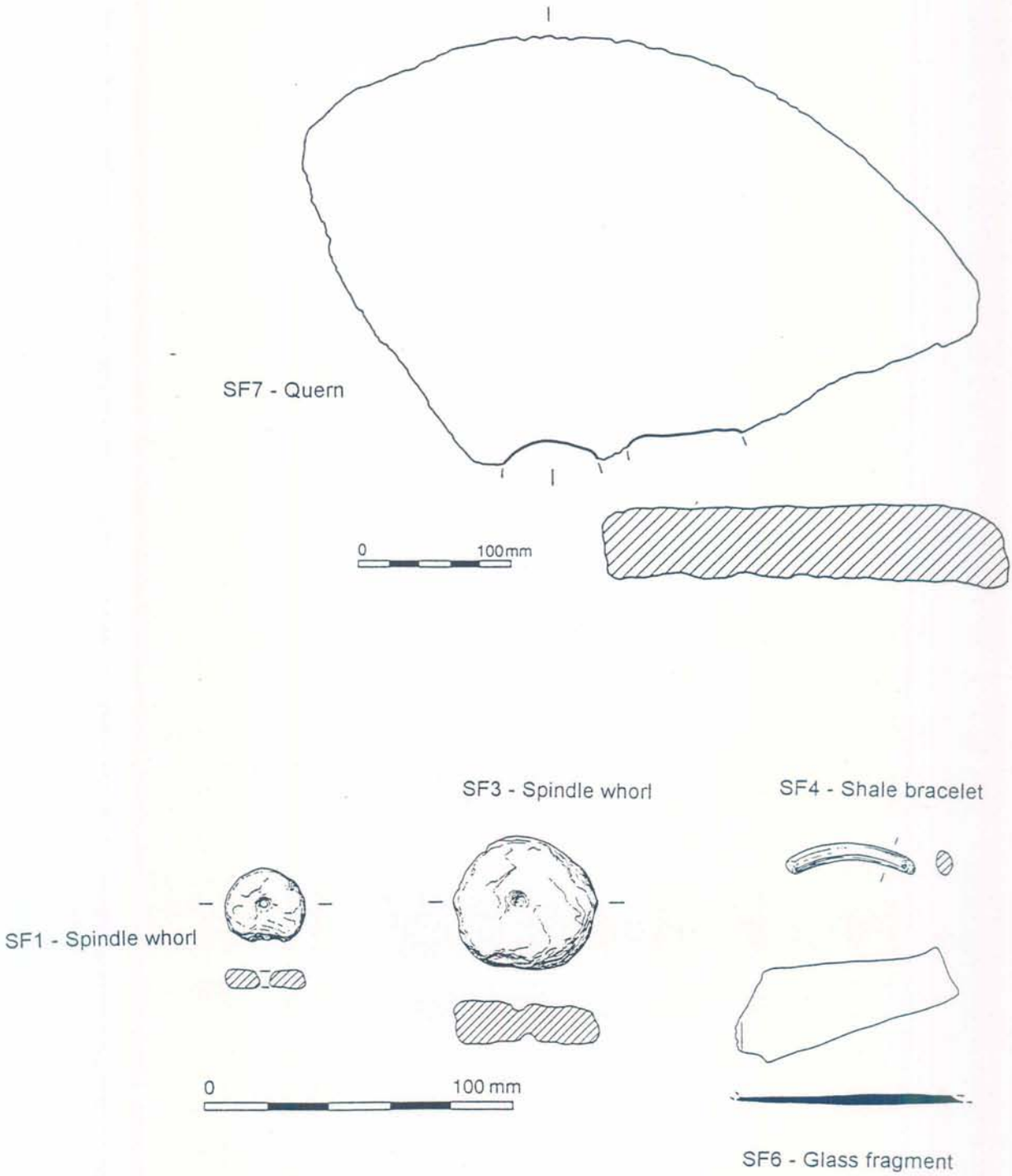
Client:	Kingsley Developers Ltd
Scheme:	Archaeological Excavations at Penhale Round, 1996
Title:	Figure 7: Objects of stone and glass



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Client:	Kingsley Developers Ltd
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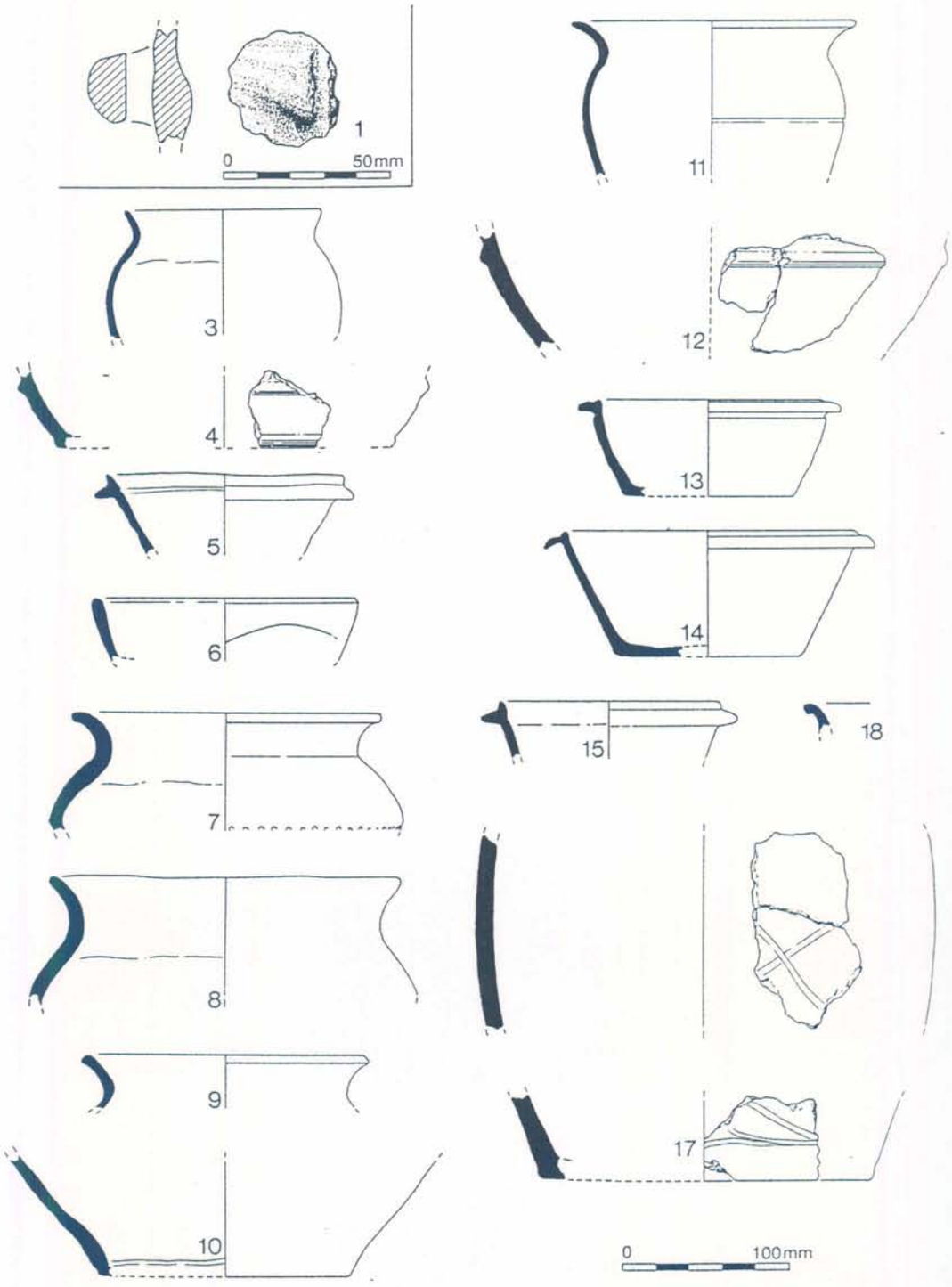
Title:	Figure 8: Roman period pottery



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