Eskmills Evaluation:
Written Scheme of Investigation

14th April 2011











AOC Archaeology Group

ARCHAEOLOGY | HERITAGE | CONSERVATION

1. INTRODUCTION

1.1 AOC Archaeology Group has been commissioned by Hackland & Dore Architects Ltd on behalf of Dunedin Canmore Housing Association to undertake a programme of archaeological works ahead of the construction of a residential development within land formerly occupied by part of the former Brunton Wireworks, Inveresk. The need for and scope of archaeological works has been determined by the East Lothian Council who are advised on archaeological matters by East Lothian Council Archaeology Service (ELCAS).

1.2 The work required is in accordance with Scottish Planning Policy (2010) and Planning Advice Note 42 (1994) in order to determine the nature, extent, condition, date and significance of any archaeological remains within the proposed development area.

1.3 This *Written Scheme of Investigation* details how the requirements of the project will be met. The first part is site specific while the Appendices detail AOC Archaeology Group's operating procedures and standards. Should the evaluation programme unearth significant archaeology features, which would suffer an adverse impact from development work, further phases of archaeological works such as excavation, post-excavation analyses and publication may be necessary.

2. BACKGROUND

2.1 Location

2.1.1 The proposed development area (Phases 1) totalling 2882 m^2 is located to the west of Inveravon Terrace, Musselburgh, East Lothian. The site is currently derelict ground centred at NGR NT 3394 7230 and is bounded by a bowling green to the north and rising ground to industrial units to the south. A new supermarket development lies to the east.

2.1.2 The underlying drift geology of the area is characterised by water-modified tills with sandy or gravelly upper layers underlain by sandy clay loam derived from Carboniferous sandstones and shales (Soil Survey for Scotland 1971). The soils are moderately developed loamy brown forest soils of the Rowanhill/Giffnock/Winton Associations. Drainage is imperfect.

2.2 Archaeological background

2.2.1 Introduction

The proposed development lies within a setting of high archaeological potential (*Scottish Burgh Survey, Historic Musselburgh: the archaeological implications for development* 1996). Several known sites of archaeological interest ranging from prehistoric burials through to modern industrial remains have been identified in the near vicinity. Given the richness of prehistoric, Roman, medieval and post-medieval remains in the area, the proximity of the Roman centre of Inveresk and the significant remains uncovered by recent archaeological works in the wider vicinity there is a possibility of encountering similar remains during ground-breaking works within the proposed development area.

2.2.2 Prehistoric

The remains of a Bronze Age cemetery were unearthed within ground previously occupied by the Brunton Wireworks, now the immediately adjacent Tesco supermarket site, in the 19th century (Lowe & Anderson 1894, 66).

2.2.3 Roman

The northern defensive line of the scheduled Roman fort at Inveresk, as determined by Richmond (1980, 294), lies to the south-east of the development area. The fort has produced abundant evidence of two phases of occupation during the middle of the 2nd century AD and was closely associated with a large civil settlement and wider rural hinterland. Excavations and chance finds confirm that the civil settlement was occupied for a similar period. The available evidence, although limited, suggests that an approach road to the fort may have traversed the development area, notionally running up from 'Old Bridge', which tradition recalls as being Roman, but appears in fact to be early 16th century. This need not necessarily mean that the actual crossing place was not originally Roman.

The Roman fort and civil settlement at Inveresk lies near the end of a ridge overlooking the mouth of the River Esk. It is generally held by scholars to have been known as "*Coria*" in Roman times (Rivet & Smith 1979). The fort was situated at the point of convergence of the two main north/south Roman roads in Scotland and was therefore of strategic importance to the Roman occupation of Scotland.

Current evidence indicates clearly that the fort was contemporary with the Antonine Wall although an isolated find of a Bronze Coin of Vespasian (AD 77-78) is known from Inveresk House. The first occupation of the Antonine Wall is traditionally dated between the governorship of Lollius Urbicus (AD 139-42) and the latter part of that of Julius Verus (AD 154-8). There followed a brief hiatus until a shorter secondary occupation for a few years from the late 150s to just before the middle of the 160s (Hanson & Maxwell 1983).

The fort Inveresk was ideally located to act as a supply base and port for the Wall and its hinterland (Breeze 1982, Hanson & Maxwell 1983). The fort would thus have been a focus for both military and civil activity in the region. It was perhaps for this reason that it attracted the presence of the chief provincial financial official, the procurator Quintus Lusius Sabinianus, who dedicated at least two altars at Inveresk, one of them to Apollo Grannus (Hassall & Tomlin 1977).

2.2.4 Roman (the civil settlement) activity

In 1565 a hypocaust (raised-floor heating system) and altar (dedicated by Sabinianus) were discovered in the grounds of Eskgrove, to the east of the fort. No further discoveries were recorded until the middle of the 18th century, when masonry remains were uncovered between Inveresk House and the church. This was followed by more discoveries nearby in 1783, when a substantial part of a bath-house ('one hundred yards in length by twenty-three feet in width' - with another hypocaust - was uncovered (Wedderburn, cited in Moir 1860, 11). The remains of this hypocaust were planned by Richmond (1980) and cleared out prior to consolidation by Thomas (1988). More buildings were found extending up to three hundred yards further to the east, beyond the Inveresk/Musselburgh road (Moir 1860).

In 1827, workmen excavating an area of ground at the eastern end of Inveresk Gate (NT 344 719) revealed 'a circle of curiously shaped stones', apparently burnt, together with two funerary urns, burnt bones, boars' tusks, some deer horn, and a gold coin of the 1st century AD. Further east, close by Inveresk Gate itself, a 'conduit' of brick and tile was found. Further south in the grounds, a wooden water channel and adjacent well were found when a gravel path subsided (Moir 1860).

In the summer of 1878, the chance discovery of a stone pine cone finial (a decorative device often employed on Roman funerary monuments) led to a short excavation the following spring about 200 yards from (and presumably to the north of, although this is not stated) the railway station. These produced abundant finds of Roman pottery, not all of it necessarily funerary in origin, and several tons of limestone, some of it partially burnt, all apparently within a large ditch, 4 feet deep and traced for a length of 30 to 40 yards. To the north, near the Poor House, more structural evidence was uncovered during the construction of a well, evidently including masonry originally intended to contain the spring (Stevenson 1878-79).

In July 1985, workmen excavating a trench through the factory floor at Brunton's Wireworks discovered quantities of human and animal bone. The factory floor lay directly over a layer of brown sand which included five U-shaped features one of which contained fragments of bone, pottery and oyster shell and a red matrix suggesting the presence of a body stain. The similar appearance of the five features visible in section, along with their regular spacing, suggests orderly burial in a cemetery. The pottery was all of a 2nd century AD date and as such it is probable that the burial dates from that time. The site of the burials lies NNE of the fort at Inveresk.

Elsewhere, aerial photographs of cropmarks in the vicinity have produced evidence for the wider landscape within which the fort and its civil settlement were situated. To the east of Eskgrove, enclosures and a possible aqueduct have been identified in this way. In 1995, excavations at Park Lane hospital revealed traces of what may have been part of a timber amphitheatre (Neighbour 1995).

A summary of the major archaeological works undertaken on local Roman remains in provided in Appendix A.

2.2.5 Medieval

Although abandoned by the Romans comparatively shortly after its construction, the site of the fort at Inveresk appears to have been re-used by the first church of St Michael's (Moir 1860). The church evidently incorporated Roman building material; such a circumstance is paralleled at a number of places, such as Chester-le-Street (Rainbird 1971).

A papal bull of 1184, included in the *Registrum de Dumfermlyn,* refers to the 'burgus et portus de Muskilburgum' (the burgh and port of Musselburgh) revealing its status as a burgh, and suggesting that at least a township was present by the late 11th century. However, there is no clear evidence that Musselburgh was a burgh until the time of Robert I, 1315 x 1328, when it was dependent on Dunfermline Abbey. It became a burgh of regality in 1562 (Pryde 1965).

The exact location of the early burgh of Musselburgh is uncertain but 'very probably the first medieval settlement clustered around the old bridge' (Dennison & Coleman 1996, 52).

Evidence of medieval activity was unearthed during a programme of archaeological survey and excavation in January 1993 on the site of a proposed food market development (Ewart & Triscott 1993). The results of this brief exercise demonstrated that the Brunton Wireworks were erected on a greenfield site, which in turn sealed medieval deposits. Artefactual evidence suggests a hiatus between the 15th/16th century and 19th century, which may be connected with the presence of the French fort built in 1548 by Desse (see below). The excavated medieval deposits appear to be agriculturally derived, covering a period from the 13th to 15th century and probably relate to the backlands associated with the river frontage occupation (Ewart & Triscott 1993). Subsequent investigation in 2001, albeit of limited scale again but spread over a wider area at the Wire Works site, predominantly exposed reworked mixed sediments incorporating industrial waste material overlying a natural sand and gravel. The material recovered was almost exclusively post-medieval in origin.

The Battle of Pinkie was fought on the fields in and around Musselburgh and Inveresk in 1547. In preparation, 'the village of Inveresk was surrounded by turf walls a yard high, along which ranges of small cannon were placed' (NSA 1845, 277).

To the east of the development area and on higher ground, a French fort was constructed immediately after the Battle of Pinkie, under Desse (who was also responsible for fortifying Leith). Also, the Old Bridge was of strategic importance and particularly so during events such as the Battle of Pinkie when it may have become a focus of fighting.

2.2.6 Post medieval

The settlement of '*MuScle Bru'*, church at *'Innervÿsk'* and *'Old Bridge'* are featured on one of the earliest maps available from archive sources, *Lothian and Linlithquo* (Blaeu 1654). Musselburgh is situated on the north side of the main Edinburgh road and there is no indication of any habitation in the area of the proposed development. Adair's map of 1682 similarly marks Inveresk and Musselburgh and shows the meander of the River Esk, in which the proposed development is located, to be unoccupied. Slezer's view of Musselburgh from Stonyhill shows Inveresk Church in the right of the picture and the proposed development area in the foreground as unoccupied ground.

The early 18th century map evidence is almost identical (Adair 1735) and it is only by the mid-18th century that the first signs of nearby industrial activity are depicted with a mill lead shown on Roy's map of 1747-55. John Laurie's map of 1763 shows the first buildings associated with the mill lead. The line of this mill lead appears now covered by Olive Bank Road and was partially excavated during water mains renewal (Kimber 2004).

Maps of the late 18th century show expanding development of buildings around the mill lead. Thomson's map of 1821 provides further indication of industrial development in the vicinity of the proposed development area. Land south and east of the proposed development area is marked as a bleachfield associated with two small buildings and a Waulk Mill. Hunter & Anderson's map of 1834 (Figure 8) shows the area between the Wauk mill and Inveresk church to comprise of two enclosed fields with three buildings shown to the immediate south-west of the development area.

Early Ordnance Survey maps (1853 & 1893) show the proposed development area as enclosed fields. The development area is crossed by a track (?) associated with the Esk Net Mills by the time of the Ordnance Survey (1908) map with a large rectangular building to the east of the track on the

Ordnance Survey (1914) plan. Until the late 19th century the majority of the development area remained as unoccupied agricultural land. The mid-late 19th century witnessed the development of small scale industry along the banks of the Esk. An archaeological watching brief undertaken during the excavation of site investigation pits to the east in 2001 revealed saggars and wasters of 19th century date relating to the Newbigging Pottery and suggested that the area may have been a dump for the waste from the pottery. Newbigging Pottery was located in what is now known as Manse Lane. The watching brief recovered both saggars and stoneware jar wasters, some stamped with the letters GRAY & SONS PORTOBELLO. Gray operated part of the Newbigging Pottery from 1869 and the whole pottery from 1893 until it closed in 1928 (Rankin & Rees 2001). The area (and wider locale including the current development area) may have been a dump for the waste from the pottery. Recent works within the adjacent Tesco site recovered further dumped material related to Newbigging Pottery together with sub-surface remains of the former Brunton Wireworks (established 1876, demolished 2000) (Cook 2009).

3. OBJECTIVES

3.1 The objectives of the archaeological works are:

i) to determine the character, extent, condition, quality, date and significance of any buried archaeological remains within the proposed development area;

ii) to advise and implement an appropriate form of archaeological mitigation, such as excavation, post-excavation analyses and publication, should significant archaeological remains be encountered that cannot be preserved *in situ*.

4. PROGRAMME OF WORKS

4.1 Introduction

4.1.1 The details of the archaeological works laid out below, are designed fully to meet the requirements of the East Lothian Council as advised ELCAS.

4.2 Evaluation

4.2.1 Fieldwork

The ground to be impacted upon covers an area of some 2882 m^2. Total trenching will be no less than 288 m^2 (total basal area of all trenches) representing a 10% sample of the proposed development area. The evaluation will be achieved through the excavation of linear trenches using a machine equipped with a 2 m wide ditching bucket. A trenching plan is attached (Figure 1). The distribution of trenching may have to be amended in the field to avoid areas of thick concrete slab (AOC would discuss and seek approval for such alterations with ELCAS while in the field).

The trial trenching will establish the extent, condition, character, quality and date of any archaeological features present. Trenches will be excavated by machine down to the first significant archaeological horizon or to natural subsoil. All machine excavation will be supervised by an experienced field archaeologist. Deep trenches will be laterally stepped or subject to gradual batter

where access for archaeological inspection is required. Trenches will be extended, or ancillary trenches excavated, in areas of archaeological discovery in establishing the full lateral extent of any significant archaeological material.

All trial trenching will be undertaken according to AOC Archaeology Group's standard operating procedures (Appendix 7). The palaeoenvironmental sampling strategy is also detailed in Appendix 7.

All significant archaeological features will be cleaned and fully defined. A sufficient number of any features present will be investigated to determine the character, function, condition, nature and date of the full suite(s) of features present.

An adequate proportion of each feature selected for investigation will be excavated, sampled and recorded to determine the character, function, nature, date and significance of the features sampled.

4.2.2 Evaluation reporting

A report will be produced in the form of a Data Structure Report, prepared in accordance with current standard Historic Scotland procedural requirements and AOC Archaeology standard procedures (Appendix 8, Section 8.1 to 8.8). Specifically the Data Structure Report(s) will contain the following:

- the location and National Grid Reference of the site;
- a non technical summary describing briefly the work undertaken and a brief outline of the phasing and history of the site;
- a full descriptive text detailing the archaeological features identified as part of the evaluation and an interpretation of their date and purpose;
- appropriate lists and diagrams summarising the contexts and artefacts recovered and the records made of them;
- a selection of digital photographs to illustrate the written report;
- fully referenced bibliography;
- photographic print and slide registers as an Appendix;
- *Discovery and Excavation in Scotland* (DES) Entry as an Appendix;
- analysis of the results of the works, including appropriate post-excavation appraisals.

Limited examination of artefacts (an initial pre-formal assessment study by a specialist) will have been undertaken as an element of the report. However, should significant artefacts and samples be recovered there may be the need for further phases of work including post-excavation assessment / analyses of samples and small finds. A costed Post-Excavation Design would be prepared in these circumstances. The need for, and scale of, such further phases would be determined in consultation with the planning authority's archaeological advisor.

In addition Summary Reports on the works and its findings will be submitted to *Discovery and Excavation in Scotland* and the OASIS online archaeological reporting facility.

In the event of significant archaeology being discovered on-site that cannot be dealt with during the evaluation, a comprehensive Mitigation Strategy will be produced. The Mitigation Strategy will define the areas of archaeological significance and define the impact of the proposed development upon

these. Proposals will be made as to the most appropriate course of action to limit the impact upon those features or areas of archaeological significance. Prior to completion of the Mitigation Strategy all proposed strategies will be discussed with the client and ELCAS.

Four copies of the report(s) will be supplied to the client for distribution to the relevant bodies.

4.2.3 Archive Deposition

The archive from these works will be prepared for deposition in the National Monuments Record of Scotland within 6 months of the completion of all fieldwork.

The disposal of small finds will be conducted in accordance with Scottish legal requirements and according to the standard procedure, Appendix 7.26 -7.29.

5. OPERATIONAL FACTORS

5.1 Monitoring

5.1.1 AOC Archaeology will liaise with ELCAS at all times to ensure they are aware of fieldwork dates and can schedule monitoring visits.

5.2 Health & Safety

5.2.1 AOC Archaeology has always maintained high standards on-site and a copy of our Health & Safety policy can be supplied on request. AOC Archaeology must be notified of the nature and extent of any contamination on site and be given guidance to the appropriate health and safety precautions required. Where these precautions comprise more than the use of thin over-suits and nitrate gloves AOC Archaeology will provide the necessary equipment for an additional cost.

5.3 Timetable

5.3.1 The evaluation will be undertaken in April 2011 once this Written Scheme of Investigation has been agreed by ELCAS on behalf of the planning authority.

5.3.2 It is anticipated that the evaluation trenching will take approximately three days conduct. The Data Structure Report will be prepared within one week immediately after completion of the fieldwork.

5.4 Project Team and facilities

5.4.1 Mr. John Gooder, Operations Director, will manage the project. Mr. Martin Cook MIfA, Fieldwork Project Manager, has been provisionally identified to direct the evaluation in the field.

5.4.2 Any resultant post-excavation analyses or conservation would be conducted by AOC Archaeology's in-house specialists and supervised by Dr Ciara Clarke, Post-Excavation Director, who specialises in palaeoenvironmental issues (Appendix 24).

5.4.3 AOC Archaeology has all the facilities necessary to undertake all resultant works, including fully equipped conservation and palaeo-environmental laboratories, secure storage and walk-in refrigeration units.

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1895 Ordnance Survey *Edinburghshire* Sheet VIII 1:10560

APPENDIX A: INVERESK ROMAN FORT - SUMMARY OF PAST INVESTIGATIONS

Richmond 1946 & 1947 excavation

Richmond succeeded in establishing the line of a 22" wide rampart on the north, west and south, giving external measurements of 480' N-S by 595' to 615' E-W, with the main entrance facing W. The line of the eastern rampart could only be approximately determined as trenching was not feasible - part of it lay under graves. The rampart was covered by an overburden of at least 5 ft of topsoil. The position of these defensive lines has subsequently confirmed by geophysical survey (Baker et al 1996). Leslie & Will (1999, 57) noted a need for a slight re-positioning of the south-western part of the defensive line very slightly to the north.

Within the fort, portions of two parallel buildings with mortar floors were examined, thought by Richmond to be barrack or stable accommodation, the southernmost overlying the remains of an earlier, demolished, granary. Two phases of occupation in the middle of the 2nd century were identified and it was suggested by the excavator that two extramural bath-houses, one to the south of the fort and one to the east, corresponding to these two phases (Richmond 1980).

Maxwell excavation 1971 (NGR: NT 3451 7199)

Archaeological excavation of part of the Inveresk Gate area was undertaken in 1971 after 'a number of items of Roman material' were found 'just below modern turf' (Maxwell 1971, 29). This excavation found three successive surfaces of a Roman road heading towards the east gate of the fort, the fringes of the lower two surfaces being covered by occupation debris, including burnt wattle and daub (Maxwell 1971).

Thomas' excavation 1976 (NGR: NT 345 722)

A larger-scale investigation was undertaken in 1976 prior to a proposed development of Inveresk Gate. The first phase identified consisted of a ditch with a V- shaped profile and a basal slot characteristic of military construction. This contained a minimal amount of sedimentation, suggesting only a short period of use, before it was backfilled; the excavator suggested that this may have formed part of a construction camp (Thomas 1989), although an alternative view might see it as part of a defensive outwork (Wilson 1984). The construction trench of one of the first structures on the site, evidently made of timber, was cut through the material filling the first phase ditch. The building appears to have been deliberately dismantled. Another similarly oriented building lay to the east of the first one and the discovery of roofing tiles appeared to show the method of roofing employed. The more westerly building contained a stone furnace, measuring 4.6 m by about 3.6 m (although later disturbance rendered more detailed examination difficult) and there was a stone-lined drain to its west and three large postholes to the east. The next phase saw the furnace retained with an additional, adjacent, circular stone structure; both contained within a post-constructed structure. At least two other timber - and one stone - structures of this phase were revealed, fronting onto an east-west street and separated by narrow cobbled alleyways. Once again the dating evidence spoke for an exclusively 2nd century date for the Roman presence. It should be noted that the preservation of remains was uneven across Thomas' trenches, those to the north-east apparently showing the results of earlier landscaping (Thomas 1989).

Hanson excavation 1981 (NGR: 341 720 centred)

Further trial trenching took place within the western part of the fort in 1981, in advance of the western extension of the graveyard. Richmond's (1980) statement that no Roman levels survived within the grounds of the market garden was tested by this investigation. Four hand-dug trenches located at regular intervals across the estimated position of the fort revealed surviving floor levels only in the most northerly trench. Here the rear of the first phase intervallum road lay undisturbed and partially sealed by collapse building rubble, which in turn lay beneath the fragmentary remains of a secondary cobbled surface. Also overlying the earliest road were traces of either rough wall foundations of the rear kerbing of the later rampart (Hanson 1981, 1985).

Rogers' excavation 1990 (NGR: NT 345 722)

Trial excavations were undertaken in 1990 in advance of repair works to a road-side wall in Inveresk Brae. Five small trenches were excavated at NT 345 722 and Roman features were uncovered in three. In one a square-sectioned ditch, possible a robber trench, was found. The fill was rich in finds, including butchered animal bone of both wild and domesticated species and pottery, much of it decorated, including sherds of Samian, Black Burnished Ware, amphorae and tile. Also found were fragments of "*Opus Signinum*" floor plaster. The second area contained the foundations of a substantial stone wall. It was at least 1m wide, although it had been robbed on the eastern face. Built of stone blocks 40cm x 15cm x 10cm and had a small foundation buttress. The foundations were covered by rubble either from its demolition or as a base for floor layers. This was capped with an *"Opus Signinum"* floor layer, broken up by root activity. Built onto this was a wall of thin, square, apparently Roman bricks. Since foundation buttresses are usually on the outside of walls all the other features would seem to have been secondary to a main stone building. The third area contained an apparent continuation of the stone wall with similar construction except for the top course, which consisted of one massive block 78 cm by 64 cm by 40 cm. The wall terminated here, but since it was robbed on the eastern side it may well have originally turned a corner in that direction (Rogers 1990).

GUARD excavations 1991 - 2001

Four seasons of rescue excavation have now taken place at St Michael's Churchyard, Inveresk, on this Roman auxiliary fort site. Work preceded the extension of the cemetery by East Lothian District Council, into the field immediately outside the cemetery wall at its western extremity.

1991 & 1993 excavations (NGR: NT 341 720)

Richmond calculated that the western defences of the fort should run obliquely through this field aligned roughly north-east to south-west. Both trenches, the first opened in April and May 1991, the second in March 1993, measured about 25 m by 20 m and were located contiguously just within the putative line of the fort defences. The state of preservation encountered in both seasons complimented and confirmed observations made by Hanson (1985) following exploratory trenches opened in this field in 1981. In general, structural remains associated with the occupation of the fort were found to survive in a reasonable state of repair in the northern half of the 1991 trench; the southern half of that trench by contrast contained only scant remains, and these in a poor state of repair. The 1993 trench was found to be largely devoid of remains, save for a series of pits and several patches of rough cobbling plus one roughly flagged area (see further below). This situation may be related to the differences in topsoil depth recorded across the two trenches, being greatest to the north and east where survival is best, and slightest to west and south where survival is poorest. Consequently one might anticipate reasonably good survival in the northern half of the field, which remains unexplored.

The 1991 excavation uncovered a stretch of some 20 m of the via praetoria, as it approached the western gate of the fort, together with it junction with the *via sagularis* and a distance of some 20 m of that road. The well-laid cobbled sub-surface of the *via praetoria* ran across the full width of the trench, bordered in places by dressed kerb stones. It was about 7.5 m wide and when sectioned was found to survive only to the depth of one or two layers of cobbles towards the east, and two or three layers to the west. The *via sangularis* by contrast survived poorly, having been completely robbed out or badly disturbed at several points along the exposed length. Consequently its width could only be estimated at around 5 m or perhaps a little more, and its depth where surviving was no more than that of the visible stones. Both it and the *via praetoria* were disturbed by a large pit which seems likely to have been cut in antiquity (see below) at the point where the two roads meet. Stratigraphic evidence encountered on the via praetoria suggests at least two phases of road building activity, one layer of road cobbling having been found to run under the in situ kerb stones on both sides of the road.

Evidence for two phases of occupation was also provided by the stratigraphic sequence recovered at the western gate. Although only partially revealed during the excavation, the remainder lying outwith the excavation area, traces of mortared stone construction were uncovered on the southern side of the road, presumably representing the foundation levels of a gate structure. Also found were two square-cut pits, one adjacent to and south of the road, the other centrally placed within it. Each was filled with carefully laid alternate layers of clay and cobbles, and though neither pit lay fully within the excavation trench, their dimensions are likely to have been about 1.25 m by 1.25 m. These presumably represent the foundations of a gate superstructure, providing firm bases in the loose sand subsoil to take the weight of large uprights; a third example presumably lay on the northern side of the road, again outside the excavated area. The position of the central example, sealed beneath the undisturbed uppermost surviving layer of road cobbling, adds weight to the contention of more than one phase of occupation.

The fort interior, as exposed in both trenches, proved to be largely empty. The adverse effect of past cultivation were evident through the lines of plough marks visible on the cleaned surface and the scarring detected on numerous pieces of dislodged building masonry, as well as kerb stones of the via praetoria. No trace of the presence of negative features indicative of the foundations for wooden barrack blocks of other rectangular-plan buildings was evident on the cleaned surfaces, and even deep, cross-site sections cut well into the natural subsoil in both seasons failed to reveal any indication of post-holes or post-trenches. It is possible that these may have existed as highly truncated features, which were missed and removed during cleaning (see also Hanson 1984), though the level at which cleaning took place was commensurate with that of the surviving road. It is perhaps more likely that no wooden structures existed in the areas opened. Certainly, the considerable quantities of masonry debris found across the site suggest that building in stone may have been more prevalent here than has previously been supposed. What little structural evidence there was within the fort interior is all of debatable provenance. One area exposed in the 1991 trench, close to the trench's southern edge, and measuring approximately 3.50 m east to west by 2.50 m north to south, may represent an occupation surface. Here an irregular patch of stone flagging incorporating two quernstones, and possibly associated with a line of three dressed masonry blocks, was found in a heavily disturbed state. Considerable quantities of Roman material were recovered from this area, but mixed in with modern finds and topsoil; no finds came from securely stratified contexts. It is possible that this relates to a post-Roman site occupation. A similar patch of stone flagging was uncovered at the southern end of the 1993 trench; of similar extent, this too had suffered considerable disturbance and insecurely stratified finds ranged in date from Roman to modern. Evidence for the possibly deliberate

destruction/demolition of the fort was presented by a large pit which was packed with Roman masonry. A few sherds of Roman pottery were recovered from different levels throughout the feature, including one from near the bottom. This, coupled with the lack of any modern material from the pit fill, suggests, though does not prove, that it was dug in antiquity. Several smaller pits, on average between 1.50 m and 2 m in diameter by on average 1 m deep were encountered scattered across the area opened in 1993. Some of these also contained quantities of animal bone. All were discrete features cut into the natural sand and lacked any telling stratigraphic relationships.

Small finds recovery was high, as would be expected on such a site, though at least half of the material came from the surface or topsoil. Preliminary examination of the pottery suggests nothing inconsistent with an Antonine occupation date (Leslie 1993).

1999 excavation (NGR: NT 341 720 centred)

In January 1999 a third season of rescue excavation was undertaken in advance of a further extension (centred NGR: NT 341 720) to the cemetery of St Michael's Church. The work demonstrated the variable survival, within the field, of the structures which comprised the south-western end of the fort. These included internal roads and drains, a small portion of the western gate, basal levels of the fort rampart, stone-built ovens and parts of internal buildings (most probably barrack blocks) of different constructional methods. Evidence exists to demonstrate, beyond doubt, at least two quite distinct constructional phases of the fort, on slightly different internal plans, with further indications which hint at further sub-phases of repair work or modifications (Leslie & Will 1999).

2000-2001 excavation (NGR: NT 341 720 centred)

Between September 2000 and February 2001 a fourth and final season of rescue excavations were undertaken. In previous seasons only small areas were excavated to allow the modern cemetery to expand; in this instance it was decided to undertake full open excavation of the remaining portion of the field. For logistical reasons the site was divided into two areas: the first area was to the north and measured 40 m by 40 m; the second area to the south measured 80 x 25 m. The survival of archaeological remains was greater in the first area which included the largest portion of the interior of the fort and was protected by deep topsoil. In the second area, where the topsoil cover was not so great, the archaeological remains had been quite badly damaged by ploughing. The first area represented the NW corner of the fort and included the ditch, rampart base, intervallum road, and the remains of several buildings and features including stone oven bases and stone-built drains. The second area was largely outside the fort but included part of the intervallum road, rampart base, gateway and ditches. While excavating the gateway a second ditch was discovered that joined to the first ditch with defensive spurs covering the gate and rampart. The western gateway to the fort survived as squared masonry foundations with a stone revetting wall along the front of the rampart.

The buildings in the interior of the fort were represented by post-holes and foundation trenches. Evidence exists for at least two quite distinct constructional phases of the fort, on slightly different internal plans, with further indications which hint at sub-phases of repair work or modifications. The phases were clearly demonstrated by two road surfaces, one on top of the other, but with different widths and alignments. The later road also sealed post-holes and pits relating to buildings from the earlier phase. Several prehistoric features were also investigated, and pottery and flints were recovered (Leslie & Will 2001).

Excavation at Eskgrove 1994 (NGR: NT 348 721)

Excavation in advance of house-building revealed a segmental ditch, 1.2-1.3m wide and 0.5-0.8m deep, on an E-W alignment over a distance of 24m. The ditch and adjacent pits yielded Samian and coarse wares together with some prehistoric and medieval pottery (Keppie 1995, DES 1994).

Resistivity and Magnetic survey 1996

Excavation previously carried out by Richmond (1978), Hanson (1985) and Leslie (unpublished) confirmed the presence of a fort on this site and yielded some details of its position and form. Richmond calculated that the western defences should run obliquely north-east to south-west through the field to the west of the church where Leslie excavated in 1993. It was in this field (NGR: NT 341 720) in 1996 that geophysical survey using seismic, magnetic and electrical techniques was undertaken. The seismic survey produced no archaeologically relevant results. The resistivity and magnetic surveys both showed linear anomalies orientated NE -SW across the field which correspond to the postulated position of the defences (Baker et al 1996).

Inveresk Gate 1996 - 2001

Evaluation 1996 (NGR: NT 346 719)

An evaluation at Inveresk Gate was commissioned to establish the extent of the Roman civilian settlement associated with the Antonine Roman fort to the north-west. Trial trenching outwith the scheduled area demonstrated the absence of Roman settlement on the slopes and floodplain to the south-east of the fort. More limited examination on the plateau, within the scheduled area revealed limited evidence for archaeological features beneath a ubiquitous deposit of medieval to post-medieval garden soil. Some of Thomas' 1976-77 excavation trenches were located and reopened. The identification of an early road as the first phase of activity can be added to Thomas' early ditch and evidence for primary Roman activity on the site (Bishop 1996). At the same time, the excavations showed that Thomas' trenches were incorrectly aligned on the published plan (Bishop 1996).

Excavation 1998 (NGR: NT 346 719)

Subsequent excavation within the scheduled area at Inveresk Gate was undertaken in advance of development. House plots and their service trenches within the scheduled area (but outwith the footprints of existing buildings) were excavated by hand. Where existing buildings were to be demolished, a watching brief was undertaken. Excavation revealed an initial phase of defences which may be associated with the construction of the neighbouring fort, rapidly followed by three successive phases of civil occupation on the site, with very obvious continuity in the plots used by succeeding structures. The site was probably only occupied between c. AD 140-65. Although there was some stone-robbing after the Roman abandonment of the site, there was little subsequent activity, beyond some sporadic medieval pits and post-medieval horticulture, until the grounds were landscaped and Admiral Milne began tree planting which was [until recently] still such a prominent feature of the site (Bishop 1998, 2005).

Archaeological excavation on Houseplot 18 driveway 1999

The excavation of this trench confirmed details that had been noted in the earlier excavations, but also provided some new insights by virtue of its placing and the penetration of a service trench into a key point in the stratigraphical sequence of the site.

In the case of the earliest deposits encountered in this trench, the 2nd phase of *vicus* activity noted in the 1998 excavations, the two post-pit fills revealed fitted into the anticipated layout of the structures to which they belonged (both of which had been partially explored in the 1976/77 and 1998 excavations). Moreover, the absence of a street parallel to the main road found in Trench A in this phase was demonstrated stratigraphically. The deposit of sand above the post-pit fills, yet under the destruction level is puzzling and, for the time being, not easily explained.

The east–west street north of the main road leading from the east gate of the fort was therefore only in existence during the third phase of civil occupation. This has important implications for the development of the civil settlement at Inveresk and may be taken to indicate either growth of the *vicus* over time (hence the need to provide additional streets) or a re-focusing of the layout, perhaps concentrating settlement nearer to the fort. It seems likely that the street truncated the size of the available plots north of the main road since a postpit from the previous phase was found beneath the line of the street (Bishop 1999, 2005).

Houseplot 16 Excavation 1999 (NGR: NT 344 719)
An evaluation and watching brief were required by a variation in Scheduled Monument Consent (ref: AMH/3293/1/1) granted on the re-location of a houseplot and its associated driveway lying within the scheduled area of the Roman military and civil settlement. Plot 16 lay along the western boundary of the CALA Homes Inveresk Gate development. The evaluation was undertaken on the plot while an archaeological watching brief monitored the ground reduction of the driveway and its graded slope. As a consequence of the findings from the evaluation, an excavation of the house footprint was undertaken immediately. Covering an area of approximately 300 m^2 the excavation discovered the terminal of a major Roman military ditch on an approximate east to west alignment, the metalled or cobbled surfaces of former tracks or roadways, pit features and a possible sleeper trench. A smaller ditch feature, provisionally interpreted as a drain and orientated SSW to NNE, lay to the north of the military ditch. The watching brief on the Plot 16 driveway discovered adjacent stone-lined and timber-lined wells of Roman date (Gooder 1999, Bishop 2005).

Well excavation 2000
The timber-lined well discovered by the above watching brief was excavated during January and February 2000. The two wells presumably belonged to the structures on the south side of street excavated within Plot 25 (Bishop 1998) and seem to have been located within the back yards. It was not possible to determine whether these were the wells of two separate properties, or whether the stone well was a replacement for the timber one, both belonging within the same property boundary (these boundaries evidently remaining static over the three phases of civil occupation). The provision of wells is interesting, not least because it implies that the civil settlement did not have access to an aqueduct supply (if indeed there was one). It is more difficult to understand why the wells were sunk on the lip of the scarp, rather than further down the slope, where they would not need to have been so deep.

The stone well appears to have been lined as it was sunk, hence its having a considerably smaller construction cut than its timber predecessor. Its attribution to the third and final civil phase, although lacking explicit evidence, would be in keeping with the findings of the earlier excavations at Inveresk Gate. The portion of the fill removed contained domestic refuse of a similar character to its predecessor and, once again, may be due to deliberate backfilling at the end of its life.

The timber-lined well had been constructed within a square construction pit. At least one, and probably three, timber barrels were then used to line the well, the construction pit presumably being backfilled as each barrel was inserted. It was equally evident that the construction pit, dug through unstable sand and gravel sub-soil strata, and apparently unshored, had collapsed in places, during (and possibly even prior to) the backfilling of the construction pit. The well itself showed an accumulation of organic material at the base and, interestingly, appears to have included the well hook from the lifting mechanism. A deposit that may represent a layer of cess suggests a brief secondary use of the well as a cess pit, before it was finally backfilled, apparently in one operation with fairly homogeneous material which included a variety of domestic refuse (pottery and animal bone being the chief surviving components).

Test-pitting in western part of scheduled area (NGR: NT 3410 7218 to NT 3409 7198)
Prior to site investigation works, nine 1 m^2 test pits were excavated immediately within the western boundary of the Scheduled area of the fort. The surface of the upper fill of the western ditch was located within one test pit, with possibly an analogous deposit representing an additional negative feature identified in an adjacent test pit. Neither of these features was excavated. No significant archaeological features were encountered elsewhere (Gooder 2001).

St Michael's House

St Michael's House Evaluation 1996 (NGR: NT 3430 7197)
An archaeological evaluation was carried out in November 1996 within the ground of St Michael's House in response to a proposal to construct a domestic dwelling across the southern alignment of the rampart and external ditch of the Roman fort. Previous archaeological work had located the ditch some 10-15 m west of the current excavations and had suggested that in the evaluation area all upstanding remains of the Roman occupation had been totally removed and that no ditch existed. Three parallel trenches were opened within and immediately adjacent to the site of the proposed building. No trace of the defences of the Roman fort was identified. The ditch must either fail to survive (unlikely given its scale), follow a different alignment, or never have been excavated in this area. Three features were identified, comprising a modern pit, a tree stump in a pit, and an alignment of stones (Hamilton 1997).

St Michael's Coach House Evaluation 1998 (NGR: NT 3425 7201)
An archaeological evaluation was undertaken in January 1998 in advance of a proposed development. Previous archaeological work suggested that the study area lies inside the Inveresk fort ditch and overlies at least part of the fort rampart and intervallum road (Richmond 1981). Archaeological work carried out in November 1996 within the grounds of St Michael's House failed to find any trace of the fort (Hamilton 1997). The study area was defined by the proposed foundation footprint of a double garage and wall within the garden of St Michael's Coach House. An area of rough, intermittent cobbling and a small area of discontinuous paving were recorded. Immediately overlying the cobbled surface a single sherd of Inveresk Ware was recovered. At the southern limit of the paving a deposit of coarse orange-brown gravels was revealed. A small rim sherd of plain Samian Ware was found in the western garage wall foundation trench. Towards the northern end of the wall foundation trench a test-pit, dug to a depth of 1.3 m, encountered no indication of subsoil possibly indicating a ditched feature here (Hamilton 1998).

Recent Discoveries

Musselburgh Health Centre 2010

Located immediately north of the fort, and following an evaluation by Headland Archaeology, a recent excavation (necessitated by the new Musselburgh Health Centre development) by CFA recorded an important collection of Roman features including burials and surfaces.

Lewisvale Park 2010

An excavation on the site of a new cricket pavilion unearthed a highly significant suite of features including a large pit containing the formal deposition of two Roman sandstone altars and a sandstone altar base. A linear ditch and gully and a collection of pit and post-hole features were also unearthed. Both ceramic and metal artefacts were recovered (Gooder 2010).

APPENDIX 1

Desk-top assessment

The sources consulted as part of the desk-top study will depend on the type and level of data required and the material that is available to provide that information. Sources used may include, where available, all or some of the following listed below:

i) Walkover survey (Appendix 5).
ii) The relevant Local Sites and Monuments Record(s) and the National Monuments Record.
iii) British Geological Survey maps.
iv) Ordnance Survey maps of the site and its locality.
v) Tithe, Apportionment and Parish maps.
vi) Historic (pre-Ordnance Survey) and Estate maps of the area.
vii) Appropriate archaeological and historical journals and books.
viii) Historical documents held in local museums, libraries, record offices and other archives. This may be a selective survey given the scope of potential historic documentation for some sites.
ix) Unpublished material held by local professional and amateur archaeological organisations and museums.
x) Aerial photographs held by local authorities, Sites and Monuments Record, the National Library of Aerial Photographs, Cambridge University Collection of Aerial Photographs and other local parties.
xi) Scheduled Ancient Monuments Lists; listed building lists; registers of parks and gardens and battlefields; any local authority constraint designations (eg conservation Areas).
xii) All available borehole, trial pit and geotechnical data from the site and its immediate environs.
xiii) Plans of services locations held by statutory undertakers.
xiv) Fire insurance maps.
xv) Old and New Statistical Accounts (in Scotland).
xvi) Building Control Records.
xvii) Standing Building Assessment (Appendix 10).

APPENDIX 2

Geophysical survey

2.1 All geophysical survey work will be sub-contracted to an appropriate professional organisation but directly managed by AOC Archaeology.

2.2 Selection of techniques will be made in consultation with the survey organisation taking into account land use, geology, complicating factors (eg metal pipes and fences), known and/or suspected archaeology.

2.3 The report will contain background information on the site (as above) and a description of any anomalies located. An interpretation of the anomalies will also be given.

2.4 At least one plot of the data will be included, normally of dot density or grey scale type. Any enhancement of the image will be explicitly stated and the likely affect of the processing described.

2.5 Clear interpretative plans will be provided in a form that a non-technical reader can understand.

2.6 Plots and interpretative diagrams will be reproduced at a scale from which exact measurements can be taken. These will normally be 1:1000 for detailed survey and 1:2500 for other plans.

2.7 The basic computerised data will form part of the site archive.

APPENDIX 3

Surface collection survey (fieldwalking)

3.1 This type of survey will only be carried out in suitable ground visibility conditions. This effectively restricts the technique to arable land which has been ploughed, harrowed and left to weather for several weeks in autumn to early spring.

3.2 The collection grid will align with the Ordnance Survey grid unless surveying for a linear scheme when the transects will be parallel to the centre of the scheme. The grid will be established using measured survey techniques.

3.3 The spacing of transects and length of collection units will be as specified in the main part of the Written Scheme of Investigation. Each transect will be 2m wide. Collection units will be logged using a numeric 12 figure National Grid Reference which will identify the southern end of the unit.

3.4 Transects will be measured cumulatively on the ground using fixed-length strings to avoid variation in individual pace. Sighting poles will be placed at opposite ends of the land parcel to mark transects.

3.5 All material considered to be man-made or not local to the area will be collected and recorded by the individual collection unit. The exception to this is where dense concentrations of building material are present when a representative sample is retained per collection unit.

3.6 Stone scatters, areas of soil discolouration and outcrops of natural substrata will be recorded and plotted by stint.

3.7 Pro-forma sheets will be used to record details of walker, soil/crop conditions, slope/topography, and lighting/weather conditions for each transect and presence/absence of finds for each collection unit.

3.8 Finds will be washed and sorted into groups in order to facilitate identification. Finds will be bagged according to artefact class within each collection unit.

3.9 Finds will be identified, quantified and recorded directly on to computer. The results will be plotted using a CAD graphics programme.

3.10 All significant artefact distributions will be plotted by field, group of fields or appropriate length for a linear scheme, at 1:2500, with separate plans for each period or relevant subdivision, indicating the numbers of artefacts per stint.

3.11 The pottery and other relevant artefacts will be scanned to assess the date range of the assemblage.

3.12 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum or other body. These will be cleaned, conserved, bagged and boxed in accordance with the guidelines set out in UKIC's "*Conservation Guidelines No 2*".

APPENDIX 4

Earthwork surveys

4.1 Base points will be established using a Total Station.

4.2 Hachured plans will normally be prepared at 1:1250 or 1:2500 for most classes of earthwork. In certain cases more detailed survey by contouring will be carried out.

4.3 Appropriately experienced personnel will undertake the survey work.

4.4 All prepared plans will be presented with an accompanying descriptive text.

APPENDIX 5

Walkover Survey

5.1 The proposed study area will be walked over in a systematic manner. Approximately 30m wide transects will be used, although this can be reduced where conditions demand.

5.2 All features identified (including modern features) will be given a unique number. The location of each feature will be marked on a 1:10,000 map. A photographic and written record will be compiled.

APPENDIX 6
Test pits

6.1 Spacing and size of test pits will vary according to local topography, geology, and known or potential archaeology. Spacing and size will be as specified in the Written Scheme of Investigation.

6.2 Test pits will be laid out in relation to the Ordnance Survey national grid.

6.3 The most appropriate tools will be used taking into account the prevailing conditions at the time of the work.

6.4 A specified volume of topsoil from each test pit will be sieved through a 10mm mesh.

6.5 Conditions, contexts and artefact totals will be recorded on pro-forma sheets.

6.6 Subdivisions within the excavated material will be based on soil stratigraphy and spits of 100mm within each stratigraphical unit.

6.7 All artefact totals will be recorded by class.

6.8 Finds will be washed and sorted into groups in order to facilitate identification. Finds will be bagged according to artefact class within each collection unit.

6.9 Finds will be identified, quantified and recorded directly onto computer where appropriate. The results will be plotted using a CAD graphics programme when appropriate.

6.10 All significant artefact distributions will be plotted by field, group of fields or appropriate length for a linear scheme at 1:2500, with separate plans for each period or relevant subdivision, indicating the numbers of artefacts per test pit.

6.11 The pottery and other relevant artefacts will be scanned to assess the date range of the assemblage.

6.12 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum or other body. These will be cleaned, conserved, bagged and boxed in accordance with the guidelines set out in UKIC's "*Conservation Guidelines No 2*".

APPENDIX 7
Machine excavated trenches

Excavation

7.1 The entire site will be visually inspected before the commencement of any machine excavation. This will include the examination of any available exposures (eg recently cut ditches and geo-technical test pits).

7.2 Normally trench positions will be accurately surveyed prior to excavation and related to the National Grid. It may be necessary to survey the positions after excavation in some instances.

7.3 All machining will be carried out by plant of an appropriate size. Normally, this will be a JCB 3CX (or similar) or 360^{O} tracked excavator with a 1.4 or 1.8m wide toothless bucket. Where access or working space is restricted a mini excavator such as a Kubota KH 90 will be used.

7.4 All machining will be carried out under direct control of an experienced archaeologist.

7.5 Undifferentiated topsoil or overburden of recent origin will be removed in successive level spits (approximately <0.5m) down to the first significant archaeological horizon.

7.6 Excavated material will be examined in order to retrieve artefacts to assist in the analysis of the spatial distribution of artefacts.

7.7 On completion of machine excavation, all faces of the trench that require examination or recording will be cleaned using appropriate hand tools.

7.8 All investigation of archaeological horizons will be by hand, with cleaning, inspection, and recording both in plan and section.

7.9 Within each significant archaeological horizon a minimum number of features required to meet the aims of the project will be hand excavated. Pits and postholes normally will be sampled by half-sectioning although some features may require complete excavation. Linear features will be sectioned as appropriate. Features not suited to excavation within the confines of narrow trenches will not be sampled. No deposits will be entirely removed unless this is unavoidable. As the objective is to define remains it will not necessarily be the intention to fully excavated all trenches to natural stratigraphy. However, the full depth of archaeological deposits across the entire site will be assessed. Even in the case where no remains have been located the stratigraphy of all evaluation trenches will be recorded.

7.10 Any excavation, whether by machine or by hand, will be undertaken with a view to avoiding damage to any archaeological features or deposits which appear to be demonstrably worthy of preservation *in situ*.

7.11 For palaeoenvironmental research different sampling strategies will be employed according to established research targets and the perceived importance of the strata under investigation. AOC Archaeology conventionally recovers three main categories of sample;

i) Routine Soil Samples; a representative 500g sample from every excavated soil context on site. This sample is used in the characterisation of the sediment, potentially through pollen analysis, particle size analysis, pH analysis, phosphate analysis and loss-on-ignition;

ii) Standard Bulk Samples; a representative 10 litre sample from every excavated soil context on site. This sample is used, through floatation sieving, to recover a sub-sample of charred macroplant material, faunal remains and artefacts;

iii) Purposive or Special Samples; a sample from a sediment which is determined, in field, to either have the potential for dating (wood charcoal for radiocarbon dating or *in situ* hearths for magnetic susceptibility dating) or for the recovery of enhanced palaeoenvironmental information (waterlogged sediments, peat columns, etc).

7.12 Any finds of human remains will be left *in situ*, covered and protected. In Scotland the local police will be informed. If removal is essential this will only take place with police approval, and in compliance with Historic Scotland's Operational Policy Paper '*The Treatment of Human Remains in Archaeology*'. In England and Wales the coroner's office will be informed. If removal is essential it will only take place under the relevant Home Office licence and local authority environmental health regulations.

7.13 All finds of gold and silver will be moved to a safe place. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage. In Scotland the recovery of such material, along with all other finds, will be reported to the Queen's and Lord Treasurer's Remembrancer. In England and Wales the recovery of such material will be reported to the coroner's office according to the procedures relating to Treasure Trove.

7.14 After recording, the trenches will be backfilled with excavated material.

Recording

7.15 For each trench, a block of numbers in a continuous sequence will be allocated.

7.16 Written descriptions, comprising both factual data and interpretative elements, will be recorded on standardised sheets.

7.17 Where stratified deposits are encountered a 'Harris'-type matrix will be compiled during the course of the excavation.

7.18 The site grid will be accurately tied into the National Grid and located on the 1:2500 or 1:1250 map of the area.

7.19 Plans will normally be drawn at a scale of 1:100, but on urban or deeply stratified sites a scale of 1:50 or 1:20 will be used. Burials will be drawn at 1:10. Other detailed plans will be drawn at an appropriate scale.

7.20 Long sections of trenches showing layers and any cut features will be drawn at 1:50. Sections of features or short lengths of trenches will be drawn at 1:20.

7.21 Generally all sections will be accurately related to Ordnance Datum. There may, occasionally, be instances where this is unnecessary when it will be agreed with the local authority's archaeological representative in advance.

7.22 Registers of sections and plans will be kept.

7.23 A full colour print and colour transparency photographic record will be maintained. This will illustrate the principal features and finds both in detail and in a general context. The photographic record will also include working shots to represent more generally the nature of the fieldwork.

7.24 A register of all photographs taken will be kept on standardised forms.

7.25 All recording will be in accordance with the standards and requirements of the *Archaeological Field Manual* (Museum of London Archaeology Service 3rd edition 1994).

Finds

7.26 All identified finds and artefacts will be collected and retained. Certain classes of material, ie post-medieval pottery and building material, may on occasion be discarded after recording if a representative sample is kept. No finds will be discarded without the prior approval of the archaeological representative of the local authority and the receiving museum.

7.27 Finds will be scanned to assess the date range of the assemblage with particular reference to pottery. In addition the artefacts will be used to characterise the site, and to establish the potential for all categories of finds should further archaeological work be necessary.

7.28 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum. Finds will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in United Kingdom Institute for Conservation's *Conservation Guidelines No. 2*.

7.29 In England and Wales, at the beginning of the project (prior to commencement of fieldwork) the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive and finds. In Scotland all archaeological material recovered belongs to the Crown and its disposal is administered by the Queen's and Lord Treasurer's Remembrancer.

APPENDIX 8
Evaluation reports

8.1 The style and format of the evaluation report will be determined by AOC Archaeology, but will be compliant with Historic Scotland's issued guidance on Data Structure Reports. The report will include as a minimum the following;

i) A location plan of the site.
ii) A location plan of the trenches and/or other type of fieldwork strategy employed.
iii) Plans and sections of features and/or extent of archaeology located. These will be at an appropriate scale.
iv) A summary statement of the results.
v) A table summarising per trench the deposits, features, classes and numbers of artefacts encountered and spot dating of significant finds.
vi) Consideration to the methodology will be given along with a confidence rating for the results.

8.2 When an evaluation is followed by an excavation the procedures defined in English Heritage's *Management of Archaeological Projects* 2nd edition 1991 will be followed for immediate post-field archive preparation and initial assessment. It will then be agreed with the local authority's archaeological advisor which aspects will need to be taken forward to the report stage.

APPENDIX 9

Area excavation

9.1 Prior to the stripping of any area excavation, all appropriate surveys (eg geophysical, earthwork, contour) or sampling strategies (eg for topsoil artefact densities, metal detecting, phosphate analysis) will be undertaken.

9.2 In most cases sites will be mechanically stripped of topsoil and other overburden. An appropriate machine will always be used. This will normally be a 360° tracked excavator with a between 1.4 and 2.4m wide toothless bucket. In other cases a JCB 3CX (or similar), or for work with restricted access or working room a mini-excavator such as a Kubota KH 90 will be used. Suitably sized dumpers or lorries will be employed to remove spoil. No plant will be allowed to cross stripped areas.

9.3 All machining will be undertaken under the direct control of experienced archaeologists.

9.4 All undifferentiated topsoil or overburden will be removed down to the first significant archaeological horizon in level spits. The archaeological horizon to which the material will be cleared will have first been established by an evaluation or by the digging of test pits.

9.5 Depending on the aims of the project, the excavated spoil may be monitored in order to recover artefacts. Where their findspots are plotted this will usually be on a 2m grid.

9.6 The surface exposed by the stripping will be cleaned using appropriate hand tools.

9.7 Should the site grid not have already been established it will be done at the cleaning stage. The grid will normally be based on a 10m spacing and related to the National Grid. A temporary bench mark related to Ordnance Datum will be founded

9.8 After the cleaning and planning of the excavation area the sampling strategy will be finalised. This will take into account the project aims (which may need modifying at this stage) and the type, quality and quantity of remains revealed. The sampling strategy will normally seek to maintain at least the following levels;

i) all structures and all zones of specialised activity (eg funerary, ceremonial, industrial, agricultural processing) will be fully excavated and all relationships recorded;

ii) ditches and gullies will have all relationships defined, investigated and recorded. All terminals will be excavated. Sufficient lengths of the feature will be excavated to determine the character of the feature over its entire course; the possibility of re-cuts of parts of the feature, and not the whole, will be considered. This will be achieved by a minimum 10% sample of each feature (usually a 1m section every 10m).

iii) Sufficient artefact assemblages will be recovered (where possible) to assist in dating the stratigraphic sequence and for obtaining ample ceramic groups for comparison with other sites;

iv) all pits, as a minimum, will be half-sectioned. Usually at least 50% (by number) of the pits will be fully excavated. Decisions as to which pits will be fully excavated will be taken in the light of information gained in the half-sectioning taking into consideration, amongst other things; pit function, artefact content and location;

v) for post and stake holes where they are clearly not forming part of a structure (see above) 100% (by number) will be half-sectioned ensuring that all relationships are investigated. Where deemed necessary, by artefact content, a number may demand full excavation;

vi) for other types of feature such as working hollows, quarry pits, etc the basic requirement will be that all relationships are ascertained. Further investigation will be a matter of on-site judgement, but will seek to establish as a minimum their extent, date and function;

vii) for layers, an on-site decision will be made as to the limits of their excavation. The factors governing the judgement will include the possibility that they mask earlier remains, the need to understand function and depositional processes, and the necessity to recover sufficient artefacts to date the deposit and to meet the project aims.

9.9.1 For palaeoenvironmental research different sampling strategies will be employed according to established research targets and the perceived importance of the strata under investigation. AOC Archaeology conventionally recovers three main categories of sample;

i) Routine Soil Samples; a representative 500g sample from every excavated soil context on site. This sample is used in the characterisation of the sediment, potentially through pollen analysis, particle size analysis, pH analysis, phosphate analysis and loss-on-ignition;

ii) Standard Bulk Samples; a representative 10 litre sample from every excavated soil context on site. This sample is used, through floatation sieving, to recover a sub-sample of charred macroplant material, faunal remains and artefacts;

iii) Purposive or Special Samples; a sample from a sediment which is determined, in field, to either have the potential for dating (wood charcoal for radiocarbon dating or *in situ* hearths for magnetic susceptibility dating) or for the recovery of enhanced palaeoenvironmental information (waterlogged sediments, peat columns, etc).

9.10 Any finds of human remains will be left *in situ*, covered and protected. In Scotland the local police will be informed. If removal is essential this will only take place with police approval, and in compliance with Historic Scotland's Operational Policy Paper '*The Treatment of Human Remains in Archaeology*'. In England and Wales the coroner's office will be informed. If removal is essential it will only take place under the relevant Home Office licence and local authority environmental health regulations.

9.11 All finds of gold and silver will be moved to a safe place. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage. In Scotland the recovery of such material, along with all other finds, will be reported to the Queen's and Lord Treasurer's Remembrancer. In England and Wales the recovery of such material will be reported to the coroner's office according to the procedures relating to Treasure Trove.

Recording

9.12 All on-site recording will be undertaken in accordance with the standards and requirements of the *Archaeological Site Manual* (Museum of London 1994).

9.13 A continuous unique numbering system will be employed.

9.14 Written descriptions, comprising both factual data and interpretative elements, will be recorded on standardised sheets.

9.15 Where stratified deposits are encountered a 'Harris'-type matrix will be compiled during the course of the excavation.

9.16 The site grid will be accurately tied into the National Grid and located on the 1:2500 or 1:1250 map of the area.

9.17 Plans will normally be drawn at a scale of 1:100, but on urban or deeply stratified sites a scale of 1:50 or 1:20 will be used. Burials will be drawn at 1:10. Other detailed plans will be drawn at an appropriate scale.

9.18 Long sections of trench edges or internal baulks showing layers and any cut features will be drawn at 1:50 or 1:20 depending on amount of detail contained. Sections of features will be drawn at 1:20.

9.19 All sections will be accurately related to Ordnance Datum.

9.20 Registers of sections and plans will be kept.

9.21 A full colour print and colour transparency photographic record will be maintained. This will illustrate the principal features and finds both in detail and in a general context. The photographic record will also include working shots to represent more generally the nature of the fieldwork.

9.22 A register of all photographs taken will be kept on standardised forms.

Finds

9.23 All identified finds and artefacts will be collected and retained. Certain classes of material, ie post-medieval pottery and building material may on occasion be discarded after recording if a representative

sample is kept. No finds will be discarded without the prior approval of the archaeological representative of the local authority and the receiving museum.

9.24 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum. Finds will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in United Kingdom Institute for Conservation's *Conservation Guidelines No. 2*.

9.25 In England and Wales, at the beginning of the project (prior to commencement of fieldwork) the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive and finds. In Scotland all archaeological material recovered belongs to the Crown and its disposal is administered by the Queen's and Lord Treasurer's Remembrancer.

Archiving, post-excavation and publication

9.26 Following completion of each stage or the full extent of the fieldwork (as appropriate) the site archive will be prepared in the format agreed with the receiving institution.

9.27 On completion of the archive a summary report will be prepared. This will include;

i) an illustrated summary of the results to-date indicating to what extent the project aims were fulfilled;

ii) a summary of the quantities and potential for analysis of the information recovered for each category of site, artefact, dating and palaeoenvironmental data;

iv) proposals for analysis and publication.

9.28 The proposals for analysis and publication will include;

i) a list of the revised project aims arising from the fieldwork and post-excavation assessment;

ii) a method statement which will make clear how the methods advocated are those best suited to ensuring that the data-collection will fulfil the stated aims of the project;

iii) a list of all tasks involved in meeting the stated methods to achieve the aims and produce a report and research archive in the stated format;

iv) details of the research team and their projected work programmes in relation to the tasks. Allowance will be made for general project-related tasks such as project meetings, management, editorial and revision time;

v) a publication synopsis indicating publisher, report format and content shown by chapters, section and subheadings with the anticipated length of text sections and proposed number of illustrations.

9.29 The summary report embracing the analysis and publication proposals will be submitted to the client and the local authority's archaeological representative for approval.

9.30 Any significant variation in the project design, including timetables, proposed after the agreement of the proposals must be acceptable to the local authority's archaeological representative.

9.31 The results of the project will be published in an appropriate archaeological journal or monograph. The suitable level of publication will be dependent on the significance of the project results, but as a minimum the basic requirements of Appendix 7.1 of *Management of Archaeological Projects* (English Heritage 1991) will be met.

APPENDIX 10

Standing Building Assessment

10.1 A standing building assessment will normally take place in concordance with a Conservation Plan, but may also form part of a Desk-Based Assessment if required.

10.2 A visual inspection will be made of both the interior and exterior of the building(s) with a view to establishing the extent of the architecturally important elements that should be included in a later phase of historic building recording work.

10.3 A brief written record will be made in addition to digital photography of areas of interest to support recommendations and outline architectural features within the building(s).

APPENDIX 11

Historic Building Recording: The Written Record (Levels 0-6)

11.1 Pro forma building recording sheets will be used for the basic written record of the building(s) including comments on the condition, construction techniques, materials, fixtures and fittings and interpretation of function. A competent analysis will be made of all building phases and any relationship between buildings. Day Book records will also be kept for any levels of recording above Level 1.

11.2 At Level 4, the written record will encompass a thorough context description of each broad phase of construction and alteration with a view to formulating a stratigraphic matrix of the site.

APPENDIX 12

Historic Building Recording: Photography (Levels 1-5)

12.1 Photography will take place at all levels of building recording, and will be undertaken with a single lens reflex camera with through-the-lens (TTL) light metering. A standard 28-90mm lens will be used at all times except where wider or shorter angle lenses are required for longer elevation photography and detailed photography.

12.2 The camera will be placed at mid-height to the subject with due care and attention to lighting situations. Two shots will be taken of each feature, undertaken by a light-meter reading of a two-step change in aperture. This change up or down will depend on light conditions.

12.3 Interior photography will be undertaken with appropriate lighting conditions and the use of a tripod. Where light access is still quite minimal, an automatic flash will be used.

12.4 All photography will be taken on colour slide and black & white negative film, such as Kodak PLUS-X or Ilford FP4, or approved equivalent. It should be exposed and processed to an archival standard, i.e., fix and wash in accordance with the manufacturers specifications.

12.5 The use of a digital camera may be used as a reference to survey and drawn elevations and ground plans on-site.

APPENDIX 13

Historic Building Recording: Rectified Photography and Photogrammetry (Level 3)

13.1 An external contractor will carry out rectified photography and photogrammetry in compliance with the following guidelines:

i) All photography will be carried out with an approved type of camera. Details of the camera used may be supplied on completion of the project.

ii) The smallest permissible photographic negative scale will normally be defined as follows: for 1:50 scale plotting, negative scale should be no more than 1:200 and for 1:20 scale plotting, negative scale should be no more than 1:200.

iii) All rectified photography will be taken on black & white negative film, such as Kodak PLUS-X or Ilford FP4, or approved equivalent. It should be exposed and processed to an archival standard, i.e., fix and wash in accordance with the manufacturers specifications.

APPENDIX 14

Historic Building Recording: Elevation Recording (Level 2)

14.1 All elevations drawn or surveyed will be a 'preservation by record' of the current state of the building. The following categories will be recorded:

i) All architectural features with associated decorative detail including windows, doors, quoin stones, string courses, roof lines and other structural stonework and jointing.
ii) Fixtures and fittings such as drainpipes and guttering, signs, brackets and vents.
iii) Later modifications and/or damage to the building such as structural cracks, areas of erosion, patches of rendering, blocked doorways, windows and other openings.

14.2 Large or small repetitive features such as windows, capitals, mouldings, etc. sampling will be undertaken as appropriate.

14.3 Where the façade is of stone construction each individual stone may be recorded. However, in most instances, a representative area, usually 1m², will be sufficient, although windows, corner stones and other architectural details will always be fully recorded. The degree of recording for ashlar will be depend upon the scale with which the elevation is to be produced and will be determined in advance of the start of works. When drawings are carried out at 1:50, a single line between the joints of the stone will normally be considered satisfactory. However, if there is a considerable gap between the stones, both sides of the stone will be shown. At a scale of 1:20 or larger, then all joints will normally be shown except where the stone is very fine ashlar.

14.4 Elevation recording by hand will normally take place if it is inappropriate to do so by survey. The size and complexity of an elevation will determine what on-site scale will be required. In general, a scale of 1:50 will be deemed appropriate with a larger scale adopted if portions of this elevation are more complex. For highly detailed architectural detail a scale of 1:1 may be appropriate.

14.5 All hand-drawn measured elevations and detail will be drawn using water-resistant paper with a hard 4H – 6H pencil. A levelled datum line will be taken through the centre of the elevation with offset measurements. All datum points will be accurately positioned within the site either by hand or by survey.

APPENDIX 15

Historic Building Recording: Elevation Recording – By Survey (Levels 2-4)

15.1 Where appropriate, elevations may be recorded by radiation survey using a reflectorless EDM (REDM) Leica TCR 705. This method of survey allows the accurate capture of data of upper floor levels. If more than one elevation is to be recorded, then a traverse will be created around each building or group of buildings. Extra stations may be set up in places where there is limited access. Values in the traverse will be adjusted by Bowditch adjustment to compensate for any errors in measurement. The adjusted values will then be calculated using LisCAD Plus v5.0 (Surveying and Engineering Module). Co-ordinates will be located by resection from existing traverse points. The survey data will be downloaded to a laptop computer on-site via Leica Office software. All measurements taken by survey will consist of three-dimensional co-ordinates relating to the Ordnance Survey National Grid.

15.2 The recording of an elevation will not be carried out by survey equipment if:
i) There are too many obstructions;
ii) The surface of the building is too dark or mossy;
iii) There is too much curved architectural detail;
iv) The distance required to set up the survey equipment in front of the elevation is too large (i.e., more than 25m) or too short to capture data from the upper levels of the elevation.

15.3 Where appropriate, elevations carried out by survey will be supplemented by detail measured by hand.

APPENDIX 16

Historic Building Recording: Interior Recording (Levels 2-4)

16.1 The recording of the interior(s) of the building(s) will consist of a written record and, where appropriate, measured sketch plans of the ground plan and the roof elevations based on the following guidelines:

i) Critical analysis of the interior condition, construction, materials, fixtures and fittings will be made using *pro forma* recording sheets.

ii) Measured interior ground plans of each room of the interior will be carried out using tapes and a Leica Disto™ Classic electronic distance measurer.

iii) All measured plans will contain: notes on the size of structural members, and finishes; floor levels, change in levels, and ceiling heights; direction of stair rises in plan with each riser numbered; the positions of service entry points, plant and machinery and sanitary fittings; below-ground drainage; soil and vent stacks and rainwater pipes where appropriate.

APPENDIX 17

Historic Building Recording: Standard Report Illustrations (Level 6)

17.1 All final illustrations for archive will be produced digitally on the Computer-Aided Drawing package, AutoCAD 2000i/2000LT and/or Adobe Illustrator v9/v10. A standard methodology will be used with all drawings adhering to the following guidelines:

17.2 Line Weight. The appropriate line weight will depend on anticipated plot scale and may need editing if the output scale is to change. The degree of detail used will affect the line weight utilised in the finished drawing. All fine architectural detail (stonework, moulded stonework, brickwork, etc.) will be produced at a line weight of 0.05mm. More general architectural features (outlines of doors and windows, etc.) will be produced at a line weight of 0.09mm. A much heavier line will indicate the changing of plane in complex elevations.

17.3 Text. Text will be made clear and informative, with orientation, position, size and letter spacing remaining appropriate to the layout of the plotted sheets.

17.4 Scale. No archaeological or historic building survey will be carried out without a particular scale or range of scales in mind.

17.5 Layers. The layering system in Computer Aided Drawing packages allow the separation of data into specified criteria. To achieve this, there is an AOC standard layering system. This system is largely based on the coding system inherent in the use of the reflectorless EDM Leica TCR705.

17.6 Digital Archiving. All drawings are produced at a 1:1 scale for easy scaling in .dxf or .dwg format. At the end of a project, all data is stored on CD-ROM.

APPENDIX 18

Historic Building Recording: Dendrochronological Analysis (Level 3)

18.1 Dendrochronological analysis of timbers from standing building is primarily undertaken to provide accurate dates for its construction. Where appropriate, samples may be taken for analysis to provide information on the source and quality of the timber, thus informing on the social and economic context of the building.

18.2 Samples for analysis will take place under the following conditions:

i) That the timber sample taken is from a species where date chronologies already exist, namely oak and pine.

ii) A minimum of eight timbers per phase or building are required to cross-match results.

iii) The ring patterns inherent in a timber sample must be over a certain length, usually seventy rings.

18.3 The method of the removal of samples of timber will be to use a corer attached to a power-driven drill, removing a core leaving a hole in the timber 10mm in diameter. The core will be taken so that a maximum radius from pith to bark is taken, thus ensuring the maximum numbers of growth rings for analysis. Timbers will be selected which have retained a full ring sequence as possible (i.e., those where the outermost rings have not been trimmed off or destroyed by woodworm).

18.4 Where it is impossible to use this intrusive method of sample, for example, in the case of painted ceilings and carved panels, the ring sequence can be measured *in situ* using a hand lens. Silicone rubber casts can also be taken where the end grain is exposed.

APPENDIX 19
Historic Building Recording: Paint and Wallpaper Analysis (Level 3)

19.1 Paint and/or wallpaper analysis will usually only take place where layers that have been applied over the years have not been removed. Where appropriate, paint analysis can take place by methods of scraped samples or thin section analysis. Cross-sections may also be obtained from samples of paint to reveal a stratigraphy of paint layers.

APPENDIX 20
Historic Building Recording: Reporting (Levels 0-6)

20.1 The style and format of the final report on historic building recording works will be determined by AOC Archaeology, but will be compliant with Historic Scotland's issued guidance on Data Structure Reports. The content of this report will depend greatly in the level of works that have taken place but at minimum will include:

i) A location plan of the site showing the areas under investigation numbered and cross-referenced in the text;
ii) A summary statement of the results;
iii) An introduction, methodology and results of the works;
iv) Photographic plates to illustrate the text.

20.2 Where a programme of historic building recording has taken place at Level 2 or above, the Data Structure Report will contain a number of illustrations, the format of which is outlined in more detail in Appendix 17.

APPENDIX 21
Watching Briefs

21.1 Where the archaeologist (Watching Brief Officer) has no remit over the working methodology of the site (specification of machine or depth of excavation). The Watching Brief Officer will simply observe the works and record their nature and form. Where the Watching Brief Officer specifies the site methodology, ie type of machine and depth of excavation. AOC Archaeology's preferred approach is to consider the Watching Brief Area as a large evaluation trench and follows in general, Appendix 7.

21.1 It is important to stress that the client determines the area affected and unless instructed by a curator the Watching Brief Officer has no power to extend the area unless it is to fully excavate a human body that otherwise would have been truncated by the works.

21.2 In addition to the general principles outlines in Appendix 7 the following approaches will be undertaken:

i) a record will be made of all site attendances;
in general a written and photographic record will be kept of the excavated sediments;
ii) where archaeological features are identified and they can be dealt with in less than two hours this work will be undertaken by the Watching Brief Officer. Recording and excavation protocols will follow Appendices 7.9 –7.11;
iii) where archaeological remains requiring more than two hours of excavation and recording, the Watching Brief Officer will stop the works and both the curator and the client will be contacted to

devise a mitigation strategy. All delays will be kept to a minimum. Any resultant excavation and recording work will be in keeping with the methods outlined in Appendix 9;

iv) the extent of the watching brief area will not be recorded unless specifically required by either the client or the curator. Where such recording is required the area will be accurately recorded by total station and linked into the Ordnance Datum;

v) Reporting of Watching Briefs will follow methods specified in Appendix 8.

APPENDIX 22

General

22.1 The requirements of the Brief will be met in full where reasonably practicable .

22.2 Any significant variations to the proposed methodology will be discussed and agreed with the local authority's archaeological representative in advance of implementation.

22.3 The scope of fieldwork detailed in the main part of the Written Scheme of Investigation is aimed at meeting the aims of the project in a cost-effective manner. AOC Archaeology Group attempts to foresee all possible site-specific problems and make allowances for these. However there may on occasions be unusual circumstances which have not been included in the programme and costing. These can include;

i) unavoidable delays due to extreme weather, vandalism, etc;

ii) trenches requiring shoring or stepping, ground contamination, unknown services, poor ground conditions;

iii) extensions to specified trenches or feature excavation sample sizes requested by the local authority's archaeological advisor;

iv) complex structures or objects, including those in waterlogged conditions, requiring specialist removal.

Health and Safety

22.4 All relevant health and safety legislation, regulations and codes of practice will be respected.

22.5 With the introduction of the Construction, Design and Management Regulations 1994, AOC Archaeology works with Clients, Main Contractors, and Planning Supervisors to create a Health and Safety Plan. Where CDM regulations apply, each project will have its own unique plan.

Insurances

22.6 AOC Archaeology holds Employers Liability Insurance, Public Liability Insurance and Professional Indemnity Insurance. Details can be supplied on request.

22.7 AOC Archaeology will not be liable to indemnify the client against any compensation or damages for or with respect to;

i) damage to crops being on the Area or Areas of Work (save in so far as possession has not been given to the Archaeological Contractor);

ii) the use or occupation of land (which has been provided by the Client) by the Project or for the purposes of completing the Project (including consequent loss of crops) or interference whether temporary or permanent with any right of way light air or other easement or quasi easement which are the unavoidable result of the Project in accordance with the Agreement;

*iii)*any other damage which is the unavoidable result of the Project in accordance with the Agreement;

iv) injuries or damage to persons or property resulting from any act or neglect or breach of statutory duty done or committed by the client or his agents servants or their contractors (not being employed by AOC Archaeology) or for or in respect of any claims demands proceedings damages costs charges and expenses in respect thereof or in relation thereto.

22.8 Where excavation has taken place evaluation trenches will be backfilled with excavated material but will otherwise not be reinstated unless other arrangements have previously been agreed. Open area excavations normally will not be backfilled but left in a secure manner unless otherwise agreed.

Copyright and confidentiality

22.9 AOC Archaeology will retain full copyright of any commissioned reports, tender documents or other project documents under the Copyright, Designs and Patents Act 1988 with all rights reserved; excepting that it will provide an exclusive licence to the Client in all matters directly relating to the project as described in the Written Scheme of Investigation.

22.10 AOC Archaeology will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988.

22.11 AOC Archaeology will advise the Client of any such materials supplied in the course of projects which are not AOC Archaeology's copyright.

22.12 AOC Archaeology undertake to respect all requirements for confidentiality about the Client's proposals provided that these are clearly stated. In addition AOC Archaeology further undertakes to keep confidential any conclusions about the likely implications of such proposals for the historic environment. It is expected that Clients respect AOC Archaeology's and the Institute of Field Archaeologists' general ethical obligations not to suppress significant archaeological data for an unreasonable period.

Standards

22.13 AOC Archaeology conforms to the standards of professional conduct outlined in the Institute of Field Archaeologists' Code of Conduct, the IFA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology, the IFA Standards and Guidance for Desk Based Assessments, Field Evaluations etc., and the British Archaeologists and Developers Liaison Group Code of Practice.

22.14 Project Directors normally will be recognised in an appropriate Area of Competence by the Institute of Field Archaeologists.

22.15 Where practicable AOC Archaeology will liaise with local archaeological bodies (both professional and amateur) in order that information about particular sites is disseminated both ways (subject to client confidentiality).

APPENDIX 23
Specialist staff

The following specialist staff may be used on this project depending on the type of artefacts and soil samples recovered during the course of the fieldwork.

AOC Archaeology Staff:

Ms Lynne Roy	Soils and sediments analysis
Dr. Anne Crone	Dendrochronology, charcoal and timber analysis
Dr. Ciara Clarke	Pollen analysis
Mr. Rob Engl	Lithics & coarse stone
Ms. Melissa Melikian	Human bone
Ms Alys Vaughan-Williams	Macroplant specialist
Mr Jacqueline Roberts	Soil analysis, mammal bone
Mr Alan Duffy	Charcoal identification

Ms Pieta Greaves	Artefact conservation

Sub-contractors

Mr. Bob Clark	Industrial archaeology & coal-mining
Ms Marta McGlynn	Historic designed landscapes
Dr. Ruby Ceron-Carasco	Marine shell and fish bone
Dr. Ann MacSween	Prehistoric pottery
Ms. Naomi Crowley	Building material, medieval and post-medieval pottery
Ms.Amanda Clydesdale	Plaster, paint and wallpaper analysis
Dr. Lindsey Thompson	Stone condition survey

APPENDIX 24
Post-excavation

24.1 *Sample Flotation*

Sample flotation is a water recovery technique designed to separate organic remains from the soil matrix. A Siraf style system of flotation and wet-sieving will be operated by the archaeological contractor. This system comprises an enclosed area of water into which the soil samples are deposited and agitated. Due to the difference in densities of organic and inorganic remains the light fractions will float, the heavy fractions will sink and the silt fraction will be washed away. The resulting floating material (flot) is collected in sieves of 0.3 mm and 1 mm, the non-floating residue (retent) is wet-sieved through a 1 mm mesh.

All flots and retents are air dried, bagged and labelled accordingly. Throughout this process all equipment is kept clean to prevent contamination of the samples. For each sample, a Sieving Assessment sheet is completed. This gives basic information about the sample, retent and flot. Prior to flotation and wet-sieving, the volume of each sample is measured by means of a graduated bucket.
If in a sample a high concentration of clay can be observed and therefore separation of the different fractions of the soil is difficult, an aqueous solution of defloculant 'Calgon' is added and the sample is left to soak overnight, before processing by flotation and wet-sieving.
Sample flotation will be carried out on site and/or at the premises of the archaeological contractor.

24.2 *Sample Wet sieving*

Sample wet sieving, also a water recovery technique, is carried out in laboratory conditions and is designed to recover waterlogged material. For the recovery of waterlogged botanical material, small soil samples (0.5 to 1.0 litre) are processed through a 0.3 mm sieve. The sediment is placed in a bucket with water and agitated before being washed through the 0.3 mm sieve. This process is repeated until the sample is totally disaggregated. The resulting material is stored in water or ethanol depending on the length of the storage period. Sample wet sieving can also be used to recover larger waterlogged material such as leather and wood in which case larger volumes of soil are processed.

24.3 *Sample Dry sieving*

Sample dry sieving is carried out to retrieve smaller artefacts that might be missed during normal excavation procedure, eg. small sherds of pottery and bone . Done in laboratory conditions, all samples are air dried in the first instance. Done in the field, the samples are processed with the sample in a field-moist state. In both cases the sample is passed through a 4 mm mesh and any items of interest are recovered and recorded.

24.4 *Residue sorting*

All residue (retent) sorting is carried out in laboratory conditions, and is designed to recover not only material that might be missed during normal excavation procedure (see dry sample sieving), but also material that would be impossible to recover during normal excavation procedure eg. charred and uncharred plant remains, insect remains and small fragments of charcoal.

The volume of the residue is recorded and then passed through a set of sieves (mesh sizes 8 mm, 4 mm, 2 mm and 1 mm). Each fraction is spread out onto a separate tray, is scanned with the naked eye and all items of interest are recovered. Under normal circumstances all identifiable material from all fractions is recovered. The only exception to this is burnt wood (charcoal) which is only retrieved from the > 4 mm fractions. All material recovered is bagged individually by material type and the material types and weights recorded on the Retent Sorting Sheet. Also recorded on this sheet are the project number, context number, area, sample number, the sorters initials, date, sample volume, retent volume and percent of the retent sorted. Under normal circumstances 100 % of all fractions are sorted. In those instances where this is not the case, this will be recorded. Where no material is recovered from a retent, the Retent Sorting Sheet will be filled out as usual, with the word sterile written across it.

24.5 *Flot sorting*

All flot sorting is carried out in laboratory conditions. The volume of each flot is measured. The flots are sorted by means of a low powered binocular microscope. The macro plant remains and other archaeological or ecological material are extracted from the flots and put into gelatine capsules or glass tubes. An estimate of the number of items recovered and the species represented are recorded. The charcoal larger than 4mm is extracted from the flots and weighed. All extracted items are bagged and labelled accordingly.

24.6 *Routine Soils Analysis*

All the samples taken on-site will have a routine partner. Four standard routine soil tests will be carried out by the archaeological contractor. These are pH analysis, Loss on Ignition, Calcium Carbonate content and Easily available phosphate content.

The pH value is the measure of the acidity (H+) or alkalinity (OH+) of the sample. Dissolving a portion of the soil in distilled water, then measuring the sample using pH meter carries this out. This is to allow us to estimate the potential for preservation within the sediment.

Loss on Ignition is the measure organic content of the sample. This is measured by burning a small amount of the sediment in a furnace at 400^0C for four hours. By measuring the weight before and after burning the organic content can be calculated. The organic content allows us to examine whether manuring or treatment of the natural soil has taken place.

Calcium Carbonate content can be measured by dissolving a few grains of the sample using Hydrochloric acid. If calcium carbonate is present then a small amount of Carbon Dioxide is given off, the greater the amount of CO_2 released the greater the amount of $CaCO_2$. The Calcium Carbonate content shows us if there is any natural calcium carbonate within the sediment, or if not, any mortar or shell has been included artificially.

The amount of phosphate within a sample is examined at the same time as $CaCO_2$. After the CO_2 has been released Ascorbic acid is applied, if Phosphate is present a colour change will occur. The phosphate content may show the presence of animals or to a lesser degree indicate where animals were kept.

24.7 *Soil Micromorphological Analysis*

Micromorphology is the study of undisturbed soils and loose sediments and other materials at a microscopic scale. A 25-30 micron thick slice of soil or sediment is mounted on glass and studied using a petrographic microscope. The samples are prepared for thin section analyses at the Department of

Environmental Science, University of Stirling using the methods outlined by Murphy (1986). The samples are analysed using the descriptive terminology of Bullock *et al* (1985) and FitzPatrick (1993).

Bullock, P., Fedoroff , N., Jongerius, A., Stoops, G., Tursina, T. & Babel, U.1985 *Handbook for soil thin section description*. Wolverhampton: Waine research Publications.

FitzPatrick, E.A.1993. *Soil microscopy and micromorphology.* Chichester: John Wiley & Sons.

Murphy, C. P. 1986. *Thin section preparation of soils and sediments*. Berkhamsted: AB Academic Press.

24.8 *Charcoal ID*

Only charcoal retrieved from the 4mm sieve (see Sieving and Sorting procedures) is used for species identification, mainly because fragments below that threshold are too small to identify. If there is no charcoal larger than 4mm present then attempts will be made to identify the largest fragments present for the purpose of C14 samples.

Surfaces are prepared for identification by using a surgical blade to prise off flakes of charcoal revealing fresh surfaces on which diagnostic features can be identified. The charcoal fragment is bedded in sand for examination under a reflected-light microscope.

On average, up to 10 fragments of charcoal are identified per bulk sample. If a single species is present then identification can stop at 5 fragments. However, if a great variety of species is present, ie more than four, then identification should continue until the analyst is happy that a representative sample has been examined. Unusual or exotic species should be bagged and labelled separately within the bulk sample.

Other variables, such as whether the fragment is young roundwood, with sub-bark surfaces intact, whether it has come from a large piece of wood and whether it is fast or slow grown, should be noted.

Species identification is undertaken with reference to Schweingruber's (1982)

24.9 *Wood ID*

Waterlogged wood; Surfaces on waterlogged wood are prepared for identification by using a cut-throat razor or a double-sided razor blade to pare off thin-sections which are cell-thick and transparent so that diagnostic features can be identified. It is consequently difficult to identify fragments of waterlogged wood smaller than 10 mm^2. The thin-sections are temporarily mounted in water on slides for examination under a transmitted-light microscope.

Sampling for identification is carried out on the same basis as that for charcoal. Species identification is undertaken with reference to Schweingruber's (1982) *Microscopic Wood Anatomy* and the in-house reference collection of the archaeological contractor.

24.10 *Non-charcoal charred plant macrofossil analysis and Waterlogged plant analysis*

Analysis of the charred plant macrofossils and waterlogged plants involves identification, quantification and interpretation. Identification of the macro plant remains is done using a low power binocular microscope with x10 and x40 magnifications. The modern reference collection of the archaeological contractor and various seed atlases (Beijerinck 1947, Berggren 1969 & 1981 and Anderberg 1994) will be used to ease identification. The botanical nomenclature follows Flora Europaea (Tutin *et al* 1964-1981). A standardised counting method is used for quantification. Habitat information for the plant species will be taken from Hanf (1983).

24.11 *Dendrochronological analysis*

*Sample size and species type;*Three conditions are necessary to ensure the successful dating of a building or archaeological site. The timber must be a species for which there are already dated chronologies which in the UK usually means oak. Cross-matching is a statistical process, and therefore a number of timbers are

required, usually at least 8 per building or phase. Finally, and for the same reasons the ring-patterns must be over a certain length, usually 70 rings. With these conditions observed it can be relatively straightforward to obtain a date for a building.

On-site sampling; In situ timbers in a standing building are usually sampled using a corer, which is attached to a power-driven drill and removes a core leaving a hole in the timber 10 mm in diameter. The core must be taken so that the maximum radius from pith to bark is sampled, thus ensuring the maximum number of growth-rings for analysis. It is also important to select those timbers which have retained as full a ring sequence as possible, ie those where the outermost rings have not been trimmed off or destroyed by woodworm.

Coring is an intrusive method of sampling and it is occasionally impossible to use this method, as in the case of painting ceilings and carved panels. If the end-grain is exposed the ring sequence can be measured *in situ* using a hand lens. Silicone rubber casts can also be taken.

If structural timbers have been removed during the renovation of a building then slices, approximately 50 mm thick can be sampled by saw, usually a chainsaw, from a point along the timber where the maximum radius survives.

Timbers only survive below ground in waterlogged conditions. Waterlogged timbers are sampled as above, by the removal of a 50 mm slice by sawing.

Sample preparation;

Cores are mounted in angle moulding and then the surface is prepared by paring with a Stanley knife followed by fine sanding with Wet&Dry sandpaper until the ring-pattern is clear and measurable.

Slices (dry); The surface of the slice is sanded, usually with a power sander, using progressively finer sandpaper until the ring-pattern is clear and measurable. It is often necessary to finish off the surface with W&D sandpaper.

Slices (wet); The slice is usually frozen for 24 hours and then the surface is planed flat using a Surform plane. This often achieves the necessary clarity of ring-pattern but where the wood is particularly hard it will be necessary to use a razor blade to pare the surface to achieve a clear ring-pattern.

Silicone rubber casts; These are fixed to battens of wood using silicone rubber, for ease of measurement.

*Measurement and analysis;*The samples are measured on a custom-made measuring table and the data logged onto the computer using DENDRO (Tyers 2000). Data graphing and statistical analysis are also carried out using the same package.

APPENDIX 25

Conservation

25.1 *Conservation principles*

The principles, ethical codes and techniques of conservation are under constant review by both practitioners and professional bodies. The archaeological contractor's approach to conservation will reflect current theory and practice, as recommended by the United Kingdom Institute for Conservation, the Scottish Museums Council, Resources for Museums and Galleries, the International Council on Museums and the International Institute for Conservation.

25.2 *Security*

The archaeological contractor will take all reasonable precautions to ensure the security of items brought in for conservation. The building will be protected by intruder detector systems; all conservation items will be kept in a secure locked store when not being worked on, and will not be left unattended. Particularly valuable items will be stored in a safe where required. A heat and smoke detection system will also be in operation 24 hours a day.

25.3 *Insurance*

Artefacts for conservation will not covered by the contents insurance of the archaeological contractor. Insurance cover can be arranged for individual items and collections, but this is expensive. Clients are normally advised that the cheapest option is to extend their own insurance for these items for a fixed period. If required, the archaeological contractor could arrange additional insurance, and these costs would be passed on.

The archaeological contractor will have full professional indemnity cover for all its staff.

25.4 *Health and safety*

All relevant Health and Safety legislation, Regulations, Guidelines and Codes of Practice will be respected; Health and Safety plans will be compiled where Construction, Design and Management Regulations 1994 apply.

25.5 *Conservators and allied specialist services*

Professionalism: The conservators of the archaeological contractor will be graduates of approved conservation courses, and will have a thorough knowledge of current conservation practices in their particular specialist fields. The conservators will have been actively encouraged to broaden their skills and experience, and to obtain professional accreditation through the United Kingdom Institute for Conservation or PACR.

25.6 *Specialist post-excavation analyses*

Other services which the archaeological contractor will be able to offer are:

wood identification and woodworking analysis
tree ring dating
pollen analysis
building materials analysis
metal artefacts
metalworking and glass working debris
materials analysis
textile analysis
insects
fish and shells
bird bones
plant remains
bone identification
soils specialist/geologist
artefact specialist
fibre identification
leather identification

25.7 *Documentation*

Conservation complements the work of other professionals by preventing the deterioration of the artefact, and by ensuring that the wider community benefits from the additional information recovered about an artefact in the course of conservation work.

Conservation reports are normally supplied as a hard copy, but can also be supplied on disc in a variety of formats, according to the client's requirements. Reports are normally printed on paper with a guaranteed

life expectancy of 150 years; photographic materials are processed to professional industry standards such as Q-Lab.

25.8 *Archival considerations*

The archaeological contractor will endeavour to ensure that the materials used to document artefacts undergoing treatment have a reasonable life span. Paper used will have an estimated lifetime of 150 years (HMSO specification), and all photographic films will be processed to industry standards by a processing company that specialises in high quality work for professional photographers. Radiography films and chemicals will be fresh and well within their expiry dates. All labelling of boxes etc. will be carried out with archival quality inks; labels will generally be duplicated for safety's sake.

Wherever possible, the archaeological contractor will consider the archiving requirements for the site, and may consult the receiving museum or archive about their requirements; the archaeological contractor will follow guidelines proposed by the Association of Museum Archaeologists.

The archaeological contractor will abide by current guidelines on the care and disposal of artefacts and human remains, as set out in:

The Disposal and Allocation of Finds
Publication and Archiving of Archaeological Projects
Treatment of Human Remains in Archaeology
Archaeological Project Design, Implementation and Archiving

25.9 *Museum of London Guidelines*

Museum of London requirements for conservation, recording, documentation, packing and archiving will be applied where these are a pre-condition.

25.10 *Assessment and estimating*

The assessment determines the condition of the artefact and the best means to ensure its survival. Radiography (x-raying) of the object is normally carried out at an early stage, and is compulsory for iron objects, which have poor survival prospects, and for some copper alloy artefacts.

The estimate for the work normally applies for six months; it may be necessary to review it thereafter. Conservation rates are agreed by negotiation.

25.11 *Recording*

Text and image records (paper, digital and/or film as appropriate) will be made of all artefacts before conservation commences. Any information recovered during cleaning and conservation (eg associated material, residues, corrosion products, manufacturing techniques) will be carefully recorded, with samples taken where necessary. Soil removed from an artefact during the process will normally be retained and returned with the object, unless the excavator and/or client decides that it is not required. Where necessary, experts will be consulted on the nature of any material discovered during cleaning or conservation of artefacts. All samples and slides will become part of the site archive and remain with the artefact.

The conservation report will also include recommendations for the care and curation of the assemblage; special finds with particular packing requirements will have clear handling and lifting instructions on the outside of any packaging.

25.12 *Conservation Record*

The conservation assessment sets out the proposed treatments for each type of artefact or material: these treatments can be discussed with the client, and with the museum, to take into account any priorities and display requirements. (See Section 9, Assessment)

25.13 *Radiography*

The archaeological contractor will x-ray all excavated iron objects, as well as some of the copper alloy, and any other items as requested by the excavator: information from the x-rays are incorporated into the conservation report. All metal artefacts can be x-rayed if required; only film and chemicals within their expiry date are used, washing periods are the optimum to maximise film preservation.

X-rays normally become part of the archive, and are returned to the client, with full details of exposure time and voltages used.

25.14 *Record photography*

All artefacts selected for conservation will be photographed (on colour slide film) at least once; usually before and after conservation, with a label and scale in the frame. Unusual artefacts, noteworthy features or modified conservation treatments will be photographed whenever appropriate.

All images will be recorded in the conservation report, and each slide labelled with the context and find number. The archaeological contractor will use Professional grade film, and a professional developing service to ensure maximum film stability. The slides form part of the conservation archive, and will remain with the artefact.

25.15 *On-site conservation and conservation on call*

A conservator can be available on site if required, and the conservators of the archaeological contractor can provide immediate advice over the phone at any time (specific arrangements must be made for out of hours working).

Advice on packing, lifting and transporting artefacts may be given in the early stages of a project.

25.16 *Conservation treatments*

The requirements of each artefact will be considered individually, and any remedial treatments carried out will use only recognised conservation treatments and approved materials. The archaeological contractor will be committed to CPD, which ensures that its conservation staff are fully cognisant with new developments in the field.

25.17 *Post-excavation storage*

It is recognised that budgetary arrangements may mean considerable time can elapse between excavation and conservation or Finds Disposal. All finds will be examined by a conservator on receipt; packing and storage materials will be renewed as necessary, and the archaeological contractor will ensure that all finds will be kept in a secure, stable environment until conservation treatments begin. Any finds that require immediate treatment will undergo conservation as soon as the conservators have consulted the Project Field Officer. Large volume storage at 1^{o} C and -20^{o} C; and storage for waterlogged material will be available in-house.

25.18 *Packing*

All artefacts will be packed in suitable inert materials, with silica gel if required. Fragile objects will be supported by Ethafoam, or similar, and lifting and handling instructions on the container. Especial care will be taken for artefacts, which will be going into long term storage. All containers will be carefully labelled, and box lists supplied.

APPENDIX 26

Archiving and finds disposal

26.1 *Finds disposal*

All artefacts and ecofacts recovered during an excavation sponsored by Historic Scotland (HS) are reported directly to HS via their own collections registrar. If all material has been fully analysed at this point, it is in most cases, transferred to an HS store. HS's Finds Disposal Panel (FDP) with permission of the Queen and Lord Treasurers Remembrencer (Q&LTR) then allocates the material to the appropriate museum for long term storage and possible display.

Artefacts and ecofacts recovered from excavations sponsored by other funding bodies are reported to the Crown via the Treasure Trove Advisory Panel (TTAP). The TTAP with permission of the Q&LTR then allocates the material to the appropriate museum for long term storage and possible display. Once the material has been allocated, it is then the museum's responsibility to arrange collection from the archaeological contractor.

26.2 *Archiving*

All archiving will be undertaken according to standards and guidelines set out by the National Monuments Record of Scotland (NMRS), located at the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS). The archives of all archaeological works will be deposited to the NMRS.

APPENDIX 27

Publications

27.1 *General*

All publications by the archaeological contractor will be clear, correct and concise accounts of what was done and will reach standards acceptable to the archaeological profession. Final reports will be published within five years of the end of fieldwork. Publications should be published in popular archaeological, general and specialist formats to inform a wide readership of what work was done and must be made available to both lay and professional audiences for the foreseeable future. Publications must also provide good value for money in terms of the content and style of the publications. In DES entries and journal publications the role of the client will be fully acknowledged. In the popular publications and monographs suggested below the role of the client will be more fully promoted, with the display of the client's logo on the cover and a foreword by their representative. The over-riding aim of the procedures outlined in this section is to ensure that, during the duration of the project, a continuous stream of information about the archaeological works is made available for peer review and public consumption. The following stages and publication vehicles are envisaged;

27.2 *DES entries*

After the completion of each piece of on-site work, whether it be a watching brief, evaluation, set-piece excavation or building recording exercise a Data Structure Report (DSR) will be produced (see Fieldwork procedures). These are not reports intended for publication but they usually include a short summary which will be submitted for publication in *Discovery and Excavation Scotland* (DES), an annual summary of fieldwork published by the Council for Scottish Archaeology. It is proposed that an individual entry for each piece of on-site work will not be submitted; rather a single entry summarising all the works carried out in any one year will be compiled by the Project Manager. The DES summary is a standard requirement of planning authority archaeologists and ensures that notice of ground-breaking works is disseminated throughout the archaeological community.

27.3 *Journal publications*

Reports on the results of excavations are normally published either as an article in an academic journal or as a monograph in an appropriate series, depending on the scale of the results. The results of the set-piece excavations will be published as journal articles with reference to other on-site works such as watching

briefs and building recording, where appropriate. The publication of these articles will follow on timeously from the completion of post-excavation works.

27.4 *Monograph publications*

The results of all the on-site works will be drawn together in a single volume, a monograph designed primarily for academic consumption. This will be published within 5 years of the completion of on-site works.

27.5 *Popular publications*

The results of all the on-site works will also be drawn together in 'popular' publications that augment the academic publications in making the results available to a wider public. This is a method of providing 'community gain' to the local and national community in return for its consent, through the planning process, to alter or demolish elements of the archaeological heritage. Popular publications may include, as deemed appropriate by the client, Internet reports within the web site of the archaeological contractor, printed colour booklets, leaflets, on-site interpretative panels and exhibitions.

27.6 *Editorial procedures*

The archaeological contractor will apply their in-house editorial policy and procedures, through which any projects nominated for publication are normally submitted.











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