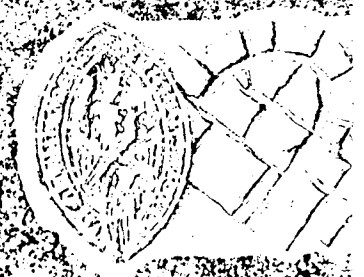


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AN ASSESSMENT  
OF  
MEADOWS BUSINESS  
PARK  
DORNOCH, HIGHLAND



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**SCOTTISH URBAN ARCHAEOLOGICAL TRUST LTD**

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**AN ASSESSMENT  
OF  
MEADOWS BUSINESS  
PARK  
DORNOCH, HIGHLAND**

RJC/JS

7th September 1998

# AN ASSESSMENT

of

## MEADOWS BUSINESS PARK

### DORNOCH, HIGHLAND

#### *abstract*

*A proposal was submitted to Historic Scotland in November 1997 for funds to assess the material recovered during a watching brief at the Meadows Business Park, Dornoch carried out by Scottish Urban Archaeological Trust and Resurgam! in Spring 1997. This document reports on the results of that assessment and, having identified the importance of the material recovered, identifies the costs required to proceed to the next stage of post-excavation analyses.*

#### 1. PROJECT BACKGROUND

- 1.1 In May 1997, the Trust was commissioned by Highland Council Archaeology Service to carry out a watching brief in Dornoch to monitor the topsoil-stripping of a new access road into a new business park development on the southern edge of the burgh. Prior to this, no archaeological work had previously been carried out in or around the burgh, although the burgh had been assessed by the Scottish Burgh Survey in 1982 (Turner & Simpson, 1982). A Data Structure Report, with recommendations for further work, was prepared shortly after the watching brief was completed in 1997.
- 1.2 The top-soil proved to be exceptionally rich in medieval and post-medieval small finds much of which had been retrieved by a local metal detectorist before the watching brief had been commissioned, and which triggered off a condition on the planning application. Perhaps more importantly, the cultivation soil was found to seal much earlier occupation possibly early medieval in date and included at least one building, enclosures, pits, and a large assemblage of ironworking waste - charcoal, slag, clay furnace fragments and possible crucibles. A large number of soil samples were taken, some of which contain quantities of charcoal, enough to provide a range of radio-carbon dates. Given that the site was machine stripped down to the natural sub-soil and that the work was carried out as a watching brief, the site records are basic and many of the features stratigraphically isolated. Much of the work proposed (and the associated cost) is, therefore, for external specialists and the reporting and illustration of the finds assemblage.
- 1.3 This site is considered important to the future management of the archaeological heritage of Dornoch as the development area was considered to lie outside the limits of the medieval burgh. The medieval and post-medieval finds recovered from the top-soil may have been cleared from elsewhere in the burgh and scattered across the field here but are, nevertheless, the first insight into the archaeological potential of the

burgh. The earlier material, which include structural features, possibly early medieval (Norse or Pictish), may provide a rare example of evidence for continuity of settlement between the early medieval period and the growth of the medieval burgh. The results may also tie in with the work currently being undertaken at Portmahomack, situated directly across the Dornoch Firth. In particular, if the metalworking material indicates industrial activity on the site and is datable to the early medieval period, it will be an important discovery.

- 1.4 This application is for funds to carry out a programme of post-excavation analyses necessary to gain a fuller understanding of the dating, development, nature and function of activity on this site, and to place this site within the context of the archaeology of the region. The product will be an archive report to be submitted to Historic Scotland. Once the results of the specialist analyses are known, the results may merit full publication. If there was agreement to publish, the archive report could be converted into a publication standard paper to be submitted to a relevant journal but would incur further costs. An estimate of the conservation costs of the artefact assemblage could not be made until X-ray and specialist analysis has been carried out.
- 1.5 Sourcing the finds and obtaining quotes for specialist work was carried out between April and September 1998.

## 2. PROJECT OUTLINE

- 2.1 The various tasks involved in the post-excavation programme have been itemised below. The costing is attached at the end of this report.

## 3. THE STRATIGRAPHIC RECORD

- 3.1 The stratigraphic record is straightforward. The attached Data Structure Report (see Appendix) lists the site archive. Only a very brief stratigraphic text was prepared for the Data Structure Report. It will, therefore, take two weeks to convert this into a more detailed phased text, integrating the results of the various specialists analyses. To carry out some further background research with a view to writing a general discussion would take a further week.

### 3.2 Costing

Prepare phased stratigraphic text	
5 days @ £125	£625

Phase plans	
3 days @ £110 per day	£330

Integrate results of specialist analyses	
5 days @ £125 per day	£625

Background research and discussion

5 days @ £125 per day

£625

Total

£2205

#### 4. THE METALLURGICAL DEBRIS

4.1 Potentially, the most important material relating to this site is the **metalworking and industrial waste**, the analyses of which will be undertaken by Dr Effie Photos-Jones of Scottish Analytical Services for Art and Archaeology.

#### 4.2 Project Summary

4.3 The relative abundant and diverse remains of metallurgical waste within the excavated trench at Meadows Business Park, Dornoch (Coleman 1997) warranted the assessment of this material prior to any further scientific and other investigation. The aim of the present assessment is to produce a coherent outline of the investigative approach to be followed and a costing of the analytical and experimental work.

#### 4.4 Introduction

4.5 A total of c 15 kg of metallurgical waste and other associated materials (pottery, bone, shell fragments etc) were retrieved from the excavated trench at the Dornoch Meadows Business Park site (Figure 1). The metallurgical waste included slag, hammer scale, fragments of iron (mostly unshaped), fragments of ore (including a large (c 1 kg) sample of good quality bog iron ore), charcoal etc. It has to be emphasized that samples of bog iron ore tend to be rather absent from Scottish bloomery sites (Photos-Jones et al, in press). The metallurgical debris was spread over both the eastern and western ends of the trench but concentrated mostly on the east. The co-existence of shells (complete and fragmentary, burnt and intact) in association with the metallurgical waste was noted by the excavator and soil and bone specialists. As a result, a closer examination of this type of debris is incorporated in the present study.

#### 4.6 Assessment Methodology

4.7 A thorough visual examination of the contents of the five boxes of Dornoch metallurgical debris and associated material was carried out in the course of a two day assessment in an attempt to establish sample typology. Relative quantities (weight in gr) of the metallurgical waste as a function of their context had already been established (see Coleman 1997). The following typologically distinct groups were evident:

- a Slag, spongy and porous
- b Slag, solid and compact
- c Charcoal fragments
- d Fragments of mostly unshaped metallic objects
- e Fragments of furnace/hearth building material/lining etc
- f Shells/bones
- g Other

4.8 A brief description of the contents of each bag is included in Table 1 and a preliminary attempt at establishing the distribution of the different materials is shown in Figure 1.

#### 4.9 Investigative Approach: an outline

4.10 The present investigator nearly always undertakes a physico-chemical approach in the examination of industrial waste. This involves the usage of optical microscopy and analytical tools like the Scanning Electron Microscope with Energy Dispersive Analyser (SEM-EDAX) and x-ray diffraction (XRD) techniques. Occasionally laboratory-based experimental work is required to attempt to simulate (heating or other) conditions under which archaeological material was formed or altered.

4.11 Following the visual examination of the Dornoch material, a number of issues/questions were raised which pertain both to its characterisation (i.e what is it and how it was made) as well as its association with other domestic/industrial waste.

4.12 The characterisation of the material pertains to issues of technology.

- a To identify the type of metallurgical practices on site. Although these are largely assumed to be iron-related it is important to establish whether they are associated with smelting or smithing or both. To that end, it would be essential to retrieve evidence for all three 'products' of the iron making cycle, namely ore, slag and metal artefact (in shaped or unshaped form).

Evidence for furnace/hearth is testified by the fragments of partially vitrified clays found on site; these materials are essential in the reconstruction of the process even though no remains of the structures themselves may be evident. Thin wall fragments of shaped vitrified ceramic fabrics (crucibles?) warrant further examination.

The findspot of the materials may pertain to the original spatial distribution of the industrial activities on site.

- b To establish the possible distribution of activities within the trench. Although the boundaries of the trench are relatively narrow, presenting only part of the original picture, nevertheless the relative abundance and diversity of the materials found should allow some tentative suggestions. Where do potential smelting or smithing activities concentrate? (The eastern vs western section of the trench.) What is the distribution of the metallurgical waste with respect to other waste or indeed with respect to the charcoal-using hearths vs peat-using hearths (Holden 1997).

The state of preservation of shells (burnt and unburnt, complete or fragmentary) may or may not have an association with the metallurgical waste.

- c It is unlikely but not improbable that shells (a source of calcium carbonate) were added as flux within the bloomery furnace. Slag chemical composition

and mineralogical characterisation will determine this question definitively. Shells or the contents thereof may have been used as food or bait but their industrial usage as fertilisers for fields is known already from the pre-historic period (T Pollard, pers comm). Shells are both broken and complete, burnt and unburnt. Some basic laboratory based heating experiments will determine how shell morphology changes as a function of temperature under oxidizing conditions. Comparisons with archaeological material can then be drawn based on photographs taken with the Scanning Electron Microscope. A temperature range for heating of the archaeological materials can therefore be established.

The chemical/petrographic characterisation of individual finds including pottery and stone.

- d To attempt to characterise individual finds with specific questions in mind.
- i The ongoing, but still at its infancy, technical characterisation of medieval Scottish Pottery fabrics has been based on the expansion of an existing data bank currently held at the National Museums of Scotland and shared between them and the Medieval Scottish Pottery Group (B Wills, pers comm). To that end petrographic and chemical analyses are continually needed which assist in the building up of this important archive. The pottery of the north-east of Scotland either as White Gritty ware or East Coast Redware is under-represented hence the need to undertake thin sectioning or a small number of fragments (2-4) and a preliminary petrological characterisation thereof.
- ii A 'moulded' ceramic fragment from unstratified levels with evidence for glazing adhering to the surface was found on site. A very small sample was removed from the surface of this artefact and subjected to XRD analysis. The presence of quartz suggested sandstone (see Figure 2). Therefore this find is not a piece of ceramic but a carved stone. It appears that there exist a small number 'glazed stones' largely unshaped from medieval contexts (B Wills). The 'glaze' on their surface has always been assumed to have been accidental. In the Dornoch sample traces of 'glaze' are seen in both the exterior and the interior surfaces; hence the need to analyse this material further.

#### 4.13 Conclusions

4.14 The Dornoch metallurgical debris presents a unique opportunity to study and elucidate aspects of the metals technology as well as its association with other domestic/industrial activities in the Medieval period in the north-east of Scotland.

#### 4.15 Costing

4.16 Sorting/assessment/sample sectioning  
1 day @ £145 per day

£145

Sample preparation

20 samples @ £50 per sample	£1000
SEM-EDAX examination and analysis 9 hours @ £65 per hour	£585
XRD 5 samples @ £35 per sample	£175
Experimental work 3 days @ £145 per day	£435
Report writing 7 days @ £145 per day	£1015
Consumables (metallographic etc)	£60
<b>Total</b>	<b>£3415</b>

## 5. THE ENVIRONMENTAL SAMPLES

- 5.1 A number of soil samples were taken during the watching brief. It became apparent during this assessment stage that it was going to prove impossible to obtain quotes from specialists for the analyses of surface collected finds as more material was almost certainly contained within the soil samples. The soil samples were, therefore, processed as part of this assessment. The report follows the division of the site into cultivation soil, west end and east end of the site as laid out in the Data Structure Report
- 5.2 Eleven un-processed soil samples were provided by SUAT for assessment by Headland Archaeology Ltd. The samples were subjected to flotation and wet sieving in a Siraf-style flotation machine. The floating debris (the flot) was collected in a 300 micro-millimetre sieve and, once dry, scanned by the author using a binocular microscope (Table 1). Residues were wet sieved down to 1 mm and fully sorted by a trained technician. Any items retrieved from the retents were bagged and are recorded in Table 2. The whole retents and any industrial debris were bagged and forwarded to an industrial specialists and the bone and shell to a archaeozoologist for further assessment.
- 5.3 **Results and Discussion**
- 5.4 **Cultivation Soil**
- 5.5 Much of the site was covered by a layer of cultivation soil (Context 2) from which a number of medieval finds were recovered. The samples taken from this layer were found to contain quantities of highly fragmented and burnt bone and marine shell. Charcoal was common and there was an absence of the industrial slag that was so prevalent in most other samples. Two pieces of 19/20th century glazed pottery were also recovered from this layer together with a swan animal bone )a feature only seen



in later butchery practice) and two well-preserved sheep skeletons thought to recent in origin (see C. Smith assessment report). This context clearly represents a cultivation soil the formation of which was probably initiated in the medieval period. Although cultivation is thought to have ceased during the 17th century the presence of more recent material suggests continued activity in the area. The mixed nature of this deposit will make interpretation of the biological elements within it of limited value.

#### **5.6 West end - metalworking debris, ditch and cut features**

5.7 Several samples (Contexts 11, 17, 28) were obtained from the west end of the main trench all of which were sealed by Context 2 above. This area appears to have been used for metalworking and this is reflected in the presence of slag in the retents of Contexts 11 and 28. Context 17, a ditch fill, is significantly different from the other samples in this part of the site in that it is dominated by marine shell (limpets, cockles and others) and probably represents midden material within the ditch. Low concentrations of animal bone and charred cereal grain in addition to metalworking debris in these samples suggest low-levels of domestic activity across this part of the site.

#### **5.8 East end - possible buildings and enclosures, ditches and pits**

5.9 The samples from the east end of the main trench (Contexts 31-56) also show evidence for metalworking in the form of slag and hammerscale. Bone, particularly burnt bone, marine shell, charcoal and charred grain are all present in larger quantities than in the west end of the trench. This food debris, although still present in relatively low concentrations, could reflect the close proximity to the rounded building within the enclosure which was, in all likelihood, associated with domestic as well as industrial activities. The presence of amorphous charred material and heather twigs from Context 31 is potentially of some interest and could be indicative of peat burning.

#### **5.10 Conclusion**

5.11 The mixed nature, and low concentration of 'environmental evidence' from Context 2, the cultivation soil, makes it of little interpretive value. Contexts sealed by this layer are, however, likely to be of medieval or earlier in date. The potential value of the metalworking debris from these samples has already been identified and the retents have been sent to an appropriate specialist for analysis. Identifications of the charcoal from this industrial activity would add something to our understanding of the metalworking process but in view of the low numbers of samples present would say little about resource availability or the local environment. The charcoal from the samples would be sufficient for AMS dating of contexts if required.

5.12 Charred grains, primarily, hulled barley with occasional oat, were identified in low concentrations from most samples. Both of these crops, together with occasional weedy elements also recovered would be typical of this part of Scotland in the last two millennia and are therefore of little interpretive value in themselves. Other than recording their presence and so adding to the accruing database on Scottish crops no