



**Contextualising Metal-Detected
Discoveries:
Staffordshire Anglo-Saxon Hoard**

(Project 5892)

Stage 2 Project Design

**Version 4
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1 Project name

Contextualising Metal-Detected Discoveries: Staffordshire Anglo-Saxon Hoard

2 Summary Description

This project will carry out the second and final stage of the research and analysis of the Staffordshire Hoard with the aim of publishing its contents in a definitive manner, and placing it within the context of seventh century English life.

3 Background

3.1 Introduction

This document describes the proposed research which will result in the final publication of the Staffordshire Hoard. This work will be carried out between January 2015 and June 2017.

The research project started in 2011 with an assessment stage. Following that it was decided that the analysis stage would be divided into two parts with Stage 1 starting in March 2012 and due to run until October 2013. The recovery of additional pieces from the Hoard in November 2012, and the decision to include a grouping exercise of the whole Hoard, lead to an extension until May 2014 for the completion of Stage 1. The project design for that was revised in the summer of 2013 to reflect these changes. That document scoped the entire project, i.e. both Stages 1 and 2¹. This document will focus on the new information that has emerged during Stage 1 and how this can be used to redefine, where necessary, the work originally proposed. To avoid needless repetition of information that is available in the original design, the reader will be referred to the relevant section there in the form 'PD2013, Section n' in the footnotes where appropriate.

The next section will summarise what has been learnt about the Hoard during Stage 1. It draws upon more detailed considerations that are available as Appendices 1 to 4. The sections that follow are the normal section headings of a MoRPHE project design (potential, research aims and objectives, business case, project scope, interfaces, communication, project review, health and safety, project team structure). These are reviews of what was presented in the original design in the light of the new information, and indicate where updates are appropriate. The methodology section for Stage 2 is then outlined in detail. This reviews what has already been done for each task, shows how the tasks feed into the final publication, and discusses timetabling. It is followed by the formal timetable with costed products.

The project is expensive and will be funded by both English Heritage and the Owners. The latter already hold £68,000 on account to pay for some of the work. This still leaves a shortfall of c.£132,000 including VAT. Both Owners have committed to a joint and robust fund-raising strategy² which reflects the

¹ Cool 2013.

² 'Staffordshire Hoard Fundraising Strategy' Birmingham Museums Trust and Stoke-on-Trent City Council, December 2014.

ambition to raise the shortfall between what EH have already committed to fund and the final total cost. Formal letters to this effect have been sent to English Heritage by Ellen McAdam acting on behalf of the Birmingham Museums Trust (dated 24.11.14) and by Michelle Adams on behalf of Stoke-on-Trent city council (dated 05.12.14). Section 16 of this document brings together all the information connected with this novel way of funding the project. It prioritises tasks that will have to be excluded from the project if the Owners' fund-raising efforts are unsuccessful, and outlines the ways in which the fund-raising will be monitored and decisions taken relating to the exclusion of any tasks. It should be noted that this section includes new material included at the request of English Heritage on December 17th, 2104.

3.2 Glossary

During Stage 1 the nomenclature of some material has been standardised. The following list defines these names and they will be used in the rest of the document.

Sheet – thick gold and silver sheet material. This includes the material formally called 'foil' and 'pressblech', and which was thought to come from helmets. This is now referred to as '*die-impressed sheet*'.

Foil – the thin gold sheet material used to back garnets.

Reeded strips – the material that has sometimes previously been called fluted strip.

C-edging – previously called C-sectioned edging.

It is also useful to define acronyms used regularly in the document.

BM	British Museum
BMAG	Birmingham Museum and Art Gallery
BMT	Birmingham Museums Trust
BRA	Barbican Research Associates
EH	English Heritage/Historic England (after April 2015)
HMG	Hoard Management Group (see Appendix 6)
PAO	Project Assurance Officer
PMAG	Potteries Museum and Art Gallery
RPAP	Research Project Advisory Panel (see Appendix 6)

It should also be noted that the term 'animal art' includes designs which include both zoomorphs and humans.

4 The results of Stage 1

4.1 Introduction

Reports on the main research strands by the people who carried them out are available as Appendices at the end of this document. Appendix 1 reviews the conservation work carried out in BMAG, and Appendix 2 outlines the typological work of Chris Fern carried out at a number of venues. Of the work

carried out at the BM, the material science is dealt with by Eleanor Blakelock in Appendix 3, whilst the joining of the die-impressed sheets and other conservation work there is described by Fleur Shearman in Appendix 4. Appendix 5 provides the results of the cloisonné pilot project³. The other major strands have no formal assessments for obvious reasons. The work of the Lincolnshire Museums and Collections Care team at Lincoln has resulted in a complete X-radiograph archive of the Hoard⁴. Bryan Alvey has designed and maintains the secure database which has been in use since the summer of 2013⁵, and which provides an invaluable research and curatorial aid.

The aim of this section is to draw together all the information that has arisen from these strands in a thematic way. This reflects the liaison that has been going on within the team, and is a precursor of the way themes will be addressed both in Stage 2 and the final publication. It will start with a brief summary of where we were at the outset, and then go on to ask a number of questions to show where we are now.

4.2 The state of the Hoard in March 2012

In March 2012⁶ most of the Hoard was still covered in soil. There were 1776 database records including *c.* 300 which related to *c.* 1,200 fragments of die-impressed sheet, reeded strips and C-edgings. Of the remainder a little under 500 records could be seen to be sword or seax fittings. There were also a small number of helmet fittings and Christian items. Approximately two-thirds of the records could not be assigned to any broad functional class as they could not then be identified. It was extremely difficult to answer the question how many items the fragments represented.

There had been a small amount of scientific analysis that had established that there could be variability in the gold composition. Some garnets had been analysed and had been shown to be coming from a variety of sources.

As far as date was concerned, it was felt that a *terminus ante quem* of *c.* AD 650/675 was appropriate, and that most of the material was of seventh century date.

When the Stage 1 research started the Hoard was divided into two parts. The material that had been identified as die-impressed sheets and reeded strips went to the BM for the joining work. The rest of the material was studied by Chris Fern. Inevitably as work has progressed it has been found that some of the material Chris Fern was looking at included pieces of die-impressed sheets and reeded strips. The BM also found pieces in the batch it had been sent which did not belong to the sheet and strip category. The material was brought together for the grouping exercise for the first time in February 2014⁷. The originally misidentified pieces have now been re-united with the rest of their fellows, but there has been no opportunity for detailed quantification.

³ PD 2013 Section 15.9iv.

⁴ PD 2013 Section 15.6.

⁵ PD 2013 Section 15.4.

⁶ See PD 2013 Section 5 for full discussion.

⁷ PD 2013 Section 15.15.

The quantifications that are offered in the next section can thus be expected to alter during the Stage 2 research as that is done.

4.3 How many items are in the Hoard?

During the life of Stage 1 the number of fragments has increased. Initially the X-radiography revealed that additional pieces were still incorporated in the soil surrounding items and, in the cases of the pommels, inside them. Then a further 89 items were recovered as part of the survey of the field in which the Hoard was found in November 2012⁸. Once the cleaning of all the Hoard finds was completed in the autumn of 2013, all of these additional fragments were given K numbers and entered onto the database which now has 2160 records, an increase of nearly 400. Of that *c.* 300 relate to the 2009 find. These additional records do not include the die-impressed sheets and reeded strips which were dealt with in the BM during Stage 1. As can be seen from Appendix Tables 4.1-2 the joins that have been made will require an addition of at least 150 records. The current estimate by fragment count is in the region of 4,000⁹.

Following the grouping exercise, it is now possible to start to make an estimate of how many of the database records relate to different items. If the die-impressed sheets and reeded strips are excluded, it can be seen that just over 350 of the individual records relate to just 120 items. As a working total it can be estimated that *c.* 1200 items will need catalogue entries. This does not mean that there are 1200 items in the Hoard. As Fern makes clear; estimating the number of some items is very problematic because of their highly fragmented state, but a start can be made. Thus the 108 silver fragments that can certainly be assigned to hilt plates come from a minimum of 19 individual items, and there is a corresponding minimum number of 138 from the 158 gold hit plate fragments¹⁰.

The following two tables simplify the data presented in Appendix Tables 2.2-21 but can be taken as a rough guide of the situation so far. Table 4.1 shows the securely identified items, Table 4.2 the less securely identified ones. The quantification column shows whether the number is actual or a minimum number (MN) estimate.

⁸ Palmer 2013; PD2013, 152 Risk number 4. The number is that following cataloguing by Chris Fern of the cleaned items.

⁹ Table A2.2.

¹⁰ Table A2.5.

<i>Type</i>	<i>Quantification</i>	<i>Gold</i>	<i>Silver</i>	<i>Other</i>	<i>Full details⁽¹⁾</i>
Pommels	Number	63	22	-	T A2.3-4
Hilt-plates	MN	138	19	-	T A2.5
Hilt-plates ⁽²⁾	Number	3	-	-	T A2.5
Hilt-collar	Number	93	10	-	T A2.6-8
Hilt-ring	Number	41	15	⁽³⁾ 2	T A2.9
Sword pyramid/boss	Number	8	2	-	T A2.10
Sword-rings	Number	-	3	-	S A2.6
Seax hilt-fittings	Number	5	-	-	S A2.7
Other sword mounts	Number	128	7	⁽³⁾ 1	T A2.11-2
Large cloisonné suite	Number	81	-	-	T A2.13
Helmet fittings ⁽⁴⁾	Number	-	4	-	T A2.14
C-edging	Number	-	2	-	T A2.15
Buckles	Number	2	1	-	T A2.16
Niello mount suite	Number	-	7	-	T A2.18
Rivets, washers etc.	Number	98	146	⁽³⁾ 1	T A2.19
Crosses	Number	4	-	-	T A2.20
Foils and garnets	Number	39	-	⁽⁵⁾ 72	T A2.21
Other	Number	-	3	⁽⁶⁾ 2	S A2.19
<i>Total</i>		<i>723</i>	<i>241</i>	<i>78</i>	

Table 4.1: Summary table of securely identified contents

Notes to Table 4.1

- (1) References here prefixed T refer to tables in Appendix 1 whilst those prefixed S refer to the text section number there.
- (2) Refers to hilt plates that remained joined.
- (3) Copper alloy.
- (4) the *c.* 1465 fragments of reeded strip, broad strip and die-impressed sheet are not included in these figures.
- (5) Garnets.
- (6) Copper alloy, associated with hilt-plate fittings

<i>Type</i>	<i>Quantification</i>	<i>Gold</i>	<i>Silver</i>	<i>Other</i>	<i>Full details⁽¹⁾</i>
Pommels	Number	6	3	-	T A2.3-4
Hilt-plates	MN	6	5	-	T A2.5
Hilt-collar	Number	1	-	-	T A2.6-8
Hilt-ring	Number	-	3	-	T A2.9
Other sword mounts	Number	2	2	⁽³⁾ 2	T A2.11-2
Niello mount suite	Number	-	1	-	T A2.18
Rivets, washers etc.	Number	-	-	⁽³⁾ 3	T A2.19
Crosses	Number	1	-	-	T A2.20
<i>Total</i>		<i>16</i>	<i>14</i>	<i>5</i>	

Table 4.2: Summary table of less securely identified contents (notes as for Table 4.1)

It is too early to attempt any useful quantification of the die-impressed sheets etc., but we now know that 17 different die patterns can be identified, as opposed to the 11 that were known in March 2012. It has been established that there are four different widths of reeded strip. The different widths use different riveting patterns implying they were used for different types of artefacts. In addition it has been possible to reconstruct a few examples of the sort of ‘U-shaped’ clip known to have been used on both helmets and vessels¹¹.

As well as all of this material, a further 736 fragments have been identified as sheet that is distinct from the die-impressed sheet, and there are c. 110 fragments that include pieces of filigree and niello inlay which are currently unidentified as to what type of object they came from, and indeed may be too small ever to be so identified¹².

4.4 What sort of things are in the hoard?

Inspection of Tables 4.1 and 4.2 show that this is still an overwhelmingly male and military group of material, as many of the items previously categorised as ‘other’ have been found to belong to that category. In Table 4.1 nearly 60% of the securely identified items come from swords or seaxes (top nine rows), and Fern notes that many of the gold items in the rivets, washers etc. category are also likely to come from such items¹³. Now that the material is clean it can be seen that a variety of types are present. It is also becoming possible to see which of the items probably came from the same parent object. This is especially noticeable in the hilt-collars, and occasionally it has been possible to suggest which hilt-collars and pommels came from the same suite. This is in addition to the suite of seax handle fittings that were known before the start of Stage 1¹⁴. There is obviously going to be considerable potential to develop this further, and this will be aided by the conservation work which will physically join the fragments where the joins have been recognised, to make complete objects. As an example there are 44 hilt-plate and 15 pommels which fall into the category where joins can be made.

Some of the other items also belong within the military milieu, most obviously the helmet fittings¹⁵. It has now been possible to identify the fragments that join to form either one or two helmet crests. Intriguingly these retain channels with an internal deposit that may represent the remains of a crest. This will need to be explored in Stage 2. Also needing to be explored in Stage 2 are the lengths represented by the die-impressed friezes. A start has been made on this and two of the joined group are already long enough to encircle a helmet at the temples.

Several of the Christian artefacts were known at the start of Stage 1, but during it more came to light. These included the gold sheet arm of a second pectoral cross enclosing a sliver of preserved wood. This was found within the

¹¹ Appendix 4 Section 3.2-3.

¹² Appendix 2 Section 2.14, Table 2.16.

¹³ Appendix 2 Section 2.16.

¹⁴ Appendix 2 Section 2.3 for seax suite see section 2.7.

¹⁵ Appendix 2 Section 2.11, see also Appendix 4 section 4.

soil inside a pommel cap. It is also suggested that some loose garnets and a garnet boss may have come from other crosses because of their similarity to those on the known great gold cross. The gold inscribed strip is now suggested to have come from a cross based on the setting it retains¹⁶.

Other items appear unique at present and their function is unknown. Chief amongst these is a large suite of cloisonné mounts which may have come from more than one parent object, possibly including a book-cover. Another unique cloisonné object is a composite roundel. A group of silver mounts decorated with geometric niello may all have come from a single parent item¹⁷.

One thing that is now even more clear than it was at the start of Stage 1 is the sheer volume of unusual and new items the hoard has produced. Some of the unique items have just been outlined, but even more regularly encountered types are represented by new forms. It is clear that new typologies will have to be developed to accommodate the hilt fittings. For example, the majority of the gold pommels are of a cocked-hat form with all-over filigree. This type was unknown prior to 1998 but now there are 33 examples in the Hoard. Also important is the group of ten silver pommels with Insular non-zoomorphic ornamentation, and the unusual silver hilt plates which seem to relate to them.

If one turns to the decoration, more than 130 objects are now known to be decorated with animal art of Salin Style II with the majority demonstrating unique designs. This number will increase in Stage 2 as the die-impressed sheets are studied in detail. This more than doubles the known number for England and, as Fern has pointed out, ‘makes a very significant contribution to the Europe-wide corpus’. The early Insular art on the silver sword fittings noted above is also important as, though the objects may be some of the latest items in the Hoard, they may be some of the earliest objects yet known with the style¹⁸.

Now it is possible to see the nature of all the decoration, it is possible to rebalance the picture people have of the Hoard. It has always tended to be the cloisonné artefacts that have attracted attention. Whilst cloisonné is important, it can easily be argued that the actual focus of the hoard is on filigree decoration¹⁹. To show this Table 4.3 has been prepared based on the gold material for certain categories as in Table 4.1. This does not quantify in full the amount of filigree and cloisonné decoration, as both also occur on the hilt plates, and on the rivets, washers category, but it does show the importance of filigree as a decorative medium.

¹⁶ Appendix 2 Section 2.17.

¹⁷ Appendix 2 Sections 2.9-10, 2.15. See also La Niece 2013, Storey 2013 for the niello mount suite.

¹⁸ Appendix 2 Section 5.

¹⁹ Appendix 2. Section 4.2.

<i>Type</i>	<i>All-over filigree</i>	<i>Filigree/ Cloisonné</i>	<i>Cloisonné</i>	<i>Full details</i>
Pommels	35	7	13	T A2.4
Hilt-collar	70	-	23	T A2.7-8
Hilt-ring	56	2	-	T A2.9
Sword pyramid/boss	-	2	10	T A2.10
Seax hilt-fittings	-	-	5	S A2.7
Other sword mounts	75	38	-	T A2.12
Large cloisonné suite	26	-	55	T A2.13
<i>Total</i>	<i>262</i>	<i>49</i>	<i>106</i>	

Table 4.3 : Distribution of decorative techniques

In addition to the gold filigree, silver items are also decorated in this way which is rare at the period. Amongst the gold filigree there are also types that are both rare and in some cases previously unknown, which continues the pattern for the Hoard to produce new material that cannot be accommodated within existing typologies.

4.5 What do we know about the materials?

Judged by the number of objects as quantified in Tables 4.1 and 4.2, gold remains the commonest metal used. Quantifying it more precisely will be a Stage 2 task as it is then that it will be possible to work with the weights of the cleaned items. It will also be possible to have a better understanding of how many items the die-impressed sheets and reeded strips represent. Copper alloy continues to have a low representation. It is present forming the cores of some pommels capped with gold, and is also present amongst the hilt-rings, sword mounts and as elements of hilt-plates, but always in very low quantities²⁰. Of particular interest are the three fragments that come from a single gilded copper alloy harness roundel found separately in 2009 and 2012 spatially outside of the focus of the hoard. This appears to share the cast early Insular interlace decoration seen on the silver round-backed and tall cocked-hat panels. The significance of this will be returned to in the next section.

A major focus of Stage 1 was the exploration of the gold content in the items²¹. A fundamental aim was to explore whether surface XRF could be used to generate the data that could be used in the gold-value strand that was planned for Stage 2²². The results of the pilot study which investigated that indicated that it could not because there appeared to be deliberate surface enrichment of the gold / surface depletion of the silver²³. The copper depletion was shown to be what could be expected due to the burial environment. The silver depletion was greater than what is normally expected.

The possibility that the silver depletion was the result of the burial environment could be ruled out as it was possible to explore one piece

²⁰ Appendix 2, sections 2.1, 2.4, 2.8, 2.19.

²¹ PD 2013 section 15.8, Appendix 3 here.

²² PD 2013 section 15.11iii.

²³ Blakelock 2013.

(K1221) which had ancient damage judged by the uniform patina. These analyses revealed a similar silver composition on the surface of the scratch to that of the underlying core, i.e. the pre-burial damage had cut through the surface enrichment layer seen elsewhere on the surface. Only a reduction in the copper content was seen on this damaged area. If burial corrosion was the only reason for the depletion in silver (and copper) seen on the undamaged surfaces of other pieces, this scratch would have been expected to show the same depletion in silver as elsewhere on the surface of K1221, but that was not the case.

These results lead to the second stage of the analytical work being focussed to explore this, to see whether it was consistently encountered. Additional resources were invested by both EH and the BM to extend the contract of the metal scientist working on this strand, and to widen the range of data being examined to include military items from other sites, female jewellery and coins as well as the military and religious items from the Hoard²⁴. The range of items were selected by Chris Fern with input from Leslie Webster to cover the date range of the Hoard so that any change with time could be explored.

In total there are now 578 surface and sub-surface analyses which is an unrivalled data set. The results have been analysed and papers prepared for submission to *Archaeometry* and the *Journal of Archaeological Science*. Once these have been through the refereeing process, the research reports will be made available via the BRA and Hoard websites early in Stage 2. Here some preliminary remarks are appropriate. The surface enhancement/depletion was shown to be a deliberate and regular result of manufacturing with some differences being noted between what may be termed the core gold elements and the applied ones (filigree wires, cell walls etc.). There is no association with date and there are intriguing hints that coins and female jewellery may have undergone more surface enhancement/depletion than other categories, i.e. the gold they were made from was less pure to begin with. These results are very important not just for the work in Stage 2, but more widely for people analysing gold, as this is more normally done via surface analysis. This may well be giving incorrect results if it is the core gold composition that is required.

No further analytical work has been carried out on the garnets during Stage 1 but a range of other materials have been identified. Stage 1 incorporated the ongoing analysis of selected materials at the BM which was already underway when it started²⁵. In addition, the analysis of a textile found during the cleaning of a hilt collar was funded via a small contingency budget held by the Project Manager. This was found to be linen²⁶.

²⁴ PD 2013 section 15.8iv with additional details in Cool 2013b. The project is extremely grateful to the authorities at the British Museum for both allowing some items in their collection to be sampled and for partly funding the work. The Potteries Museum and Art Gallery also kindly allowed a pendant they own to be analysed.

²⁵ PD 2013 section 15.8v.

²⁶ Cartwright 2013a.

The originally planned work has resulted in the identification of various macro organics²⁷ including horn inside two pommel caps and associated with two hilt-plates. One pommel had a wooden core (*Fraxinus excelsior*) and wood was also associated with one of the hilt-plates that had the horn (field maple – *Acer campestre*). Both horn and wood (*Fraxinus excelsior*) were found inside a silver fitting enclosing an iron bar that may be the arm of a processional cross²⁸. Hornbeam (*Carpinus betulus*) was associated with another silver fitting that currently awaits typological examination as it has been at the BM during Stage 1. There is further potential for the identification of organics as an additional 31 items with organic material were identified during the conservation and cataloguing, and these await analysis²⁹. The work in the BM has also identified beeswax, animal gum and plant gum as the materials which were used in the cloisonné objects³⁰.

The niello has also been identified and been found to be a silver sulphide (Ag₂S) niello³¹. This is not unusual where it is used on the gold objects as that is the normal pattern on that material at the time. Where it is unusual is that it is also the type used in the silver niello suite. Previously the niello on Anglo-Saxon silver has been found to be stromeyerite (AgCuS) niello. Such a finding emphasises how unusual this suite is.

Other inlays at present remain unidentified and intriguing. Foremost amongst these is the mystery ‘green’ or ‘off-white’ material found in the cells of artefacts like K660. So far the analytical techniques tried have failed to identify its composition³². If resources allow, the identification of this material is felt to be of high priority³³. Susan La Niece (*pers. comm.*) has pointed out that in old museum collections it is not unusual to find empty cells which might once have contained material like this. Under older conservation regimes the gold would have been cleaned for exhibition in a way that might well have removed any evidence for it. The approach taken in the careful cleaning of the items of the Hoard to preserve as much information as possible for further analysis³⁴ provides a unique opportunity to explore this hitherto unknown type of cloisonné inlay.

4.6 What is the date of the hoard

The date range of the Hoard has not changed greatly during Stage 1 and it is considered that the majority of the finds fit with the material culture of the first half of the seventh century. The latest items are the mid-seventh century group of silver round-back and tall cocked-hat silver pommels and associated fittings with early Insular decoration. Fern discusses this in greater detail in Appendix 2³⁵. He also draws attention to the fact that the gilded copper alloy harness mount found at a little distance from the focus of the hoard is contemporary

²⁷ Cartwright 2013b.

²⁸ Appendix 2 Section 2.17.

²⁹ Appendix 2 Section 6.

³⁰ Steele and Hacke 2013.

³¹ La Niece 2013..

³² La Niece 2013, 4.

³³ See Section 14.8ii here.

³⁴ Appendix 1 Section 1.1.

³⁵ Appendix 2 Section 8.

with the latest items in it. Hardly any items earlier than those of post-medieval date have been found in the field. Given this virtual sterility of the field with regard to first millennium finds, it would be a remarkable coincidence if this piece was deposited entirely independently of the Hoard deposition. Fern is surely right in saying that a connection between it and the actual deposition of the Hoard is a possibility. Many might conclude it was more likely to be a probability.

The deposition date of broadly the mid-seventh century for the deposition of the Hoard is, as Fern notes, at some odds with some suggestions for the dating of the strip with biblical inscription. Authors who have commented on this have dated it variously to *c.* 600 and the eighth century. Fern points out the following:-

‘However, its (empty) gem-setting with filigree collar and zoomorphic surround, and even the niello inlay to its lettering, all indicate manufacture in keeping with other hoard objects’

The importance of this observation will be returned to below.

5 The Potential of the Hoard to aid Knowledge

5.1 Introduction

In the project designs for the Stage 1 analysis, five areas of potential were identified³⁶. The viability of these will now be assessed in the light of the Stage 1 work and how they will be integrated into the revised publication synopsis (Appendix 7). The original five will be considered under the headings used in the original PD. An additional one will be added at the end.

5.2 The Hoard as an artefact - exploring depositional practices

In the original project design it was suggested that the concept of artefact biography would be a useful tool to explore why the Hoard might have been deposited. Attention was also drawn to the various models that have been proposed of why bullion might have been deposited.

The work on the objects so far has shown that the concept of artefact biography will indeed be helpful in studying it. It has been possible to record the degrees of wear on the cleaned items which will tell us about the life of the artefacts prior to their disassembly. From the marks associated with the removal of the pieces from their parent objects it is possible to study the way in which those were destroyed. In some cases, such as the snapped arm of a pectoral cross, Fern has suggested the damage may be iconoclastic³⁷. Systematic comparison of the different types of damage on the different classes of artefacts might well cast light on the nature of the destruction, which will in turn help us to decide which, if any, of the current hoarding models the Staffordshire Hoard fits into.

³⁶ PD 2013 Section 6.

³⁷ Appendix 2 Section 3.

The recovery of additional pieces of the gilded harness roundel in 2012 provides a little additional information that will be helpful in evaluating the nature of the deposition. The first fragment found in 2009 was stated to have been found c. 100m from the focus of the Hoard³⁸. The two pieces from the 2012 survey were recorded as having been found 40m NE and 60m SE from the original Hoard find spot. It was observed in the case of the 2012 finds that the separation could not have been the result of recent ploughing as that was in a different orientation. It was noted that they were close to the former field boundary, and it was suggested that their distribution might have been influenced by movement along the associated ditch during maintenance³⁹. It does seem likely that the field saw two contemporary acts of deposition. The fact that the second one was of base metal rather than precious metal, and from a functional type (harness fittings) which does not feature in the Staffordshire Hoard as normally defined, may well be important for our understanding.

This will feed into several parts of the final publication, primarily in the discussion of the artefacts themselves in Part One, and in the discussions of hoarding practices, its place within contemporary society and what the hoard might mean in Part Two.

5.3 The Hoard as art – re-writing decoration

It was always known that the Hoard would make a considerable impact on studies of seventh century art, and the Stage 1 work has confirmed this. As was anticipated, additional examples have been discovered as the material has been cleaned, more than doubling the known amount of objects with Salin Style II known from England. Whilst this may not re-write what is currently known, it would certainly lead to a fundamental re-appraisal of this topic. The scope for iconographic studies too can now be seen to be considerable, as new patterns have emerged.

What had not been anticipated in the original PD was the important group of silver artefacts with non-zoomorphic Insular interlace. The Hoard may provide some of the earliest instances of this known, which will have important consequences for the study of that style as well.

This aspect will be considered primarily in the section on art and image in Part One of the final publication, but will also have an input into the consideration of the Hoard's date there.

In the original project design it was noted that, closely associated with the potential the Hoard had for art style studies, was the potential it had for informing us about Anglo-Saxon craftsmanship at its highest level. This belief has been confirmed and indeed results of Stage 1 have surpassed our expectations. No-one had anticipated that the goldsmiths were deliberately enhancing / depleting the surface of the gold. The fact that there might be a gender difference is fascinating and worthy of a research project of its own. Alas, it is not possible to explore this within the confines of this project as the

³⁸ PD 2013, 90.

³⁹ Palmer 2013, Sections 9.2-3, fig. 8. See Section 4.5 here.

Hoard is resolutely male. There can be no doubt, however, that the Stage 1 results will play an important role in any such future project carried out by others.

The question that arises from the discovery is how was this effect achieved? Here the Hoard does have the potential to contribute to the answer as it is so large that samples for metallography could be found. The Owners have shown themselves open to requests for sub-surface analysis, and have themselves explored the possibility of such research. A limited programme to explore this will be possible in Stage 2⁴⁰, but this may be a useful area for future research projects.

Apart from exploring this technique there is certainly potential for exploring different workshop practices during Stage 2. The work so far has regularly recorded differences in manufacture that could be interpreted in that way, both in the cloisonné and in the filigree⁴¹. There are for example different construction techniques used for similar artefacts and some use layout marks.

This aspect of the potential will be fully explored in the making the objects section of Part One of the publication.

5.4 The Hoard as history – the origins of Mercia

The original project design was cautious about the potential the Hoard had for exploring the origins of Mercia. It did suggest that should different and distinctive decorative styles emerge, then a case could be made for it demonstrating the demand from a princely elite possibly based in Mercia. Stage 1 has suggested that different regional traditions are present⁴², but to what extent any of them can be linked with Mercia itself will have to await the detailed cataloguing and typological work of Stage 2. It could be significant in this respect that so many unique objects have emerged from the Hoard. When this is paired with features such as the unusual type of niello being used on them, this might well suggest that there could have been a local input. Again, though, this can only be explored via the typological work of Stage 2.

The confirmation that the Hoard was deposited in the mid seventh century (see 4.6) places it at a pivotal point in the history of Mercia. The historical context includes that of the formation of the Mercian kingdom and the apparent cross-over from British to Mercian control, possibly through cooperation and integration of British and Anglo-Saxon interests. There is some evidence to suggest that Lichfield may still have been under the control of a British religious community in the 630s and it apparently only became the Mercian see in the 660s. The recovery of the Hoard close to the known early Mercian centres of Lichfield and Tamworth opens up intriguing avenues of research. When the full extent of the cultural connections of the pieces becomes apparent during the work of Stage 2, it is possible that inspecting the Hoard in the light of the what was happening in the region and more widely,

⁴⁰ See 14.8v.

⁴¹ Appendix 1 Section 1.1; Appendix 2 Sections 4.2-3.

⁴² Appendix 2 Section 4.3.

may help us understand it more and the reasons for its deposition. And, of course, the Hoard itself may illuminate the early history of Mercia in turn.

This aspect of the Hoard will mainly be considered in the context of the Hoard section of Part Two of the publication, but will also feed into the what does it mean section there.

5.5 The Hoard as economy – the gold standard

The exploration of the gold composition was originally instigated for two reasons⁴³. Gold fineness had traditionally been used as a dating tool at this period, though analysis of other objects was starting to indicate that the picture was not as simple as once thought. Secondly, it was clear that the Hoard could provide useful data for exploring whether or not a bimetallic system was in place in seventh century England. It was felt that the silver would have less potential to contribute because of the extreme fragmentation it exhibited.

An unrivalled body of seventh century gold fineness data is now in place. It has supported the view that using such measurements to date items is not clear-cut. The potential of the data to help date the Hoard is limited, though obviously it will have an important role to play in the wider debate about using gold fineness for dating. Discussions have been held with John Hines about whether the phenomenon of the surface enrichment / depletion would be problematic for his proposed work on bimetallism. It is felt that it will not be, so this area of potential remains to be explored in Stage 2.

The work of Stage 1 in re-uniting objects that join means that there is now more potential in the silver as well. This is especially the case with the silver pommels. Over 20 have been identified, and their decoration means that they will be able to be assigned to an early or late date band within the Hoard. This has the potential to add well-dated silver fineness data, and so a more rounded investigation of the bimetallic system can be conducted.

All of this will be discussed in the Hoard and Society section of Part Two of the publication.

5.6 The Hoard as worth – value then and now

When the original project design was written, it was suggested that one of the important areas where the Hoard had potential to inform debate was in tracking the changing public attitudes to finds such as this. The response to its recovery had been phenomenal, and had resulted in the development of a regional identity that have been virtually unknown up to that point.

This response has continued. The conservation outreach programme run by the BMT and detailed in Appendix 1 section 3, provides a good illustration. A few additional examples can be given here. The Mercian Trail Community Touring Exhibition, which is running from August 2013 to the summer of 2016, has been received enthusiastically by people in the region⁴⁴. This has been organised by the Staffordshire Museums Service with a grant of £85,000

⁴³ PD 2013 Section 6.5.

⁴⁴ Anon 2014.

from the Heritage Lottery Fund. It takes a small exhibition of replicas of the Hoard, with information about the find and interactive exhibits, to small venues such as community centres and libraries in the region. In the five months to the end of 2013, over 16,000 people had been to see it at five venues.

The Hoard has also been the inspiration for various artists. Perhaps one of the most interesting responses with reference to local reactions to the Hoard is the Staffordshire Hoard Community Quilt. This is a series of panels consisting of individual squares embroidered with themes inspired by the Hoard. It came about when Adult and Community Learning at Stoke-on-Trent invited local sewing enthusiasts to produce the squares and send them in. It has been on display in various venues in the region in 2013 including the Dudson Centre, Hanley, the Burslem School of Art and in PMAG itself⁴⁵. The response by local knitting enthusiasts group Ripping Yarns in producing interpretations of the Hoard which were exhibited at PMAG can also be noted⁴⁶. Archaeological finds do not normally enthuse their local communities to get busy with their needles.

There can be no doubt that the Hoard has the potential to be an extremely interesting case study for a wide range of people far beyond the archaeological world addressing issues of regionalism, identity and in the long run the economic benefit such finds can bring. This aspect will be explored in the 'Afterword' section of Part Two of the publication

5.7 The Hoard as a window – new perceptions of the seventh century

When the Hoard was first discovered there were many diverse claims for what the impact of the discovery was going to have on the interpretation of the seventh century. Now that Stage 1 is complete, and we have a much better view of what it consists of, it is appropriate to say that it will revolutionise some aspects of our knowledge of the period. The sheer scale of the new and often unique types that it contains, and the unsuspected craft practices that are being revealed, will definitely lead to major re-interpretations in various areas. This aspect of the research will emerge throughout the publication.

6 Research Aims and Objectives

6.1 Introduction

The research aims originally scoped⁴⁷ are still valid. The overarching one was set as making the details of the find available to both the scholarly community and the general public as promptly as possible within the bounds of good scholarship. This remains the case. Should the timetable described later in this document be adhered to, then it is quite possible for the final publication to be available in 2018, allowing for refereeing, copy editing and production. This would be approximately nine years after its discovery and would be a

⁴⁵ Burslem - <https://www.facebook.com/AdultLearningStoke/posts/556233757733373> ; Hanley - <http://twicsy.com/i/aziYTd> – these and all other URLs check 3rd November 2014.

⁴⁶ See Staffordshire Hoard Newsletter 6 (December 2013), 9.

⁴⁷ PD 2013 Section 7.

considerable achievement for all concerned. It would compare very favourably to previous Treasure finds. The Hoxne hoard of late Roman plate and coins found in 1992 was used as a comparison in the original project design to show the difference in expectations that the Owners of the Staffordshire Hoard had had to deal with⁴⁸. That hoard is also a useful index of how long it can take to publish Treasure finds, as the final volume which published it did not appear until 18 years after the discovery.

Whilst the aims remain the same, it is useful here to assess what progress has been made to achieving them. The original project design forecast the following⁴⁹

By the end of Part 1, we will be able to answer most of the questions surrounding what it consists of (6.2) and when it was deposited (6.3). It is to be anticipated that further refinement will occur during the second part from the detailed art style studies that will be deferred until then. Most of the work relating to why it was deposited (6.4) will be deferred until Part 2. We will have some answers about what it tells us about seventh century life by the end of Part 1, most notably those relating craft and manufacturing issues. Importantly in relation to this is the fact that much of the information BMAG will need to inform its new permanent gallery will be in place. This is due to open 2014 in and is concentrating on the scientific and conservation aspects of the Hoard. Some of the aspects that will feed into 6.6 will be in place but clearly work on that aspect can only be completed at the end of the full project.

6.2 What does the Hoard consist of?

As outlined in 4.2-3 here we now have a much better knowledge of how many things are in the Hoard, what they are, and what they are made of. There are still gaps in this. The die-impressed sheets and fluted strips have yet to receive typological study and so understanding them will be a Stage 2 task as always planned. Moving the grouping exercise into Stage 1 has meant that we are far further along the road to being able to answer the question ‘what does the Hoard consist of’ than originally anticipated. Naturally, though, the detailed typological work proposed for Stage 2 should enhance our knowledge and might even identify what purpose some currently mysterious objects served.

6.3 When was it deposited?

A mid-seventh century date for deposition has been established through study of the decoration, with most of the material belonging to the first half of the century and only a little possibly being of late sixth century date (see 4.4 here). Wear has been noted on objects and during Stage 2 the systematic study of this will enable questions of over what length of time the Hoard might have been assembled. If, for example, the typologically older objects show heavy wear it

⁴⁸ PD 2013, fig. 4.1.

⁴⁹ PD 2013 Section 7.1. The numbers of the sections have been replaced with those used here for ease of reference.

could be suggested that the whole body of material was collected and dismantled in a single event.

It was tentatively suggested in the original project design that the dating of the inscription on the gold strip, now interpreted as being a cross arm, might help refine the date. Fern's study of the decoration and construction of the piece now makes this unlikely. Indeed the comparisons it has with the majority of the material seems to make it more likely that the deposition date for the Hoard is likely to have implications for the dating of the epigraphy. It was also doubted originally that radiocarbon dating would be of any use in helping to refine the date. This has been confirmed as, though organics have been found, the wood is of long-lived species⁵⁰ and so inappropriate for such use.

6.4 Why was it deposited?

This remains an aim to be fully explored in Stage 2. A few hints have started to emerge in Stage 1. Fern's suggestion that some dismantling was almost iconoclastic destruction will be a new strand to explore in Stage 2, and the possibility that there may have been two separate deposits will also be of use in answering the question (see 5.2 here). The fact that it was deposited at a time of transition in the Mercian region (see 5.4) may also have a part to play. There can be a variety of reasons for depositing items and taking them out of everyday life, and one can be that they are best consigned to the gods because of the power they represent. A period when a new political entity is coming into being is likely to be a period where there is disquiet and uncertainty, and these may seek outlet in unusual patterns of behaviour. Placing the Hoard within the political and religious historical context of the mid seventh century may help this question be explored.

6.5 What does it tell us about seventh century life?

Much of the work towards answering this question will be carried out in Stage 2 as planned. Some of the results of Stage 1 that will contribute to it have raised new research questions such as how did the seventh century goldsmiths achieve the surface enhancement / depletion. There will certainly be major contributions to understanding workshop practice. It also seems likely that regional difference within the material may be discovered.

The range of insights are likely to be both ones primarily of interest to the scholarly community, but also ones that will fascinate a wider audience. It had previously been observed that the wear on Anglo-Saxon pommels was often noted on the top of them. This would not come about through active use of the sword as a weapon. It would come about if the owner consistently rested his hand on top of the sword whilst it was in its sheath. The Hoard has overwhelmingly confirmed this. So, far from a vision of fierce fighting Anglo-Saxon soldiers, we can have the picture of elegant men posing to display their flashy weaponry. This is possibly not the sort of insight originally scoped, but is undoubtedly something that catches the imagination and brings the lives of these items and of their owners vividly into focus.

⁵⁰ Cartwright 2013b, 8

6.6 What can we learn from the experience?

Originally this aim was designed to exploit the potential as described in **5.6** above. That remains viable and evidence that will be useful to explore it continues to accumulate. We can now add another strand to this. Much has already been learnt much about what can be viewed as best practice when it comes to organising projects such as this using jointly owned material, balancing the sometimes conflicting demands of exhibition and research, and developing a collegiate working atmosphere. All of this will be put to good use in Stage 2, and the lessons learned may well be of use to future projects with similar problems.

7 Business Case

The business case for funding the research project remains the same as it was at the outset of the project⁵¹. Funding Stage 2 will continue the process that started when EH agreed to fund the excavation which recovered the Hoard in 2009 under SHAPE sub-programme 32144.110: Heritage at Risk: Recording historic sites, buildings and monuments under imminent threat outside the planning process. EH has since funded the Assessment and the Stage 1 analysis at a total cost of over £430,000. In addition it also funded the survey work in November 2012 which resulted in the recovery of the additional parts of the Hoard (EH Project 6611). Now that these have been acquired by the Owners through the generous donation of £57,395 from the jewellers Wartski, these pieces too come within the purview of the research project. The Stage 2 research scoped here will be the final stage in reaping the research dividend that all this investment has sown.

In the original project design attention was drawn to the fact that this knowledge dividend came not only from EH, but also the large investments of the Owners through the generous donations of such organisations as National Geographic TV and members of the public. It also pointed out that this research feeds directly into EH's core function. As it says itself, it 'exists to help people understand, value, care for and enjoy England's unique heritage'⁵². It is appropriate here to draw attention to the continuing investment in Hoard-related activities and the continuing desire of people to understand the Hoard.

To take the final point first. The Mercian Trail Community Touring Exhibition (see **5.6** here), has explored visitor reaction to the exhibition. It was noted that there were two subjects that were asked about by a significant number of the visitors. They wanted to know more about how the objects were made, and they wanted to know more about possible theories for why the Hoard was buried. Both of these are questions that the research project will be able to go a long way towards answering by the end of Stage 2. It is not too much to assert that the results from the research project will be the foundation upon which all of the activities of the wider Hoard Programme will ultimately be built.

⁵¹ PD 2013 Section 8.

⁵² <http://www.english-heritage.org.uk/about/who-we-are/how-we-are-run/what-we-do/>

The research project is thus essential if the knowledge dividend from all of the wider investment is to be released. This wider investment has been considerable in the two years that Stage 1 has been running. In addition to the £85,000 it gave for the community touring exhibition, the Heritage Lottery Fund has also given £700,000 to the BMT for their permanent Hoard gallery that opened in October 2014, and £40,000 to PMAG for their 2012/3 Hoard exhibition. Arts Council England has awarded PMAG just over £163,000 for a project which will create and deliver a touring exhibition, *Swords and Fire*, based on the Hoard⁵³, and has also given £6,000 for their current exhibition on the Anglo/Saxon Kingdom of Mercia. All of these exhibitions and this investment of nearly one million pounds, make use of the results that are accruing from the research project, and this process can be expected to continue. Indeed it is to be anticipated that team members will have an increasingly direct input to this. As an example, a special edition of *West Midlands History* was published to coincide with the opening of the BMT gallery. This had a supplement on the animal art of the Hoard entitled *Beasts, Birds and Gods* written by Chris Fern and George Speake, two of the team members. This is now sold by BMT to raise funds for the Hoard Programme.

These are what might be termed the direct museum-type investments, but it is interesting to note also the investment on the artistic side that the Hoard has inspired. This has been very diverse. So far Arts Council England has funded the ceramic figures by Catherine Morling at PMAG as part of the Olympic celebrations (£70,000)⁵⁴, and a fantasy short film *The Last Dragon Hunter* currently part of the exhibition at PMAG (£10,000)⁵⁵. It has also recently been announced that it is awarding the New Vic Theatre, Newcastle-under-Lyme, £198,000 for a theatre festival in the summer of 2015 called *Behold* which will attempt to tell the stories of the Hoard⁵⁶. Although the academic research was not intended to have artistic outcomes, it can be noted that some of the stories it can tell may well end up on the stage.

The sum needed to complete the research as outlined in this document is very large, but it is an investment which the Owners, EH, the local area and its inhabitants, the wider national and international academic communities, and indeed the artistic communities, will be benefitting from for years to come.

8 Project Scope

The scope of the project in general remains as described in the original project design⁵⁷. Stage 1 can be seen as a very large assessment to establish what is in the Hoard and to confirm that the proposed avenues of research were viable. In Stage 2 the research leading directly to the final publication will be undertaken and completed. The final product will be a digital and letterpress ‘manuscript’ ready for external refereeing. This project costs for the text and illustrations. It does not include any post-refereeing costs.

⁵³ <http://www.artscouncil.org.uk/news/arts-council-news/million-pound-investment-midland-museums/>

⁵⁴ <http://katharinemorling.co.uk/projects/morling-and-the-hoard>

⁵⁵ <http://www.chrisstonefilms.com/portfoliodragon.html>

⁵⁶ <http://www.britishtheatreguide.info/news/ behold-new-festival-inspired-3089>

⁵⁷ PD 2013 Section 9.

As before it does not include any additional fieldwork. That undertaken in November 2012 was outside the scope of this project and funded separately.

9 Interfaces

Some up-dates on the interfaces of the project are appropriate⁵⁸. Stage 2 now follows Stage 1 and the position within the overall Hoard Programme is shown in the organisational chart provided here as Appendix 6. This replaces the chart given in the original project design as Appendix 4. The interaction with the rest of the programme will be via the Programme Co-ordinator as before.

Two of the projects noted originally where interactions would be useful have been published (dating Anglo Saxon graves and the coin gold content survey), and the team is now working from the published volumes⁵⁹. The other projects are still running and interaction will proceed where appropriate during Stage 2.

A new project may be added. This is the AHRC-funded *Crisis or Continuity. Hoarding in Iron Age and Roman Britain with special reference to the 3rd century AD* project being run jointly by the University of Leicester and the British Museum⁶⁰. Its aim is to understand why so many hoards were buried in Britain in the Iron Age and Romano-British periods. It has obvious relevance to the attempt this project is making to place the Staffordshire Hoard within a wider context (sections **14.11** here). Professor Colin Haselgrove who is a co-investigator on that project is also a contributor here.

HMG are currently planning a popular publication to be produced during 2015. It will draw primarily on the results of Stage 1 and it should be possible to include some additional Stage 2 results relating to the work on the die-impressed sheets (see **14.5iii**). The team will liaise closely with the author once appointed and the timing of some tasks, such as an early production of a reconstruction drawing of a sword or seax, may be adjusted so that the work can feed into the popular publication.

The Project Co-ordinator has drawn up a timetable for the production of this which sees it as five stage process running from December 2014. This timetable is presented here as Appendix 10 and is summarised in fig. 9.1. The detailed planning are taking place from December 2014 to March 2015. She and the Project Manager will liaise during January and February 2015 to timetable the input that will be needed from the research project and team. The progress of this will be reported to HMG and EH via the channels outlined in **10.5**. The time critical point stage is the second one which includes the photography of research activities. This is due to run from April to July 2015. During that time it is hoped to photograph the research team carrying out activities connected with Products 20-24. The research results this popular book will mention were those completed in Stage 1. The only new work likely to be incorporated are results from Products 21 and 24 as it is hoped to include photographs of some of the joined foils.

⁵⁸ PD 2013 Section 10.

⁵⁹ Bayliss et al 2013; Gannon 2013.

⁶⁰ <http://www2.le.ac.uk/departments/archaeology/research/projects/hoarding-in-iron-age-and-roman-britain>

The full timetable for the Stage 2 research is shown in figs. 15.1-4. Fig 9.1 here includes the key research tasks relevant to the production of the popular book (in green). As can be seen there is a two month window of opportunity when all the tasks needed for Stage 2 of the book will be running together. The new work needed for Stage 3 will in part have been completed before it starts (Product 24 – sheet grouping) and in part will be finished during Stage 3 (Product 21 – conservator 2 for sheet)

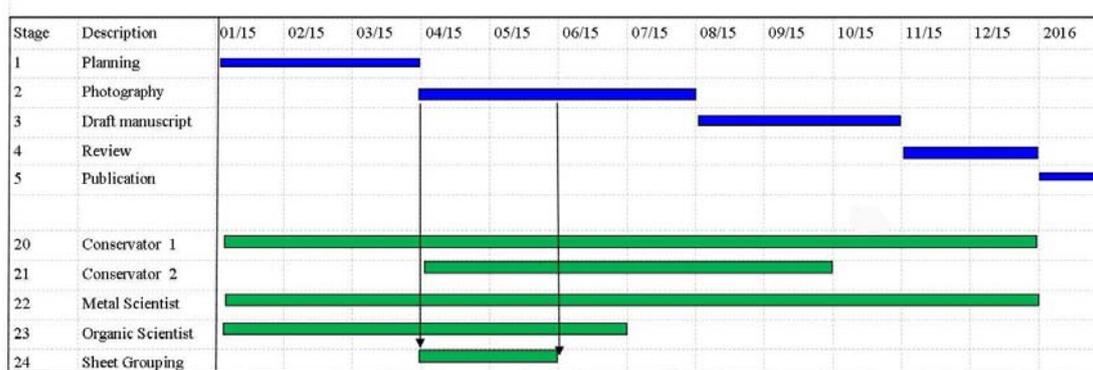


Fig. 9.1. The interaction between the stages of the popular book (shown in blue) and the relevant research products shown in (green)

10 Communication

10.1 Introduction

The definitions of the different components of the team remain as in the original project design⁶¹. The various communication methods outlined originally have worked well, and are reviewed and up-dated here. During Stage 2 it is anticipated that in addition to the email and telephone conversation communications within the team, additional use may be made of such techniques as Skype.

Discussions between EH and the Owners are currently ongoing about the appropriate form of wording and use of logos for all outcomes of the research project. BRA will ensure that both EH and the Owners are appropriately recognised in all newsletters, media announcements, and publications drawing directly on the results of the project.

10.2 The secure website

This has been working since the summer of 2013. How it is now working is outlined in section 14.4. Here it is sufficient to say that it allows all team members to access all of the data. The team have experienced no problems in using it. The museum personnel have also reported that it has been useful to them as it now provides detailed descriptions of all the pieces. This information had not hitherto been available to them. The secure website will continue to play a central role in the communications between the team in Stage 2.

⁶¹ PD 2013 Section 11, Section 11.1 for definitions.

10.3 The newsletter

During the life of Stage 1, seven Newsletters have been circulated to keep the wider team informed of what the different strands are doing. They have been a very useful tool, not only for the team itself, but also as a means of providing information to the wider world. There is a small mailing list of people who have expressed interest, but a much larger group would appear to access them via the web. They are placed on the BRA website in a downloadable form where they regularly attract attention. Newsletter 5, for example, was issued in June 2013 and in the following year had received almost 4000 hits. As there is no particular optimisation in place to draw attention to their availability there, this was both a surprising and encouraging discovery.

It is proposed to continue issuing the Newsletters in Stage 2 at a rate of about two a year. This has been found to be an optimum spacing. It does not add to the contributors workload unduly, and allows progression to be seen.

10.4 Project team meetings and other meetings

During Stage 1 three project meetings were held. The first two (October 2012 and May 2013) were attended by the core team and the academic editors. At the third in March 2014, the core team was joined by members of the wider team. Members of HMG and RPAP together with invited participants from the wider Anglo-Saxon scholarly community also attended. These meetings proved invaluable. During the first two important relationships between the different team members were built up. This was important in a team that was based in different parts of the country, had not known each other previously, and needed to collaborate across the different strands if the best use of the resources was going to be achieved. The team collaboration that has gradually developed is extremely good, so much so that as time has progressed the team works well together without the prompting from the Project Manager. In my experience of managing other projects this is rare. So if only for that reason, the core team project meetings can be judged a success. In addition though, these were the meetings where the direction the research would take in Stage 1 was decided and resources were re-focused following discussion. The third meeting was useful for informing all the stakeholders of the results of Stage 1 and for refining the publication outline as it is now presented in Appendix 7.

For Stage 2, one project meeting is planned in April / May 2016. This will be for the team and academic editors only. If resources permit a second day could be added to this in the form of a seminar/conference to which a similar audience to that invited to the third project meeting of Stage 1 could be invited. If held in the lecture theatre at PMAG it would be possible to allow other people to attend as well. The aim would be for the team to present their results and thinking to that date and invite comment. If this took place, the team only meeting would be held on the day following to discuss the work, reflect on the comments of the previous day and to prepare for writing the final versions of their contributions which should by then already have been drafted. The first day of this could provide the Owners with an opportunity to gain additional publicity and, if thought appropriate, invite some of the individuals and organisations who have contributed to their appeals.

There will also be other meetings of smaller sub-sets of team members throughout Stage 2. The main series is that involving the Academic Editors and the Project Manager. Ideally these will take place once every six months to revise the final publication plan as appropriate, and to keep track of the stories that will be emerging from the research. That timetable though relies on additional resources being raised through fund-raising. The most important ones would be the one at the start of Stage 2 (February 2015) to fine-tune the publication synopsis given in here in Appendix 7, and ones from the spring of 2016 onwards as the draft reports and contributions start to accumulate.

A meeting is also timetabled for the summer of 2015 for those team members who will be involved in the workshop practice / object biography strands (see **14.9ii**) to co-ordinate their work. Other ad hoc meetings will be convened by the project manager as and when needed, as has been happening during Stage 1.

10.5 Communication with the Executive

The Project Manager will communicate with the Executive (which will be EH) via the PAO in both the formal Highlight Reports and Project Assurance meetings, and informally as circumstances require. The communication with HMG who act as the Project Board will be via the Programme Co-ordinator with whom the Project Manager will liaise. The Project Manager will provide summary highlight Reports for each HMG meeting in the intervals between the main ones prepared for EH. This will keep the HMG abreast of developments and progress every two months.

Section **16.4** provides details of how information about the fund-raising that this project will require will be reported to both EH and HMG.

10.6 Communication with the public

During Stage 1 team members have presented results regularly in a variety of media. The Birmingham conservators have continued to develop their outreach programme very successfully and this has been internationally acclaimed as a model of good practice, being awarded the Archaeological Institute of America's Conservation and Heritage Award⁶². Team members have given public lectures and contributed to popular articles about the Hoard and its research. This has included articles in the popular magazines *British Archaeology* in 2013 and *Current Archaeology* in 2014⁶³. As noted in Section **7**, the team has also made a contribution to the special issue of *West Midlands History* published to coincide with opening of the new BMT. The public interest in the Newsletter has already been noted (see **10.3**). This range of activity will be continued and developed in Stage 2.

10.7 Highlight reports

Within Stage 1 four scheduled Highlight reports have been written by the Project Manager for EH and HMG, and an additional one was submitted when it became apparent that some re-alignment of the project was needed in the

⁶² See Appendix 1 Section 3 for full details.

⁶³ Klemperer 2013; Hilts 2014.

autumn of 2012. Full Highlight reports will continue to be produced during Stage 2 according to the timetable set by EH, with additional ones if the Project Manager thinks they are appropriate. They will include information about the progress of the fund-raising (see **16.4**) These will be in addition to the mini reports for HMG prepared at two monthly intervals (see **10.5**).

11 Project Review

11.1 Introduction

The original project design⁶⁴ anticipated that because the Hoard had never been the subject of a formal assessment, it would be necessary to keep progress under constant review and, if necessary, move resources from one strand to another. This is indeed what happened with a part of the photography budget being re-directed when it was appreciated that photography would need in the main to be deferred until Stage 2. A similar attitude will be taken in Stage 2, but now it is much easier to scope the individual tasks as has been done in Section **14**.

Stage 2 will suffer from a new area of uncertainty brought about by the need to fund raise for a significant part of the necessary resources. The way this will be kept under review is outlined in **16.4**.

11.2 Review timetable

A major point of review will be needed towards the end of 2015 to consider the progress of the fund-raising (see section **16**) and to decide which of the tasks prioritised there can be carried forward. This may necessitate fine-tuning the likely out-comes of the project. A second review point will take place after the team project meeting (see **10.4**) to ensure that the final reports are co-ordinated and ensure that any outstanding issues are addressed.

12 Health and Safety

The project will continue to be run in accordance with the Health and Safety Policies of BMT, PMAG, the BM, and BRA. Copies of these have already been deposited with EH.

13 Project Team Structure

13.1 Project Executive

There will be a change in the project Executive for Stage 2 consequent on the change of organisation receiving the grant aid. EH will now become the Executive with the HMG assuming the role of Assurance/Project Board. The RPAP will retain its advisory role to HMG and will be consulted by the Project Manager as needed as the project proceeds. It may be noted that as there has been no necessity for the Project Manager to discuss matters in person at HMG meetings during the life of Stage 1, it is assumed that this will continue in Stage 2. She would be available for meetings if HMG felt it

⁶⁴ PD 2013 Section 12.

necessary. It may also be noted that in their meeting on May 12th 2014, RPAP made plans for only two meetings of that group per year other than in exceptional circumstances⁶⁵. Since the appointment of the Programme Coordinator, the Project Manager no longer acts as secretary to the RPAP.

13.2 Project team

13.2i Introduction

This section provides brief up-dates where appropriate about the project team. In general the way in which the project is managed and the team remain as described in the original project design⁶⁶, and further details may be found there. Changes in personnel are noted here. For ease of comparison the same sub-sections will be maintained, though the input of some strands is now completed until final revisions for the publication are needed. As before brief biographical details of the members, including, where appropriate, links to their web pages have been gathered together on the Barbican web site via the Projects/Staffordshire Hoard links⁶⁷. This now includes details about the full team as well as the core team as previously.

As the project progresses, there is a danger that the loss of a key individual from the team could seriously delay it. This danger is considered in Risk Log 2.⁶⁸

13.2ii Project management and central services

This will be continue to be run through Barbican Research Associates as before. The team members who fall within this strand are Hilary Cool and Stephanie Rátkai (Project management), Bryan Alvey (secure website and database), Val Kinsler (copy editing) and Michael Baxter (statistical advice). This core team will be augmented by an illustrator (Ian Dennis) in the latter part of Stage 2 to produce distribution maps and other general illustrations for the final publication to a uniform standard across the different strands.

13.2.iv Conservation at BMAG

This has now undergone major changes in personnel. Pieta Greaves who has been the team leader since January 2013 will remain in post, and be responsible for quality assurance tasks. She will also contribute to the Legacy strand (see **14.12**). There are currently no dedicated Hoard conservators in post, but BMT have indicated they will appoint one for one year from the start of Stage 2. This will be the post 'Conservator 1' in section **15**. This project design requests funds for a second conservator to work with die-impressed sheets etc. This will be the post 'Conservator 2' in section **15** here. BMT have also received an award that enables posts to continue the analysis of the metal and the organics to be put in place (see **14.8**). These are 'EF Post 1-2' in section **15**. Eleanor Blakelock and Peter McElhinney have been appointed to these posts.

⁶⁵ Please see Appendix 8 Risk log 1.

⁶⁶ PD 2013 Section 14.2.

⁶⁷ <http://www.barbicanra.co.uk/section.php?xSec=42>

⁶⁸ Appendix 8.

13.2v *Conservation and Archaeological Science at the BM*

This strand of work has effectively been completed. The personnel will remain team members in the broad sense and the BM will send representatives to the team project meeting. They will also revise their completed reports as appropriate in the final part of Stage 2. Susan La Niece will continue to have an active analytical input in Stage 2 as she will be investigating the unusual green inlay (see **14.8ii**). Eleanor Blakelock moves from the BM to BMAG for Stage 2 and this will ensure continuity and comparability of approaches.

13.2vi *Typology and Research at PMAG*

The lead in the typology and research strand will continue to be Chris Fern, but there are some changes in the arrangements for Stage 2 to those originally planned. Instead of a fixed-term appointment in the second stage directly appointed by PMAG, the following will happen.

- George Speake will take over the responsibility for cataloguing, illustrating and preparing the typological discussion for the die-impressed sheets. This is in addition to his role in producing the animal art overview.
- Niamh Whitfield joins the team to assist Chris Fern in the production of the overview of the filigree.
- Hilary Cool will conduct the detailed recording of the cloisonné following on from the work reported in Appendix 5 here if resources allow.
- Use will be made of outside authorities as appropriate to comment and contribute if necessary to particular points.

Sam Richardson will continue in her role of providing administrative back-up at PMAG. As the only HER archaeologist based in either museum, Jon Goodwin will prepare the regional background survey drawing on all relevant sources. Alongside the Programme Co-ordinator and the Conservation Co-ordinator, Deb Klemperer will now provide a contribution to the legacy strand (**14.12**).

As originally planned David Ganz, Elizabeth Okasha and Michelle Brown were to provide epigraphic and palaeographic guidance on the inscribed strip⁶⁹. It may be appropriate to reduce the number of contributors depending on discussions with the publisher about available word length (see Appendix 7).

13.2vii *The excavation narrative*

This will be as originally planned. Alex Jones will prepare the narrative using the aerial photography study by Alison Deegan which has already been completed. The illustrations will be completed by Nigel Dodds and Suzy Blake will provide the GIS data needed. The Project Manager will compile such additional information for the November 2012 survey from the completed report⁷⁰. Henry Chapman will review the survey data produced by

⁶⁹ Richard Marsden has also agreed to assess the Merovingian sources.

⁷⁰ Palmer 2013.

both Birmingham Archaeology and Archaeology Warwickshire to ensure consistency.

13.2viii The invited contributors and commentators

This remains as originally planned. The personnel are:-

- Svante Fischer – Continental hoarding patterns (northern Europe).
- Peter Guest – Late Roman Gold hoarding UK/Empire.
- Matthias Hardt - Continental hoarding patterns (central Europe).
- Colin Haselgrove – Prehistoric UK hoarding.
- John Hines – gold value and military background.
- George Speake – animal and other art.
- Alan Thacker – Religious and historical background .

Discussions are currently ongoing as to who will write the contribution on early medieval material culture due to the resignation of the original choice.

In addition Barbara Yorke will provide a contribution on the possible implications the Hoard has for the understanding of Mercian history, and how the latter may help us understand the what drove the deposition of this group of material. This will be integrated into the into the religious and historical background.

Depending on resources (see section **16**), the consideration of the broad British background (by Professor Haselgrove and Dr Guest) may have to be shortened or omitted.

13.2ix The editors

The academic editors of the final volume will now be Chris Fern, Tania Dickinson and Leslie Webster with assistance from the Project Manager.

14 Methodology

14.1 Introduction

This section provides up-dates to the methodology as set out in Section **15** of the original project design. Our aim continues to be to deliver a programme of work ending in a publication that will provide a firm foundation for future research. Many topics that could be explored, such as the provenance of the garnets would be major projects in their own right and so are excluded for others explore once this foundation is put in place. We will attempt to start to answer some of the many questions that people ask about the Hoard. We are not aiming to produce the final definitive statement and indeed, for this curious group of material, definitive conclusions may never be reached.

A new publication synopsis has been prepared by the academic editors and this is given in Appendix 7. This section describes how the particular tasks contribute to the final publication, and what the likely balance between letterpress and digital publication will be.

HMG have indicated that they wish to draft the sections of the publication that deal with the fund-raising and the demands the Hoard places on the owners. This has not, therefore, been included in the methodology section, but will form part of the final letterpress publication⁷¹.

14.2 Background information

The methodology for gathering this information remains as scoped in the original project design⁷². With agreement of EH in 2012, the work was deferred until Stage 2. The bulk will appear in the digital part of the book with a briefer outline in the letterpress as appropriate⁷³.

14.3 Stratigraphic narrative

The methodology for producing the stratigraphic narrative for the excavations and survey in 2009 and 2010 remains as scoped in the original project design⁷⁴. It will make use of the aerial photography report that has already been completed during Stage 1. The full stratigraphic narrative will be presented in the digital section of the publication. A short synthetic overview will be prepared for the letterpress part⁷⁵. The wider archaeological community has sometimes had issues with how the original excavations were carried out, probably as a result of the extreme secrecy they were conducted in. The overview will address these concerns.

The survey work that led to the recovery of the additional items in November 2012 has already been the subject of a grey literature report⁷⁶. A summary of this will be prepared for the digital part of the publication and a small note prepared for the letterpress⁷⁷. A review of the survey data from both the 2009 and 2012 work will be carried out, and mapping the find spots of the material with known locations will combine data from both years.

14.4 Development and maintenance of database and website

The proposed work for this was detailed in the original project design as Section 15.4 and Appendix 2. The database was designed and implemented as outlined there, and has been in use since the summer of 2013. It stores the catalogue, images, analytical reports etc. that are the outcome of our research effort. It is a secure password protected area. Team members and stakeholders such as museum personnel have been provided with user names and passwords and have access to the information at different levels. These range from the right to access and alter everything, a right which is limited to the Project Manager and Bryan Alvey, to view only rights. Team members may upload and edit their data, and may down-load information from all parts of the team. Specific queries which generate reports on the data for the researchers have been written.

⁷¹ Appendix 7, section 2.2ii, 2.2xiii.

⁷² PD 2013, Section 15.2.

⁷³ Appendix 7 Section 2.3ii..

⁷⁴ PD 2013 Section 15.3.

⁷⁵ Appendix 7 Sections 2.2iii and 2.3ii.

⁷⁶ Palmer 2013.

⁷⁷ Appendix 7 Section 2.2iii, 2.3ii.

With the completion of Stage 1, an overhaul of the data captured will be undertaken together with an archive of the entire application in its current form. Some additions and revisions to the information captured are required as a result of the research undertaken in Stage 1.

The current catalogue field holds the descriptive notes for each K number and are the outcome of Chris Fern's work throughout Stage 1. For the final publication there is now the need to move to catalogue entries for the joined items. Fields will be added to store these. Following the grouping exercise, the fields that store the concordance information about which K numbers are joined to others have been cleaned and checked, and their associations recorded on the database. Further changes to the database have also been noted by the research team: these will be analysed, the functional specification amended, and the development work carried out in order to satisfy the new requirements. The upgraded system will then be tested before going live⁷⁸. It is anticipated also that a number of small scale amendments to the database subsequent to the upgrade are likely to be carried out during the Stage 2 process.

During Stage 2, a number of tasks associated with the upload of data to the database have been identified: these include the upload of reports carried out in Stage 1 from various organisations, the upload of records and photographs from the conservation process, and uploads to the new catalogue area as the descriptions are updated. Many of these operations will be carried out at intervals, as and when the data becomes available and will require the intervention of the database manager. In addition, the reporting element will be expanded, and a series of reports developed to allow the system to report on a variety of factors required by the research teams.

Towards the end of Stage 2 the metadata specifications of the database will be up-dated in anticipation of it being transferred to the care of the Owners and to the Archaeological Data Service (ADS) for long term curation. Discussions have already started with the ADS about the proposed transfer, and the database manager will liaise with the ADS and carry out any further operations required by them to ensure a smooth deposition process. The manager will also liaise with the final publisher if necessary.

Throughout this period Bryan Alvey will continue to oversee and administer the web domain, carrying out backups periodically and ensuring the security of the data.

There will be a guide to the metadata of the database in the digital part of the publication and a short section in the letterpress to guide the reader to it⁷⁹.

⁷⁸ The timetabling of this initial work is subject of Risk Log 3.

⁷⁹ Appendix 7 Section 2.3ii and 2.2xvi.

14.5 Conservation

14.5i Introduction

The full methodology for the conservation approach is given in Section 15.5 of the original project design, and the approach and philosophy expressed there will continue to be the guiding principle in Stage 2.

14.5ii Remedial conservation

During this stage the focus will move to remedial conservation⁸⁰ to enable the joins that have been confirmed during the grouping exercise and the work on the die-impressed sheet to be physically consolidated. This will facilitate the final cataloguing and illustration (see 14.9), and will be done in close collaboration with Chris Fern and George Speake who will prioritise the order in which material is worked on. The Project Manager will liaise with the staff of the two museums to ensure there is adequate forward planning for the transport of items to be worked on to be arranged without undue inconvenience to the museums. The majority of the Hoard is currently in BMAG in anticipation of this work following the grouping exercise, but it is likely that some fragments which are on display in PMAG, Lichfield and Tamworth may need to be moved. With sufficient forward planning, the removal of material from the last two mentioned sites can be arranged as part of the normal rotations of the exhibitions there. A small contingency courier budget is included in case it is not possible to make use of the BMT vehicles within the necessary timeframes.

Two conservators will work on this in Birmingham. One will take the responsibility of dealing with the body of material that Chris Fern has already seen (Conservator 1/general in Section 15). This post is funded by BMT and will last for 1 year. The typological work has regularly involved the creation of new records as additional fragments have been found, and the amending of records as pieces have been shown to belong to each other. The work of updating the records on the database will be one of the tasks that Conservator 1 will complete. The second post (Conservator 2/sheet) for which funding is requested, will take responsibility for continuing the work on the die-impressed sheets and fluted strips that was carried out in Stage 1 at the BM. After internal discussions taking into consideration the amount of resources already expended on this body of material, the amount of resources needed elsewhere, the fact that piecing together the foils is effectively a task that could continue for a very long time, and the need to set defined goals, it has been decided to limit this work to a period of six months (see 16.2 for further discussion). The breakdown of how conservator 2's time will be spent is available in Appendix 9 (Product 21).

14.5iii Die-impressed sheets and reeded strips

As will be apparent from previous sections here (4.1-2), this category of material poses special problems and has up to now not been the subject of any detailed typological input. During the grouping exercise it was possible to place all of the pieces in their appropriate broad categories, but no further

⁸⁰ PD 2013 Section 15.5ii.

joining work was undertaken. In April 2014 George Speake and the Project Manager visited BMAG and, with the Conservation Coordinator, inspected the die-impressed sheets. Dr Speake noted that there was potential for further work on assigning the fragments to their correct patterns, as he was of the opinion that not all had been correctly assigned.

It is therefore proposed that there will be a mini-grouping exercise involving George Speake, Chris Fern and the designated sheet conservator (Conservator 2, project funded). This will last for three days, involve the laying out of all the fragments, an inspection to re-assign fragments to their correct groups if necessary, and to refine the strategy which will be used in respect of this material for the rest of Stage 2. It may be noted that this mini-grouping exercise does not need the sort of preparation that was needed for the main grouping exercise in February 2014. All of the relevant fragments are in BMAG and are likely to remain there during Stage 2. There is also sufficient space for the laying out in the normal Conservation Studio.

The approach that will be taken towards the sheets and foils is that during the mini grouping exercise they will be assessed from a typological point of view to decide the value of further work to search for more joins. It is possible that we are reaching the point at which additional resources put into this area are not justified, as the increase in our knowledge will not be sufficient to repay the cost. The review point will be at the end of the Grouping exercise (Product 24). The designated conservator (Conservator 2), the Conservation Coordinator and the Project Manager will be involved in the decision alongside the typologists. The criteria used will be to what extent each frieze pattern has enough joined fragments to fully illustrate the pattern.

It will then be decided which elements can best be used in an attempt to quantify and describe the material. A start to this has already been made and is outlined in Appendix 4 here⁸¹. Currently measuring finished edges is one approach to quantification that has been useful. Area might be another, and weight would provide a useful tool for comparing the relative amounts of the different types present. All of these can be explored. The work already done has also highlighted the fact that there is potential for identifying different dies. Detailed measurements of specific features using the Keyence microscope in the BMAG studio provide a method for exploring this. The size of the shields on the warrior friezes, for example, would be an obvious area to explore.

The designated conservator (Conservator 2) would take the responsibility for making and finding any physical joins, and conducting the quantification and die identification work. He or she will liaise regularly with the typologists via phone, email and Skype as well as face-to-face meetings.

14.5iv Reporting

The work done under this strand will result in up-dated entries to the secure website and detailed written reports of what each conservator has done. The

⁸¹ Appendix 4 Section 4.

full reports will form part of the digital section of the publication, and depending on the outcomes short overviews may be appropriate for the letterpress⁸². It is also anticipated that the conservators will be involved in producing the parts of the final publication that deal with cross-strand themes such as wear, workshop practice etc.⁸³. The Conservation Coordinator will take the lead in documenting the conservation methodology and the conservation inputs for the legacy strand for the final publication⁸⁴.

14.6 X-radiography

The work for this is now complete⁸⁵. In the final publication summaries of the methodology used can be derived from the original project design and placed in the digital part of the publication⁸⁶. Some digitised images are likely to be used in the letterpress to illustrate the pieces, as the complex filigree for example is often better appreciated from the X-radiograph than from a photograph. The complete *corpus* will be available digitally.

It is not anticipated that any further X-radiography will be needed, but if it is it will be carried out in-house at BMT by the Hoard conservators there.

14.7 Work on the die-impressed sheets

In the original project design, the work under the equivalent heading in Stage 1 was planned to take place at the BM⁸⁷. That work has now been completed⁸⁸. The work that is proposed on the material for Stage 2 has been discussed as section **14.5iii** here.

14.8 Materials Analysis

14.8i Introduction

In Stage 1 the material analysis strand took place in the BM, and was concentrated on understanding the gold content and responding to specific queries posed by the conservators based in Birmingham⁸⁹. The results of this are reported on in Appendix 3 here and have been discussed above in Section **4.5**. Once the project had formally been divided into two stages, it was always anticipated that the materials analysis strand would be concentrated in Stage 1 for logistical reasons. The Department of Conservation and Scientific Research at the BM was due to move premises in late 2013, and it was doubted that their personnel and equipment would be available to work on the project in Stage 2. It was for that reason that a disproportionate amount of the Stage 1 resources were directed at material analysis and conservation. Stage 2 was always envisioned as a time when the bulk of the resources would be re-directed towards the typology strand.

⁸² Appendix 7 Sections 2.3ii. 2.2xiii.

⁸³ These form part of Appendix 7 sections 2.2iii-v and 2.3.

⁸⁴ See Appendix 7 Section 2.2xiii

⁸⁵ PD 2013 Section 15.6.

⁸⁶ Appendix 7 Section 2.2ii.

⁸⁷ PD 2013 Section 15.7 – then called impressed foils.

⁸⁸ See Appendix 4 for report.

⁸⁹ PD 2013 Section 15.8.

The results of the work during Stage 1 have raised interesting questions that could be answered by further programmes of analysis, but the issue of resources had seemed to rule this out. BMT, however, has received funding for 1.5 posts for a year whose focus is on the material analysis. A third of the time will be used for public outreach and the rest for analytical work. The research project will thus benefit from an unanticipated additional 12 months of follow-up work during 2015.

All of the work in this section is either separately funded or the subject of fund-raising. If it produces results that can augment those already achieved it will be included in the final publication in the places indicated.

14.8ii Analysis of the green inlay

As outlined in Section 4.5 here, the mysterious green inlay in some cloisonné pieces has so far eluded identification. It has been identified as an area of investigation that needs further work by the conservation, typology and materials analysis strands⁹⁰. It appears to be a rare survival safeguarded by the approach that has been taken to the conservation and cleaning of the Hoard items. If that is correct, it has considerable potential for informing knowledge more widely.

Susan La Niece has proposed that there are two avenues that could be pursued. The first is analysis by X-ray diffraction which defines what compounds are present. With the move of the Department of Conservation and Scientific Research in the BM to new premises, they have access to a new XRD machine which could carry this out. The second would be to examine the stratigraphy of the material within the cells. This would be done by carefully lifting the contents of a cell, mounting in cross-section and examining, element mapping and analysing the section by SEM-EDX.

This work will be carried out by Susan La Niece at the BM. She would sample the material at Birmingham thus avoiding the need for Hoard items to travel. There are no security issues surrounding the transport of samples and so she could take these back with her to London without incurring additional carriage charges. The reason for carrying out this work in the BM is that there are a large group of scientists there with expertise covering a wide range of materials and instrumentation. Their combined knowledge is likely to be important for identifying what this inlay is. This work is being funded by part of the grant BMT have received from the Esmée Fairbairn Foundation.

This work would contribute to the sections of the publications dealing with craft practices⁹¹. The full reports would be in the digital section with a short note in the relevant parts of the letterpress if appropriate. If the mystery is solved, it would probably be appropriate to write a short note for journal publication to alert the wider world to the phenomenon, especially as previously the material might have inadvertently been removed in cleaning.

⁹⁰ Appendix 1 Section 4.3i; Appendix 2 Section 4.3, Appendix 3 Section 5.4.

⁹¹ Appendix 7 Sections 2.2v, 2.3ii.

14.8iii Analysis of the metal content

Stage 1 has already produce a considerable body of gold analytical data (see Section 4.4 here), but currently we have no data on the silver other than that produced during the XRF analysis of some non-gilded foils⁹². Now that more silver items can be identified and dated, it would be appropriate to conduct a targeted project to generate a body of analytical data from sub-surface analyses to contribute to the explorations of the bi-metal standard (section 5.5 here). BMT have applied for and received funding for a post to further explore metal content using the Mistral XRF facility available there. Eleanor Blakelock who was the metal analyst for Stage 1 at the BM has been appointed to this post and this will ensure a consistency of approach with the metal analysis already carried out.

There would be the need to integrate the results with those obtained during Stage 1 work at the BM⁹³. The full report on the work would be published in the digital part of the publication, and it would also feed into the discussion of the bimetal system in the letterpress⁹⁴.

14.8iv Analysis of the outstanding organics

As noted in Section 4.5 here there is a small body of organic material that has been identified during the cleaning and cataloguing work which requires analysis. This includes osseous material that can be identified using the microscope facilities in BMAG. There is also the continuing potential that the pastes which have been revealed during Stage 1 cleaning have⁹⁵. The ones that have so far been analysed at the BM were those funded by the National Geographic strand of the project, and were obtained during the pre-Stage 1 cleaning⁹⁶. The second Esmée Fairbairn Foundation post at BMT will take responsibility for this aspect of the material analysis work. As in Stage 1 the material would be analysed using Fourier transform infrared spectroscopy (FTIR). BMAG possess a facility that can perform destructive FTIR which could be used if a sample could be taken. It is anticipated that they can rent a non-destructive facility to carry out analyses where insufficient remains for a sample to be taken. The organics analyst will also sort the samples that have already been taken to assess their value, and decide whether they should be disposed of or retained⁹⁷. The latter will be stored with the appropriate items they came from.

Again this work would need to be integrated with the Stage 1 results⁹⁸. As a whole this work would contribute to the sections of the publications dealing with craft practices⁹⁹. The full report would appear in the digital part of the publication alongside the reports already generated by the BM in this area. There would need to be integration of both sets of results for their inclusion in the letterpress.

⁹² Appendix 3 Section 1d.

⁹³ See Risk Log 2.

⁹⁴ Appendix 7 Sections 2.2x and 2.3ii.

⁹⁵ Appendix 1 Section 4.3ii.

⁹⁶ PD 2013, Section 15.8v

⁹⁷ Appendix 1 section 1.2.3.

⁹⁸ See Risk Log 2.

⁹⁹ Appendix 7 Sections 2.2v, 2.3ii. .

14.8v *Metallographic and other analyses*

The exploration of how the seventh century craftsmen were producing the surface enrichment / depletion is a research question of great interest¹⁰⁰. The way to explore this would be via through the microscopic examination and analysis of cross-sections¹⁰¹. Birmingham Universities School of Metallurgy and Materials has kindly offered the use of equipment and staff support free of charge to BMT. Within the department's dedicated Centre for Electron Microscopy there is an SEM-EDS system and also a microprobe with both EDS and WDS (wave dispersive X-ray). The EDS techniques allows for fast sample investigation. More detailed spectra are provided by the WDS which can resolve spectrum peak overlaps and provides more accurate quantitative analysis.

The Conservation Coordinator has already held discussions with the Chair of RAP to narrow down the aims of any work exploring whether it is possible to establish how the depletion occurred, and whether it is possible to establish about how the soldering was conducted. It is proposed that once Dr Blakelock is in post in January she will produce an outline design to explore this as part of the Esmée Fairbairn Foundation work. Dr Blakelock not only brings her previous experience of working with the Hoard items using SEM/EDS at the BM, but also has previous metallographic experience. She will produce a project outline explaining the scope and methodology to be used as her first task in January. This will be considered by HMG at their first meeting of 2015. It is appreciated that resources will probably not be sufficient to answer all the questions that could be asked during Stage 2, but the work will scope the problem and will be a useful starting point for future research to be carried out by other teams.

The Conservation Coordinator is also currently engaged in discussions with practicing goldsmiths to explore the possibility that once the metallographic work has been carried out and a better understanding of what manufacturing techniques might have been used, these can be explored via a small programme of experimental archaeology. No resources for that aspect of the work are requested for here.

The detailed analytical reports would form part of the digital part of the publication and they would also form part of the craft practice overview for the letterpress¹⁰²

14.9 Cataloguing, Typology and Research

14.9i *Introduction*

The cataloguing and typology methodology as originally described¹⁰³ took a pessimistic view of what could be achieved within the resources available in

¹⁰⁰ Section 4.4 and Appendix 3.

¹⁰¹ Appendix 4 Section 5.3.

¹⁰² Appendix 7 Section 2.2v and 2.3ii.

Stage 1. With some additional resources, and a considerable amount of goodwill on the part of Chris Fern (CF), much more has been achieved than was hoped for. The results are summarised in Section 4 and reported in full in Appendix 2. In what follows, the Stage 2 work in this area has been re-designed. As already noted in Section 13.2vi, a second typology post is no longer planned, instead George Speake (GS) will take a larger role, and Niamh Whitfield and Hilary Cool will also assist. The basic timetabling will see the cataloguing and typology completed by the summer of 2016. The thematic sections (art styles, different types of decoration etc.) will be completed during the final year of the project.

14.9ii *Cataloguing and typology*

Work will proceed on discrete groups of material as outlined in Table 15.1. The existing catalogue notes will be revised and catalogue entries produced relating to joined objects. The typology work will be carried out producing new typologies where appropriate, e.g. the pommel caps, and placing the material in a wider context with *comparanda* etc.. The groupings will be checked by final research visits to PMAG and BMAG when the opportunity will be taken to upgrade the entries for those pieces which were still obscured by soil when CF originally saw them. The research visits will be of two day length to allow CF to see the material in the museum in which they are currently exhibited without introducing the need for any travel for the objects themselves. As noted in connection with the remedial conservation (section 14.5ii), there will probably be the need to arrange rotation of some objects in the exhibitions at Lichfield and Tamworth back to their parent museums to enable the visits to be carried out. CF and the Project Manager will liaise as soon as Stage 2 is commissioned to ensure that there is a timetable which will allow the museum staff to organise any transfers in the least inconvenient way¹⁰⁴.

As part of the cataloguing and typology work, the mini-grouping exercise described in 14.5iii will take place in April or May 2015 and preferably early in April 2015. The detailed work on the cloisonné as described in Appendix 5 is a task for which funds need to be raised. Whether there is a possibility of it going ahead will be reviewed at the end of 2015. An alternate strategy for dealing with the cloisonné which may involve the limited use of external experts will be put in place if insufficient resources are available.

Research visits to gather comparative data will be made by CF to the British Museum and to the Royal Armouries in Leeds, the latter to study the Woolaston Helmet.

The regular visits to check the groupings will enable a constant liaison between CF and Conservator 1 (see 14.5ii above) to take place. Visits by GS who will be working on the cataloguing and typologies of the die-impressed sheets will allow similar liaison with Conservator 2 (see 14.5iii above). These visits will also allow issues relating to wear, workshop practice etc. to be discussed and documented in preparation for inclusion in the final publication.

¹⁰³ PD 2013 Section 15.9.

¹⁰⁴ See also Risk Log 4

The catalogues will be prepared in Word as this will allow easy and rapid copy editing for consistency of terminology etc. This work will be done by Val Kinsler in batches as CF finishes the different categories of finds. Once the text is edited and agreed, it will be sent to Bryan Alvey for batch up-load to the secure database (see **14.4**). These provide the full catalogue entries for the digital publication. Either the 'simple name' or 'full-name' fields of the database can be used to generate a reduced hand-list style catalogue for the letterpress volume¹⁰⁵ depending on what the ultimate publishers consider appropriate.

The typology reports will appear in full detail in the digital part of the final publication. Discussions will be held with the Academic Editors to decide on the level of detail that is appropriate for the letterpress volume¹⁰⁶.

14.9iii Overview studies

The work described in **14.9ii** is effectively the fine detail. There will also be the need to have studies that provide synthetic overviews drawing together themes across the types. These overviews will include functional and decorative ones. CF will produce the overview of the military material and Leslie Webster the one on religious items. CF and GS will produce the one on the animal art. CF will also produce overviews of the filigree and cloisonné. In the former he will be aided by Niamh Whitfield. For the latter Hilary Cool will liaise over the results of the detailed analysis, if it has gone ahead, and it may be appropriate to consult and involve noted cloisonné specialists. The various pairings will have face to face meetings to progress and discuss these syntheses. There will also be an overview of the inscribed cross arm from both the typological, epigraphic and paleographic aspects¹⁰⁷. Other studies which fall into this synthetic strand include reviews of workshop practice, wear and dismantling already discussed in previous sections¹⁰⁸.

These studies will be placed in the letterpress part of the final publication¹⁰⁹. It may well be appropriate to have some supporting detail in the digital part. Again discussions will be held with the Academic Editors to decide on the appropriate balance.

14.9iv Illustration

Four separate methods of illustrations will be used. Photographs, X-radiograph images, interpretive animal art drawings and reconstruction illustrations. The X-radiograph images are already available from the Stage 1 work and will not be considered further here. Each piece will have a full photographic, X-radiographic and interpretative drawing (if appropriate) record available in the digital part of the publication accompanying the catalogue entry. The number to be included within the letterpress volume will be the subject of discussions

¹⁰⁵ Appendix 7 Section 2.2xiv.

¹⁰⁶ Appendix 7 Section 2.3ii.

¹⁰⁷ See Section 13.2vi here for the people who have agreed to contribute. The work will appear in the letterpress see Appendix 7 section 2.2vii.

¹⁰⁸ See 14.5iv, 14.8v, 14.9ii.

¹⁰⁹ Appendix 7 Sections 2.2iv, 2.2v, 2.2vii.

between the Project Manager, the Academic Editors and the designated publishers once the Owners have decided on who their publishing partners will be.

There is already a large portfolio of photographs created by Guy Evans during Stage 1¹¹⁰, and now on the Hoard database. Excluding those items that were photographed when soil was present, and those items which can now be joined together and so need new photographs, approximately 150 items have a complete photographic record. In addition a further 50 need an additional view now that they are completely clean. These are items such as pommels or mounts which were photographed when they still retained soil internally or on their backs, meaning that the interiors and backs need views in the clean state.

This leaves approximately 750 items that will need new photographs. We estimate that approximately one third will need five to six views to provide complete coverage, and the remainder will need only three or less. The work will be scheduled to start in 2016 after the joining work (see Section **14.5ii** here) is underway and has built up an assemblage of items to be dealt with. In Stage 1 the photographs were produced using stacking technology. This was found too time-consuming both as regard to taking the photographs and preparing the stacked images afterwards. Following discussions within the team it is not felt that the technique is cost-effective, as most of the Hoard can adequately be photographed using non-stacking technology. The Stage 2 photographs will therefore not be stacked unless necessary.

It has been decided that the majority of the photography will take place at BMAG to reduce transport costs where space can be provided. Cotswold Archaeology has agreed to carry out this work with their team of experienced skilled small finds photographers and we are currently exploring costs with them¹¹¹.

The items with figurative art will also be illustrated by interpretive line drawings, produced by the people studying the material. This is a highly specialised form of technical drawing, which few people can produce. An example of this approach can be seen in Appendix Fig. 2.1. Of the material CF is dealing with, 114 items need this sort of illustration. They will be produced to the standard of that drawing, digitally rendered and using greyscale conventions for the different zoomorphic head, body and leg elements. This work is timetabled for the final year. It is proposed to combine the photographic images and the line drawings in the same way as is shown in Appendix Fig. 2.1.

Currently it is known that there are 17 different designs in the die-impressed sheets. Examples of each will be illustrated by line drawings with those with animal art also having interpretive illustrations showing the different zoomorphic elements. This work will start in the financial year 2015/6 once the agreed joining has taken place (see **14.5iii** above) and the relevant photographs are in place, as the illustrations use scaled photographs as a base.

¹¹⁰ PD 2013 Section 15.9ix

¹¹¹ This work is subject to Risk Log 5.

GS uses a free-hand style of illustration rather than the digital style favoured by CF. As it is unlikely that the animal art illustrations by the two authors will occur on the same page in the letterpress volume, it is not felt that this will cause problems visually due to the two styles being seen in close proximity. It will also have the benefit that it will be immediately obvious whether the animal art has been derived from the foils or the other artefacts.

Reconstruction drawings will be prepared showing how the individual items would have fitted together on their parent items. It is anticipated that there will be five sword / seax reconstruction and three of more complex items such as the cloisonné mount suite and the helmet. These will be produced by Ian Dennis as black and white drawings. He and CF will liaise over the precise detail. These drawings will occur in the letterpress volume and no doubt the museums will find them useful for exhibition and other purposes (see section 9).

14.10 Statistical Analysis

The range of statistical techniques that can be called upon to aid the analysis of all the different datasets the research is producing remains as originally described¹¹². Professor Baxter has been involved in offering advice and carrying out some analysis for both the gold analysis data and the cloisonné pilot project during Stage 1¹¹³. He will continue to fulfil this advisory role in Stage 2. If appropriate he will write a brief overview of the statistical techniques which have been used. This will be available in the digital part of the publication¹¹⁴.

14.11 Background studies

The range of background studies to be carried out in Stage 2 to place the Hoard in context was described in Section 15.11 of the original project design with some minor alterations. The academic editors are of the opinion that there is less need for the wide survey of prehistoric and Roman hoarding patterns to provide context than was originally envisioned. They also consider that there should be an additional contribution on the implications the Hoard may have for understanding Mercian history. Apart from that and the addition of one extra team member, the methodologies outlined in the original PD will continue to be followed using the same personnel. As originally described these essays on art styles, gold value, seventh century life and mindset, and special deposits were generally planned to be placed in Section 3 of the final publication. With the new publication synopsis outlined in Appendix 7, there is now an essay on the art styles and iconographies in Part one (the material evidence) with the rest being placed in Part Two (Interpretation). Supporting evidence will be in the digital part of the publication¹¹⁵.

The proposed timetable sees this work starting in April 2015 so that drafts can be completed and circulated prior to the project meeting early in the financial year 2016/7, and then finalised and submitted after that meeting. Maps and

¹¹² PD 2013 Section 15.10.

¹¹³ Section 4.4 Appendix 5 here.

¹¹⁴ Appendix 7 section 2.3ii.

¹¹⁵ Appendix 7 Section 2.3ii.

other illustrations that may be required will start to be prepared after the drafts have been received (see Product 52).

It can be noted that the consideration of special deposits will be greatly aided by two things that occurred during Stage 1 and which are not noted in the original methodology description. The first is the publication of the volume reviewing the fifth century *hacksilber* hoards, that puts in place a considerable amount of useful data from across western Europe and beyond¹¹⁶. The second is the establishment of the AHRC project on Hoarding in Iron Age and Roman Britain¹¹⁷. Both of these will be valuable sources for the exploration of why the Hoard was deposited.

14.12 Legacy

The proposed work under this strand is described in Section 15.11 of the original project design, and the basic approach outlined there will be followed, i.e. a two-fold approach. One strand will follow the social history of the Hoard itself, and the other the changing attitudes to Treasure finds over the years. During Stage 1 the two museums have accumulated considerable knowledge of the impact such finds can have¹¹⁸. The two designated leads for this are Deb Klemperer (PMAG) and the Conservation Coordinator (BMT) who will both speaking on behalf of both museums. It will also be appropriate to have input from the wider Mercian Trail strand of the programme contributed by the Programme Coordinator. There will be synthetic sections on this in the letterpress volume with the bulk of the supporting data in the digital part¹¹⁹. This will ensure that the original non-academic archive such as the transcripts of interviews with the original finder is curated for the long term.

During the life of Stage 2 the programme co-ordinator, the project manager and the team will investigate ways of monitoring the impact of the research (numbers of website views, requests for information, external publications making use of the data, media interest etc.). The project manager will keep a log of this and will discuss with the PAO how best it could be developed for EH's future use when it wishes to investigate the impact its grant-aid has had.

14.13 Final Report – Editing

In the original project design it was anticipated that there would be the release of an interim catalogue at the end of Stage 1. Given considerably more progress has been made in Stage 1 than was anticipated, it has been decided not to do this. Preparing one would require resources that could be more usefully directed towards the final catalogue. Other than that, the methodology for the editing remains as originally described¹²⁰. The Academic Editors will hold meeting to discuss progress and review the publication outline which is given in Appendix 7 here.

¹¹⁶ Hunter and Painter 2013.

¹¹⁷ See Section 9 here.

¹¹⁸ See Appendix 1 section 3 and Section 7 here.

¹¹⁹ Appendix 7 section 2.2xiii. 2.3ii and 2.3iii.

¹²⁰ PD 2013, Section 15.13

At their meeting on 30th July 2014, the HMG requested that a scientific editor be retained in the later stages of the project to act as an internal and independent reviewer¹²¹.

14.14 Project Management

The roles the Project Manager will play will continue to be as described originally¹²². The alteration in her relationship with the executive and RPAP has been noted in Section **13.1** here. Sam Richardson will continue to act as the liaison point at PMAG taking responsibility for document changes etc. that may result from work associated with the research.

Some additional work may be noted. There will be a need to collate and write some sections of the final publication from information that arose in the early stages of the research project and before. The Project Manager will take the responsibility for producing these or, if appropriate, commissioning others to produce them. She will also take responsibility for producing and collating all the elements of the final publication before submission to EH, such as producing all the preliminaries, checking all parts are present etc. Chris Fern will produce regular reports to update the Project Manager on progress.

15 Stages, Products and Tasks

Stage 2 is timetabled to last 30 months from January 2015 until June 2017. The timetable is shown in figures 15.1-4. These only include the products that start and finish within the overall timescale. Products that are timetabled to run all the way through such as project management (Product 1), PMAG administrative support (Product 2), the production of the Newsletter (Product 3), typology administration (Product 4), Academic editor meetings (Task 5) and database development (Product 6) are omitted. Details of the Products are placed in Table 15.1. In this each product gives the methodology section(s), the aim that is addressed, the title of the product, the number of days it will take, the person who will carry it out, the dates it will be carried out within, the salary or fee cost, and the sundry cost for travel and subsistence etc. The table is followed by a notes section which explains the various timings and costs. Some tasks will be subject to fundraising (see section **16**) and so have been timetabled over a long period to allow for this. The notes will indicated which ones fall into the fund-raising category.

Abbreviations for the people carrying out the work are as follows. Those indicated by a ‘*’ symbol will be directly managed by Barbican.

AJ	Alex Jones*
AT	Alan Thacker*
BA	Bryan Alvey*
BY	Barbara Yorke*
C1	BMT conservator
C2	Sheet conservator

¹²¹ The Project Manager has sought advice about who the best candidate for this role would be and will be holding discussions with them once the project is commissioned.

¹²² PS 2013 Section 15.14

CF Chris Fern*
 CH Colin Haselgrove*
 DK Deb Klemperer*
 EB Eleanor Blakelock
 EF1 EFF 1
 EF2 EFF 2
 GS George Speake*
 ID Ian Dennis*
 HC Hilary Cool*¹²³
 JG Jon Goodwin*
 JH John Hines*
 LW Leslie Webster*
 MB Michael Baxter*
 MH Matthias Hardt*
 ND Nigel Dodds*
 NW Niamh Whitbread*
 PG Pieta Greaves
 PGu Peter Guest*
 PM Project Manager*
 RPAP Chair of the RPAP
 SF Svante Fischer*
 SLN Sue La Niece
 SRa Stephanie Ratkái*
 Sri Sam Richardson
 TD Tania Dickinson*
 VK Val Kinsler*

All the tasks other than the contributions by the museum staff to the legacy strand (see Section 14.12 here) have been costed, including those which are not being funded directly by the research project, for example the posts and work funded by the Esmeé Fairbairn Foundation. The notes indicate which tasks are not included in the budget presented in Section 18.

The Risk Log forms Appendix 8 and the detailed product descriptions form Appendix 9.

Detailed financial information is not available in this version and so pages 43-63 have been removed

¹²³ NB HC is used where Hilary Cool is acting as a typologist rather than the Project Manager.

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During the life of Stage 1 every item moved at least twice for X-radiography and some pieces went back and forth to both the British Museum and the Museums and Collections Care team at Lincoln. This put a considerable burden of work on staff of both museums, not only in condition checking the material every time, but also for continuously making and re-making displays as the items went on their journeys. The entire team would like to thank Deb Klemperer, Dave Symons and all their colleagues for this major call upon their time on top of all their other duties.

The members of RAP, CAP and latterly RPAP are thanked for their input. Leslie Webster as chair of RAP and then RPAP has been unfailingly helpful and supportive throughout the long journey to this point. We all owe her a great debt of gratitude.

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Mike Baxter undertook the proof reading of the main text of this document in its original version, and Val Kinsler edited all the Appendices other than Appendix 7, again in the original version. My thanks to both of them. As ever the mistakes are mine.

Appendix 1: Conservation programme. Assessment report¹

Deborah Cane (Conservation manager) and Pieta Greaves (Staffordshire Hoard Conservation Coordinator)

1 Conservation programme

1.1 Introduction

The hoard conservation project is unique for archaeological materials recovered in the UK. Since 2010 the project has taken an innovative, open and collegiate approach to conservation. The main focus of this aspect of the programme was to conserve the objects to a high standard and to liaise with the research programme led by PMAG². Further to this it has successfully engaged both conservation professionals and public audiences, and has delivered an extraordinary range of activities over a short time period, raising the conservation profile in the UK public domain.

The programme is also committed to having a selection of objects always on display, in four venues across the region (PMAG, BMAG (now BMT), Lichfield Cathedral and Tamworth Castle). This has added a layer of complexity, entailing movement of conserved and unconserved objects across four locations.

BMAG took the lead on the conservation programme because it had an established conservation department; to facilitate the programme three new positions were established; two full-time conservators and a dedicated Hoard Conservation Manager.

To manage the conservation programme in a controlled framework, a formal Conservation Plan³ was developed and agreed. The plan was written in conjunction with the BM's conservation department. It outlined the techniques to be used, procedures and order of the work, including how the process would be documented. The overarching conservation aim was stated in the plan as 'The conservation work on the hoard will produce objects which are physically and chemically stable and will reveal and preserve all the surviving surface detail and any related information, such as organic material, by means which will not be prejudicial to the wider study of the Hoard'⁴.

¹ This Appendix was produced at the end of Stage 1 and is an accurate Assessment of the work that had been carried out during that Stage. In the interval since then BMT has been able to commit additional resources to Stage 2 through the grant from the Esmée Fairbairn Foundation. What these posts will do has been finalised at a very late stage in the product of this project design. They are outline in the main body of the text with cross-references provided here where appropriate by footnotes.

² Cool 2013 – PD 2013.

³ Cane 2010.

⁴ Cane 2010, 2.

Alongside the conservation plan, a Conservation Advisory Panel, composed of specialists in the area of archaeological, science, metals conservation and conservation ethics was established to advise and support the process.

1.2 Methodology

The conservation carried out was based on the condition of the object and the requirements of the research. The conservation problems posed by the Hoard were reasonably straightforward in comparison with more complex multi-component objects such as iron or copper alloy objects, which may have complex corrosion layers or mineralised organics. The Hoard largely consists of gold and garnet, which are relatively chemically stable materials, with minimal associated organic material. The Hoard does, however, contain primarily broken objects and fragments, damaged prior to burial by their physical removal from larger entities. This creates issues with physical stability, as the majority of pieces have damaged edges and detached or loose components. For example, often the garnets are held within the cells by residual soils, which added a further complication in that a balance needs to be struck between removing soils and applying adhesives or consolidants, which could compromise further analysis. Care was also required to uncover any remaining organics that could have survived the burial environment; during conservation several small fragments of textile closely attached to silver fragments had emerged from the soils.

Some of the silver components demonstrate embrittlement from the burial environment, but not to a point where immediate consolidation is required.

Since 2010 the BMAG conservation team have conserved some 95% of the 4000 objects and fragments that make up the assemblage, with the BM conservation team the other 5%. The conservation falls into three main categories (investigative, remedial and display), with most conserved to the remedial conservation requirement.

Investigative conservation – processes used to examine and record artefacts by non-invasive means, by removing accretions or by sampling for analysis. The conservation will consist of cleaning specified areas only, in order to reveal the area or material of interest.

Remedial conservation – treatments used to stabilise objects for handling and storage; this includes the repair and consolidation of broken and fragile objects. The majority of the conservation to this point falls into this category.

Display conservation – any further work that is required for display.

The conservation team remove soils from the exterior surfaces to allow the decoration to be viewed. For display purposes, it is unnecessary to remove soil from internal areas. Consolidation may be required if the object is to travel over long distances. Very little of this work has been carried out on the Hoard material.

1.2i *Conservation procedure*

The high levels of repetitive conservation justified creating a template to standardise and document all the conservation work. The documents contain all the important information on the objects pre- and post-conservation, including a full photographic record. Photomicrographs were taken as appropriate to document pre-conservation if movement of fragile or loose components might occur during conservation. Examples of conservation reports can be found at the end of this appendix (Addendum 1).

1.2ii *Treatment*

Treatment was standardised across the conservation programme, although with variations between filigree and cloisonné objects.

Soils were removed under the microscope using a thorn in a pin vice. If the soil is particularly compacted and hard and there are no organics or evidence in the soil, then a soft brush and distilled, pH neutral water or industrialised methylated sprits (IMS) could be used to wet the surface prior to this procedure. The surfaces were not overly wetted as this may travel into and under fine cracks. Care was especially taken around garnet cells since any migration of liquids could discolour under the garnets. Care was also taken around the garnets, and soil was not removed if it was felt that this factor was holding the garnet into the cell.

If consolidation was required for a garnet or a loose component of an object, Paraloid B72 (composed of an ethyl methacrylate (70%) and methyl acrylate (30%) copolymer) in acetone was applied. A 20% solution applied with a micro pipette will consolidate the garnet but also run into the foil and paste below. Alternatively, Paraloid from the tube (propane-2-ol, nitrocellulose) was mixed with acetone to make a thicker adhesive that can be applied as a spot, in one application, with the tip of a cocktail pick (pin if used with great care) or thorn. This will hold the garnet in place at one edge only. A visual document of the consolidation locations was created and added to the reports as required.

Small fragments that were not associated with the object but found within the soil matrix were cleaned and retained under the original K number. These new fragments have been renumbered by Chris Fern and will be separated as required, based on Chris Fern's recommendations.

All organic materials were recorded; organic material was left *in situ* for research and analysis if possible. If it was felt that any material was susceptible to loss, it was documented and then sampled. Where possible, any pastes or probable pastes were recorded but otherwise left untouched and *in situ* for later analysis.

Impressions of washers, contact material etc. were recorded, photographed, measured, and described in condition reports as observed by conservation team.

All corrosion products will be left *in situ* and recorded and photographed. This applies to surface tarnish and lumps of copper corrosion.

All soil and residue was kept, stored in the sample tubes, labelled and placed into the sample storage boxes as per the protocol (see **1.2.iii**).

After conservation, a small paper label with the K number was attached to the object with Paraloid B72.

1.2.iii Samples

Samples were retained of all materials removed from the objects. Soils as well as organic residues and pastes were documented and collected for further analysis. The full sample procedure can be found at the end of this appendix (addendum 2)⁵.

1.3 Observations recorded during conservation

As conservation proceeded, it was clear that objects could be grouped based on typology. A working document was created of potential and confirmed groupings (available on request from BMT) of all the conservation observations; this information was shared with the research team.

Further to this, all observations of construction lines and marks were detailed, any repairs were highlighted in the conservation report, possible makers' marks and recording of damage – all were noted in the conservation records. A complete synthesis of these observations has yet to be made.

2 Characterisation projects

In 2011 Cymbeline Storey and Deborah Magnoler worked on two characterisation projects that aimed to arrange and identify the niello and cloisonné garnet objects better. Both these pieces of work were completed and fed into the continuing work of Chris Fern⁶. As both reports were during the initial stages and contain some uncleaned objects, some of the observations and conclusions are no longer correct as work has continued since the reports were completed.

2.1 Niello

Cymbeline Storey's work on the niello aimed to assess the physical stability of the objects for handling, as well as to identify specific groups and types of objects within the niello group based on material, shape, decoration, etc. This would enable joins to be found between fragments which, in turn, would provide more information about the composition of the hoard. The intention was to locate and document joins (where possible) but not physically to join the objects.

⁵ See **14.8iv** for what will happen to these in Stage 2.

⁶ Magnoler 2012, Storey 2013.

The document created was not intended to serve as a full technical report on the objects. Rather, it is a preliminary report outlining groups of objects and the key features of each group to help the research and conservation teams make sense of this largely fragmentary set of objects.

Fourteen groups were identified during the project, denoted by the letters A through N in the report, as well as seven stand-alone objects. There are now 141 fragments in the niello group; however, the identification of niello is visual only and further analysis should be used to confirm the classification⁷.

2.2 Cloisonné garnet

Deborah Magnoler worked on the cloisonné garnet report. The purpose of this work is to provide an overview of the cloisonné decorated objects in the Staffordshire Hoard and to find possible associations of objects with the same or similar cloisonné pattern. Objects decorated with single stones, such as fittings and hilt plates, were not taken into account.

Magnoler concluded that there is a variety of cloisonné patterns within the Staffordshire Hoard, the two main distinctions being geometric and zoomorphic. Manufacturing techniques also seem to vary, ranging from objects with larger garnets, orderly patterns and virtually undisturbed cell work (for example the lentoids, the curved, pointed and edging strips groups, the fin-shaped fittings and the fish-scale pattern fittings), to objects where the cell work appears to be smaller as well as less precise geometrically. Generally the latter appear to be in a worse state of preservation (for example the small cloisonné collars and pommel groups).

3 Outreach

The outreach programme created by the conservation team has formed an important part of the project. The idea of carrying out conservation in the public eye is not a new one. The hoard programme, however, has been unique in the intensity and regularity with which it was able to provide outreach, and by using social media has gained an international audience that has been sustained over the years.

This programme provides an example of how conservation can drive different aspects of a project other than the conservation of the objects themselves, and has acted as a catalyst to encourage public access and participation in the wider project. The hoard has generated interest beyond its historical context to create a stronger sense of local identity and pride in the region, as demonstrated by the formation of the Mercian Trail (see 3.2 below).

⁷ See Appendix 2 Section 2.15.

Engagement activities take the form of professional placements, placements for conservation students, and non-conservation placements. A programme of open lectures and talks, publications, studio tours, family days, written blogs and video blogs was launched to create a supportive public community of interest.

The conservation team have been rewarded for its efforts, firstly in late 2013 with the announcement that it had received the Archaeological Institute of America's Conservation and Heritage award, and secondly in early 2014 with the shortlisting of the conservation outreach programme for the Museum and Heritage awards.

3.1 Creating the collegiate environment

The aim of the collegiate conservation programme was to allow the project to be as inclusive as possible and to maintain the professional interest already generated by the discovery. To this end, a programme of professional and student placements, including volunteers and non-conservation specialists, was put in place. Between 2010 and 2013 there were 14 professional, 27 student and 10 non-specialist placements who participated in both the hands-on conservation programme and the public engagement programme. The placement programme proved very successful, attracting participants for the professional and student placements from Germany, Canada, the Netherlands, Greece, the USA, as well as the UK.

The professional placements were able to experience working on the hoard objects while sharing their conservation experience with the hoard team, the conservation students and the non-specialists, creating a vibrant learning environment where everyone could openly discuss ideas. The conservation students were also able to gain confidence by using their knowledge to demonstrate to the non-specialists how to handle tools, the ethics of conservation and how to approach the treatment of an object. Non-specialists came from the National Heritage Ironwork Group (NHIG), a body that promotes good conservation practice in the restoration of historic ironwork by supporting museum placements for its members; the NHIG students consisted of professional and trainee blacksmiths, who learnt about conservation on the micro scale, by using microscopes. The exchange of knowledge relating to metals, tools and metal-working once again created an invigorating cross-disciplinary debate regarding the treatment of metals within different disciplines of the heritage sector.

All the participants experienced practical conservation but also participated in public tours, social media and, on occasion, were part of the team used when the conservation process was filmed for National Geographic, Time Team (an archaeological programme shown on Channel 4, UK), Country File (BBC) and for local and national news items.

3.2 Collaborations

The main funding collaboration was with National Geographic, who received facilitated filming for television and exhibition rights in return for £150,000. Partnerships have been established with the British Museum Department of Conservation and Scientific Research, where the hoard project has benefitted from the expertise of the conservation and research departments, and with the Centre de Recherche et de Restauration des Musées de la France (C2RMF) research laboratory at the Louvre through the EU-funded CHARISMA programme, where analytical work allowed the project to gain a snap-shot of possible provenance for the garnets and gold analysis. Both institutions hold important collections of comparable material to the hoard; these collaborations have facilitated the exchange of expertise and scientific data, and helped establish the conservation and research project in its wider context.

The conservation programme has also forged long-term academic partnerships with Birmingham University and Birmingham City University, relating to the use of scanning and digital technology to interpret the hoard. Birmingham is a centre for the UK jewellery industry and for the study of jewellery, and the conservation team have widened their professional networks to ensure that this local academic and professional expertise can be harnessed for the benefit of the conservation project. This cross-disciplinary dialogue is particularly important for a collection like the Staffordshire Hoard, where debate about the manufacturing techniques and function of the objects is ongoing. Links with Anglo-Saxon re-enactors such as the 7th-century specialists Wulfheodenas, who make and use replica artefacts, likewise brings new perspectives to the collection and its conservation.

The wider project has also created a long-term partnership with local government organisations and historic sites across the region. Known as the Mercian Trail, the aim of the partnership is to generate longer-term social and economic benefits for the region by building on high levels of public interest both in the finds and in the broader Mercian past of the area. The partnership brings together BMAG, PMAG, Lichfield Cathedral, Lichfield District Council, Tamworth Borough Council and Staffordshire County Council. Their vision is to position the region as the heartland of Anglo-Saxon England, through the creation of a permanent visitor trail, with each location telling a different part of the Mercian story.

3.3 Meeting the public: tours, talks and events

The conservation team met the public in face-to-face events that allowed people to see and discuss the material directly and ensured that the conservation was accessible to all demographics.

Through a programme of monthly charged tours, the conservation team opened the studio to members of the public. During the tour, conservation techniques and discoveries were shared with the public. Members of the public were given the opportunity to learn from the conservators, ask questions about the conservation process and look down a microscope at some of the hoard objects. Between 2010

and 2013 there have been 30 public tours with a total of 296 participants. Access was also provided for stakeholders and VIP visits; in total 164 visits in groups of varying sizes, totalling over 2,000 visitors.

Talks are a cost-effective and popular way to disseminate information to the public. In this case, the public interest in the Staffordshire Hoard provided the conservation team with an opportunity to gain audiences who would not traditionally be attracted to a conservation-focused talk. Since 2010, 41 talks have been completed, with an estimated total audience of 1,940 people in a range of groups from special interest to the wider public.

The conservation team has also participated in several family days. During these events children of all ages got to clean an object covered in soil. Often these were small tokens or small toys, but the experience of cleaning and examining objects under the microscope and using thorns and bamboo cocktail picks was a real one. The team also carried out conservation in a 'pop-up' conservation studio in the museum galleries. As time was limited, and it was a un-trialled format at BMAG, the event was conducted over four days in a glass-fronted room where the public could enter and either watch the conservation under way or talk to the conservators. This proved to be popular and attracted 1179 visitors over the four days.

3.4 Social media

To help with the dissemination of information the museums decided to create a web profile so that people could follow the work carried out on and around the hoard from the moment of acquisition to the present, including conservation as it happened. The web profile took several forms; a dedicated webpage with written and video blogs and a social media presence on sites such as Facebook and Twitter feeds as well as YouTube.

The positive benefit of this approach was a large audience, obtained with low start-up costs and connecting with an existing audience already familiar with the platforms in use. It also had a positive effect on the conservation programme with all the participants benefiting from the knowledge that they were supported in their efforts by the public.

The monthly video blogs were made by the team in an honest and simple style. The videos documented the individual conservation events to create a real-time feeling of the studio and the conservation work, along with an insight into the team and their personalities.

By autumn 2013, 51 video blogs and 41 written blogs had been posted on-line. They proved to be very popular and the initial demographic of public interest was mapped. The data showed not only a huge interest within the Midlands, and also across the UK, but surprisingly more than half of the use was from outside the UK. From 2010-2013, the web site had 646,901 individual hits, 45.5 % from the

UK, 33% from the USA and 21.5% from the rest of the world. The hoard Facebook page has to date 1,493 friends, Twitter generated 2,719 followers and YouTube videos have had over 12,000 viewings.

4 Stage 2 conservation

In stage 2 there is still a need for conservation by BMT, who would like to take an active role in some of the analysis; it will also keep up the active outreach programme that has become popular.

4.1 Die-impressed sheet and reeded strips

The rejoining and fragment-matching work for the sheets continues. The work by the BM has been important in establishing the types and possibilities of these. As these items are rare in Anglo-Saxon material and may represent a helmet, we think it is important that this work continues into stage 2. There will, of course, be a law of diminishing returns at some point with the sheets but at present we believe that more significant advances can be made, both with the sheets and with matching as many of the reeded strips as possible. Refining connections between the two materials will also help interpret the materials and either prove or rule out the existence of a helmet, or show other ranges or construction for other types of objects⁸.

4.2 Rejoining objects

A lot of work is needed to rejoin fragments in order to achieve whole or mostly whole objects. This will be important for Chris Fern so he can see the style and form of the material; it will also be important for the publication and drawings. The niello objects, for example, would benefit from rejoining not only for study and research, but also for their long-term preservation. Another important task will be the continuation of the renumbering process and the documentation of the objects as Chris Fern requires⁹.

4.3 Analysis

There is potential in additional scientific analysis and to this end BMT has applied for and received funding from the Esmée Fairbairn Foundation to facilitate this¹⁰.

4.3i Metals

More analysis is required to understand the alloys of the metals, in particular the silver. However, there may be cause to look at some of the gold once specialists begin to consider the work the BM have already completed. BMT already have in house XRF equipment that could give us data capable of comparison with the work by the BM¹¹.

⁸ See **14.5iii** in the main document

⁹ See **14.5ii** in the main document.

¹⁰ See **14.8i** in main document.

¹¹ See **14.8iii** in the main document.

The niello would benefit from a small programme of work. As there are few objects (14 in total), it would be possible to study the whole collection and carry out further analysis on the niello composition, selecting more appropriate samples that would give us a more complete picture of the niello both on the silver and gold objects¹².

The 'green' material in some of the cells should be investigated further. This material seems to be unique within the hoard and the opportunity to study it now that everything has been cleaned and samples can be taken more selectively would be advantageous¹³.

We also believe that metallographic analysis of the metals, both silver and gold alloys, would be beneficial as this could inform us how the metals were manufactured and in particular how they were enriching their surfaces¹⁴.

It would also be beneficial to have someone familiar with gold and silver working who could look at the material and give their opinion on manufacturing and construction techniques¹⁵.

4.3ii *Analysis of organics*

BMT would like to explore the organics, pastes etc. A selective sample of already exposed material could be studied to gain a better understanding of regional or time period differences with regard to choice of organic materials; also studies of any residues of possible resin or adhesives already exposed during conservation would be beneficial. The risk to the organics is high at this point as they are very fragile and prone to contamination because of the need for frequent movement associated with display and study¹⁶.

4.4 **Garnets**

The garnets could be looked at further. We are scoping the resources at Birmingham University this month (April) to assess the possibility of working in collaboration with them to help with the identification of the garnets. They have in-house gemologists and will also have a Raman spectrometer soon; they also have skills in identifying the methods in which stones were cut and polished that we may be able to utilise¹⁷.

4.5 **Outreach**

BMT will continue with the outreach programme described in section 3 here.

¹² No resources for this are present in Stage 2.

¹³ See **14.8ii** in the main document.

¹⁴ See **14.8v** in the main document.

¹⁵ See **14.8v** in the main document.

¹⁶ See **14.8iii** in the main document.

¹⁷ These discussions are ongoing and do not require any additional resources. Should a programme of collaborative work take place during Stage 2, the results will be included in the final publication.

Addendum 1: Example hoard treatment reports
K 1261 Condition Report

Conservation Started: 31/07/2012

Conservation Finished: 31/07/2012

Conservator: Cymbeline Storey

Time Taken: 2 hours

Including digital photography, report, conservation and packing.

Dimensions: (L) 16mm (W) 8mm (D) ~1.5mm

Weight before: 1.01g

Weight after: 1.00g

Digital photography:

Taken with a Nikon Coolpix 4500 digital camera, under daylight or bulbs and Meiji Techno RZ Stereo microscope with an Infinity 1 camera (with analyses capture software) and fibre optic lights, 7-75× magnification. Taken before and after.

Annotation on any of the storage bags or boxes: SSH09, 1001, N10, 1971, 350 (in a triangle), 5/8/09

Description: Visual and microscopic examination using Meiji stereo microscope 7-75× magnification

Silver gilt fragment. The front is gilded and has a zoomorphic decoration. The back is ungilded. This object is thought to be a fragment of a channelled crest similar to K549.

Associated Objects: K546 ('crest' strip) + K678 (animal 'terminal')

Other possible fragments of this object (all TBC): K31, K47, K 49, K139, K192, K363 (tip of nose of animal terminal), K519, K535, K541, K616, K629, K868, K950, K1012, K1158, K1257, K1261, K1376, K1652, K1761

Pre-conservation condition: Visual and microscopic examination using Meiji stereo microscope 7-75× magnification

The object is a flat fragment. Three of the four sides are uneven break edges. The fourth side is finished and flat.

The front is gilded and ~60% covered with compact, sandy soil, particularly in recessed areas and on break edges. Visible metal has patches of dark grey tarnish and general abrasion.

The back is ungilded and ~50% covered with compact, sandy soil that is thick in areas. Visible silver is heavily and consistently tarnished to a dark grey colour. There is general surface abrasion.

Treatment: Carried out using a Meiji stereo microscope

Purpose: Display/study

Aim: Partial cleaning

Materials: Soft natural/synthetic brushes, cotton swab, cocktail stick, thorn in pin vice/holder, water/IMS on metals

The granular soil on the front was mechanically removed or reduced where possible using a fine thorn tip secured in a pin vice and a small pure bristle brush. IMS or water was used to soften the soil to facilitate removal. Loose particles of soil were then removed with a small swab of IMS.

The paper K number was attached to a patch of soil on the back with HMG brand Paraloid B72 (ethyl methacrylate copolymer) from the tube, applied with a cocktail stick.

A new storage box padded with white polyethylene foam was constructed to house the object. A strip of Tyvek (spun bound polyethylene fibres) was used as a cushion for the object and to help lift it out of the foam.

Post-conservation condition/findings

Soil removal from the front revealed a beautiful and delicate zoomorphic design of two creatures biting each other. The design seen on this fragment is not the same as that seen on the channelled 'crest' K546. The width and thickness of the fragment appears to be the same as that seen on K546, however.

Key features

- Silver gilt fragment with zoomorphic decoration – two animals biting each other
- Fragment of channelled crest

Samples

1. soil from front and edges

Appendum 2: Staffordshire Hoard Sampling Guidelines

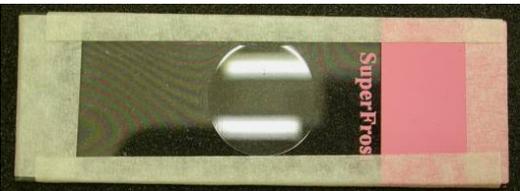
The choice of sampling method and storage containers to use is highly dependent both on the material being sampled and the type of question that it is hoped the sample will be used to address and hence the choice of analysis method. The advice below is intended to give general guidance and is based on the following principles:

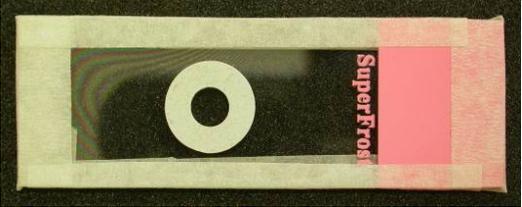
- If there are organic components that are of interest, efforts must be made to avoid contamination of the sample, thus materials made of organic components should be avoided. Avoid plastic or gelatine containers and use aluminium foil in preference to paper, tissue or plastic when handling or wrapping samples.
- Use as small a container as possible to ensure that the sample can be located for analysis. Where a sample is an intact fragment, try to avoid this breaking up. Foil may be useful to support macro-organic materials like wood as well as to ensure that contamination is minimised.

When sampling material, always:

- Clean tools with acetone prior to sampling to avoid contamination. Make sure containers are clean/free of fingerprints, dust etc. Wear gloves to avoid contamination.
- Place a clean sheet of white paper or tissue underneath the object to catch the sample if it falls/pings off (or aluminium foil for organic materials).
- Take as large a sample as possible/appropriate. This is a judgement call on the part of the conservator. The minimum amount of material that can be analysed by FTIR, XRF, SEM or XRD is approximately the size of the head of a pin, although more would be better, particularly if the sample has to be transported or more than one analytical technique is likely to be needed to fully characterise the sample. Raman can be carried out with a smaller amount. Sample sizes for analysis of amorphous organic materials depends on what proportion of the sample the organic material of interest represents.

Material	Appropriate container(s)	Instructions/comments	Image
Soil	<p><i>Preferred:</i> Glass vial</p> <p><i>Acceptable:</i> Polypropylene vial</p>	<p>Choice of container depends on what it is hoped to do with the sample. Plastic should be avoided if organic analysis may be required, but as a control when analysing inorganic materials plastic containers are probably acceptable.</p>	
<p>Amorphous organic material</p> <p>(pastes, adhesives etc.)</p>	<p><i>Preferred:</i> Glass vial</p> <p><i>Acceptable:</i> Cavity slide topped with flat slide (if sample will fit in it) but do NOT use adhesive ring stickers)</p>	<p>Do NOT use gelatine capsules or polypropylene vials.</p> <p>If this is all that is available, wrap the sample in foil first.</p>	
<p>Macro-organic material</p> <p>(plant matter, wood, textile, leather, bone etc.)</p>	<p><i>Preferred:</i> Cavity slide topped with flat slide (if sample will fit in it)</p> <p><i>Acceptable:</i> Glass vial</p>	<p>Place sample in centre of cavity slide. Place a flat slide on top. Seal edges with tape. Store flat.</p> <p><i>Note: for 14C dating</i> ideally use glass vials with lids with foil inserts on the inner side (not the ones with plastic on the inner side). If that is not possible, seal inside aluminium foil before placing in a plastic container. Sample sizes are very variable with material. For an indication see:</p>	

		<p>http://c14.arch.ox.ac.uk/embed.php?File=leaf_arch.html#material</p> <p>Do NOT use gelatine capsules or polypropylene vials. If this is all that is available, wrap the sample in foil first.</p>	
Solid corrosion products	<p><i>Preferred:</i> Polypropylene vial</p> <p><i>Acceptable:</i> Glass vial</p> <p>Gelatine capsule</p>	For XRF, XRD or SEM. Do not break up sample; keep as a chunk if possible.	  
Powdered material	<p><i>Options:</i></p> <p>Flat glass slide</p> <p>Cavity slide</p> <p>Glass vial with insert</p>	<p>Choice very dependent on material of interest and analysis technique to be employed, as a range of analysis methods can be used for powdered samples.</p> <ul style="list-style-type: none"> For very small samples and where organic components are of no interest, place small amount of powder in centre of flat side. Try to separate grains. Place another flat slide on top. Seal edges with tape. Place ring-shaped sticker on top of covering slide so 	 

		<p>that the powdered material is in the middle of the circle. Retain spare material in glass vial. Store flat.</p> <ul style="list-style-type: none"> • For samples where organic components may be of interest, use cavity slide or glass vial. • For samples for organic analysis use glass vial. 	
Unknown material	Glass vial	If in doubt, place sample in glass container.	

Appendix 2: Typological Overview. Assessment Report

Chris Fern FSA

1 Introduction

This report is an assessment of the nearly 4000 objects and fragments that make up the Staffordshire Hoard. It integrates the material found in 2009 with the smaller collection of 91 finds made in 2012. However, as some fragment-groups and objects were unavailable for study, and conservation and reconstruction is continuing, the numbers and interpretations given herein remain subject to change.

Between May 2012 and October 2013, the author spent a total of 55 days examining objects and fragments at five different locations (Table 2.1). In accordance with the Stage 1 Project Design¹⁸, all material was examined except for that sent to the BM (principally die-impressed sheet and reeded strip fragments). The end aims were: (1) the production of this report; (2) a draft catalogue following the K-number¹⁹ sequence entered onto the project's online database.

Year	Birmingham	British Museum	Lincoln	Stoke	Tamworth	Total
2012		2	13	13	1	29
2013	13		10	3		26
2014	10					10
					<i>Total</i>	65

Table 2.1: Locations visited and days spent to examine hoard material

The recording was complicated by the collection's dispersal between multiple institutions, and by the fact that cleaning of the hoard was ongoing up to September 2013. Ultimately, therefore, it was not possible to examine all objects/fragment-groups, and some *c.* 400 K-numbers were recorded in an unclean state. Cleaned finds were measured and weighed, and record photos were taken. X-radiographs of the collection, produced at Lincolnshire Archive, and conservation records and reports produced by BMAG were also consulted. At the end of Stage 1, in February 2014, the whole collection was reunited at BMAG for a grouping exercise. Undertaken over 10 days, this allowed the confirmation of joining fragments, and of pairs and sets of fittings.

2 Finds

As cleaning was ongoing throughout the assessment process, it has not been possible yet to update the original weights for the uncleaned material, reported shortly after the find's discovery²⁰. Table 2.2 instead shows the fragment count for each object class of material. It can now be confirmed that the majority of the copper alloy is of modern/recent origin. As first reported, around three-quarters of the *c.* 6.8kg find is gold metalwork (though this figure included accreted mud), with

¹⁸ Cool 2013 – PD2013.

¹⁹ The 'K-numbers' were allocated by Kevin Leahy in 2009. However, as the material was cleaned and sorted at Stage 1 it was necessary for over 290 new K-numbers to be created.

²⁰ Leahy 2010.

the remaining quarter mostly silver. However, using the fragment count the position is reversed: over half of the assemblage is silver sheet, or strip fragments with a reeded surface. The majority of this could come from just one object (Section 2.11). The original calculation that *c.* 60% of the hoard mass was weapon-fittings has now increased, as many more mounts and other fittings have been identified as probably from swords or large fighting knives (i.e. seaxes). Nevertheless, the largest object remains the folded gold cross (K655).

<i>Object type</i>	<i>Gold</i>	<i>Silver</i>	<i>Copper alloy</i>	<i>Garnet (loose)</i>	<i>Glass</i>	<i>Stone</i>	<i>Sub-total</i>
Buckle	2	2					4
Cloisonné <i>en suite</i> (incl. filigree panels)	63						63
Cloisonné roundel (K130 etc.)	8						8
Cross (pectoral)	2						2
Cross (processional-type)	6	1					7
Edging (C-section)		55					55
Helmet: crest(s) and cheek-pieces	2	31					33
Helmet: broad strip		<i>c.</i> 13					<i>c.</i> 13
?Helmet: reeded strip		<i>c.</i> 700					<i>c.</i> 700
?Helmet: die- impressed sheet		<i>c.</i> 750					<i>c.</i> 750
Mount (hilt and non hilt-fittings)	148	22	5				175
Niello <i>en suite</i>		76					76
Hilt-collar	125	49					174
Hilt-plate	164	111					275
Hilt-ring	44	26	37				107
Pommel	77	73					150
Sword-boss	2					1 (bead)	3
Sword-pyramid	8	6					14
Sword-ring		3					3
Cross-hatched foil	39						39
Garnet				72			72
Rivets, nails, washers and bosses	98	146	4				248
Sheet metal	23	707	6				736
Miscellaneous	28	66	75		1		170
Total	839	(c.)2837	127	72	1	1	(c.)3877

Table 2.2: Finds by fragment/object count (not including modern/recent material)

2.1 Pommels

Eighty-five pommels are identified from 147(+?3) fragments, though six are represented by fragments (rivet-housings) from the ends of pommels only (Tables 2.3–4). In addition, three silver fragments are tentatively identified as rivet-housings, and there are also two gold panels (K5 and K136; included in Table 12)

that may be from the sides of pommels. If included, this would take the total to ninety²¹.

<i>Form</i>	<i>Frag</i> s/ <i>objects</i>	<i>Pommels</i>	<i>Pair/Sets</i>	<i>All-over</i> <i>filigree</i>	<i>Filigree/</i> <i>Cloisonné</i> <i>panel</i>	<i>Style II</i>	<i>Insular</i> <i>ornament/i</i> <i>nterlace</i>
Cocked-hat	9	8		1		3	
'Insular' cocked-hat	25	2			1	1	2
Small round-back	10	5	2*		2		5
Round-back	25	6	1		3	2	3
Fragment	1+?3	1+?3				1	
Total	70+?3	22+?3	3	1	6	7	10

. * one pair; one set of three

Table 2.3: Silver pommels

<i>Form</i>	<i>Frag</i> s/ <i>objects</i>	<i>Pommels</i>	<i>All-over</i> <i>filigree</i>	<i>Filigree &</i> <i>cloisonné</i>	<i>All-over</i> <i>cloisonné</i>	<i>Relief</i>	<i>Style II</i>
Cocked-hat	65	54	33	7	13	1	32
Round-back	3	3	2			1	3
Fragment	9	6	?1				
Total	77	57+6	35+?1	7	13	2	35

Table 2.4: Gold pommels

Following cleaning, it is now apparent there are no copper-alloy examples²². However, a number of the gold pommels retain their original cores of cast copper-alloy, over which the precious-metal cap was set. Others might have had cores of horn, based on organic remains reported on by the British Museum²³, or in some cases of an as yet unidentified (?calcitic) material. One (K457) core retains an iron fragment of sword tang (Fig. 1).

Sixty-three are gold. The majority are of 'cocked-hat' form with all-over filigree decoration (Fig. 2.1; Table 2.4). A different type is represented by thirteen that have all-over cloisonné decoration, while seven demonstrate both techniques. Most of these, regardless of their decoration, appear to have been formed out of gold sheet, though it is possible some might be cast. In typological terms, the majority broadly fit with Menghin's *Typ Beckum-Vallstenarum* (1983), although three pommels have round profiles rather than the cocked-hat shape. The smallest (K376), in cloisonné, is part of a hilt-suite from an ornate seax (Section 2.7). Only two have relief ornament, in both cases combined with niello decoration. One (K27+K358), in particular, stands out for its rich, moulded animal art, in Salin's Style II²⁴. In all, 35 (61%) of the complete pommels have animal Style II, although just three of the cloisonné pommels are so decorated.

All of the 22 silver pommels are cast except for one, most with gilding, and seven have animal Style II decoration. Eight are cocked-hat forms that are again closest to

²¹ This is only slightly fewer than the estimate of 92 made before cleaning (Leahy 2010).

²² *pace* Fischer and Soulat 2010

²³ Cartwright 2013b

²⁴ Salin 1904; Fern forthcoming

*Typ Beckum-Vallstenarum*²⁵. One (K711) is an import, probably from Scandinavia²⁶, while three with line-edge ornament (K286, K456 and K827) are so similar they suggest the same workshop. The example that is not cast has filigree decoration over a copper-alloy core (K306), akin to the gold filigree pommels. The remaining silver pommels are round-back forms or in two cases unusual cocked-hat forms (some in a highly fragmented state). Shared details of style and manufacture within this group may point to a common origin for some. A number have fine cast, non-zoomorphic interlace and other ornament, including triskeles, that can be considered of an early Insular character. The interlace can be compared, for example, to that on mould fragments from the Mote of Mark, in south-west Scotland²⁷. This is combined in multiple cases with gold panel inserts decorated with filigree and sometimes cloisonné, and a number have niello inlay also. The small size of some may indicate they come from seaxes, not swords. In addition, one otherwise plain, round-back pommel (K240+K1447+K1615) has a possible incised rune.

It should be noted that the maximum number of pommels is not equivalent to the actual number of swords/seaxes represented. Hilts could be fitted with non-metal pommels, for example of horn, but be mounted with other decorative fittings, examples of which are well represented in the hoard (Section 2.8).

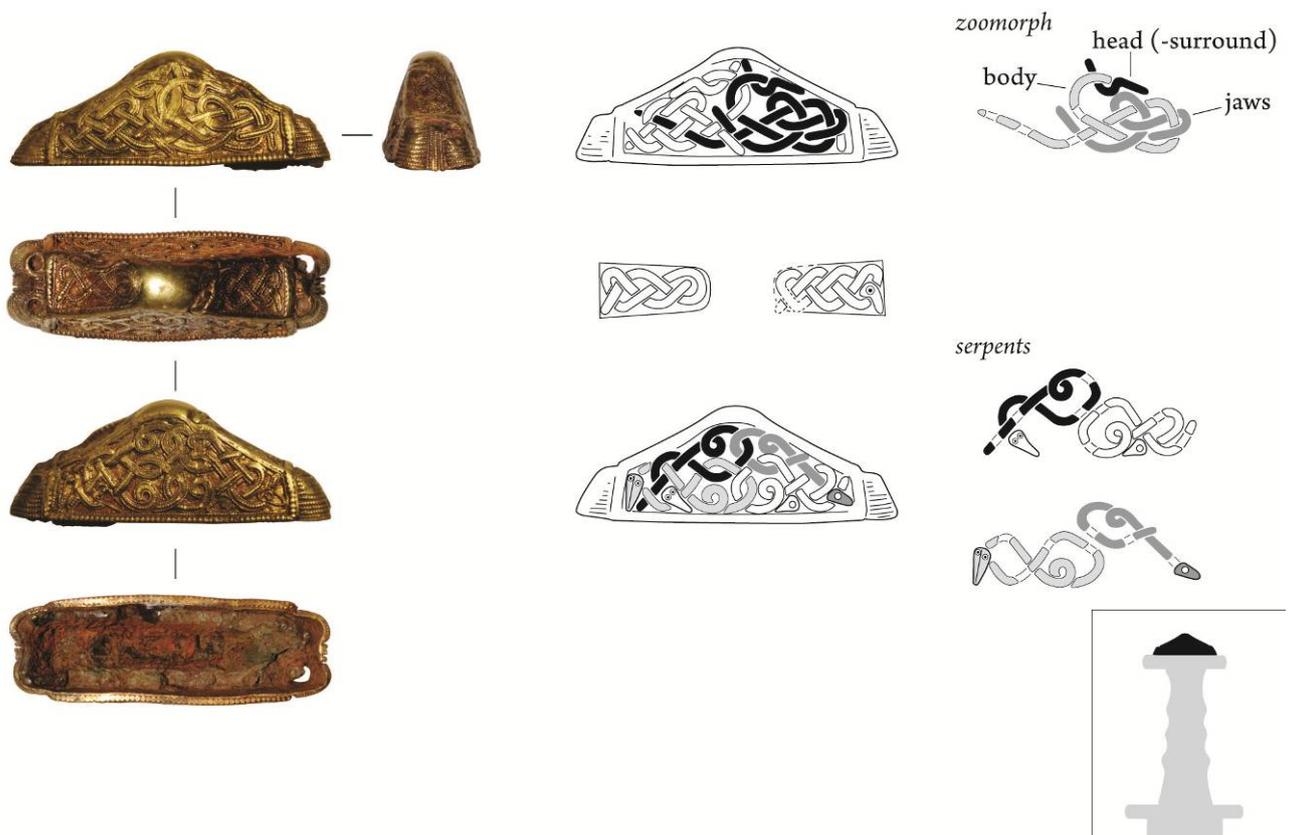


Figure 2.1: Gold pommel with filigree ornament in animal Style II (scale 1/1). Photos and drawings by author

²⁵ I disagree with Fischer's and Soulat's (2010) identification of K559 as a *Typ Bifrons-Gilton* pommel.

²⁶ Fern forthcoming.

²⁷ Laing and Longley 2006, fig. 57

2.2 Hilt-plates

Both the gold and silver hilt-plate assemblages are in a particularly fragmented and incomplete state. Nevertheless, multiple joins have been found and around a dozen pairs or suites of plates have so far been identified. Where fitted, a sword could have as many as four plates: a pair for both the top and bottom guards²⁸. But a determination of the actual number remains problematic. In Table 2.5, the figures in bold are for the Maximum Number (MN) possible, but the totals must be regarded as an exaggeration of the real number, as many fragments not joined could be from the same plates.

		Silver		Gold		
<i>Hilt-plate</i>		<i>Frag/objects</i>	<i>MN plates</i>	<i>Frag/objects</i>	<i>MN plates</i>	<i>Fixed pairs</i>
S W O R D	Top guard, pommel-side	1	1	16	14	2
	Top guard, grip-side	4	1	18	16	
	Top guard (unknown)	14	8	23	19	
	Lower guard, grip-side			31	23	1
	Lower guard, blade-side	17	7	35	33	
	Lower guard (unknown)			10	9	
	Uncertain type/identification	32+?3	27+?3	24+?6	23+?6	
	Suite K63 etc.	36	1+?1			
	Suite K417 etc.	4	1+?1			
	SEAX Lower guard, blade-side			1	1	
Total		108+?3	19+?32	158+?6	138+?6	3

Table 2.5: Hilt-plates by material and type

With the exception of a single cast plate (K567), all the other gold hilt-plates and fragments were shaped from sheet metal (typically <0.5mm or less), in some cases over a copper-alloy liner. The cast example is also unique for its single-edged blade slot (L. 36mm), its size indicating it comes from a 'broad' seax. In all other instances the blade slots were for double-edged swords. The seax example is also the only plate decorated with animal Style II. On most others decoration was limited to the bosses at each end that covered the rivets. These could be shaped domes of gold sheet or set with small cabochon garnets (or in one case flat glass: K37), in either case with a filigree collar. However, a small number of plates have additional filigree decoration (e.g. K399+K881) or cloisonné trims (e.g. K87, K374, K691, K767, K1056 and K1150).

The smaller silver assemblage probably reflects the lower incidence of silver pommels. Many objects/fragments demonstrate traces of gilding, a few have line

²⁸ Menghin 1983: *Typ Faversham-Endrebacke*

decoration running around their sides, and a small number have punched ornament. Most appear cast, though some might have been formed out of sheet. In addition, 40 fragments come from several unusual ‘hilt-plates’ (K63 etc; K417 etc.). They demonstrate gilded interlace and were also mounted with filigree decorated panels, so it seems likely they relate to the silver pommel group with similar decoration (Section 2.1).

2.3 Hilt-collars

Around 170 fragments/objects make-up 105 hilt-collars (Tables 2.6–8). Forty-one potential pairs are identified. Each represents a collar at the top and bottom of a weapon-grip. Most are probably from swords, though also included in Table 8 are the cloisonné collars from the seax-hilt suite described in Section 2.7, and it is possible others might likewise come from seaxes.

<i>Form</i>	<i>Frag/objects</i>	<i>Collars</i>	<i>Pairs</i>	<i>Style I</i>	<i>Style II</i>	<i>‘Insular’ interlace/ ornament</i>
Collars	49	10	3+?1	2	3	2

Table 2.6: Silver hilt-collars

<i>Form</i>	<i>Frag/objects</i>	<i>Collars</i>	<i>Pairs</i>	<i>Style II</i>	<i>Interlace</i>	<i>Herringbone</i>	<i>Scrollwork</i>
Broad (H. >12mm)	49	32	12+?2	12	17	2	1
Narrow (H. <11mm)	49+?1	38+?1	10+?3	5	9	19	4
Total	98+?1	70+?1	22+?5	17	26	21	5

Table 2.7: Gold filigree hilt-collars

<i>Form</i>	<i>Frag/objects</i>	<i>Collars</i>	<i>Pairs</i>	<i>Geometric (only)</i>	<i>Style II</i>
Broad cloisonné (H. >8mm)	14	13*	5+?1	8	5
Narrow cloisonné (H. <7.5mm)	11	10	1+?3	10	
Total	25	23	6+?4	18	5

*one pair combines narrow and broad types

Table 2.8: Gold cloisonné hilt-collars

The smaller silver assemblage includes multiple, significant pairs. For example, one pair (K181/K298 etc.) demonstrates the only animal Style I from the collection. Another pair (K160 etc./K304) is of unusual angular-polygonal form, decorated with animal Style II, inlaid with niello, that may be a suite with one of the pommels (K39+K1007). There are also remains of a pair with fine cast Insular ornament and gold filigree panels (K34 etc.).

The larger gold assemblage can be separated into ‘broad’ and ‘narrow’ classes. The majority of the collars, like the pommels, are of sheet construction with filigree decoration. Around 70 are suggested, including up to 27 pairs. The broad collars of this group mainly have animal Style II and related (non-zoomorphic) interlace ornament. By contrast, the narrow collars most frequently have herringbone pattern (i.e. ‘false plait’) filigree.

The around 20 cloisonné collars, including 10 possible pairs, have mainly geometric decoration, in keeping with most early Anglo-Saxon cloisonné jewellery. However,

five have animal Style II designs. One collar pair (K660/K967) probably formed a suite with pommel K355, and another (K850/K1155) may be a match with pommel K1155.

In addition, there is one possible narrow collar (K111) of plain sheet.

2.4 Hilt-rings

Hilt-rings (Table 2.9), like collars, were fitted to the top and bottom of sword-grips. The majority of the gold examples are of thick beaded wire, filigree manufacture (Fig. 2.2a). All the silver fragments are cast imitations of this form. Owing to the fragmented nature of the assemblage, and the similarity of many, it is difficult to establish accurately the true number of rings originally represented.

<i>Material</i>	<i>Frag./ objects</i>	<i>Rings</i>	<i>Thick beaded</i>	<i>Twisted- beaded</i>	<i>Wrapped- beaded</i>	<i>Beaded garnet</i>	<i>Herringbone (imitation)</i>
Silver	23+?3	?15+?3	18				
Gold	43	?40	20	10	8	2	
Gold (Sect. 2.7)	1	1					
Copper alloy	37	?2	?1				1
Total	104+?3	?58	38+?1	10	8	2	1

Table 2.9: Hilt-rings

Two further filigree types are demonstrated. Ten rings are formed from beaded wires twisted together ('twisted-beaded'), including two or three pairs with two twisted-beaded wires side by side (Fig. 2.2b). Another eight comprise a thick wire formed from a beaded wire wrapped around a core wire ('wrapped-beaded') (Fig. 2.2c). There is also a unique pair in cloisonné and filigree (K570/K679) with 'beaded' garnet cloisonné (Fig. 2.2d). These are skeuomorphs of the thick beaded wire form. Also, a plain (egg-shaped) gold ring is from the seax hilt (Section 2.7).

Thirty-seven, small to very small, copper-alloy and gilt fragments possibly come from just two rings: one imitates thick beaded wire (K511/K1571/K1695/K2018), and the other copies the double twisted-beaded wire form (K1454/K1461/K1607/K1618/K1657/K1659/K1660/K1696/K1873).



Figure 2.2: Hilt-ring types: a) Thick beaded filigree wire; b) Twisted-beaded filigree wire; c) Wrapped-beaded filigree wire; d) Beaded garnet and twisted-beaded filigree wire (scale 1/1, except (b) at 2/1). Photos (a–c) by author, (d) by Guy Evans

2.5 Sword-pyramids and sword-bosses

Ten sword-pyramids and two sword-bosses form six pairs (Table 2.10). One pair have cast silver bodies, their sides mounted with gold panels decorated with filigree scrollwork and tear-drop-shaped, cabochon garnets (K302/K382/K676/K849/K999/K1254). All the others are gold with garnet cloisonné decoration, including one pair with animal Style II (K451/K1166). One pair (K377/K462) is of low type (H. 14mm), but the rest are tall forms (H. >19mm).

<i>Material</i>	<i>Frag./objects</i>	<i>Fittings</i>	<i>Pairs</i>	<i>Geometric cloisonné</i>	<i>Panel – filigree scrollwork/cloisonné</i>	<i>Style II cloisonné</i>
Silver (pyramid)	6	2	1		2	
Gold (pyramid)	8	8	4	6		2
Gold (boss)	2+1 (bead)	2	1	2		
Total	16+1	12	6	8	2	2

Table 2.10: Sword-pyramids and sword-bosses

The pair of sword-bosses (K675/K1425) can be associated with a stone barrel-shaped bead (K764); the long loop on the reverse of either boss slots neatly into the perforated centre of the bead (Fig. 2.3). This arrangement is paralleled in a single example from Kent, as well as by continental finds²⁹.

²⁹ Evison 1976, 312; Menghin 1983, 144.



Figure 2.3: Sword boss (K675) fitted in stone bead (K764) (scale 2/1). Photo by author

2.6 Sword-rings

There are three sword-rings (K531, K543 and K1625) of cast silver, which would have been fitted to pommels³⁰. One (K543) is incised with two birds' heads, and another has traces of gilding (K531). K543 demonstrates a reasonable fit with pommel K711, although there are no wear/contact marks on the latter to confirm the association.

2.7 Seax hilt-fittings in cloisonné

Five hilt-fittings in gold and garnet cloisonné come from a seax: a capped fitting (K354), plain ring (K690) and broad collar (K370) slot neatly together. They were fitted at the top of the grip, with the tang end (that projected through the top of K354) originally capped by a small pommel (K376). The underside of this has been ripped open, revealing a pin housing; the pin would have fastened through the top of the tang to secure the hilt and might possibly have been removable to allow repairs. The remaining broad collar (K449) was fitted separately at the bottom of the grip (the blade end); it has a slot for a single-edged blade, which is surrounded by a contact mark left by the actual blade (L. 28mm). The two collars have animal Style II designs in garnet. The expertise of the cloisonné approaches the achievement of the famous regalia of Sutton Hoo, Mound 1.

2.8 Other hilt-fittings, guard-fittings and mounts

Several silver mounts, all cast, come from sword grips (e.g. K1277). Most notable is a bird-headed pair (K791/K1525+K1603) with fine cast interlace (Fig. 2.4).



Figure 2.4: Silver mount (K791) with bird's head and interlace fill (scale 1/1). Photos by Guy Evans, drawings by author

³⁰ Evison 1967

<i>Mount</i>	<i>Frag/objects</i>	<i>Fittings</i>	<i>Pairs</i>
Silver	22	7+?2	1
Copper alloy	3+?2	1+?2	
Total	25+?2	8+?4	1

Table 2.11: Silver and copper-alloy fittings

<i>Mount</i>	<i>Frag/objects</i>	<i>Fittings</i>	<i>Pairs/sets</i>	<i>Cloisonné</i>	<i>Filigree</i>	<i>Sheet</i>	<i>Moulded</i>	<i>Style II</i>
Cross	3	3		1	2			
Eye-shaped†	2	2	1		2			
Peltaic	2	2	1		2			
Rectangular/sub-rectangular/trapezoidal	35	29	4+?1§	2	26	1		2
Semi-circular	1	1			1			
Serpent (moulded)	8	6+?2	3				6+?2	
Tongue-shaped	11	11	4*	6	2	3		3+?2
Triangular/sub-triangular/cocked-hat	17	17	2	4	13			2
Zoomorphic (small)	22	21	6	7	13	1		12
Zoomorphic (large)	2	1				1		1
Other	8	7	1	2	4	1		3
Composite roundel	8	1		1		(incl.)		1
U-form/tip mounts (guard)	29	27	9‡	15	10	2		4
Total	148	128+?2	31	38	75	9	6+?2	27

*includes two sets of three

†not including mounts K876 and K1403, from pommels (entered in Table 3)

‡includes two sets of four, and two sets of three

§K810 is a suite with hilt-guards K305/K464/K721 (not included as pair/set in this table)

Table 2.12: Gold fittings

There are just five fragments of copper alloy with cast ornament, four with gilded interlace, though only three are definitely from a mount. They are from a single harness roundel found 50–100m from the rest of the collection, the fragments discovered separately in 2009 (PAS code: WMID-C28605) and 2012 (K5001/K5007). It was not deemed to be part of the treasure, but it is of considerable significance to the hoard's interpretation (Section 8).

The more numerous gold fittings demonstrate an array of forms, mainly in filigree and cloisonné, with multiple pairs and sets represented. The vast majority are small mounts, mostly rectangular/sub-rectangular, triangular/sub-triangular or zoomorphic forms. Many are probably from sword-hilts. Filigree scrollwork (without zoomorphic content) is the most common decoration. They have a significant parallel in an antiquarian find in the British Museum: the 'Cumberland' horn sword-hilt (reg. num. 1876,0717.1). Its preserved horn pommel, grip and guards are covered with multiple mounts in filigree scrollwork, as well as one in garnet cloisonné, very like examples in the hoard. Personal study by the author and X-radiographic analysis of the hilt at the British Museum³¹ (Blakelock *et al.* 2013) for this project has shown that the filigree mounts were fixed with small gold nails (Fig. 2.5). Some of the hoard fittings have identical nails still *in situ*, and others were recovered loose (Section 2.16).

³¹ Blakelock *et al.* 2013.

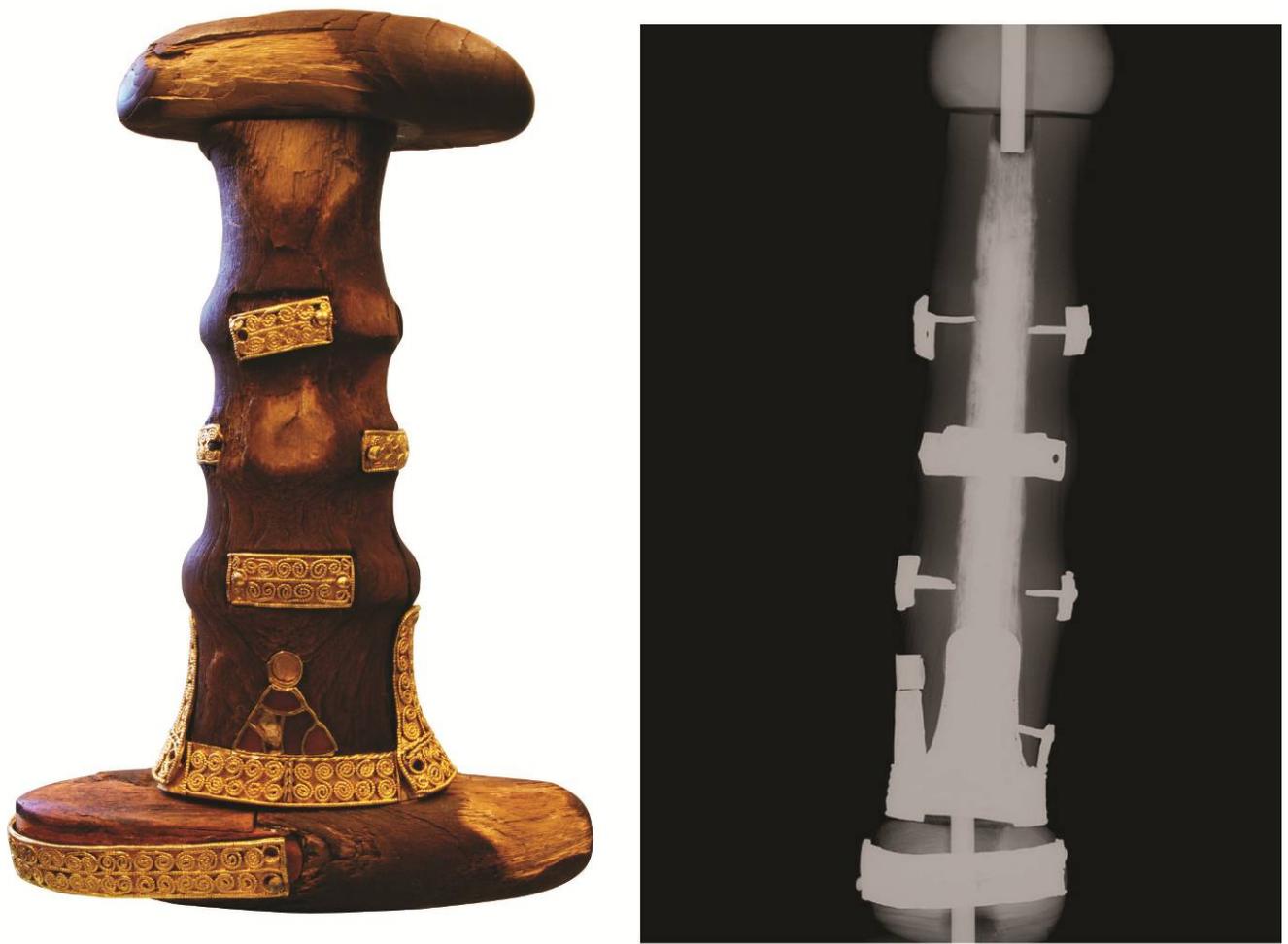


Figure 2.5: The 'Cumberland' horn sword-hilt with mounts in gold filigree and cloisonné, with similar mounts from the hoard (scale 1/1). Photo of hilt by author, mounts by Guy Evans; X-ray © Trustees of the British Museum

As well as mounts of rectangular and triangular form, the Cumberland hilt also has a strip-fitting on its lower guard. The hoard includes multiple similar examples in filigree, as well as in cloisonné. This last type has not been seen before on Anglo-Saxon weapons. Some preserve the U-form of the end of the guard. One set of four in cloisonné (K323/K348/K373/K773) indicates a sword-hilt with fittings at the tips of both its top and bottom guards. In addition, there are two in gold sheet (K972 and K1079), representing another type not seen previously, both of which contain organic remains of the guards.

The zoomorphic mounts mostly take the form of birds (or are bird-headed) or fish, or combine the two. The curvature of some suggests they might have been fitted to sword grips also. However, the shape and size of other mounts indicate different

applications. The largest example, of a fish between birds (K652+K1249), was probably fitted to a board; not necessarily a shield, but possibly the high front-board of a saddle of the period³². In all, over 30 mounts have animal Style II ornament or take zoomorphic form, including seven in cloisonné.

A small number with filigree decoration are inserts for pommels. A pair of eye-shaped form with filigree scrollwork (K876 and K1403) fit two small silver pommels (Section 2.1; incl. in Table 2.3). Another is of cocked-hat shape, and has a possible rock crystal stone (K136), and one is of semi-circular form with scrollwork fill (K5).

A further unique group comprises serpent mounts cast in moulded form. Although now twisted, it appears these were also originally set on a flat, or flattish, surface, fixed by small gold nails projecting from their reverses (like on other mounts, e.g. K16 and K1084).

2.9 Composite roundel in cloisonné

Eight pieces in Table 2.12 are part of a composite roundel (K130 etc.). It is without parallel, and its purpose currently remains unknown. The large roundel, though bent, seems never to have been flat, but convex, and it has four fixing holes on its reverse. Birmingham conservators have reconstructed it³³: a cylinder piece (K1055) originally projected from the roundel's centre, topped by a disc with a large millefiori glass stud (K545). Other sheet panels with Style II creatures (K54/K467/K1324/K1510) and a triangular cloisonné part (K112) are detached from the roundel (K130).

2.10 Large mounts in cloisonné *en suite*

Over 30 mounts and fragments form several distinctive suites with related geometric cloisonné and filigree ornament (Table 2.13). The mounts are of high-quality manufacture, and the majority, possibly all, are probably from a single workshop. Most form pairs of strip-mounts, but there is also a pair of large eye-shaped mounts (Suite 1a: K270/K843), and a pair of wing-shaped mounts (Suite 5: K653/K654). Two sets (Suites 1b and 3) have slots that were originally filled with small rectangular (or curved-rectangular) gold panels bearing filigree decoration, in most cases (Style II) serpents. A few of these remained *in situ* when found, in strip-mounts of Suite 3, but, because they were not fixed with nails/rivets, most (26) were recovered loose.

³² Fern forthcoming.

³³ Magnoler 2012.

Suite	Mount type	Frag./objects	Fittings	Filigree panels				
				serpent, moulded head (Style II)	serpent, U-head (Style II)	serpent, granular eye (Style II)	serpent, filigree head (Style II)	curved, interlace
1a	Rectilinear, angled end	8	4					
	Eye-shaped	2	2					
1b	Rectilinear, curved, with panels	4	4					
1c	Rectilinear, curved	2	2					
2a	Rectilinear	5	2					
2b	Rectilinear, pointed end	4	4					
3	Flat-curved, with panels	6	6	(+6)		(+1)		
4	Edge mounts	4	3					
5	Wing-shaped	2	2					
Loose serpent panels		26	26	22	1		1	2
Total		63	55	22(+6)	1	(+1)	1	2

Table 2.13: Large cloisonné mounts *en suite*

The suites are without parallel outside the collection, and their purpose is currently unknown, but their varying curved and flat forms suggest they may be from more than one parent object. Suite 4, in particular, stands out: it comprises two corner sections and a straight section that look as if they were designed to fit along the edge of a thin board, perhaps a book-cover.

2.11 Helmet

There are around 1500 fragments of related silver sheet with die-impressed ornament, reeded strip and other objects, the majority of which possibly comes from just one helmet (Table 2.14)³⁴. Key to this identification are 38 fragments/objects that make up two helmet-crests (or two sections from one crest) and a pair of cheek-pieces. These were cast in silver *en suite*, with all-over, gilded animal Style II.

Part	Frag.	Parts	Pairs	Style II
Crest with animal-head terminal	24	2	1	2
Cheek-piece	9	2	1	2
Reeded strip	BM (c. 700)	BM	BM	
Broad strip	BM (c. 13+)	BM	BM	
Die-impressed sheet	BM (c. 750)	BM	BM	Yes
Total	33 + c. 1463	4(+?)	2	4(+?)

Table 2.14: Silver-gilt, silver and gold fittings and fragments from a helmet, or helmets

³⁴ [The number of fragments quoted for the silver sheet and reeded strip are based on the original assessment, as well as the numbers established from the author's personal examination of that part of the hoard not sent to the British Museum. These numbers should be regarded as estimates only, therefore, to be adjusted at Stage 2 when the material sent to the British Museum has been fully quantified.]

The curving crest sections have side walls that form a slightly tapering channel. To the narrower end of each fitted a cast animal-head (K47+K678/K363+K397). Both crests and head-terminals are the same but for small details. The channel in each case contains remains of an off-white calcite, or organic, yet to be analysed; possibly it originally held a hair crest.

One cheek-piece (K453+K740+K1509) was found in 2009, the other in 2012 (K97/K594/K1223/K5004). They were cast with two attachment tabs each, over which slotted a gold fitting of thick beaded wire. These two fittings (K288/K772) are the only non-silver parts. The cheek-piece found in 2012 is yet to be cleaned, so it is uncertain, presently, if their decoration is identical.

The vast majority of the remains from the potential helmet(s) are small fragments of thin silver sheet with die-impressed ornament, and fragments of reeded strip, in several different widths. Mostly the fragments are gilded. This material was sent to the BM at the start of Stage 1, where the process of assembly was continued from the work started at BMAG³⁵. It remains to be resolved if any of the patterned sheet and reeded strip is from other objects, e.g. drinking vessels. But it is now known that one frieze with die-impressed decoration was originally retained within a fragmentary broad channel-fitting of silver. This is curved and might possibly be the remains of a helmet brow-band.

2.12 Edging

Fifty-five fragments of C-edging may come from just two objects (Table 2.15). One assemblage is in plain silver, the other is silver-gilt. Multiple joins have been made for the latter, forming straight and curved sections, and one straight section with two ends at right angles. A small piece of preserved wood (K420), 4mm thick, was found in the last, pierced by an iron nail (though this does not penetrate the C-edging). Some interiors of this edging show scratches possibly from a blade used to prise off the metal fittings. In the period, C-edging could be fitted to objects including helmets, purse-lids and scabbards, but the role of the hoard edging has yet to be established.

<i>Part</i>	<i>Frag</i> s	<i>Object</i> s
C-edging, silver-gilt	31	?1
C-edging, silver	24	?1
<i>Total</i>	55	?2

Table 2.15: C-edging in silver and silver-gilt

A number of fragments of ‘edging’ were sent to the BM so were not available for analysis. These may add fragments to the two groups already identified, or be from additional groups (they are: K96, K237, K250, K426, K523, K818, K834, K2001: renumbered from K1445).

2.13 Buckles

There are two small gold buckles with plates (K144 and K685). Both are *Marzinzik Type II.24b-ii*³⁶. They could have come from belts, though at Ford (near

³⁵ See Appendix 4.

³⁶ 2003, 52, pls. 143–49.

Winchester) similar examples were found attached to the edge of a seax scabbard, for its suspension from a belt³⁷.

<i>Material</i>	<i>Frag/objects</i>	<i>Buckles</i>
Silver	2	1
Gold	2	2
Total	4	3

Table 2.16: Silver and gold buckles and buckle parts

There is a silver buckle with a wide loop (K959) and tongue with an oval or heart-shaped shield (K957). The loop has a channel filled with gold herringbone-pattern filigree. The tongue-shield is edged with silver beaded wire. The silver sheet remains of a belt-plate were also found during cleaning of the loop.

2.14 Other sheet metal

Distinct from the thin sheet with die-impressed ornament, described in Section 2.11, is a large quantity of mainly flat silver sheet (mostly Th. 0.5–1mm) in a highly fragmented state (Table 2.17). The majority has gilding on one side and is flat, but is otherwise undecorated. Combined, the fragments could represent a sizeable plate surface, and a few have fixing holes and score lines that perhaps relate to fittings once attached to it. However, it is uncertain what function it served.

<i>Sheet</i>	<i>Frag/objects</i>	<i>Description</i>
Silver-gilt	472	Mostly flat, gilded one side, ?cast
Silver	235	Mostly flat, ungolded
Gold	23	??Hilt-plate; ?other
Copper alloy	6	Undiagnostic
Total	736	

Table 2.17: Silver, gold and copper-alloy sheet

The over 200 fragments of silver sheet without gilding probably come from multiple objects. Two possibly joining fragments have Insular scroll ornament (K754/K1925), but almost all others are plain.

Some of the gold sheet probably comes from torn hilt-plates, though the pieces are small, and so cannot be certainly identified. The few copper-alloy fragments are similarly undiagnostic, and possibly recent/modern in origin.

Some fragments were unavailable for study as they were within fragment-groups sent to the British Museum. The following include a mix of reeded strip, die-impressed sheet and copper-alloy fragments, all small: K435 (x17); K1332 (x21); K1371 (x?); K1395 (x?); K1417 (x?); K1418 (?); K1480 (x?); K1490 (x?65); K1493 (x?40); K1518 (x?11); K1551 (x?50); K1557 (x?25); K1567 (x?25); K1577 (x?30); K1615 (x?30); K1627 (x?50); K1627 (x?20); K1701 (x?10).

³⁷ Musty 1969.

2.15 Mounts with geometric niello decoration *en suite*

<i>Niello mount</i>	<i>Fragms</i>	<i>Objects</i>	<i>Description</i>
Group A	4	2	Pair of eye-shaped mounts
Group B	27	3	Pair of tapered strips, and related strip
Group C	16	1/?2	Strips, angle- and butt-ended
Group D+E	25	1	Fantail mount
Fragments	4		From A–E
Total	76	7+?1	

Table 2.18: Silver mounts with geometric niello ornament

Groups A–E, identified in Table 18, follow from Cymbeline Storey’s internal BMAG report³⁸, which first identified the sets of silver mounts, characterised by geometric niello decoration imitating cloisonné and gilded edging. They appear to have been manufactured *en suite* and are very possibly, therefore, from a single parent object. They include a pair of eye-shaped mounts (Group A) that is reminiscent of the pair in cloisonné (Section 2.10), and which might suggest a common provenance for both groups. The mounts have no obvious parallels outside of the hoard, and the form of their decoration is rare generally. During the grouping exercise it was identified that Groups D and E were in fact one object.

2.16 Loose rivets, washers, nails and bosses

Some objects retain rivets or nails *in situ*, including pommels, hilt-plates, mounts and fragments of reeded strip. These are important for understanding manufacture and function. Many more objects have lost their fixings, however, a proportion of which is represented by around 250 loose rivets, nails, bosses and washers (Table 19).

<i>Niello mount</i>	<i>Gold</i>	<i>Silver</i>	<i>Copper alloy</i>
Boss-headed rivet	18	5	
Boss (no rivet)	34	7	?1
Small rivet	13	52	?1
Large rivet (flat-headed)		2	
Small nail	16	21	?1
Washer		2	
Double-washer	8		
Nail/rivet fragment	9	57	1
Total	98	146	?4

Table 2.19: Nails and rivets, and related fixings, by material

The boss-headed rivets and bosses without rivets probably mainly come from hilt-plates. Most of the gold examples have filigree collars and a small number were set with garnets, and in one case, possibly glass. The small gold rivets and double-washers most likely also come from hilt assemblies. However, the greater quantity of the small silver rivets, and possibly some of the nails also, may largely be from the suite of niello-ornamented mounts (Section 2.15) or from fragments of reeded strip (Section 2.11). Both these object types demonstrate numerous fixing holes,

³⁸ Storey 2013.

and occasional fragments retain similar *in situ* nails/rivets. The smallest nails in gold and silver are of the type used to fix mounts to hilts (Section 2.8).

2.17 Pectoral crosses and processional-type crosses

Only one pectoral cross is certain, in gold with a central cabochon garnet (K303). Its arms are of boxed construction with a loop for attachment, and it is decorated with filigree scrollwork. Three other small crosses in the collection were mounts (Section 2.8). In addition, there is a fragment of what might be the arm of a second, smaller, pectoral cross also of boxed gold-sheet construction, with herringbone filigree decoration. It was found in soil inside pommel K465 (renumbered to K1898), and contained within its ‘arm’ a sliver of preserved wood.

<i>Type</i>	<i>Frag</i> s	<i>Object</i> s
Pectoral cross	1+?1	1+?1
Processional-type cross	7	3
Total	8+?1	4+?1

Table 2.20: Crosses

The great gold cross (K655), as it has become known, like the pectoral cross, is an example of a *crux gemmata* (jewelled cross). However, it cannot be said for certain that it was mounted as a processional cross. Its once flat form means that other alternatives are possible: for example, as a mount on a book-cover, or perhaps as an altar cross. It had six gemmed bosses originally: one remains *in situ* without its stone, and four survive detached (K656/K657/K658/K659) but only one of these retains its stone, a garnet (fractured and repaired in antiquity). The arms between the boss settings are filled with Style II animal art.

The gold inscribed strip (K550), with its version of Numbers 10.35 (Brown 2010), might be the arm from another cross. It has one gem-setting, without a stone, similar in manufacture to those from cross K655. In addition, a further garnet-boss (K1314) may be from a related, missing object, as it shares the same shape, bezel form and filigree collar as the boss on K550. Two other large, loose garnets (K308 and K695) could be from these or other crosses also. In addition, a third processional-type cross may be represented by another ‘arm’, a composite fragment, comprising a core of wood and iron encased in silver (K274).

2.18 Loose garnets and cross-hatched foils

There are 72 loose garnets (not counting small bosses with garnets; Section 2.16). Three are large cabochons that could have come from processional-type crosses (Section 2.17). The remainder are all small, flat, cut garnets that demonstrate a range of mostly familiar forms, including stepped and mushroom shapes. Probably in the main these are detached from cloisonné objects in the collection (a few have backing foils adhering). This is probably true, too, of the small cross-hatched foils found loose.

<i>Object</i>	<i>Number</i>
Garnets	72
Cross-hatched gold foils	39
Total	111

Table 2.21: Garnets and gold foils

Almost all the cloisonné objects in the hoard demonstrate gold backing foils with cross-hatched patterns (that reflected light back through the garnet or glass stone), as was the norm. As defined in Avent's and Leigh's system (1977), most are die-impressed with a 'standard' cross-hatched pattern, as was most common. A minority have, alternatively, a 'boxed' pattern, and some objects combine both types, again reflecting usage outside the hoard.

The 39 loose foils include examples of both 'standard' and 'boxed' patterns, but there are also several instances of a rare 'special boxed' 5×4 pattern; the only object so far identified with this pattern in the hoard is garnet-boss K1314. The fineness of some foils, both loose and on jewellery, matches and in some cases exceeds that of the finest examples recorded by Avent and Leigh, as well as those used for the Sutton Hoo regalia³⁹.

2.19 Miscellaneous and modern material

The gold, silver and copper-alloy fragments in this category that are of antiquity are mainly very small. They include fragments of detached filigree wire, gold and silver, gold cloisonné wall, and niello inlay. The silver filigree may all come from one object: pommel K306.

<i>Type</i>	<i>Frag./objects</i>
Silver, unidentified	34
Silver, filigree fragments	19
Silver, wire rings	2
Silver, bracket	7
Niello-inlay fragments	4
Gold, cloisonné fragments	4
Gold, filigree fragments	22
Gold, pair of 'cap' fittings	2
Copper alloy, liner/boss-core fragments	?47
Copper alloy, other	?28
Glass	1
Lead/solder	8
Slag	1
Stone (natural)	14
No find (incl. soil/vegetation/insect)	9
Modern/recent (ironwork, copper-alloy sheet/fitting, bottle glass, brooch/fitting etc.)	70
Unidentified	20
<i>Total</i>	292

Table 2.22: Miscellaneous and modern material

A pair of silver wire rings (K428/K786) show the same type of manufacture as 'slip-knot' necklace rings of seventh century date⁴⁰, except that in this case one has a cast, blunt 'pin' on its loop (the other is damaged and has probably lost its 'pin'). At present no role has been assigned them, though it seems unlikely in this case that

³⁹ East 1985.

⁴⁰ cf. Geake 1997, 48–50, fig. 4.10.

they represent feminine jewellery. A pair of gold ‘cap’ fittings with filigree collars (K311/K394) is currently unidentified too.

A silver bracket (K516+K787+K794+K997+K1128+K5058+?K1129) is in several pieces and bears cut-marks. It was found with a piece of preserved hornbeam wood⁴¹. Its function is unknown, though it may have served to mount a wooden staff object on a flat base (such as an altar cross).

Included in the copper-alloy assemblage are fragments of hilt-plate liner, and one example of a core from a boss from a hilt-plate (K509). Perhaps pre-dating the hoard is a finial that might be a Roman furniture-fitting (K101).

Recent material includes objects probably lost by walkers on the heath: brooches/fittings (K576 and K848), a possible silver cane top (K899) and a dog tag (K890). The last is inscribed with a local address: E. A. DOWNING – 29 CROSS ST – CHASE TERRACE – NR WALSALL.

3 Condition

A key characteristic of the metalwork is its fragmented and damaged state, and the evidence of wear to the objects from use. It was identified at the start of the project that it was essential to record this detail, to provide information about the artefacts before they were deposited, and about their end-treatment. This information will be analysed at Stage 2.

In a few cases the damage is recent, including from plough strikes (e.g. K449), but in most instances it took place before burial. The gold objects demonstrate tearing, folding and cutting, and for some pommels damage possibly from a gripping-tool (i.e. tongs) or from levering. In the case of the weapon-fittings it has been suggested this was caused by the action of stripping the precious-metal components from swords and seaxes⁴². However, some treatment looks more deliberate, even iconoclastic; one instance being the snapped arm of the pectoral cross (K303). The highly fragmented state of the silverwork might also have been exacerbated.

Wear has been recorded for the fully cleaned objects. As well as informing on the functional use of an object, it can also be considered a rough indicator of how old an item was when it was lost from circulation. In addition, fine scratches on some items, notably gold hilt-plates, could be from polishing.

4 Materials and technology

4.1 Metals

A limited targeted analysis of gold items by SEM-EDX has been completed at the BM⁴³.

⁴¹ Cartwright 2013b.

⁴² Leahy 2010.

⁴³ Appendix 3.

The smaller, but more fragmented, silver assemblage has not yet undergone metals analysis, but this should be done to inform a better understanding of the alloys, and the results may also be helpful for matching suites of objects.

4.2 Filigree

Filigree is the predominant decorative technique in the hoard. It is found on two-thirds of the pommels and hilt-collars, and around half of the other mounts from hilts. Almost all are gold objects, though there are also a few silver examples – principally pommel K306. These are rare in the period.

The hoard objects conform generally to the high level of expertise recognised of Anglo-Saxon filigree manufacture. Designs in beaded wire and plain twisted wire (e.g. herringbone) are most common, but there are also examples of rarer, granular work, and twisted-beaded and wrapped-beaded wires (Fig. 2b–c). This last type has not been previously seen. Also new are spirals formed of beaded wire on one pair of pyramid fittings (Fig. 6).

There is considerable variation in the treatment of the sheet backing to which the filigree was soldered, and in the basic sheet-construction of the filigree objects themselves (especially the pommels). This may point to different workshops, or at least to the hands of different craftsmen. In addition, a number of pieces show layout marks, linear scorings on the sheet backing that guided the filigree pattern.

The solder used to fix the wires to the backing sheet is generally invisible to the naked eye, and is difficult to see even under microscope examination. This is in keeping with most filigree work of the period, and may indicate eutectic soldering⁴⁴. However, a few objects show instances of what could be solder ‘flood’, possibly indicating an alternative method, i.e. brazing.

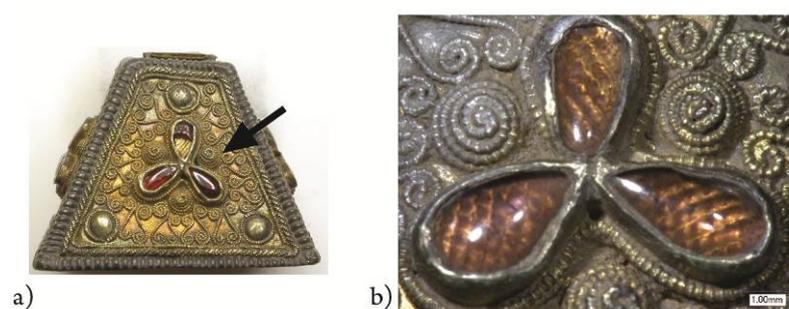


Figure 2.6: Sword-pyramid (K302) with spirals of beaded wire (scales 3/2 (a), 6/1 (b)). Photos © Birmingham Museums Trust

4.3 Cloisonné (garnets, glass and other inlays, and gold foils)

All the cloisonné artefacts were made in gold, but there is clear variation in quality and manufacture between pieces. Some are of very fine craftsmanship with cell forms and animal Style II, comparable to the regalia from Sutton Hoo (Section 2.7). However, there are also examples of less expert cloisonné, especially that paired with filigree on some pommels, which may suggest a different regional tradition.

⁴⁴ Coatsworth and Pinder 2002, 95–100.

Mostly small, flat, cut garnets fill the cellwork in repeating geometric patterns. However, a small number of objects include glass ‘stones’, some millefiori. Also on a few objects, tiny dark droplets of glass were used for the eyes of animals (e.g. K16/K1084 and K370/K449). A selection of the glass was analysed in Paris in 2010, the results of which have been assessed by the BM⁴⁵, and two other studies on single objects have also been completed⁴⁶. This has identified the probable reworking of Roman glass, as well as types manufactured by north-west European, and possibly Anglo-Saxon, glass-workers.

Most of the garnet shapes conform to known types (e.g. stepped and mushroom), though there are also some rarer forms, for example, of ‘honeycomb’ cloisonné (e.g. K449), and cross-shaped garnets (e.g. K284+K327)⁴⁷. Of note, too, are several large cabochon garnets, one (K659) at least of which comes from the great gold cross (K655). They are among the largest stones known from the period, and demonstrate exceptional skill in garnet cutting and polishing.

Gold cross-hatched foils were set behind the garnets in almost all cases. These conform, with one exception identified to date, to the known ‘standard’ and ‘boxed’ forms identified by Avent and Leigh (1977). Where stones and foils are missing, the paste filler at the base of the cells is visible. A study by the British Museum of objects from the hoard has established the basic mix was of beeswax and a proteinaceous material, probably animal glue⁴⁸.

A number of cloisonné objects that are entirely without garnets and gold foils are significant. The cells instead are filled by an off-white material, discoloured by copper corrosion product. Identification of this material – possibly a decayed inlay – is considered a high priority for Stage 2.

So-called ‘makers marks’, comprising lightly scored lines and crosses, usually on the reverse of objects, are a particular feature of the cloisonné suites (Section 2.10), though they also occur on other hoard objects. It is possible they are actually marks used to guide assembly. Such marks are rare, but are known on other complex, composite objects of the period, including the Derrynaflan Paten⁴⁹.

In cases of damage, evidence for the solder used to fix the cell walls can be seen.

4.4 Niello

An assessment by Cymbeline Storey⁵⁰, grouped the objects with niello decoration. In addition, samples of the black inlay were sent to the British Museum for analysis⁵¹. All were found to be of silver sulphide type (Ag₂S), which has been found to be less common in Anglo-Saxon metalworking generally⁵².

⁴⁵ Meek 2012.

⁴⁶ Meek 2013a–b.

⁴⁷ cf. Avent 1975, no. 182.

⁴⁸ Steele and Hacke 2013

⁴⁹ Brown 1993.

⁵⁰ Storey 2013.

⁵¹ La Niece 2013.

⁵² La Niece 1983.

5 Style and Typology

Style and typology are the main criteria for dating and provenancing the hoard metalwork.

The majority of the hoard's artefacts are rare and new forms, and so they are generally poorly served by existing typologies. For example, the most 'common' pommel-type in the collection, of gold sheet with filigree decoration, was unknown before 1998. Therefore, new typologies will be needed for most object classes.

Over 130 objects are now identified with animal art of Salin's Style II. Most are in gold, and executed in filigree, though this figure does not include the die-impressed material with zoomorphic decoration assessed by the BM and so will increase further at Stage 2. Around half the pommels have Style II, and around a quarter of mounts and hilt-collars. In comparison, there is just one pair of hilt-collars that have Style I, the art that preceded Style II in Europe. Thirty-one objects are near-identical panels filled with filigree serpents, from the cloisonné suite(s) (Section 2.10), but the majority of objects demonstrate unique designs. In all, this more than doubles the known Style II catalogue for England, and it makes a very significant contribution also to the Europe-wide corpus. Other pommels and hilt-collars have (non-zoomorphic) interlace.

The majority of the cloisonné objects, in contrast, have geometric ornament, as was typical. This is imitated, too, in niello on the set of silver mounts (Section 2.15), a form of decoration that is rare in England.

A further style may be suggested by the many mounts with filigree scrollwork, for which the best comparison is the 'Cumberland' sword-hilt (Fig. 2.5). However, scrollwork also occurs elsewhere in England, for example, on Kentish brooches and pendants of the early seventh century. Nevertheless, in the hoard, it seems rarely to be combined with Style II and interlace.

The early Insular art that occurs mainly on silver objects fuses Anglo-Saxon and Celtic decoration (Section 2.1). Details include triskeles, eye-shapes, and a dense non-zoomorphic interlace. They are probably among the latest objects in the hoard, but may be some of the earliest objects yet known with the style.

6 Organics

A small number of finds have preserved organics, or material that is awaiting confirmation as such: K189, K238, K282, K283, K285, K290, K305, K306, K352, K420, K455, K458, K465, K546, K680, K1898, K653, K710, K787, K972, K1012, K1079, K1097, K1127, K1551, K1620, K1713, K1821, K2040, K2065, ?K5028.

A selection has been examined at the BM⁵³. Horn has been identified inside two pommel caps (K352 and K680) and with two hilt-plates (K282 and K283). The

⁵³ Cartwright 2013b.

same may be possible for other non-examined examples (e.g. K285, K306, K455, K458, K465, K972 and K1079). Wood was found associated with two fittings (K274 and K787) and one pommel (K290), and further examples are now suspected inside one fragment of C-edging (K420), and within the arm of a possible cross (K1898). An organic, or possibly a calcite, paste with the helmet-crest(s) also needs investigation (Section 2.11).

A further report (Cartwright 2013a) is on a single small fragment of textile (K1821) found inside a gold hilt-collar (K281). It is of processed and unprocessed flax (*Linum usitatissimum*), that Caroline Cartwright has concluded is 'not out of place for the seventh or eighth century'⁵⁴. It might be part of a bag in which the hoard was buried or from wrappings for objects.

7 Other Considerations

One pommel (K240+K1447) is incised with a possible rune, and two other objects (K112 and K1003) also have linear markings that might be meaningful. K112 is a triangular inlay detached from roundel K130 etc., and the markings in this case are more likely to be assembly or keying marks. K1003 is a cloisonné hilt-collar. Professor John Hines has seen photos of the pommel and has confirmed that it warrants further scrutiny (pers. comm.).

A small number of gold objects (e.g. K78/K728/K1555, K567, K655, K816 and K1014) and silver objects (e.g. K47+K678, K63 etc, K369 etc. and K959) demonstrate punch-decoration. Simple triangular and annular punch-marks predominate, the latter mainly being used to depict the eyes of animals.

8 Date

On the evidence of form and art style, the majority of the finds undoubtedly fit with the material culture of the first half of the seventh century.

This notwithstanding, a small group of silver sword-fittings is of the sixth century, probably the century's last half/third. Included is the pommel import (K711), although earliest may be the pair of hilt-collars with Style I (K181 etc./K298 etc.). Some of these fittings demonstrate considerable wear from use.

Some of the filigree-decorated sword pommels and collars may date from the end of the sixth century, too, though most are probably of the early seventh century, based on the forms of their Style II and interlace ornament. Many of these also show heavy wear. The scrollwork hilt-fittings of 'Cumberland' type are probably broadly contemporary, based on the dating of scroll decoration on Kentish disc brooches⁵⁵.

A second stage of Style II ornament developed within Anglo-Saxon England and is datable to around the second quarter of the seventh century, from around the time of

⁵⁴ Cartwright 2013a.

⁵⁵ Avent 1975.

the Sutton Hoo Mound 1 burial⁵⁶. It is at least as well represented in the hoard as the preceding stage of Style II, if not more so⁵⁷. Examples include the ornament on the seax hilt-suite (Section 2.7), seax hilt-plate (K567), gold cross (K655), helmet-crest(s) and cheek-pieces (Section 2.11), and cloisonné roundel (Section 2.9).

One object, in particular, remains contentious within the overall dating: the inscribed strip (K550). Okasha⁵⁸ has dated it to the eighth century, and Brown⁵⁹ dates it no earlier than *c.* 650. However, its (empty) gem-setting with filigree collar and zoomorphic surround, and even the niello inlay to its lettering, all indicate manufacture in keeping with other hoard objects. Furthermore, it has been demonstrated that it shares scriptural characteristics with the Book of Durrow⁶⁰. The date of this manuscript has itself been the focus of considerable and complex debate, though a date for its production within or even at the start of the third quarter of the seventh century remains an acknowledged possibility⁶¹.

Around the mid-seventh century is also the most likely date of the small collection of silver seax/sword-fittings, comprised of round-back and tall cocked-hat pommels, and other fittings, with fine cast early Insular decoration and gold panelled ornament (Sections 2.1 and 5). This is likely to be among the latest material in the hoard. Significantly, the interlace on the gilded copper-alloy harness roundel, found apart from the rest of the hoard, appears similar. A connection between this artefact and the actual deposition of the hoard might be a possibility, therefore.

⁵⁶ Høilund Nielsen 1999, Phase MS Anglian.

⁵⁷ Høilund Nielsen 2010.

⁵⁸ Okasha 2010.

⁵⁹ Brown 2010.

⁶⁰ Brown 2010; Klein 2013.

⁶¹ Haseloff 1987, 46; Henderson 1987; Brown 2010.

Appendix 3: Materials Analysis Programme. Assessment report

Eleanor Blakelock

1 Pilot Projects

There were five pilot projects in the first stage of the materials analysis programme in the Staffordshire Hoard project design⁶².

1.1 Gold enrichment study

A pilot study of 16 gold items was carried out to determine whether there was any surface enrichment/depletion and whether this related to find location. This was carried out using the equipment stated in the project design⁶³; small areas on these pieces were prepared using a tool to reveal the sub-surface for SEM-EDX and XRF analysis.

The results from the pilot study of surface enrichment of 16 gold sheet objects, mostly hilt plates, clearly showed that in many cases there is significant but not consistent surface enrichment of the gold at the surface owing to the depletion of both copper and silver. The analysis of deep scrapes, probably made when dismantling the swords before burial, indicated the expected loss of copper from the surface during burial, and little loss of silver. However, the results from undamaged surfaces of the same objects suggest that some form of deliberately induced depletion gilding was carried out by the goldsmiths to remove both silver and copper from the surface of sheet gold components, perhaps to enhance their golden colour.

At this stage it was difficult to say whether more sophisticated surface treatment was a widespread Anglo-Saxon metalworking practice. This was a small sample of similar artefacts and bias may have been introduced to the results because of the selection of such a specific type of object, as they are almost all of similar alloy composition. Therefore, more work was necessary on a larger range of object types, and particularly objects of composite construction, to see whether the components vary in composition and surface treatments. This was carried out in the second stage (see Section 2).

The results also suggest that XRF analysis on unprepared object surfaces, even with its deeper penetration into the body of the object can provide only semi-quantitative information at best about the original alloy composition. The accurate determination of the original alloy or 'core' composition of objects can only be achieved by sub-surface analysis using techniques such as SEM-EDX and/or XRF, or other invasive or destructive analytical techniques. The unpredictable variability within the surface and sub-surface results means that there is no feasible method to recalculate the sub-surface results using surface XRF or SEM-EDX data.

⁶² Cool 2013: PD 2013 Section 15.8iii.

⁶³ PD 2013 Section 15.8vi.

A full report of the results and a detailed discussion of the methodology has been circulated⁶⁴. In addition to this, a methodological paper is being prepared to be published in the journal *Archaeometry*.

1.2 Component study

The second pilot study focused on the comparison of the alloy compositions of individual components in objects of composite construction. This research was carried out in conjunction with the second stage of the analysis project, and is therefore reported below in Section 2.

1.3 Comparison between institutions

The third pilot study was originally envisaged as a comparison of the surface XRF and PIXE analyses conducted at the various institutions who have undertaken analytical work on the hoard since its initial discovery. In light of the surface enrichment noted during the first of the pilot studies, the original set of PIXE surface data is no longer of such direct relevance to the subsequent analytical work undertaken during the hoard project. The hoard owners have copies of all of the raw PIXE data acquired in Paris and scientists at the BM still intend to prepare a basic report to accompany the deposit of this data in the hoard project database. There is also a stand-alone publication planned in the near future to honour agreements with the CHARISMA project, under which the PIXE work was undertaken, and with colleagues at the C2RMF who assisted with the work, but this will be easier to do once the enrichment work has been published and can be cited and the typological work is complete.

A new study focusing on the comparison between SEM-EDX (surface and sub-surface) analysis results and the results from the different XRF systems (surface and sub-surface analyses) at BM and BMT is being carried out. The aim of this is to establish the degree of inter-comparability of the data.

On 21 March 2014, Eleanor Blakelock from the British Museum visited BMT to discuss and share information about the procedures employed at the British Museum to undertake the sub-surface alloy compositional analysis of the hoard objects using XRF. During this visit, the 'MAC' standards commissioned for the hoard project and a number of British Museum alloys of known composition were analysed.

A report on the inter-comparability of the data from the British Museum SEM-EDX and XRF and the BMT XRF is being prepared⁶⁵.

1.4 Die-impressed sheet analysis

To support the work of the BM conservators⁶⁶ (15.7), a selection of the silver die-impressed sheet fragments were chosen for analysis. In total 18 foil fragments from six different friezes were examined by surface XRF⁶⁷.

⁶⁴ Blakelock 2013

⁶⁵ Blakelock forthcoming a.

⁶⁶ PD 2013 Section 15.7.

⁶⁷ PD 2013 Section 15.8vi

With the exception of the interlace sheets (frieze 10), the XRF analysis of the fronts of all the foils revealed the presence of mercury gilding, which prevents direct access to the silver alloy below. Surface XRF of the fronts of the foils therefore cannot be used to group them. The analysis of the backs of the foils showed a range of compositions that overlap between friezes and therefore do not help in the identification of compositional groups linked to specific friezes. This study overall shows that a rapid surface XRF survey is not the appropriate technique to identify frieze groups.

The non-gilded interlace foil fragments from frieze 10 are analytically different but they are easily distinguished from other fragments owing to the lack of surface gilding, so XRF analysis is unnecessary. If more types of non-gilded friezes are present within the hoard assemblage, XRF analysis may be able to help distinguish between them.

A report of the results has been circulated⁶⁸.

1.5 Coin study

A recent study by Gareth Williams and Duncan Hook at the British Museum of a large group of Anglo-Saxon coins, some originally studied by Oddy, has been published⁶⁹. This study showed a good correlation between Oddy's original specific gravity (SG) analysis carried out in the 1970s⁷⁰ and the SG and XRF analysis of the same coins undertaken in the Williams and Hook study.

With the involvement of Gareth Williams and Duncan Hook, eight additional Merovingian coins were selected for comparison with the previously examined coin group and the gold alloy compositions analysed using sub-surface XRF⁷¹ and SG (see Section 3 below). In addition to the eight new coins analysed, six Anglo-Saxon coins from the study by Williams and Hook (2013) were also re-examined using SEM-EDX in light of the results from pilot 1.1 here. This examination has revealed that surface treatments resulting in surface enrichment were also being applied to contemporary Anglo-Saxon coinage.

A full report of the results is being prepared⁷².

2 Second Stage Analysis

In the second stage of the materials analysis programme, the group of gold objects from the hoard selected for analysis was increased. The study broadened in scope with the inclusion of a number of objects from the BM's collection and a pendant from PMAG as *comparanda*, allowing extension of the study to functional categories not included in the hoard.

⁶⁸ Blakelock 2014.

⁶⁹ Williams and Hook 2013.

⁷⁰ Oddy 1972.

⁷¹ PD 2013 Section 15.8vi.

⁷² Blakelock and Hook forthcoming.

In total, 114 individual objects from the Staffordshire Hoard were analysed, along with the pendant from PMAG and a further 36 individual Anglo-Saxon objects from the BM (excluding the coins included in the surface enrichment study mentioned in Section 1.5 here). This created a data-set of gold alloy compositions for 157 Anglo-Saxon objects and coins.

Analysis of individual components from six hoard objects selected from the pilot study (K88, K301, K352, K660, K673 and K689) showed that there were clear differences between them. Therefore, when it was possible to do so, individual components were also examined from a number of the objects selected for this second stage analysis. In total, 288 individual object components were examined including sheets, cast bodies, cell walls, caps, beaded wires, twisted wires and pins.

A full report of the results is being prepared⁷³.

Individual reports are also being produced for specific sets of objects including the seax set (K376, K354, K690, K370 and K449), the great cross (K655, K656, K657, K658, K659 and K1314) and the ‘mystery’ object (K130, K545, K1055)⁷⁴. In addition to these reports, two multi-author articles are planned and will be produced based on the second stage analysis work, one for the *Journal of Archaeological Science* and the other for *Antiquity*.

3 Techniques Used

Specific gravity (SG) allows for the estimation of the percentage of gold in an alloy, and in this case is used as a check on the XRF analyses, and for identifying plated or otherwise unusual coins. This non-destructive method has the advantage of taking into account the whole object. The specific gravity is determined by weighing the object first in air and then suspended in a suitable liquid. The coins were suspended in Flutec (perfluoro-1-methyl-decalin) for 10 minutes and the temperature was recorded to take into account the coefficient of thermal expansion of the liquid, which influences the result of the measurement. Further details on the method and its accuracy are described in Hughes and Oddy (1970) and Oddy and Blackshaw (1974).

4 Analysis of Technology, Construction and Inlays

To support the conservation work⁷⁵ and to gain a better understanding of the technology, construction techniques and materials used in the objects in the hoard, identification of materials such as inlays, textile fragments and other macro-organic residues, adhesives and backings, etc. have been carried out. A range of techniques were used, including PIXE-PIGE, XRD, FTIR and Raman spectroscopy, GC-MS, SEM-EDX and XRF, in addition to X-radiography, and a number of reports have

⁷³ Blakelock forthcoming b

⁷⁴ Blakelock forthcoming c; Blakelock and Ambers forthcoming; Blakelock forthcoming d.

⁷⁵ PD 2013 Section 15.8v.

been circulated or are in preparation⁷⁶. A stand-alone publication is also in preparation that will bring the preliminary analytical work (PIXE analysis undertaken in Paris) on the garnets from a group of objects from the hoard into the public domain.

5 Future Scope for Scientific Analysis

5.1 Metal analysis of the hoard

The second stage analysis project has allowed a large range of gold objects and components to be analysed, creating an extensive database of the core and surface metal alloy of the gold objects in the hoard. This work could be extended to include a wider range of object types, but the results obtained to date do not suggest that this would reveal a significantly different picture to that already obtained in stage 2 of the gold analysis, but any future work should be carried out on prepared sub-surface areas.

To assess whether analysis of silver objects from the hoard would be of value, a pilot study should first be carried out on a limited number of items to determine whether a rapid surface XRF survey will reveal any distinguishable alloy groups. This may assist conservators grouping the objects and may reveal changes in composition through time. Silver alloys are even less stable than gold alloys and the changes caused by corrosion are likely to penetrate deeper into the metal, factors that may affect the value of such analysis.

5.2 Metal analysis of contemporary artefacts in other collections

Analysis of further male- and female-associated items of the period would be required to understand more about the differences in surface enrichment seen in this study.

More research on the surface enrichment seen in the contemporary coinage is required to understand the use of this technique in coin manufacture. Enrichment analysis of coins from a wider time period might help to determine whether the later coins are generally more enriched than the earlier ones, for example. It may also be possible to identify different coin groups or mints, if there are differences in the amount of enrichment present.

5.3 Metallographic studies of the hoard

Previous studies by other researchers have shown that it is possible to understand more about metalworking technologies, such as the apparent deliberate surface treatment to give a gold-enriched surface, through microstructural analysis, especially when combined with chemical analysis⁷⁷. Depletion techniques affect the surface of the object, and although burnishing often removes this evidence at the very surface of an object, below this burnished surface a porous zone created by the loss in silver and copper can often be seen⁷⁸. The technologies employed in the deliberate silver depletion seen in the Staffordshire Hoard objects would therefore

⁷⁶ Cartwright 2013a; 2013b; La Niece 2013; Meek 2012; 2013a; 2013b; Mongiatti 2014; Mongiatti and Ambers 2013; Mongiatti *et al.* 2013; Stacey 2014; Steele and Hacke 2013.

⁷⁷ La Niece 1995; Lehrberger and Raub 1995, 347–50; Voute 1995, 336

⁷⁸ Lehrberger and Raub 1995, 347.

most likely be better understood through the microscopic examination and analysis of cross-sections.

5.4 Inlays and decorative techniques

Further scientific study of inlays and wire and filigree, as well as construction techniques, could contribute to an understanding of the workshop practices to be seen among the hoard items. Further work on the non-metallic components of the hoard may also be helpful. For example, several items have what appears to be a green inlay in cells that has yet to be satisfactorily identified. This might be attempted by a combination of X-ray diffraction, SEM-EDX analysis and various spectroscopic techniques. Further work to identify and characterise other inlay materials or organic materials may also be promising avenues for further research.

Appendix 4: BM Conservation Strand. Assessment Report

Fleur Shearman

1 Introduction

The role of the BM conservation strand is identified in the original PD⁷⁹ at **14.2v** and described fully at **15.7**. Completion of National Geographic funded work on materials analysis and subsequent enabling of conservation for various object types was undertaken prior to the commencement of work on the foils. Remaining work on sword fittings and other items from the hoard submitted to the BM with their scientific queries was rolled together with the main EH funded programme⁸⁰ and all conservation was carried out as defined there. Items identified by BMT as needing analytical support included silver fitting K516 and parts of the crouching/kneeling warrior frieze (DS7) and its associated silver retaining tray. After analysis work to establish the materials used as fixatives for the tray⁸¹, adhesive or consolidant could be used on them in their reconstruction. Following identification of the wood from the silver fitting K516⁸², further silver fragments were added to it from metal fragments submitted as part of the foils project.

2 Approaches/methodology

Following an audit of the 350 K numbers delivered to the BM, metal fragments were initially sorted into silver-gilt reeded strip, silver and silver-gilt die-impressed sheets and other categories. Using the provisional iconographic sheet sequences as identified and numbered by D. Symons of BMT (see **3.2** here), recognisable fragments were sorted into groups. X-radiography of any fragments still embedded in soil was carried out for recognition purposes and examples of frieze types X-radiographed to view any technical differences which might be discernable by using this approach.

This was followed by cleaning and removal of all remaining soil from the material submitted to the BM: all soil was kept and identified by K number. Dissolution of soil accretions was enabled via immersion or application of solvent (industrial methylated spirit) or distilled water. The original packing incorporated multiple K numbers in one box so repacking was carried out to aid flexibility and efficiency in the sorting phase, first to separate out K numbers by packing individually and then to group by different frieze types within K numbers or by width or diagnostic features within the reeded strip. This stage was refined by the addition of previously unrecognised groupings/subgroupings of die-impressed sheet types and the separation of miscellaneous material and broken sword fittings from the targeted groups of frieze and sheet. Several hundred joins were then made, both between and across K numbers and were subsequently recorded by frieze type or strip width in an Excel spreadsheet now available on the secure database as an archive file. Length measurements of join sequences from strips and silver tray DS 7 and the serpentine frieze DS 9 are also included in this table. The results are

⁷⁹ Cool 2013 – PD 2013.

⁸⁰ PD 2013 Section 15.8i, 15.5.

⁸¹ Stacey 2014.

⁸² Cartwright 2013b, 8.

discussed in the following section. Reconstruction of plain silver-gilt pieces was progressed, to assess their level of curvature and function.

Joins were made with nitrocellulose adhesive and join sequences requiring support, backed with nylon gossamer tissue. Where necessary fragments were mounted on plastic board interleaved with nylon gossamer and lightly adhered to the substrate at the edges.

3 State of the work in January 2014

3.1 Introduction

The PD always envisioned that the work on the foils would be an ongoing task⁸³, and would probably not be complete by the time the fragments were returned from the BM at the end of the fixed term appointment of the conservator who would deal with them. The BM work was completed at the end of January 2014 when all material was returned to Birmingham for the grouping exercise. The next two sections detail the work that has been achieved on the foils and the fluted strips by then.

3.2 The foils

When the foils arrived at the BM, 11 different patterns had been identified by Dave Symons the BMT curator. These were numbered DS 1-11 as follows:-

- Frieze DS 1 Larger size warriors moving to left.
- Frieze DS 2 Larger size warriors moving to right.
- Frieze DS 3 Smaller size warriors moving to left.
- Frieze DS 4 Smaller size warriors moving to right.
- Frieze DS 5 Eagle crested warriors moving to left (possibly the same as 3).
- Frieze DS 6 Eagle crested warriors moving to right (possibly the same as 4).
- Frieze DS 7 Running, kneeling warriors (also called running man or crouching warrior).
- Frieze DS 8 Horseman riding down warrior.
- Frieze DS 9 “Beaked” quadrupeds (also called serpentine, zoomorphic).
- Frieze DS 10 Interlace panels (silver, non-linear).
- Frieze DS 11 Facing moustached heads.

Frieze DS 7 was directly associated with fragments of a silver tray and the organic material within the tray retained the imprint of the sheet. This was identified as beeswax⁸⁴. Patterns DS 1-7 and DS 9-11 were linear friezes but DS 8 is better described as a panel.

During the work in the BM the author and Dugyu Camurcuoglu, who was the fixed term conservator appointed to work on the sheets, were able to identify additional patterns. Atypical warriors possibly associated with the panel DS 8 were assigned to DS 8/BM 8a and DS 8/BM 8b. Four new frieze types have been added, currently identified as DS/BM 12+.

⁸³ PD 2013 Section 15.7ii.

⁸⁴ Stacey 2014.

The amount of joined material is summarised by frieze type in Table 4.1 below which also includes a quantification for the silver tray associated with frieze DS 7. A division has been made between those where the joins are within a K number and those where multiple K numbers have contributed to the joined element. The multiple K number category includes joined pieces where between two and twelve K numbers have contributed. It has not been uncommon for fragments identified by the same K number to have contributed to more than one frieze type.

<i>Frieze description</i>	<i>Type</i>	<i>No. joined incidences</i>		<i>Total</i>
		<i>Within K no.</i>	<i>Across K no.</i>	
Warriors right	DS 2, 4, 6.	5	10	15
Warriors left	DS 1, 3, 5.	2	10	12
Warriors		8	2	10
Running warrior	DS 7	7	10	17
Horseman	DS 8	3	1	4
Atypical warrior	DS 8 BM 8a	2	1	3
Warrior Caenby type	DS 8 BM 8b	3	-	3
Serpentine beaked	DS 9	11	32	33
Gripping beast	DS 10	1	2	3
Male heads	DS 11	-	1	1
Knotwork	DS/BM 12+	-	1	1
Gripping beast panel	DS/BM 12+	-	1	1
Different feet	DS/BM 12+	+ ⁽¹⁾	-	-
Back leg	DS/BM 12+	-	1	1
Silver herringbone		-	1	1
<i>Total</i>		41	73	114
Silver tray for 7		-	7	7

Table 4.1: Summary of the joins between and within K numbers in the die-impressed sheet (See text for details. Note ⁽¹⁾ identified but no joins made).

3.3 The reeded strips

The reeded strips have been sorted by width and Table 4.2 quantifies the joined ones in the same way as has been done for the foils. The joins made across K numbers range from two to four different numbers apart from two of the 14mm wide fragments which included fragments from eight and fourteen different K numbers.

<i>Width (mm)</i>	<i>No. joined incidences</i>		<i>Total</i>
	<i>Within K no.</i>	<i>Across K no.</i>	
5	3	1	4
8	20	2	22
11	3	1	4
14	-	4	4
<i>Total</i>	26	8	34

Table 4.2 : Summary of the joins between and within K numbers made in the reeded strips (See text for details).

The largest proportion were the 8mm. fragments. The 5mm wide strips were mainly straight with regular rivet holes. For the 14mm wide strips it was possible to join two long curved lengths with rivet holes set in a zig-zag pattern on alternative sides. Some narrower pieces with deliberate curvature and rivet holes have also been found.

It may be noted that a few examples of fluted 'U'-shaped clips were found, reconstructed from small fragments. These are a type of fitting that can be used on items such as helmets and vessels.

4 Future work

The greatly increased corpus of joined fragments means that there is considerable potential for a range of additional work in Stage 2. This will have to include assigning additional K numbers to the new groupings to ensure they have unique identifying numbers. As noted in 3.2 and 3.3 here, the joins cross K numbers and frequently the same K number contributes to different pieces. This work will need to be prioritised early in Stage 2.

Now that larger expanses of scenes are available it will be possible to relate the die-impressed sheets to other better preserved examples from elsewhere. A good example of this are the joined fragments assigned to DS 8 / BM 8b which have enabled comparison to be made to the fragment from the Caenby barrow in Lincolnshire⁸⁵. There is also the potential for exploring how many versions of the same scene and the number of dies that are present through accurate measurement.

For the die-impressed sheets a start has been made in measuring the lengths of the strips reconstructed and calculating how long they might have been. In two cases (DS 7 and DS 9) they are approximately as long as would be needed to encircle a head around the temples. Extending this work clearly has the potential to help calculate quite how many items these foils may have decorated.

For the fluted strips it may be noted that the tighter the curve of the item to which the strip is attached the more rivets holes are needed, the joins have allowed the spacing of the holes to be calculated. This provides the potential in Stage 2 to explore what the strips were used on more closely.

During the grouping exercise in February 2014 additional pieces relevant to the work reported on here were recognised that had not been part of the material at the BM. These will need to be reintegrated with the rest of the material and joins tested.

Completion of friezes to establish the footprint of at least one of each of the diagnostic types, where this proves possible, would be valuable. There is also potential for a more complete reconstruction of the broken and disassembled silver tray for DS7 which may also relate to helmet parts. At the grouping exercise, for example, additional joins were found.

⁸⁵ Bruce Mitford 1978, 207, fig. 153.

Appendix 5: Pilot study to explore the cloisonné decorated items

H.E.M. Cool

1 Introduction

The cloisonné-decorated items in the hoard have attracted much popular attention, and from the research point of view are a complex data set. The original project design for the analysis of the hoard put in place a second member of the typology team, one of whose main roles would have been to take responsibility for their recording and analysis. When the project was formally split into two stages, this post was abandoned and instead a short (one-week long) pilot study was included⁸⁶. The aim of this was to calculate how long it would take to record the data in Stage 2, and whether the results would justify the input of resources. This document reports on the results.

From the start, therefore, an important element of this pilot has been the quantification of resources that would be needed were the cloisonné to be fully recorded. It was hoped to develop methodology for numbering each cell and assigning them to a typology; take into consideration the information from the foils, and possibly incorporate information about the inlays themselves. For this last element the pilot would have drawn on information derived from the PIXE analysis of garnets at Paris in 2010, and from the gemmological programme that the conservators at Birmingham were planning to carry out. For a variety of reasons the information about the garnets has not been available, and so that strand was removed from the pilot project.

2 Sample selection

Choice of the items to be examined was governed by what was available as high quality images of completely cleaned pieces amongst the photographs that Guy Evans had taken during the early part of Stage 1. Amongst the pieces available in this form, items were selected that covered a range of shapes and functional types. For this pilot project, preference was given to pieces that had not suffered a high degree of damage or folding. The pieces chosen were a large oval mount (K270), a simple rectangular strip mount (K273), one of the large slotted mounts (K275) and two pommels (K284 and K292). These are shown in Appendix Fig. 5.1. The five items consisted of a total of 918 cells.

⁸⁶ Cool 2013. PD 2013 Section 15.9iv. Task 16.



K 270



K273



K275



K284



K292

Fig 5.1: The pieces used in the cloisonné pilot project

3 Methodology

3.1 *Numbering the cells*

For this task the work was done in Adobe Photoshop CS6 extended and unless otherwise stated this is the program that was used throughout the pilot work.

After experimentation it was found that the quickest way of doing this was to save the colour image as a greyscale one, and then convert it back to colour. Sequential numbers starting with 1 were then superimposed on each cell in a contrasting colour. Appendix fig. 5.2 shows a small part of K270 with its numbering. These images are designed to be viewed digitally and can be placed on the hoard secure web-site. It is possible to number between 3 and 4 cells a minute.

For this pilot project a small free-standing Access database was prepared. The metadata for this is provided at the end of this report, but here it may be noted that the primary key automatically assigns a unique number to the cell.



Fig. 5.2: An example of the cell numbering from K270

3.2 *Developing a typology*

Two options for approaching the typology were considered. Adams in her doctoral thesis grouped families of shapes together and was interested in individual shapes only as far as they were combined in a pattern⁸⁷. Arrhenius in her book *Merovingian Garnet Jewellery* provides what is in effect a vocabulary and grammar for describing cell shapes⁸⁸. Following a set of rules it is possible to build up a description of quite complex shapes. It is this latter approach that was judged most useful here, though in the full analysis it is likely that the cell shapes will be grouped into families as Adams did.

⁸⁷ Adams 1991, 42, 45-7.

⁸⁸ Arrhenius 1985, 11-12, figs. 4-5, 71-3, 197 and 203.

For this pilot, images of the different cells used in two of the pieces were created as separate layers using drawing facilities within Photoshop. Fig. 5.3 shows part of K270 with just the different cells shown as black shapes. The Arrhenius system was applied to these shapes and it was found that most could be accommodated. Fig. 5.3 shows some of the appropriate Arrhenius codes alongside the cell shapes. Thus half a mushroom shape is R, the full mushroom 2R. The stepped block is 2St(2) and is a good example of how the grammar of the system works. The first figure – 2 – shows that it is symmetrical. If there was just one side the first figure would be 1. If it was a stepped cross it would be 4. The St element shows the basic shape and the (2) element shows there are two steps. Arrhenius uses superscripts for the latter element. Databases such as Access do not currently support superscripts so the convention of placing such elements within brackets has been adopted.

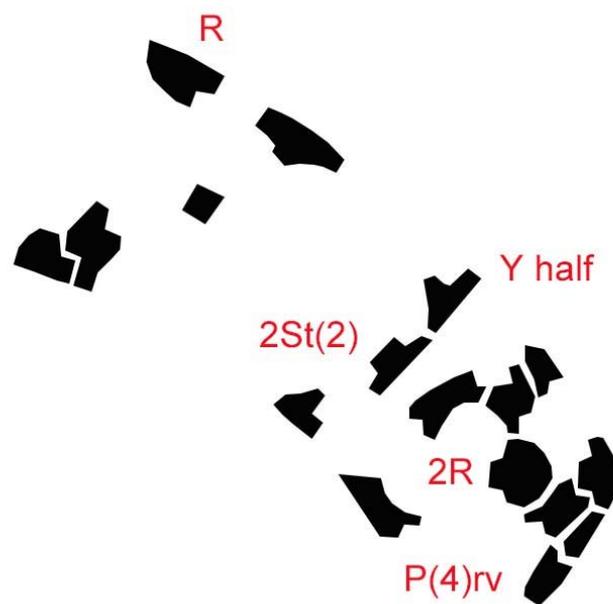


Fig. 5.3: An example of the cells from K270 with codes for the cell shapes

It is considered that with a certain amount of further systemisation the Arrhenius scheme could easily be used for recording the cloisonné of the hoard. There are certain inconsistencies with it at present. As noted for the mushroom and stepped shapes, the normal convention is to use the figure 2 in front of the code if it is symmetrical. This is not done for the arrow shape 'Y' and in the sample there were a considerable number of half arrow shapes. Whilst working through the sample, various cells were encountered which had one side of one shape and one side of another. A good case in point being on K292 where there was a cell best described as 2St(2)+1St(3). Arrhenius does not seem to have included rules for this eventuality, but using both connected by a '+' symbol was found to be an easy and useful solution.

After the first pair of items were coded using a formally extracted template like fig. 5.3, it was found that it was easy enough to work directly from images of the items. As with learning any new language, the first pair were time-consuming to complete but thereafter it became quicker. The codes for the shapes can result in strings of

six or eight characters which are likely to give rise to mistakes in the typing. The quickest way of entering the data was found to be to set up individual look-up values in the appropriate database field for the most regularly occurring cell types in each piece. The values could then be input with a single letter or number. Even allowing for the fact that the look-up field is regularly having to be reset, it was found that two cells a minute could be identified and the data input.

Arrhenius uses not only the shape grammar, but also some measurement data in her typology. She graded the garnets as to whether they would fit inside boxes of known area and for the stepped garnets used the size of the steps to assign pieces to different workshop traditions⁸⁹. It would be possible to take both of these measurements within Photoshop once the scale of the image has been set. The rectangular marquee tool allows boxes of fixed size to be produced and these can be moved over the image to check the size category the cell would fall into. Using the ruler tool within the eye dropper suite would also enable precise measurements to be taken. The data entry times for checking whether a cell fitted within a box of particular dimensions would be in the vicinity of three a minute. Recording precise measurements of steps would be about one cell a minute allowing for checking that two or three steps on the piece were all the same.

For this pilot only shape data was recorded in full because of time constraints. All of the geometric cells were assigned to a Arrhenius code. One face of one of the pommels (K284) had a non-geometric patten. Here the cells were coded as either 'figured' for the garnet inlayed cells or 'capped' for the capped cells. If the cells were distorted beyond recognition this was noted. If the cells were damaged but the original shape could be ascertained this was also noted.

Following the coding the database table was sorted on the cell type field so that all the cell types were listed in a simple alpha-numeric order. This allowed the data to be rapidly checked for consistency. The data was then ready for the analysis that is reported in section 3.4 here.

3.3 *The foils*

The original plan for the pilot study had included the possibility that the foils might be recorded following the methodology of assigning the foil to a pattern type and counting the number of grid lines per mm⁹⁰. Discussions were held with Chris Fern who had been noting the type of foils present during his cataloguing work. He had observed that there was very little variation in the foil types⁹¹. This had also been noted on the pieces selected for the pilot. It was therefore decided that it would be a waste of resources to systematically record all the foils in the pilot. It was also noted that it would not have been possible to do this easily from the photographs for all of the cells, though it is normally possible to do it for at least one example of each cell type recorded on a particular piece. Recording the foils could be done in the same way as proposed for measuring the steps and would take the same length of time. A proposal for how best to deal with the foils is outlined in section 4 here.

⁸⁹ Arrhenius 1985, 16 fig. 2a, 70-1.

⁹⁰ Avent and Leigh 1977.

⁹¹ Appendix 2 Section 2.18.

3.4 Analysing the data

For the purpose of this pilot no refined typological work was undertaken. Each cell type coding was taken to represent a type. In a full analysis of the entire *corpus* it will be sensible to gather individual cell types into families, but for the present the aim was to see whether using the data as coded it was possible to see difference and/or similarity between the pieces.

From sorted database table (see above 5.2), the different types were numbered sequentially. For the analysis each face of a pommel and each shoulder were regarded as separate units. One of the shoulders of K284 was incomplete and damaged and was excluded from the analysis. Once this shoulder and the broken cells on others were excluded, the table for analysis consisted of ten items (the columns) and 54 types (the rows). The data are presented in Table 5.1 at the end of this report.

The obvious way of analysing a table such as this is by using Correspondence Analysis. Within early Medieval scholarly communities this is a technique that has been widely used often in the hope of producing seriated sequences that have a chronological significance⁹². Another important use of the technique is for exploratory multivariate analysis and it is being used in this way here. The outputs for each analysis will be shown as two biplots, one showing the types (the row plot) and one showing the items (the column plot). The plots are equally scaled and items in the column plot that have relatively similar proportions of each type will be shown in the same area as those types in the row plot. All of the analysis has been carried out in the statistical package R.

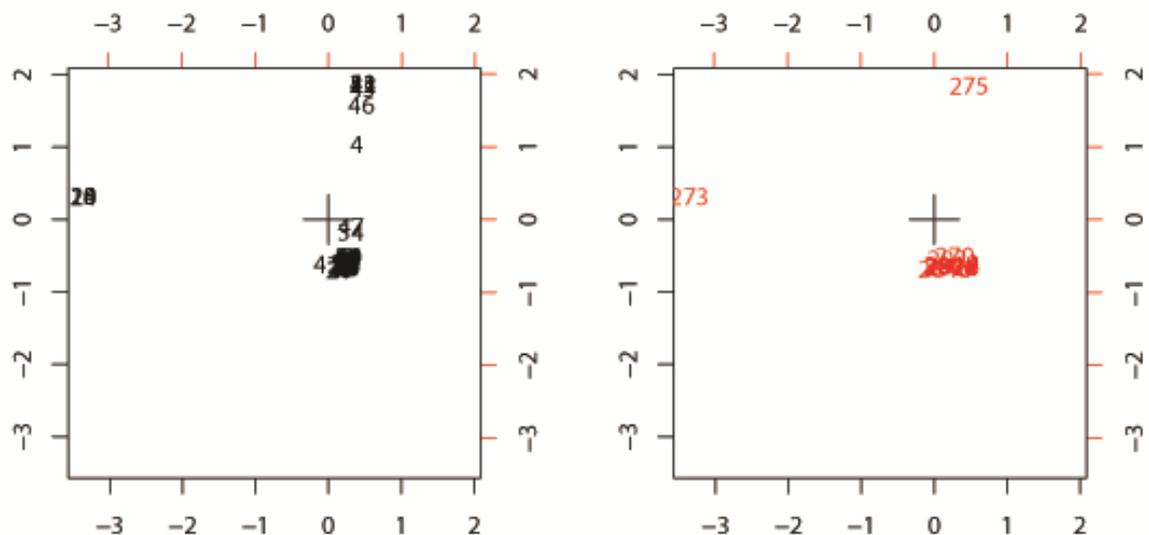


Fig. 5.4: Correspondence analysis of the full data set

Fig. 5.4 shows the plots for the entire data set. What is immediately apparent is that the two pommels and the oval eye mount (K270, 284, 292) must have much more in

⁹² See, for example, Bayliss *et al* 2013.

common with regard to their assemblages of cell shapes than they do with the strip mount K273 or the slotted strip K275. Within this very small data set, K273 and K275 are obviously outliers and can be removed from the analysis⁹³. Re-running the analysis without them allows the tight grouping below the origin to be explored. To aid clarity types with only a single example have also been removed. The result is shown in fig. 5.5 where the relative groupings of types most strongly associated with particular pieces can be explored. It can be noted that there is over-plotting of types in the area of 270, 292f and 284d. This can be rectified by jittering the points very slightly (fig. 5.6).

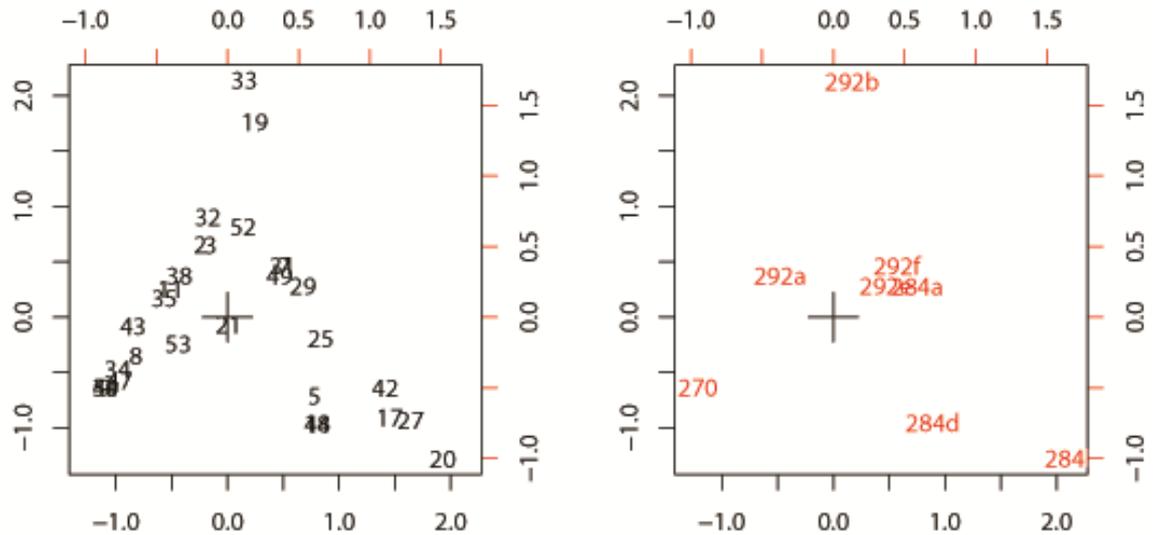


Fig. 5.5: Correspondence analysis of the data set with K273 and 275 removed.

As can be seen, once the data is coded and plotted an iterative process of investigation can be started to explore it. Substantive analysis of this small data set is not appropriate, but one or two points can be made to illustrate the value of the approach. In a full analysis it could be anticipated that far from being outliers as they were in fig. 5.4, K273 and K275 would be the centre of other concentrations that could be further analysed. This would be a relatively quick and easy way of separating the material out into primary groups which is an important step if workshop practices are to be explored. Secondly the approach has the benefit of looking at the entire assemblage of types being used to decorate a piece, not just concentrating on single unusual types to make links as has been tried before. This is demonstrated by considering two of the cases on fig. 5.5. There is one non-geometric item (face b of pommel K284) and this has been separated out in the bottom right of the plot as would be expected. It is important to note though that in the overall analysis of fig. 5.4 it remaining with the rest of its group because of the geometric cell types it has. Fig. 5.5 brings together the two shoulders of the pommel K292 and the geometric face of pommel K284. Inspection of the associated types shows that this is happening because of the repeated use of square /rectangular cells. When trying to group by eye, there is a tendency to make links via the unusual. Analysis using this methodology also give weight to common

⁹³ For sequential analysis of data removing outliers see discussion in Cool and Baxter 1999.

combinations which may be of as much, or even more use, in isolating workshop practice.

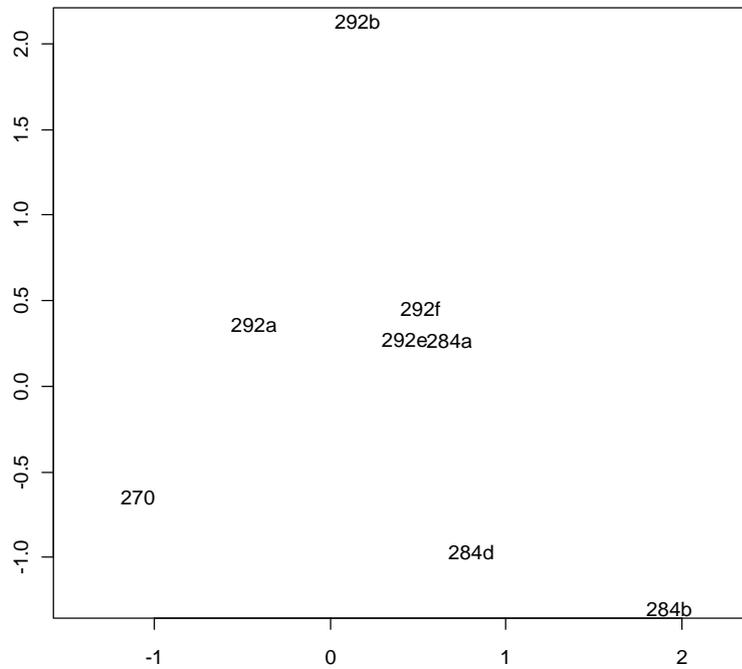
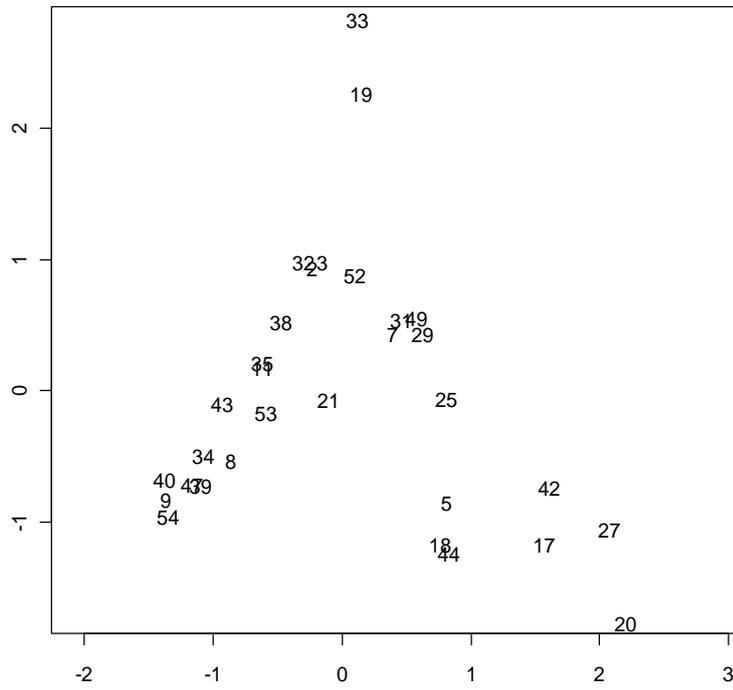


Fig. 5.6 The same Correspondence Analysis as in Fig. .5 but with the points jittered slightly to aid legibility.

The analyses are extremely quick to run once the data are set up. Plots such as Figs. 5.4 and 5.5 can be produced as rapidly as the researcher can type three short lines of instructions. Many different analyses exploring different aspects or groupings in the data can easily be done in an hour. As with any investigation, it is the time spent thinking about the data and the questions that can be asked of it, the time spent setting up the data and the time spent thinking about the results that are the time-consuming aspects. The analyses themselves are marginal costs within the overall time allotment for the task.

4 Proposals for Stage 2

The cloisonné characterisation document prepared in Birmingham⁹⁴ can be used to quantify how many individual cells there might be. At the time the document was written many of the pieces were still obscured by mud and so the quantification is an approximate estimate informed by the actual numbers known from the five pieces in the pilot project.

Based on this, it is thought that there are probably in the region of 9600-9700 cells that would need to be coded. Using the timings given in 5.2, numbering the cells would take between six and seven days and coding the data would take 11 days. Consideration has been given to the possibility of coding each piece and producing aggregated totals of the types present without numbering the cells. With that option the seven days for numbering would be saved. The numbering though would have a long term curatorial value that goes beyond its use in analysis. Loans of the hoard items are likely to take place and of course the material regularly moves between the two owning institutions and the subsidiary exhibitions in Tamworth and Litchfield. Each move involves condition checking and there is the possibility that garnets and other inlays can be dislodged in transit⁹⁵. Being able to identify cells at risk precisely, quickly and easily as this would allow would obviously have benefits. A full numbering is also the only way that the interactions between cell shape, foil type and inlay type could be explored as well. It is thought that those seven days would be a useful investment both for the research and for curation.

Once coded the data would need to be reviewed and the formal typology extracted and revised. This could be illustrated by following the methodology developed in the pilot project using layers to extract the shapes and then mounting them. The typology would be available as part of the digital part of the publication. Based on the timings from the pilot project, this stage would take three days for the typology revision and two days for the preparation of the illustrations. Once the data had been revised it would be uploaded from the developmental Access database to the secure hoard database. It would be impractical develop the cell coding directly on the secure web database because of time issues. The timings outlined could not be achieved if each record was having to be saved to a remote server.

The data would be analysed using the methodology outlined in 3.4. For sub-sets of the data it will be appropriate to include foil type and inlay type in the analyses. It may be appropriate to record some size data for both the foils and the cells, but it is

⁹⁴ Magnoler 2012, see Appendix 1 Section 2.2.

⁹⁵ See Appendix 1 Section 1.2 for the problems surrounding the garnets and inlays.

not intended that this information be recorded for the entire corpus as it is doubted whether the research dividend would be sufficient to justify the input of the amount of resources it would cost. If particularly useful and interesting patterns started to emerge from the size data it would be appropriate to liaise with the conservators in Birmingham as the Keyance digital microscope could be used as a check to see that the size data was being accurately recorded. The analysis of the data and the report arising from it would take seven days including a one day allowance for measuring additional size data for a sub-set of foils and cell shapes.

The results of the analyses will be incorporated into the overall discussion of the cloisonné items which will naturally take into consideration information about how the pieces were made, the art styles etc. That part of the consideration in the final publication will be written by Chris Fern and an allowance of two days has been made for meetings between him and the author for liaison and discussion.

Type	270	273	275	284a	284b	284d	292a	292b	292e	292f	Total
1	0	0	0	0	0	0	1	0	0	0	1
2	2	0	0	1	0	0	0	2	0	0	5
3	0	0	0	1	0	0	4	1	0	0	6
4	0	0	2	1	0	0	0	0	0	0	3
5	0	0	0	1	0	4	0	0	0	0	5
6	0	0	0	1	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	0	2	2
8	51	0	0	0	0	3	23	0	0	0	77
9	2	0	0	0	0	0	0	0	0	0	2
10	0	13	0	0	0	0	0	0	0	0	13
11	14	0	0	3	0	0	9	6	0	0	32
12	0	0	0	0	0	0	1	0	0	0	1
13	0	0	4	0	0	0	0	0	0	0	4
14	0	28	0	0	0	0	0	0	0	0	28
15	0	1	0	0	0	0	0	0	0	0	1
16	0	0	0	1	0	0	0	0	0	0	1
17	0	0	0	2	6	2	0	0	0	0	10
18	0	0	0	0	0	2	0	0	0	0	2
19	0	0	0	7	0	0	0	42	2	2	53
20	0	0	0	0	21	0	0	0	0	0	21
21	3	0	0	5	0	0	0	0	0	0	8
22	0	0	37	0	0	0	0	0	0	0	37
23	0	0	5	0	0	0	0	0	0	0	5
24	0	2	0	0	0	0	0	0	0	0	2
25	3	0	0	25	17	5	1	0	10	10	71
26	0	0	0	0	0	0	0	1	0	0	1
27	0	0	0	5	17	0	0	0	0	0	22
28	0	26	0	0	0	0	0	0	0	0	26
29	0	0	0	2	0	0	0	0	0	0	2
30	0	0	0	1	0	0	0	0	0	0	1
31	0	0	0	16	2	0	5	4	0	13	40
32	2	0	0	1	0	0	0	3	0	0	6
33	0	0	0	0	0	0	0	4	0	0	4
34	5	0	1	0	0	0	1	0	0	0	7
35	1	0	0	0	0	0	4	0	0	0	5
36	0	0	0	0	0	0	1	0	0	0	1
37	0	0	0	0	0	0	1	0	0	0	1
38	0	0	0	0	0	0	2	0	0	0	2
39	4	0	0	0	0	0	0	0	0	0	4
40	73	0	0	0	0	0	0	0	0	0	73
41	0	0	2	0	0	0	0	0	0	0	2
42	0	1	0	7	10	0	0	0	0	0	18
43	8	0	0	0	0	0	0	2	0	0	10
44	0	0	0	0	0	2	0	0	0	0	2
45	0	0	39	0	0	0	1	0	0	0	40

Type	270	273	275	284a	284b	284d	292a	292b	292e	292f	Total
46	1	0	7	0	0	0	0	0	0	0	8
47	13	0	3	1	0	0	0	0	0	0	17
48	0	0	0	0	0	0	1	0	0	0	1
49	0	0	0	0	0	0	0	0	2	2	4
50	0	0	0	0	0	0	0	1	0	0	1
51	0	0	85	0	0	0	0	0	0	0	85
52	0	0	0	15	0	0	19	15	4	4	57
53	27	0	0	6	0	0	0	0	6	6	45
54	6	0	0	0	0	0	0	0	0	0	6
Total	215	71	185	102	73	18	74	81	24	39	882

Table 5.1: the full data set.

Field name	Data type	Description
ID	Auto number	Unique identifier for each cell
K no	Integer	Reference number for piece
Side	Text (5 characters)	Identifies the side of the piece as in Chris Fern's final catalogue.
Cell number	Integer	Individual cell number for each piece as described in section 5.1 here. Relates to a photographic key
Type	Text (20 character)	Alphanumeric coding for cell shape. See section 5.2 here.
Analysis type	Integer	The temporary typology number used within the pilot project (see section 5.4 here).
Comment	Memo field	Space for notes arising from coding or analysis
Count	Integer	Set to 1 to enable tables such as Appendix table 5.1 to be generated.

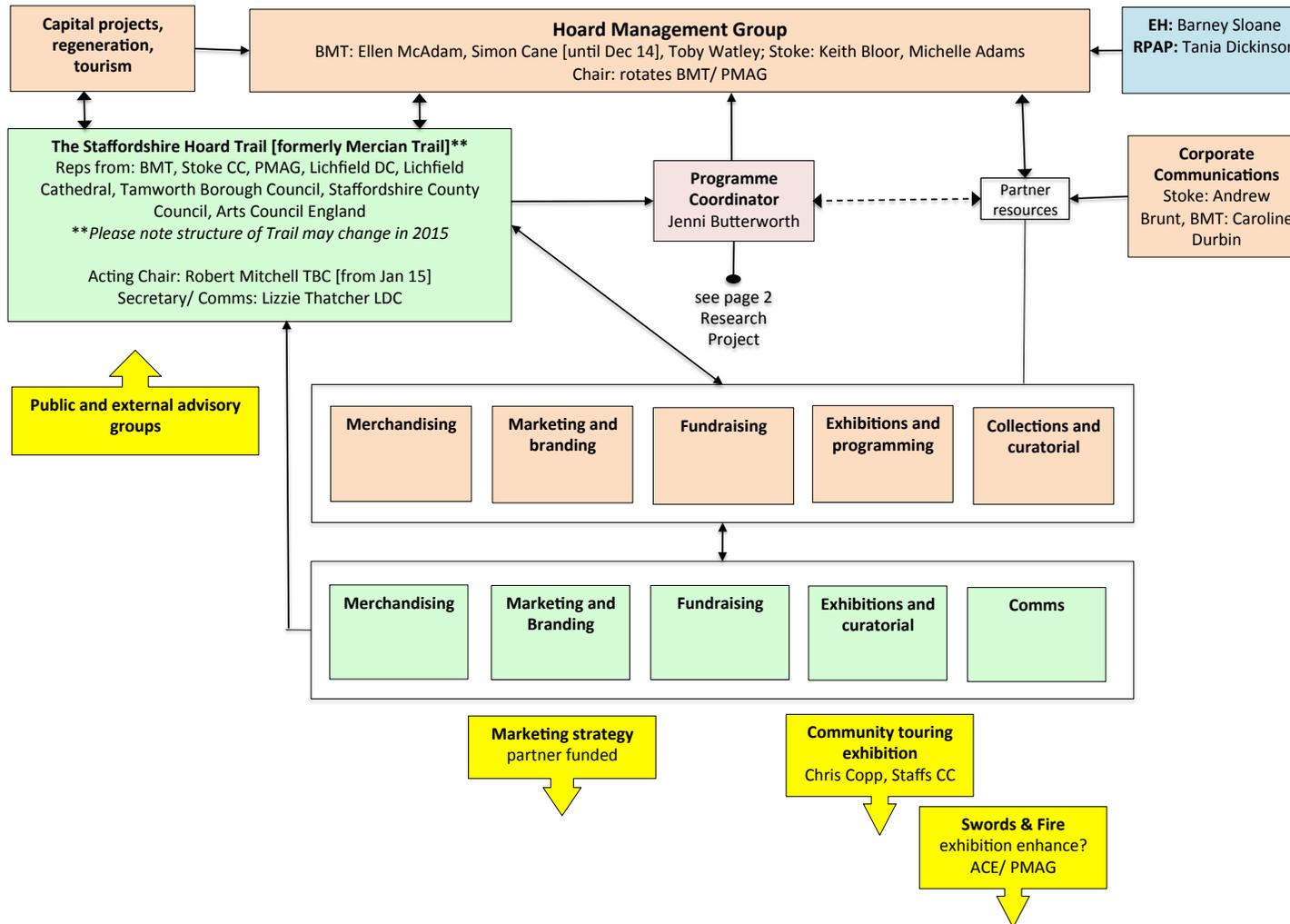
Table 5.2 : Metadata for Access database table used in the pilot project.

Appendix 6: The Staffordshire Hoard Programme

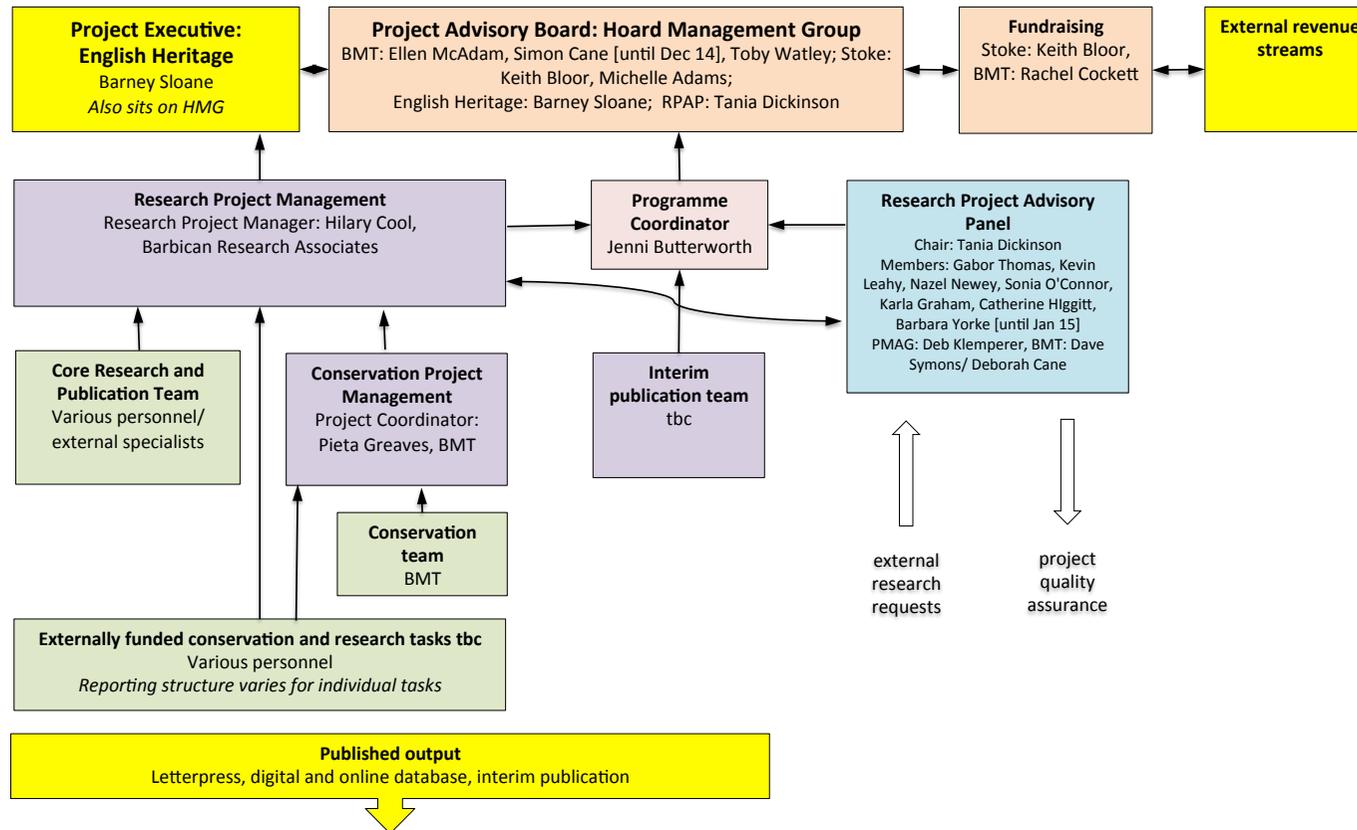
Jenni Butterworth

The chart on the next two pages reflects the structure of the wider Staffordshire Hoard Programme as of October 2014. The membership and chair details for RPAP are those anticipated for Stage 2.

Staffordshire Hoard Organisational Chart/ OVERALL STRUCTURE



Staffordshire Hoard Organisational Chart/ RESEARCH PROJECT



Appendix 7: The Publication Strategy¹

Leslie Webster and Chris Scull

1 Introduction

The final outcome of the project will be an integrated publication consisting of two major elements.

There will be a visually attractive single letterpress volume in large format, and generously illustrated with integrated full colour and line drawings. It should be clearly written, easy to navigate, and a pleasure to use. It will present a structured thematic narrative, supported by an illustrated summary catalogue, and incorporating specialist contributions on key aspects of the assemblage.

There will also be a large digital section consisting of an online database, archive and resource package. Users of the letterpress book will be directed to this, as the repository of the detailed object catalogue, full illustrative record, specialist conservation and scientific data, and supporting specialist analyses and interpretative discussions.

These two components, letterpress and digital, will constitute a *fully integrated publication* and are described in more detail in section 2 below. The intention is that the letterpress volume will stand alone as an expert and accessible statement of the discovery, investigation, analysis, understanding and significance of the hoard, but that the user will have access to the full catalogue and research data, and supporting analytical discussion and interpretative materials, through the online resources.

During the early months of Stage 2 a publisher for the letterpress volume will be approached and negotiations will take place to decide on the most appropriate outlet. It is anticipated that this will be a grant-aided rather than a commercial publication. The editorial group have already suggested a number of suitable publishers to the HMG and await their decision of which one should be approached first.

After an initial period of hard copy availability it is suggested that a digital version with low-resolution images be made freely available online: evidence shows that this will stimulate hard-copy sales. PDF offprints of individual contributions will be supplied to contributors.

The database and digital resource package will be freely available online from the outset via the Archaeology Data Service (ADS). It will be linked to all main partners' websites and other appropriate portals. The digital element will be prepared in consultation with the ADS and will conform to their guidelines. It is envisaged that provision will be made through the owners for active curation. As research on the hoard continues, relevant reports and/or links to future publications may be added; inclusion criteria will be established in consultation with the Research Project

¹ This appendix is based on the Publication Strategy document prepared by Leslie Webster and Chris Scull (with some input from Chris Fern, the chair of RPAO and the PM). It was presented to HMG for consideration on 13th July 2014.

Advisory Panel and the editors, with input to be managed by the owners, or by their designated agents.

Marketing and Publicity will be agreed between publisher, owners and English Heritage as grant-aiding body. Publication of the hoard will be a media event with an international profile and there will be a correspondingly high-profile launch event. All appropriate avenues of publicity will be utilised: review copies to relevant specialist and popular journals and appropriate press, as well as via wider media coverage and promotional events. Publication will be trailed and promoted through social media.

2 Publication synopsis

2.1 Introduction

2.1i The nature of the integrated publication

As already noted the integrated publication will comprise a letterpress monograph, backed by an online database which will hold full catalogue details, images and research data for individual objects, and a digital section comprising detailed research reports with supporting interpretative discussion, and other research resources generated by the project, bearing on broader themes and data-sets.

It is not possible or desirable to accommodate all supporting discussion and data within the letterpress volume, which must present a synthetic interpretative narrative. However, it is essential that supporting data and discussion are made available and are properly integrated with the letterpress volume. This supporting text, tables and graphic content will form an integral part of the publication, within a common structure, but will be available only online, as a digital resource. This content will be indicated within the letterpress text (QR codes may be appropriate), and the contents listing of the letterpress volume will show the full content, hard copy and digital. The letterpress volume will represent in essence the visible part of the much greater iceberg that is the integrated publication.

In what follows the key components are presented below (sections **2.2** and **2.3**) as letterpress and digital elements because this corresponds with the way in which buyers and users will physically encounter the publication. This is merely a convenient way of presenting the synopsis and does not detract from the envisioned integrated final product.

2.1ii Working Title and Attributions

It is suggested that the book be called *The Staffordshire Hoard: an Anglo-Saxon Treasure*. It will be edited by Chris Fern, Tania Dickinson and Leslie Webster, with the text by Chris Fern and other contributors and the catalogue by Chris Fern

2.1iii Illustrations

The narratives in the letterpress volume will be extensively illustrated with integrated high-quality colour images, and with supporting black and white drawings and other illustrative material. Each entry in the summary catalogue at the end of the book will be illustrated with a large thumbnail image and where necessary, an explanatory line

drawing. QR codes could enable the reader to link these entries directly to a suite of further images on the database.

2 *Letterpress Volume*

This will consist of a richly illustrated set of thematic narratives which will incorporate the results of investigation, research and scientific analysis, placing the hoard in its wider context, and discussing its significance. This will be supported by a fully illustrated summary catalogue. For more detailed information, such as the full excavation report, the full catalogue, scientific reports and conservation data, and extended specialist discussion, there will be in-text links to the online database and digital section.

2.2i *Foreword/Preface (the owners, or possibly an outside author)*

The owners to advise on authorship.

2.2ii *Introduction: questions, challenges, and aims (Tania Dickinson and Leslie Webster)*

This sets out the stall, emphasizing that the hoard is a discovery of international importance which is transforming our understanding of Anglo-Saxon England in a period of radical social and religious change, and poses many new questions and challenges. It identifies the main research questions and aims which the publication will address, and explains the integrated structure of the volume and database. It concludes with thanks and acknowledgements to all those involved in the many challenges of this major project.

Part One: The Material Evidence

2.2iii *Discovery and Investigation (various contributors)*

A contextual description of the hoard's location and the circumstances of its discovery, with a summary account of subsequent archaeological investigations, and of the Treasure process leading to its joint acquisition by PMAG and BMT. This will also include an account of the conservation methods and lessons learned.

2.2iv *The artefacts (Chris Fern with other contributors)*

Discussion of the range of objects that comprised the hoard, what they originally represented, and how they were modified before burial.

2.2v *Making the objects (various contributors)*

This will focus on what the expert craftsmanship and technology revealed in the objects in the hoard can tell us about workshop practices and their possible regional variation in the Anglo-Saxon period, and how this has extended our understanding of aspects of early medieval technology.

2.2vii *Art and image in the hoard (Chris Fern, George Speake and other contributors)*

The impressive range of ornament on the objects in the hoard will be analysed in its wider art-historical context; distinctive styles and iconographies will be discussed, and the implications for the dating of the assemblage assessed. Discussion of the inscription will be included in this section.

2.2viii *Dating the hoard (Chris Fern and other contributors)*

The crucial questions of when objects in the hoard were made, when they came together, and at what date the assemblage was placed in the ground will be addressed. A succinct explanation of how the object types can be dated will be part of this. The origins of individual items within this will also be discussed in the light of the overall assemblage and its date.

Part Two: Interpretation

2.2ix *The context of the hoard: local, regional and national (Alan Thacker, Barbara Yorke, and other contributors)*

The landscape context of the hoard will be reviewed, with cross-reference to existing studies. Its significance within the wider religious and political history of seventh-century Mercia and Anglo-Saxon England, and its context within the wider North Sea zone will be discussed. Against the backdrop of the transition from paganism to Christianity, there will also be discussion of the ideological context of the hoard's visual vocabulary, and its implications for the understanding of the development of the earliest Anglo-Saxon Christian art and script in the seventh century.

2.2x *The hoard and society (John Hines and other contributors)*

This section will consider what the hoard represented as monetary wealth and social value, how representative it is of the range of contemporary material culture in Anglo-Saxon society, and what it tells us about the elite social milieu for which these objects were originally manufactured, and in which they developed their own biographies of use, circulation, and transformation.

2.2xi *Hoard and hoarding (Matthias Hardt, Colin Haselgrove and other contributors)*

The unusual nature of this hoard in an Anglo-Saxon context and the reason[s] for its deposit have excited a great deal of speculation. Specialists from different archaeological backgrounds will discuss possible parallels for and theories about this kind of assemblage, and suggest how it might be interpreted in the light of other cultural examples.

2.2xii *What does it mean? (Chris Fern, Tania Dickinson and Leslie Webster)*

The exceptional nature of the hoard raises questions about the provenance of its individual components; how and why it was assembled, and the individual items disassembled; why it was buried, and why in this particular place. Alternative explanations and narratives will be considered here.

2.2xiii *Afterword: The impact of the hoard and future work (editorial group and various contributors)*

Summarising how the hoard has changed our understanding of Anglo-Saxon politics, religion and culture in the 7th century, and the impact it has had on people and culture in the present day. The latter aspect will look at what its reception tells us about changing attitudes to Treasure finds and what implications it has for the future. There will also be a consideration of how such finds can be a catalyst for public engagement as demonstrated by the successful outreach programmes both museums have built around the Hoard.

There will also be a consideration of the avenues of research of that presented themselves as the project developed but which could not be pursued. Some of the promising new lines of research are suggested here, which could feed into new displays and inspire new interpretative ventures. The location[s] of the material for future research and relevant contact details are provided.

Part Three: Catalogue, Bibliography and Database Guide

2.2xiv Catalogue (Chris Fern)

A summary catalogue of the main components of the hoard, fully illustrated in colour and with interpretative drawings; the detailed catalogue and further illustrations will be accessible through a link to the archive/database.

2.2xv Bibliography (editorial group and contributors)

This will include links to the database, the official web-site and other relevant web-sites.

2.2xvi Guide to the use of the digital section (Project Manager)

A detailed user-guide to the database and digital resources will be provided in the book, and on-line.

2.3 Database and Digital Resources

There will be three categories of digital resource:

2.3i The object database,

This holds full details and visual records of each artefact, along with object-specific scientific, compositional and analytical data;

2.3ii Additional parts of the narrative

This will consist of text, tables and graphic materials that form part of the integrated report narrative, which will share a common structure with the letterpress volume and be signposted through in-text links in the letterpress volume; and

2.3ii Supplementary material

Supporting material: analytical and other data that does not fit easily within a narrative report but which should be made available to researchers: this material will be referenced in the narrative text as appropriate but the main signposting will be through the user guide.

3 Handling and Review

The Publication Synopsis set out in **2.2 and 2.3** defines only a high-level structure for the publication and its constituent elements. If this synopsis and approach is agreed, it will be necessary to define content and specific contributions in greater detail in order to provide editors and contributors with a clear framework, and to keep this under review as the project progresses. This will be handled by the project manager and editorial group, in consultation with the project team. It is envisioned that this will be

put in place in outline early in Stage 2 of the project, but the detail will have to await the appointment of a publisher and discussion with their representatives. Such detail would include sub-headings with summaries, full author attributions, indicative word counts and initial estimates of illustration requirements.

4 The role of the editorial group

4.1 Project manager

The PM is responsible for organising and overseeing the management and progress of the publication project in behalf of the owners; liaises with the editors and authors on the publication schedule and delivery of the completed text; works with the database manager to ensure completion of the database, its integration into the publication, and handover to ADS; reports to HMG via the Programme Coordinator

4.2 Academic Editors

Tania Dickinson and Leslie Webster are responsible for overseeing the quality and content of the contributions; they work closely with Chris Fern, who is responsible for overseeing coherence and consistency throughout the various contributions. They liaise closely with the Project Manager and with the Programme Coordinator, and report through the Project Manager to HMG via the Programme Coordinator.

4.3 Scientific editor

A scientist of international standing will act as an internal but independent reviewer of all the scientific contributions prior to submission of the manuscript.

4.4 Publisher's editor

The publishers editor will be responsible for professional editing after the text has been delivered. Once appointed they will work closely with the editors and contributors during Stage 2. They will report directly to the HMG via the PC.

Appendix 8: Risk Log

Risk Number 1

Title: RPAP funding

Description: In October 2014 HMG and EH informed the Project Manager that they wished the costs of the RPAP meetings to be included as a core project cost. This has been done according to the timetable that RPAP themselves suggested in their May 2014 meeting, i.e. two meetings per year. If it is decided that they need to meet more than that, additional costs will be incurred. Those for the RPAP members themselves will be covered by application for funding to the Mercian Trail as normal. There will also be the additional cost for the project manager to attend as this is not covered within the project management calculations.

Probability: Low to moderate

Impact: None as far as time is concerned. The cost is in the vicinity of £440 for the project manager and £1000 for the RPAP members per meeting.

Countermeasures: Encourage the RPAP members to communicate by email and plan to hold the meetings after key points in the project so that they can consider the results and advise if appropriate.

Owner: Project Manager and Programme co-ordinator

Date this entry last updated: 3rd November 2014.

Risk Number: 2

Title: Losing key personnel

Description: This stage will run from the fourth to the sixth year of the life of the project. Some personnel have been involved since its inception and their loss for any reason during this period would naturally be a problem. There would be the loss of their knowledge of what had gone before and of their expertise. The individuals are Hilary Cool (Project Manager), Leslie Webster (Academic editor), Chris Fern (lead typologist / academic editor) and the Conservation Co-ordinator.

Probability: Low

Impact: Variable see the next section.

Countermeasures: For all of Stage 1 Stephanie Ratkái has acted as a deputy project manager on behalf of Barbican attending project meetings and editing some of the Newsletters. She could take over the role full-time either permanently or until someone else could be appointed. The impact should thus be relatively low and there would be no financial impact. Stage 2 has seen the appointment of a new Academic Editor who has been involved with the project for part of Stage 1 (Tania Dickinson). As there are three academic editors the loss of one could be absorbed. The loss of two would be more problematic but the Project Manager could take over some of the work with the aid of other team members for period expertise. Again the impact should be relatively low and there would be no financial impact. The loss of Chris Fern would be far more problematic. This would probably only come about through ill health or death, but such unfortunate outcomes must be at least considered. He was recruited because he had a fairly unique set of skills and he is now the person who has the most intimate knowledge of the hoard. Other team members could take over some of the work he will do. George Speake, for example, is part of the team and will jointly be writing the animal art sections and could take over that. There would, however be a delay whilst additional team members were put in place to replace Chris. The conservation co-ordinator is currently in post until March 2016. It is anticipated that she will have put in place all her contributions before she leaves the post, though naturally the editors might have queries afterwards.

Estimated time/cost: There would be both project management time/cost implications for replacing Chris Fern and time/cost implications for recruiting new team members and for them to familiarise themselves with what had already been achieved and what needed to be done. A delay of three to six months and a cost of c. £5,000 could be anticipated if the problem arose early in Stage 2. This would decrease if the problem arose later in the life of the stage. The cost of commissioning the conservation co-ordinator to respond to queries will be in the region of £200-£300 and could probably be absorbed by Barbican.

Owner: Project Manager

Date this entry last updated: 6th January, 2015

Risk Number: 3

Title: Availability of Bryan Alvey

Description: There is work that needs to be done to develop the database for Stage 2 (Task 6). Ideally some of this would be done as soon as Stage 2 starts. The proposed start of the project on 5th January 2015 takes us into a period when Bryan Alvey may be very busy with other projects and would be unavailable.

Probability: Low to Moderate.

Impact: The work would probably have to be delayed until the financial year 2015/6. This should not impinge on the cataloguing work, but might delay input of the conservation information.

Countermeasures: PM to discuss priorities with BA as soon as a firm date for the start of Stage 2 is known.

Estimated time/cost: There would be no cost impact. The initial work may be completed up to six months late.

Owner: Project Manager.

Date this entry last updated: 3rd November, 2014.

Risk Number: 4

Title: Availability of objects

Description: The owners are planning a UK tour of some objects during the life of Stage 2. This will mean they will not be available for photography and inspection by the typology team during that period and the preparation periods.

Probability: High

Impact: Moderate providing there is sufficient information available in good time to plan.

Countermeasures: The PC, PM and museum curators will liaise over the lists of the material to travel and the timetable of the photographer and typology team will be adjusted if necessary.

Estimated time/cost: There will be no additional cost and overall within the whole timetable of Stage 2 there should be no additional time needed. Overall some products may have to have later completion dates to accommodate the availability of the objects.

Owner: Project Manager

Date this entry last updated: 3rd November, 2014.

Risk Number 5

Title: Photography being more expensive than budgeted for.

Description: The original plan for the photography was for the task to be fulfilled by a PMAG staff photographer, in-house and without any overhead. In October 2014 HMG requested that this plan be altered to the one outlined on p. 38. The unit with whom we are in negotiations with, is the last large one with the staff able to carry out such work in the region. Bringing in an external photographer will cost more (currently c. £55 per day) and there will

travel costs to be included. On the positive side they may be able to complete the work more rapidly.

Probability: High

Impact: In time no impact. In cost possibly in the vicinity of £7,000 but currently being discussed.

Countermeasures: It is hoped that we can cost this task accurately before the project is commissioned.

Owner: Project Manager

Date this entry last updated: 3rd November 2014.

Appendix 9: Product Descriptions

Product Number: 1

Product Title: Project Management – general.

Purpose of Product: To oversee smooth running of project & report to stakeholders including EH.

Composition: Emails, telephone calls, face to face meetings. Maintaining budget controls and writing Variation requests as needed. Attending RPAP meetings (6 allowed for). Organising seminars and team meetings (2 in life of project). Organising editorial and other meetings. Drafting Highlight Reports and end of Project report (5 allowed for) for EH with associated meetings (4 allowed for). Drafting brief progress reports for each HMG meeting.

Derived from: This project design.

Allocated to: Hilary Cool.

Format and Presentation: Word and .pdf documents for written reports.

Quality Criteria and Methods: Maintaining timetable outlined in section

Person/Group responsible for Quality Assurance: Project Manager.

Person/Group responsible for Approval: Project Executive.

Planned Completion date: 16th June 2017.

Product Number: 2

Product Title: PMAG Administrative support

Purpose of Product: To conduct necessary conditions checks, and act as liaison and collate material for legacy strand.

Composition: Ongoing work at PMAG and this document.

Derived from: Ongoing work at PMAG and this document.

Allocated to: Sam Richardson.

Format and Presentation: Up-dated object documentation in PMAG system.

Quality Criteria and Methods:

Person/Group responsible for Quality Assurance: Hilary Cool

Person/Group responsible for Approval: Project Manager.

Planned Completion date: 31st March 2017 if fund raising allows, otherwise 31st March 2016.

Product Number: 3

Product Title: Newsletter.

Purpose of Product: Communication within team and with outside world..

Composition: Information collected from the different strands of the team and circulate it in the form of an email Newsletter, six times over the life of the project..

Derived from: This project design and ongoing work during the life of the project.

Allocated to: Stephanie Rátkai.

Format and Presentation: Word and .pdf files.

Quality Criteria and Methods: Feedback from team and outside stake-holders as to what aspects are useful.

Person/Group responsible for Quality Assurance: Project Manager.

Person/Group responsible for Approval: Project Manager.

Planned Completion date: 31st March 2017 if fund raising allows, otherwise 31st March 2016.

Product Number: 4

Product Title: Typology liaison and administration.

Purpose of Product: To liaise with other team members especially the project manager and the reconstruction illustrator; to provide feedback for Highlight Reports, Newsletters etc.; to acquire appropriate comparanda for elements of hoard artefact reports; to select final illustrations for publication.

Composition: Telephone calls, emails, preparation of briefing notes and illustrations, visits to the British Museum and Royal Armouries.

Derived from: The ongoing research.

Allocated to: Chris Fern

Format and Presentation: Word reports and mock-up reconstructions.

Quality Criteria and Methods: Smooth running of the typology strand.

Person/Group responsible for Quality Assurance: Project manager.

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2017, if fund raising allows, otherwise 31st March 2016.

Product Number: 5

Product Title: Academic Editor meetings

Purpose of Product: To review progress and shape publication

Composition: Fine tuning of publication outline.

Derived from: This PD and ongoing research results

Allocated to: Chris Fern, Tania Dickinson, Leslie Webster, Hilary Cool

Format and Presentation: Face to face meetings, with notes taken by HC and circulated in Word by email.

Quality Criteria and Methods: Successful final publication.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2017.

Product Number: 6

Product Title: Database development

Purpose of Product: To update the web-based database developed during Stage 1, and liaise with the ADS to ensure the smooth migration of the digital data at the end of the project.

Composition: Meetings with Chris Fern, Hilary Cool, the ADS. Development of new catalogue tables; writing new report queries; uploading bulk batches of data.

Derived from: Product 4 of Stage 1 (Cool 2013, 144) and ongoing research in Stage 2.

Allocated to: Bryan Alvey.

Format and Presentation: Additions to database (for design see Cool 2013, Appendix 2)

Quality Criteria and Methods: Catalogues and analysis data successfully generated for use by the team. Data successfully migrated to the ADS.

Person/Group responsible for Quality Assurance: Project manager.

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2017.

Product Number: 7

Product Title: Pommel Catalogue

Purpose of Product: To prepare final catalogue and typology of

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 20th February 2015

Product Number: 8

Product Title: Hilt plate Catalogue

Purpose of Product: To prepare final catalogue and typology of the hilt plates.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 29th May 2015.

Product Number: 9

Product Title: Hilt collar catalogue.

Purpose of Product: To prepare final catalogue and typology of the hilt collars.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 31st July, 2015.

Product Number: 10

Product Title: Hilt Ring Catalogue

Purpose of Product: To prepare final catalogue and typology of the hilt rings

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 22nd August, 2015.

Product Number: 11
Product Title: Sword pyramid etc. catalogue
Purpose of Product: To prepare final catalogue and typology of the sword pyramids, rings and bosses.
Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.
Derived from: Stage 1.
Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 25th September, 2015.

Product Number: 12
Product Title: Other mounts catalogue
Purpose of Product: To prepare final catalogue and typology of the other mounts.
Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.
Derived from: Stage 1 and Product 7 here.
Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 14th November, 2015.

Product Number: 13
Product Title: Cloisonné suite catalogue
Purpose of Product: To prepare final catalogue and typology of the cloisonné suite of fittings.
Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.
Derived from: Stage 1 and Product 7 here.
Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 12th December 2015.

Product Number: 14

Product Title: Niello suite catalogue

Purpose of Product: To prepare final catalogue and typology of the niello suite.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Entries on database. Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 15th January 2016

Product Number: 15

Product Title: Non-helmet sheet catalogue

Purpose of Product: To prepare final catalogue and typology of the sheet not associated with possible helmets.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 27th February 2016.

Product Number: 16

Product Title: C-edging catalogue

Purpose of Product: To prepare final catalogue and typology of the C edge bindings.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern

Format and Presentation: Word report.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 4th March 2016.

Product Number: 17

Product Title: Rivets / buckles catalogue

Purpose of Product: To prepare final catalogue and typology of the rivets etc and buckles.

Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.

Derived from: Stage 1 and Product 7 here.

Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 23rd April, 2016

Product Number: 18
Product Title: Cross catalogue
Purpose of Product: To prepare final catalogue and typology of the crosses
Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.
Derived from: Stage 1 and Product 7 here.
Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 6th May, 2016.

Product Number: 19
Product Title: Garnets, foils and miscellaneous fragment catalogue
Purpose of Product: To prepare final catalogue and typology of the loose garnets, foils and miscellaneous fragments
Composition: Upgrading entries from Stage 1 as appropriate. Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG and PMAG. Writing report for publication.
Derived from: Stage 1 and Product 7 here.
Allocated to: Chris Fern
Format and Presentation: Word report.
Quality Criteria and Methods: Normal academic protocols.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 11th June 2016.

Product Number: 20
Product Title: Conservation documentation, joining the pieces.
Purpose of Product: To ensure database is kept up to date and join fragments for study.
Composition: Checking and completion of documentation and ensuring database is up-dated. Joining the fragments where possible and documenting this. Input into final reports as appropriate. Meetings and discussions with Chris Fern.
Derived from: Products 17 and 25 of Stage 1
Allocated to: Conservator 1
Format and Presentation: Up-dated database entries. Word reports.
Quality Criteria and Methods: See 14.5ii
Person/Group responsible for Quality Assurance: Conservation Co-ordinator.
Person/Group responsible for Approval: Project Manager.
Planned Completion date: 31st December 2015.

Product Number: 21

Product Title: Sheet conservation and cataloguing

Purpose of Product: To continue joining and stabilisation of die-impressed sheets and to catalogue elements of them.

Composition: Joined and documented fragments. Catalogue entries with measurements for die identification. Catalogued of reeded strips and C-bindings with detailed measurements and weights. Input into final reports derived from Products 16, 17 and 24 here. Anticipated distribution of time – familiarisation 5%, prepare for Grouping (Product 24) 10%, Grouping 10%, make joins 50%, make measurements 10%, document and report writing 10%.

Derived from: Products 10 and 12 of Stage 1 and Product 21 here.

Allocated to: Conservator 2.

Format and Presentation: Up-dated database entries. Word reports.

Quality Criteria and Methods: See 14.5iii.

Person/Group responsible for Quality Assurance: Conservation co-ordinator.

Person/Group responsible for Approval: Project Manager

Planned Completion date: 30st September 2015 (depending on recruitment).

Product Number: 22

Product Title: Metal Analysis

Purpose of Product: To explore composition of silver objects and manufacture methods.

Composition: Analyses using XRF, reports on the results, input into workshop practice strand.

Derived from: Product 13 of Stage 1

Allocated to: Metals Scientist, Ellie Blakelock

Format and Presentation: Data tables, Word reports, up-dated database entries as appropriate.

Quality Criteria and Methods: See 14.8iii, v.

Person/Group responsible for Quality Assurance: Conservation co-ordinator.

Person/Group responsible for Approval: Project Manager.

Planned Completion date: 31st December 2015 (depending on recruitment).

Product Number: 23

Product Title: Organic analysis

Purpose of Product: To identify the outstanding organics found during the conservation in Stage 1.

Composition: Analyses using FTIR, reports on the results,

Derived from: Product 17 of Stage 1.

Allocated to: Organics conservator

Format and Presentation: Data tables, Word reports, up-dated database entries as appropriate.

Quality Criteria and Methods: See 14.8iii.

Person/Group responsible for Quality Assurance: Conservation co-ordinator.

Person/Group responsible for Approval: Project manager

Planned Completion date: 30th June 2015 (depending on recruitment)

Product Number: 24

Product Title: Sheet grouping.

Purpose of Product: To assess progress with die-impressed sheets; decide on amount of further joining work appropriate; choose pieces for illustration.

Composition: Three day grouping exercise to be held at BMAG.
Derived from: Products 10 and 12 of Stage 1.
Allocated to: Chris Fern, George Speake, Conservator 2, Pieta Greaves
Format and Presentation: Up-dated database entries, Word document.
Quality Criteria and Methods: Production of detailed plan for dealing with material in Stage 2.
Person/Group responsible for Quality Assurance: George Speake
Person/Group responsible for Approval: Project manager
Planned Completion date: 1st June 2015 (depending on half-term dates).

Product Number: 25
Product Title: Catalogue copy editing
Purpose of Product: To ensure consistency in catalogue.
Composition: Copy editing of catalogues, checking inconsistencies with Chris Fern, agreeing final wording, dispatching finished text to Bryan Alvey for bulk upload to database.
Derived from: Products 7-19
Allocated to: Val Kinsler
Format and Presentation: Edited Word text
Quality Criteria and Methods: Normal copy editing procedures
Person/Group responsible for Quality Assurance: Chris Fern / Bryan Alvey
Person/Group responsible for Approval: Project Manager
Planned Completion date: 2nd September 2016.

Product Number: 26
Product Title: Photography
Purpose of Product: To provide images for final publication.
Composition: Taking appropriate digital images of artefacts and completing Stage 1 archive where original view was dirty. Post production to ensure a uniform white background and a scale..
Derived from: Products 7-21
Allocated to: tba
Format and Presentation: Digital scaled images of artefacts.
Quality Criteria and Methods:
Person/Group responsible for Quality Assurance: Chris Fern
Person/Group responsible for Approval: Project Manager
Planned Completion date: 2nd September 2016 (depending on availability of objects which may be subject to exhibition needs¹).

Product Number: 27
Product Title: Background information.
Purpose of Product: To provide the whole team with as much published and unpublished material relating to the local area in the sixth and seventh century.
Composition: A digested compilation of HER, PAS, OASIS etc records.
Derived from: Section 4.6 of this document.
Allocated to: Jon Goodwin.
Format and Presentation: Word and .pdf files to be stored on the database.
Quality Criteria and Methods: Normal desktop survey.
Person/Group responsible for Quality Assurance: Project Manager.

¹ See Risk Log 4.

Person/Group responsible for Approval: Project manager.
Planned Completion date: 30th September 2016

Product Number: 28²

Product Title: Survey data concordance.

Purpose of Product: To ensure consistency between the three sets of survey data produced by Staffordshire CC, Birmingham Archaeology and Archaeology Warwickshire.

Composition:

Derived from: Original excavation and survey records.

Allocated to: tba

Format and Presentation: tba

Quality Criteria and Methods: tba

Person/Group responsible for Quality Assurance: tba.

Person/Group responsible for Approval: Project manager.

Planned Completion date: 30th September 2016.

Product Number: 29

Product Title: Stratigraphic Narrative.

Purpose of Product: To document the excavations and survey in 2009 and 2010 on the Hoard site.

Composition: Full stratigraphic and survey narrative with appropriate illustrations.

Derived from: Archive of excavations and information deposited in SHER, the aerial photograph assessment.

Allocated to: Alex Jones with the assistance of Nigel Dodds.

Format and Presentation: Word files and illustrations in format suitable for letterpress and web.

Quality Criteria and Methods: Normal final excavation report standards.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager.

Planned Completion date: 30th September 2016.

Product Number: 30

Product Title: Die-impressed sheets typology illustration

Purpose of Product: To prepare final catalogue, typology and illustrations of the die-impressed sheets.

Composition: Preparation of final catalogue entries for letterpress and digital parts of publication. Preparing appropriate typologies and checking final groupings by visits to BMAG. Producing the final drawn illustrations with analysis of the animal art where appropriate. Writing report for publication.

Derived from: Products 21 and 24.

Allocated to: George Speake

Format and Presentation: Finished drawings, Word files, up-dated database entries.

Quality Criteria and Methods: Normal academic protocols.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 31:03:2016

Product Number: 31

² EH requested that this task be included at a meeting on 19th August 2014. They have already had some discussions with Dr Henry Chapman of Birmingham University. Discussions are ongoing with him..

Product Title: Green cloisonné identification

Purpose of Product: To identify the composition of green material in some cloisonné cells.

Composition: Preparation of suitable samples. Analysis as in 14.8ii. Writing report for publication

Derived from: Product 14 of Stage 1.

Allocated to: Sue La Niece

Format and Presentation: Data tables, Word reports, up-dated database entries as appropriate.

Quality Criteria and Methods: See 14.8ii

Person/Group responsible for Quality Assurance: Sue La Niece

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st March 2016. This product will only be carried out if the fund-raising is successful.

Product Number: 32

Product Title: Cloisonné recording and analysis

Purpose of Product: To create typology of cloisonné cells and analyse to explore whether there are workshop signatures.

Composition: Systematic numbering and coding of cells; refining and documenting typology, conducting statistical analyses, writing report and preparing illustrations for typology.

Derived from: Product 16 of stage 1, see Appendix 3 here, using photographs generated in Stage 1 and from Product 26 here.

Allocated to: Hilary Cool, Michael Baxter

Format and Presentation: Coded digital illustrations on database. Access table to be incorporated into database, Word report.

Quality Criteria and Methods: See Appendix 5.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st March 2016. This product will only be carried out if the fund-raising is successful.

Product Number: 33

Product Title: Gold Value study.

Purpose of Product: To evaluate current theories of how gold was valued in the 7th century in light of the hoard data.

Composition: Comparison of Hoard data with ongoing research on value.

Derived from: Products 15, 16 of Stage 1 and Product 22 here, and past publications (Hines 2011 etc).

Allocated to: John Hines.

Format and Presentation: Word document.

Quality Criteria and Methods: Normal Academic protocols, see **14.11**.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager.

Planned Completion date: 30th September 2016.

Product Number: 34

Product Title: Military Aspects Study.

Purpose of Product: To provide broad background to explain the military aspect of the Hoard.

Composition: Comparative material from published sources etc.
Derived from: This document and ongoing relevant information gathered during the Analysis Project.
Allocated to: John Hines.
Format and Presentation: Word document.
Quality Criteria and Methods: Normal Academic protocols, see **14.11**.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager.
Planned Completion date: 30th September 2016.

Product Number: 35
Product Title: History and Religion Study.
Purpose of Product: To provide broad background to explain the historical and Christian aspects of the Hoard.
Composition: Comparative material from published sources etc.
Derived from: This document and ongoing relevant information gathered during the Analysis Project.
Allocated to: Alan Tranter. Barbara Yorke
Format and Presentation: Word document.
Quality Criteria and Methods: Normal academic protocols, see **14.11**.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager.
Planned Completion date: 30th September 2016.

Product Number: 36
Product Title: Seventh century material culture background.
Purpose of Product: To provide broad background to explain the seventh century material culture against which the Hoard has to be considered.
Composition: Comparative material from published sources etc.
Derived from: This document and ongoing relevant information gathered during the Analysis Project..
Allocated to: to be arranged
Format and Presentation: Word document.
Quality Criteria and Methods: Normal academic protocols see **14.11**.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager
Planned Completion date: 30th September 2016.

Product Number: 37
Product Title: Special deposits.
Purpose of Product: To provide the hoarding and special deposits background against which the Hoard has to be judged.
Composition: Comparative material from published sources etc.
Derived from: This document and ongoing relevant information gathered during the Analysis Project.
Allocated to: Colin Haselgrove, Peter Guest, Svant Fischer, Matthius Hardt.
Format and Presentation: Word document.
Quality Criteria and Methods: Normal academic see **14.11**.
Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)
Person/Group responsible for Approval: Project manager

Planned Completion date: 30:9:16 with the completion of the British background element subject to fund raising.

Product Number: 38

Product Title: Archive collation

Purpose of Product: To collect and document relevant information relating to original recovery of hoard in detectorist / fundraising stage.

Composition: Transcripts of interviews. Establishment of copyright ownership, negotiations with copyright owners etc.

Derived from: Records such as television programmes

Allocated to: t.b.a

Format and Presentation: Word files.

Quality Criteria and Methods: See 14.12.

Person/Group responsible for Quality Assurance: Project manager.

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2016. This product will only be carried out if the fund-raising is successful.

Product Number: 39

Product Title: Co-ordination of wear/workshop study

Purpose of Product: To plan for coherent final reports on wear, workshop practices etc.

Composition: Regular short meetings between principle team members responsible for these final reports timetabled for when CF is in Birmingham for the cataloguing and typology products. Email and telephone contact.. Project manager may attend.

Derived from: Products 7, 11-22.

Allocated to: Ellie Blakelock, Chris Fern Conservators 1 and 2.,

Format and Presentation: Notes from meetings in Word.

Quality Criteria and Methods: See 14.9iii.

Person/Group responsible for Quality Assurance: Project Manager

Person/Group responsible for Approval:

Planned Completion date: 31st December 2015.

Product Number: 40

Product Title: Reconstruction drawings

Purpose of Product: To produce black and white line illustrations to show elements would have been combined.

Composition: Discussions between Chris Fern and Ian Dennis to decide on details, production of c. 7-8 illustrations. Input from George Speake as appropriate.

Derived from: Products 11-22, 30 here.

Allocated to: Ian Dennis, Chris Fern.

Format and Presentation: Digital images suitable for web and letterpress publication.

Quality Criteria and Methods: See 14.9iv.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st December 2016. This product will only be carried out if the fund-raising is successful.

Product Number: 41

Product Title: Draft overviews wear workshop practice

Purpose of Product: To integrate information from different research strands relating to these topics for final report.

Composition: Collated information, decisions on format and choice of illustrations, draft report.

Derived from: Product 39 here

Allocated to: Chris Fern, Ellie Blakelock, (conservators if in post).

Format and Presentation: Word file

Quality Criteria and Methods: See 14.9iv.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project manager

Planned Completion date: 31/12/2016.

Product Number: 42

Product Title: Die-impressed sheet / helmets study

Purpose of Product: To integrate information relating to die-impressed sheets, helmet components etc. and produce report on the helmet component of the hoard.

Composition: Liaison between participants and production of report together with instructions for possible reconstruction.

Derived from: Products 4, 14, 17 and 30 here

Allocated to: Chris Fern, George Speake

Format and Presentation: Word file

Quality Criteria and Methods: See 14.9ii.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st August, 2016.

Product Number: 43

Product Title: Object overview

Purpose of Product: To produce synthetic overviews of the functional categories in the hoard

Composition: Essays on the military items, the religious items etc. including consideration of epigraphy Considerations of what is still unidentified.

Derived from: Products 7-19, 30 and 42 here.

Allocated to: Chris Fern, Leslie Webster with epigraphers.

Format and Presentation: Word document with choice of relevant illustrations

Quality Criteria and Methods: See 14.9iii

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st December 2016.

Product Number: 44.

Product Title: Animal art

Purpose of Product: Produce a synthetic overview of animal art

Composition: Meetings between participants, drafting and agreeing final report. Choosing illustrations for it.

Derived from: Products 7-18, 30 and 47 here.

Allocated to: Chris Fern and George Speake

Format and Presentation: Word file.

Quality Criteria and Methods: See 14.9iii.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager
Planned Completion date: 1st March 2017.

Product Number: 45.

Product Title: Filigree

Purpose of Product: Produce a synthetic overview of the filigree in the Hoard.

Composition: Meetings between participants, drafting and agreeing final report. Choosing illustrations for it.

Derived from: Products 7-19 here.

Allocated to: Chris Fern and Niamh Whitfield

Format and Presentation: Word file.

Quality Criteria and Methods: See 14.9iii.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 1st March 2017.

Product Number: 46

Product Title: Cloisonné

Purpose of Product: Produce a synthetic overview of the cloisonné in the Hoard

Composition: Meetings between participants, drafting and agreeing final report. Choosing illustrations for it.

Derived from: Products 7-19, 31-2 here.

Allocated to: Chris Fern with input from Hilary Cool and others if appropriate.

Format and Presentation: Word file.

Quality Criteria and Methods: See 14.9iii.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 1st March 2017.

Product Number: 47

Product Title: Animal art drawings

Purpose of Product: To produce the interpretive animal art drawing (other than those on the die-impressed sheets)

Composition: Drawings of the pieces with the views of the different elements separated out. .

Derived from: Products 7-19 here.

Allocated to: Chris Fern

Format and Presentation: Digital greyscale files suitable for letterpress and web publication

Quality Criteria and Methods: See 14.9iv.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 1st March 2017..

Product Number: 48

Product Title: Team meeting and seminar

Purpose of Product: To assess progress and fine tune final publication

Composition: One day seminar with presentations and discussions including an invited audience. Following day a meeting of team only to assess discussions and decide on any changes to the final part of the project that are necessary. Notes circulated afterwards.

Derived from: Products 1-47 here

Allocated to: Whole team and invited stakeholders (if fund-raising allows)

Format and Presentation: See under composition. Word file.

Quality Criteria and Methods: See 10.4.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 27th May 2016..

Product Number: 49

Product Title: Revisions of BM reports

Purpose of Product: To provide an opportunity for the reports produced in Stage 1 of the project at the British Museum to be revised if appropriate in the light of the typological etc research forthcoming from Stage 2.

Composition: Revised reports produced as part of Stage 1

Derived from: Products 13 and 14 of Stage 1 (see also Appendix 4 here) and Product 48 here.

Allocated to: Appropriate BM personnel.

Format and Presentation: Edited Word texts.

Quality Criteria and Methods: See 14.5iv, 14.8iii-iv.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW)

Person/Group responsible for Approval: Project Manager

Planned Completion date: 31st September 2016.

Product Number: 50

Product Title: Legacy.

Purpose of Product: To explore the impact the discovery of the Hoard has had on the owners and to compare that to what happened before.

Composition: Series of case studies (impact on museums; development of outreach of conservation; development of a Mercian identity and impact on tourism; comparison with what has gone before with such discoveries) with synthetic commentary.

Derived from: Section 4.1 of PD 2013, material in museums; Mercian trail records.

Allocated to: Museum personnel; Programme co-ordinator; Hilary Cool.

Format and Presentation: Word documents.

Quality Criteria and Methods: See 14.12

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW).

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2017.

Product Number: 51

Product Title: Select and mount illustrations

Purpose of Product: To double check that the appropriate illustrations occur in each section. To produce the combined figures using the photographs and the analytical line drawings.

Composition: List identifying which illustration should be in which part of the publication (if not already allocated). Mounted scaled figures

Derived from: Products 8, 26, 30, 40 and 47 here.

Allocated to: Chris Fern

Format and Presentation: Word document. Digital files suitable for use in letterpress and web.

Quality Criteria and Methods: See 14.9iv. 14.11

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW).

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st March 2017.

Product Number: 52

Product Title: Additional illustration

Purpose of Product: To produce distribution maps and any other line drawing needed for the publication to a uniform standard

Derived from: Products 33-7, 43-6.

Allocated to: Ian Dennis

Format and Presentation: .jpeg and .tiff files

Quality Criteria and Methods: See 14.11.

Person/Group responsible for Quality Assurance: Academic editors (CF, TD, LW).

Person/Group responsible for Approval: Project manager.

Planned Completion date: 31st December 2016.

Product Number: 53

Product Title: Academic editing.

Purpose of Product: To produce the final publication.

Composition: Introductions to sections and final conclusions.

Derived from: Product 1-52 and especially Product 3

Allocated to: Chris Fern, Tania Dickinson, Leslie Webster.

Format and Presentation: Word files.

Quality Criteria and Methods: see 14.13.

Person/Group responsible for Quality Assurance: Project Manager

Person/Group responsible for Approval: Project manager

Planned Completion date: 31st May 2017.

Product Number: 54

Product Title: Final check/submission

Purpose of Product: To collate files and submit.

Composition: Final read through, check all files are present, provide prelims to letterpress and digital text, submit to client.

Derived from: Products 1-53.

Allocated to: Project manager

Format and Presentation: Files in various formats loaded onto external hard drive

Quality Criteria and Methods: see 14.14

Person/Group responsible for Quality Assurance: Project Manager

Person/Group responsible for Approval: Project manager

Planned Completion date: 16th May 2017.

Product Number: 55

Product Title: RPAP

Purpose of Product: Advice to HMG and team as requested

Composition: Meetings four times during the life of Stage 2.

Derived from: Staffordshire Hoard Programme

Allocated to: RPAP

Format and Presentation: Minutes of meetings in Word for circulation to HMG.

Quality Criteria and Methods: Not applicable

Person/Group responsible for Quality Assurance: HMG

Person/Group responsible for Approval: HMG

Planned Completion date: 16th May 2017.

Appendix 10: Timetable for the production of the popular book

Jenni Butterworth

<p>Stage 1 Dec 2014- Mar 2015</p>	<p>Project management:</p> <ul style="list-style-type: none"> - establish detailed schedule in liaison with research project manager and owners. - establish copyright, IP, credit and liaison framework with the research project team. - gather publishing and design options. - establish detailed draft budget and liaise with development teams about this. - create detailed editorial brief for the book - submit preliminary proposal to EH regarding publication grant.
<p>Stage 2 Apr 2015- Jul 2015</p>	<p>Project management:</p> <ul style="list-style-type: none"> - HMG to finalise decisions about budget, personnel, publisher etc. <p>Photography:</p> <ul style="list-style-type: none"> - Capture research activities to create original images for book, namely conservation, science analysis, silver sheet grouping. This is a time-critical window. - Conduct audit of owners' hoard images, identify possible targets likely to require new photography (e.g. joined items).
<p>Stage 3 Aug 2015- Oct 2015</p>	<p>Production:</p> <ul style="list-style-type: none"> - Production of draft manuscript
<p>Stage 4 Nov 2015- Dec 2015</p>	<p>Review:</p> <ul style="list-style-type: none"> - To research project team, RPAP, owners for review - EH referee process?
<p>Stage 5 Jan 2016- Mar 2016</p>	<p>Publication of book?</p>