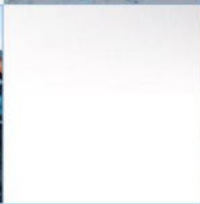
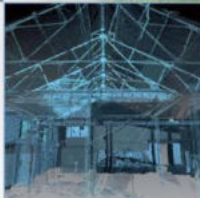
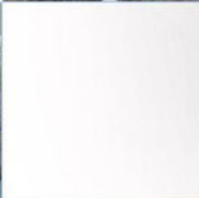
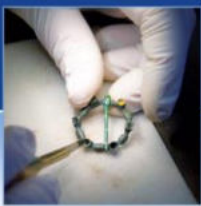


# RAF Skaw, (SM13097), Unst: Ground Investigation Works Written Scheme of Investigation

June 2020

AOC Project No. 24277



ARCHAEOLOGY

HERITAGE

CONSERVATION

# RAF Skaw, Scheduled Monument (SM13097), Unst: Ground Investigation Works Written Scheme of Investigation

On Behalf of: Shetland Space Centre

National Grid Reference (NGR): HP 66630 15405

AOC Project No: 24277

Scheduled Monument: SM13097

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Date: June 2020

This document has been prepared in accordance with AOC standard operating procedures.

Author: Lisa Bird Date: June 2020

Approved by: Vicky Oleksy Date: June 2020

Draft/Final Report Stage: Draft Date: June 2020

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## 1 INTRODUCTION

- 1.1 A programme of ground investigation works comprised of peat probing and machine dug trial pits is required to inform the design of the Launch Site for the proposed Shetland Space Centre in Unst. The proposed Launch Site is located in the southern portion of Scheduled Area of Skaw, radar station (SM13097- Figure 1). The southern area of the Scheduled Skaw, radar station includes the remains of the northern most 1940-1945 RAF radar transmission base, including domestic and functional structures, as well as the remains of defensive buildings and bomb craters.
- 1.2 This *Written Scheme of Investigation* is to support the application for Scheduled Monument Consent (SMC) for the Ground Investigation works within the southern portion of Scheduled area of Skaw, radar station (SM13097).
- 1.3 Whilst the redline boundary for the proposed Shetland Space Centre (see Figure 1) also crosses the Scheduled Monument of Inner Skaw (SM7664). No ground investigation (peat probes and test pits) works are proposed within the Inner Skaw Scheduled Monument (Figure 2).
- 1.4 The programme of archaeological works required is in keeping with best practice outlined in current planning policy and guidelines: *Scottish Planning Policy (2014)* & *PAN 2/2011 Planning and Archaeology (2011)* and ClfA Standards and Guidance. It is also in keeping with current policy and guidelines on the historic environment: *Historic Environment Policy for Scotland (2019)*. The programme of works have also been designed in relation to the Scheduled Monument Consents Policy (HES 2019b), in particular SMP1, SMCP1 and SMCP4.
- 1.5 This *Written Scheme of Investigation* (WSI) details how the requirements of the archaeological works will be met. An archaeologist and UXO specialist will be present for all peat probes and the excavation of all test pits. The first part of this WSI details the history of the Scheduled Monument; and the second part then details the peat probing works and the machine test pitting. It also details the requirements of any recording and reporting of discovered archaeological remains if appropriate.
- 1.5 This WSI is accompanied by Figures, Plates and Appendices detailed below:
- Figure 1: Site Location Plan
  - Figure 2: Plan of Ground Investigation Works showing heritage assets (East)
  - Figure 3: Plan of Ground Investigation Works showing heritage assets West)
  - Plate 1: View of the external blast wall of the ACH Transmitter (Site 96) (From Carle, 2018a)
  - Plate 2: View of the external blast wall of the ACH Receiver (Site 99) (From Carle, 2018a)

- Plate 3: View of the external blast wall of the ACH Generator (Site 98) (From Carle, 2018a)
- Plate 4: View of the surviving remains of one of the original 90' Towers (Site 97) within the ACH area (Carle, 2018a)
- Plate 5: View of two bomb craters (Site 110) to Site 85 (CH Transmission Block); Site 111 (CH Receiver Block) and Site 96 (ACH Transmission Hut) (From Carle, 2018b)
- Appendix 1: Skaw, radar station Gazetteer
- Appendices 2-28: AOC Archaeology Group's operating procedures and standards.

## 2 PROJECT BACKGROUND

### 2.1 Site Location

2.1.1 The Site is located largely within the southern portion of the Scheduled area of Skaw, radar station (SM13097- Figure 1). The Site is proposed to be the location of the Launch Site associated with the proposed Shetland Space Centre. This WSI has been produced as a supporting document to the SMC application for the proposed ground investigation works including peat probes and the excavation of test pits. These ground investigation works are required on the Site to inform the design and layout of the proposed Shetland Space Centre Launch Site. The results of the ground investigation works will also inform the assessment of impacts to be undertaken as part of the Environmental Impact Assessment Report for the overall planning application. The proposal for the construction of the Launch Site and any archaeological mitigation would be the subject of a further application for SMC which would be supported by an additional WSI.

2.1.2 The location of the peat probes and test pits are shown on Figures 2 & 3. The extent of known remains and the point data for known heritage assets are also plotted on Figures 2 & 3. Proposed peat probes and the location of test pits works have been designed with a 5m buffer from all known heritage assets to ensure that these works do not disturb the Scheduled remains or any known archaeological remains.

2.1.3 Whilst the redline boundary (Figure 1) extends within the Scheduled Monument of Inner Skaw (SM7664), no peat probes or test pits are currently proposed within that Scheduled Monument. No machines or vehicles will track through Inner Skaw (SM766) and the onsite archaeologist will guarantee that there is no accidental incursion into that area.

### 2.2 Archaeological Background

2.2.1. The heritage assets within the Scheduled area of Skaw, radar station (SM13097) discussed in the text below are detailed in Appendix 1: RAF Skaw Gazetteer and are shown on Figures 2 & 3. The Site Gazetteer (Appendix 1) has been compiled using designated heritage assets data

downloaded from Historic Environment Scotland (HES); non-designated heritage asset data stored on Pastmap (<https://pastmap.org.uk/>) and Canmore (<https://canmore.org.uk/>), hosted by HES; historic aerial photography held by the National Collection of Aerial Photography (NCAP) (online only), hosted by HES; historical maps held by the National Library of Scotland (online only) (<https://maps.nls.uk/>); a Historic Environment Record extract, including the surveyed extent of known heritage assets within the southern area of Skaw, radar station (SM13097) provided by Shetland Amenity Trust (SAT), archaeological advisors to Shetland Islands Council; and information and plans taken from a research blog by Gordon Carle, entitled The History of Saxa Vord (A History of RAF Skaw- Parts 1-3, uploaded 2018). Due to Covid-10 restrictions, any archival material which may be pertinent to the RAF Skaw Scheduled Monument (SM13097) held by Shetland Archive Collections, at Shetland Museum and Archives was not consulted.

2.2.2. The proposed peat probes and test pits are located within the southern area of the Skaw, radar station Scheduled Monument (SM13097-Figure 1). Skaw, radar station, including the northern area of the monument beyond the Site boundary, was Scheduled in 2012. The Scheduled area includes the remains of at least 50 structures associated with the northernmost radar station in the British Isles. RAF Skaw is described briefly at the start of the Scheduling document as:

*“... the remains of a Second World War Chain Home radar station. The station is spread over two sites, a main [the proposed Launch Site] and a reserve site, with over 50 buildings and structures reflecting its core early warning function and with supporting infrastructure and domestic blocks. The radar complex is the furthest north of its type in the United Kingdom. It is located on rough grazing land over two headlands (Lamba Ness and Blue Jibs) at the northeast corner of Unst.*

*This extensive complex includes a variety of concrete and brick buildings and structures, some of which are heavily protected with blast walls. The site includes four key elements: buildings and structures for signal receiving and transmitting; defensive structures built to protect the complex; supporting infrastructure to service the radar function; and domestic buildings to house the military personnel stationed here...The main complex covers an area of Lamba Ness approximately 1800m long by 450m wide...*

*The area to be scheduled comprises two irregular-shaped polygons and includes the remains described above and an area around them within which evidence relating to the monument's construction, use and abandonment may survive, as shown in red on the accompanying map. Specifically excluded from the scheduled area are the above-ground elements of a modern transmission mast, its anchor points, cabling and cable channelling and associated maintenance cabin, the above-ground elements of an electricity transmission line and its anchor points, the above-ground elements of all modern farm buildings, the above-ground elements of a small building to the immediate north of the building known as 'the engine house', all modern boundary features not associated with the original function of the site, all*

*cattle grids, the above-ground elements of interpretative signage and the uppermost surface of the metalled access track, to allow for their maintenance.” (HES, 2012)*

- 2.2.3. The Statement of Significance for the Scheduling notes that the Skaw, radar station is a “*remarkably well preserved military complex dating to the early 1940’s*” whose remains provide a “*coherent*” physical monument of a largely intact military complex which can be readily understood by visitors.
- 2.2.4. A visit by HES to the Scheduled Monument (SM13097) in 2014 described the upstanding remains in the southern area as in generally stable condition with localised problems, including concrete cracking and decaying; iron corrosion; and ground level change caused by sheep waste.
- 2.2.5. The location for Skaw, radar station (SM13097) was chosen by the RAF for its strategic position, height, its unrestricted radar range and the fact that steep cliffs could protect the radar station from a landing attack by sea. However, the location was also vulnerable to air attack. In total 15000 tonnes of construction materials and equipment were carried to Skaw for the radar station and associated accommodations and defensive structures (HES & HSC, n.d.). This was facilitated by the widening, lengthening and improvement of a road historically known as The Floggie, which extended from Norwick to the south and which was the only close sea landing location (Carle, 2018a).
- 2.2.6. The earliest portion of the Skaw, radar station remains within the Scheduled Monument are located in the eastern most area of the Lamba Ness peninsula, which was the location for the Advance Chain Home (ACH) transmitter and receiver (centred at Site 95; individual elements of the ACH are centred at Sites 96-100 & 111) (Figure 3). These structures were constructed between January 1941 and 17<sup>th</sup> May 1942 (Carle, 2018a), with the equipment becoming operational in January 1941 and being used 24 hours a day thereafter (Carle, 2018b). Recent imagery of the building remains, mainly the blast walls of the ACH Transmitter (Site 96) and ACH Receiver (Site 99) indicate that the blast walls survive almost intact (Plates 1 & 2). The blast wall remains of the ACH generator (Site 98) were damaged by a historical fire, however the surviving walls appear to survive to about 20 courses of brick in height in places (Plate 3). The remains of the original two transmission towers were also recently photographed (Plate 4).



Plate 1: View of the external blast wall of the ACH Transmitter (Site 96) (From Carle, 2018a)



Plate 2: View of the external blast wall of the ACH Receiver (Site 99) (From Carle, 2018a)



Plate 3: View of the external blast wall of the ACH Generator (Site 98) (From Carle, 2018a)



Plate 4: View of the surviving remains of one of the original 90' Towers (Site 97) within the ACH area (Carle, 2018a)

- 2.2.7. There are two domestic areas within the Skaw, radar station, the earlier is thought to be recorded within the centre of the Site, towards the southern boundary of the Scheduled area, and is centred on Site 83 (individual elements Sites 105-109). This domestic area (Site 83) is generally believed (Carle, 2018a) to have provided accommodation to those deployed to the ACH site (Site 95). Another domestic site is centred at Site 69 (individual elements Sites 118-138) by the RAF Camp Gate (Site 104), towards the western boundary of the Scheduled area. A bomb crater (Site 117), caused by a bomb which was dropped on the 15<sup>th</sup> October 1941, and is thought to have bounced over the domestic buildings prior to explosion, is recorded to the south of this domestic area. This indicates that the domestic area centred at Site 69 was constructed prior to October 1941. Site 69 is thought to have originally housed civilian construction workers who were deployed to RAF Skaw from 1940 to construct the ACH and later the larger radar station (Carle, 2018a).
- 2.2.8. Whilst the ACH station was operational, work began on the Chain Home (CH) station, centred in the centre of the Scheduled Monument. The receiver towers of the CH were about three times as tall than the ACH towers and the CH Transmission tower about four times taller (Carle, 2018a). The remains of the CH towers are centred on Sites 102, 103, 111 and 144. As the RAF radar station developed, buildings associated with the CH station were built (Sites 84-87, 93, 102, 103, 111 & 144- Plate 5) as were defensive structures such as air raid shelters, gun emplacements and guard huts and extra accommodation buildings (Sites 61, 70, 71, 72, 74, 76-78, 80-82, 84, 88-90, 92, 94, 101, 114-116, 139, 142 & 145). Three bomb craters have also been identified (Sites 110 & 141) within the Scheduled area. The CH radar was commissioned on the 17<sup>th</sup> May 1941 and replaced the ACH radar as the radar station at RAF Skaw (Carle, 2018b), however the fully operational CH radar was not completed until 17<sup>th</sup> May 1942 (Carle, 2018c).

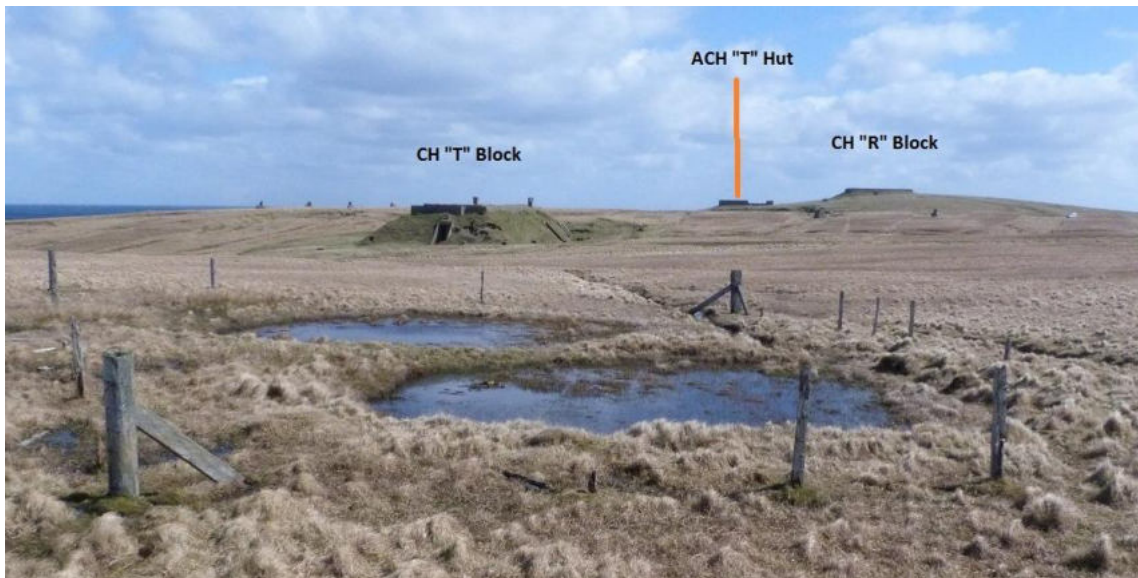


Plate 5: View of two bomb craters (Site 110) to Site 85 (CH Transmission Block); Site 111 (CH Receiver Block) and Site 96 (ACH Transmission Hut) (From Carle, 2018b)

- 2.2.9. By January 1944 parts of the radar station at Skaw had begun to be dismantled (Carle, 2018c). The ACH Transmitter (Site 96) and Receiver (Site 99) and the two wooden towers (Sites 97 & 100) were dismantled by the 10th April 1944 (Carle, 2018c) leaving the blast walls seen in Plates 1 & 2. RAF Skaw was ordered to stop reporting on 4<sup>th</sup> August 1945 and the transmitters were dismantled from August 1945 onwards (Carle, 2018c). During demolition one of the 107m transmitter masts crashed on top of a transmitter block (HES & HSC, n.d.). This transmitter block would only survive at the foundation level.
- 2.2.10. The Scheduled area of Inner Skaw (SM7664) overlaps with the centre, northern boundary of the Scheduled Area of RAF Skaw. Inner Skaw (SM7664) includes the remains of a series of farmhouses which are thought to date from the Norse period onwards. Individual elements (Site 25), within the Scheduled Monument which likely relate to the surviving remains of structures drawn on the 1882 Ordnance Survey map, surveyed by the SAT in 2017, extend within the Scheduled Area of Skaw, radar station (SM13097).
- 2.2.11. Other remains within the Scheduled Monument, not associated with the Second World War RAF radar station include a quarry of unknown date (Site 62) which is not recorded on historic mapping; a cairn (Site 9) recorded in 1878 of which no upstanding remains have been identified in the 20<sup>th</sup> century; the discovery area of a midden found in 2001 which contained pottery, steatite vessel fragments and stone tools (Site 48); and the centre point of a steam trawler (Site 22) lost at sea in 1936. The first edition Ordnance Survey map records an unroofed structure (Site 36) and an enclosure (Site 35) in the western area of the Scheduled Monument. The residential structure known as Priest House (Site 61) also pre-dates the RAF remains. The Priest family are thought to have inhabited the house from at least 1885 until the Second World War when the structure was requisitioned (Carle, 2018a).
- 2.2.12. Historic mapping records very few details about the Site prior to the first edition Ordnance Survey (OS) in 1882, which indicates that the area was not densely settled in the 19<sup>th</sup> century.

However, buildings and unroofed structures are documented within the Site and within the wider area to the south. A decrease in population in the 19<sup>th</sup> century has been attributed to a crop failure in the early 1800's and the collapse of the herring industry in the early 20<sup>th</sup> century (Mouat & Barclay, 1793 & Ingram & Ingram, 1845). Annotations on the OS map of 1882, within the Scheduled Monument from east to west include; *Inner Skaw, The Neaps, The Garths, Lock Lambaness* and *Geo of Shinnahang*. The first three probably refer to land ownership, whilst the last two are names of geographical features. Pre- Second World War OS mapping does not record any further information about the area.

### 3 OBJECTIVES

3.1 The objectives of the archaeological works are:

- i) to monitor peat probing works ensuring that they do not encroach upon known archaeological features or remains;
- ii) to monitor c. 48 machine dug test pits ensuring that they do not encroach upon known archaeological features or remains and stopping works if archaeological remains are encountered.
- iii) to ensure archaeological remains are left in situ and are not damaged by peat probes (as far as possible) and test pits;
- iv) to ensure that any peat probes or test pits do not extend into the Scheduled Monument of Inner Skaw (SM7664);
- v) to advise and implement an appropriate form of mitigation, formulated with the approval of HES, if significant archaeological remains are encountered.

### 4 PROGRAMME OF ARCHAEOLOGICAL WORKS

#### 4.1 Introduction

4.1.1 The details of the archaeological works, laid out below, are designed to support the application for the Scheduled Monument Consent (SMC) for ground investigation works, including peat probes and test pits within Skaw, radar station (SM13097). The ground investigation works are required to inform the final design for the Launch Site associated with the proposed Shetland Space Centre. The archaeological works will comprise a watching brief on all peat probing and machine dug test pit.

#### 4.2 Peat Probing

- 4.2.1 Peat probes are proposed on each of the proposed launch pad sites, at the proposed satellite track station area and at the proposed assembly and storage area in the east of the Site along proposed access roads. The probes would be laid out in a c. 25m grid. Probing would also take place in the centre and either side of the new and existing access track at 25m intervals; (Figures 1-3).
- 4.2.2 Peat probing will be undertaken partly using simple, hand driven probes and partly using Russian probes. Russian probes are slightly larger and have the potential to disturb sediment around the probe. As such Russian cores will not be located within 5m of known archaeological sites, or archaeological remains identified by the on site archaeologist.
- 4.2.3 Russian probes enable the collection of small cores. The on site archaeologist will review the cores on site and note any evidence of buried land surfaces and the potential for environmental proxies. In the case of either being observed, samples will be taken for further analysis.
- 4.2.4 Existing access tracks will be used for access. The location of the peat probes have been designed to avoid all known heritage assets. Due to the nature of the Scheduled Monument, peat probing works are unlikely to cause physical damage to the upstanding and foundations remains of the Second World War RAF base.

### **4.3 Test Pits**

- 4.3.1 The location of the test pits are not fixed and may be subject to change following the results of peat probing investigations. The test pits proposed for this WSI have been located away from known heritage assets.
- 4.3.2 A watching brief will be undertaken on all test pits within the Scheduled Monument (SM13097). Test pits are to be machine excavated with a tracked JCB, using a toothless ditching bucket. There is an allowance for 48 test pits. Initial test pit locations include the launch pad sites; along existing and new access tracks; in the satellite tracking area; and in the assembly and storage area. Test pits are proposed to be an average of 1m wide x 2m long.
- 4.3.3 Where archaeological remains are encountered the test pit will be abandoned and moved in consultation with a Site Investigation (SI) Engineer and the archaeologist on site.
- 4.3.3 Existing access tracks will be used for access. Due to the nature of the Scheduled Monument and the design of the test pit locations, these works are unlikely to cause physical damage to the upstanding, foundation and buried remains of a Second World War RAF base.

4.3.7 Test pits will be halted where archaeological remains are encountered. The archaeological remains will be cleaned in so far as they may be characterised, and a record made of the location, extent and character of the archaeology. Archaeological remains will be left in situ.

4.3.8 Should human remains be unearthed, then these will be left *in situ*, covered and protected. HES, SAT and the local police will be informed immediately. No removal of bone will be undertaken.

#### 4.4 Reporting

4.4.1 Within three weeks of the completion of on-site works the results will be presented to the client in the form of a written report for distribution to HES.

4.4.2 The report will synthesise the results of the watching brief and advise on the significance and extent of any archaeological features identified and any archaeological constraints for the design of the proposed Shetland Space Centre.

4.4.3 The report will take the form of a Data Structure Report (4 copies), prepared in accordance with current standard HES procedural requirements and AOC Archaeology standard procedures (Appendix 9). Specifically, the Data Structure Report will contain the following:

- i) a full descriptive text detailing the features identified and an interpretation of their date and purpose;
- ii) a location map plan of the Site within its landscape at a scale of at least 1:10,000;
- iii) plans and elevations at an appropriate scale showing peat probing and test pit areas and features located;
- iv) appropriate lists and diagrams summarising the contexts and artefacts identified and the records made of them;
- v) analysis of the results of the works, including appropriate post-excavation appraisals;
- vi) a constraints map and strategy to mitigate the impact of the development on any archaeological deposits revealed during the watching brief.

4.4.4 The results will also be reported using the OASIS and ASPIRE digital reporting protocols. In addition, a Summary Report on the works and its findings will be submitted to *Discovery and Excavation in Scotland*.

4.4.5 AOC will also supply alongside the digital copies of the report a GIS shapefile of the archaeological event for the local HER. The shapefile shall cover the intervention area rather than the whole development site.

#### 4.5 Mitigation and Post-Excavation Analysis

- 4.5.1 Should HES require further works, or the location of test pits are moved prior to the beginning of works a '*Written Scheme of Investigation Addendum*' will be prepared for submission and approval by HES.
- 4.5.2 It is proposed that any archaeological remains encountered will be left in situ. Archaeological remains encountered will be added to a heritage constraints map which will form part of the constraints mapping for the final design and layout for the proposed Shetland Space Centre.
- 4.5.3 Following any works where significant archaeology has been discovered there may be a requirement for further post-excavation analysis and/or publication. In such a case then a '*Post Excavation Research Design*' (PERD) will be produced within 3 months of approval of the '*Data Structure Report*' by HES and any final publication, if required, will be produced within one year of the agreement and approval of the PERD. All material, should it be the case that the development does not continue in a funding capacity for these works, will be stored and dealt with adequately as per AOC's standard operating procedures (see Appendices). All mitigation and post-excavation analyses costs are to be borne by the client.

#### **4.6 Archive Deposition**

- 4.6.1 The archive from these works will be prepared for deposition in the National Record of the Historic Environment within 6 months of the completion of all archaeological works.
- 4.6.2 The disposal of small finds will be conducted according to the standard procedure, detailed in Appendix 7.27.

#### **4.7 Timetable**

- 4.7.1 HES and the archaeologists at SAT, archaeological advisors to Shetland Islands Council, will be informed of the precise schedule of watching brief works as soon as they become known.

### **5 OPERATIONAL FACTORS**

#### **5.1 Monitoring**

- 5.1.1 AOC Archaeology Group will liaise with HES at all times to ensure they are aware of fieldwork dates, of any changes to peat probes and/or test pits and can schedule monitoring visits. A mobile phone will be present on site at all times.
- 5.1.2 AOC Archaeology Group will also liaise with the Archaeologists at SAT, archaeological advisors to Shetland Islands Council to ensure they are aware of fieldwork dates and can schedule monitoring visits if necessary.

## 5.2 Health & Safety

5.2.1 AOC Archaeology has always maintained high standards on-site and a copy of our Health & Safety policy can be supplied on request. The Project Officer will prepare appropriate documentation, including a Risk Assessment, for inclusion in the site's Health & Safety Plan. This will include a Site Specific RAMS as well as a Covid-19 Specific RAMS.

5.2.2 In the event that the peat probes and/or test pits are carried out during restrictions associated with the 2020 CoVid-19 outbreak, the Risk Assessment will detail measures taken to prevent infection and contamination:

- The maximum number of people that will be on Site at any one time.
- How welfare facilities will be used (ie staggering lunch and tea breaks, staggering start/end time etc.).
- How travel to and from site will occur.
- Regular cleaning of shared equipment and welfare facilities.
- Follow all RAMS (AOC's and main client's etc).
- Avoid contact with standing water at all times.
- Wear gloves.
- Always wash hands before eating/drinking/smoking.
- Keep canteen/welfare areas clean.
- Avoid unnecessary contact with eyes, mouth and nose using dirty hands.
- Immediately wash and dress all cuts and skin abrasions.
- Seek medical attention as per the guidelines above.
- Understand it is the responsibility of each staff member to ensure compliance with the control measures.

5.2.3 Best practice on 2m stand-off will be applied, including:

- Ensure RAMS are adequate for site conditions.

- Tool box talk to be issued each day with updates
- Ensure the Welfare is adequate for the number of staff on site;
- Ensure Welfare is clean and tidy. Welfare should be cleaned before and after each use
- Welfare- Breaks to be staggered to ensure 2 m stand-off is maintained.
- Do not congregate on site. Maintain distance at all times.
- Use telephones to contact folk, rather than close contact
- Action for Site Managers-Ensure continued competent resource is available to implement the requirements of the AOC Coronavirus update document

5.2.4 Cleaning procedures that should be in place across the site, particularly in communal areas and at touch points include:

- Taps and washing facilities
- Toilet flush and seats
- Door handles and push plates
- Hand rails on staircases and corridors
- Lift and hoist controls
- Machinery and equipment controls
- Food preparation and eating surfaces
- Telephone equipment

### **5.3 Project Team and facilities**

5.3.1 Victoria Oleksy MCIfA, Assistant Director (Consultancy), will manage the project.

5.3.2 Any resultant post-excavation analyses or conservation would be conducted by AOC Archaeology's in-house specialists and supervised by Dr Ciara Clarke MCIfA who specialises

in palaeoenvironmental issues (Appendices 24 & 25) and/or Ms Gretel Evans, Conservation Sector Manager (Appendix 26).

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

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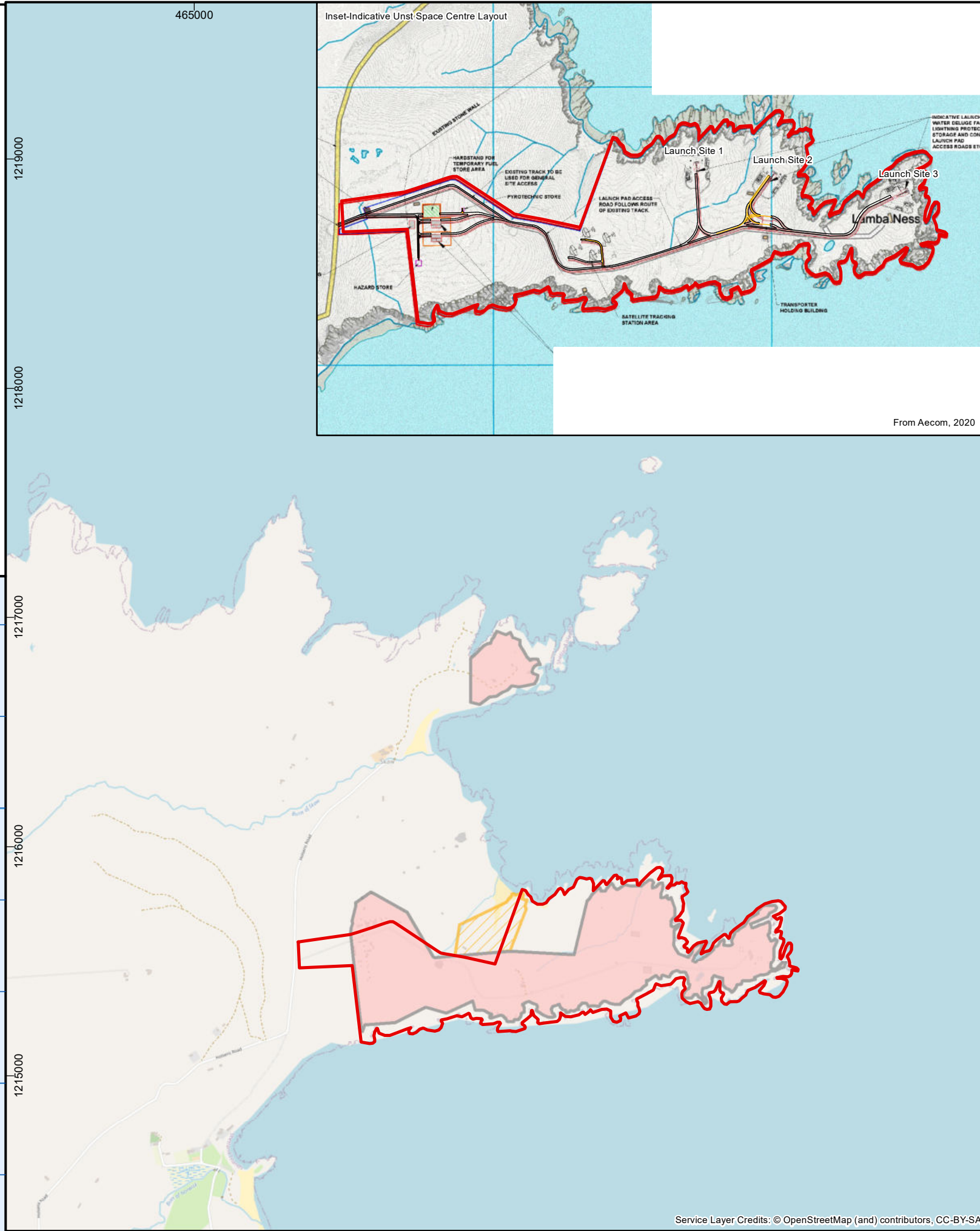
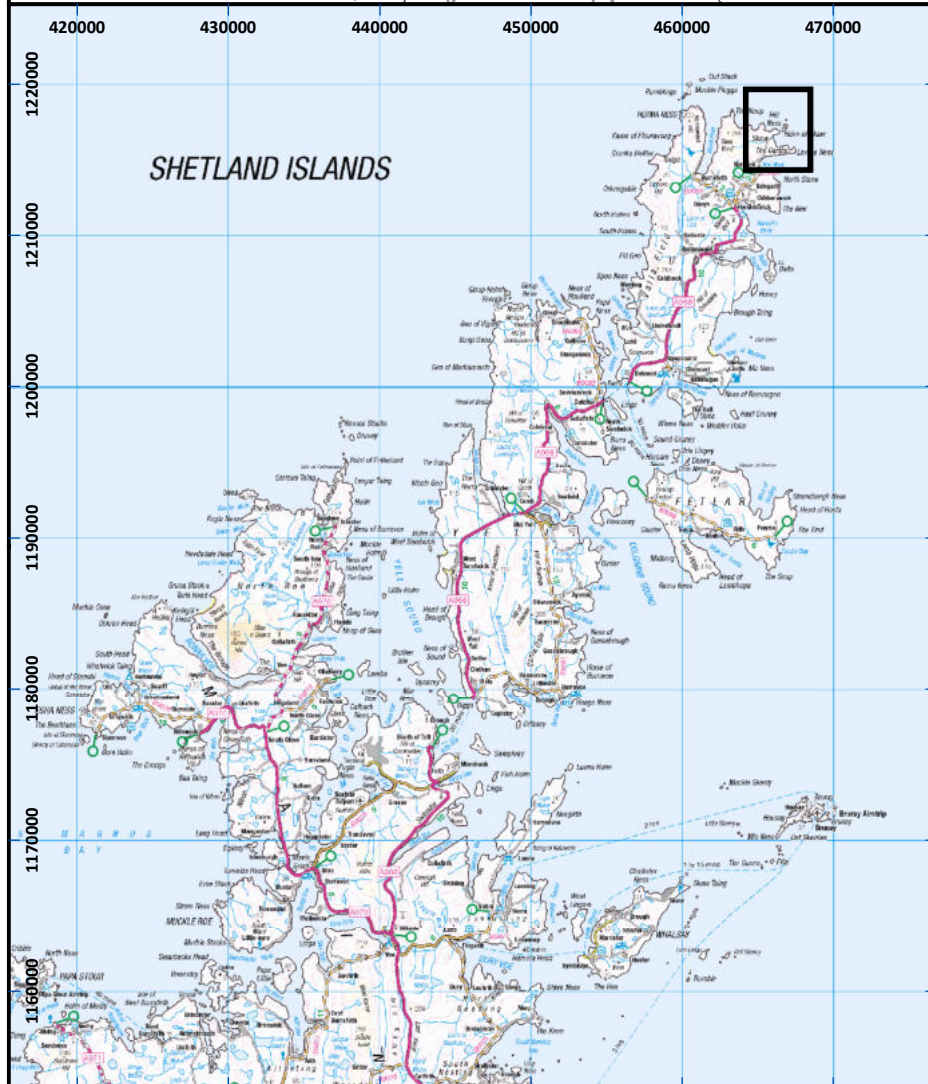
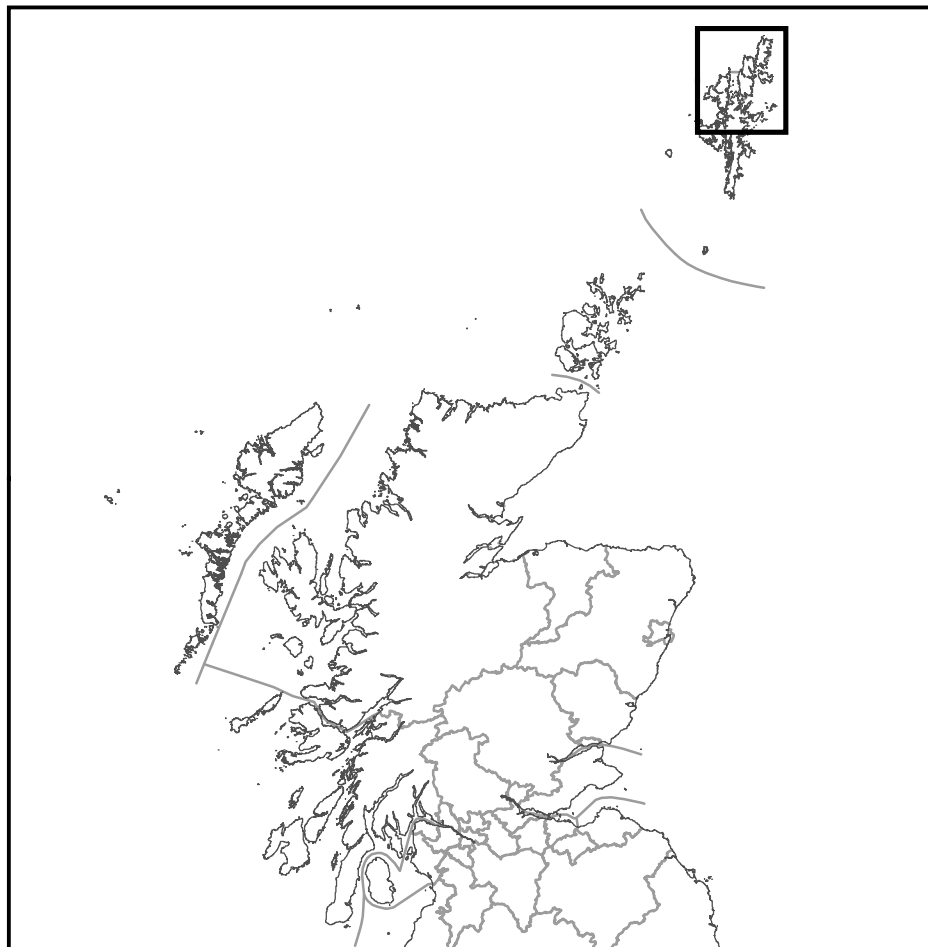


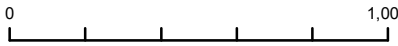
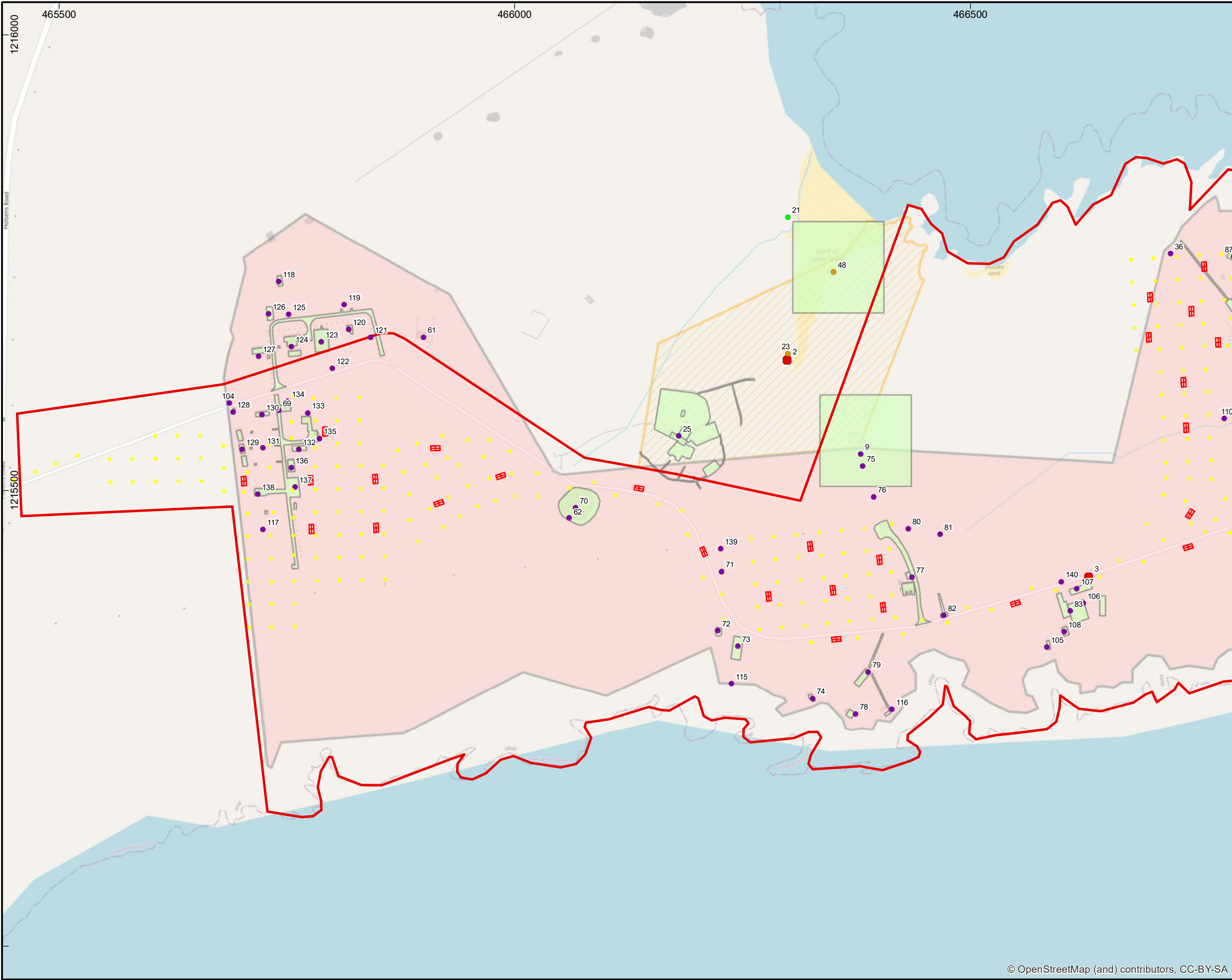


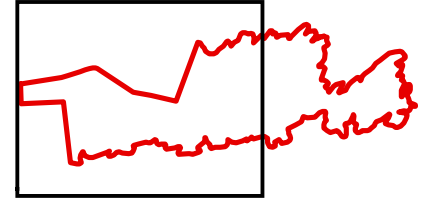
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Site Location Plan- with inset of Indicative Proposed Development plan	
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FOR Shetland Space Centre	
Drawn/checked:	LB/SO
DWG no:	01/24277/WSI/01/01
AOC Project No.:	24277
 (C) AOC Archaeology Group 2020	
	
SYSTEM Coordinate System: British National Grid Projection: Transverse Mercator Datum: OSGB 1936	
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Plan of Ground Investigation works (west) showing heritage assets

- Legend
- Site Boundary
  - Skaw, radar station Scheduled Monument
  - Inner Skaw Scheduled Monument
  - Known heritage asset extent
  - Scheduled Monument (centre point)
  - Distinct feature within Scheduled Area
  - Distinct feature within Inner Skaw Scheduled Area
  - Non-designated asset
  - Peat Probe
  - Trial Pit



FOR  
Shetland Space Centre

Drawn/checked:	LB/SO
DWG no:	01/24277WSI/02/01
AOC Project No.:	24277

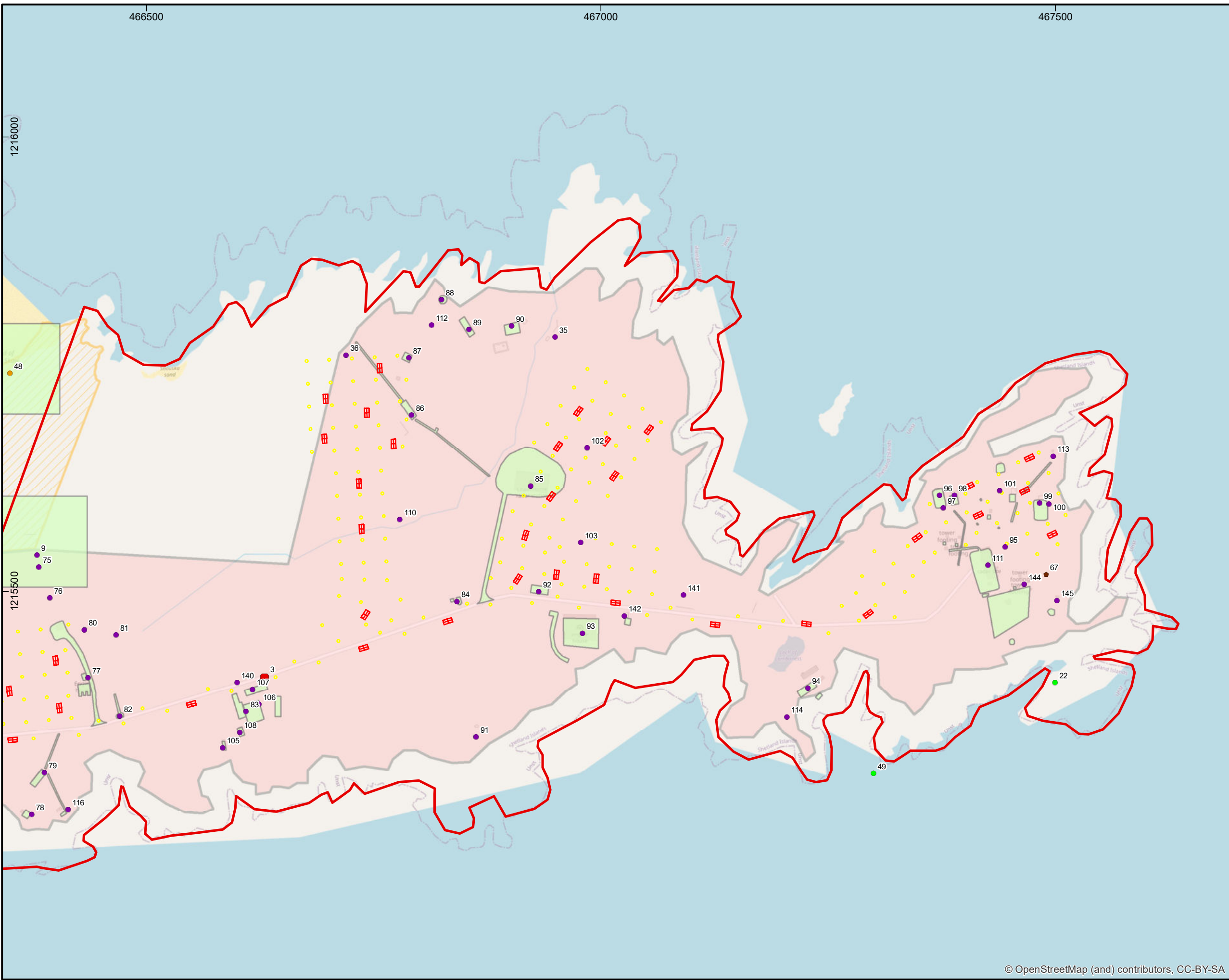


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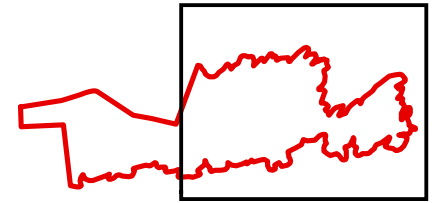


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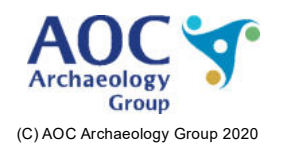
Plan of Ground Investigation works (east) showing heritage assets

- Legend
- ▭ Site Boundary
  - Skaw, radar station Scheduled Monument
  - Inner Skaw Scheduled Monument
  - Known heritage asset extent
  - ▭ Scheduled Monument (centre point)
  - Distinct feature within Scheduled Area
  - Distinct feature within Inner Skaw Scheduled Area
  - Non-designated asset
  - Event
  - Peat Probe
  - Trial Pit



FOR  
Shetland Space Centre

Drawn/checked:	LB/SO
DWG no:	01/23555/DBA/02/01
AOC Project No.:	24277



SYSTEM  
Coordinate System: British National Grid  
Projection: Transverse Mercator  
Datum: OSGB 1936

SCALE 1:4,000 @ A3



## APPENDIX 2

### Desk-top assessment

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

## APPENDIX 3

### Geophysical survey

- 2.1 All geophysical survey work will be sub-contracted to an appropriate professional organisation but directly managed by AOC Archaeology.
- 2.2 Selection of techniques will be made in consultation with the survey organisation taking into account land use, geology, complicating factors (eg metal pipes and fences), known and/or suspected archaeology.
- 2.3 The report will contain background information on the site (as above) and a description of any anomalies located. An interpretation of the anomalies will also be given.
- 2.4 At least one plot of the data will be included, normally of dot density or grey scale type. Any enhancement of the image will be explicitly stated and the likely affect of the processing described.
- 2.5 Clear interpretative plans will be provided in a form that a non-technical reader can understand.
- 2.6 Plots and interpretative diagrams will be reproduced at a scale from which exact measurements can be taken. These will normally be 1:1000 for detailed survey and 1:2500 for other plans.
- 2.7 The basic computerised data will form part of the site archive.

## APPENDIX 4

### Surface collection survey (fieldwalking)

- 3.1 This type of survey will only be carried out in suitable ground visibility conditions. This effectively restricts the technique to arable land which has been ploughed, harrowed and left to weather for several weeks in autumn to early spring.
- 3.2 The collection grid will align with the Ordnance Survey grid unless surveying for a linear scheme when the transects will be parallel to the centre of the scheme. The grid will be established using measured survey techniques.
- 3.3 The spacing of transects and length of collection units will be as specified in the main part of the Written Scheme of Investigation. Each transect will be 2m wide. Collection units will be logged using a numeric 12 figure National Grid Reference which will identify the southern end of the unit.
- 3.4 Transects will be measured cumulatively on the ground using fixed-length strings to avoid variation in individual pace. Sighting poles will be placed at opposite ends of the land parcel to mark transects.
- 3.5 All material considered to be man-made or not local to the area will be collected and recorded by the individual collection unit. The exception to this is where dense concentrations of building material are present when a representative sample is retained per collection unit.
- 3.6 Stone scatters, areas of soil discolouration and outcrops of natural substrata will be recorded and plotted by stint.
- 3.7 Pro-forma sheets will be used to record details of walker, soil/crop conditions, slope/topography, and lighting/weather conditions for each transect and presence/absence of finds for each collection unit.
- 3.8 Finds will be washed and sorted into groups in order to facilitate identification. Finds will be bagged according to artefact class within each collection unit.
- 3.9 Finds will be identified, quantified and recorded directly on to computer. The results will be plotted using a CAD graphics programme.
- 3.10 All significant artefact distributions will be plotted by field, group of fields or appropriate length for a linear scheme, at 1:2500, with separate plans for each period or relevant subdivision, indicating the numbers of artefacts per stint.
- 3.11 The pottery and other relevant artefacts will be scanned to assess the date range of the assemblage.
- 3.12 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum or other body. These will be cleaned, conserved, bagged and boxed in accordance with the guidelines set out in UKIC's "*Conservation Guidelines No 2*".

## APPENDIX 5

### Earthwork surveys

- 4.1 Base points will be established using a Total Station.
- 4.2 Hachured plans will normally be prepared at 1:1250 or 1:2500 for most classes of earthwork. In certain cases more detailed survey by contouring will be carried out.
- 4.3 Appropriately experienced personnel will undertake the survey work.
- 4.4 All prepared plans will be presented with an accompanying descriptive text.

## APPENDIX 6

### Walkover Survey

- 5.1 The proposed study area will be walked over in a systematic manner. Approximately 30m wide transects will be used, although this can be reduced where conditions demand.
- 5.2 All features identified (including modern features) will be given a unique number. The location of each feature will be marked on a 1:10,000 map. A photographic and written record will be compiled.

## APPENDIX 7

### Test pits

- 6.1 Spacing and size of test pits will vary according to local topography, geology, and known or potential archaeology. Spacing and size will be as specified in the Written Scheme of Investigation.
- 6.2 Test pits will be laid out in relation to the Ordnance Survey national grid.
- 6.3 The most appropriate tools will be used taking into account the prevailing conditions at the time of the work.
- 6.4 A specified volume of topsoil from each test pit will be sieved through a 10mm mesh.
- 6.5 Conditions, contexts and artefact totals will be recorded on pro-forma sheets.
- 6.6 Subdivisions within the excavated material will be based on soil stratigraphy and spits of 100mm within each stratigraphical unit.
- 6.7 All artefact totals will be recorded by class.
- 6.8 Finds will be washed and sorted into groups in order to facilitate identification. Finds will be bagged according to artefact class within each collection unit.
- 6.9 Finds will be identified, quantified and recorded directly onto computer where appropriate. The results will be plotted using a CAD graphics programme when appropriate.
- 6.10 All significant artefact distributions will be plotted by field, group of fields or appropriate length for a linear scheme at 1:2500, with separate plans for each period or relevant subdivision, indicating the numbers of artefacts per test pit.
- 6.11 The pottery and other relevant artefacts will be scanned to assess the date range of the assemblage.
- 6.12 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum or other body. These will be cleaned, conserved, bagged and boxed in accordance with the guidelines set out in UKIC's "*Conservation Guidelines No 2*".

## APPENDIX 8

### Machine excavated trenches

#### *Excavation*

- 7.1 The entire site will be visually inspected before the commencement of any machine excavation. This will include the examination of any available exposures (eg recently cut ditches and geo-technical test pits).
- 7.2 Normally trench positions will be accurately surveyed prior to excavation and related to the National Grid. It may be necessary to survey the positions after excavation in some instances.

- 7.3 All machining will be carried out by plant of an appropriate size. Normally, this will be a JCB 3CX (or similar) or 360<sup>0</sup> tracked excavator with a 1.4 or 1.8m wide toothless bucket. Where access or working space is restricted a mini excavator such as a Kubota KH 90 will be used.
- 7.4 All machining will be carried out under direct control of an experienced archaeologist.
- 7.5 Undifferentiated topsoil or overburden of recent origin will be removed in successive level spits (approximately <0.5m) down to the first significant archaeological horizon.
- 7.6 Excavated material will be examined in order to retrieve artefacts to assist in the analysis of the spatial distribution of artefacts.
- 7.7 On completion of machine excavation, all faces of the trench that require examination or recording will be cleaned using appropriate hand tools.
- 7.8 All investigation of archaeological horizons will be by hand, with cleaning, inspection, and recording both in plan and section.
- 7.9 Within each significant archaeological horizon a minimum number of features required to meet the aims of the project will be hand excavated. Pits and postholes normally will be sampled by half-sectioning although some features may require complete excavation. Linear features will be sectioned as appropriate. Features not suited to excavation within the confines of narrow trenches will not be sampled. No deposits will be entirely removed unless this is unavoidable. As the objective is to define remains it will not necessarily be the intention to fully excavated all trenches to natural stratigraphy. However, the full depth of archaeological deposits across the entire site will be assessed. Even in the case where no remains have been located the stratigraphy of all evaluation trenches will be recorded.
- 7.10 Any excavation, whether by machine or by hand, will be undertaken with a view to avoiding damage to any archaeological features or deposits which appear to be demonstrably worthy of preservation *in situ*.
- 7.11 For palaeoenvironmental research different sampling strategies will be employed according to established research targets and the perceived importance of the strata under investigation. AOC Archaeology conventionally recovers three main categories of sample;
- i) Routine Soil Samples; a representative 500g sample from every excavated soil context on site. This sample is used in the characterisation of the sediment, potentially through pollen analysis, particle size analysis, pH analysis, phosphate analysis and loss-on-ignition;
  - ii) Standard Bulk Samples; a representative 10 litre sample from every excavated soil context on site. This sample is used, through floatation sieving, to recover a sub-sample of charred macroplant material, faunal remains and artefacts;
  - iii) Purposive or Special Samples; a sample from a sediment which is determined, in field, to either have the potential for dating (wood charcoal for radiocarbon dating or *in situ* hearths for magnetic susceptibility dating) or for the recovery of enhanced palaeoenvironmental information (waterlogged sediments, peat columns, etc).
- 7.12 Any finds of human remains will be left *in situ*, covered and protected. In Scotland the local police will be informed. If removal is essential this will only take place with police approval, and in compliance with Historic Scotland's Operational Policy Paper '*The Treatment of Human Remains in Archaeology*'. In England and Wales the coroner's office will be informed. If removal is essential it will only take place under the relevant Home Office licence and local authority environmental health regulations.
- 7.13 All finds of gold and silver will be moved to a safe place. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage. In Scotland the recovery of such material, along with all other finds, will be reported to the Queen's and Lord Treasurer's Remembrancer. In England and Wales the recovery of

such material will be reported to the coroner's office according to the procedures relating to Treasure Trove.

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

#### *Recording*

- 7.15 For each trench, a block of numbers in a continuous sequence will be allocated.
- 7.16 Written descriptions, comprising both factual data and interpretative elements, will be recorded on standardised sheets.
- 7.17 Where stratified deposits are encountered a 'Harris'-type matrix will be compiled during the course of the excavation.
- 7.18 The site grid will be accurately tied into the National Grid and located on the 1:2500 or 1:1250 map of the area.
- 7.19 Plans will normally be drawn at a scale of 1:100, but on urban or deeply stratified sites a scale of 1:50 or 1:20 will be used. Burials will be drawn at 1:10. Other detailed plans will be drawn at an appropriate scale.
- 7.20 Long sections of trenches showing layers and any cut features will be drawn at 1:50. Sections of features or short lengths of trenches will be drawn at 1:20.
- 7.21 Generally all sections will be accurately related to Ordnance Datum. There may, occasionally, be instances where this is unnecessary when it will be agreed with the local authority's archaeological representative in advance.
- 7.22 Registers of sections and plans will be kept.
- 7.23 A digital photographic record will be maintained. This will illustrate the principal features and finds both in detail and in a general context. The photographic record will also include working shots to represent more generally the nature of the fieldwork.
- 7.24 A register of all photographs taken will be kept on standardised forms.
- 7.25 All recording will be in accordance with the standards and requirements of the *Archaeological Field Manual* (Museum of London Archaeology Service 3rd edition 1994).

#### *Finds*

- 7.26 All identified finds and artefacts will be collected and retained. Certain classes of material, ie post-medieval pottery and building material, may on occasion be discarded after recording if a representative sample is kept. No finds will be discarded without the prior approval of the archaeological representative of the local authority and the receiving museum.
- 7.27 Finds will be scanned to assess the date range of the assemblage with particular reference to pottery. In addition the artefacts will be used to characterise the site, and to establish the potential for all categories of finds should further archaeological work be necessary.
- 7.28 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum. Finds will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in United Kingdom Institute for Conservation's *Conservation Guidelines No. 2*.
- 7.29 In England and Wales, at the beginning of the project (prior to commencement of fieldwork) the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive and finds. In Scotland all archaeological material recovered belongs to the Crown and its disposal is administered by the Queen's and Lord Treasurer's Remembrancer.

## Evaluation reports

- 8.1 The style and format of the evaluation report will be determined by AOC Archaeology, but will be compliant with Historic Scotland's issued guidance on Data Structure Reports. The report will include as a minimum the following;
- i) A location plan of the site.
  - ii) A location plan of the trenches and/or other type of fieldwork strategy employed.
  - iii) Plans and sections of features and/or extent of archaeology located. These will be at an appropriate scale.
  - iv) A summary statement of the results.
  - v) A table summarising per trench the deposits, features, classes and numbers of artefacts encountered and spot dating of significant finds.
- vi) Consideration to the methodology will be given along with a confidence rating for the results.
- 8.2 When an evaluation is followed by an excavation the procedures defined in English Heritage's *Management of Archaeological Projects* 2nd edition 1991 will be followed for immediate post-field archive preparation and initial assessment. It will then be agreed with the local authority's archaeological advisor which aspects will need to be taken forward to the report stage.

## APPENDIX 10

### Area excavation

- 9.1 Prior to the stripping of any area excavation, all appropriate surveys (eg geophysical, earthwork, contour) or sampling strategies (eg for topsoil artefact densities, metal detecting, phosphate analysis) will be undertaken.
- 9.2 In most cases sites will be mechanically stripped of topsoil and other overburden. An appropriate machine will always be used. This will normally be a 360° tracked excavator with a between 1.4 and 2.4m wide toothless bucket. In other cases a JCB 3CX (or similar), or for work with restricted access or working room a mini-excavator such as a Kubota KH 90 will be used. Suitably sized dumpers or lorries will be employed to remove spoil. No plant will be allowed to cross stripped areas.
- 9.3 All machining will be undertaken under the direct control of experienced archaeologists.
- 9.4 All undifferentiated topsoil or overburden will be removed down to the first significant archaeological horizon in level spits. The archaeological horizon to which the material will be cleared will have first been established by an evaluation or by the digging of test pits.
- 9.5 Depending on the aims of the project, the excavated spoil may be monitored in order to recover artefacts. Where their findspots are plotted this will usually be on a 2m grid.
- 9.6 The surface exposed by the stripping will be cleaned using appropriate hand tools.
- 9.7 Should the site grid not have already been established it will be done at the cleaning stage. The grid will normally be based on a 10m spacing and related to the National Grid. A temporary bench mark related to Ordnance Datum will be founded
- 9.8 After the cleaning and planning of the excavation area the sampling strategy will be finalised. This will take into account the project aims (which may need modifying at this stage) and the type, quality and quantity of remains revealed. The sampling strategy will normally seek to maintain at least the following levels;

- i) all structures and all zones of specialised activity (eg funerary, ceremonial, industrial, agricultural processing) will be fully excavated and all relationships recorded;
- ii) ditches and gullies will have all relationships defined, investigated and recorded. All terminals will be excavated. Sufficient lengths of the feature will be excavated to determine the character of the feature over its entire course; the possibility of re-cuts of parts of the feature, and not the whole, will be considered. This will be achieved by a minimum 10% sample of each feature (usually a 1m section every 10m).
- iii) Sufficient artefact assemblages will be recovered (where possible) to assist in dating the stratigraphic sequence and for obtaining ample ceramic groups for comparison with other sites;
- iv) all pits, as a minimum, will be half-sectioned. Usually at least 50% (by number) of the pits will be fully excavated. Decisions as to which pits will be fully excavated will be taken in the light of information gained in the half-sectioning taking into consideration, amongst other things; pit function, artefact content and location;
- v) for post and stake holes where they are clearly not forming part of a structure (see above) 100% (by number) will be half-sectioned ensuring that all relationships are investigated. Where deemed necessary, by artefact content, a number may demand full excavation;
- vi) for other types of feature such as working hollows, quarry pits, etc the basic requirement will be that all relationships are ascertained. Further investigation will be a matter of on-site judgement, but will seek to establish as a minimum their extent, date and function;
- vii) for layers, an on-site decision will be made as to the limits of their excavation. The factors governing the judgement will include the possibility that they mask earlier remains, the need to understand function and depositional processes, and the necessity to recover sufficient artefacts to date the deposit and to meet the project aims.

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

- i) Routine Soil Samples; a representative 500g sample from every excavated soil context on site. This sample is used in the characterisation of the sediment, potentially through pollen analysis, particle size analysis, pH analysis, phosphate analysis and loss-on-ignition;
- ii) Standard Bulk Samples; a representative 10 litre sample from every excavated soil context on site. This sample is used, through floatation sieving, to recover a sub-sample of charred macroplant material, faunal remains and artefacts;
- iii) Purposive or Special Samples; a sample from a sediment which is determined, in field, to either have the potential for dating (wood charcoal for radiocarbon dating or *in situ* hearths for magnetic susceptibility dating) or for the recovery of enhanced palaeoenvironmental information (waterlogged sediments, peat columns, etc).

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

9.11 All finds of gold and silver will be moved to a safe place. Where removal cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the artefacts from theft or damage. In Scotland the recovery of such material, along with all other finds, will be

reported to the Queen's and Lord Treasurer's Remembrancer. In England and Wales the recovery of such material will be reported to the coroner's office according to the procedures relating to Treasure Trove.

#### *Recording*

- 9.12 All on-site recording will be undertaken in accordance with the standards and requirements of the *Archaeological Site Manual* (Museum of London 1994).
- 9.13 A continuous unique numbering system will be employed.
- 9.14 Written descriptions, comprising both factual data and interpretative elements, will be recorded on standardised sheets.
- 9.15 Where stratified deposits are encountered a 'Harris'-type matrix will be compiled during the course of the excavation.
- 9.16 The site grid will be accurately tied into the National Grid and located on the 1:2500 or 1:1250 map of the area.
- 9.17 Plans will normally be drawn at a scale of 1:100, but on urban or deeply stratified sites a scale of 1:50 or 1:20 will be used. Burials will be drawn at 1:10. Other detailed plans will be drawn at an appropriate scale.
- 9.18 Long sections of trench edges or internal baulks showing layers and any cut features will be drawn at 1:50 or 1:20 depending on amount of detail contained. Sections of features will be drawn at 1:20.
- 9.19 All sections will be accurately related to Ordnance Datum.
- 9.20 Registers of sections and plans will be kept.
- 9.21 A digital photographic record will be maintained. This will illustrate the principal features and finds both in detail and in a general context. The photographic record will also include working shots to represent more generally the nature of the fieldwork.
- 9.22 A register of all photographs taken will be kept on standardised forms.

#### *Finds*

- 9.23 All identified finds and artefacts will be collected and retained. Certain classes of material, ie post-medieval pottery and building material may on occasion be discarded after recording if a representative sample is kept. No finds will be discarded without the prior approval of the archaeological representative of the local authority and the receiving museum.
- 9.24 All finds and samples will be treated in a proper manner and to standards agreed in advance with the recipient museum. Finds will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in United Kingdom Institute for Conservation's *Conservation Guidelines No. 2*.
- 9.25 In England and Wales, at the beginning of the project (prior to commencement of fieldwork) the landowner and the relevant museum will be contacted regarding the preparation, ownership and deposition of the archive and finds. In Scotland all archaeological material recovered belongs to the Crown and its disposal is administered by the Queen's and Lord Treasurer's Remembrancer.

#### *Archiving, post-excavation and publication*

- 9.26 Following completion of each stage or the full extent of the fieldwork (as appropriate) the site archive will be prepared in the format agreed with the receiving institution.
- 9.27 On completion of the archive a summary report will be prepared. This will include;
  - i) an illustrated summary of the results to-date indicating to what extent the project aims were fulfilled;

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

9.28 The proposals for analysis and publication will include;

- i) a list of the revised project aims arising from the fieldwork and post-excavation assessment;
- ii) a method statement which will make clear how the methods advocated are those best suited to ensuring that the data-collection will fulfil the stated aims of the project;
- iii) a list of all tasks involved in meeting the stated methods to achieve the aims and produce a report and research archive in the stated format;
- iv) details of the research team and their projected work programmes in relation to the tasks. Allowance will be made for general project-related tasks such as project meetings, management, editorial and revision time;
- v) a publication synopsis indicating publisher, report format and content shown by chapters, section and subheadings with the anticipated length of text sections and proposed number of illustrations.

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

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

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

## **APPENDIX 11**

### **Standing Building Assessment**

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

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

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

## **APPENDIX 12**

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

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

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

## APPENDIX 13

### Historic Building Recording: Photography (Levels 1-5)

- 12.1 Photography will take place at all levels of building recording, and will be undertaken with a single lens reflex camera with through-the-lens (TTL) light metering. A standard 28-90mm lens will be used at all times except where wider or shorter angle lenses are required for longer elevation photography and detailed photography.
- 12.2 The camera will be placed at mid-height to the subject with due care and attention to lighting situations. Two shots will be taken of each feature, undertaken by a light-meter reading of a two-step change in aperture. This change up or down will depend on light conditions.
- 12.3 Interior photography will be undertaken with appropriate lighting conditions and the use of a tripod. Where light access is still quite minimal, an automatic flash will be used.
- 12.4 All photography will be taken on colour slide and black & white negative film, such as Kodak PLUS-X or Ilford FP4, or approved equivalent. It should be exposed and processed to an archival standard, i.e., fix and wash in accordance with the manufacturers specifications.
- 12.5 The use of a digital camera may be used as a reference to survey and drawn elevations and ground plans on-site.

## APPENDIX 14

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

- 13.1 An external contractor will carry out rectified photography and photogrammetry in compliance with the following guidelines:
- i)* All photography will be carried out with an approved type of camera. Details of the camera used may be supplied on completion of the project.
  - ii)* The smallest permissible photographic negative scale will normally be defined as follows: for 1:50 scale plotting, negative scale should be no more than 1:200 and for 1:20 scale plotting, negative scale should be no more than 1:200.
  - iii)* All rectified photography will be taken on black & white negative film, such as Kodak PLUS-X or Ilford FP4, or approved equivalent. It should be exposed and processed to an archival standard, i.e., fix and wash in accordance with the manufacturers specifications.

## APPENDIX 15

### Historic Building Recording: Elevation Recording (Level 2)

- 14.1 All elevations drawn or surveyed will be a 'preservation by record' of the current state of the building. The following categories will be recorded:
- i)* All architectural features with associated decorative detail including windows, doors, quoin stones, string courses, roof lines and other structural stonework and jointing.
  - ii)* Fixtures and fittings such as drainpipes and guttering, signs, brackets and vents.
  - iii)* Later modifications and/or damage to the building such as structural cracks, areas of erosion, patches of rendering, blocked doorways, windows and other openings.
- 14.2 Large or small repetitive features such as windows, capitals, mouldings, etc. sampling will be undertaken as appropriate.

- 14.3 Where the façade is of stone construction each individual stone may be recorded. However, in most instances, a representative area, usually 1m<sup>2</sup>, will be sufficient, although windows, corner stones and other architectural details will always be fully recorded. The degree of recording for ashlar will be depend upon the scale with which the elevation is to be produced and will be determined in advance of the start of works. When drawings are carried out at 1:50, a single line between the joints of the stone will normally be considered satisfactory. However, if there is a considerable gap between the stones, both sides of the stone will be shown. At a scale of 1:20 or larger, then all joints will normally be shown except where the stone is very fine ashlar.
- 14.4 Elevation recording by hand will normally take place if it is inappropriate to do so by survey. The size and complexity of an elevation will determine what on-site scale will be required. In general, a scale of 1:50 will be deemed appropriate with a larger scale adopted if portions of this elevation are more complex. For highly detailed architectural detail a scale of 1:1 may be appropriate.
- 14.5 All hand-drawn measured elevations and detail will be drawn using water-resistant paper with a hard 4H – 6H pencil. A levelled datum line will be taken through the centre of the elevation with offset measurements. All datum points will be accurately positioned within the site either by hand or by survey.

## APPENDIX 16

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

- 15.1 Where appropriate, elevations may be recorded by radiation survey using a reflectorless EDM (REDM) Leica TCR 705. This method of survey allows the accurate capture of data of upper floor levels. If more than one elevation is to be recorded, then a traverse will be created around each building or group of buildings. Extra stations may be set up in places where there is limited access. Values in the traverse will be adjusted by Bowditch adjustment to compensate for any errors in measurement. The adjusted values will then be calculated using LisCAD Plus v5.0 (Surveying and Engineering Module). Co-ordinates will be located by resection from existing traverse points. The survey data will be downloaded to a laptop computer on-site via Leica Office software. All measurements taken by survey will consist of three-dimensional co-ordinates relating to the Ordnance Survey National Grid.
- 15.2 The recording of an elevation will not be carried out by survey equipment if:
- i) There are too many obstructions;
  - ii) The surface of the building is too dark or mossy;
  - iii) There is too much curved architectural detail;
  - iv) The distance required to set up the survey equipment in front of the elevation is too large (i.e., more than 25m) or too short to capture data from the upper levels of the elevation.
- 15.3 Where appropriate, elevations carried out by survey will be supplemented by detail measured by hand.

## APPENDIX 17

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

- 16.1 The recording of the interior(s) of the building(s) will consist of a written record and, where appropriate, measured sketch plans of the ground plan and the roof elevations based on the following guidelines:
- i) Critical analysis of the interior condition, construction, materials, fixtures and fittings will be made using *pro forma* recording sheets.
  - ii) Measured interior ground plans of each room of the interior will be carried out using tapes and a Leica Disto™ Classic electronic distance measurer.

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

## APPENDIX 18

### Historic Building Recording: Standard Report Illustrations (Level 6)

- 17.1 All final illustrations for archive will be produced digitally on the Computer-Aided Drawing package, AutoCAD 2000i/2000LT and/or Adobe Illustrator v9/v10. A standard methodology will be used with all drawings adhering to the following guidelines:
- 17.2 Line Weight. The appropriate line weight will depend on anticipated plot scale and may need editing if the output scale is to change. The degree of detail used will affect the line weight utilised in the finished drawing. All fine architectural detail (stonework, moulded stonework, brickwork, etc.) will be produced at a line weight of 0.05mm. More general architectural features (outlines of doors and windows, etc.) will be produced at a line weight of 0.09mm. A much heavier line will indicate the changing of plane in complex elevations.
- 17.3 Text. Text will be made clear and informative, with orientation, position, size and letter spacing remaining appropriate to the layout of the plotted sheets.
- 17.4 Scale. No archaeological or historic building survey will be carried out without a particular scale or range of scales in mind.
- 17.5 Layers. The layering system in Computer Aided Drawing packages allow the separation of data into specified criteria. To achieve this, there is an AOC standard layering system. This system is largely based on the coding system inherent in the use of the reflectorless EDM Leica TCR705.
- 17.6 Digital Archiving. All drawings are produced at a 1:1 scale for easy scaling in .dxf or .dwg format. At the end of a project, all data is stored on CD-ROM.

## APPENDIX 19

### Historic Building Recording: Dendrochronological Analysis (Level 3)

- 18.1 Dendrochronological analysis of timbers from standing building is primarily undertaken to provide accurate dates for its construction. Where appropriate, samples may be taken for analysis to provide information on the source and quality of the timber, thus informing on the social and economic context of the building.
- 18.2 Samples for analysis will take place under the following conditions:
  - i)* That the timber sample taken is from a species where date chronologies already exist, namely oak and pine.
  - ii)* A minimum of eight timbers per phase or building are required to cross-match results.
  - iii)* The ring patterns inherent in a timber sample must be over a certain length, usually seventy rings.
- 18.3 The method of the removal of samples of timber will be to use a corer attached to a power-driven drill, removing a core leaving a hole in the timber 10mm in diameter. The core will be taken so that a maximum radius from pith to bark is taken, thus ensuring the maximum numbers of growth rings for

analysis. Timbers will be selected which have retained a full ring sequence as possible (i.e., those where the outermost rings have not been trimmed off or destroyed by woodworm).

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

## APPENDIX 20

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

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

## APPENDIX 21

### Historic Building Recording: Reporting (Levels 0-6)

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

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

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

## APPENDIX 22

### Watching Briefs

Where the archaeologist (Watching Brief Officer) has no remit over the working methodology of the site (specification of machine or depth of excavation). The Watching Brief Officer will simply observe the works and record their nature and form.

- 21.1 Where the Watching Brief Officer specifies the site methodology, ie type of machine and depth of excavation. AOC Archaeology's preferred approach is to consider the Watching Brief Area as a large evaluation trench and follows in general, Appendix 7.

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

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

- i) a record will be made of all site attendances;
- ii) in general a written and photographic record will be kept of the excavated sediments;
- iii) where archaeological features are identified and they can be dealt with in less than two hours this work will be undertaken by the Watching Brief Officer. Recording and excavation protocols will follow Appendices 7.9 –7.11;
- iv) where archaeological remains requiring more than two hours of excavation and recording, the Watching Brief Officer will stop the works and both the curator and the client will be contacted to devise a mitigation strategy. All delays will be kept to a minimum. Any resultant excavation and recording work will be in keeping with the methods outlined in Appendix 9;
- v) the extent of the watching brief area will not be recorded unless specifically required by either the client or the curator. Where such recording is required the area will be accurately recorded by total station and linked into the Ordnance Datum;
- vi) Reporting of Watching Briefs will follow methods specified in Appendix 8.

## APPENDIX 23

### General

- 22.1 The requirements of the Brief will be met in full where reasonably practicable .
- 22.2 Any significant variations to the proposed methodology will be discussed and agreed with the local authority's archaeological representative in advance of implementation.
- 22.3 The scope of fieldwork detailed in the main part of the Written Scheme of Investigation is aimed at meeting the aims of the project in a cost-effective manner. AOC Archaeology Group attempts to foresee all possible site-specific problems and make allowances for these. However there may on occasions be unusual circumstances which have not been included in the programme and costing. These can include;
- i) unavoidable delays due to extreme weather, vandalism, etc;
  - ii) trenches requiring shoring or stepping, ground contamination, unknown services, poor ground conditions;
  - iii) extensions to specified trenches or feature excavation sample sizes requested by the local authority's archaeological advisor;
  - iv) complex structures or objects, including those in waterlogged conditions, requiring specialist removal.

#### *Health and Safety*

- 22.4 All relevant health and safety legislation, regulations and codes of practice will be respected.
- 22.5 With the introduction of the Construction, Design and Management Regulations 1994, AOC Archaeology works with Clients, Main Contractors, and Planning Supervisors to create a Health and Safety Plan. Where CDM regulations apply, each project will have its own unique plan.

#### *Insurances*

- 22.6 AOC Archaeology holds Employers Liability Insurance, Public Liability Insurance and Professional Indemnity Insurance. Details can be supplied on request.
- 22.7 AOC Archaeology will not be liable to indemnify the client against any compensation or damages for or with respect to;

- i) damage to crops being on the Area or Areas of Work (save in so far as possession has not been given to the Archaeological Contractor);
- ii) the use or occupation of land (which has been provided by the Client) by the Project or for the purposes of completing the Project (including consequent loss of crops) or interference whether temporary or permanent with any right of way light air or other easement or quasi easement which are the unavoidable result of the Project in accordance with the Agreement;
- iii) any other damage which is the unavoidable result of the Project in accordance with the Agreement;
- iv) injuries or damage to persons or property resulting from any act or neglect or breach of statutory duty done or committed by the client or his agents servants or their contractors (not being employed by AOC Archaeology) or for or in respect of any claims demands proceedings damages costs charges and expenses in respect thereof or in relation thereto.

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

*Copyright and confidentiality*

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

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

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

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

*Standards*

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

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

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

## APPENDIX 24

### Specialist staff

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

#### AOC Archaeology Staff:

Dr. Anne Crone	Dendrochronology, charcoal and timber analysis
Dr. Ciara Clarke	Pollen analysis
Mr. Rob Engl	Lithics & coarse stone
Ms. Melissa Melikian	Human bone
Ms Lynne Roy	Soils and sediments analysis
Mr Alan Duffy	Charcoal identification
Ms Gretel Evans	Artefact conservation

#### Sub-contractors

Dr Alan Hall	Macroplant specialist
Mr. Bob Clark	Industrial archaeology & coal-mining
Ms Marta McGlynn	Historic designed landscapes
Dr Jennifer Thoms	Mammal bone
Dr. Ruby Ceron-Garasco	Marine shell and fish bone
Dr. Ann MacSween	Prehistoric pottery
Ms. Naomi Crowley	Building material, medieval and post-medieval pottery

## APPENDIX 25

### Post-excavation

#### 24.1 *Sample Flotation*

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

All flots and retents are air dried, bagged and labelled accordingly. Throughout this process all equipment is kept clean to prevent contamination of the samples. For each sample, a Sieving Assessment sheet is completed. This gives basic information about the sample, retent and flot. Prior to flotation and wet-sieving, the volume of each sample is measured by means of a graduated bucket.

If in a sample a high concentration of clay can be observed and therefore separation of the different fractions of the soil is difficult, an aqueous solution of defloculant 'Calgon' is added and the sample is left to soak overnight, before processing by flotation and wet-sieving.

Sample flotation will be carried out on site and/or at the premises of the archaeological contractor.

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#### 24.2 *Sample Wet sieving*

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

#### 24.3 *Sample Dry sieving*

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

#### 24.4 *Residue sorting*

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

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

#### 24.5 *Flot sorting*

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

#### 24.6 *Routine Soils Analysis*

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

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

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

Calcium Carbonate content can be measured by dissolving a few grains of the sample using Hydrochloric acid. If calcium carbonate is present then a small amount of Carbon Dioxide is given off, the greater the amount of CO<sub>2</sub> released the greater the amount of CaCO<sub>2</sub>. The Calcium Carbonate content shows us if there is any natural calcium carbonate within the sediment, or if not, any mortar or shell has been included artificially.

The amount of phosphate within a sample is examined at the same time as CaCO<sub>2</sub>. After the CO<sub>2</sub> has been released Ascorbic acid is applied, if Phosphate is present a colour change will occur. The phosphate content may show the presence of animals or to a lesser degree indicate where animals were kept.

#### 24.7 *Soil Micromorphological Analysis*

Micromorphology is the study of undisturbed soils and loose sediments and other materials at a microscopic scale. A 25-30 micron thick slice of soil or sediment is mounted on glass and studied using a petrographic microscope. The samples are prepared for thin section analyses at the Department of Environmental Science, University of Stirling using the methods outlined by Murphy (1986). The samples are analysed using the descriptive terminology of Bullock *et al* (1985) and FitzPatrick (1993).

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

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

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

#### 24.8 *Charcoal ID*

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

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

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

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

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

#### 24.9 Wood ID

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

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

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

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

#### 24.11 Dendrochronological analysis

*Sample size and species type;* Three conditions are necessary to ensure the successful dating of a building or archaeological site. The timber must be a species for which there are already dated chronologies which in the UK usually means oak. Cross-matching is a statistical process, and therefore a number of timbers are required, usually at least 8 per building or phase. Finally, and for the same reasons the ring-patterns must be over a certain length, usually 70 rings. With these conditions observed it can be relatively straightforward to obtain a date for a building.

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

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

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

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

#### *Sample preparation;*

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

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

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

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

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

## APPENDIX 26

### Conservation

#### 25.1 *Conservation principles*

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

#### 25.2 *Security*

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

#### 25.3 *Insurance*

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

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

#### 25.4 *Health and safety*

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

#### 25.5 *Conservators and allied specialist services*

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

#### 25.6 *Specialist post-excavation analyses*

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

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

#### 25.7 *Documentation*

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

Conservation reports are normally supplied as a hard copy, but can also be supplied on disc in a variety of formats, according to the client's requirements. Reports are normally printed on paper with a guaranteed life expectancy of 150 years; photographic materials are processed to professional industry standards such as Q-Lab.

#### 25.8 *Archival considerations*

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

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

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

*The Disposal and Allocation of Finds*

*Publication and Archiving of Archaeological Projects*

*Treatment of Human Remains in Archaeology*

## *Archaeological Project Design, Implementation and Archiving*

### 25.9 *Museum of London Guidelines*

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

### 25.10 *Assessment and estimating*

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

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

### 25.11 *Recording*

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

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

### 25.12 *Conservation Record*

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

### 25.13 *Radiography*

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

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

### 25.14 *Record photography*

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

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

#### 25.15 *On-site conservation and conservation on call*

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

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

#### 25.16 *Conservation treatments*

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

#### 25.17 *Post-excavation storage*

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

#### 25.18 *Packing*

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

## **APPENDIX 27**

### **Archiving and finds disposal**

#### 26.1 *Finds disposal*

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

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

## 26.2 *Archiving*

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

## **APPENDIX 28**

### **Publications**

#### 27.1 *General*

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

#### 27.2 *DES entries*

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

#### 27.3 *Journal publications*

Reports on the results of excavations are normally published either as an article in an academic journal or as a monograph in an appropriate series, depending on the scale of the results. The results of the set-piece excavations will be published as journal articles with reference to other on-site works such as watching briefs and building recording, where appropriate. The publication of these articles will follow on timeously from the completion of post-excavation works.

#### 27.4 *Monograph publications*

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

#### 27.5 *Popular publications*

The results of all the on-site works will also be drawn together in 'popular' publications that augment the academic publications in making the results available to a wider public. This is a method of providing

'community gain' to the local and national community in return for its consent, through the planning process, to alter or demolish elements of the archaeological heritage. Popular publications may include, as deemed appropriate by the client, Internet reports within the web site of the archaeological contractor, printed colour booklets, leaflets, on-site interpretative panels and exhibitions.

#### 27.6 *Editorial procedures*

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



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