



Brora Back Beach, Sutherland Data Structure Report 2012



Scottish Coastal Archaeology and the Problem of Erosion



University
of
St Andrews

Back Beach, Brora, Sutherland

report by
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The SCAPE Trust

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SUMMARY PROJECT INFORMATION

<i>Period of fieldwork</i>	27 th July – 22 nd August 2011
<i>Local Authority</i>	Highland
<i>Parish</i>	Clyne
<i>NGR</i>	NC 90470 03307

The 2010 excavations were coordinated by **Jacquie Aitken** (Clyne Heritage Society) and **Joanna Hambly** (SCAPE Trust). The site was supervised by **Joanna Hambly** (SCAPE Trust) and **Cathy Dagg** (Archaeologist) with assistance from **Sarah Salem** (St Andrews University).

Our **Volunteers** in 2011 were:

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Linda Allgood	Janice Mackinnon
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Beth Blackburn	Cait McCullagh
Elizabeth Blackburn	Ella McDonagh
Jean Bowker	Heather MacDonald
Ken Bowker	Lisa MacDonald
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Steve Clark	Margot Patton
Anne Coombs	Valerie Pugh
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David Findlay	Sarah Salem
Susan Findlay	Roger Smith
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Stan Holroyd	Robin Ward
William Hawans	Sally Ward
Nick Lindsey	John Wombell
	Trina Wombell

The site drawings were digitised by **Sarah Salem** with assistance from **Matthew Cox** and **Caroline Lill**. **Matthew Cox** and **Sarah Salem** created animations with the laser scan data.

ACKNOWLEDGEMENTS

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1. Introduction

The SCAPE Trust and the Clyne Heritage Society carried out a fifth season of excavation of salt pans at the Back Beach in Brora East Sutherland. The excavation was funded by Historic Scotland and their support is gratefully acknowledged. The site was excavated by volunteers who, once again, made the most significant contribution to the success and the outcomes of this important project.

This year's excavation saw the completion of the excavation of the building in Trench 9 on the site of the 'Old Salt House', marked on John Farey's 1813 *Mineral Map of the Coal Field at and near Brora*. The eastern half of this building was fully excavated in 2010. The remainder of the building was actively eroding. Deposits on the south (beach) side of the building had already been largely destroyed prior to the excavation.

Documentary evidence records that Lady Jane Gordon, Countess of Sutherland, established a salt pan here in 1598. The pans were renewed by her son, John the 12th Earl, in 1614, although it is not certain whether production had actually ceased. It was a short-lived venture because in 1618, there is a reference to the iron of the pans being sold, probably to help pay off Estate debts following the death of John the 12th Earl in 1616. For fuller historical background see previous DSR's and <http://www.shorewatch.co.uk/brora/>.

2. Summary of principle outcomes

The principal outcomes of the 2011 excavations were:

- the completion of the total excavation and recording of the 16th/17th century building;
- The recovery of further evidence showing the quality and uniqueness of the building for the historical period in this area. This includes a moulded stone window sill; several more fragments of window glass; and a carved stone fireplace and chimney set into the dividing wall;
- the discovery of graffiti, masons marks and possible apotropaic marks carved into the stone lintel and jamb of the fireplace;
- the recovery of cultural remains including thousands of fish bones; two fragments of whale bone; a range of iron objects; and locally produced pottery, never previously found in this area from this period.

3. Community and events

Around 40 volunteers, mainly drawn from the local community, collectively contributed more than 200 person days over the 3 week excavation. This commitment is directly responsible for the significant achievements of the 2011 season. As well as local participation, the 2011 excavations enjoyed a very high local profile. This is due to Jacquie Aitken and the Clyne Heritage Society who raise awareness of the project through talks, displays and published articles throughout the year. The highly visible location of the excavation on a popular beach resulted in hundreds of visitors. The regular site Open Day attracted around 30 visitors, who enjoyed a site tour by Nick Lindsay and a chance to look at a display of finds and information from this and previous years put together by Jacquie Aitken.

4. Methodology

4.1. Trench location

A 12m x 10m trench (**Trench 9**) was opened up by machine over the western side of the visibly eroding building (Figure 2).

4.2. Excavation

A mechanical excavator fitted with a 2m wide toothless bucket was used to open up Trench 9 and remove the majority of the clean sand overburden (Plates 1, 2 and 3). A significant amount of landscaping was carried out to ensure safe working conditions and to achieve a stable and accessible coast edge after the excavation was complete.

Following machining, the trenches were cleaned by hand (Plate 4). Deposits and features were identified in plan and excavated as single contexts wherever possible. Stratigraphic control was maintained by sections at the limits of excavation supplemented by temporary sections.

Finds from each context were bagged separately. Samples for further analysis (environmental, mortar, etc.) were taken from relevant contexts.

Volunteers undertook all aspects of excavation under supervision from the site archaeologists and experienced non-professional archaeologists. Training at the Bora excavations was tailored, as in previous years, to meet individual requirements, the most common method being to team a less experienced volunteer with a more experienced individual.

Health and safety was paramount. Every volunteer and member of staff received a health and safety induction where site rules to ensure safe working were clearly explained. Hardhats were worn at all times. Eye protection and gloves were available and worn whenever needed.

4.3. Finds

All contexts except for demolition deposits, containing cultural material were sieved in order to retrieve small sized material, e.g. fishbone. Where substantial quantities of fish bone were present in a context, the whole context was bagged and wet sieved. The majority of the finds were processed and catalogued during the excavation period.

4.4. Recording

The site grid was re-established using a Leica TC407 total station theodolite, and tied into the national grid using previous fixed survey stations and fixed easily identifiable points on current OS mapping. A site datum (6.22m OD) relative to the bench mark on the Free Church on Gower Street had been established in 2010.

A laser scan survey of the site was commissioned from Orkney Research Centre for Archaeology (ORCA). The data was processed by ORCA using Leica Cyclone. ORCA supplied SCAPE with the point cloud data.

A standard single context recording (using pro forma context sheets), and planning system, based on that developed by the Museum of London Archaeology Service, was used. All plans, sections and

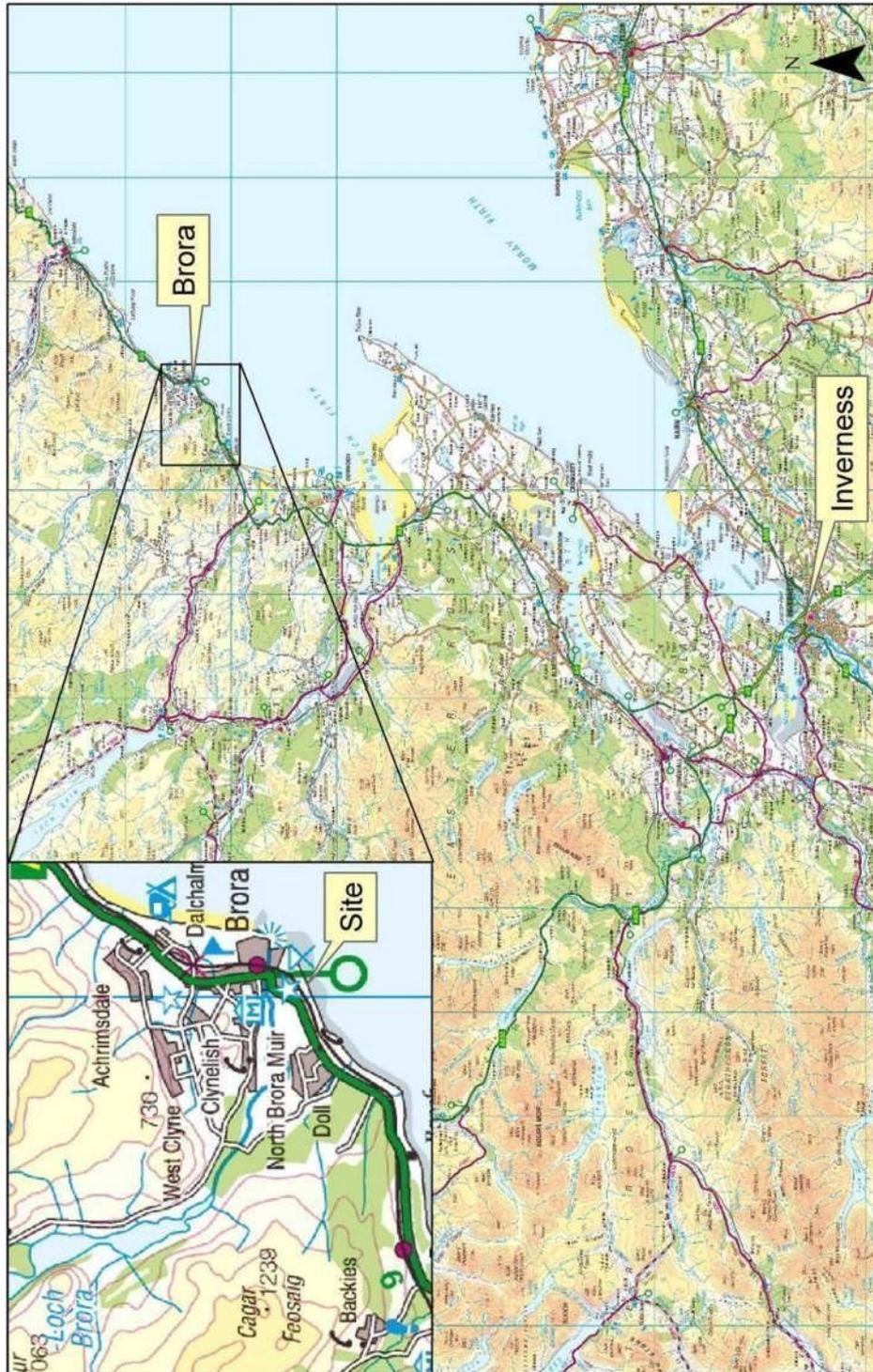


Figure 1. Location of study area. Map Courtesy of Highland Council.
Not to scale.

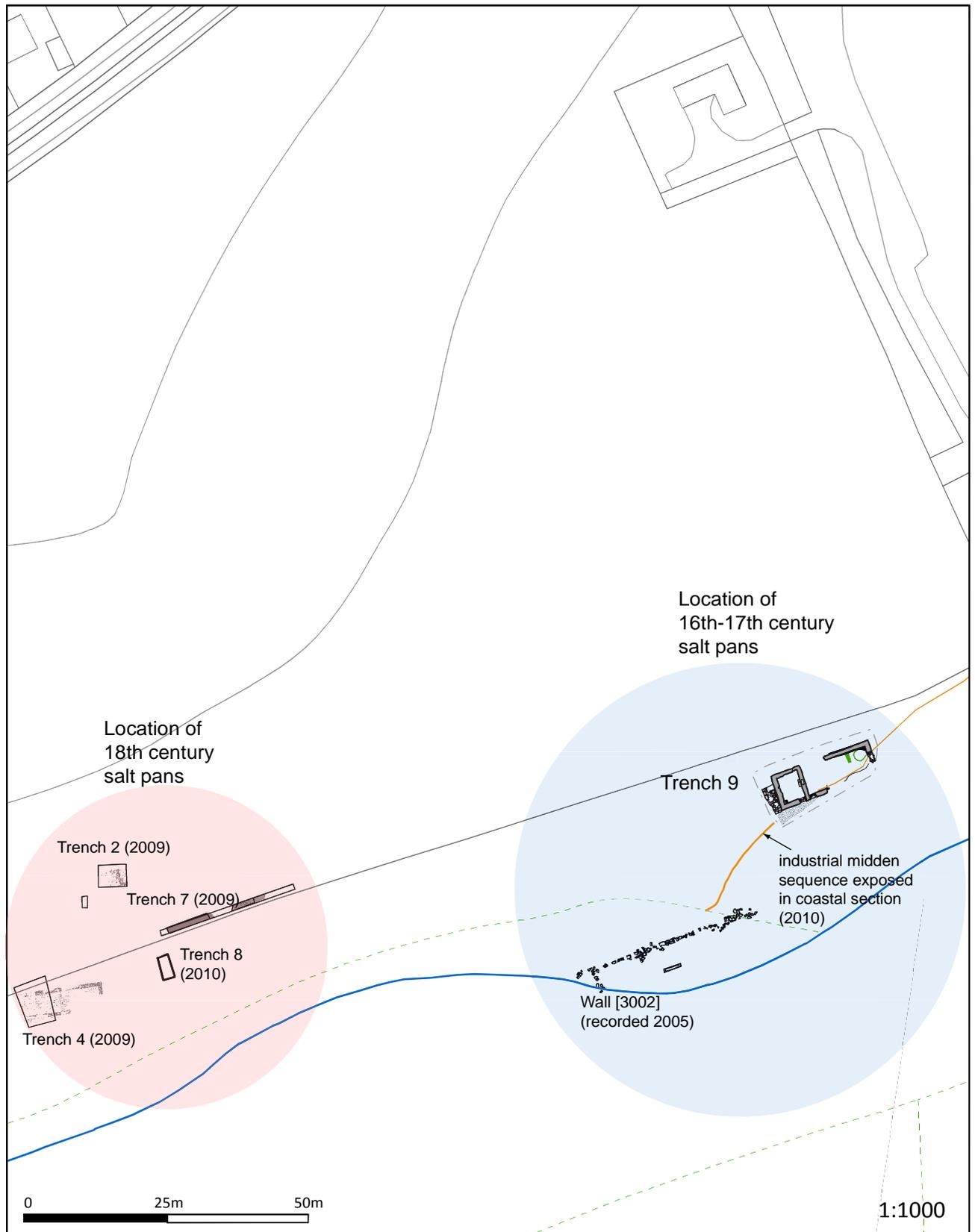


Figure 2. Location of Trench 9 in relation to previously recorded remains

elevations were drawn at a scale of 1:20 (or occasionally 1:10 where appropriate). Photographs were taken of every excavated context; of phases of site development; and general working shots. The photographic record was greatly enhanced by the use of a pole cam, developed and constructed by John Wombell.

Registers were compiled for all contexts, drawings, photographs, finds and samples.

Volunteers carried out every aspect of site recording. Specific one-to-one training was given as required and as for excavation; less experienced volunteers were teamed with more experienced individuals.

4.5. Post-excavation

All records were checked, cross referenced and the data input into an excel spreadsheet. All drawings were digitised directly into Illustrator (CS2 and CS4). Layers were used to maintain the single context plans. Survey data was processed and added to the project GIS. Finds had already been processed on-site, and these were sent to specialists for analysis. Finds catalogues and reports are appended with this report. Animations from the point cloud data were created in Point Tools 1.8.

5. Results

Some contexts excavated in 2011 were continuations of those excavated and recorded in 2010. The relevant 2010 context numbers are given *in italics*. The descriptive text of section 5 should be read in conjunction with the site matrix, (Figure 10) and phase plans (Figures 3, 8 and 9). Interpretive text related to the description is in italics.

Trench 9

Overall plan of the building (Plate 5)

The overall plan of the building, when completely revealed was rectangular, with a length to width ratio of approximately 3:1, oriented east northeast, west southwest. The external dimensions measured 17m long x 5.8m wide (56 feet x 19 feet). A dividing wall separated the building into two rooms. The larger eastern room, (the eastern half of which was fully excavated in 2010) had internal dimensions of 11.2m x 4.6m (37 feet x 15 feet). The smaller western room had internal dimensions of 3.6m x 4.6m (12 feet x 15 feet). Two doorways in the south wall [904] on either side of the dividing wall [9003] gave access to each room from the outside. The dividing wall contained a fireplace and chimney [9077]. To the west of the building, a stone buttress [9027], later incorporated into a larger stone platform-like feature [9037] abutted the outside face of west wall [9002].

PHASE 1

5.1 Phase 1A: Construction of the building in Trench 9

Contexts described in Phase 1A are shown in plan on Figure 3

Overlying natural sand, the earliest cultural deposit recorded within the building in Trench 9, was a loose, pale greyish yellow, coal flecked, fine sand (9064) and (9041) *same as 975*, containing remnants of the raw materials used to construct the building. These remnants comprised occasional sandstone chips; lumps and spills of mortar; lumps of clean yellow clay and occasional burnt and unburnt shale/coal fragments. Low numbers of fish bones, mussel shells, animal bones and iron objects were recovered from the layer. *The deposit was typical of a construction horizon. It incorporated a range of raw materials used in the construction of the building, as well as small quantities of trampled coal dust and ash.*

Outside the building, extending around the outside of the northwest corner and a short distance along the outside of the north wall were deposits (9073), (9074) and (9075). Although these were separate layers, their composition was very similar and it is likely they were part of the same accumulation event. The deposits comprised loose light brown sand streaked with dark brown organic rich material, coal flecks and rare fragments of burnt shale. Each deposit was between 0.2m and 0.4m thick. *The composition and stratigraphic position of these deposits were similar to construction deposits (9064/9041) and (9054) recorded within the building. It is likely they formed the external extension of these construction deposits.*

Construction features, east room

In 2010, a number of boulders were noted within the construction sand and recorded as part of 975. In 2011, further unmodified boulders (9071) were exposed (Plate 6). These would have formed a continuous layer across the eastern two thirds of the east room but were absent from the western third. The finished level of the overlying paved floor (919) recorded in 2010, was higher where it was laid upon the boulders than the paved floor (9039) of the northwest quadrant of the room where no boulders were present.

Cutting construction horizon (9064/9041) in the east room were four linear features, a posthole and a pit/posthole.

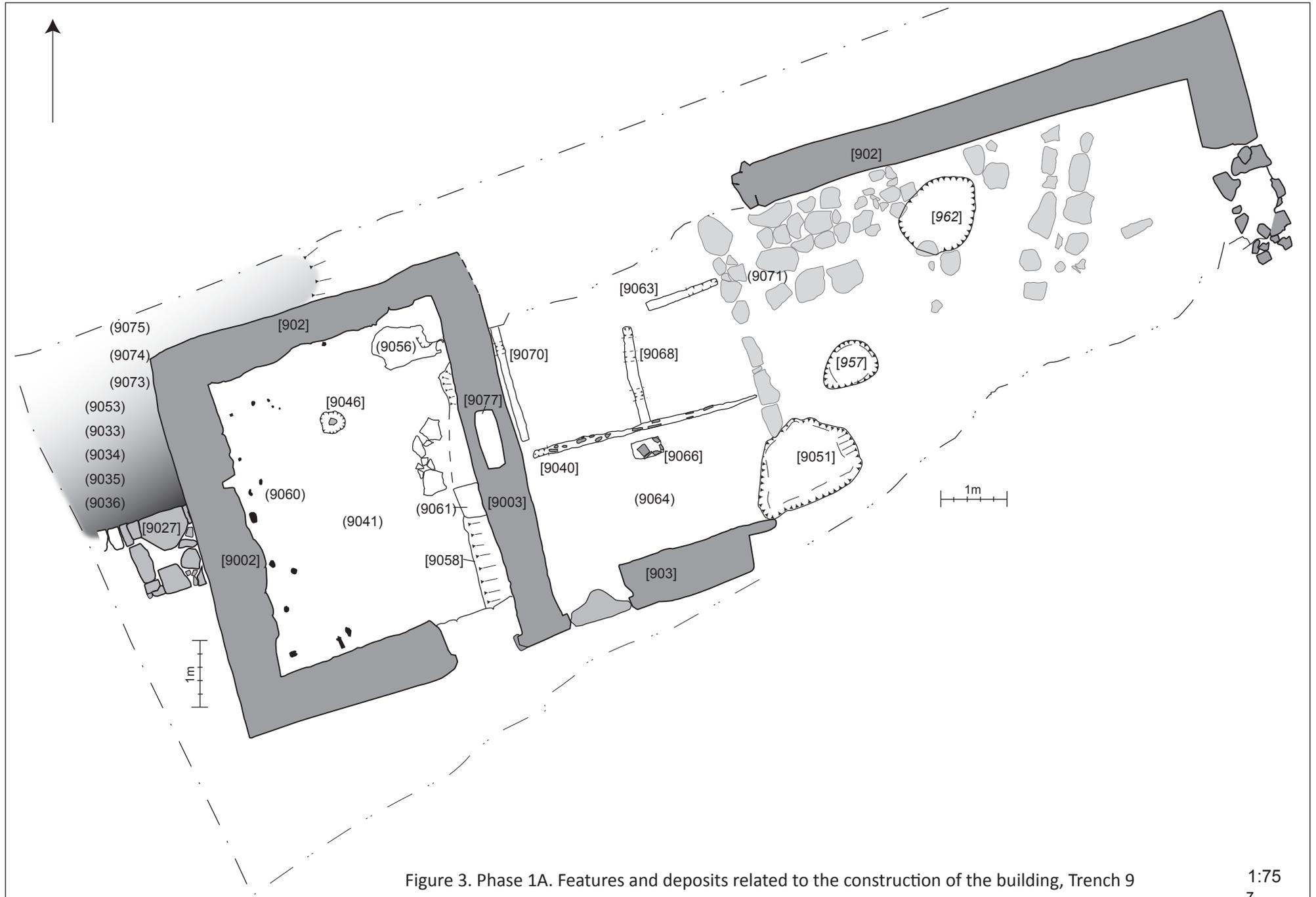


Figure 3. Phase 1A. Features and deposits related to the construction of the building, Trench 9

The cut for pit/posthole [9051] same as 952 was oval in plan with dimensions of 1.6m x 1.2m, x 0.3m deep. It had vertical sides and a flat base and was located against the south wall of the building, at the western limit of the boulder layer. The single fill (9052) same as 959 was composed of compacted blackish brown sand containing lenses of organic material and clean yellow sand. Angular fragments of broken shale floor slabs were present at the base of the east side of the cut. On the west side was a collection of mussel, scallop, winkle and whelk shells (Plate 7). The fill also contained fish bone, iron nails embedded in wood and occasional animal bone. The eastern part of this feature was excavated in 2010. The re-deposited fragments of paving slabs suggest packing material, but the function of the feature is unclear.

A sub-square, vertical sided, flat bottomed posthole [9066] measuring 0.45m x 0.35m x 0.35m was situated in the south west quadrant of the room (Plate 8). The single fill (9065) comprised two large cobbles set vertically into the cut as packing stones within a matrix of loose dark brownish black sand containing coal flecks and occasional fishbone.

Cut into the sand in the western third of the room, was a linear, vertical sided, concave based, feature [9040] oriented east-west (Plate 8). It measured 4m long by 0.1m-0.2m wide with a variable depth to maximum of 0.3m. It was filled with (9055) which comprised vertically positioned small shale slabs set within a matrix of loose, dark brown/black and light orangey brown sand. The slabs were placed in two parallel rows lining the edges of the linear cut. A line of nails lay along the edge of the feature (most recorded as context (9031)). The positioning of the slab fragments and the presence and arrangement of the nails suggested the feature was a foundation for an upright, wooden structure. The structure was installed at an early phase in the construction of the building, and divided the subsequently laid paved floor (9039) same as 919, from the compacted shale surface in front of the door (9031). The eastern end of the feature terminated at the edge of the boulder layer (9071).

The inception of the features described above belonged to the construction phase of the building, but they were likely to have accommodated superstructures, the function or use of which was contemporary with the use of the building, for example, internal partitions and posts. Feature [9040] defined an entrance area in front of the door to the east room. It may have been an internal partition, or possibly the foundations of a counter separating the porch area from the rest of the room.

On the north side of structure [9040] were 3 further linear features. None were as substantial as [9040]. A slight linear depression of light greyish brown sand, [9070] and (9069), 1.5m x 0.15m x 2cm deep, oriented N-S was located adjacent and parallel to the west wall of the room. A very similar slight linear depression [9068], 1.5m long, 0.2m wide and 3cm deep, filled with stained sand (9067) also lay perpendicular to feature [9040] and was aligned with posthole [9066]. Oriented east-west, a third more substantial linear feature [9063], 1m long x 10-15cm wide x 10cm deep with vertical sides and a flat base lay parallel to the north wall of the room. The cut was filled with (9062), a plastic light greyish white lime mortar and sand (Plate 9).

The features on the north side of [9040] described above were probably structural and were sealed by a further construction horizon, (9054) and paved floor (9039). They, therefore, must be associated with activities related only to the construction of the building. Two of the features [9070] and [9068] were no more than clearly defined linear stains in the clean sand underlying the building. It is possible these features are evidence of the base of a scaffolding platform or similar, in use during the construction of the building.

Overlying the features described above was a loose, mixed dark brown to black sand (9054) with spreads of lime and mortar and trampled burnt and unburnt shale (Plate 10). A small number of iron objects, animal bones and moderate quantities of marine shell were recovered from the layer, including 29 oyster shells found at the interface with the cleaner sand layer (9041) below.

(9054) was typical of a construction horizon. It incorporated a range of raw materials used in the construction of the building. The extent of the mortar spreads indicates mortar was mixed and/or walls were harled at this level. The presence of such extensive spreads of trampled ash suggests it may have been deliberately deposited to consolidate the surface of the very soft sand during the construction of the building. The origin of the ash is likely be from salt pan hearths, and provides evidence that a pan house (the remains of which were probably the wall on the beach at Site 3) was operating during the construction of the building in Trench 9.

Construction features, west room

In the west room, structural features also belonging to the construction of the building are described below. Sixteen stakeholes [9060] were recorded located parallel to and at a distance of between 0.3m to 0.4m from the south, west and north walls of the building. These were mainly squarish and circular in plan and between 2cm and 12cm deep (Plate 11). Four had a pointed profile, four had flat bases and two were angled. All were filled with very dark brown homogenous soily sand.

A circular concave sided cut [9046], 0.3m in diameter and 0.13m deep was located in the northern half of the room. A single flat stone had been laid at the base. The cut was filled with clean dark grey clay/shale (9047) identical to that of overlying deposit (9032).

In the northeast corner was a 0.8m x 0.4m spread of plastic yellowish brown clay (9056). This filled a slight depression in the soft underlying sand (9041). A rectangular cut oriented E-W, measuring 0.5m long x 0.2m wide, x 6cm deep was recorded below the clay pad (but not given a separate context number). This was filled with clay, shale, organic material and red sandstone chips and contained some fish bone and animal bone.

Together, these features provide evidence for structures associated with the construction of the building, probably scaffolding or similar. They were subsequently sealed by the make-up for the floor (9032) and so must have been in use only during the construction of the building.

The masonry

The only surviving evidence for a construction trench for a wall was [9058] recorded in the west room. The trench measured 4m long, 0.45m wide and 0.3m deep with steeply sloping sides and a flattish base. It extended from the threshold of the doorway to the north side of fireplace [9077] and hearth [9048]. It had been backfilled with loose mixed sand (9059) containing sandstone chips, mortar and lenses of darker material. A solid slab of mortared rubble (9061) also within the cut was located in the angle formed by the south side of the hearth stone [9048] with dividing wall [9003].

No construction cut was visible on the east side of wall [9003], or for any other wall of the building. The more substantial construction trench here may be related to the requirement for extra care in the construction of the foundation for the wall which was to support the chimney and fireplace.

The walls of the building were constructed predominantly from fine-grained, hard, greyish white siliceous sandstone boulders (Callovian stage Clynelish Quarry Sandstone Member), with less commonly occurring blocks of quartzite; Old Red Sandstone; conglomerate; granite; moine schist; and red flag-like sandstone. The size of the masonry blocks generally fell between 0.15m – 0.5m, each block surrounded by smaller angular packing stones. The walls were constructed of two parallel skins of facing stones infilled with a generously mortared rubble core, the final width of each wall measuring approximately 0.7m (2 feet). The finish was random uncoursed rough face, with stressed quoins. Except for [9058] foundation trenches were not visible, but there was a clear foundation course of unmortared large unworked beach boulders, presumably laid into a shallow trench in the sand. Although the hard white sandstone was quarried (e.g. at Clynelish) in later periods, the rounded form of the boulders and

chatter-marked cortex provides evidence that the masonry used to construct the walls of the building was collected as boulders from the adjacent shoreline.

All masonry for the external walls was bonded with a weakly cemented white lime mortar, speckled with yellow and orangey brown coarse sand/fine grit and shell fragments. The mortar was generously applied to bond the inside of the facing blocks with the angular rubble core of the walls, and also used to harl the external and internal faces of the walls. Drops and splashes from the harling of the external face of north and west walls formed discontinuous narrow spreads of lime mortar upon the external ground surface. For approximately 0.5m above this level, both on the internal and external faces of the walls, the harling survived as a relatively continuous covering surrounding the larger masonry blocks. Above this it was weathered and fragmentary revealing the small packing stones that surround the facing blocks. The exception was the internal face of west wall [9002], the central part of which had not been pointed or harled. This was possible evidence for a structure that abutted the face of the wall here. It coincided with a noteworthy concentration of mortar and rubble demolition (9072), but there was no further evidence to help interpretation.

Fireplace and chimney

In dividing wall [9003] was fireplace and chimney [9077]. The masonry of the dividing wall and chimney was clay bonded, not mortar bonded as in all other walls. The fireplace surround and lintel were constructed with dressed Brora Sandstone blocks (pale yellow, fine-grained friable sandstone, which outcrops at Sputie just west of the site). These formed stressed quoins on both sides to form an opening 1.10m wide at the front of the fireplace. The inside edge of each block was cut at an angle greater than 90° to form the sides of the fireplace which were angled towards the back of the fireplace which measured 0.6m wide. The masonry forming the back and the base of the fireplace was severely heat reddened and cracked. A 4cm thick deposit of ash and coal (9015) lay upon the base of the fireplace. The lintel was formed from a single rectangular block, 1.14m long x 0.34m high x 0.16m thick. A severe crack had broken the lintel into two pieces (in antiquity).

Carved into the lintel and the north side of the fireplace surround were a number of symbols and letters (Figures 4 and 5). Horizontal grooves carved into one of the surrounding blocks on the south side were likely to be the result of knife sharpening.

Moulded masonry

The surviving section of south wall [904] contained two 0.94m (3 feet) wide door openings located on either side of the internal dividing wall [9003]. The openings were flanked with pale yellow, fine grained Brora Sandstone door jambs with chamfered corners. A symbol consisting of an 8cm x 6cm bisected inverted triangle, was carved onto the outside face of the western jamb of each door at ground level (Plate 12; Figure 6).

Built into the west wall [9002] was a moulded stone window sill [9076], 0.5m wide x 0.3m deep x 0.24m thick. A shallow splay was carved into the outside edge of the sill. Just forward from the centre line of the stone was a single square mortis c. 4cm in diameter, which would have housed an iron stanchion bar (Plate 13). The dimensions of the sill indicate it could have accommodated a *circa* 0.35m wide fixed light.

The position of the sill in the wall, and the arrangement of the surrounding masonry of the wall, shows that the piece was not in situ (Plate 14; Figure 7). However, the freshness of the carving in the soft sandstone indicates it was not re-used from a pre-existing building. It may have been an extra un-needed piece, or was damaged or unsuitable as a window sill. The stone is an important find because it provides information as to the likely size and form of the windows in the building, thus far evidenced only by fragments of window glass.

Carvings

The carvings in the door jambs, the north side of the fireplace surround and the fireplace lintel comprised a range of marks. The bisected inverted triangles on the doorways the 4 mark on the fireplace lintel and the rune-like marks (Π, Λ, Π) have a similar appearance to masons' marks. Others had letter forms, such as the S β β on the lintel and the clear E D carved into the fireplace side.

The timing of the engraving is important for their interpretation. All were carved into soft easily weathered sandstone. It is clear that the inverted triangles inscribed at ground level on the doorjambs were carved either during the construction phase or use of the building. The marks have been stained by the coal and ash deposits that accumulated in front of the building when it was in use, and must have been buried rapidly when the building ceased to function, as they were still very crisp. The carvings around the fireplace were less well preserved and showed signs of weathering. This was probably as a result of their positioning at a higher level on the building, meaning they were exposed to the elements for a period when the building was unroofed. Unlike the symbols on the door jambs, there was no definitive evidence that the fireplace symbols were carved during the construction phase or use of the building. Therefore, it is possible they were carved when the building was ruinous. However, there is no archaeological evidence for re-use of the building following the demise of the salt house in 1617, and the stratigraphic evidence strongly suggests the building was very rapidly inundated with sand following its abandonment. So, if the fireplace carvings represented graffiti that post-dated the use of the building, they must have been inscribed within a relatively short time period (decades) after the pan house ceased to operate and are very likely to be no later than the 17th century. It is also perfectly possible that the door lintels also carried carvings, but these structural elements have not survived.

Some of the clearer letter forms appeared to be graffiti initials. Some of the marks appear similar in form to masons' marks, but their position on the building is unusual for a mason's mark. However, there are other avenues of research.

The use of apotropaic symbols (from the Greek to avert), reached a peak during the early 17th century. These were carved around openings of houses to ward off evil or bad luck. During the period when this building was constructed, fear of witchcraft, especially on the east coast of Scotland, was at its height. Published examples of possible apotropaic marks in Scotland of this period have been recorded carved into wooden fireplace lintels in Anstruther (Darwood & Sherriff, 2003) and at Culross. The marks usually have a simple geometric or letter type shape (carved with straight lines to resemble runic script). Some of these have a similar appearance to the marks found around the fireplace at Brora. The marks may have been inscribed by the occupiers of the building, or in some cases by the builders during the construction phase into fabric which would have been covered up.

*An alternative theory is that some of the marks may have represented 'house marks' (Williams, 1857; Christison, 1901). This could be most relevant to the inverted triangles engraved on the west jamb of each doorway. The use of distinguishing marks to denote owners' property was common in northern Europe during the medieval and early modern period. Williams records numerous examples of house marks, dating from the mid 16th century, engraved on houses in Germany, Witney, Oxfordshire, Norwich and Yarmouth. These house marks were connected with merchants', tradesmen's' and stonemasons' marks (Williams *ibid*). Some of the house marks illustrated by Williams from Ditmarsh (in modern Germany), Lubeck (Germany), Oxfordshire, Sussex and Somerset (Figure 11) are very close in their form and their position on the buildings to those recorded in Brora.*

Structures and deposits to the west of the building

Contemporary with the construction of west wall [9002], and built against its external face, was a square, 1.2m x 1.0m stone structure [9027] which survived to a height of 0.7m (Plate 16; Figure 7). The structure was composed of very large roughly hewn boulders of siliceous white sandstone, Old Red

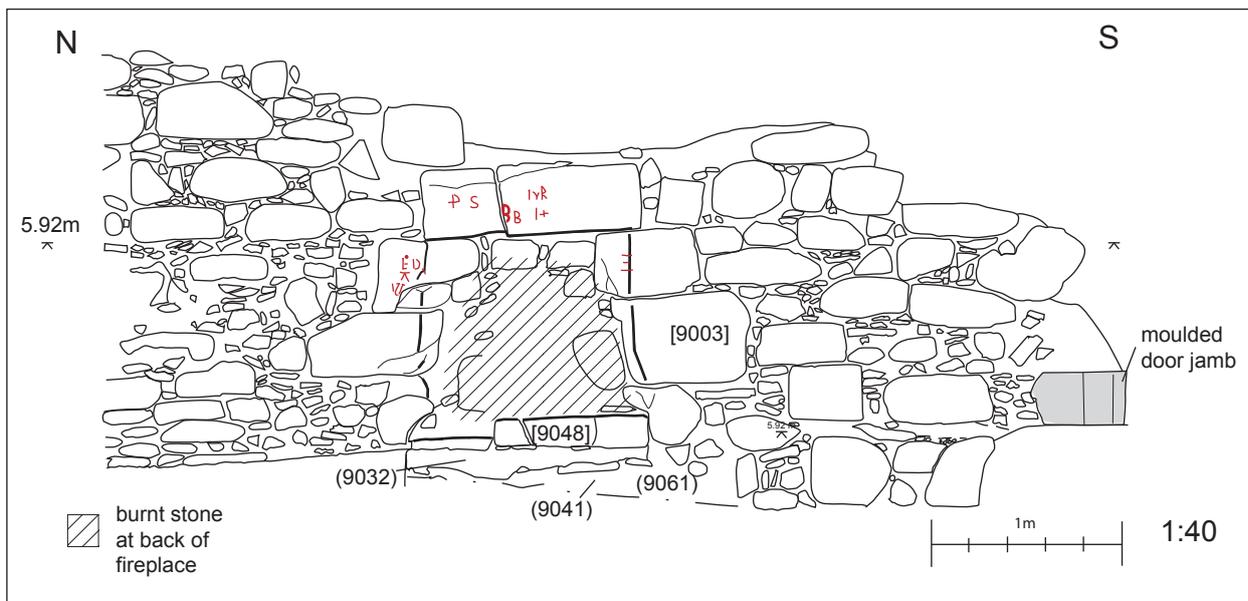


Figure 4. Elevation of west facing dividing wall [9003] showing fireplace and carved symbols

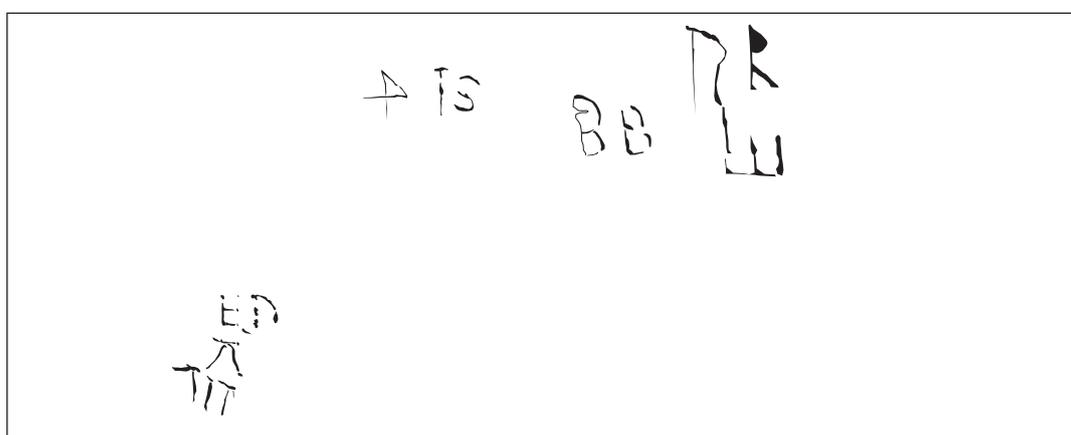


Figure 5. Detail of fireplace and tracing of carved symbols

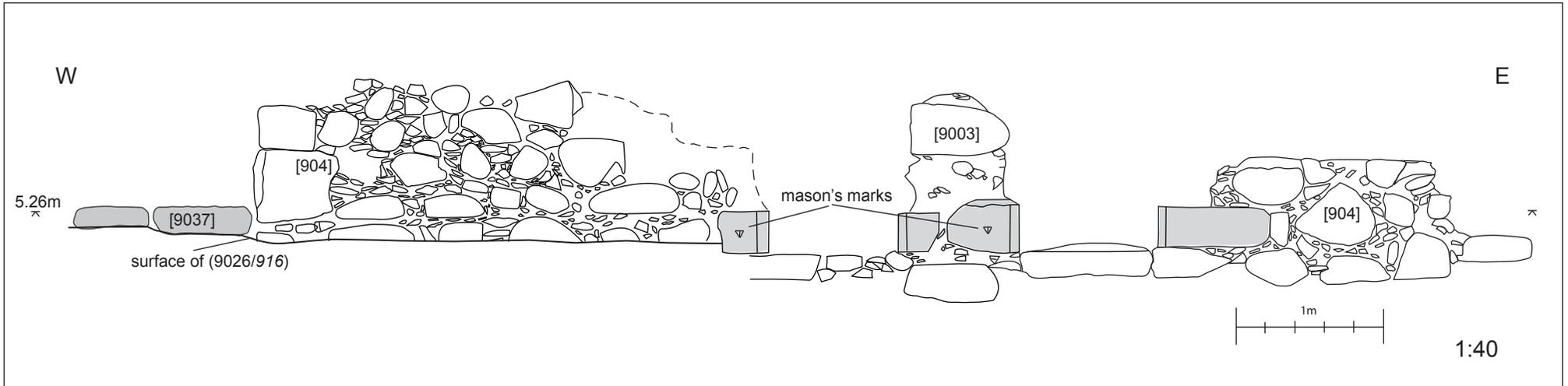


Figure 6. Elevation of surviving stretch of front (south) wall [904] showing doorways and position of masons marks

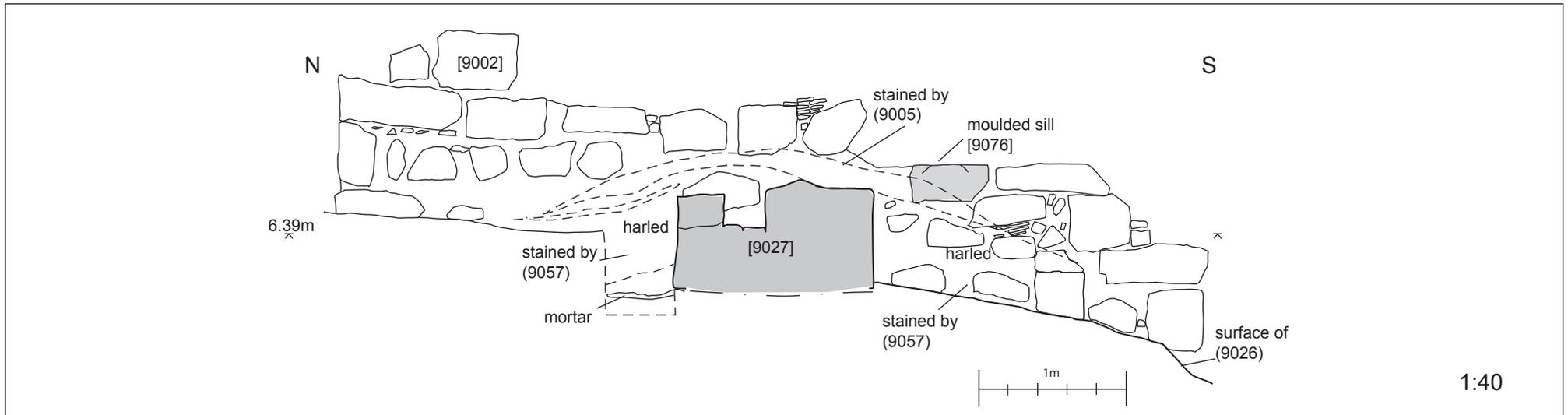


Figure 7. Elevation of west wall [9002] and butress [9027] showing position of moulded window sill and staining caused by accumulation of burnt shale deposits

Sandstone and granite, bonded with clay and harled on the north and south faces with lime mortar. The form and position of the structure indicates it was a supporting buttress for the west gable end wall of the building.

Following construction of the buttress a series of deposits composed of burnt and unburnt shale, sand and food waste were dumped on its northern side. These formed a mound in the area between the north side of the buttress and wall [9002], dipping downwards and petering out northwards and westwards. At the base was a 0.1m thick deposit of colourful red, purple, pink and black burnt shale (9036), overlain by a 0.13m thick layer of sulphurous yellowish and greenish unburnt shale (9035). Above this, was a dump of loose pale brown sand (9034) present in the corner formed by the north side of the buttress with the face of the west wall. This deposit contained 30 % of all fishbone recovered from Trench 9, as well as small numbers of marine shell and animal bone and a number of iron objects including a possible fragment of smithing slag. A tiny sherd of abraded medieval pottery, probably no earlier than the mid 12th and no later than the mid 14th century, was recovered from the deposit (Haggarty *pers comm.*). This must be re-deposited, but is of interest because it is evidence of a medieval presence on the Back Beach at Brora. The dump of sand and food waste was overlain by a further layer of burnt shale (9033) and blown sand (9053), before being sealed beneath compacted surface (9026), same as 916, described below.

The stratigraphic relationship of these dumps and spreads of burnt and unburnt fuel and food waste show that they accumulated during the construction of, or at a very early phase of use of, the building in Trench 9. They underlie the earliest external surface (916/9026) and are contiguous with and have a similar composition to the sequence of industrial waste deposits recorded in the coastal section westwards of the building, which extended to the remains of the monumental wall on the beach (Site 3, see DSR 2010). They provide further evidence that the building at Site 3 was in operation during the construction of the building (activities at site 3 must be the origin of the burnt material) in Trench 9; and that the spreads of burnt deposits forming the compacted surfaces between the buildings were laid down at this time.

5.2 Phase 1B: Use of the building in Trench 9

Contexts described in Phase 1B are shown in plan on Figure 8

Floors and surfaces, east room

Paved floor (9039), same as 919, was composed of large angular bituminous shale slabs, bedded onto clean beach sand (9045) same as 976/918 and packed with beach cobbles and pebbles (Plates 17 and 18). The bedding sand contained moderate numbers of iron objects, clinker, fishbone, marine shell and animal bone, as well as sandstone chips, clean clay and mortar. The paved floor did not extend south of partition feature [9040]. South of this feature covering a 2mx 4m area in front of the doorway was a layer of highly compacted sulphurous unburnt shale and sand (9031) that formed the surface or floor of the entrance of the room. Seventy four iron objects were recovered from layer (9031) along with frequent marine shell including 91 oyster shells.

Floors and surfaces, west room

Covering the construction horizon and features in the west room was an homogenous, sterile dark grey clayey shale (9032). This formed a continuous deposit across the room, and varied in thickness from 1cm against the west wall, to 15cm in the southeast of the room. The deposit tended to be more clay rich at the surface with looser sulphurous shale making up the major component of the deposit at the base (Plate 19). The material of (9032) was laid as make-up for a floor or surface in the west room. It was similar to deposit (9031) in the entrance area of the east room although much more homogenous and sterile.

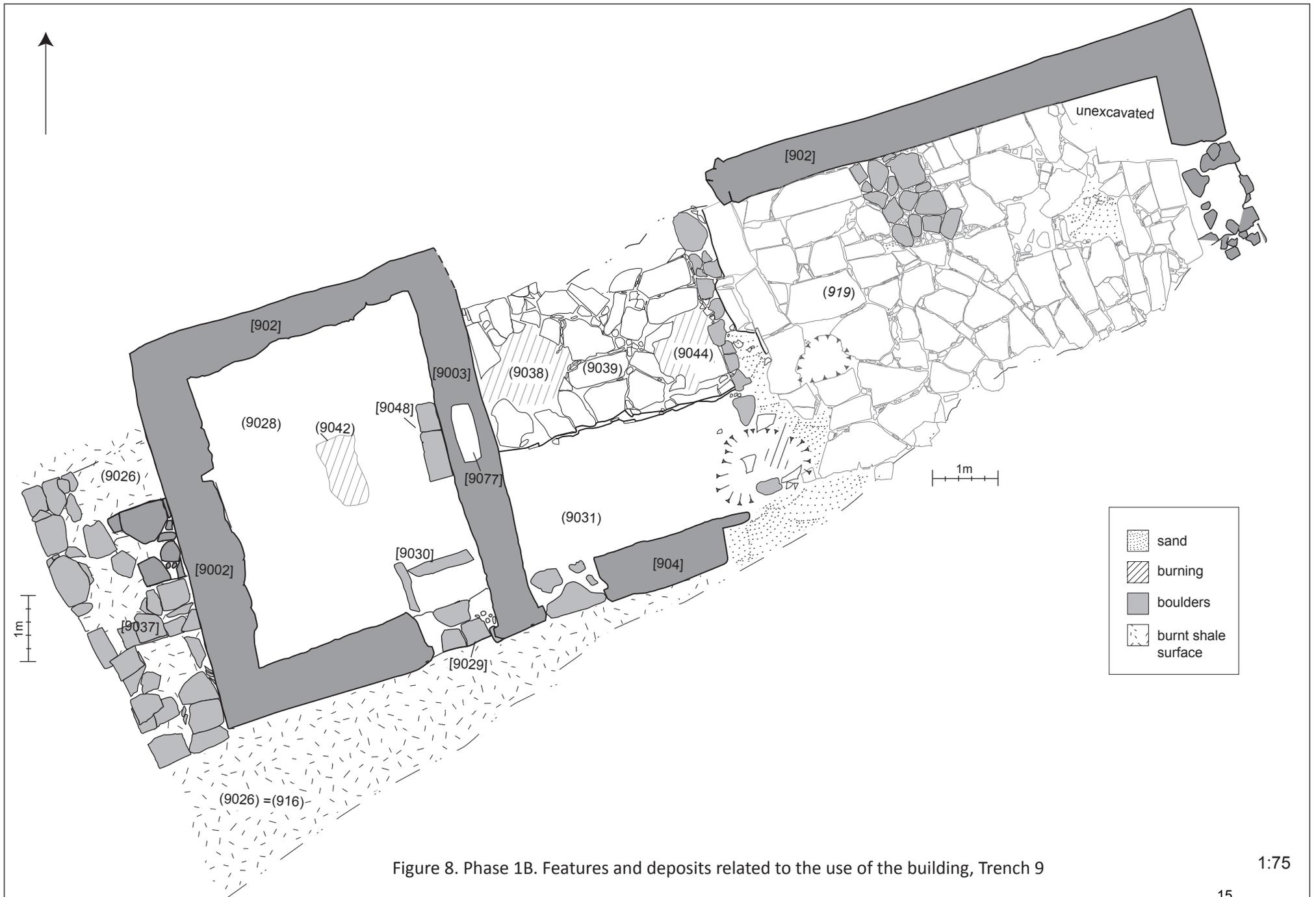


Figure 8. Phase 1B. Features and deposits related to the use of the building, Trench 9

Fixed structural features, such as the hearth stones [9048], two rectangular sandstone blocks [9030] in front of the doorway, and paving stones [9029] at the entrance, were bedded into (9032) (Plate 20). The hearth stones [9048] projected 0.4m into the west room. They comprised two hard light grey sandstone blocks, bedded into shale/clay layer (9032) and levelled with small flat angular slabs of red sandstone. The two sandstone blocks [9030] measured 1m x 0.17m and 0.82m x 0.12m and were set at right angles to define a small porch area of the west room. The porch area was paved with three large (c. 0.4m x 0.4m) flat boulders [9029] surrounded by smaller pebbles, in a mortar matrix.

The surface of (9032) was covered with a thin variable black, purple and ashy deposit (9028) (Plates 20 and 21). This was soft and crumbly immediately adjacent to the west and north walls, and compacted elsewhere, particularly in the entrance area in front of the doorway, where it was mixed with a greater proportion of coal dust, and covered the paved porch area. The layer was typical of trample associated with use/occupation of the room. A low to moderate quantity of fish bone, marine shell, animal bone and a number of iron objects were recovered from the layer.

Structures and deposits to the west of the building

The highly compacted and colourful exterior surface 916, composed of fuel ash and recorded south of the building in 2010 was also encountered in the 2011 excavation (Plate 22). The layer extended across the threshold of the doorway into the west room, where it terminated in a straight line (Plate 12). This provided evidence of the position of a former wooden door frame, against which the layer would have abutted.

Surrounding buttress [9027] and abutting wall [9002] to the west of the building, was a thin layer of highly compacted, colourful black/ purple/pink/brown burnt shale and ash within a sandy clay matrix (9026) (Plate 16). The deposit was the continuation of 916 on the western side of the building. The layer was most substantial to the south and west of the buttress, petering out to the north where it overlay the sequence of fuel ash/waste and food waste dumped outside the northwest side of building described above.

Laid upon compacted surface (9026) was a spread of cockle shells (9025) within a matrix of loose pale brown sand (Plate 23). The deposit was unusual in that it only contained cockle shells (146 were recovered) and must have represented the remains of a single event or activity.

The shells formed the final deposit of the sequence that preceded the construction of a dry-stone structure [9037], built against the outside face of the west wall of building. It incorporated buttress [9027] into a 4.7m long (N-S), 2m wide (E-W) wedge-shape structure. It was constructed of very large, 0.8m to 0.6m in diameter, roughly faced boulders laid upon surface (9026) to form a perimeter or revetment wall. This was then infilled with further boulders of varying sizes and mixed shale/sand/clay (9057), which contained low to moderate quantities of animal bone, fish bone, marine shell and occasional iron objects. *The whole formed a stone platform that linked the higher ground to the rear of building with the lower ground in front (Plate 24). The upper part of the structure was too damaged to be sure about its final form. It could have been a simple loading platform facilitating access to an upper floor or storage area of the building. It could have carried stone or wooden steps.*

Covering the stones of [9037] was a highly variable layer of black/pink/yellowish brown sand and clay containing large amounts of burnt shale and coal (9005), *probably same as 945*. In places the layer was trampled and highly compacted. Moderate to large quantities of fish bone, marine shell, animal bone, and a number of iron objects as well as some clinker and possible slag were recovered from the deposit. An arrowhead (Plate 25) was found by our youngest volunteer in this layer. The closest published parallels in the region are barbed hunting arrowheads dating from the 14th and 15th centuries found during the restoration of Urquhart Castle near Drumnadrochit near Inverness (Samson, 1982). At an early stage in the excavation, a body sherd of green glazed post medieval reduced ware found within

the trampled deposits overlying [9037] was recorded as a cleaning find (9001) although it probably came from (9005).

(9005) was similar to the initial sequence of dumps of fuel and food waste on the west side of the building. It was composed of fuel ash and kitchen waste dumped periodically outside the west side of the building during its use, and trampled in places to form a possible surface. It formed a distinctive mound over platform [9037], which could be identified as a black stain on the outside face of wall (Plate 16, Figure 7). It was probably the same as layer 945 recorded in front of (south) and west of the building in 2010.

5.3 Phase 1C: Disuse (?) and decommissioning of the building in Trench 9

Contexts described in Phase 1C are shown in plan on Figure 9.

Fires (shown on Figure 8)

In the northwest corner of the east room, an approximate 1m² area of the paved floor was covered with dark red, black and pink burnt clay and ash (9038) containing frequent small fragments of crushed mussel shell. The intense heat of the fire, which had caused the area of burning, had penetrated the paving slabs and scorched the underlying bedding sand (9045) (Plate 26). A spread of compacted ash flecked with coal (9044) overlay the paved floor in the east of the area of excavation. There was no evidence of *in situ* burning here, and it is likely the ash was related to (9038).

In the centre of the west room, the clay surface of (9032) had been burnt to a very hard dark red fired clay (9042) which covered an area of 0.95m N-S x 0.6m E-W. The scorching extended to a depth of 8cm through the underlying layer (9032). This *in situ* burning was very similar to that recorded in the east room (9038).

The circumstances of the 'bonfires' lit upon the paved floor of the east room and in front of the fireplace of the west room are not known. Stratigraphically, they belong to the period immediately following the use of the building and so were unlikely to be associated with the function of the building during its salt house phase. The scale and intense heat of the fires provides greater support for a theory that they were related to the dismantling and decommissioning of the building – rather than campfires of squatters.

Deposits, east room

Directly overlying the paved floor and burnt areas in the east room was a firm to compacted very dark brown/black organic and clay rich sand (9024) (Plate 27). The layer varied in thickness from <1cm to 5cm. It contained small spreads of clean clay, occasional mortar fragments, ash and lime putty-like material. In places, there was a laminated structure, suggestive of trampling. A range of cultural material was recovered from (9024) including moderate quantities of fish bone, crustacean, animal bone, marine shell and a number of iron objects as well as 4 sherds of pottery and 19 sherds of window glass. The glass was recovered from the interface of the layer with floor slabs (9039) below, from the northern half of the room. The pottery included a jug handle and rim of a coarse fabric (Plate 28). The inside surface of the pot was a buff colour and the outside, an orangey brown with areas of scorching. The broken cross section of the pottery showed that it had a dark grey (reduced) core. The pottery is unlike anything recovered from the immediate area in this period and is probably locally made. The closest parallels are from Tarbat (Haggarty *pers comm.*). The Tarbat pottery has been classified as East Coast Redware, a type of red fabric with a green glaze, which forms a tradition of native pottery production apparently dating from the 13th to the 15th centuries (Hall, 1999)

A very similar, but more variable and less compacted deposit (9020) covered (9024). The layer was between 5cm and 10cm thick and extended across the area of excavation in the east room. The deposit contained lumps and patches of clay, mortar and tumbled masonry, concentrated adjacent to dividing

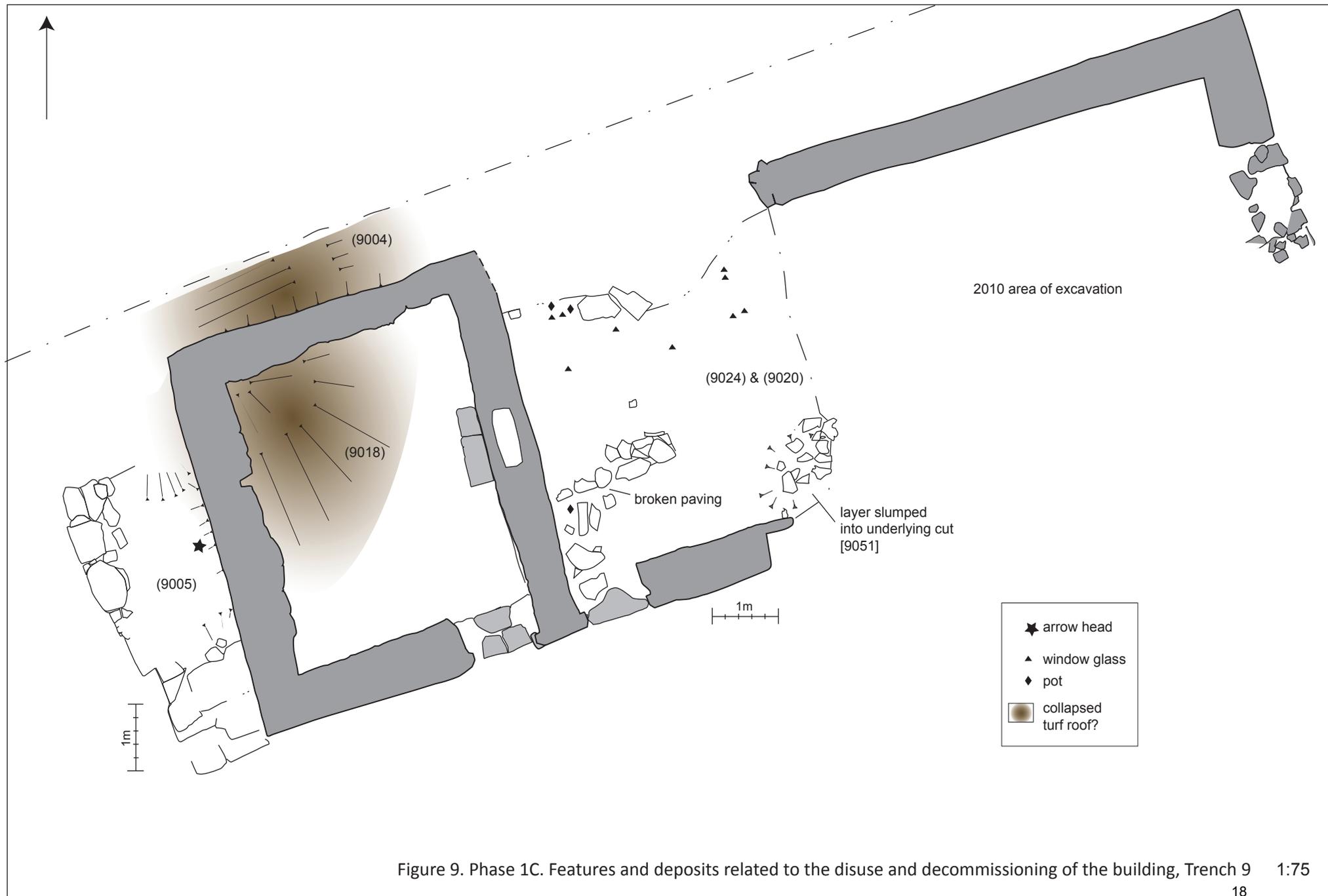


Figure 9. Phase 1C. Features and deposits related to the disuse and decommissioning of the building, Trench 9 1:75

wall [9003]. Low to moderate amounts of fish bone, crustacean, marine shell and animal bone were recovered from the layer. Deposit (9020) is probably the upper part of (9024).

The trampled nature of (9024) and the quantity of cultural material incorporated within it, including food waste, provides evidence of a human presence during its accumulation. The presence of window glass fragments suggests the deposit was associated with the cessation of use and initial decommissioning of the building; the glass fragments possibly the result of a broken pane during the removal of the windows. The upper part of (9020) contained building materials including tumbled masonry, clay and mortar which show that some demolition occurred during the accumulation of the deposit. The organic content of the deposit could have derived from a turf roof, of which there is further evidence in the west room and on the north side of the building.

Deposits, west room

Separating occupation deposits (9028) with rubble demolition deposits (described below) a drift of windblown sand (9022) was recorded across the southern half of the west room. A small number of iron objects, a copper alloy button and small to moderate quantities of fish bone, animal bone and marine shell were assigned to this layer, although were more likely to have come from the surface of underlying layer (9028). The drift of sand may well mark the end of use of the building.

Above this was a soft, homogenous dark brown stone free soil-like deposit (9018) containing lenses and streaks of clay and sand. The deposit formed a mound of material, up to 1.15m thick piled up in the northwest corner of the west room (Plate 29). It petered out southwards and eastwards to less than 1cm thick in the southwest corner of the room. Tumbled masonry was pressed into the top of the layer but not contained within it.

Deposits outside the building

Against the north side of wall [902] was a similar mound to (9018) composed of a firm, homogenous very dark brown peaty and soil-like chunks and lenses within a mixed brown sandy matrix (9004). The mound was highest at the centre of the face of the wall outside the west room, thinning and dipping downwards towards the west, east and north (Plate 30). Eastwards, the homogenous organic material became mixed with greater proportions of sand. Westwards, the deposit thinned and overlapped the limits of the burnt and unburnt shale dumps on the west side of the building. The only finds recovered from the deposit were two very heavy lumps of iron rich material – possibly slag.

The composition, form and stratigraphic position of both (9018) and (9004) support an interpretation that these deposits were the remains of a collapsed section of the turf roof the building.

PHASE 2

5.4 Phase 2A: The primary demolition of the building

Primary demolition deposits, east room

The earliest demolition deposits in the east room comprised large masonry blocks within a loose, pale yellowish brown sand, mortar and clay matrix (9017), *same as 916, 950,953*. This was concentrated along the east side of dividing wall [9003].

Primary demolition deposits, west room

The base of the demolition sequence in the west room comprised clay and rubble deposits (9012), (9019), (9021) and (9023) (Plate 31). These were essentially the same variable deposit, excavated and recorded as separate layers due to their very uneven form. They were banked up against the north and west walls of the room, becoming much thinner in the centre of the room and towards the south and east. Gravity had caused the largest and heaviest blocks of masonry to roll into the centre and eastern side of the room. Within the fireplace, these deposits were composed of a brownish grey plastic clay containing coal and burnt sandstone fragments and coal streaks and flecks (9010).

The origin of the clay in all these demolition layers was the clay bonding of the central wall and chimney washed out of the masonry from the wall [9003] and the chimney superstructure.

Low quantities of animal bone, fish bone, marine shell and small numbers of iron objects and wood fragments were recovered from the clay rich demolition material.

5.5 Phase 2B: Secondary demolition and abandonment of the building

Secondary demolition deposits, east room

The clay rich demolition was overlain in the east room by a loose, pale yellowish brown and greyish brown sand containing frequent large and medium sized rubble blocks (9013), *same as 923*, concentrated along the east face of dividing wall [9003]. A number of the blocks were sooted and burnt on one side, and must have originated from the chimney. Away from the wall, the relative proportion of rubble to sand decreased until the deposit was composed of mainly sand at the junction of the 2011 and 2010 areas of excavation.

Secondary demolition deposits, west room

Equivalent deposits in the west room comprised (9014), a loose, pale yellowish and greyish brown sand containing frequent very large, large and medium rubble (Plate 32). This deposit completely filled the west room. The upper part was removed by machine, but it attained a thickness of at least 2m in places. The equivalent deposit filling the fireplace was (9011), a mixed blown sand, clay and rubble. A noteworthy concentration of mortar and rubble (9072) occurred in the centre of the western half of the west room.

Low numbers of fishbone, animal bone and marine shell, presumably re-worked from earlier deposits, were recovered from all these demolition layers.

Both inside and outside the building, the upper part of the sand rich demolition material was removed by machine. In the area of the west room and round the north and west sides of the building, extremely large masonry blocks were removed during machining (Plate 3).

The sheer quantity of surviving building material on the site provides evidence that materials were not removed for re-use, and also supports an interpretation that the building may have been of one and half

or two storeys. This is further supported by the stone structure [9037] on the west gable end wall, which could have given access to an upper floor.

5.6 Phase 2C: Events following the demolition of the building

At the junction of the 2010 and 2011 excavation areas in the east room, demolition deposits and blown sand (9013) was covered by a very thin layer (2cm to <5mm) of slightly compacted, mottled dark brown/black sand (9008), same as 933, with occasional clay and ash patches. This deposit spread over a 3m x 2m wide area petering out southwards and westwards. Ten iron objects were recovered from the surface of the layer. The layer was the continuation of 933, excavated in 2010. Forty iron objects, predominantly nails and diamond shaped objects were recovered from the surface of 933, bringing the total number of objects recovered from this deposit to 50.

The deposit represents an episode of stability, within the sequence of accumulation of blown sand. The iron objects may be the result of deliberate removal from, or in situ decay of, a wooden structure, such as planking from a boat.

Subsidence of north wall [902]

The northern edge of deposit (9008) was truncated by what was first thought to be a robber cut for the central part of north wall [902], which was the only part of the masonry of the building that did not survive. The vertical sided cut [9007] closely followed the line of the absent wall between the upstanding portions to the east and west. Upon excavation, the masonry of the wall was revealed, (9006), slumped into a depression or void, the southern edge of which had initially been recorded as the cut. The central portion of north wall [902] had collapsed as a more or less coherent block into an underlying void (Plates 33, 34 and 35). The sterile nature of the sand matrix amongst the fallen masonry and the lack of any material from demolition deposits of the building within the cut support a later date for the failure of the wall, i.e. following the abandonment and inundation with sand of the ruinous building.

The cause of the void which caused the failure of the wall was not established. It may have been related to an underlying geological feature. John Farey's mineral map of 1812 depicts a 'Coal Pit used in Qⁿ Elizabeths reign' east of the site. Although the location of the pit surveyed by Farey is too far away to be the cause of the collapse of the wall, it is possible that a tunnel or shaft related to earlier coal prospection underlies this part of the structure.

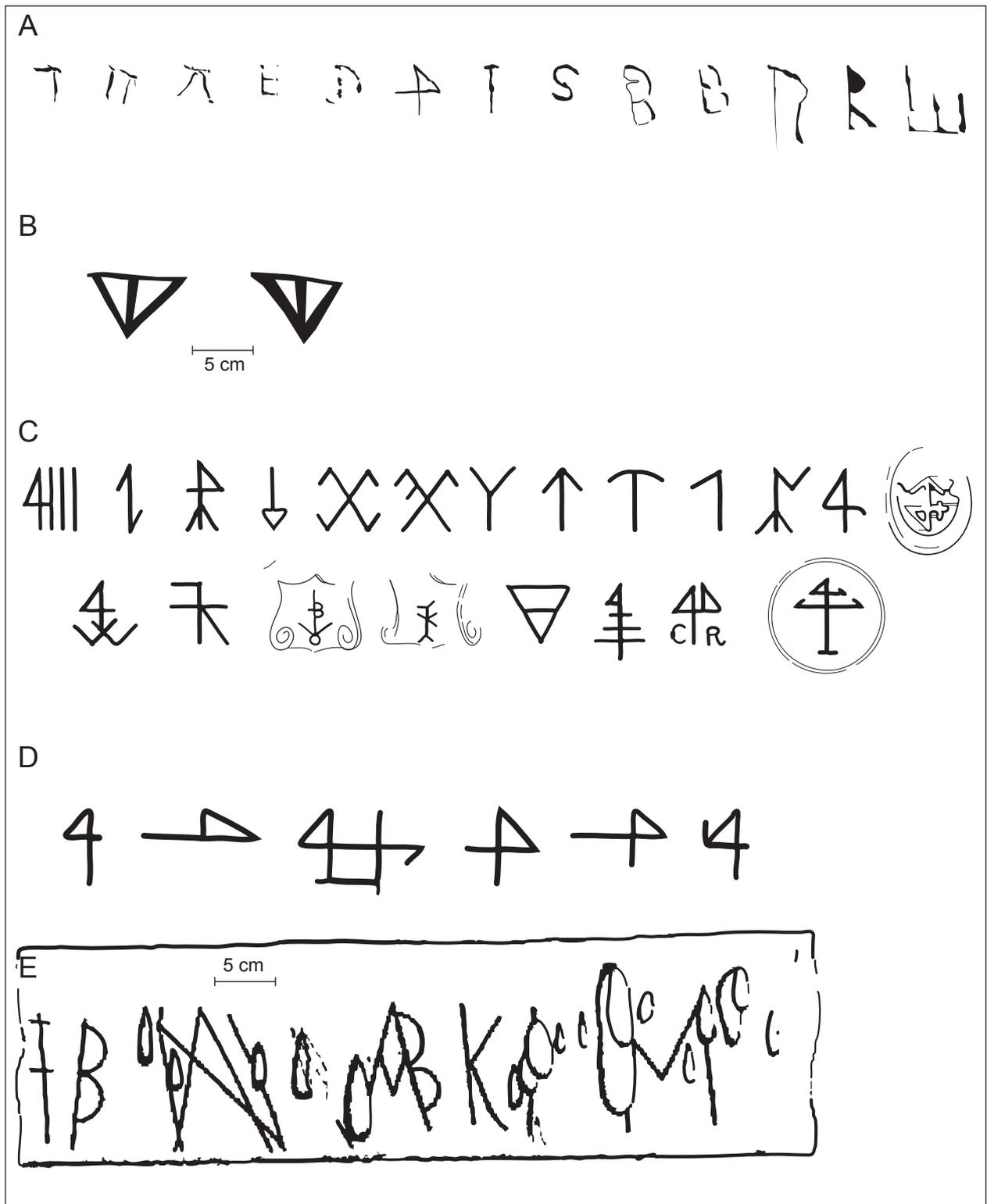


Figure 11. Tracings of the clearest marks recorded in Brora shown in relation with examples of contemporary house marks, medieval 4 type masons marks and symbols interpreted as apotropaic marks from Scotland. (not to scale unless stated)

- A: Symbols carved on the lintel and northern side of the fireplace in Brora.
- B: Symbols carved onto the doorjambes in Brora.
- C: 16th and 17th century housemarks from Ditmarsh and Lubeck (in modern Germany), from Williams, 1857, Plate X page 383
- D: Medieval 4 type masons' marks recorded in Scotland, from Christison, 1902, Figure 114 p 396.
- E: Possible apotropaic marks from Anstruther, from Darwood & Sherriff, Illus 3 p 126
Numerous further examples may be found in Easton, 1999.

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Plate 1. The site at the beginning of excavation, taken from the shoreline. The east end of the building revealed in the 2010 excavation is on the right. Looking north.



Plate 2. Machining of the west end of the building. Looking west.



Plate 3. Machining out sand from the west room. Very large masonry blocks were encountered through out the accumulation of dune sand within and around the building. Looking west.



Plate 4. The site following machining. Looking east.



Plate 5. Aerial view of whole building. The sand covered 2010 area of excavation and the remnants of the limekiln, inserted into the ruinous building, are visible in the top half of the photograph. Looking east.



Plate 6. Construction features in east room. Spread of boulders (9071) is in the foreground. Looking west.



Plate 7. Fill (9052) of pit/posthole (9051) showing concentration of marine shell on the left and re-deposited shale floor slabs on the right. The east side of this feature was recorded in the 2010 edge of excavation, where the floor slabs appeared to respect the edges of the cut.

Plate 8. Linear structural feature (9040) in east room. This divides the paved floor (9039) with the shale surface (9031) of the entrance area. The fill of the feature (9055) consists of two parallel lines of vertically placed shale fragments and cobbles. These must have supported an upstanding wooden structure, now gone, to create an internal partition dividing the entrance area from the rest of the room. Posthole (9066) is visible just in front of the baulk on the right hand side of the partition. Linear slot (9068) is on the left side of the partition. Looking east.





Plate 9. Construction features in east room. Mortar filled feature (9063) is in the foreground. Looking south.



Plate 10. Construction and trampled deposit (9054) below clean bedding sand (9045). Mortar spreads are clearly visible. Looking south.



Plate 11. Some of the stakeholes (9060) in the west room adjacent to west wall [9002]. Looking west.



Plate 12. Thresholds and the base of moulded stone jambs of doorways in south wall [904].
 A symbol of a divided upside down triangle is carved into the western jamb of each doorway. A strip of highly compacted burnt shale external surface (916) south of the building can be seen extending over the outside edge of the threshold stone to where it must have abutted a wooden doorframe. Looking north.



Plates 13 and 14. Moulded stone window sill [9076] built into west wall [9002] showing splay and stanchion hole. The surrounding masonry and position of the stone in the wall make it unlikely to be *in situ*. Looking east.



Plate 15. Moulded stone window sill in Clyne Kirkton church. The sill is almost identical in form and size to that in the salt pans building. In the church, the stone has been positioned with the splay facing inwards. The church was re-built in 1770 on the site of its predecessor. This was probably the church which was repaired by Robert Gordon between 1625 and 1626. The window may be re-used from the early 17th century repair and the timing means it is possible for the same Sutherland Estate stone mason to have been responsible for the carved masonry for the church and for the salt pan buildings.



Plate 16.
Original buttress [9027] against west wall [9002] surrounded by compacted surface (9026). The buttress was later incorporated into stone structure [9037], the perimeter walling of which can be seen in the foreground lying upon surface (9026). Moulded window sill [9076] is to the right of the buttress. Looking east.



Plate 17.
Aerial view of east room showing paved floor (9039) and compacted shale floor (9031) in the entrance area, which is defined to the east (left) by a N-S alignment of boulders within the shale floor, and pit (9051) visible where the south wall is truncated. An area of burning (9038) can be seen in the northwest corner of the room. The area of ash (9044) lies at the left end of the scale. The slumped section of north wall [902] is clearly visible in the foreground. Looking south.



Plate 18.
Surviving floors and contexts in east room that relate to the use of the building. The alignment of boulders on the left of the photograph (largely coinciding with the 2010 limit of excavation) appear to define a change in floor level which is slightly higher to the east (left). The shale floor (9031) of the entrance area is separated from the paved floor by a partition or counter (9040). Burnt area (9038) is to the right. Ash (9044) is to the left of the photograph. Looking south.



Plate 19.
Detail of material (9032) used as floor make-up on west room. It appears to have been laid in two episodes. The lower half of the deposit is a sterile clay/shale. The upper half is more mixed with cultural material including burnt shale and coal. The surface (9028) is sandier and is made up of trampled burnt fuel and other cultural material.



Plate 20.
Aerial view of west room showing occupation surface (9028). The hearth and chimney are visible in the dividing wall on the left side of the photograph. Two rectangular stones set at right angles define a small porch area in front of the doorway. Structure [9037] outside the west side of the building is on the right. Looking south.



Plate 21.
Removal of primary demolition fallen upon trampled surface (9028) in west room. Drift of blown sand (9022) visible in the southwest corner. Looking south.



Plate 22.
External surface (916) south of the building.
Looking northwest.



Plate 23.
Cockle shells of layer (9025). Part of the
sequence of cultural dump deposits in and
around stone structure [9037]. Looking south.



Plate 24.
Structure [9037] against west wall [9002].
Looking north.



Plate 25.
Arrowhead found by Callum Mackinnon in
dump of burnt fuel (9005) upon external stone
structure [9037].



Plate 26.
Clean bedding sand (9045) following removal of paved floor, showing scorching caused by burning (9038). Looking south.



Plate 27.
Black organic rich layer (9024) overlying floor of east room. The remnants of demolition rubble can be seen slumping into the top of underlying feature [9051] in the bottom left hand corner of the photograph. This feature also clearly shows the 2010 limit of excavation. Looking west.



Plate 28.
Handle of jug recovered from organic layer (9024) upon paved floor in east room.



Plate 29.
Homogenous brown soil-like deposit (9018) mounded in the northwest corner of the west room. Looking north.



Plate 30.
Dark coloured cultural deposits outside the building. Behind the building, these comprise a pile of organic rich sand (9004) very similar to (9018) in the corner of the west room. To the west of the building (right of the photograph) these comprise layers of burnt shale and coal mixed with food waste, which are largely delimited within the area of the external stone structure [9037].



Plate 31.
Mixed demolition deposits, (9072; 9012; 9010; 9021; 9023) within west room during excavation. The largest masonry blocks have rolled into the centre and eastern side of the room. Looking south.



Plate 32.
Team work. Removing large masonry blocks (9014) and clean sand from the west room. Looking northeast.



Plate 33.
Slumped portion of north wall [902] during excavation showing large block of collapsed wall within the fill (9006) of the feature. Looking east.



Plate 34.
Slumped portion of wall [902] following excavation. The form of the masonry tipping into the feature is clearly visible, as is the edge of the undisturbed paved floor (9039) at the base of the southern edge of the section. Looking north.



Plate 35.
Slumped section of wall [902]. Looking north.

Appendix 1. Summary of contexts

CONTEXT NUMBER	CONTEXT TYPE	DESCRIPTION	INTERPRETATION	SAME AS (2011)	SAME AS (2010)	PLANS	SECTIONS/ELEVATIONS	FINDS
9001		Initial cleaning layer number for finds						
9002	STRUCTURE, WALL		West gable end wall of building				021	
9003	STRUCTURE, WALL		Dividing wall				001	
9004	DEPOSIT [exterior]	Firm, very dark brown peaty chunks and lenses of material within mixed brown sandy matrix. Present within LOE area north (outside) west room. Approx. 20cm thick, and 'mounded' against the northwest corner of wall [902] thinning and dipping downwards towards the west, east and north. Eastwards, the homogenous organic material becomes mixed with greater proportions of mixed sand.	Remains of a collapsed portion of turf roof? Probably same as similar homogenous soily mound 9018 present within the inside northwest corner of wall [902] in west room.	9018?	908?	012	028, 044	140
9005	DEPOSIT/LAYER [exterior]	Compacted in places, loose upon excavation, black/pink/yellowish brown sand with clay and frequent burnt shale and coal frags. Occurs over and around stone-built platform structure 9037. Contains frequent fish bone, marine shell and Fe objs.	Fuel ash and kitchen waste dumped periodically outside west of building and trampled in places to form possible surface. Possible same as layer 945 recorded in front of (south) and west of the building in 2010.		945?	005		47, 26, 15, 17, 52, 40
9006	CUT	South side only seen and excavated. Linear, oriented E-W, follows line of north wall [902]. Steep sided, 0.9m deep at edge, but collapsed portions of wall remain in base, so could be much deeper.	South edge of hole created by collapse of central portion of wall [902] into underlying void.			002, 006		
9007	DEPOSIT/FILL	Large chunks of wall masonry, some still mortared together, within a matrix of loose, yellow sand with coal flecked drifts. A few fragments of organic material, almost certainly 9020 and frags of shale slab derived from floor 9039.	Collapsed and slumped portion of wall 902 that has fallen as a coherent block into an underlying void. The sterile nature of the sand matrix indicates the building was already inundated by windblown sand when the collapse occurred. The lack of any mixed material from the primary demolition deposits of the building within the cut supports a later date for the failure of the wall.			002, 006		23, 34, 51
9008	DEPOSIT/LAYER [interior]	Slightly compacted, loose on excavation, mottled dark brown/black sand. Occasional clay and ash patches. Thickness varies from 2cm - <5mm. Survives as a 3m x 2m wide patch at the east edge of ex. Peters out southwards and westwards. 10 fe objs recovered from the layer.	Same layer (western part) of 933 excavated and recorded in 2010. Contains ash, clay and coal not seen in 2010.		933	003	003	1-13, 36, 38
9009	DEPOSIT [interior]	Approx. 10 frags of dark red, burnt, sandstone fragments within fireplace 9077.	Highly burnt fragments of sandstone fallen from back of chimney into fireplace.				004	
9010	DEPOSIT [interior]	Brownish grey plastic clay containing coal and burnt sandstone fragments and coal streaks and flecks. Occurs within fireplace 9077.	Clay bonding, probably washed out of demolition material from chimney superstructure.	9012			004	
9011	DEPOSIT [interior]	Mixed blown sand, clay and rubble within fireplace 9077.	Upper part of demolition material filling fireplace.	9014			004	27, 37
9012	DEPOSIT [interior]	Brownish grey plastic mixed clay sand and sandy clay along west side of west room. Contains rubble with adhering lumps of clean clay. 1 frag wood recovered from layer.	Primary demolition of upper part of clay bonded dividing wall [9003] and chimney [9077]. Includes relatively continuous layers of clay washed out of rubble.	9010		007		18
9013	DEPOSIT [interior]	Loose, pale yellowish brown and greyish brown sand containing frequent large and medium sized rubble blocks, concentrated along east face of dividing wall [9003] in east room. A number of blocks are sooted and burnt on one side, probably originating from chimney 9077. More frequent smaller sized rubble at interface with dark brown layer below.	Demolition material from walls containing material from collapsed chimney superstructure. Building unroofed and being inundated with windblown sand during this event, which probably happened in stages with sand building up between episodes of collapse. Much of this deposit across the whole site removed by machine.	9014	923			155
9014	DEPOSIT [interior]	Loose, pale yellowish and greyish brown sand containing frequent very large, large and medium rubble. Fills west room. Thickest at centre of room. The upper part of this deposit machined out. At least 2m thick.	Demolition from gable end wall [9002], central wall [9003] and chimney 9077. Probably episodic with windblown sand building up between episodes. Large quantity of masonry (much of it machined out) would support theory of a 2-storey or 1 1/2 storey building.	9013		007		16, 41, 42, 43
9015	DEPOSIT [interior]	Compacted black and grey layer, 4cm thick, containing ash upon hearth base within fireplace [9077], west room.	Remains of fire ashes in fireplace.					
9016	VOID	VOID	VOID					
9017	DEPOSIT [interior]	Loose, pale yellowish brown sand/mortar clay matrix with frequent large rubble. Concentrated along east side of dividing wall [9003] in western end of east room.	Primary demolition of masonry of building in east room.	9012 9021 9019 9023		008		33, 50
9018	DEPOSIT [interior]	Homogenous dark brown stone free soil-like deposit with lenses and streaks of clay and sand. Present as a mound of material piled up in the northwest corner of the west room. Peters out to a thin, <1cm thick, layer of material in southwest corner. Not present along eastern edge of room. Tumbled blocks are pressed into the top of the layer but not contained within it.	Possible remains of collapsed section of turf roof, same as 9004 outside of this section of wall.	9008		007, 010, 013, 015	014	44, 45
9019	DEPOSIT [interior]	Dark grey clay and rubble in southwest area of west room.	Primary clay rich demolition. Probably largely originates from clay bonded dividing wall [9003]. This demolition sequence includes deposits 9012, 9021 and 9023. These are essentially the same variable deposit, excavated and recorded as separate layers due to the very uneven form of these demolition deposits which are banked up against the north and west walls, and much thinner in the centre of the room and towards the south and east.	9012 9021 9023		010		117
9020	DEPOSIT/LAYER [interior]	Firm to loose dark brown to black sand and clay mottled orange, pink and yellowish brown. 5-10cm thick, extends across east room. Inclusions of clay lumps and patches. Lumps and patches of mortar present adjacent to dividing wall [9003]. Deposit firmer and browner adjacent to south wall [904]. Contains fish bone, crustacean, marine shell and animal bone.	Cultural deposit in the east room probably associated with the early disuse of the building. The organic nature of the material could derive from a turf roof, and the mortar and clay derive from demolition activity. Remains of food waste shows human presence during the accumulation of the deposit. Probably upper part of deposit 9024 below. Differs only in degree of compactness and mixing. No similar deposits recorded in the west room, although 9018 has similar organic content and colour, although far less variable in composition.	9024	920	009		39, 54, 118, 156
9021	DEPOSIT [interior]	Greyish green and yellow clay with rubble within west room. Occurs mainly in north and north east of the room. Peters out southwards and westwards. Contains fish bone, marine shell and occasional wood fragment.	Primary demolition deposit within sequence of clay rich demolition deposits filling the west room. See 9019.	9012 9019 9023		013	014	21, 125, 132, 167
9022	DEPOSIT [interior]	Thin layer of windblown sand only present in southwest corner of west room. Separates rubbly demolition deposits from possible occupation deposits. Contains cultural material fish bone, marine shell, animal bone, fe objs and a cu alloy button. It is likely that the majority of the finds recorded from this layer were actually recovered from the underlying deposit 9028 during excavation.	Drift of windblown sand upon occupation deposits/floor of west room. Preserved beneath demolition so must have accumulated right at the end of the use of the building.			013		48, 59, 143, 57, 58, 56, 133, 172
9023	DEPOSIT [interior]	Greyish green and yellow clay with rubble within west room. Occurs mainly in west and northwest of west room.	Primary demolition deposit within sequence of clay rich demolition deposits filling the west room. See 9019.	9012 9021 9019		015		

Appendix 1. Summary of contexts

CONTEXT NUMBER	CONTEXT TYPE	DESCRIPTION	INTERPRETATION	SAME AS (2011)	SAME AS (2010)	PLANS	SECTIONS/ELEVATIONS	FINDS
9024	DEPOSIT/LAYER [interior]	Firm, compacted in places, very dark brown-black organic and clay rich sand occurring throughout east room overlying floor slabs 9039 and compacted surface 9031. Varies from <1cm to 5cm thick. Contains small spreads of clean clay, occasional mortar fragments, ash and lime putty-like material. Laminated structure, suggesting trampling, in places. Contains cultural material - fish bone, animal bone, marine shell, 4 sherds of pottery, fe objs and 19 sherd of window glass. The glass was recovered from the interface of the layer with floor slabs 9039 below, from the northern half of the room.	Cultural deposit in east room, overlying floor slabs 9039. The same deposit as 920 excavated in 2010. The presence of window glass fragments within the deposit suggests it is probably associated with the cessation of use of the building. The fragments are possibly the result of a broken pane during the removal of the window glass. The trampled nature of the deposit and the quantity of cultural material incorporated within it (including 4 out of a total of only 6 sherds of pottery recovered in the excavation) shows a human presence during the accumulation of the deposit. See 9020.	9020	920	011	016, 022	31, 60, 77, 120, 24, 29, 142, 160, 170, 20, 23, 25, 30, 32, 61-64
9025	DEPOSIT [exterior]	Loose, pale brown sand of variable thickness, < 5cm. 146 cockle shells, mainly lying convex surface up were recovered from this layer, which lies upon compacted external surface 9026 directly underlying structure 9037 constructed against the west gable end wall 9002 of the building.	Part of the sequence of cultural deposits, primarily composed of fuel ash and food waste, dumped outside the west wall of the building, over and around structure 9037. This deposit is unusual as it only contained cockle shell, and must represent the remains of a single event/activity that took place immediately prior to the construction of 9037.	9037		005	017	174
9026	DEPOSIT/LAYER [exterior]	Highly compacted, black/ purple/pink/brown burnt shale and ash in a sandy clay matrix. Approx. 2cm thick, present around buttress-like structure 9027 built against the outside west gable end wall 9002. The layer underlies structure 9037.	External surface composed of fuel ash. Same as 916 recorded in front of building in 2010.		916		008	
9027	STRUCTURE [exterior]	Square, 1.2m x 1.0m stone structure, surviving to a height of 0.7m abutting central part of outside face of west gable end wall 9002. Composed of roughly hewn very large boulders, mainly siliceous sandstone, with ORS and granite, clay bonded and harled on the north and south faces with lime mortar. Construction contemporary with wall 9002, although not keyed into it.	Supporting buttress for west gable end wall 9002. Subsequently modified/incorporated into larger stone-built structure 9037.			043	041, 042	
9028	DEPOSIT/LAYER [interior]	Variable black, purple and ashy deposit occurring across west room. Soft and crumbly adjacent to west and north walls. Highly compacted and mixed with more coal dust near south doorway and in centre of room near to burnt area 9042.	Trampled material upon shale/clay floor make-up 9032.			015, 019	023	71, 79-88, 91-94, 96, 97, 139
9029	STRUCTURE [interior]	Three large (c. 40cm x 40cm) flat boulders surrounded by smaller pebbles set into mortar paving threshold area of west room.	Paving for threshold/porch area of doorway 9078 in west room.	9030		019		
9030	STRUCTURE [interior]	Two rectangular sandstone blocks, 1m x 17cm and 82cm x 12cm, set at right angles to define small porch area of west room.	Threshold and porch area of west room.	9029		019		
9031	DEPOSIT/LAYER [interior]	Highly compacted shale and sand in southwest quadrant of east room. Northern edge defined by partition feature 9040. Black with iron staining from ferrous shale. Burnt shale and ash causes purple/pinkish colour in places. Concentration of oyster shell in southwest half of room in front of the doorway. 74 fe objects recovered from this deposit.	Floor. Equivalent to shale slabs 9039 on north side of partition feature. Present in front of doorway 9079 in southwest area of room. Could indicate an area of heavy traffic or a 'dirty area' relative to rest of the room which is paved and shows little sign of wear.			018	016, 022	128, 175, 65-67, 69, 72-76, 104-107, 113-116, 152, 153.
9032	DEPOSIT/LAYER [interior]	Homogenous, dark grey clayey shale, within west room. Varies from 1cm thick in west to 15cm at southeast. Tends towards more clayey at surface and looser more shale, with sulphurous streaks at base.	Sterile, geological material, used as make-up for floor or surface. Some similarities and same event as deposit 9031 in east room, although much more homogenous and sterile. 9028 forms the trampled surface of this deposit.			019	023	99
9033	DEPOSIT [exterior]	Loose, black/purple/orange burnt shale. 5cm - 10cm thick. Occurs on western side of building from north side of buttress 9027 where it is thickest - petering out at northwest corner of building. Recorded in section.	Upper part of series of deposits composed of fuel ash/waste and food waste dumped outside west side of building. Likely to be the result of the same deposition events as those that resulted in the thick layer of burnt waste recorded in the section westwards of the building.				017, 044	
9034	DEPOSIT [exterior]	Loose, pale brown sand containing large quantities of fish bone. Occurs outside west side of building, piled up against west wall 9002 and north face of buttress 9027, where it is 20cm thick, petering out westwards and at northwest corner of building. Mainly recorded in section.	Dump of sand and food waste against west gable end wall.				017, 044	163, 123, 146, 149, 157, 162, 166.
9035	DEPOSIT [exterior]	Loose black unburnt shale with yellowish and greenish sulphur streaks. 13cm thick in corner where north edge of buttress 9027 meets external face of wall 9002. Peters out towards northwest corner of wall.	Dumped deposit of unburnt sulphurous shale within series of dumped deposits outside west end of building.				017, 044	
9036	DEPOSIT [exterior]	Loose, black/purple/orange burnt shale. Approx. 10cm thick. Occurs on western side of building from north side of buttress 9027 where it is thickest, continuing around the northwest corner of the building along the northern edge of wall 902 for approx. 1m. Recorded in section.	Dumped deposit of burnt shale outside west end of building and extending a short distance along northern side. Forms base of dumped sequence of mainly burnt fuel and food waste deposits.				017, 044	
9037	STRUCTURE [exterior]	Roughly built dry stone wedge shaped structure against outside face of west wall of building. 4.7m long (N-S), 2m wide (E-W). Constructed of very large (0.8m - 0.6m) roughly faced boulders laid upon compacted surface 9026 to form a perimeter revetment wall. Boulders of varying sizes and mixed shale/sand/clay 9057 used as infill.	Platform-like structure. Links higher ground to rear of building with lower ground in front. The upper part of the structure is too damaged to be sure about its final form. It could have been a simple loading platform - facilitating access to an upper floor or storage area of the building. It could have carried stone or wooden steps.			024	032, 041, 017	
9038	DEPOSIT [interior]	Area of burning in northwest corner of east room. Firm to plastic black/ash grey/orange/dark pinkish red clay containing frequent small fragments of mussel shell (too small to collect).	Base of fire lit upon stone slabs 9039 in northwest corner of east room. The intense heat of the fire has scorched the sand underlying the paving.			018		
9039	DEPOSIT, PAVED FLOOR [interior]	Paved stone floor in east room. Comprises large, irregular shaped angular bituminous shale paving slabs packed with beach cobbles and pebbles and bedded onto clean beach sand 9045. Occur in eastern two thirds and northwest quadrant of east room. Southern limit of the slabs in the western half of the room defined by a linear cut, probably for a partition or counter structure. The western limit of the shale slabs are defined by a line of beach boulders. East of these the slabs are laid at a slightly higher level than in the northwest part of the room.	Paved stone floor of east room. Equivalent to floor layer 9031 located in the southwest quadrant of the room in front of the door.		919	018	016, 022	
9040	CUT/STRUCTURAL [interior]	Linear, vertical sided, concave based, cut oriented east-west. Situated across centre of western third of east room in front of doorway. Dimensions, 4m long, 10-20cm wide, varying depth up to maximum of 30cm. Separates paved floor 9039 and compacted surface 9031. Filled with 9055.	Structural feature, that defines compacted shale floor area in front of door, probably an entrance zone. The cut would have housed a vertical superstructure - either an internal partition wall, or possibly a counter?			039	016, 022	

Appendix 1. Summary of contexts

CONTEXT NUMBER	CONTEXT TYPE	DESCRIPTION	INTERPRETATION	SAME AS (2011)	SAME AS (2010)	PLANS	SECTIONS/ELEVATIONS	FINDS
9041	DEPOSIT [interior]	Loose sand below 9032 in west room. Discoloured immediately below overlying context, becoming cleaner with depth. Contains small quantities of burnt and unburnt shale, sandstone chip, mortar and cultural material including fe objs (mostly nails), fishbone, marine shell and animal bone.	Construction horizon of building in Trench 9. Contains building raw materials, presence of coal dust burnt material typical of trample.	9064	975	029, 040		129, 135, 169, 85, 89, 90, 95, 141
9042	DEPOSIT [interior]	Very hard dark red area of burnt clay within a very shallow depression in the surface of deposit 9032. Located in the centre of the west room. Extends 0.95m N-S, 0.6m E-W, 5-8cm deep.	Area of intense burning, similar to 9038 in east room.			019	023	
9043	DEPOSIT [interior]	Plastic - hard reddish orange and black area of burnt clay and coal, 0.5m x 0.3m x 3cm thick in east room.	Small patch of burnt material, upon layer 9031. The location of the burning coincides with the location of infilled pit or posthole 9051 in east room.			018		
9044	DEPOSIT [interior]	A 1m x 1m x 2cm thick area of compacted light greyish brown ashy/clayey sand containing frequent coal flecks. The material lies upon and infills the joints between floor slabs 9039.	Area of compacted ash. Possibly related to area of burning 9038.			018		
9045	DEPOSIT/LAYER [interior]	Loose, pale yellowish brown sand, containing occasional sandstone chips underlying floor slabs 9039 within east room. Small quantities of cultural material including animal bone, fishbone, marine shell and fe objs. The slabs are fixed to the internal faces of the walls, with clean pale orangey brown rippled with blue/grey clay and lime.	Bedding material for paved floor slabs 9039 in east room of building.		976 918	025	016, 022	130, 176, 154, 171, 101-103, 151
9046	CUT [interior]	Circular concave sided cut, 30cm diameter, 13cm deep in central part of west room. Flat stone at the base.	Post setting, associated with construction of the building.			029	023	
9047	DEPOSIT/FILL	A single flat stone at the base of the cut within a dark grey clay/shale matrix identical to that of 9032.	Packing material of shallow post setting.				023	98
9048	STRUCTURE [interior]	Two sandstone slabs. 0.8m x 0.4m x 10cm thick and 0.4m x 0.3m x 10cm thick in front of fireplace [9077] in west room. Slabs set into layer 9032 and levelled with thin fragments of dark red sandstone.	Stone hearth of fireplace [9077].			013, 019	020, 023, 033	
9049	CUT/STRUCTURAL [interior]	Linear slot against west side of west porch stone [9030].	Foundation cut for stone [9030]. Or, slot to hold wooden partition against west side of porch stone to define porch area.			029		
9050	DEPOSIT/FILL [interior]	Loose dark brown soily sand filling slot 9049.	Fill of structural slot [9049]. Organic soily composition indicates it may possibly derive from decayed wood.			029		
9051	CUT/STRUCTURAL [interior]	Oval in plan, vertical sided cut, 1.6m E-W x 1.2m N-S 30cm deep. Located adjacent to south wall [904] in the western half of the east room, at the interface of layer 9031 to the west and paved floor 9039/919 to the east, and at the southern end of a boulder alignment.	Cut - probably structural. The relationship with layer 9031 is ambiguous. The eastern side of this cut lies within the 2010 season excavation trench. Here, the paved floor [919] appeared to respect the edges of the cut. It is possible that layer 9031 on the west side also respects the cut, i.e. that the structure contained within it protruded above the floor.		952	035, 037	034	
9052	DEPOSIT/FILL [interior]	Friable to loose mixed dark brown and light yellowish brown sand with organic lenses. Large angular fragments of broken shale floor slabs concentrated at the base of the east side of the cut. A concentration of mussel, scallop, winkle and whelk shells are piled up at the base on the west side. Also contains fish bone, fe nails embedded in wood and occasional animal bone. Eastern part of this feature excavated in 2010.	Fill of cut [9051]. Re-used slabs suggests packing material. Concentration of marine shell unusual.		959	035, 037	034	119, 164, 159, 147, 150
9053	DEPOSIT [exterior]	Loose, pale yellowish and greyish brown sand outside west side of building.	Part of midden and burnt fuel dumps around outside west side of building around buttress [9027].		967?		017	
9054	DEPOSIT [interior]	Loose, mixed dark brown to black, light greyish white, some orange and pink. Sand with trampled burnt and unburnt shale spreads and mortar/lime spreads. Mortar concentrated adjacent to dividing wall [9003]. Frequent oyster shells at interface with cleaner sand layer below. Located in north west quadrant of east room. Probably also underlies layer 9031 in southwest quadrant on the other side of structure 9040, but not recorded.	Trampled material accumulated upon soft sand prior to laying of floor slabs. The mortar and lime spreads must relate to the construction of the building. The burnt material may have been spread to consolidate the surface of the very soft sand. Probably equivalent to underlying cleaner sand 9064.			030	016, 022	124, 108, 111, 173
9055	DEPOSIT/FILL [interior]	Vertically positioned small shale slabs within a matrix of loose, dark brown/black and light orangey brown sand. The slabs are placed in two parallel rows lining the edges of the linear cut [9040].	Positioning of stones suggests packing for upright wooden structure. A line of nails along the edge of the feature, (most recorded in context 9031) one adhering to one of the shale fragments, supports a suggestion of a wooden structure. This may have formed an internal partition. Possibly a counter? The positioning of the feature divides the southwest third of the room in from of the doorway into an entrance area. The flooring of this area is of compacted shale 9031, and not the shale paving 9039/919 which has been used a flooring in the rest of the room.			039	016, 022	144
9056	DEPOSIT [interior]	Spread of plastic yellowish brown clay located in northeast corner of west room. 80cm x 40cm x 10cm thick. Occupies a slight depression in soft underlying sand 9041. A rectangular cut oriented E-W, measuring 51cm long x 22cm wide, x 6cm deep was recorded below the clay pad. This was filled with clay, shale, organic material and red sandstone chips and contained some cultural material, fish bone and animal bone. Finds were recorded as 9056.	Stratigraphical position shows this feature must be related to construction activities. Could have supported a scaffolding post, or consolidated a soft spot in the corner of the room.			029, 040	040	127, 100, 138
9057	DEPOSIT [exterior]	Highly variable loose, colourful deposit composed of sand, clay, burnt and unburnt shale. Infills dry stone masonry of structure [9037] outside west side of building. Contains cultural material, animal bone, fish bone and marine shell.	Filling material in and around boulders of revetment/platform structure [9037].			024		121, 145, 131, 165
9058	CUT/STRUCTURAL [interior]	Linear cut, oriented N-S. 4m long, 45cm wide, 30cm deep with steeply sloping sides and flattish base. Extends from threshold of west room, northwards parallel to dividing wall [9003] to north side of fireplace [9077] and hearth [9048].	Construction cut for dividing wall [9003] and fireplace [9077]. No construction cut visible on the east side of the wall. No construction cuts observed for any other wall of the building. Probably related to the extra strength required for the chimney and fireplace.			040		
9059	DEPOSIT/FILL [interior]	Loose mixed sand containing sandstone chips, mortar and lenses of darker material.	Backfill of construction cut 9058. Contains material derive from wall construction.				040	040
9060	STRUCTURE [interior]	Sixteen stakeholes in west room. These are generally parallel and between 30-40cm from west wall [9002]. Mainly squarish and circular in plan, 2cm - 12cm deep. Four have a pointed profile, four have a flat base and two are angled. All are filled with very dark brown homogenous soily sand.	Stakeholes associated with the construction of the building, although only surviving in west room. Possible remains of scaffolding for west wall?			040	040	
9061	DEPOSIT [interior]	Solid slab of mortared rubble in west room located in corner of south side of hearth [9048] with dividing wall [9003].	Foundation for hearth [9048]. Almost certainly within construction cut 9058.			040		

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CONTEXT NUMBER	CONTEXT TYPE	DESCRIPTION	INTERPRETATION	SAME AS (2011)	SAME AS (2010)	PLANS	SECTIONS/ELEVATIONS	FINDS
9062	DEPOSIT/FILL [interior]	Plastic light greyish white mottled dark brown lime, mortar and sand. Fills rectangular cut 9063 in east room.	Mortar and lime rich fill of shallow rectangular cut. Deposit derived from materials used in the construction of the building.				030, 039	
9063	CUT/STRUCTURAL? [interior]	Linear vertical sided flat bottomed cut, 1m x 10-15cm x 10cm deep oriented E-W, located at the northern edge of the west side of east room, parallel to north wall [902]. Sealed by paved floor 9039.	Structural feature associated with construction of the building. See 9070 for further discussion.				030, 039	
9064	DEPOSIT	Loose, pale yellowish brown sand containing small quantities of mortar and lime, sandstone chips and clay. Underlies all deposits.	Construction horizon containing material from dressing masonry and constructing walls.	9041	975		039 016, 022	
9065	DEPOSIT/FILL [interior]	Two large cobbles set vertically into cut 9066 in a matrix of loose dark brown/black sand containing coal flecks and occasional fishbone.	Fill of posthole 9066 . Packing material still <i>in situ</i> .				039	137
9066	CUT/STRUCTURAL [interior]	Sub square in plan, 45cm x 35cm x 35cm deep vertical sided flat bottomed cut. Filled with 9065 . Located in south west (entrance) area of east room. Aligns with linear shallow feature 9068 .	Post hole.				039	
9067	DEPOSIT/FILL [interior]	Loose, light greyish brown sand, 3cm thick. Fill of slight linear depression 9068 .	More of a stain than a fill, however, linear form is clearly defined.				039	
9068	CUT? [interior]	Slight linear depression, 1.5m x 20cm x 3cm deep, oriented N-S. Filled with 9067 . Located in centre of western half of east room, perpendicular to partition feature 9040 . Lines up with posthole 9066 on the south side of the partition,	Clearly defined linear stain in clean sand of construction horizon 9064 . See 9070 for further discussion.				039	
9069	DEPOSIT/FILL [interior]	Loose, light greyish brown sand, 3cm thick. Fill of slight linear depression 9070 . Contains a large fe nail and a fishbone.	More of a stain than a fill, however, linear form is clearly defined.				039	136, 148
9070	CUT? [interior]	Slight linear depression, 1.5m x 15cm x 2cm deep, oriented N-S. Filled with 9069 Located in northwest corner of east room, parallel to dividing wall [9003].	Clearly defined linear stain in clean sand of construction horizon 9064 . Features 9070 , 9063 and 9068 subdivide the area north of partition 9040 into 3 relatively equal areas. The stratigraphic position of these features below paved floor 9039 indicates they are associated with the construction of the building. However, it is not impossible they relate to structures belonging to an earlier phase of activity, and that the laying of the paving was a subsequent modification.				039	
9071	DEPOSIT/STRUCTURE [interior]	3m x 2m area of large unmodified beach boulders size range 0.6m x 0.4m to 0.2m x 0.2m. Varying lithologies - Clynenish sandstone, conglomerate, ORS. Located in east room at eastern limit of excavation. Extends into 2010 area of excavation. Overlain by shale slabs 9039/919 which are at a slightly higher level in the eastern third of the east room where the underlying boulders are present.	Boulder pad that raises the floor level of the eastern part of east room. Function unknown. In 2010, boulders were recorded as an inclusion of construction horizon 975 within which they lay.				039	
9072	DEPOSIT [interior]	Loose, pale greyish and yellowish white deposit of masonry in a mortar rich sandy matrix. Occurs in centre of western half of west room.	Noteworthy concentration of mortar and rubble overlying clay rich demolition material in west room. The mortar rich demolition coincides with an unharled/rendered area in the central portion of the inside face of west wall [9002]. This may be coincidental, but it may be possible evidence of a structure against the internal face of the wall here that would account for it not being finished off with a lime render - as are all other walls of the building.				007	
9073	DEPOSIT [exterior]	Loose light brown sand streaked with dark brown organic rich material. Contains rare fragments of burnt shale. C. 20cm thick. Accumulated against outside face of north wall [902]. Recorded in section.	Base of sequence of accumulation of deposits to the north of the building during its use. Probably same as 9075 and 9074 .				028	
9074	DEPOSIT [exterior]	Loose, brown mottled with dark brown and black sand containing rare burnt shale. 8cm - 20cm thick. Extends northwards from buttress 9027 to the north side of the building. Recorded in section.	Lower part of deposits that accumulated outside the building during its use. Combination of sand and trampled material. Probably same as 9075 and 9073 .				017, 028, 044	
9075	DEPOSIT [exterior]	Loose, brown sand mottled with coal flecks and dark brown streaks. 20cm - 40cm thick. Occurs outside north wall of building. Recorded in section.	Part of sequence of deposits that accumulated outside the building during its use. Combination of sand and trampled material. Probably same as 9074 and 9073 .				028, 044	
9076	MOULDED STONE	Soft pale yellow fine-grained sandstone window sill. 0.5m wide x 0.3m deep x 0.24m high. Shallow carved splay widening outwards from 0.27m to 0.35cm. A single square mortice, c. 4cm diameter, which would have housed an iron stanchion bar, is located in the middle of the stone slightly forward of the transverse centre line. The carved sill is a re-used stone inserted into the southern end of west gable end wall [9002], c. 1 m from the base of the wall. It is not <i>in situ</i> .	Moulded stone sill of a narrow fixed light, c. 35cm wide with a central iron stanchion bar. This stone is not <i>in situ</i> , but the freshness of the carving in the soft sandstone, indicates it is not re-used from a pre-existing building. It may be an extra moulded piece, not needed in the building, or was damaged and unsuitable. An important find because it provides information to the likely size and form of the windows in the building, this far evidenced only by fragments of window glass.	part of [9002]			042	
9077	STRUCTURE/FIREPLACE	Fireplace opening into west room.		part of [9003]		15	04, 20, 23, 33	

Appendix 2. Register of finds sorted by context

Finds No.	Context No.	Equal to 2010 context number	Material	Description	No. of pieces	Comments	X-ray plate number
46	9001		bone	animal bone	3		
14	9001		ceramic	pottery	1		
140	9004	908	Fe	two solid heavy iron lumps. Could be smithing slag or fragments of smithing hearth base?	2		6
47	9005	945	bone	animal bone	38		
26	9005	945	clinker & slag-like		13		
15	9005	945	Fe	barbed arrowhead	1	selected for further cleaning	7
17	9005	945	Fe	various	35		6
52	9005	945?	fishbone		many	sieved 2mm	
40	9005		marine shell	oyster x 3 limpet x 1 winkle x 4 mussel x 4 frags cockle x 10 crustacean x 1	23		
28	9007		clinker		2		
34	9007		fishbone		1		
51	9007		marine shell	limpet x 2 winkle x 6 unid bivalve frag x 1	9		
36	9008	933	bone	animal bone	7		
1	9008	933	Fe	nail	1		1
2	9008	933	Fe	nail	1		1
3	9008	933	Fe	nail	1		1
4	9008	933	Fe	nail	1		1
5	9008	933	Fe	nail	1		1
6	9008	933	Fe	nail	1		1
7	9008	933	Fe	nail	1		1
8	9008	933	Fe	nail	1		1
9	9008	933	Fe	nail	1		1
10	9008	933	Fe	nail	1		1
11	9008	933	Fe	nail	1		1
12	9008	933	Fe	nail	1		1
13	9008	933	Fe	nail	1		1
38	9008	933	fishbone		4		
27	9011	923	clinker		5		
37	9011		fishbone		2		
18	9012		Wood		3		
155	9013	923	fishbone		c. 20	sieved 2mm	
41	9014	923	bone	animal bone	15		
42	9014	923	fishbone		many	sieved 2mm	
43	9014		marine shell	oyster x 2 limpet x 1 winkle x 2 mussel x 1 whelk x 1	7		
16	9014		Pb		1		
50	9017		bone	animal bone	6		
33	9017		marine shell	oyster x 1 cockle x 1 crustacean x 1	3		
44	9018		bone	animal bone	2		
45	9018		marine shell	limpet x 1 mussel x 1 periwinkle x 1 unid bivalve frags x 4	7		
117	9019		Fe		1		7

Appendix 2. Register of finds sorted by context

Finds No.	Context No.	Equal to 2010 context number	Material	Description	No. of pieces	Comments	X-ray plate number
39	9020	920	bone	animal bone	28		
118	9020	920	Fe		3		5
156	9020	920	fishbone		many	sieved 2mm	
54	9020		marine shell	oyster x 2 limpet x 2 winkle x 18 mussel (large) x 8 whelk frags x 7 cockle x 1 scallop x 1 periwinkle x 4 crustacean x 2	45		
125	9021		bone	animal bone	8		
21	9021		Fe	nails (one in wood)	3		5
132	9021		fishbone		24	sieved 2mm	
167	9021		marine shell	mussel x 3 whelk x 1 periwinkle x 1 unid x 1	6		
48	9022		bone	animal bone	33		
56	9022		Cu alloy	button?	1	selected for further cleaning	7
59	9022		Fe	lump	1		6
143	9022		Fe	nails and nail fragments	8		5
133	9022		fishbone		52	sieved 2mm	
172	9022		marine shell	oyster x 1 limpet x 3 winkle x 1 mussel frags x 3 crustacean x 2 unid x 2 frags	12		
57	9022		wood		3		
58	9022		wood		2		
120	9024	920	bone	animal bone	36		
31	9024	920	ceramic	pottery base	1		
60	9024	920	ceramic	pottery handle fragment x 1, handle/body fragment x 1	2		
77	9024	920	ceramic	pottery rim fragment	1		
24	9024	920	Fe	large iron object with bolts/studs	1		3
29	9024	920	Fe	two very small nails embedded in wood	1		7
142	9024	920	Fe	nails and nail fragments. Square headed and square shaft profile	11		3
160	9024	920	fishbone		many	sieved 2mm	
20	9024		glass	window glass	1		
23	9024		glass	window glass	1		
25	9024		glass	window glass	7		
30	9024		glass	window glass	2		
32	9024		glass	window glass	1		
61	9024		glass	window glass	2		
62	9024		glass	window glass	3		
63	9024		glass	window glass	1		
64	9024		glass	window glass	1		

Appendix 2. Register of finds sorted by context

Finds No.	Context No.	Equal to 2010 context number	Material	Description	No. of pieces	Comments	X-ray plate number
170	9024		marine shell	oyster x 73 limpet x 33 winkle x 30 mussel frags x 28 whelk x 8 scallop frags x 10 periwinkle x 3 crustacean x 2 unid x 1	186		
174	9025		marine shell	cockle x 146 (111 whole)	146		
122	9027		bone	animal bone	2	check - this is a structure.	
126	9028		bone	animal bone	28		
71	9028		Fe	lump	1		1
78	9028		Fe	nail	1		1
79	9028		Fe	nail	1		2
80	9028		Fe	lump	1		1
81	9028		Fe	one broken nail with square hollow cross section; one small nail	3		2
82	9028		Fe	sub square bolt head?	1		1
83	9028		Fe		2		1
84	9028		Fe	two small flat rectangular objects	2		2
86	9028		Fe	nail?	1		1
87	9028		Fe	one nail head; one fragment	2		1
88	9028		Fe	irregular flattish object	1		1
91	9028		Fe	diamond shaped flat object	1		1
92	9028		Fe	small lump	1		1
93	9028		Fe	bolt head? Shaft has rectangular profile	1		2
94	9028		Fe	small lump	1		1
96	9028		Fe	small nail	1		2
97	9028		Fe	nail head? Circular/diamond shaped	1		1
139	9028		Fe	fragments	2		1
134	9028		fishbone		18	sieved 2mm	
168	9028		marine shell	oyster x 10 limpet x 2 winkle x 2 mussel x 13 frags whelk x 1 cockle x 8 periwinkle x 1	37		
128	9031		bone	animal bone	6		
65	9031		Fe	irregular lump	1		4
66	9031		Fe	nail fragment	1		4
67	9031		Fe	nail	1		4
69	9031		Fe	nail	1		4
72	9031		Fe	nail fragment	1		4
73	9031		Fe	irregular, plate-like, one piece when found	3		5
74	9031		Fe	irregular lump	1		4
75	9031		Fe	plate-like, laminated	1		4
76	9031		Fe	irregular, plate-like	1		4
104	9031		Fe	plate-like fragment with wood	1		4
105	9031		Fe	large irregular plate-like lump	1		4
106	9031		Fe	irregular lump	1		5
107	9031		Fe	irregular lump	1		4
113	9031		Fe	irregular lump	1		4
114	9031		Fe	long irregular piece, concreted to shale fragment when found	2		4
115	9031		Fe	irregular lumps. One plate-like	2		4
116	9031		Fe	irregular fragment	1		4
152	9031		Fe	large irregular plate-like lump	1		4
153	9031		Fe	fourteen irregular plate-like and lumps; six nails	20		5
175	9031		marine shell	oyster x 91 cockle x 1 limpet x 1 winkle x 2	95		
99	9032		Fe	broken nail. Shaft has rectangular profile	2		7

Appendix 2. Register of finds sorted by context

Finds No.	Context No.	Equal to 2010 context number	Material	Description	No. of pieces	Comments	X-ray plate number
123	9034		bone	animal bone	4		
163	9034		ceramic	small (18mm x 15mm) rectangular body sherd. Dark grey and buff colour. Roughly made. Grass tempered? No sign of glaze.	1	sieved	
146	9034		Fe	solid heavy iron lump. Could be smithing slag or fragment of smithing hearth base?	1		6
149	9034		Fe	plate fragment	1		2
157	9034		Fe	slit pin? Tweezer-like shape	1	selected for further cleaning	3
162	9034		fishbone		many	sieved 2mm	
166	9034		marine shell	limpet x 2 winkle x 2 mussel x 4 periwinkle x 1	9		
129	9041	975	bone	animal bone	8		
85	9041	975	Fe	two irregular fragments	2		2
89	9041	975	Fe	squarish nail/bolt head	1		2
90	9041	975	Fe	nail	1		2
95	9041	975	Fe	large concreted lump. Probably more than one object. Wood fragments and fishbone visible. A single fused lump when found	3		3
141	9041	975	Fe	irregular fragments	4		2
135	9041		fishbone		15	sieved 2mm	
169	9041		marine shell	mussel x 25 winkle x 1 unid frag x 1	27		
130	9045	976	bone	animal bone	12		
176	9045	976	clinker-like		13		
101	9045	976	Fe	irregular lump with wood fragments	1		2
102	9045	976	Fe	nail	1		2
103	9045	976	Fe	nail	1		2
151	9045	976	Fe	four plate-like fragments; four nails; two irregular fragments	10		2
154	9045	975?	fishbone		>30	sieved 2mm	
171	9045		marine shell	limpet x 5 mussel (small) x 28 whelk x 4 crustacean x 2	39		
98	9047		Fe	nail head? Circular/diamond shaped	1		7
119	9052	959	bone	animal bone	2		
147	9052	959	Fe	nail in wood	1		2
150	9052	959	Fe	nails and nail fragments	9		5
159	9052	959?	fishbone		many	sieved 2mm	
164	9052		marine shell	limpet x 5 winkle x 22 mussel x 40 whelk x 3 scallop x 1 periwinkle x 4	74		
124	9054	975	bone	animal bone	1		
108	9054	975	Fe	various	8		3
111	9054	975	Fe	small broken nail	2		7
173	9054		marine shell	oyster x 29 limpet x 7 cockle x 4 mussel frags x 2 crustacean x 4	46		
144	9055		Fe	nails, originally concreted to shale slot fill	2		7

Appendix 2. Register of finds sorted by context

Finds No.	Context No.	Equal to 2010 context number	Material	Description	No. of pieces	Comments	X-ray plate number
127	9056		bone	animal bone	30		
100	9056		Fe	two very small lumps, very light in weight	2		7
138	9056		fishbone		c. 30	sieved 2mm	
121	9057		bone	animal bone	13		
145	9057		Fe	large fragment of bent iron plate	2		6
131	9057		fishbone		27	sieved 2mm	
165	9057		marine shell	mussel x 1 clam ? X 1	2		
137	9065		fishbone		2		
148	9069		Fe	large nail	1		2
136	9069		fishbone		1		
112	??		Fe	strip	1		

Appendix 3 Window glass report Brora Back Beach Saltpans

K R Murdoch

During the 2011 excavations at the Saltpans at Brora a total of 32 small shards of window glass were recovered from a single context **C9024**. These shards were in poor condition with relatively thick dark brown corrosion products adhering to the surface. However, close examination revealed that around 30-40% of the original thickness of the glass survived as uncorroded heart glass. The corrosion layers were very unstable and flaked off readily. Before this happened, the original thickness of the glass was established to have averaged 2mm. The glass had a pale dull green tinge, this is typical in most medieval and post medieval window glass and comes from the presence of iron in the raw materials or in the clay of the crucibles in which the glass was made.

Three shards were selected for analysis as part of a Historic Scotland project researching into the dating of window glass by composition. It follows on from research into window glass used in England which resulted in an interpretation model being created for the English material. The dating of the Brora glass is based on this EH (English Heritage) model and at the moment should be regarded as advisory. Analysis was carried out using both SEM (scanning electron microscope) with spectrometer and pXRF (portable X-Ray Fluorescence Spectrometer). Each technique has advantages and disadvantages and combined they give better results. The SEM is poor with Strontium and Arsenic and the pXRF cannot detect Sodium and has difficulties with other elements (oxides) at the lower end of the atomic spectrum.

Table 1: Origins of test samples plus shard numbers per small find

Small find no	Test Sample	No of shards	Comments
SF20		3	
SF23	BBB11-3	2	
SF25	BBB11-2	9	One with stress fracture, one with selvage
SF30		2	
SF32		2	
SF61	BBB11-1	9	One with selvage
SF62		1	One with selvage
SF63		3	
SF64		1	

Selvage refers to the rounded edge on the shard, an indication that it includes the edge of a table (table was the description given to a complete sheet of window glass before cutting). Although the shard sizes here were small the selvages appeared to be straight indicating broad or cylinder glass. Crown glass would have had curved selvages.

A stress fracture is a thin saw-like crack in the glass, the result of poor annealing (gradual cooling of the glass to relieve manufacturing stresses)

Table 2: SEM and pXRF analysis results

SEM results																	
Ref	SiO ₂	Al ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	Fe ₂ O ₃	TiO ₂	MnO	As ₂ O ₃	Sb ₂ O ₃	BaO	P ₂ O ₅	SO ₃	Cl	SrO	ZrO ₂
BBB 11-1	62.7	0.90	22.6	2.2	0.59	6.2	0.58	0.10	0.66	0	0.48	0.37	2	0.22	0.11	0	0
BBB 11-2	62.7	1.5	22.2	2.5	0.60	5.9	0.59	0.12	0.71	0	0.35	0.30	1.9	0.23	0.16	0	0
BBB 11-3	61.8	1.6	22.9	2.6	0.56	6.1	0.50	<0.1%	0.62	0	0.40	0.33	1.9	0.27	0.13	0	0
pXRF results, taken both sides of sample																	
BBB11-1	60.31	2.50	27.52	2.34		7.41	0.68	0.28	0.81				1.44	0.40	0.03	0.06	0.01
BBB11-1	59.94	2.55	27.75	2.30		7.56	0.66	0.30	0.81				1.33	0.41	0.02	0.06	0.01
BBB11-2	54.07	2.17	23.59	1.73		6.55	0.55	0.24	0.64				1.17	0.34	0.02	0.06	0.01
BBB11-2	56.56	2.85	23.11	1.56		6.43	0.57	0.24	0.65				1.23	0.30	0.03	0.06	0.01
BBB11-3	58.03	2.69	26.48	2.26		7.12	0.58	0.24	0.64				1.22	0.36	0.03	0.06	0.01
BBB11-3	57.26	2.65	26.41	1.73		7.09	0.57	0.25	0.68				1.18	0.40	0.03	0.06	0.01

Interpretation

All three tested shards were HLLA (High Lime Low Alkali) glass. This is typified by a Calcium (CaO) content of over 20% and a combined Potassium (K₂O)/Sodium (Na₂O) content of less than 10%. The Sodium and Potassium alkaline oxides are used as a flux to lower the temperature at which the batch will vitrify and remain workable.

The English Heritage model identified two date groups of HLLA glass, HLLA1 c1567-c1600 and HLLA2 c1600-c1700. These are differentiated mainly through the level of Manganese (MnO). In HLLA1 glass MnO is around 1% and in HLLA2 around 0.25%.

Interestingly the Brora glass MnO level falls between these two at 0.65-0.8%. Two thoughts spring to mind; firstly this could be a changeover composition between HLLA1 and 2 which might place it the period around 1600. This would fit neatly with the date of the first Saltworks at Brora. However, this interpretation may be too convenient and there is a second possibility.

There is no evidence as yet that glass was made from raw materials in Scotland before c1610. If the glazing at Brora related to the creation of the first works in the 1590s then the glass would have been imported, probably from the continent of Europe rather than England. The English Heritage model is based on findings from glass in England, much of which would have been made there. The composition of continental glass may have differed slightly from this while still falling into the general classification of HLLA.

What is beyond doubt is that the Brora window glass is earlier than 1700 and while a reasonable argument can be put forward for an early 17th century date, we can not be sure at this stage. Further testing of glass from late 16th/early 17th century sites may help to clarify this.

Work consulted

Dungworth D and Girbal B 2011: *Walmer Castle, Deal Kent, Analysis of Window Glass, Technology Report*, Research Department Report series no. 2-2011, English Heritage.

Appendix 4. The animal bone

Catherine Smith, Alder Archaeology

Introduction

As in previous seasons, a small assemblage of animal bone was recovered from the excavation at Brora Saltpans, Back Beach (Site Code BBB11). All of the bones came from Trench 9 and compared very favourably with previous finds as regards their state of preservation. Most of the fragments were better preserved than those from the earliest seasons' work and showed less rootlet damage. Although most of the fragments were small in size, where chopped, they retained their sharp edges, with less signs of rootlet damage and erosion than on fragments found previously on the site and tool marks such as knife cuts were preserved. Carnivore gnawing was apparent on over 10% of the fragments. The method of analysis was as described in the interim animal bone report (Smith 2010).

Results

Animal bone fragments are catalogued in Table 1, by context and species. The results are summarised in Table 2, by phase.

As in the previous seasons, bones of domestic animals were the most prevalent. Sheep/goat (26) fragments were the most numerous, followed by cattle (20), their numbers being increased if large ungulate fragments (14) are added to the cattle total and small ungulate (49) to the sheep/goat total. Pig (2) bones were also present as were horse (3) and adult cat (2). Previously only bones from a kitten had been recorded at the site, in Trench 4C (ibid). Wild mammals were represented by rabbit (2). In addition two fragments of probable cetacean bone from a large whale species were recovered from Context **9024** (Bag 120) in Phase 1B/2A.

Amongst the bird bones were those of domestic species, the domestic fowl (*Gallus gallus*) and domestic/greylag goose (*Anser anser*) as well as several wild species, the puffin (*Fratercula arctica*), rock dove/feral pigeon (*Columba livia*) and starling (*Sturnus vulgaris*).

The starling is unlikely to have been eaten due to its small size, but the rock dove is synonymous with the doocot pigeon (the doo) and may have formed part of a meal.

Butchery

Due to a better standard of preservation of bone in Trench 9 with respect to bones found in previous excavation seasons elsewhere on site, it was apparent that many of the smallest fragments were sharp-edged chips or splinters formed during butchery, particularly of long bones. The larger fragments from which they must have derived are largely absent, which may be explained in several ways. Firstly, large bones may have been brought on to the site, but maximum use was made of them by chopping into small fragments in order to prepare stock for soup or stews from the grease within the bones. This also allows maximum access to the nutritious marrow contained in the central cavities within the shafts of long bones. Secondly, after butchery was carried out on site, resulting in the splinters, the resulting pieces were cooked and the remains fed to dogs. The high proportion of gnawed fragments (about 10% of the total) indicates that carnivore gnawing could have resulted in the partial destruction or removal of some of the larger bones originally brought on to the site. Bone splinters may therefore have survived where large fragments did not as they were less attractive to dogs, or indeed cats. Rodent gnawing was also present on one of the fragments and this too must have been a taphonomic factor. Thirdly, the meat available to the inhabitants of the site may have been from poorer quality cuts of

meat, for example the part containing the ribs (flank) or neck (scrag end) and thus larger limb bones may not have been present in great quantities.

Worked fragments

The two probable cetacean fragments (**9024**; Bag 120; Phase 1B/2A) were hard and dense, raising the suspicion that they may be fossil in nature. Both fragments have a series of relatively large abraded lenticular pits on the inner surface. On close scrutiny the outer surface has the pitted appearance of whalebone and bears a similarity to the cortex of a mandible of a right whale, used for comparison. The smaller of the two fragments (length 47.8mm, breadth 22.6mm, thickness 6.8mm) has been modified by filing with a tool, forming two straight edges. The larger fragment (length 101.7mm, width 19.0mm, thickness 9.5mm) is broken, has no worked surfaces and does not conjoin with the smaller fragment. These pieces of whalebone probably represent the remains of a beached animal which has been scavenged for useful materials to be used in artefact manufacture. The context, from which they came, **9024**, is contiguous with **920**, a layer excavated in 2010 which formed a protective peaty layer laid over a floor inside the Trench 9 building; the artefact or offcut from which the fragments came may have been broken, then lost or discarded and trampled into this peaty layer. Alternatively, if the pieces are offcuts, then manufacture may have taken place within the building.

A crudely shaped bone object was also retrieved from Context **9034**, Bag 123, Phase 1B, an occupation surface external to the building in Trench 9. The object consists of a fragment of large ungulate long bone shaft, roughly trimmed along each long edge (length 70mm, width 21.7mm, thickness of shaft 6.0mm). Some paring is also evident on the outer aspect of the bone shaft, where striations and a hack mark made by a tool are visible. Most noticeable however is the evidence of use-wear on the most roughly trimmed long edge which has given the object a high polish in this area. What may be the remains of rough notches, polished by use, are placed about one third along the length of the object, on either side of the shaft. The object could have been used to wind lengths of yarn or twine which could have resulted in polishing by friction.

Discussion

The fragments from the 2011 season derive from the occupation, abandonment and destruction of a building associated with the saltpans. Just over half of the total number of fragments are associated with the construction and occupation of the building and seem to represent the remains of meals. As in the previous seasons, there is a suspicion that the occupants made the best of what may have been scarce food resources: meat bones were highly chopped in order to extract the last morsel of nutrition from them. Discarded bones were then used to feed companion or working dogs and/or cats. Few high status cuts of meat seem to have been present – for example few vertebrae were found, but many ribs, the remains of cheap cuts such as beef or mutton flank, were present. In addition, there was further evidence that wild birds and mammals such as puffins, rock doves and wild rabbits were exploited for their meat. The birds would have been most accessible in the breeding season and it is almost certain that their eggs would also have been collected from the rocky ledges and cliffs where breeding took place.

Appendix 4. Animal bone catalogue sorted by context

Catherine Smith, Alder Archaeology

Find no.	Context No.	Class	Species	Bone	L/R	prox	dist	Age	Part	Quantity	Butchery	Gnawed	Comment
46	9001	mammal	pig	mandible	R			13mo		1		GD	
46	9001	mammal	cattle	scapula	L			U	glenoid/neck	1	ch CC		
47	9005	mammal	cattle	1st phalange		pf		I/A	entire	1			
47	9005	mammal	cattle	2nd phalange		pf		I/A	entire	1			
47	9005	mammal	sheep/goat	mandible	R			E	oral	1			
47	9005	mammal	sheep/goat	mandible	R				oral	1			
47	9005	mammal	sheep/goat	metacarpal	L				prox	1	sh ch ML; KC ant		rootlet marks
47	9005	mammal	sheep/goat	calcaneum	R			U	shaft	1			abraded
47	9005	mammal	sheep/goat	metatarsal	L				prox	1			rough circular hole in shaft, prox, med
47	9005	mammal	cf cattle	humerus	L				shaft	1	ch ML	GD	
47	9005	mammal	cf rabbit	vertebra				unfused	centrum	1			
47	9005	bird	puffin	tibio-tarsus	L			adult	entire	1			
47	9005	bird	indet sp						shaft	1			
47	9005	bird	cf fowl	humerus					shaft	1			
47	9005	fish							fragments	2			
47	9005	mammal	SU	rib					artic	1			
47	9005	mammal	SU	rib					shaft	4			
47	9005	mammal	LU	LBSF					shaft	1	ch sag	GD	
47	9005	mammal	IM						fragments	14			
36	9008	mammal	sheep/goat	metacarpal					prox	1		GD	
36	9008	mammal	sheep/goat	femur		ltf		A	shaft	1	?ch sag		
36	9008	mammal	SU	rib					shaft	2			
36	9008	mammal	IM						fragments	3			abraded
41	9004	mammal	sheep/goat	atlas					caudal	1	ch sag		
41	9004	mammal	pig	innominate	R				acetabulum	1	ch DV; KC ventral beneath rim		
41	9004	mammal	SU	rib					articulation	4			
41	9004	mammal	SU	rib					shaft	3			
41	9004	mammal	SU	vertebra					centrum	1	ch sag		
41	9004	mammal	IM	LBSF						1	chopped 'butchers' chip'		
41	9004	bird	Goose cf greylag	humerus	L				entire	1	KC prox artic & 2 x KC dist, palmar		
41	9004	bird	Fowl	innominate	L					1			
50	9017	mammal	cf Horse	tooth					root/occlusal	1			?loPM/M
50	9017	mammal	IM							1			?mandible fragment
50	9017	mammal	IM						fragments	2	sawn & chopped 'butchers' chips'		
50	9017	mammal	IM						fragments	2			
44	9018	mammal	cattle	innominate	R				acetabulum/pubis	1	ch DV x 3; hack on pubis		
44	9018	bird	fowl	tarso-metatarsus	L			A	entire	1			spur present; exostoses
39	9020	mammal	horse	mandible	R				fragments	1			reconstructed M3,2,1, PM4.
39	9020	mammal	horse	tooth					incisor	1			

Appendix 4. Animal bone catalogue sorted by context

Catherine Smith, Alder Archaeology

Find no.	Context No.	Class	Species	Bone	L/R	prox	dist	Age	Part	Quantity	Butchery	Gnawed	Comment
39	9020	mammal	cat	radius	L				prox	1		GD	conjoins with ulna
39	9020	mammal	cat	ulna	L				prox	1		GD	conjoins with radius
39	9020	mammal	SU	rib					articulation	1			
39	9020	mammal	SU	rib					shaft	2			
39	9020	mammal	LU	LBSF						1			abraded
39	9020	mammal	IM	epiphysis					?femur head	1			abraded
39	9020	bird	cf fowl	humerus				immature		1			
125	9021	mammal	LU	rib					shaft	1		GD	
125	9021	mammal	SU	vertebra					neural spine	1			
125	9021	mammal	IM	LBSF					fragments ?same	5			
48	9022	mammal	cattle	mandible	L				aboral	1	ch CC		
48	9022	mammal	cattle	radius	L				shaft	1	prob ch sag	GD	
48	9022	mammal	cattle	ulna				J	olecranon	1		GD	
48	9022	mammal	SU	rib					shaft	7			
48	9022	mammal	SU	rib					shaft	1			callous; ?healed fracture
48	9022	mammal	IM	scapula					blade	3	chopped with thin hacks, 'butchers' chips'		
48	9022	mammal	LU	LBSF					shaft	1	ch sag	GD	
48	9022	mammal	IM						fragment	9	9 chopped fragments		
48	9022	bird	fowl	coracoid	L			immature	entire	1			abraded
48	9022	bird	fowl	scapula	L			immature	entire	1			abraded
48	9022	bird	fowl	ulna	R			A	entire	1			
48	9022	bird	innominate		R					1			
48	9022	bird	indet sp	tibio-tarsus				immature	distal	1			
48	9022	bird	indet sp						fragments	2			
48	9022	bird	Rock dove	humerus					distal	1		GD	
48	9022	crustacean		cheliped					fragment	1			?burnt
120	9024	mammal	cattle	tooth					lower PM2	1			
120	9024	mammal	cattle	tooth					lower PM3/4	1			
120	9024	mammal	cattle	tooth					incisor	1			
120	9024	mammal	cattle	skull					frontal	1	2 x parallel knife cuts		
120	9024	mammal	sheep/goat	mandible	R				M3	1			
120	9024	mammal	sheep/goat	scapula	R			U	neck	1		GD	
120	9024	mammal	sheep/goat	scapula	L/R			U	blade; caudal	1			
120	9024	mammal	sheep/goat	femur	L/R				shaft	1	ch sag		
120	9024	mammal	SU	rib					articulation	1			
120	9024	mammal	SU	rib					shaft	8			
120	9024	mammal	SU	vertebra					lateral	1			
120	9024	mammal	SU	skull					fragment	1			
120	9024	mammal	IM						fragments	11			
120	9024	mammal	IM						fragment	1		GD	

Appendix 4. Animal bone catalogue sorted by context

Catherine Smith, Alder Archaeology

Find no.	Context No.	Class	Species	Bone	L/R	prox	dist	Age	Part	Quantity	Butchery	Gnawed	Comment
120	9024	mammal	cf cetacean						fragment	1	file/saw cuts on 2 edges		length 47.8mm
120	9024	mammal	cf cetacean						fragment	1			length 101.7mm
120	9024	bird	cf fowl	sternum				immature	keel	1		GD	
120	9024	bird	cf fowl	sternum					keel	1			
122	9027	mammal	LU	rib					shaft	1	2 parallel KC		3 conjoin fragments
126	9028	mammal	sheep/goat	ulna				U	shaft	1	KC along anterior edge		
126	9028	mammal	LU	?mandible						1			
126	9028	mammal	SU	vertebra					lateral process	1			
126	9028	mammal	SU	rib					shaft	2			
126	9028	mammal	IM						fragments	12	chopped 'butchers' chips'		
126	9028	bird	Goose cf greylag	coracoid	R			A	entire	1			
126	9028	bird	cf fowl	scapula					shaft	1			
126	9028	bird	fowl	ulna	L			A	entire	1			
126	9028	bird	fowl	ulna	L			immature	shaft	1			
126	9028	bird	fowl	tibio-tarsus	L			A	distal	1	KC dist condyle		
126	9028	bird	fowl	radius	L			A	entire	1			
126	9028	bird	fowl	radius	R			A	entire	1			
126	9028	mammal	rabbit	humerus				J	shaft	1		GR	
126	9028	fish							fragments	2			
128	9031	mammal	cattle	mandible	R				aboral	1	chopped CC		
128	9031	mammal	SU	rib					articulation	1			
128	9031	mammal	LU	LBSF					shaft	1	ch sag		
128	9031	mammal	IM						fragment	1			abraded
123	9034	mammal	cf cattle	scapula				U	blade	1			
123	9034	mammal	LU	LBSF					shaft	1			worked fragment with use wear
129	9041	mammal	cattle	tooth					incisor	1			
129	9041	mammal	cattle	scapula					blade; caudal	1	4 x parallel hacks, DV		
129	9041	mammal	sheep/goat	radius	R				shaft	1	ch sag	GD	
129	9041	mammal	sheep/goat	ulna	R			U	olecranon	1			
129	9041	mammal	LU	?skull						1	chopped		
129	9041	mammal	IM	LBSF					shaft	1	ch sag	GD	
129	9041	mammal	IM						fragments	2			
130	9045	mammal	sheep/goat	skull				unfused	parietal	1	ch sag	GD	
130	9045	mammal	sheep/goat	femur	R				shaft	1	ch sag		
130	9045	mammal	LU	vertebra					dorsal	1	ch DV & DV hack		
130	9045	mammal	SU	rib					shaft	1			
130	9045	mammal	IM	?scapula						1	parallel hacks		abraded
130	9045	mammal	IM						fragments	8			
119	9052	mammal	cattle	tooth					incisor	1			
124	9054	mammal	sheep/goat	innominate	L			J	ac, ischium	1	ch sag	GD	
127	9056	mammal	cf cattle	scapula					blade	1		GD	

Appendix 4. Animal bone catalogue sorted by context

Catherine Smith, Alder Archaeology

Find no.	Context No.	Class	Species	Bone	L/R	prox	dist	Age	Part	Quantity	Butchery	Gnawed	Comment
127	9056	mammal	cattle	calcaneum	L				shaft	1		GD	extensively gnawed
127	9056	mammal	cattle	1st phalange					entire	1			
127	9056	mammal	sheep/goat	skull					petrous	1			
127	9056	mammal	sheep/goat	skull				unfused	squamous	1			
127	9056	mammal	sheep/goat	atlas				unfused		1			
127	9056	mammal	sheep/goat	mandible	R				M3	1	KC lingual		
127	9056	mammal	sheep/goat	scapula	R			J		1		GD	no pecten
127	9056	mammal	sheep/goat	scapula	R			J		1		GD	no pecten
127	9056	mammal	LU	vertebra					neural spine	1	ch DV		
127	9056	mammal	LU	rib					shaft	1		GD	
127	9056	mammal	LU	LBSF					shaft	1	ch sag; ML hack overlying sag cut		
127	9056	mammal	LU	LBSF					shaft	1			
127	9056	mammal	IM						fragments	13	butchers' chips'		
127	9056	bird	Rock dove	humerus	L				entire	1		GD	
127	9056	bird	Starling	mandible	L & R				beak	1			
127	9056	fish							fragment	1			
121	9057	mammal	sheep/goat	scapula	L					1	hack, ventral	GD	no pecten, but neck fairly broad
121	9057	mammal	sheep/goat	humerus	L				shaft	1	KC posterior	GD	
121	9057	mammal	SU	rib					articulation	1			
121	9057	mammal	SU	rib					shaft	5			
121	9057	mammal	IM						fragments	2			
121	9057	mammal	IM						fragments	2		GD	

Appendix 5. Analysis of the fish remains from Brora Back Beach 2011 excavations of Trench 9, with a note on the crustacean remains.

Ruby Ceron-Carrasco

Methodology

Remains of fish bone were recovered from eighteen contexts excavated in the 2011 Season of excavation at Brora Back Beach, Trench 9.

The fish remains derived mainly from sieved bulk samples; over 3400 fragments of fish bone were recovered with some 50% of these being skeletal elements identifiable to species or family group.

The fish skeletal elements were identified, where possible, to species level or to family group, using a comparative modern fish bone reference collection and standard guides (Watt *et al* 1997). Nomenclature follows Wheeler & Jones (1989, 122-123).

The sizes of the cod-family species (Gadidae) were given an approximate size range. This was done by matching the archaeological material to modern fish skeletons of known size based on 'total body length'. Therefore, elements were categorized as 'small' (15-30 cm), 'medium' (30-60 cm), 'large' (60-120 cm) and 'very large' (120-150 cm).

The size of the identified non-gadoid species was calculated by comparison with modern specimens of known size and these were from 'adult' specimens.

All elements were examined for signs of butchery and burning.

Quantification was calculated as NISP (the number of identified species) by fragment count, using single or paired elements which are easily identifiable to species such as skull parts and vertebrae. The recording of preservation state of the fish bone was based on two characters: texture on a scale of 1 to 5 (fresh to extremely crumbly) and erosion also on a scale of 1 to 5 (none to extreme). The sum of both was used as an indication of bone condition; fresh bone would score 2 while extremely poorly preserved bone would score 10 (after Nicholson 1991).

Results

The results of the identification of the fish remains are given in the catalogue. The summary of species present and NISP (Number of Identified Species) by element for Trench 9 is given in Table 1.

The level of preservation of the fish bone was consistent, in terms of fragment size and condition. Skeletal elements were most frequently 40-70 % complete. Their condition score was generally in the range of 7-8 indicating poor to extremely poorly preserved bone.

Fish skeletal elements of both the head and vertebrae column were recovered indicating that fish were brought whole to the site.

Nine taxa were identified consisting of seven identified to species and two to family level. All these were marine species, haddock (*Melanogrammus aeglefinus*) was the main species represented. The other species identified were cod (*Gadus morhua*), saithe/Pollack (*Pollachius* sp.) and the family group, Gadidae. Flatfishes were also identified plaice (*Pleuronectes platessa*) and halibut (*Hippoglossus hippoglossus*), and unidentified flatfish of the Pleuronectidae family. Mackerel (*Scomber scombrus*) and the anadromous salmon (*Salmo salar*) were also present.

This area produced large amount of fish remains with haddock the most abundant species represented whilst other gadids such as cod were present in minimal amounts. Very few elements flatfish were recovered; the flatfish remains were from plaice and halibut.

The large amounts of fish remains recovered in this area suggest that fish were consumed probably at a period of busy anthropogenic activity, the main species present here, haddock, would have provided an important and easily available source of fresh food.

Table 1: Fish species representation by NISP

Species	NISP
Cod (small)	196
Cod (medium)	166
Cod (large)	21
Cod (very large)	9
Haddock (small)	458
Haddock (medium)	245
Haddock (large)	21
Saithe/pollack (small)	33
Gadidae (small)	46
Gadidae (medium)	13
Gadidae (large)	5
Plaice (adult)	35
Halibut (adult)	1
Flatfish (Pluronectidae)	18
Mackerel (adult)	1
Salmon (adult)	3
Total	1271

Taxonomic analysis (otherwise stated, After Wheeler 1969 & 1978)

Haddock (*Melanogrammus aeglefinus*) is found throughout the North Sea and has been a very important commercial species eaten fresh or smoked. It lives very near the bottom but large shoals are occasionally found in mid-water; in the North Sea spawning takes place from late February to early May. This species may attain a length of over 100 cm. Haddock is at its best in October and January; it needs to be handled well and is generally gutted at sea; the skin is kept on to avoid tearing of the soft flesh. It does not take salt as well as cod for this reason it is mainly cured by drying and smoking (Lockhart 1997).

Cod (*Gadus morhua*) has been one of the most important food fish in the British fish fauna, and has been exploited since prehistory. Its value as prime food is enormous and when salted or dried it keeps for winter consumption or trade. In northern Atlantic waters, cod spawns in February and March. A mature specimen can reach 150 cm in length. The cod is widely distributed in a variety of habitats from the shoreline to well down the continental shelf. The younger, smaller fish, however, usually live close inshore.

Saithe (*Pollachius virens*) and Pollack (*Pollachius pollachius*) live closely inshore by rocky locations during their juvenile stage which lasts three years. In their fourth year they move further offshore. These species have been an easily available source of food since prehistory throughout Scotland caught, in a domestic basis, from the safety of rocky locations using simple lines and/or domestic hand-nets.

Flatfish present in this assemblage belonged to species of the Pleuronectidae family group, i.e. flatfishes which have both eyes on the right side of the body. These fish are widely distributed in the cool temperate waters of the Atlantic and most are found in shallow waters such as plaice and dab, although a few species are found in deeper waters such as the halibut.

Plaice (*Pleuronectes platessa*) is found in a variety of substrates, from sand and gravel to rocky grounds and is mainly found during spring and summer. It attains a length of up to 60 cm. It can be caught by spearing and line fishing.

Halibut (*Hippoglossus hippoglossus*) is a deep water fish found on a variety of different substrates, an important fish food, this species may attain a total length of 250 cm and it is mainly caught on line. Today halibut is a highly regarded fish but before the 19th century it was mainly used as fertilizer (Ellis 1995). Halibut are found from June-March and caught from boats using lines.

Mackerel (*Scomber scombrus*) (Scombridae family), is a common North Atlantic fish living near the surface of the sea in huge schools above the continental shelf. It is found seasonally close inshore but is highly migratory, making migrations as well as moving north in the summer. This is an important food-fish. It is caught in various ways including nets and by hook. Mackerel does not keep well after capture and therefore has to be eaten immediately, fresh, or be processed by smoking because of its high oil content (Ellis 1995). This is an oil-rich fish which once caught, spoils quite rapidly, their bone also disintegrate quite rapidly under buried conditions which may account for their relatively low presence compared to the above species, in the archaeological record.

General discussion

The size range of the Gadidae remains recovered at Brora Trench 9 and the other fish family groups indicate a variety of fishing techniques that were already described for the fish remains recovered in previous seasons at Brora. These include: simple line fishing or the use of hand-nets such as the poke net or 'tabh', from locations on the rocky shore for young gadidae specimens of saithe/pollack and small cod, also mackerel which can be found inshore as well as salmon. Boats would have been used, with line and hook for the catch of haddock and the larger species of gadidae, e.g. medium to very large cod which inhabit deeper waters as well as halibut. Plaice, would have been caught by spearing from sandy locations.

Such activities would have been in practice for most of the year but particularly in autumn and winter, other species present in this assemblage, as well as such as plaice.

The East Coast maintained a prolific fishery industry from at least the 16th century up to its demise in the early 20th century; this industry supplied local needs as well as external trade (Coull 1996). Brora must have played an important role in the development of the fishing industry particularly as a source of supply of salt for curing cod and herring for export. Workers in the Salt Pans must certainly have relied on the supply of fresh fish as one of their main sources of food.

Conclusion

All the species present in the Brora Back Beach, Trench 9 assemblage have had a long history as important sources of food and some, in particular, cod and haddock, may have been either consumed fresh or as salted, dried or smoked products.

The fish bone recovered at Trench 9 area are remains of anthropogenic activities and attest to their use of an important natural resource that was available for local consumption throughout the year as well as used for commerce.

A note on the crustacean remains

Burnt claws and carapace fragments of the edible crab *Cancer pagurus* were also recovered in Trench 9. These are considered to have been residues of crab meat consumed by humans and disposed of by burning.

The early fishing industry of 16th-17th century around the East Coast focussed on line fishing and to a lesser extent herring fishing however, there were a few individual boats that targeted lobsters and crabs. Generally speaking this would have been a supplemental activity in addition to the fishers primary goal of white fishing (for haddock, cod and flatfishes) however a few boats may have engaged exclusively with creel fishing for lobster and crab (Lockhart 1997).

Early fishing records make little mention of lobster and crab fishing and it is not until the mid 1800's that some references to shellfish appear. The reason for this may have been the absence of markets for this particular seafood until that time; although remains of crab appear in the archaeological record in Scotland as far back as the Mesolithic period.

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Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
9005	dentary/right	1	Haddock	L	4	4	8	40%	proximal
	dentary/right	2	Haddock	M	3	4	7	70%	proximal
	dentary/left	2	Haddock	M	3	4	7	60%	proximal
	maxilla/right	2	Haddock	M	3	4	7	70%	proximal
	maxilla/left	1	Haddock	M	3	4	7	60%	proximal
	premaxilla/right	1	Haddock	M	3	4	7	60%	proximal
	premaxilla/left	4	Haddock	M	3	4	7	70%	proximal
	cleithra	25	Haddock	M	3	4	7	40%	proximal
	ceratohyal	1	Haddock	M	4	4	8	60%	
	ceratohyal	3	Haddock	S	3	4	7	70%	
	ceratohyal/epihyal	1	Haddock	S	3	4	7	70%	fused
	articular/left	1	Cod	S	3	4	7	40%	proximal
	articular/left	3	Haddock	S	3	4	7	50%	proximal
	clavicle	1	Haddock	M	3	4	7	60%	proximal
	opercular	2	Gadidae	M	4	4	8	70%	proximal
	parasphenoid	6	Gadidae	M	4	4	8	70%	
	frontal	1	Gadidae	L	4	4	8	70%	
	parasphenoid	1	Gadidae	L	4	4	8	60%	
	precaudal vertebrae	8	Haddock	L	4	4	8	60%	
	caudal vertebrae	12	Haddock	L	4	4	8	60%	
	precaudal vertebrae	12	Haddock	M	4	4	8	60%	
	caudal vertebrae	35	Haddock	M	4	4	8	60%	
	caudal vertebrae	89	Haddock	S	4	4	8	60%	
	precaudal vertebrae	40	Haddock	S	4	4	8	60%	
	otolith	2	Haddock	M	3	4	7	50%	
	precaudal vertebrae	14	Haddock	S	4	4	8	60%	burnt/white
	caudal vertebrae	18	Haddock	S	4	4	8	60%	burnt/white
	precaudal vertebrae	7	Cod	S	4	4	8	60%	burnt/white
	caudal vertebrae	5	Cod	S	4	4	8	60%	burnt/white
	precaudal vertebrae	6	Cod	L	4	4	8	60%	
	caudal vertebrae	7	Cod	L	4	4	8	60%	
	precaudal vertebrae	16	Cod	M	4	4	8	60%	
	caudal vertebrae	5	Cod	M	4	4	8	60%	
	precaudal vertebrae	27	Cod	S	4	4	8	60%	
	caudal vertebrae	35	Cod	S	4	4	8	60%	

Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
	precaudal vertebrae	7	Saithe	VS	4	4	8	70%	
	caudal vertebrae	5	Saithe	VS	4	4	8	60%	
	posttemporal	1	Haddock	S	4	4	8	70%	proximal
	fragments	200	Unidentifiable	Unknown	4	5	9	5%	
		609							
9007	precaudal vertebrae	1	Cod	L	4	4	8	70%	
		1							
9008	vertebrae	1	Cod	VL	4	5	9	40%	
		1							
9011	dentary/right	1	Ling?	L	4	5	9	40%	medial
		1							
9013	caudal vertebrae	1	Haddock	S	4	4	8	60%	
		1							
9014	cleithra	1	Pleuronectidae	Adult	4	4	8	60%	
	precaudal vertebrae	1	Halibut	Adult	4	4	8	70%	
	precaudal vertebrae	29	Haddock	S	4	4	8	60%	
	caudal vertebrae	7	Haddock	S	4	4	8	60%	
	fin rays	12	Unidentifiable	Unknown	3	4	7	50%	
	fragments	80	Unidentifiable	Unknown	4	5	9	5%	
	ceratohyal	2	Haddock	S	4	4	8	70%	
	hyomandibular	1	Gadidae	S	4	5	9	50%	medial
	posttemporal	1	Haddock	S	4	4	8	50%	proximal
		134							
9020	cleithra	7	Pleuronectidae	Adult	4	4	8	60%	medial
	cleithra	4	Haddock	S	4	4	8	40%	
	posttemporal	1	Haddock	L	3	4	7	60%	proximal
	posttemporal	4	Haddock	S	3	4	7	60%	proximal
	ceratohyal	2	Haddock	S	4	4	8	70%	
	dentary/left	2	Cod	S	3	4	7	60%	proximal
	dentary/left	2	Haddock	S	3	4	7	60%	proximal
	dentary/right	2	Haddock	S	4	4	8	50%	proximal
	premaxilla/left	1	Haddock	S	4	4	8	60%	proximal
	opercular	1	Gadidae	M	4	4	8	60%	proximal
	preopercular	3	Gadidae	S	4	4	8	50%	
	parasphenoid	4	Gadidae	S	4	4	8	60%	
	maxilla/right	1	Haddock	S	3	4	7	60%	proximal

Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
	epibranchial	1	Gadidae	L	3	4	7	70%	
	hyomandibular	1	Gadidae	S	4	4	8	60%	
	caudal vertebrae	4	Haddock	M	3	4	7	60%	
	caudal vertebrae	7	Palice	Adult	4	4	8	60%	
	precaudal vertebrae	22	Haddock	S	3	4	7	70%	
	caudal vertebrae	38	Haddock	S	3	4	7	70%	
	precaudal vertebrae	20	Cod	S	3	4	7	60%	
	caudal vertebrae	45	Cod	S	3	4	7	60%	
	otolith	1	Haddock	M	3	4	7	70%	
	Claws/carapace	***	Cancer pagurus	Unknown	4	4	8	20%	
	fragments	>100	Unidentifiable	Unknown	4	5	9	5%	
		273							
9021	fin rays	20	Unidentifiable	Unknown	4	4	8	50%	
		20							
9022	cleithra	1	Haddock	M	3	4	7	40%	
	cleithra	1	Haddock	S	3	4	7	40%	
	precaudal vertebrae	2	Haddock	M	3	4	7	60%	
	caudal vertebrae	1	Haddock?	L	4	5	9	40%	
	fin rays	6	Unidentifiable	Unknown	3	4	7	60%	
	fragments	>30	Unidentifiable	Unknown	4	5	9	5%	
		41							
9024	precaudal vertebrae	2	Cod	M	3	4	7	70%	
	precaudal vertebrae	7	Haddock	M	3	4	7	60%	
	caudal vertebrae	5	Haddock	M	3	4	7	60%	
	precaudal vertebrae	9	Haddock	S	3	4	7	60%	
	caudal vertebrae	7	Haddock	S	3	4	7	60%	
	precaudal vertebrae	4	Cod	S	3	4	7	60%	
	caudal vertebrae	4	Cod	S	3	4	7	60%	
	dentary/right	1	Cod	M	4	4	8	60%	medial
	dentary/right	2	Haddock	S	4	4	8	50%	medial
	cleithra	8	Haddock	S	3	4	7	40%	
	ceratohyal	1	Haddock	S	4	4	8	70%	
	ceratohyal	1	Haddock	M	4	4	8	70%	
	cleithra	3	Pleuronectidae	Adult	4	4	8	60%	proximal
	ceratohyal	1	Mackerel?	Adult	4	4	8	70%	with cut marks
	frontal	4	Gadidae	M	4	5	9	60%	

Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
	branchiostegals	5	Gadidae	L	3	4	7	70%	
	otoliths	19	Haddock	S	3	4	7	60%	
	parasphenoid	4	Gadidae	S	4	4	8	60%	
	Claws/fragments	***	Cancer pagurus	Unknown	4	4	8	10%	burnt/white
	fragments	>400	Unidentifiable	Unknown	4	5	9	5%	
		487							
9028	cleithra	1	Pleuronectidae	Adult	3	4	7	70%	proximal
	otolith	1	Haddock	S	3	4	7	60%	
	preopercular	1	Gadidae	S	4	4	8	60%	
	fin rays	7	Gadidae	Unknown	4	4	8	40%	
	parasphenoid	1	Gadidae	S	4	4	8	50%	
	dentary/left	1	Haddock	S	4	4	8	60%	proximal
		12							
9034	dentary/right	1	Cod	VL	4	5	9	40%	medial
	premaxilla/left	2	Cod	VL	4	4	8	50%	proximal
	premaxilla/right	1	Cod	VL	4	4	8	60%	proximal
	articular	1	Gadidae	VL	4	5	9	40%	medial
	premaxilla/right	1	Cod	L	4	4	8	40%	proximal
	maxilla/left	1	Cod	L	4	5	9	40%	proximal
	pharyngeal plate	1	Cod	L	3	4	7	70%	
	ceratobranchials	4	Gadidae	VL	3	4	7	80%	
	epibranchials	7	Gadidae	VL	3	4	7	70%	
	cleithra	5	Pleuronectidae	Adult	4	4	8	70%	
	quadrate	1	Gadidae	L	4	4	8	60%	medial
	articular/left	1	Cod	L	4	4	8	60%	proximal
	dentary/right	2	Haddock	S	4	4	8	60%	proximal
	dentary/left	3	Haddock	S	4	4	8	60%	proximal
	ceratohyal	6	Haddock	S	4	4	8	60%	
	hyomandibular	7	Gadidae	S	4	4	8	60%	
	preopercular	5	Gadidae	S	4	4	8	60%	
	opercular	6	Gadidae	S	4	4	8	60%	
	caudal vertebra	3	Salmon	Adult	3	4	7	70%	
	precaudal vertebrae	11	Plaice	Adult	3	4	7	70%	
	caudal vertebra	15	Plaice	Adult	3	4	7	70%	
	precaudal vertebrae	50	Cod	M	4	4	8	60%	
	caudal vertebra	90	Cod	M	4	4	8	60%	

Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
	precaudal vertebrae	44	Haddock	M	4	4	8	60%	
	caudal vertebra	85	Haddock	M	4	4	8	60%	
	precaudal vertebrae	35	Haddock	S	4	4	8	60%	
	caudal vertebra	24	Haddock	S	4	4	8	60%	
	precaudal vertebrae	7	Saithe/Pollack	S	4	4	8	60%	
	caudal vertebra	15	Saithe/Pollack	S	4	4	8	60%	
	precaudal vertebrae	10	Cod	S	4	4	8	60%	
	caudal vertebra	16	Cod	S	4	4	8	60%	
	dentary/right	3	Cod	S	3	4	7	70%	proximal
	premaxilla/right	2	Cod	S	3	4	7	70%	proximal
	premaxilla/left	3	Cod	S	3	4	7	60%	proximal
	fragments	>1000	Unidentifiable	Unknown	5	5	10	5%	
	otoliths	8	Haddock	S	3	4	7	70%	
	Claws/carapace frags	***	Cancer pagurus	Unknown	4	4	8	10%	burnt/white
		1476							
9041	ceratohyal	1	Cod	L	3	4	7	70%	
	cleithra	1	Haddock	S	4	4	8	40%	
	precaudal vertebrae	7	Haddock	S	3	4	7	70%	
	ceratohyal	1	Haddock	S	4	4	8	70%	
	cleithra	1	Pleuronectidae	Adult?	4	4	8	60%	proximal
	precaudal vertebrae	1	Plaice	Adult?	3	4	7	70%	
		12							
9045	cleitra	3	Haddock	M?	4	4	8	40%	
	precaudal vertebrae	1	Cod	L	4	5	9	40%	
	precaudal vertebrae	1	Haddock	S	3	4	7	60%	
	dentary/left	1	Haddock	S	4	4	8	60%	proximal
	hyomandibular	1	Gadidae	S	4	4	8	60%	
	branchiostegals	4	Gadidae	S	4	4	8	40%	
	fragments	>60	Unidentifiable	Unknown	4	5	9	5%	
		71							
9052	precaudal vertebrae	2	Haddock	M	3	4	7	60%	
	caudal vertebrae	3	Haddock	M	3	4	7	60%	
	precaudal vertebrae	4	Haddock	S	3	4	7	60%	
	caudal vertebrae	3	Haddock	S	3	4	7	60%	
	precaudal vertebrae	2	Cod	S	3	4	7	60%	
	caudal vertebrae	2	Cod	S	3	4	7	60%	

Appendix 5. Fish bone catalogue sorted by context number

Ruby Ceron-Carrasco

Context	Element	Number	Species	Size	Erosion	Texture	Condition	Element %	Comments
	dentary/left	1	Cod	S	4	4	8	60%	proximal
	dentary/left	2	Haddock	S	4	4	8	60%	proximal
	dentary/right	2	Haddock	S	4	4	8	60%	proximal
	premaxilla/left	1	Haddock	S	4	4	8	60%	proximal
	premaxilla/right	1	Haddock	S	4	4	8	60%	proximal
	vomer	1	Haddock	S	4	4	8	60%	proximal
	posttemporal	2	Haddock	S	4	4	8	40%	proximal
	hyomandibular	3	Gadidae	S	4	4	8	60%	
	ceratohyal	4	Haddock	S	4	4	8	70%	
	cleithra	1	Haddock	M	3	4	7	50%	
	cleithra	1	Haddock	S	3	4	7	40%	
	pharyngeal plate	1	Cod	S	3	4	7	70%	
	precaudal vertebrae	1	Plaice	Adult	3	4	7	70%	
	fragments	>400	Unidentifiable	Unknown	4	5	9	5%	
	otolith	5	Haddock	S	3	4	7	80%	
	claws/carapace	***	Cancer pagurus	Unknown	4	4	8	20%	burnt white
		442							
9056	cleithra	1	Haddock	M?	4	4	8	40%	
	precaudal vertebrae	3	Haddock	M	3	4	7	70%	
	precaudal vertebrae	6	Haddock	S	4	4	8	70%	
	basioccipital	1	Gadidae	S	4	4	8	60%	
	dentary/left	1	Haddock	S	4	4	8	60%	proximal
		12							
9057	vomer	1	Cod	L	4	4	8	60%	proximal
	precaudal vertebrae	1	Cod	L	4	4	8	60%	
	precaudal vertebrae	1	Cod	M	4	4	8	60%	
	precaudal vertebrae	1	Haddock	M	3	4	7	70%	
	cleithra	2	Haddock	M	4	4	8	40%	
	dentary/left	1	Cod	M	4	4	8	60%	proximal
	claw	1	Cancer pagurus	Unknown	4	4	8	10%	burnt/white
		8							
9065	branchiostegal	1	Gadidae	S?	3	4	7	60%	
		1							
	TOTAL	3601							

Appendix 6. Marine shell catalogue sorted by context. Trench 9, 2010 and 2011

Find No.	(2010 Context No.)	Context No.	Mussel (<i>Mytilus edulis</i>)	Oyster (<i>Ostrea edulis</i>)	Cockle (<i>Cerastoderma edule</i>)	Winkle (<i>Littorina littorea</i>)	Limpet (<i>Patella vulgata</i>)	Whelk (<i>Buccinum undatum</i>)	Flat periwinkle (<i>Littorina littoralis</i>)	Scallop (St. Jame's shell) (<i>Pecten maximus</i>)	Baltic tellin (<i>Macoma balthica</i>)	Pelicans foot shell (<i>Aporrhais pespelecani</i>)	Unidentified shell frags	Crab (<i>Cancer pagurus</i> ?)
2011														
40	945	9005	12	3	10	9	11	2						1
51		9007				6	2						1	
43		9014	1	2		2	1	1						
33		9017		1	1									1
45		9018	1				1		1				4	
54		9020	8	2	1	18	2	7	4	1			2	
167		9021	3					1	1				1	
172		9022	3	1		1	3						2	2
170	920	9024	86	73		30	35	8	6	10	1		6	2
174		9025			146									
168		9028	13	10	8	2	2	1	1					1
175		9031		91	1	2	1							
166		9034	4			2	2		1					
169		9041	25			1							1	
171		9045	28				5	4						2
164		9052	40			22	5	3	4	1				
173	975	9054	5	29	5	1	7							4
165		9057	1										1	
2010														
9116		916	4		1	16	4	3	1					
9104		917	3		2	9	5						5	
9113		921		3					1				12	
9109		933	1			1	1					1	2	
9105		939	1	1										
9102		941		1		2								1
9148		956	29					1						
9119		961	7	1	1									
9126		981	6											
		TOTALS	281	218	176	124	87	31	20	12	1	1	35	16