NÁTTÚRUSTOFA VESTFJARÐA
FORNLEIFADEILD

NA BO

Archaeological Excavations at Qassiarsuk 2005 – 2006

Field report
(Data Structure Report)

Edited by Ragnar Edvardsson
With contribution by Caroline Paulsen, Mike Church, Ian Simpson, Paul Adderly Albína Pálsdóttir and Thomas H. McGovern

Náttúrustofa Vestfjarða
NABO
Grønlands Nationalmuseum & Arkiv

Apríl 2007
NV.nr. 03-07

Náttúrustofa Vestfjarða
Aðalstræti 21
415 Bolungarvík

Sími: 4567005
Fax: 4567351

Kennitala: 610397-2209
Netfang: nave@nave.is
Heimasíða: http://nave.is

1. Introduction

This is the data structure report of the Qassiarsuk international archaeological project in 2005 and 2006 at the ruin Ø29a (KNK61V3-III-539). Here can be found, a.o., descriptions of the methodology selected for the excavation, the excavations themselves, lists of everything that was recorded during the two seasons, i.e. finds, samples, archaeological units, etc. Here are also published the preliminary interpretations of the data and discussion for future work at Ø29a. The main aim of the report is to present the data in such a way that it can accessible to both scholars and laymen and give a detailed description of all elements of the project. The analysis of the data is still in progress and it is understood that the reader will not publish any of the material contained herein without the permission of the Greenland Museum and Archieves or the authors.

The excavation at Qassiarsuk in 2005 and 2006 was a cooperative project between various institutions and Universities, Greenland National Museum and Archives (NKA), North Atlantic Biocultural Organization (NABO), University of Stirling and Aberdeen, Hunter College and the Graduate Center of the City University of New York.

The project was aimed at providing a modern stratigraphically controlled collection of bones and artifacts and to assess the conditions of preservation at this major site. It also aimed at assesing the site for future work and to see if the the site Ø29a could reveal new archaeological data.

Very special thanks are owed to the hard working and enduring international field crews of the 2005-06 seasons, and to the people of Qassiarsuk village who showed such kind hospitality. Special thanks are also owed to the staff at SILA in Copenhagen for allowing the use of their facilities and library during the writing of this report. Vital logistic support was provided by the NKA and VECO Polar Services. Funding support was provided by CUNY Northern Science & Education Center, the Greenland National Museum and Archives, the National Geographic Society Committee for Research & Exploration, the US National Science Foundation Office of Polar Programs Arctic Social Sciences Program, and the UK Leverhulme Trust.

2. Aims and Methods

Ragnar Edvardsson

The aims of the 2005 field season was to asses if the KNK2629 site (Ø29a) could reveal any more zoo archaeological material for analysis and if the site was worth further work. The earlier excavations on revealed extensive bone assemblage but few bones found their way to the National Museum in Copenhagen. The anlysed sample was too small to give any conclusive results about the economy of the farm. It was hoped that with more excavation in the midden a larger data sample could be extracted, giving a better idea about the economy of the farm, any changes in farming strategy and other important factors affecting the farm throughout time until its abandonment.

The basic aim was to locate the old excavation trench that Nørlund and Stenberger excavated in 1932 (Plan 2), clean it out and excavate from the edges of the trench into the undisturbed midden layers. Other aims were also to get pollen, wood, C^{14}, and other organic samples from the undisturbed layers to gain deeper understanding of the farm.

The aim of the 2006 season was in general the same as in 2005, i.e. excavate the undisturbed midden layers on the southeastern side of the Nørlund and Stenberger excavation trench, where the 2005 excavation had showed highest amount of well preserved bones. The focus of the 2006 season was on the midden layers but any other archaeological features, structures, etc., were also excavated.

The methodology of the excavations at Ø29a is the so called *open area* excavation and *single context* recording. This method has been used now for over 10 years on various sites in the North Atlantic and has proved an excellent method of excavating both structures and midden sites (Edvardsson, Ragnar, 2004).

With this method a large area is opened, preferably an area of a 10 x 10 meters and each archaeological unit (context), i.e. deposits, cuts, structures, etc., are excavated in a reversed order, starting with the youngest. All units are cleaned, photographed, planned and finally removed. The whole area is excavated at the same time, which gives the archaeologists a view of all phases of the site until the whole area is excavated to the undisturbed phase before occupation. Ideally all archaeological units are removed, i.e. structures, midden deposits and other units and at the end of excavation nothing remains except the soil prior to occupation of the site. This gives a complete understanding of the history of the site and any changes it has gone through. In the case of the excavation at Ø29a no structures where removed only midden deposits as none of the structures that were recorded were completely exposed and therefore could not be fully excavated.

It is important in order to gain full understanding of any archaeological site that everything prior to the excavation at hand is treated as part of the archaeology and therefore the earlier archaeological trenches at Ø29a were recorded in the same manner as any other archaeological deposit.

All deposits were sieved with a 4mm mesh to collect bones, wood and artifacts. Control samples were taken from all deposits and those deposits that were thought to be rich in organic material were sampled in more detail. Each sample was collected in a 5 liter bag. Micro morphology samples were also collected during the 2005 season from selected deposits.

3. Earlier Work at Ø29a

Caroline Paulsen

The investigations of the Brattahlid area may already have started in 1751, where Peder Olsen Walloe traveled around in the fiords in the southern Greenland in search of Norse ruins. In the area of Tunulliarfik he described an area that must be the Narsarsuaq-valley, and also described a large number of ruins, 2 of them with what he considers churches. But he does not point out exactly where these presumed churches are in the landscape, or which ruins they're connected to. Prior to Walloe´s visit the missionary Hans Edge went from the colony of Good Hope, established in 1721 in the Nuuk area, to the east coast to search for the eastern settlement. On his way he went into the fiords in the south and saw several of the Norse ruins, without realizing that he had actually found eastern settlement in a completely different place than he set out to search for it. Between 1838 and 1845 the Royal Society of Northern Antiquaries published Grønlands Historiske Mindesmærker – a description of the ruins known in Greenland at the time. In 1832 the systematic surveys

prior to these publications resulted in a visit in Qassiarsuk, and excavations were made in the largest of the ruins, and proved the existence of a church.

The way of numbering the ruins – dividing the ruins into Ø for Eastern Settlement, V for Western Settlement and M for the Middle Settlement, followed by a number, was introduced by Captain Daniel Bruun in 1894. His systematic work numbering the ruins as they were found, followed up the work of Captain Gustav Holm, who in 1880 started the systematic descriptions of the individual Norse ruins. Daniel Bruun gave the ruins north of the river on the Qassiarsuk plateau the number Ø29, when the ruins later was divided into different farms they were given the numbers Ø29a (the Northern farm) and Ø29b (the Mountain Farm).(Arneborg, 2006, 18-19)

The major excavations in the area were done in 1932 after the large scale excavations at Igaliku/Gardar and Herjolfsnæs/Ikigaat. This excavation was done by Professor Poul Nørlund from the National Museum in Copenhagen, and Professor Mårten Stenberger from the University of Uppsala. The main purpose of the excavation were the structures, but also the midden was investigated, and zoologists were involved in the project. The entire excavation was started by digging a approximately 35 meter long and 1 meter wide trench from the northwestern part of the churchyard wall toward the southeastern part of the dwelling (Mårten Stenbergers diary, 1932 (Unpublished), p.1ff(21 June) and aerial photograph, 28th July 1932). After locating the midden and the dwelling the large excavations described in the publication from 1934 were carried out. The entire farm consisted of 18 structures, including dwelling, church, byres, barns, pens, storehouses and a couple of unidentified structures (Nørlund & Stenberger 1934, p. 1ff).

In 1961 and 1964 Jørgen Meldgaard and Knud J. Krogh, from the National Museum in Copenhagen excavated the small church, "Thjodhildes Church" (Arneborg 2006, p 1 8-19), and also did test trenches and small excavations around on the farm-area. One of these trenches was dug through the oldest part of ruin 2, revealing a small turf build longhouse. In addition to finding the small church another dwelling was found, dated to the landnám period, and placed on the field just by the newly discovered church. In all, 9 trenches approximately 1 m wide, 1-3 meters long were excavated in 1974, cutting the longwalls of the sturcture (Krogh, K, 1982). Several of the old trenches from Nørlund and Krogh had been left open until the 1990's. The more recent work in this area, done by Hans Kapel in the 1990's, has included filling up these old trenches and making the ruins more visible by reconstructing some of the structures in turf above the ground. Also the area between the ruins was cleaned up, removing old spoil heaps, and stones from the area, and paths were made to make the ruins accessible, but also to protect the ruins from erosion from the large amount of tourists visiting each year (Kapel, H, 1999).

4. The Brattahlíð Excavations in 2005, KNK2629 (Ø29a)

Ragnar Edvardsson and Caroline Paulsen

The excavation in 2005 was from early August to early September and the excavation team consisted of; Ragnar Edvardsson, Dr. Mike Church, Juha Martilla, Caroline Paulsen and Mass Hoydal. During the later part of the excavation Dr Ian Simpson and Dr Paul Adderly joined the team to take micro morphology samples.

An area of approximately 65 m^2 (Plan 2) was opened in the area were Nørlund and Stenberger had located a kitchen midden and partially excavated it in 1932 (Nørlund and Stenberger, 1934). The aim was to open the whole 1932 excavation trench as it was recorded and published in the 1934 report, clean it out and excavate into undisturbed midden deposits (Plan 1).

Pic. 1. The excavation area in 2005

It soon became apparent that the site had gone through major disturbance from the 1932 excavation and it proved extremely difficult to find the edge of the 1932 excavation trench. This was the result of various factors, such as the actual trench was quite different from the published version, the trench had been open for decades after the conclusion of the excavation, which had caused the trench edges to collapse inwards, and a major renovation of the site around 1990 had further damaged the site. This renovation had filled the midden excavation trench with large rocks.

An aerial photograph taken during the 1932 excavation showed that in front of the main building complex a trench had been excavated from south to north. It was therefore very clear that the midden trench was somewhat larger than published in 1934. It was decided to alter the excavation method as it would have been too time consuming to find the whole 1932 midden trench and clean out all the debris from it. It was estimated that it would take the whole season just to open and clean the old trench.

4.1 Description of archaeological units

It was decided to locate the old trench from 1932 on the south side where the aerial photograph suggested it would be easiest and to excavate 4 test trenches, 3 to the northeast and 1 to the southwest of the 1932 trench. Once the south edge of the old trench had been located a 2 x 4 meter trench would be excavated into the undisturbed midden deposits. The 4 trenches were all the same size, approximately 1 x 1 meters. Trenches 2 and 5 were abandoned soon after their excavation had begun due to difficulties in excavating them. After the removal of topsoil large rocks appeared and it proved impossible to remove them without making the two trenches larger.

It was hoped that with this alteration of the excavation method, it would be possible to extract enough data from the midden for detailed analysis and that undisturbed areas could be identified for future work on the site.

Trench 1.

Unit 1. Surface. 5 – 10 cm deep topsoil.

Unit 2. Infill of Nørlunds trench. This deposit consisted mostly of rocks with earth in between.

Unit 3. The cut for Nørlunds trench. The cut was only recorded on the south side as any attempt of locating it elsewhere was abandoned.

Unit 4. Stone rubble under unit [2] probably the same kind of material.

Unit 7. Same as unit [2].

Unit 9. Mixed material and is possibly an undisturbed midden deposit.

Unit 12. Based black midden deposit.

Unit 14. Midden deposit in sw corner of the trench.

Unit 18. Mixed turf and midden deposit in the northwestern end of the trench. Possibly a redeposit layer.

Unit 26. Black midden deposit.

Unit 27. Isolated turf material.

Unit 32. Same as [2].

Unit 34. Midden mixed with turf deposit.

Unit 35. Gravel subsoil. Undisturbed deposit.

Unit 37. Turf wall, made of strengur turf in south end of Nørlunds trench.

Unit 38. Structural collapse from some structure west of the trench possibly part of the collapse from a well recorded by Nørlund and Stenberger.

Unit 39. Mixed turf material in N- trench, redeposit material and is same as [2].

Unit 40. Mixed material, redeposit and is same as [39] and [2].

Unit 41. Midden material/turf. Visible in s-section, under [38].

Unit 42. Midden material in South section, under 41.

Unit 43. Old excavation trench. Same as [3].

After removal of topsoil [1] it became clear that there had been a lot of activity since 1932 and the latest probably caused damage to the midden. Earth and stones formed the infill [2], [4], [7], [32], [39], [40] of the old 1932 excavation. The deposits consisted mostly of large boulders which had given water easy access to the undisturbed midden underneath. Frost action had also caused these boulders to move which created a grinding effect further damaging the midden.

The cut [3], [43] for Nørlunds/Stenberger trench was difficult to locate especially because the trench had been left open for decades and the sections had collapsed inwards. Furthermore the edge was impossible to locate anywhere except on the south side, towards the churchyard. This was because the reported version of the 1932 midden excavation was somewhat different than the actual trench. A much larger area would have needed to be opened on all sides if the whole excavation trench was to be located.

The time allotted for the team to excavate did not allow such a large excavation and a much larger team is needed for that kind of work.

All the stone rubble was removed from the excavation trench except from the center of the trench. Underneath the rubble redeposit layers [9], [18], were recorded. These deposits were dark with some turf inclusions and could be collapse from sections as the old trench was open for such a long time.

Few midden deposits [12], [14], [26], [34] were recorded in trench 1. It is difficult to determine if these deposits are in situ or are the lowest part of the midden as it seems that during the excavation in 1932 the midden was not excavated everywhere down to the gravel subsoil [35], leaving patches of midden here and there.

On the North west side of the trench a stone collapse [38] was recorded that did not belong to the actual infill of the trench. This may be structural collapse from some structure northwest of the trench, towards the main dwelling. It is quite possible that this collapse is a part of the well structure recorded by Nørlund and Stenberger in 1932.

On the south side of the trench a turf wall [37] made of *strengur* turf was recorded. This wall was about 2 meters long and 80 cm wide, made of white/greenish turf. The wall disappeared into the sections and the remainder of this structure is probably on the south side of the trench. The question is whether it is remains of a structure is yet to be determined. Underneath [37] two undisturbed midden deposits were recorded [41], [42] and both extend to the south from the south section of trench 1.

Trench 2

The trench was located north of trench 1, approximately 2 meters to the north (Plan 3). It was 1 x 1 meters in size.

Unit 31. Topsoil same as [1].

No other deposits were recorded in trench 1 as it proved too difficult to excavate any further down. This was mainly because large stones were recorded everywhere in the trench an in order to remove them the trench would have had to be made a lot bigger.

Trench 3

This trench was located approximately 4 meters to the west of trench 1 (Plan 3).

Unit 19. Rubble overburden same as [2], under [1].

Unit 20. Mixed dark brown silt with some turf/midden, under [19]. Inclusions are charcoal fragments, burned bone but preservation for unburned bones is bad.

Unit 22. Turf deposit under [20]. Slumped turf blocks, not a structure in situ but probably collapse or dump from somewhere around the trench.

Unit 23. Mixed dark brown silt with some charcoal under [22]. Inclusions are charcoal and burned bones. Unburned bones are badly preserved.

Unit 25. Possible burning patch defined by edge set slab, under [22]. This deposit was in lenses, light grey to black in color.

Unit 36. Turf line under [19] overlying [20]. Black organic silt forming a distinct horizon between [19] and [20].

After removal of topsoil [1] similar mixed material [19] was recorded which is the result of the renovation of the site. Underneath was a deposit [20] mixed with turf and midden. When [20] had been removed a deposit of slumped turf [22] was recorded that was not a wall feature but probably a collapse or a dump from some structure in the vicinity. Underneath were mixed deposits [23], [25] containing both turf and midden and are probably midden dumps. A Turf deposit [36] formed a clear horizon between [19] and [20] and is probably an interface between these two deposits.

Trench 4.

Unit 8. Possible midden deposit with turf layer, under [10]. Mixed color, grey/light grey/brown, mixed with limited midden material. With charcoal and turf inclusions, few wood remains and bad bone preservation (Plan 3).

Unit 10. Redeposit rubble over [8], under [1]. Grey/brown organic silt containing large stones, with occasional flecks of charcoal.

Unit 11. Grey to reddish brown turf under [8]. Very distinct layer, largely organic.

Unit 13. Organic black/brown midden with bone/plant material, under [11]. Numerous uncarbonized wood specimen and bones both in a bad and good state of preservation. The bones are from domestic animals and therefore this is probably a Norse midden dump.

Unit 16. Brown/grey deposit, under [13]. Inclusions are gravel, some bone and wood remains.

Unit 17. Dark brown/black soil with some wood and bone under [16].

Unit 28. Grey clay subsoil under [17].

Unit 29. Gravel layer under [28].

The same kind of deposit [10] was recorded after the removal of topsoil [1] as in all trenches. Underneath 5 deposits of midden were recorded [8], [11], [13], [16], [17] all were rich in organic material. Underneath were two undisturbed deposits, clayish [17] and a gravel deposit [28].

Trench 5.

This trench was located approximately 5 meters to the southwest of trench 1, about 5 meters north of the churchyard wall (Plan 3).

Unit 33. Topsoil/rubble layer in top of tr. 5.

As with trench 2 the excavation quickly hit large sets of stones which made it impossible to continue the excavation and therefore any further work in this trench was abandoned.

Trench 6.

The trench was the largest of the test trenches, approximately 2 x 4 meters. It extended from the south edge of trench 1 to the southwest (Plan 3).

Unit 5. Redeposit rubble of earth under topsoil [1].

Unit 6. Dark grey compact silt with some bones. Interface on top of midden. Silt/sandy deposit.

Unit 15. Midden deposit under [6]. Silt/sandy deposit, with bone, wood and other organic material.

Unit 21. Mixed midden/turf deposit under [15]. Dark brown mixed with bones, stones, wood and charcoal fragments.

Unit 24. A midden deposit under [21]. Black/brown with stones, bones and charcoal inclusion. Rich in organic material.

Unit 30. Turf collapse from wall [37]. Mixed turf deposit, sloping away from the wall [37].

Once it became clear that the area south of trench 1 was undisturbed it a trench was cut towards the south to get to the in situ midden deposits. Underneath the topsoil [1] a deposit [5] that consisted of mixed material was recorded. This deposit probably formed when the area was renovated around 1990.

Underneath [5] was a deposit [6] that was compact, dark and contained some bones. This deposit is probably the interface between the deposits [5] and [15]. Once [6] had been removed a dark midden layer [15] was recorded that was rich in bones and other organic material. Right under that was another midden deposit, similar to [15] but had more turf inclusions. This deposit was rich in bones, charcoal, wood and other organic material. Right under this deposit were two more [21], [24] midden deposits that were similar to [15]. In the north end of the trench was a turf layer [30] that is collapse from the wall [37] recorded in trench 1. Underneath [24] was a gravel deposit that extended over the whole trench and is probably the undisturbed subsoil [35].

4.2 Artifacts

Caroline Paulsen and Ragnar Edvardsson

The total number of artifacts recorded during the 2005 season was 47 finds. Of these there were 24 recorded in trench 1, 5 in trench 3, 6 in trench 4 and 11 in trench 6. One find was a surface find. The find assemblage consisted of 18 (38%) steatite objects, 9 (19%) made of wood, 8 (17%) of iron, 3 (6%) of bone, 7 (15%) of stone and (5%) 2 of horn.

The distribution of finds within each deposit was 8 finds in unit 2, 1 in unit 5, 6 in unit 6, 1 in unit 7, 1 in unit 8, 2 in unit 9, 1 in unit 11, 1 in unit 12, 4 in unit 13, 10 in unit 18, 2 in unit 20, 1 in unit 21, 2 in unit 22, 1 in unit 23, 4 in unit 24 and 1 in unit 26. The largest collection of artifacts was recorded in disturbed contexts, with the total number of finds from such deposits was 24 or 51%. This can only ben explained with the fact that earlier excavation techniques were different than today and during the 1932 excavations no deposits were sieved and most of the work was done with a shovel not a trowel, which always causes the danger of missing the smaller objects. Furthermore earlier excavators were selective in their collection of artifacts and only sampled the best and threw the rest away (Vebæk, C.L., 1992, p. 76).

Of the total assemblage 23 (50%) finds were unidentifiable, 5 (10%) iron nails, 15 (32%) vessel fragments made of steatite, 1 (2%) spindle whorle made of steatite, 1 (2%) dress pin made of bone, 1 (2%), hammer made of stone and 1 (2%) hook made of iron.

GU Number	Reporting Number	Unique Sample Code	Delta C-13	C-14 Age	Error (1sigma)
GU-14459	SUERC-11552	NKA2629 C.8 BS.A	-21,0	775	35
GU-14460	SUERC-11556	NKA2629 C.13 BS.A	-21,1	1030	35
GU-14461	SUERC-11557	NKA2629 C.13 BS.B	-20,9	1065	35
GU-14462	SUERC-11558	NKA2629 C.6 BS.A	-21,3	815	35
GU-14463	SUERC-11559	NKA2629 C.6 BS.B	-20,9	775	35
GU-14464	SUERC-11560	NKA2629 C.15 BS.A	-22,4	930	30
GU-14465	SUERC-11561	NKA2629 C.15 BS.B	-22,4	870	35
GU-14466	SUERC-11562	NKA2629 C.24 BS.A	-23,6	925	30
GU-14467	SUERC-11566	NKA2629 C.24 BS.B	-20,3	930	35
GU-14457	SUERC-11550	NKA2629 C.26 BS.A	-21,2	1050	35
GU-14458	SUERC-11551	NKA2629 C.26 BS.B	-20,2	980	35

Table 1. List of c14 samples taken during the 2005 season (Uncaliberated).

All finds were recorded in the midden deposits and about half of them are in a secondary contexts as they probably had been removed from their primary context and redeposit during the 1932 excavations. This makes them unusable for relative dating of the context that they were recorded in.

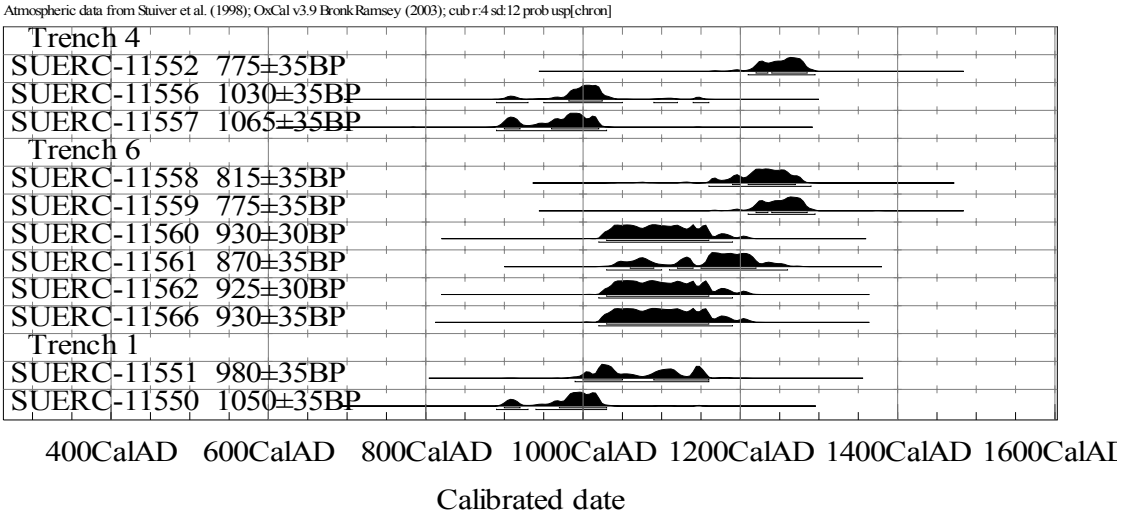


Figure 1. calibrated AMS radiocarbon dates (all on fully terrestrial domestic mammal bone), data courtesy of Dr. Gordon Cook, Scottish Universities Reactor Centre, E. Kilbride, calibration OxCal v3.9

The remaining artifacts that were recorded in their primary context are not significant enough to be used for relative dating. Some work has been done on typology of steatite vessels from Greenland but vessel shards from Ø29a are to fragmentary to be of use. The stone hammer is of a type that was used over a long period of time in the North Atlantic and remains the same throughout time (Edvardsson, Ragnar, 2004). Similarly, the spindle whorle and the dress pin is also of a type common in the Viking and Medieval period. The nails found during the excavation are also of a Medieval type and this shape remained more or less unchanged well into the 19th century.

4.3 C^{14} Analysis

Ragnar Edvardsson and Tom Mcgovern

During the 2005 excavation 11 samples were extracted for C^{14} analysis. All samples were long bones from large terrestrial animals, 1 caribou and 10 cow bones (table 1). The samples were analyzed by Dr. Gordon Cook, Scottish Universities Reactor Centre. Of the total 11 samples 3 were taken from units [8] and [13] in trench 3, 6 from units [6], [15], [24] in trench 6 and 2 from unit [26] in trench one. The samples came from both lower and upper levels of the trenches to give a date range for the excavation trenches.

The calibrated dates (fig.1) for the samples show that the earliest deposits in trenches 1 and 4 date to around 1000CalAD and could possibly be older than that, suggesting an early *landnám* on the site. The oldest deposits in trench 6 seem to be a bit younger than in the other trenches, ca. 1100 – 1200 CalAD. None of the later deposits in all trenches extend much further than 1300 CalAD.

4.4 Conclusions of the 2005 excavation

The excavation in 2005 at Qassiarsuk gave a clear picture of what had happened to the site after the 1932 excavations. It was evident that from the end of the excavation in 1932 and to 2005 the site had been badly damaged due to open trenches, other later unrecorded excavations and the renovation in the1990´s. The condition of the site was a surprise for the 2005 team as they had expected something else based on the published work from Qassiarsuk. However, with a flexible excavation strategy the team managed to gain good understanding of the site and extract important data for further analysis. The excavation in 2005 also gave a good idea about were to find the undisturbed midden deposits and set the stage for the 2006 season.

Trench 1 became the largest puzzle during the 2005 excavation as it proved extremely difficult to locate the 1932 trench edges. In the end the trench edge was only located in the south part and the search for it was abandoned elsewhere as it would have taken up all the excavation time. It also was clear that the excavation in 1932 had not excavated the midden completely down to the undisturbed soil beneath and patches of midden were left here and there. The excavations showed that a large amount of stones that had been pushed into the open trench had damaged the undisturbed midden, both were it was left in the bottom and along the sections.

The 1932 excavation had recorded permafrost in the midden but the 2005 excavation could not find any indication of permafrost and the midden was waterlogged. This is a very important information because if the permafrost is no longer present in middens in South Greenland and they have become waterlogged, bones are decaying more rapidly than before as the soil composition is being altered. It still remains a question weather the 1932 excavators actually saw permafrost as it is still debated if there ever was permafrost in South Greenland. The frozen deposits recorded in 1932 may be the results of some cold winters and short summers.

In both trench 3 and 4 undisturbed midden deposits were recorded and as in trench 1 no sign of permafrost could be detected. However, in both trenches, the midden deposits revealed organic material and some bones (See discussion below).

The C14 analysis is very interesting as it gives a good idea about the beginning of settlement on the site. The oldest C14 dates are around the year 1000CalAD and possibly earlier. That suggests that the farm KNK2629 was settled during the initial phase of the settlement of Greenland. The younger dates suggest that the last dumps of midden material in the area was around 1300 or a little later.

It is important to point out that the C14 samples are few and only come from few deposits. To get a clear picture of the date range in the midden more samples are needed from different areas. However, the dates are encouraging and especially the older ones as they suggest that the farm is one of the earliest farms settled in the area.

5. The Brattahlíð Excavation in 2006, KNK2629 (Ø29a)

Ragnar Edvardsson and Caroline Paulsen

The excavation in 2006 was from the end of May until the end of June. The excavation team was; Ragnar Edvardsson, Caroline Paulsen, Mass Hoydal, Helgi Michelsen, Konrad Smiarowski and Anthony Mustchin. In the beginning of the excavation the team that had worked at the rescue excavation at Qorlortorsuaq assisted in the excavation but they left the site in the beginning of June.

The excavation focused on an area 100 m2, between the churchyard and the 2005 excavation (Plan 2). The 2005 excavation had suggested that this area was undisturbed and had the greatest potential of finding midden deposits in situ.

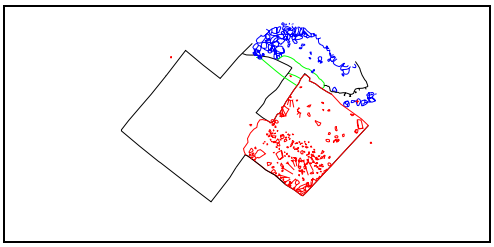


Fig 2. Unit 44

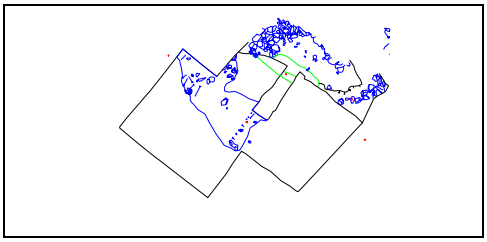


Fig 3. Unit 45.

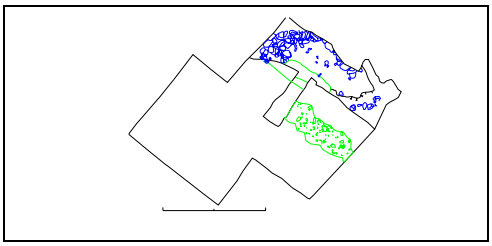


Fig 4. Unit 46.

5.1 Description of archaeological units

Below is a list of all units with a description. On the left is a picture of each unit to show its location within the excavation.

Unit 44. This unit was 5 x 4 meters was located on the east side of trench 6 and southeast of Nørlunds trench. It consisted of a mixture of midden material and a large number of stones. It was rich in charcoal, ash and turf. This deposit is probably the same as no. 6 from the year before.

Unit 45. This unit was 1,50 x 3,50 meters and extended from the west trench edge, down slope towards the east. The deposit ended just south of trench 6. Dark midden dump mixed with organic material and bones.

Unit 46. The unit was 1 x 5 meters and extended eastwards from trench 6. It is under [44]. Units 46 and 48 are the same deposits. Midden dump with many stones and pebbles. Inclusions are ash, charcoal and bones.

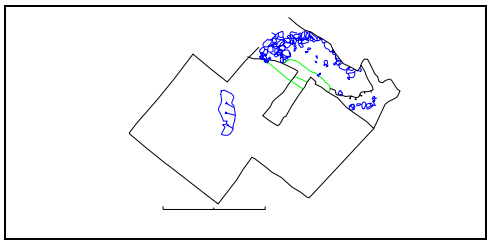


Fig 5. Unit 49.

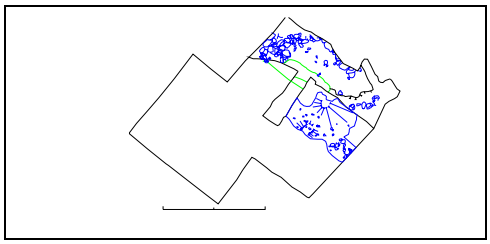


Fig 6. Unit 50.

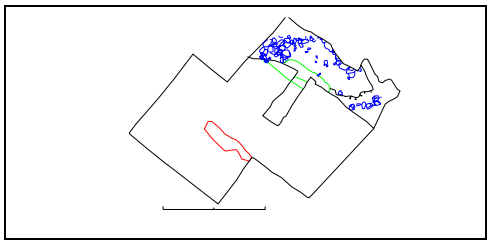


Fig 7. Unit 51.

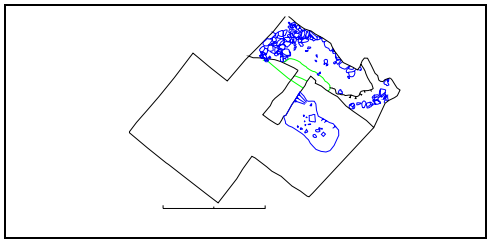


Fig 8. Unit 53.

Unit 47. Same as [45].

Unit 48. Same as [46].

Unit 49. This unit was 0,80 x 1 meter and was located on the east side of a stone row that extended from north to south through the excavation area. Light brown deposit, mixed with gravel and earth. A possible remains of a stone lining.

Unit 50. The unit was 2 x 0,50 meters and was located in the northeastern part of the excavation, east of trench 6. Dark brown midden deposit, rich in charcoal. Below [48].

Unit 51. The unit was 0,50 x 2,10 meters and was in the southeastern part of the excavation. Dark deposit mixed with gravel.

Unit 52. Same as [50].

Unit 53. This unit was 1,50 x 3 meters and extended eastwards from trench 6. Dark brown, clayish silt with sparse charcoal flecking. Below [50].

Unit 54. The unit was located in the south part of the excavation trench and was 4,50 x 3 meters. Yellow to brown silt deposit, containing charcoal flecking.

Unit 55. Small deposit, 1 x 1 meters, just south of the 2005 excavation trench. Dark brown midden deposit mixed with turf. Below [45].

Unit 56. This deposit was 4 x 3 meters and was on the western side of the excavation, sloping towards the east. Greyish and brown with red flecking. Mixed deposit below [45, 47].

Unit 57. This cut was in the southeast part of the excavation. A modern trench, 1,50 x 0,80 meters. Mixed with modern class.

Unit 58. This unit was 2 x 1,50 meters and extended from the west excavation edge towards trench 6, just south of the 2005 trench. Mixed deposit, with midden material and turf lenses. Below [55].

Unit 59. Same as [44].

Unit 60. This unit was 2 x 4 meters and extended along the west side of the excavation trench, sloping towards the east. Grey brown with some reddish spots and mixed with turf material in places. Below [56].

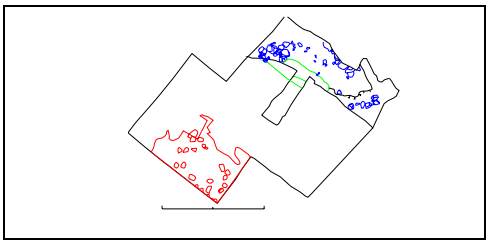


Fig 9. Unit 54.

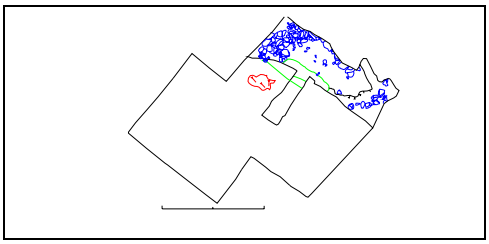


Fig 10. Unit 55.

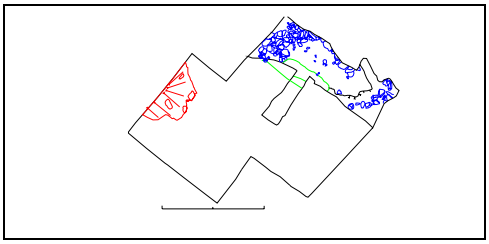


Fig 11. Unit 56.

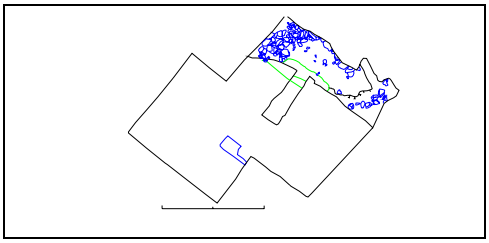


Fig 12. Unit 57.

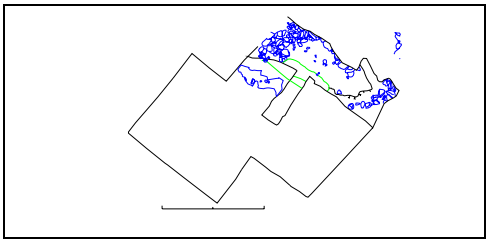


Fig 13. Unit 58.

Unit 61. This unit was 2 x 1,50 meters and extended from the west excavation edge towards trench 6, just south of the 2005 trench. Dark grey compact gravel. Below [58].

Unit 62. Same as [75].

Unit 63. This deposit was 2 x 2,50 meters and extended from the west excavation trench edge towards trench 6. It was cut by Nørlunds trench on the north side and was around (above). Dark brown midden deposit, rich in charcoal, wood. Lenses of white turf. Under [061].

Unit 64. This unit was in the southwestern corner of the excavation trench and was 0,80 x 0,80 meters. Brown, silt deposit with charcoal flecking and some pebbles Below [060].

Unit 65. This unit was in the southwestern corner of the excavation trench and was 80 x 80 centimeters. Brown silt with red, grey and yellowish flecking. Below [64]. This deposit could be the lower level of [64].

Unit 66. This unit was in the southeastern part of the excavation trench, 2 x 0,80 meters. It extended along the south trench edge and sloped towards the north. Mixed silt. With charcoal/turf, reddish and grey. Below [54].

Unit 67. This unit was 2 x 1 meters and was located in the southeastern part of the excavation, just south of trench 6. Dark brown slightly clay silt with moderate charcoal flecking and orange yellow mottles. Below [54].

Unit 68. This unit was in the southeastern part of the excavation trench, 3 x 3 meters and extended along the eastern side of trench 6. It was limited by the excavation trench on the east and south sides. Dark brown/grey organic silt, midden deposit. Charcoal flecking, bones and stones. Under [66, 67].

Unit 69. Same as [45, 47].

Unit 70. This deposit was 1 x 0, 50 meters and

was on the west side of trench 6. Dark brown silt, wood and charcoal. Patches of ash. Below [063]. Same as [15] from the year before.

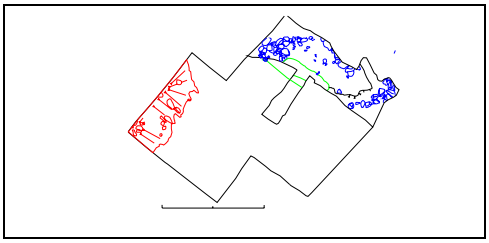


Fig 14. Unit 60.

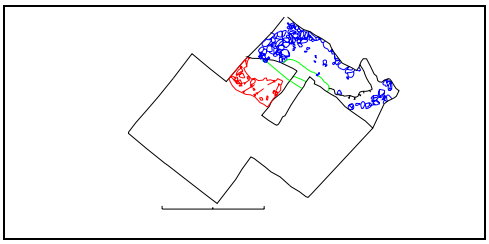


Fig 15. Unit 61.

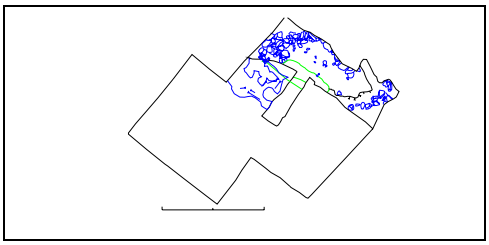


Fig 16. Unit 63.

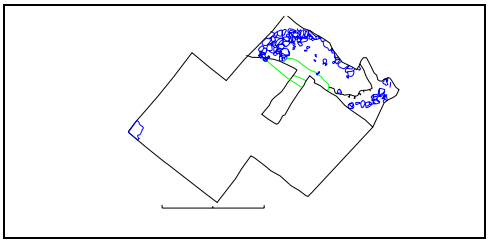


Fig 17. Unit 64.

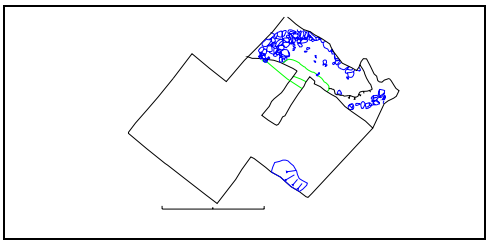


Fig 18. Unit 66.

Unit 71. This unit was 2 x 1 meters and extends from the northwest part of the excavation trench. It was lying in a depression between small mounds and disappeared into the section. This unit consisted mostly of stones and was thought to be a possible drain feature but it is doubtful and probably just is a collapse of stones. Below [63].

Unit 72. The deposit was 2,50 x 1,50 meters and extends along the west section. It slopes into a depression on the north side. Below [060]. Silt, red brown mixed with light grey turfish spots.

Unit 73. Same as [68].

Unit 74. This unit was 0,50 x 0,50 and was limited to the southwest corner of the excavation. Mixed deposit. Turf and charcoal. Dark brown. Collapse. Mixed collapsed material from a wall.

Unit 75. The unit was 1 x 0,40 meters and was in the south part of the excavation. Brown/silt mixed with gravel and stones.

Unit 76. This unit was 0,50 x 0,50 and nearly circular in shape. It was in the south part of the excavation. Red/brown silt material. Mixed with pebbles and stones.

Unit 77. The unit was 2,20 x 0,60 and was on the east side of a row of stones going through the excavation from north to south. Gray silt deposit, mixed with gravel. Dark brown lenses.

Unit 78. This unit was 2,00 x 0,70 meters and extends along the west section of the excavation, sloping towards the north. Dark gray silt deposit. Charcoal flecking. Below [071].

Unit 79. The unit was 3,50 x 2,00 and extends from the northwest section along the row of stones going through the excavation from north to south. Dark brown to grey middenish deposit.

Unit 80. This unit was 2,00 x 1,80 meters and was in the south part of the excavation, sloping towards the center. Silt dark brown with turf and pebbles.

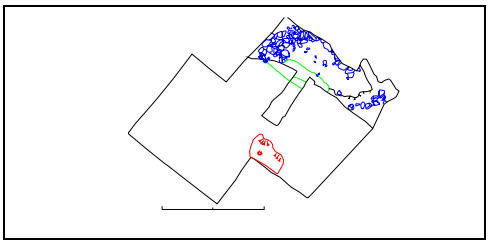


Fig 19. Unit 67.

Unit 81. This unit was 5 x 5 meters and extended all over the eastern part of the excavation. Black/gray deposit. Mixed with charcoal, turf, bones etc. Midden dump. A large number of stones of all sizes were recorded all over this deposit. None of them were parts of structures, they were probably dumped into the area.

Unit 82. The unit was 1,50 x 1,20 and was along the west section of the excavation. Mixed turfish layer. Possible infill or collapse. Below [078].

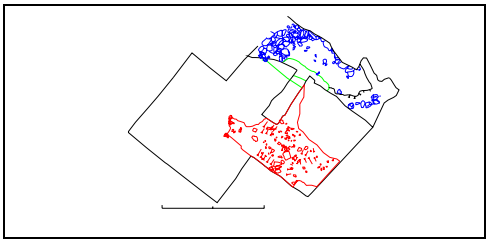


Fig 20. Unit 68.

Unit 83. This unit was 1,40 x 1,40 and was in the northwest part of the excavation. Black gray deposit, mixed. Trench 6 cut this deposit and it is probably the same as 81. It gets two numbers as physical connection could not be established.

Unit 84. Grey/white turf deposit along outer boundary wall (Not excavated).

Unit 85. Wall of structure in southwest part of excavation (Not excavated).

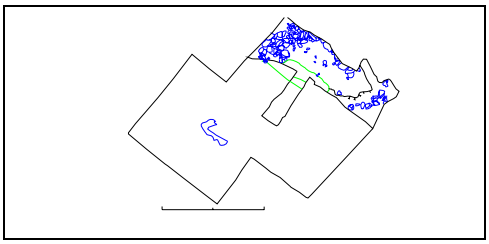


Fig 21. Unit 69.

Unit 86. Collapse from wall in southwest part of excavation, inner (Not excavated)

Unit 87. Collapse from wall in southwest part of excavation, outer. (Not excavated)

Unit 88. Stone wall extending from the north to south through the excavation. Boundary wall. (Not excavated)

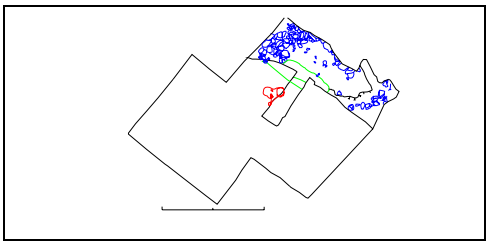


Fig 22. Unit 70.

Unit 89. Midden deposit that extends from [88] towards the east. (Not excavated).

Unit 90. Collapse of stones in the northwest part of the excavation. (Not excavated)

Unit 91. Row of stones in the north part of the excavation, by Nørlunds trench. (Not excavated)

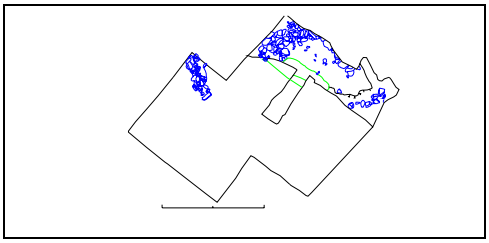


Fig 23. Unit 71.

After the removal of topsoil [1] a deposit was exposed that was mixed with stones and modern material. This deposit was very thin and was recorded as *cleaning* layer. This deposit was recorded everywhere in the excavation area.

Underneath this deposit in the northeast part of the excavation was a midden deposit [44] that was

mixed with stones, charcoal and bones. Underneath [44] was another midden deposit [46], similar to 44, mixed with small pebbles, stones, bones, charcoal and ash. When [46] had been removed a midden deposit [50] became visible, which was dark in color and mixed mainly with pebbles, stones, charcoal and bones. After the removal of [50] the fourth midden deposit [53] was recorded. This deposit was dark brown, clayish and rich in charcoal. Underneath in the southeastern part of the excavation was a small midden deposit [67], which was rich in charcoal and small pebbles. East of deposit [67] another deposit was recorded [66], similar in composition as [67] and is probably the same unit. Underneath [66] and [67] a midden deposit [68] was recorded that extended into the center of the excavation, south of trench 6. This deposit was dark grey and mixed with charcoal, stones and bones. A small deposit [77] was recorded under [68] that was on the east side of the row of stones. This deposit was mixed with gravel and dark midden lenses. Underneath [77] in the northeast part of the excavation was a midden deposit [81], rich in bones, charcoal, turf, wood and stones. This was the last deposit excavated and under it was another midden deposit recorded [89] that was not excavated during the 2006 season.

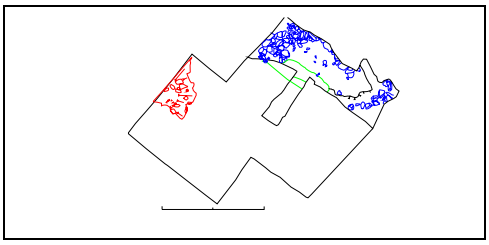


Fig 24. Unit 72.

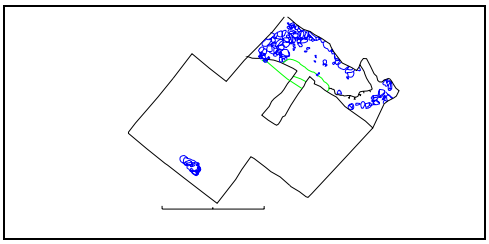


Fig 25. Unit 75.

In the northeast part a few deposits were recorded separately as it was not clear during excavation whether they were independent units or a part of the same. To clarify this a baulk was created in the center of the area, extending south to north. It became clear that they were the same. Unit [46] is the same as [48], 44 is the same as [59] and [50] is the same as [52].

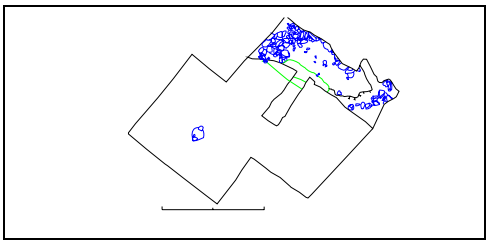


Fig 26. Unit 76.

From the north western part of the excavation a midden deposit [45] was recorded that extended into the middle of the excavation. This deposit was similar in composition as [44] and on the same level as but they could not be connected. In the western part of the excavation a row of stone became visible that extended from the northwest to southeast and disappeared into the sections in the north and south. On the east side of this stone row a deposit [49] was recorded that was mixed with gravel and earth and is probably remains of a stone lining that was a part of the stone row. Underneath [49] a small deposit [51] was recorded, which was mixed with earth and gravel. When [51] had been removed a deposit [54] was recorded that extended over most of the south part of the excavation, except the southwestern most

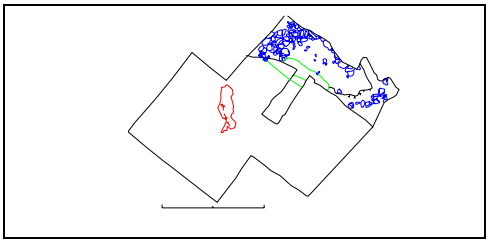


Fig 27. Unit 77.

corner. This was a mixed deposit, containing turf and specks of charcoal. This unit was above unit [66] and [67]. Few deposits were recorded separately in this area but it later became clear that they were parts of other deposits. Units [47] and [49] were the same as unit [45].

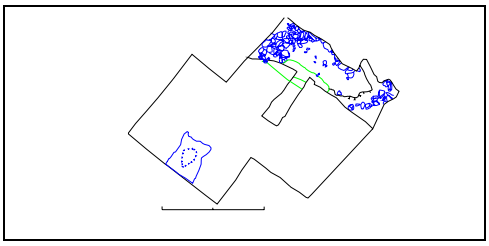


Fig 28. Unit 78.

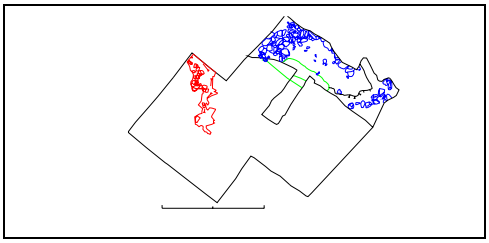


Fig 29. Unit 79.

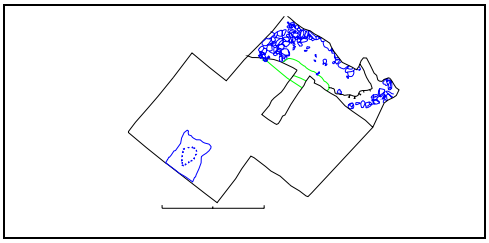


Fig 30. Unit 80.

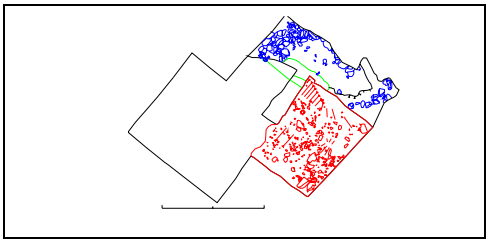


Fig 31. Unit 81.

In the northwest part of the excavation, just south of the edge of Nørlunds excavation, a number of deposits were recorded. Under [45] a small midden deposit was recorded [55], dark grey mixed with turf, wood and organic material. Once [55] had been removed another mixed deposit was recorded [58]. The deposit was dark and mixed with turf and organic material. Below [58] was a dark deposit [61]that was mixed with gravel and on the west side of it were fairly large stones that probably are collapse from the area west of the trench. Next deposit that was recorded in this area extended over most of the northwestern part of the excavation and was cut by Nørlunds excavation trench. This was a dark midden deposit [63] that consisted of organic material and bones. In the eastern part of this area, by trench 6, a small midden deposit [70] was recorded that consisted of bones and was very rich in wood and organic material. The final midden deposit excavated in this area was a dark grey deposit that was rich in wood organic material and bones. This deposit is probably the same as [81] in the eastern part but as it was cut by trench 6 a connection could not be established. The final deposit recorded [83] in this area was a row of stones [91], orienting in a east west direction, and are probably remains of unknown structure.

When topsoil [1] had been removed in the southwestern part of the excavation trench, deposit [45] became also visible in this area. Once it had been removed a mixed deposit was recorded [56], light brown to reddish, including turf and some midden material. The deposit sloped away from the west section towards the east. Underneath [56] was a similar mixed deposit [60] that extended along the west section. Mixed with turf, charcoal and earth. In the southwestern corner two similar deposits [64] and [65] were under [60]. These deposits were mixed with turf, earth and some charcoal. Both are probably the same but there was a clear distinction between them. In the same area was another mixed deposit [74] under [65]. This deposit was

mixed with turf material and stones and is probably wall collapse on the inside of a structure.

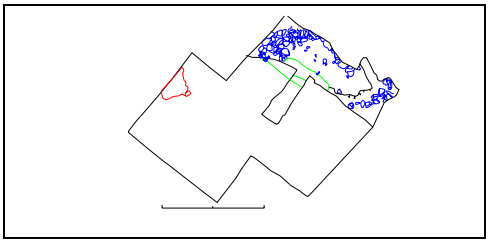


Fig 32. Unit 82.

Underneath [60] in the northwestern most corner of the excavation was a deposit [71] that consisted mostly of large rocks. The context was lying in a depression and is probably collapse from a structure that is somewhere outside the trench. When [71] had been removed a mixed deposit [72] was recorded, that consisted mostly of turf material. This deposit was limited by the wall of the structure [85] in the south western area and could be outer collapse from this structure. Similar deposits [78] and [82] were under [72] and is also remains of collapse from the same wall. Deposit [82] was beneath [78] and was the last deposit excavated in this area.

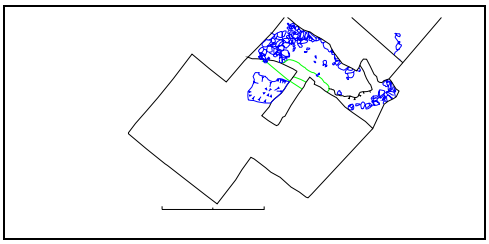


Fig 33. Unit 83.

Two deposits were recorded in the southeastern part of the excavation trench [75] and [80]. Deposit [75] was a mixed with gravel and earth and [80] was similar mixed with turfish material and pebbles. Unit [80] was the last deposit excavated in this area.

As the season came to and end and excavation was halted the final stage of excavation was recorded. In the southwestern part of the excavation a structure was recorded [85] that is probably the gable end of a building that extends to the south and west. This structure could be the north end of building 4 that was recorded and excavated by Nørlund and Stenberger. In the published report from 1934 Nørlund remarks that they had problems finding the north end of the building (Nørlund, Stenberger, 1934). Two collapse deposits were recorded that belong to this structure [86], inner, and [87], outer (Plans 5 and 6).

A stone wall [88], consisting of one row of stones, extends from the north part of the excavation towards the south. In both ends it disappears into the sections and it is likely that this wall continues in both directions. It is also possible that the wall will continue along the west part of the churchyard wall and even connect to it. This wall is probably remains of some boundary wall or a pen (Plans 5 and 6).

In the northwest part of the excavation a collapse of stone was recorded [90], which is either collapse from the boundary wall [88] or an unknown structure to the northwest. This cannot be established without further excavation of the site.

In the north part of the excavation a row of stones [91] was recorded that seems to have been damaged by Nørlunds excavation. This row of stones is oriented in a east west direction and the stones disappear into the west section but there are no stones extending far to the east. This is probably remains of a structure of an unknown function.

Deposit [89] is a midden layer that extends over the whole eastern part of the excavation and towards the west. It reaches the boundary wall but does not seem to go

under it. It seems to go under [91] but that cannot be determined without further excavation in the area.

5.2 Bone remains

Thomas H. McGovern, Albína Pálsdóttir

The bone collections come from stratified contexts in the midden area south of the *Brattahlið North Farm* Ø29N, whose structures were excavated in 1932. Magnus Degerbøl (1934) has provided a pioneering and still valuable zoo archaeological report of the early excavations, which like many of the period were not carried out stratigraphically. The current cooperative project was aimed at providing a modern stratigraphically controlled collection of bones and artifacts and to assess conditions of preservation at this major site. While both the 1932 work and subsequent digging caused significant disturbance of the midden deposits, the NKA/NABO team was able to recover a substantial archaeofauna from intact stratigraphy. A final report will include the unstratified collections deriving from the post-1932 spoil and will include a fuller discussion of taphonomy, deposition, and comparative questions.

Excavation, Recovery, Preservation

The 2005-06 Qassiarsuk project employed current standard NABO methods of stratigraphic excavation and 100% sieving through 4 mm mesh dry sieves, with an approximate 3% whole soil sample reserved for flotation. Back dirt was regularly checked for missed bone and every attempt was made to recover small fragments of bone, wood, and charcoal. The 2005-06 Ø29a collections are thus directly comparable in method of recovery to other modern excavations in the N Atlantic region and can be reasonably compared to contemporary collections from Iceland and the Faroes. Conditions of preservation ranged from fair to excellent, although (unlike the summer 1932 season) no frozen deposits were encountered. Some bone showed the exfoliation typical of repeated extreme freeze-thaw cycles, and some unrecoverable "bone mush" was encountered during excavation, but most bone survived in good condition. More extensive discussion of taphonomic indicators will follow in later reports, but overall the collection seems to be broadly comparable in condition to most Icelandic archaeofauna, though the superb conditions of organic preservation typical of seasonally frozen Greenlandic sites is no longer present at the Ø29a middens.

Laboratory Methods

Analysis of the collection was carried out at the Hunter College Zoo archaeology Laboratory and made use of extensive comparative skeletal collections of the lab and the holdings of the American Museum of Natural History. All fragments were identified as far as taxonomically possible (selected element approach not employed) but most land mammal ribs, long bone shaft fragments, and vertebral fragments were assigned to "Large Terrestrial Mammal" (cattle-horse sized), "Medium terrestrial mammal" (sheep-goat-pig-large dog sized), and "small terrestrial mammal" (small dog-fox sized) categories. Only elements positively identifiable as *Ovis aries* were assigned to the "sheep" category, with all other sheep/goat elements being assigned to a general "*caprine*" category potentially including both sheep and goats. Seal bones are likewise identifiable to species level only on a restricted range of elements. This creates a

substantial "phocid species" category comparable to the "caprine" category (which incorporates ribs, small cranial fragments, unidentifiable long bone elements and vertebrae). On some elements it is possible to distinguish "large seals" (either hooded *Cystophora cristata* or bearded *Erignathus barbatus*) from the three smaller species (common/harbor seals *Phoca vitulina*, harp seals *Phoca groenlandica*, and ringed seals *Phoca hispida*). Most cetacean (whale) bone is highly fragmented and probably often represents craft debris, but it has been occasionally possible to distinguish bones of great (usually baleen) whales ("large cetacean") from the bones of smaller whales (probably narwhal or beluga) or porpoise ("small cetacean"). Murre and Guillemot are not distinguishable on most bones and are presented together as *Uria species.* The data presentation thus attempts to reasonably reflect the different levels accuracy possible in osteological identification, but creates some pooled categories at different taxonomic levels, which require some care in comparisons. Following NABO Zoo archaeology Working Group recommendations and the established traditions of N Atlantic zoo archaeology we have made a simple fragment count (NISP) the basis for most quantitative presentation. Measurements (Mitoyo digimatic digital caliper, to nearest mm) follow Von Den Dreisch (1976), mammal tooth eruption and wear recording follows Grant (1982) and general presentation follows Enghoff (2003). Digital records of all data collected were made following the 8th edition NABONE recording package and all digital records (including archival element by element bone records) and the bone samples will be permanently curated at the Greenland National Museum and Archives with full copies at the Zoological Museum of the University of Copenhagen.

Phasing of Bone-bearing contexts

The stratified deposits could be divided into nine phases based on superposition and a suite of 12 radiocarbon dates (Figure 1).

Phases I –II relate to prior archaeological excavations carried out 1932-1990 and contain no *in situ* bone (the unstratified bone material from the spoil will be reported later). Phases III to IX appear to span most of the period of Norse occupation from the late 10th to 15th centuries. Bone bearing midden deposits concentrate in phases V, IV, and III, all of which have produced quantifiable archaeofauna (over ca. 300 NISP for an archaeofauna composed mainly of mammals). The lower phases produced bone collections which are too small to individually quantify, though sharing many of the main patterns observed in the larger collections. The large archaeofauna thus come from Phase V (the first half of the 13th century or ca. 1200-50), Phase IV (second half of the 13th century, ca. 1250-1300) and the upper Phase III (securely post -1300 by C14). We thus do not have a continuously quantifiable record of economy at Brattahlið N farm from first settlement to final abandonment, but rather a substantial, well documented archaeofauna dating from the middle- to -later years of the Norse settlement in Greenland. By good luck, this slice of time seems to have caught some zoo archaeological transitions with both economic and environmental significance.

Species present

Table 2 presents the taxa identified from the smaller earlier phases VIII-IX.

Table 1	***IX***	***VI***	***VII***	***VIII***
Taxon	***early 11th***	***late 11th-***	***late 11th-***	***late 11th-***

		c	12th c	12th c	12th c	
Scientific	***English***					
Domestic Mammals						
Bos taurus	Cattle	7	25	4	9	
Equus caballus	Horse	0	1	0	0	
Canis familiaris	Dog (X= tooth marks)	**x**	**x**	**x**		**x**
Sus scrofa	Pig	0	0	0	1	
Capra hircus	Goat	1	2	0	0	
Ovis aries	Sheep	1	6	0	0	
Ovis or Capra	Caprine	6	28	0	10	
Wild Mammals						
Rangifer tarandus	Caribou	12	4	0	5	
Alopex lagopus	Arctic fox	0	2	0	0	
Phoca groenlandica	Harp seal	1	8	0	1	
Phoca vitulina	Harbor seal	0	0	0	0	
Cystophora cristata	Hooded seal	0	1	0	0	
E. barbatus or *C. cristata*	Large Seal	0	3	0	0	
Phocidae sp.	Seal sp.	24	90	0	7	
Odobenus rosmarus	Walrus	0	8	0	1	
Small cetacean	Porpoise/Beluga size	0	1	0	0	
Cetacea sp	Whale sp	1	0	0	0	
Birds						
Larus marinus	Black backed gull	0	0	0	1	
Uria sp.	Guillemot or Murre	0	4	0	0	
Aves sp	Bird sp.	1	0	0	0	
	total NISP	54	139	4	35	
Large Terrestrial Mammal		5	38	0	1	
Medium Terrestrial Mammal		28	73	3	11	
Unidentified Mammal		36	181	0	65	
	total TNF	123	431	7	112	

Canine (probably domestic dog) tooth marks were present in all phases.

Table 3 presents the larger archaeofauna of Phases III-V, which provide NISP large enough for fuller quantification and form the basis for further discussion.

Table 2		***V***	***IV***	***III***
Taxon		***early 13th c***	***later 13th c***	***14th-15th c***
Scientific	***English***			
Domestic Mammals				
Bos taurus	Cattle	64	94	25
Equus caballus	Horse	1	1	0
Canis familiaris	Dog (X= tooth marks)	1	**X**	1
Sus scrofa	Pig	2	5	0
Capra hircus	Goat	6	5	4
Ovis aries	Sheep	20	19	9
Ovis or Capra	Caprine	74	115	53

Wild Mammals				
Rangifer tarandus	Caribou	25	22	15
Phoca groenlandica	Harp seal	15	34	11
Phoca vitulina	Harbor seal	17	3	2
Cystophora cristata	Hooded seal	9	7	1
E. barbatus or *C. cristata*	Large Seal	9	8	0
Phocidae sp.	Seal sp.	360	640	360
Odobenus rosmarus	Walrus	14	19	7
Small cetacean	Porpoise/Beluga size	0	3	5
Cetacea sp	Whale sp	14	24	6
Cetacea sp	L Whale sp.	1	3	1
Birds				
Lagopus mutus	Ptarmigan	0	1	0
Anser sp.	Duck species	0	1	0
Cygnus sp.	Swan species	1	0	0
Haliaeetus albicilla	Sea eagle	1	0	0
Uria sp.	Guillemot or Murre	8	15	7
Cepphus grylle	Black guillemot	0	0	1
Fratercula arctica	Puffin	0	1	0
Aves sp	Bird sp.	18	16	4
	total NISP	660	1036	512
Large Terrestrial Mammal		100	184	14
Medium Terrestrial Mammal		161	289	137
Unidentified Mammal		3446	4451	3338
	total TNF	4367	5960	4001

Domestic Mammals.

Relative Proportions. Domestic mammal bones recovered from Phases III, IV, and V include Cattle, both sheep and goat, dog, horse and a few pig bones. Sheep, goat, and cattle dominate the domestic mammal assemblage in all periods, as is normal for Greenlandic Norse collections. While pigs were probably most common in the earlier phases of settlement in Greenland, some pigs definitely survived into the 13th-14th centuries. Bone elements recovered at Brattahlið in both 20th and 21st century excavations and also on the Vatnahverfi farm E167 suggest local pig keeping rather than the import of occasional cured ham (Degerbøl 1934, McGovern in Vebaek 1992, McGovern et al 1996). Dog and horse bones are very rare in all layers, though as noted dog tooth marks are very widespread.

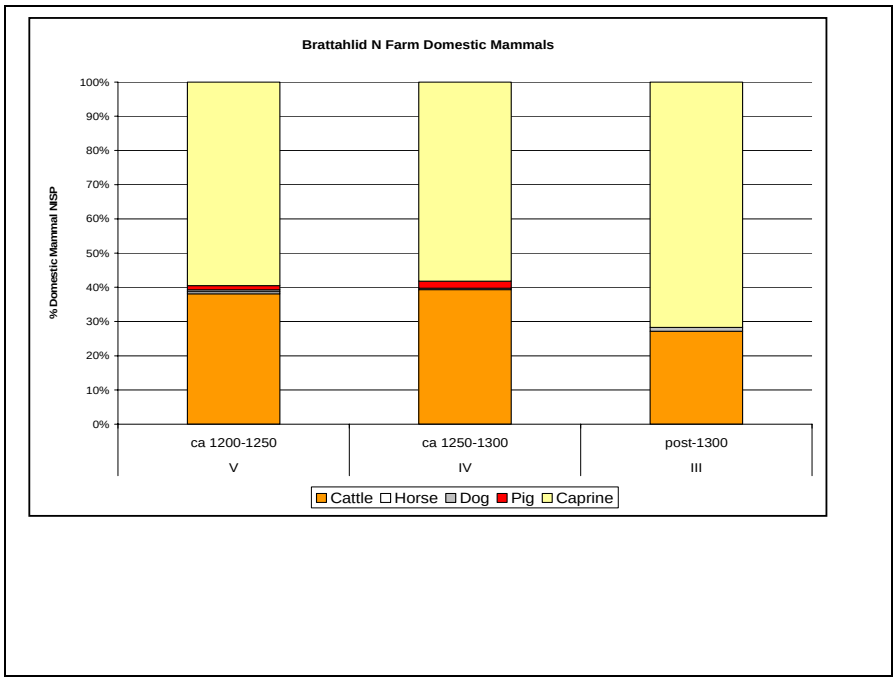


Figure 34. Relative proportions (NISP) of domestic stock (all sheep and goat combined as Caprine)

As figure 34 illustrates, the overall proportions of the domestic stock at Brattahlið N Farm appear virtually identical in the two 13th century collections (Phases IV and V), but there is an apparent shift after 1300 AD, with fewer cattle and no pig bones being deposited. Caprines increase relative to cattle after 1300 though cattle remain a major element in the farming pattern throughout.

The changing proportions of cattle to caprine bones at Brattahlið N Farm is illustrated clearly by figure 35, which presents a direct ratio of the two taxa. Note that even in Phase III, the proportion of cattle to caprines remains high, and there is no sign of the sort of transition from a ratio of around two to five caprine bones per cattle bone to around twenty caprine per cattle bone that is seen in the Mývatn Icelandic archaeofauna in the period ca 900-1200 AD (McGovern et al 2007). This major early 13th c Icelandic shift towards caprines is probably linked to intensified wool production, as mixed flocks of sheep and goats become nearly all sheep at the same time.

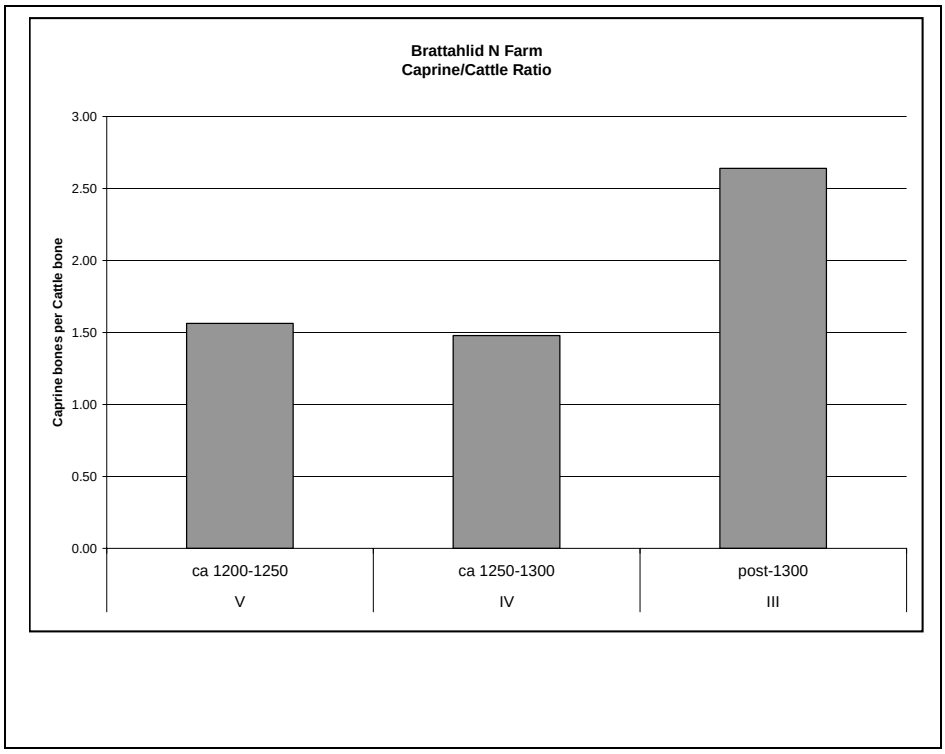


Figure 35 Ratio of Caprine bones per cattle bone in the three major phases (tall bar = more caprine).

Table 3 Sheep to Goat bones

	V	***IV***	***III***
	ca 1200-1250	***ca 1250-1300***	***post-1300***
Sheep/Goat Ratio	3.33	3.80	2.25

As a major new overview and re-analysis of existing Norse archaeofauna demonstrates, there is no evidence for a similar shift in sheep and goat husbandry in Greenland (Mainland and Halstead 2005). Mainland and Halstead's finding is further confirmed by the results of the new archaeofauna from Brattahlið; goat proportions remain high throughout the deposit (table 3). As Mainland and Halstead argue, this suggests that the Norse Greenlanders were unlikely to have produced more wool than required for their own household needs, and wool or woolen cloth is unlikely to have been produced for export as in Iceland.

A fuller discussion of animal size, age at death, and reconstructed management strategy will be included in the final report, but the presence of young (neonatal) calf bones would suggest the widespread Norse pattern of dairying noted on other Greenlandic and N Atlantic sites (McGovern 1992, McGovern et al 2001, Mulville & Thoms 2005). While

sample size will constrain some analyses, it appears overall that the domestic mammal economy was aimed at production of food (milk and meat) rather than other secondary products.

Wild Species

Caribou bones are present in low but consistent frequency throughout the phases, with the relative percentage for the three later phases well within the prior Eastern Settlement range of around 2-5% (table 4). In addition to caribou bone, several pieces of worked antler craft debris have been identified, providing additional evidence for widespread Norse antler working in Greenland.

This differs from the known Western settlement range of between 5 and 27 % of NISP total, which almost certainly reflects biogeography as much as economy. Greenlandic caribou have tended to fragment along the long coastline into localized breeding populations subject to different crash-boom cycles that in historic times are driven mainly by climatic variation but whose intensity can be enhanced or reduced by changing

Table 4 Caribou	***V***	***IV***	***III***
	ca 1200-1250	***ca 1250-1300***	***post-1300***
Caribou %	3.79	*2.12*	*2.93*

amounts of hunting pressure by humans or wolves (Meldgaard 1986). The caribou of the two Norse settlement areas thus represent two different population pockets, which had different dynamics and different vulnerabilities. The caribou of the Western Settlement area enjoy more closely inter-connected grazing areas and were probably less subject to deadly range-icing in winter than were caribou in the Eastern Settlement area (Vibe 1967). Western Settlement caribou have also proven more resilient in the face of sustained human hunting. Caribou were driven to complete extinction in the entire Eastern Settlement region by Inuit hunters in the early 19th century (following the widespread introduction of firearms) but they survive in substantial numbers today in the former Western Settlement area. The medieval Norse settlers certainly had the capacity to place heavy pressure on the relatively fragile Eastern Settlement caribou herds, maintaining large hunting dogs and probably employing drive systems (Degerbøl 1934, 1941; McGovern & Jordan 1982, McGovern 1985b)The zooarchaeological evidence from Brattahlið N Farm in combination with the older unstratified collections thus suggests that the Norse were willing and able to manage their hunting of the smaller and probably more climatically vulnerable Eastern Settlement caribou herds to allow a long term sustainable yield.

Arctic Fox: Fox bones are present in small numbers on many Norse sites in Greenland and Iceland, and the Brattahlið N Farm archaeofauna contains two elements (femora and atlas vertebra) found in the same context. Fox were probably taken in snares for both their fur and for stock protection.

Sea Mammals

Whales: As table 5 indicates, whale bone fragments are present in low frequency throughout the Brattahlið N Farm archaeofauna. As observed by Enghoff (2003), it is difficult to know if whalebone in such context represents tons of meat or simply the

remains of whalebone artifact production from curated fleshless bone. In this case, nearly all the fragments are small chips, many of which show cut marks and polish suggesting they are better seen as craft waste than a major item of diet.

Walrus: While walrus occasionally appear all around the coast of Greenland, the greatest concentrations historically have been far from the Eastern Settlement area around modern Disko Bay (Arneborg 2000, Vibe 1967). This was the area known to the Norse as the *Norðursetur* and multiple lines of evidence suggest a large scale summer hunt drew

Table 5 Cetacea	***V***	***IV***	***III***
	ca 1200-1250	***ca 1250-1300***	***post-1300***
total cetacean	15	30	11
cetacean %	2.27	2.90	2.15

participants from both Eastern and Western Settlements hundreds of kilometers north from their farms in the inner fjords (McGovern 1985a, Dugmore et al 2007). The deeply rooted tusk was not usually extracted at the kill site, but instead the front of the maxilla was cut away and brought back to the home farms for final finishing for export (Roesdahl 2005). Fragments of the dense maxillary bone have been found on nearly every Norse farm excavated, in both settlement areas and on inland as well as coastal farms. Complete walrus bacula (penis bones) and the burial of complete skulls inside the churchyard wall at both Brattahlið and Garðar may underline the importance of the hunt to the Norse Greenlanders, and perhaps point to its ritual as well as purely economic aspects. The walrus bone found at Brattahlið N Farm in 2005-06 are mainly small chips of ivory and

Table 6	**Walrus Elements**	**count**
Ivory chips		13
Maxillary fragments		40
Post Canine		2
Baculum		1
Rib		1

maxillary fragments, but the peg like post-canines (often used in Greenland for craft work) and a single baculum fragment were also recovered (Table 6). Walrus ribs are also often used in craft work, and the single find thus may not necessarily represent a meal.

Figure 4 illustrates a portion of the very end of the tusk root, cut off with a backed medieval saw, apparently as part of final finishing of a tusk for export. Similar fragments are reported by Degerbøl (1934).

It is always difficult to reasonably quantify walrus tusk extraction debris, as a single skull can generate a very large number of potentially identifiable fragments (see discussion in McGovern et al 1996). Despite such fundamental counting issues, it is probably still safe to assume that larger quantities of tusk extraction debris accumulating through time is connected to the nature and intensity of the hunting and ivory processing effort. Figure 36 presents such a rough comparative quantification by site and settlement area.

Pic. 2. illustrates a portion of the very end of the tusk root, cut off with a backed medieval saw, apparently as part of final finishing of a tusk for export. Similar fragments are reported by Magnus Degerbøl (1934).

Most of the Western Settlement walrus processing debris is concentrated on the two nearby farms of W51 (Sandnes) and W52a. Sandnes is a known chieftain's farm with church and extensive buildings, and seems to have been heavily involved in the northern hunt and tusk processing for export, and W52a may have been a closely connected client farm (Roussell 1941, McGovern et al 1996). While the Western Settlement seems to have been particularly active, it is clear that the Eastern Settlement also played a role in the long range hunt. The Ø29N (Brattahlið N Farm) Phase III, IV, and V walrus processing debris counts take first place among currently known Eastern Settlement archaeofauna, and compare favorably to most of the Western Settlement archaeofauna. Did the chieftain's farm at Brattahlið play a central role in the Eastern Settlement comparable to Sandnes in the Western Settlement in organizing the *Norðursetur* hunt and the processing of walrus products?

Seals

Seal bones make up a large portion of all Greenlandic Norse archaeofauna, and they are abundant in the Brattahlið N Farm deposits. Five species of seals are present in Greenlandic waters, two (harp and hooded seal) are carried by the circulating drift ice from Labrador, and the other three are non-migratory residents (common/harbor seals, ringed seals, and bearded seals). Harp seals and the larger but rarer Hooded seals (*P. groenlandica* and *C. cristata*) appear in spring in the Eastern Settlement area and follow the drift ice northwards along the coast. Harp seals are one of the most abundant seal species on earth, and have been hunted by all human cultures to settle the eastern arctic. The harp seal formed a key element in Norse subsistence in Greenland, and its bones are common in archaeofauna from both Eastern and Western Settlements. The common seal (*Phoca vitulina*) is a widespread North Atlantic species near the northern edge of its range in the low arctic. Common seal pups do not thrive in ice filled waters, and the presence of persistent summer sea ice is thus tends to reduce common seal populations (for discussion see Woollett et al. 2000). Adults are able to survive winter ice and low temperatures, so where open water is present in summer, common seal populations can thrive in southern Greenland. Inuit hunters have also successfully taken the arctic adapted ringed seal (*P. hispida*) and the rarer large bearded seal (*E. barbatus*), which make breathing holes through winter ice and are the characteristic seals of the high arctic. Comprehensive catch records (Figure 37) provide a useful picture of recent hunting

patterns by modern (Inuit-descended) Greenlanders in the two former Norse settlement areas (Vibe 1967, McGovern 1991).

Today, Qaqortoq and Narsaq districts are heavily affected by summer drift ice carried around Cape Farewell from East Greenland and Danmark Strait, and as a result common seals are very rarely seen or hunted in these districts. Migratory hooded and harp seals along with the ringed seal (taken especially in winter) provide the bulk of the subsistence sealing in the former Eastern Settlement area. Further north in the inner fjords of Nuuk district around modern Kapisillit are not affected by summer drift ice, and common seals are regularly taken (hooded seal migration diverges from the harp seals' and hooded seals are rare in the former Western Settlement area).

Figure 38 presents the identified seal bones recovered from the quantifiable Phases III-V from the 2005-06 excavations at Brattahlið. Note that ringed seal bone is rare or absent (a few specimens were reported from the 1932 excavation: Degerbøl 1934:153). This is a pattern typical of all other Norse archaeofauna from Greenland, Norse sealers do not seem to have regularly taken this species (McGovern 1985b, 1992). Common seal bones are far more abundant in the lower layers than the modern catch data would

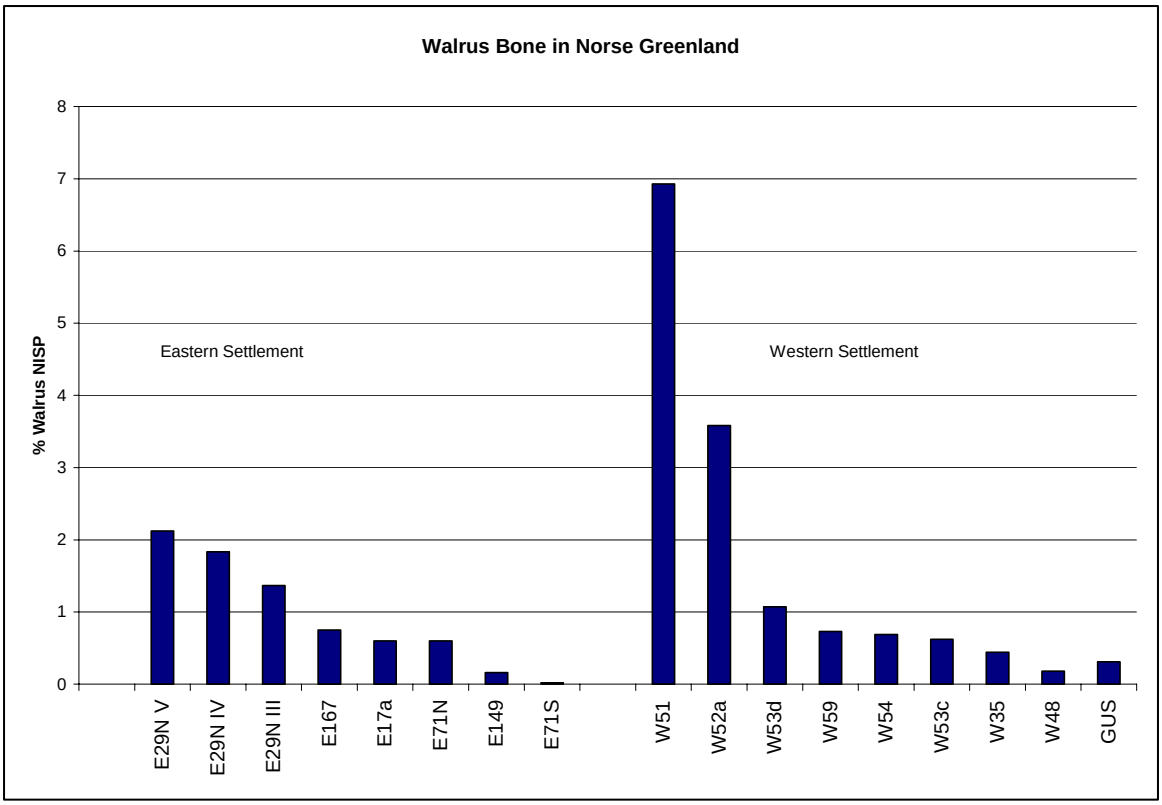


Fig 36. Comparision of the NISP% of walrus processing debris in archaeofauna from the Eastern and Western settlements.

predict, and early 13th c Norse hunters seem to have taken them in some numbers. Common seals seem to have then declined sharply in abundance between the early and late 13th century. Are these differences from the modern catch records due to differences in culture, technology, or climate?

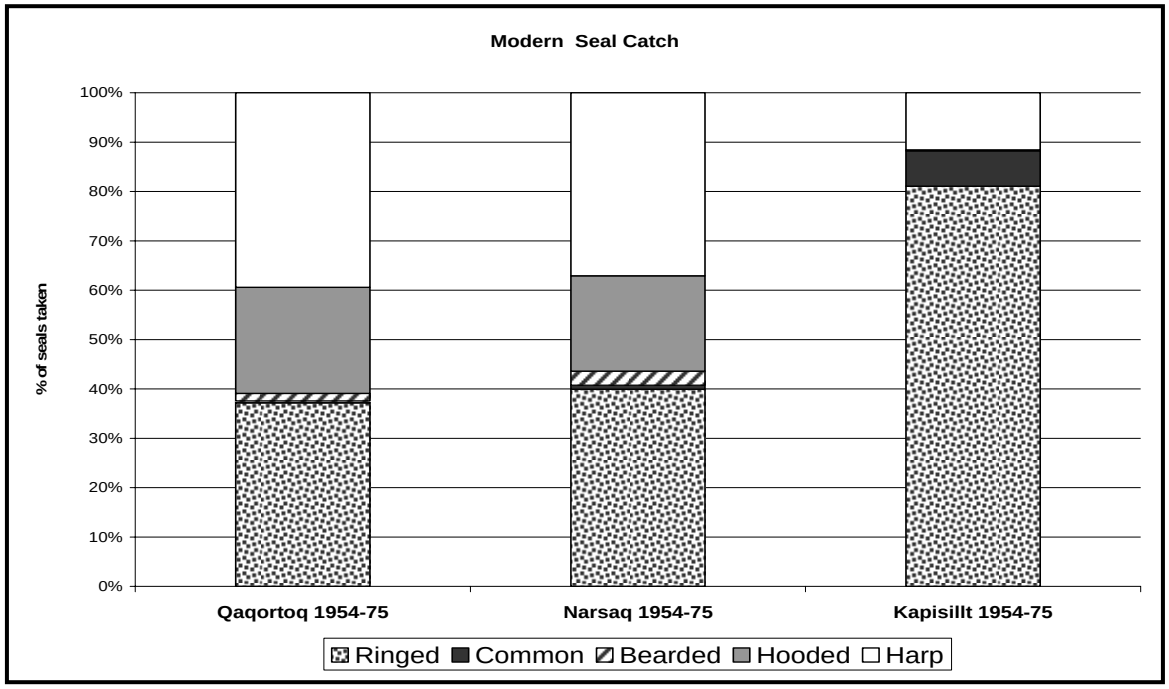


Fig 37. Modern catch records for Qaqortoq and Narsaq districts (covering the former Norse Eastern settlements) and the village Kapisillit (part of Nuuk district (covering part of the middle former Western settlement).

Climate Change or Over-hunting

The scarcity of ringed seal bones in these Norse deposits is almost certainly the product of a very different seal hunting technology and social organization from that of modern Inuit Greenlanders. Norse sealing apparently did not make significant use of harpoons or Inuit ice hunting techniques, but concentrated instead upon mass netting and clubbing of seals on land or drift ice by coordinated groups of hunters. While much remains to be learned about Norse sealing in Greenland, the presence of large amounts of seal bone in inland farms may suggest the special communal nature of Norse sealing. Analysis of available seal dental annuli suggests a hunt concentrated in spring/summer (McGovern et al 1996).

The presence of substantial numbers of common seals in earlier phases and their reduction in later phases is not readily explained by technological or social differences in the seal hunters. The observed change occurs completely within the Norse cultural context during a period of apparent stability. Two hypotheses can be advanced to explain this marked transition in the Brattahlið archaeofauna:

- depletion of common seal stocks in the area due to over hunting by Norse sealers, or;

- climatic change from earlier warmer conditions with little or no summer drift ice to a climate regime similar to modern conditions during the later 13th century.

Common seal populations tend to be localized and it is certainly possible that particular pods could have been wiped out or forced to relocate to less accessible hauling out locations by over-exploitation. However, one expect would such impacts to occur earlier in the settlement process- by around 1250 AD the Norse had been hunting in this part of Greenland for about nine human generations. Our understanding of Norse natural resource management capabilities has been expanded by work in Iceland and the Faroes, where there is growing evidence for successful community-level management of seabirds, waterfowl, freshwater fishing, and common grazing (Church et al 2005, McGovern et al 2006, Simpson et al 2002, 2003, 2004). As we have learned more about Viking-Medieval Norse economy in the N Atlantic, older ideas of widespread heedless depletion of all forms of natural capital (eg. McGovern et al 1988) are being replaced by notions of more sophisticated and successful resource management. If the Norse Greenlanders in the Eastern Settlement area were successfully conserving their fragile caribou stocks, why were common seals over hunted? Common seal populations are still

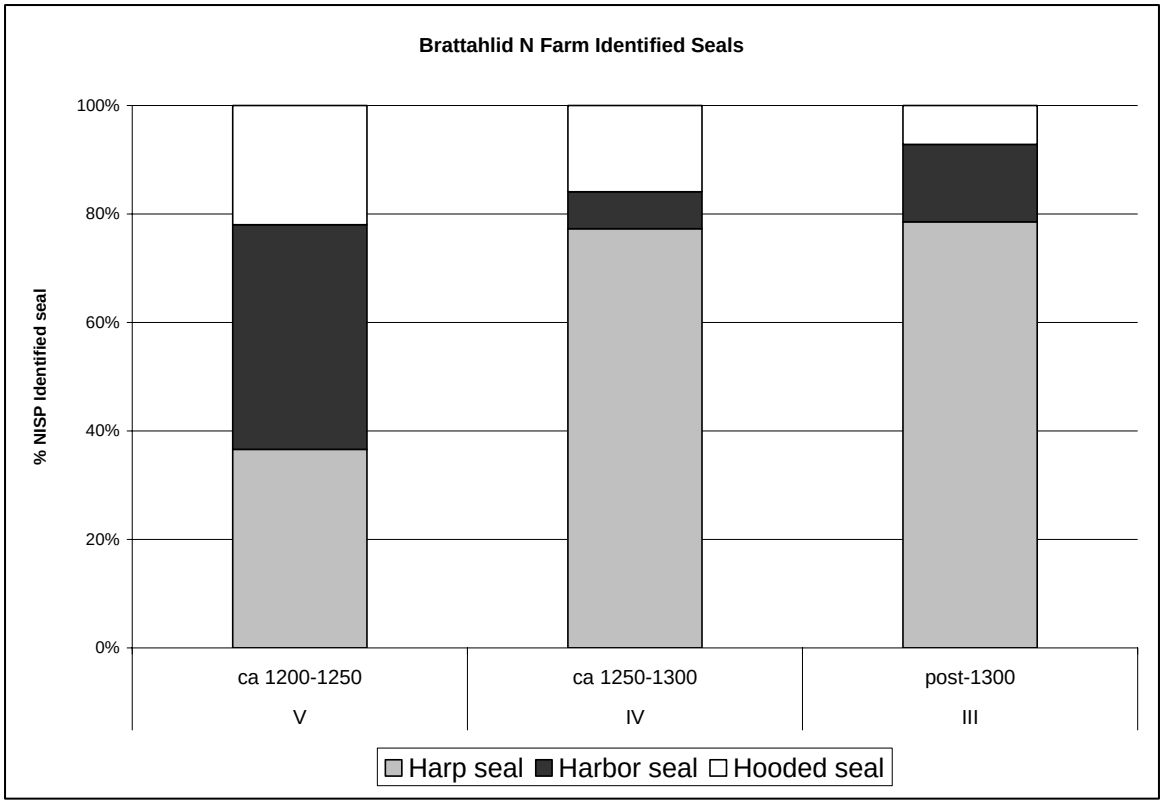


Figure 38. Relative proportions of identified seal bones. Phase V = n41, Phase IV = n44, Phase III = n14

sustainably hunted in several parts of Iceland today on a small scale.

However, Icelandic sealing has clearly been very different in scope from the far larger Greenlandic effort, and unanticipated consequences or just bad luck can certainly

overtake management strategies on the local scale. A broadening of the data set to include more sites in both settlement areas may be helpful in assessing the two hypotheses (Figure 8).

Figure 39 compares available stratified seal bone collections in both settlement areas. These collections can be roughly sorted temporally by radiocarbon and stratigraphy to before vs. after the late 13th / early 14th century. In the Eastern Settlement area, both the older archaeofauna from E17a at Narsaq and the

2005-06 Brattahlið North Farm (Ø29N) phased collections show similar patterns of abundant common seal bones in the earlier layers, and a sharp reduction in the later layers. The two sites are far enough apart that it is unlikely that both would have hunted the same local common seal pods, suggesting a wide impact rather than a local depletion. In the Western Settlement, collections from *Gården under Sanden* (GUS), W 51 Sandnes,

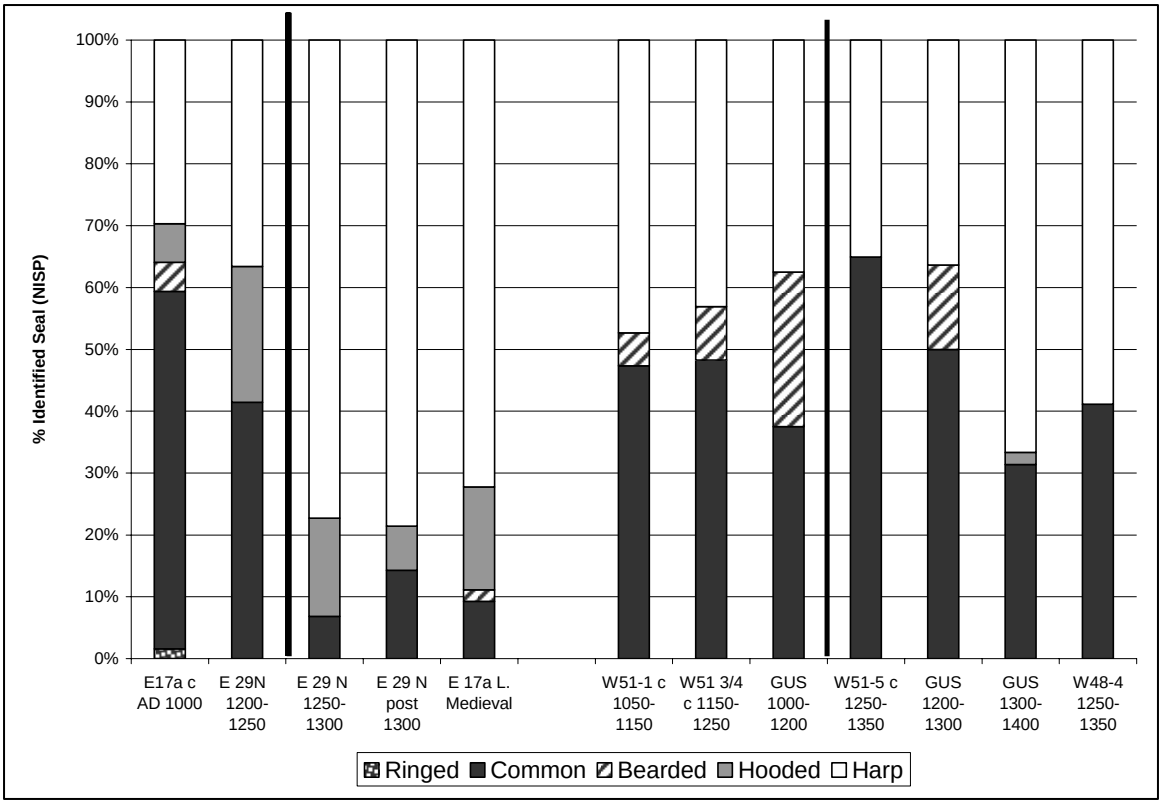


Fig 39. Identified seal species from stratified sites both in the Eastern and Western Settlements. Broad vertical lines roughly divide the archaeofauna from before and after the later 13th century in both settlement areas. Enghoff (2003, McGovern et al. 1996, McGovern et al. (1993).

and the small site W48 all continue to contain varied but always substantial amounts of common seal bones both before and after the late 13th century. The W 51 Sandnes site is close to what was the largest common seal hauling out and pupping ground in this portion of Nuuk district, and the continued availability of common seals throughout the Norse occupation at Sandnes may be another argument in favor of successful management of common seal resources.

It would appear that something happened to change Norse hunters' access to common seals in the latter half of the 13th century in several parts of the Eastern Settlement but not in the Western Settlement area, and at present the most likely hypothesis seems to be climate change and a transition to modern conditions of increased summer drift ice. Some geophysical and oceanographic data may support a mid-to-late 13th century transition point from a largely open water summer marine environment in Danmark Strait. High resolution sea cores from Nansen Fjord in East Greenland seem to flag such a threshold (Jennings & Weiner 1996, Jennings et al. 2001). Jennings and Weiner (1996) report evidence from foraminifera and ice transported debris for an on set of heavier summer drift ice in the last half of the 13th century. Further consultation with climatologists will be important to attempt to better tie down this apparent temporal correlation and we welcome collaborative efforts.

Birds

Bird bones make up a small but significant portion of most Norse archaeofauna from Greenland (usually ten percent of total or less), and the Brattahlið North Farm archaeofauna follows this pattern. Like most other Norse, Inuit, and Palaeoeskimo archaeofauna in Greenland, the Ø29N bird collection is mainly made up of guillemot or

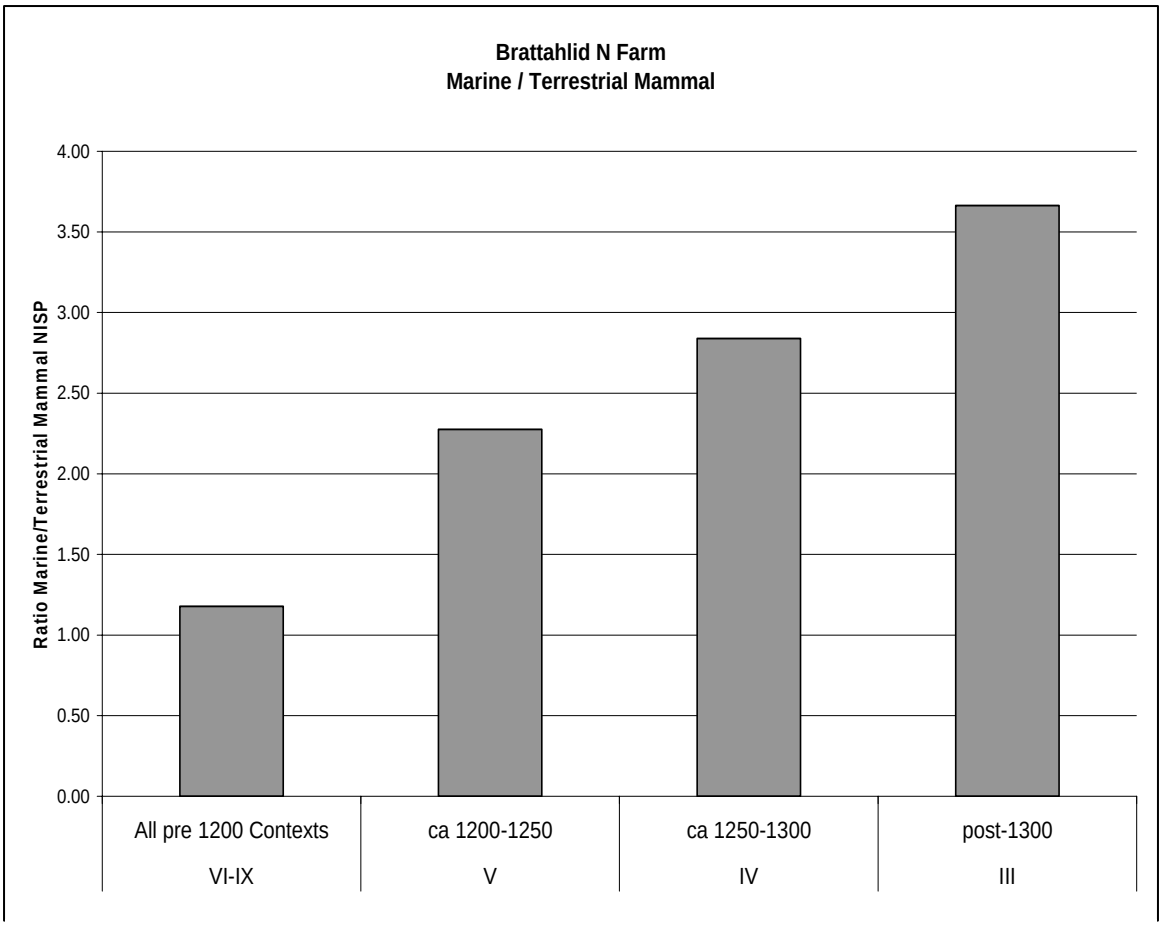


Figure 40. All bone fragments identifiable as terrestrial mammal compared to all marine mammal bones in direct ratio (taller bar = more marine).

murre, whose nesting colonies are widespread along the west coast (Gotfredsen 1997). A

few raptor bones (gyrfalcon and sea eagle) reported from both the 20th and 21st century excavations (Degerbøl 1934: 154) may possibly relate to the historically known Greenlandic falconry trade.

Fish

No fish remains were recovered from the 2005-06 excavations at Qassiarsuk/ Brattahlið, despite complete sieving and excavation by a highly motivated team which included zoo-archaeological specialists alerted to watch for any fish remains. This negative result only duplicates the outcome of intensive sieving efforts (largely aimed at recovering missing fish bones) carried out by several teams in the Western Settlement. While taphonomic forces may well have destroyed fish bone at Brattahlið, contemporary Icelandic sites with comparable (or worse) conditions of organic preservation are typically filled with fish bones. The Greenlanders simply do not seem to have made fish or fishing a major portion of their economy, and their unique seal-dominated subsistence strategy appears to extend from the latest to the earliest layers excavated. While other parts of the Scandinavian North Atlantic intensified fishing for both local provisioning and trade, the Norse Greenlanders did not follow the path of their near relatives and seem to have concentrated upon sea mammals to provide both trade goods and subsistence. While the causes for this unusual pattern remain to be satisfactorily explained, the 2005-06 excavations at Brattahlið North farm can only add confirmation of its reality.

Intensified Use of Marine Resources? While fishing may have played a minor role in Norse economy in Greenland, the use of sea mammals seems to have increased steadily through time at Brattahlið North Farm. By combining all bone that can be identified as terrestrial mammal, and comparing this total to all bone that can be identified as marine mammal (mainly seals), a broad overview of the balance between these two major categories is possible. Since this scale of analysis allows inclusion of the smaller earlier Phases VI-IX, a longer time perspective can be achieved (figure 40). As Figure 40 illustrates, there is a very strong overall trend towards more marine mammal bone from earlier to later contexts. Even at what must have been an elite household, subsistence relied more and more upon the use of marine species, a finding supported by the large scale isotopic study carried out on human bone from Norse Greenland by Jette Arneborg and her colleagues (Arneborg et al. 1999, 2007). Seals increasingly seem to have filled any provisioning gaps left by the domestic farming economy, and the importance of sealing and marine resources seems to have progressively increased with time, even in the heart of the Eastern Settlement.

5.3 Palaeo-environmental analysis at Ø29a

Mike Church

Four main research aims were identified at the outset of the 2005 excavations:

To establish the form and extent of the midden deposits identified by Nørlund & Stenberger (Nørlund and Stenberger, 1934) and to assess the state of preservation of the ecofacts and artefacts within the sampled deposits.

To date the sequence of midden deposits through the provision of multiple AMS radiocarbon dates.

To assess the nature of the environment immediately prior to Norse landnám and human impact on the environment at landnám.

To undertake detailed zooarchaeological, archaeobotanical and geoarchaeological sampling and analyses throughout the excavated sequence, with a view to reconstructing Norse palaeoeconomic practises.

These aims were investigated through the integrated use of the methods outlined below.

METHODS

Excavation and sampling

All of the archaeological deposits were dry-sieved at 4mm for the extraction of wood, zooarchaeological remains and artefacts, a sieving strategy consistent with other NABO excavations in Iceland and Greenland (McGovern, 2004). The integrated use of soil micromorphology, bulk and routine soil samples was also undertaken to explore the research questions. A *total* sampling strategy (Jones, 1991) was employed, involving the removal of bulk samples of between 5 and 10 litres from every excavated sediment context that represented *in situ* archaeological remains. Generally these samples represented less than 5% of the total volume of context excavated. Extra bulk samples were chosen for insect analysis from organic rich *in situ* middens, for example Context 13 in Trench 4. Routine samples of ~0,1 litres were taken from these bulk samples for sedimentary analysis. Kubiena tins were column sampled from key layers within three of the sections for thin section preparation for soil micromorphological analysis. A column sample of small soil samples was also taken through the *in situ* midden deposits identified in Trench 4 from turf to the underlying sub-soil. The samples consisted of approximately 15 cc of sediment taken at 1 cm contiguous intervals from the section, for pollen and detailed sedimentary analysis (Sample 42 in Trench 4 section).

Laboratory and quantitative methods

Charcoal was sorted from the >4 mm dry sieved residue and the charcoal rich samples (Sample 18 Context 25) were wet-sieved and processed following Kenward et al (1980). All charcoal identifications were checked against the botanical literature (Schweingruber, 1990, Hather, 2000) and modern reference material from collections in the Department of Archaeology, Durham University. The charcoal fragments were generally identified to genus, with the number of fragments and weight in each sample for each genus recorded. The fragments were also categorised into roundwood or timber and the number of rings noted. Other miscellaneous observations, such as bore-holes or vitrification, were noted when appropriate.

A sub-sample of approximately 0.1 litres was taken from each bulk sample to help assess site formation processes and ecofact taphonomy. Three basic sedimentary tests were undertaken: 1) organic content as indicated by percentage of weight loss on ignition at 550°C for four hours, following Dean (1974) and Heiri *et al*. (2001) 2) soil pH using a Fisherbrand Hydrus 100 pH meter to measure ~20g of wet soil in 50g of distilled water, following Hodgson (1976) and 3) basic mineral magnetic parameters of mass-specific magnetic susceptibility (χ) and frequency dependent magnetic susceptibility (κfd%) using an MS2 Bartington system on air-dried soil, following Dearing (Dearing, 1999).

The slides for soil micromorphological analysis were prepared following the methodology outlined by Simpson et al. (2003). Pollen samples were prepared using standard procedures (Moore et al., 1991). All digital records, zooarchaeological, archaeobotanical and geoarchaeological samples will be permanently curated in the Greenland National Museum in Nuuk.

Summary of progress

All of the environmental specialist work is ongoing at the following laboratories in research institutions in the UK:

1) Sample and environmental analysis is being co-ordinated by Dr. Mike Church at the Department of Archaeology, Durham University. Dr. Church's team is processing the bulk samples and wood dry sieved remains for archaeobotanical analysis, distributing and managing the sample processing and integrating the results. The dry-sieved wood and charcoal samples have been processed for specialist identification and the semi-quantitative frequency of the remains for each context have been estimated for the 2005 season (see Table 3). An initial assessment has established that local species, including birch (*Betula* sp.) and willow (*Salix* sp.) roundwood / branchwood are abundant as well as a range of exotic driftwood species of various coniferous genera, such as larch (*Larix* sp.), pine (*Pinus* sp.) and spruce (*Picea* sp.). The archaeobotanical assemblages from both the 2005 and 2006 seasons are very well preserved and many thousands of uncarbonised and carbonised plant remains have been recovered.

2) Radiocarbon dating and isotopic analysis of bone material is ongoing at SUERC, Scotland. Dr. Gordon Cook and his team are undertaking the analysis with radiocarbon results and sample progress highlighted in Table 2. Isotopic analysis of the carbon and nitrogen stable isotopes within bones of cows, sheep and pigs is also on-going as part of an international project investigating domestic animal diet and management across the North Atlantic, funded by the Leverhulme Trust (UK).

3) Soil micromorphological analysis is being undertaken by Professor Ian Simpson's team at the University of Stirling and is addressing a number of key issues of site formation processes and fuel procurement strategies, building on methodologies and research undertaken in Greenland (Adderley and Simpson, 2006) and within the wider North Atlantic (Simpson et al., 2003).

4) Pollen analysis is on-going on the column sample through the midden layers within Trench 4 and is being analysed by Dr. Ed Schofield at the University of Aberdeen. The sedimentary analysis of this profile and the sub-samples from the bulk samples is being undertaken by the team at Durham.

5) Beetle analysis of some of the organic rich midden layers is to be undertaken by Dr. Eva Panagiotakopulu of the University of Edinburgh.

Sample	Context	Wood bag	Number of charcoal fragments	Mass of charcoal (g.)	Wood abundance
S.18	C.25	n/a	260	30.2	None

S.43	C.17	n/a	33	2.76	Trace
n/a	C.13	W2	10	1.53	Abundant
n/a	C.15	W3	13	5.12	Abundant
n/a	C.13	W4	2	0.8	Abundant
n/a	C.15	W5	6	0.48	Abundant
n/a	C.15	W6	11	6.91	Abundant
n/a	C.16	W7	2	0.28	Abundant
n/a	C.17	W8	2	0.08	Present
n/a	C.18	W9	14	3.81	Present
n/a	C.15	W10	5	0.45	Abundant
n/a	C.20	W11	170	18.65	Present
n/a	C.21	W12	18	4.27	Abundant
n/a	C.22	W13	41	10.67	Present
n/a	C.18	W15	9	1.41	Present
n/a	C.21	W16	13	9.12	Abundant
n/a	C.22	W17	36	2.95	Present
n/a	C.18	W18	11	1.52	Present
n/a	C.23	W20	127	17.29	Present
n/a	C.24	W21	22	7.46	Abundant
n/a	C.22	W22	18	6.46	Present
n/a	C.25	W23	9	0.71	Present
n/a	C.27	W24	2	0.43	Present
		Total	834		5000+

Table 7. Charcoal and wood frequency for dry-sieved material from 2005 season

Code	Context	Sample (bone)	^{14}C Age (yr BP ± 1σ)	δ^{13}C (‰)	Calibrated Range (Bronk Ramsey, 2005)
SUERC-11550	Tr. 1 C.26	Cow	1050±35	-21.2	890-1030 cal AD
SUERC-11551	Tr. 1 C.26	Cow	980±35	-20.2	990-1160 cal AD
SUERC-11552	Tr. 4 C.8	Caribou	775±35	-21.0	1185-1285 cal AD
SUERC-11556	Tr.4 C.13	Cow	1030±35	-21.1	890-1120 cal AD

SUERC-11557	Tr.4 C.13	Cow	1065±35	-20.9	890-1030 cal AD
SUERC-11558	Tr.6 C.6	Cow	815±35	-21.3	1160-1280 cal AD
SUERC-11559	Tr.6 C.6	Cow	775±35	-20.9	1185-1285 cal AD
SUERC-11560	Tr. 6 C.15	Cow	930±30	-22.4	1020-1170 cal AD
SUERC-11561	Tr.6 C.15	Cow	870±35	-22.4	1040-1260 cal AD
SUERC-11562	Tr.6 C.24	Cow	925±30	-23.6	1020-1180 cal AD
SUERC-11566	Tr.6 C.24	Cow	930±35	-20.3	1020-1190 cal AD
Submitted	C.81	Cow			
Submitted	C.81	Cow			
To be submitted	C.44	Cow			
To be submitted	C.44	Cow			
To be submitted	C.17	Wood			

Table 8: Radiocarbon results and sample progress

5.4 Geoarchaeological investigations at Qassiarsuk (Brattahlíð), Greenland

Ian A. Simpson and W. Paul Adderley

Introduction

Qassiarsuk is commonly considered, despite occasional speculation, to be the location of Brattahlíð, the site of Eríc Þorvaldsson, the first Norse settlement of Greenland in AD 982 and at the core of the Eastern settlement. The extensive Norse and Inuit ruins at the site have been subject to several archaeological surveys (Bruun, 1895; Guldager et al., 2002; Roussell, 1941) with excavations focusing on the early Norse church structure and churchyard and the nearby Norse dwelling and byre (Krogh, 1982; Meldgaard, 1982; Nørlund and Stenberger, 1934); these have clearly established that this was an important site throughout much of the Norse period in Greenland. The geology of the area is mixed with biotite rich gneiss underlying the north of the site and sandstones underlying the southern portion (Geological Survey of Greenland, 1973). Site topography is characterised by a gently sloping east facing aspect with a terrace, possibly a raised beach, to the west of the present day intensively improved grassland infield areas used to produce winter feed for sheep.

While excavating the 'North farm' at Brattahlíð, Nørlund and Stenberger also excavated a trench in front of the dwelling and reported the occurrence of over 2 m of stratified midden (anthropic) deposits. Our 2005 excavation re-opened this trench so that modern methods excavation and recovery could be applied, including the analyses of soils and sediments (geoarchaeology) in anticipation that these would reflect the cultural and natural environments in which they were formed. In considering soils and sediments in this way they become a record of activity and environmental conditions which can be elucidated by geoarchaeological investigation.

At Ø29a our geoarchaeological objectives were threefold. First we sought evidence of and from fossil soils buried beneath the anthropic sediments of the midden that would indicate environmental conditions prior to settlement. Secondly, we sought evidence from the fossil soils of impacts on the landscape associated with settlement and related activities, prior to the deposition of the anthropic midden material. Thirdly, we sought to characterise the anthropic sediments themselves to indicate the nature of activities at the site. For each of these objectives we used thin section micromorphology of undisturbed samples to characterise soils and sediments from the site. This technique allows microscopic identification of features and their relationship to one another from which interpretation of activities and environmental conditions can be made. This is the first time that thin section micromorphology of archaeological soils and sediments in Greenland has been reported. The technique has been successfully used at a number of contrasting archaeological sites in the Norse north Atlantic region (see for example Simpson et al., 1999; 2000; 2003; 2005), giving confidence in its application to Norse Greenland.

Methods

Field sections and sampling

Three sections from the re-excavated midden deposits were examined in detail, from Trenches 1, 4 and 6 (Figures 41, 42 and 43), giving the opportunity to consider variations in deposition processes across the midden. Description of the exposed stratigraphies used Munsell colour notation and standard textural classes allowing soils and sediments on the site to be integrated as stratigraphic contexts and matrices, and which formed the basis for sampling of undisturbed sediments using Kubiëna tins (8x5x5cm). Four samples were collected from each of the three sections. To support the excavation, chronological control of the stratigraphy was achieved through a series of eleven radiocarbon measurements on bone from the midden (ten on cow bone and one on caribou bone; SUERC- 11551-1152, 1556-11562 and 11566).

Thin section sample preparation and description

Thin sections were manufactured from the Kubiëna tin samples using standardised methods (www.stir.ac.uk/thin) based on procedures developed by Murphy (1986). Water was removed from the sediment samples through vapour-phase acetone exchange, confirmed by repeated measurement of the density of the acetone solution. Samples were impregnated under vacuum with polyester resin (Crystic) and peroxide catalyst. The blocks were cured for six to eight weeks with a further period of one week finishing in an oven at 40°C. Sections were then prepared by cutting, bonded onto glass-slides and precision lapped to a consistent 30 µm thickness monitored optically and through direct measurement. After further diamond polishing each section was then cover-slipped.

Micromorphological analyses of the glass mounted thin sections were undertaken using an Olympus BX-50 polarising microscope over a range of magnifications (x 7.5 to x 400). Both transmitted {plain polarized (PPL); between crossed-polars (XPL)} and reflected {oblique incident (OIL)} light sources were used. Descriptions were made following internationally accepted terminology (Bullock et al., 1985; Stoops, 2003) with assessment of the coarse and fine mineral material, organic material and groundmass *b*

fabric. A semi-quantitative analysis of features was made and recorded in summary tables; these are given in figures 44, 45, 46 and 47.

Results and discussion

Field observations and chronologies

Trench 1 in the main excavation area demonstrated that much of the original material had been cut through, with large boulders subsequently re-deposited from earlier possibly numerous and undated earlier excavation activities. Beneath these disturbed materials however, from one section of the trench, there is an intact sequence of deposits ca. 25 cm in thickness (Figure 41). These deposits comprise midden-like black fine sandy silt loams overlying very dark greyish brown gravels and fine sandy silt loams (context 34); these in turn overlie a fossil soil with a black peaty loam upper horizon, micro-laminated with evidence of linear sand lenses (context 26), and underlying greyish brown sandy loam and gravels (context 35). Two radiocarbon measurements from this trench indicate that context 26 can be dated to ca. 1000 AD and the overlying midden deposit to between 1000 AD and 1,100 AD. Four undisturbed samples were collected in Kubiëna tins from the undisturbed deposits, two from the fossil soil and two from the overlying midden material and gravel.

Trench 4 was located beyond the main excavation area (Figure 42). In the south facing section an intact sequence of thick and micro-laminated fine sandy silt loam midden deposits (contexts 10, 8, 11, 13 and 16) containing bone, charcoal and uncarbonised wood fragments overlie a modified fossil soil. The upper horizon of the fossil soil (context 17) is a black organic fine sandy silt loam containing bone fragments and uncarbonised wood fragments. The underlying horizon is a dark greyish brown fine sandy silt loam, but with a thin black horizon 1-2 mm in thickness through it (context 28). As at Trench 1, well sorted gravels lie beneath the fossil soil (context 35). Three radiocarbon measurements from Trench 4 suggest that the fossil soil dates from before 1000 AD with the first midden contexts (context 16 and 13) deposited ca. 1000 AD. This is followed by a hiatus in deposition until ca. 1100 with subsequent continuous deposition through to 1300 AD. Three undisturbed samples were collected from the midden deposits and one from the fossil soil sequence.

Trench 6 was located in the main excavation area and also demonstrates an intact midden sequence overlying a fossil soil (Figure 43). The midden sequence (contexts 5, 6, 15, 21 and 24) is complex with colours including black, very dark grey and dark reddish brown, and textures including gritty sandy loams, sandy silt loams and peaty loams. Occasional charcoals and wood fragments are evident throughout. The underlying fossil soil is characterised by a black peaty loam upper horizon (context 35A) above a thin very dark greyish brown coarse sandy loam horizon (context 35B), beneath which lie the gravel deposits that are evident across the whole site (context 35C). Six radiocarbon measurements suggest anthropic deposition commenced no earlier than 1100 AD, later than that evident in the other trenches, and continued through to ca. 1300 AD. This also implies that the underlying fossil soil was buried later and represents a Norse land surface from settlement though to ca. 1100 AD. Three undisturbed samples were collected from the midden deposits and one from the fossil soil sequence.

Summaries of soil and sedimentary features observed in thin section are given in figure 44 (Trench 1), 45 (Trench 4) and 46 (Trench 6). Variations in micromorphology between fossil soils and overlying anthropic sediments, primarily the absence or presence respectively of anthropic inclusions, enable them to be considered separately, although aspects of the fossil soils are also evident in the anthropic sediments.

Fossil soils and environmental conditions prior to settlement.

The black peaty upper horizon of the fossil soil evident in the field is characterised in thin section by four discrete micro-horizons organised as repeating sequences of accumulation (Figure 48a). These micro-horizons include - i) an organic discontinuous micro-horizon dominated by amorphous reddish brown fine organic material generally no more than 1.5 mm in thickness (Figure 48b); ii) a dark brown intact and dominantly organo-mineral horizon with spongy microstructures, moderately sorted coarse mineral material, and very few coarse and fine organic materials generally up to 8 mm in thickness ; iii) a brown to light brown intact organo-mineral horizon with spongy, channel / chamber and intergrain microaggregate microstructures with moderately sorted coarse mineral material and very few coarse and fine organic materials but which has a considerably greater thickness of up to 22 mm.; and iv) a micro-horizon dominated by a linear and moderately sorted sub-angular coarse mineral fraction with thicknesses of up to 6 mm and average grain sizes of between 100 and 200 μm (Figure 48c). These are observed as discrete micro-horizons in the samples from Trenches 1 (samples 27, 28, 29) and 4 (sample 21), although micro-horizon iii) is missing and there is more stone in sample 21. In sample 34 from Trench 6 attributes of the four micro-horizons are observed but they are patch and mixed. Beneath the complex upper horizon of the fossil soil, and underlying the midden site, compacted coarse mineral material comprising quartz dominated sands and gravels with feldspars and biotites dominate, together with grey fine mineral material overlying brown mineral and organo-mineral fine material.

The shallow sequence of organo-mineral and organic upper horizon, overlying a grey mineral horizon beneath which lies a brown, dominantly mineral, but occasionally organo-mineral, horizon is typical of a A, E (elluvial), B horizon well drained podsol sequence. The consistently compacted, indurated, nature of the B horizon suggests that the profile has been subject to long term freeze-thaw processes even although silt cappings, a feature of B horizon in podsols found elsewhere in the vicinity of Qassiarsuk, are absent from these fossil soils. A distinctive feature of the A horizon are the contrasts in organic, organo-mineral material, and the variances in the organic and mineral components within the organo-mineral material. We interpret this as clear evidence for intermittent and contrasting periods of landscape instability increase in moderately well sorted and linear organised mineral component - and stability increase in organic component with decomposition and mixing with mineral material as the A horizon developed. The composition of the accumulated mineral material in the A horizon is similar to that in the underlying E and B horizons, although moderately sorted rather than poorly sorted, and indicates periods of degradation and movement in and around the Qassiarsuk area.

Integration of observations and interpretations suggests that the pastorally-based Norse settlers arriving at this locality occupied an area that was comparatively gently sloping and well drained, and compared to other localities in the vicinity it is likely to have been

marginally warmer. The soils however were shallow and would have been nutrient poor with limited inherent productivity as well as lacking soil moisture holding capacity. Furthermore, the combination of soil type and climatic conditions meant a susceptibility to localised soil movement. The juxtaposition of organic A horizon features, rather than mineral accumulations from eroded areas, with overlying sediments indicative of cultural activity suggests that the arrival of the Norse at this site coincided with a period of landscape stability in its vicinity.

Fossil soils and evidence of landscape impacts and activities

As well as pre-settlement environmental information, the fossil soils also retain features observable in thin section that can be associated with settlement impacts and activities on the landscape. There is evidence of rubified sand and gravel (up to 9 mm diameter) with very few fine charcoals accumulated between the fossil soil and anthropic deposit in Trench 1 (Figures 49a, 49b and 49c); in the upper (A) horizon of the fossil soil, charcoals, rubified coarse mineral material and fine bone fragments (Figure 49c) are found in Trench 4 (sample 21); and mixing of micro-horizons together with few charcoals is evident in Trench 6 (sample 34).

Charcoals and rubified coarse mineral materials testify to the burning of the landscape as a deliberate *landnám* activity and a means of clearing the landscape for settlement and grazing activity. Furthermore, the rubification of several of the individual grains amongst the sand and gravel accumulations at ca. 1000 AD and the associated charcoal materials link burning of the landscape with significant disturbance of the environment and a level of mineral material movement greater than that found in the fossil soil prior to settlement. Soils within the site were themselves disturbed and mixed, but not at a level to contribute to the movement of mineral material. Despite this, there is only very limited and inconsistent evidence (rare bone fragments) of waste material being used as fertiliser on soils, even in the fossil soil not buried to ca. 1100 AD, repeating the findings of a more extensive exploration of the Brattahlíð home field and others in the surrounding region (Adderley and Simpson, 2006). Norse settlers in the Qassiarsuk region of the Eastern settlement preferred to rely on natural soil fertility and productivities rather than try to enhance fertility through land manuring strategies as in other areas of the Norse North Atlantic.

Anthropic sediments and site activities

The earliest phase of accumulation deposited ca. 1000 AD represented by contexts 16 and 13 in Trench 4, the deposits through to ca. 1100 AD represented by context 34A in Trench 1 and material deposited into the 1100 – 1300 AD period represented by contexts 24 and 21, Trench 6 are characterised in thin section by repeated sequences and mixes of a range of feature attributes. Dark brown and brown organo-mineral material with parenchymatic tissue, fungal spores and hyphae, diatoms and phytoliths, and with occasional fractured but sometimes linear, red amorphous and cryptocrystalline pedofeatures (Figure 50a), comprise the bulk of the anthropic sediments. In places the parenchymatic tissue is fragmented and, very rarely, associated with what are almost certainly degraded calcium spherulites. Large (up to 5 mm) wood charcoal fragments are evident, and very few and few bone fragments together with vivianite (Figure 50b), found where bone fragments are absent, are also evident. None-anthropic material is also

evident in these midden sequences, particularly in the earliest phases. Organic micro-horizons dominated by spongy amorphous reddish brown fine organic material and similar to micro-horizon i) found in the fossil soil upper horizon is evident in several parts of the stratigraphy. Similarly, a micro-horizon dominated by coarse mineral material that is linear and moderately well sorted and similar to micro-horizon iv) in the fossil soil is also found.

We interpret the bulk of these anthropic sediments as deriving from uncarbonised predominantly podsolised turf material (Adderley et al., 2006) possibly the waste from structure construction activity but more likely used as bedding for domestic livestock given the occurrence of fragmented parenchymatic tissue with possible associated calcium spherulites interpreted as manure materials (Canti, 1997). Embedded within this material are indicators of domestic waste deposition including bone fragments and, in the lower parts of the stratigraphy, phosphorus rich vivianite resulting from the decomposition and recrystalisation of bone material in wet, reducing conditions. Fuel residues are also evident as wood charcoal and rubified coarse mineral grains indicative of turf combustion (Simpson et al., 2003). This mix of turf, and livestock, fuel and food wastes is typical of occupational debris associated with a functioning Norse domestic settlement in different areas of the north Atlantic region. The organic micro-horizons are interpreted as indicative of short-term standstill phases in anthropic sediment deposition with a vegetation cover forming across at least part of the midden; deposition was intermittent. Although care is needed in interpreting the micro-horizon accumulations of coarse mineral material as some of this may have been introduced with turf material to the site, some of the micro-horizons do reflect the landscape instability evident prior to Norse settlement and indicate that landscape instability continued particularly during the early phases (pre- 1100 AD) of site settlement, after which landscape instability returned to a pre-Norse settlement intensity.

A marked change in sediment characteristics is observed in the later part of the 1100 – 1300 AD phase, and is represented by contexts 15 and 6 in Trench 6 and contexts 11 and 8 in Trench 4. Here substantial reduction in occurrence of the turf and animal manure indicators (described above) is observed, while frequencies of bone and charcoal increases. While these increases may be because of better preservation conditions, the fact that these materials are found throughout the stratigraphy suggests that this is a cultural rather than a taphonomic change. Additionally, orange – red fine mineral material observed under oblique incident light with rubified coarse mineral fraction and often associated with fine charcoals becomes evident (Figure 50c), a feature indicative of combusted organic, peaty, material. The occurrence of coarse mineral material also increases in these sediments, both as part of the matrix and as discrete linear micro-horizon within the stratigraphy, testifying to an increased landscape instability.

Occupation of the site clearly continued until at least the 1300s, but post 1100 AD subsistence strategy began to change. Evidence of consumption is still present in the form of bone fragments and a more diverse set of fuel wastes, but evidence of domestic livestock wastes becomes increasingly lacking. This may simply be the result of a change in manuring strategy with these wastes ending up in the hone field to improve winter fodder production. However despite some evidence of this occurring at a Norse farm in the Qassiarsuk hinterland (Commisso and Nelson, 2007), our own field and

micromorphological investigations have failed to find significant traces of home-field manuring at Qassiarsuk itself or at three other Norse farms in the area. While productivity's of some Norse home-fields were clearly improved by irrigation (Adderley and Simpson, 2006), use of manures to increase nutrient status seem lacking. It is thus possible to suggest that the subsistence strategy of the site started to place less reliance on domestic livestock production post 1100 AD, at least in the immediate vicinity of the site. It may be that the occupants of the site sought to exploit and rely more on other types of resource, marine mammals for example, or that the site was provisioned by regulated the livestock production of farms round about them. The micromorphological evidence suggests that increasing and more persistent landscape instability, at least in the immediate vicinity of the settlement, is a partial explanation for this shift in strategy.

Conclusions

Thin section micromorphology of fossil soils and anthropic sediments at Qassiarsuk (Brattahlið) related to excavation matrices and chronologies have enabled fundamental questions of environment and activity associated with the Norse settlement of the locality to be addressed. Norse settlers at what became Brattahlið arrived in a location that had shallow, freely drained nutrient poor podsols. Significantly, the locality was subject to periodic phases of landscape instability prior to settlement. Initial Norse settlement intensified landscape instability and there is evidence of landscape burning and disturbance in the fossil soils; there is however little evidence to support a systematic manuring strategy to enhance soil fertility. The earlier phases of anthropic sediment deposition reflect, as might be expected, a subsistence strategy based on domestic livestock management and the use of wood and turf as fuel resources. There is however a marked change in anthropic sediment characteristics between 1100 and 1300 AD, with a decline in micromorphological indicators associated with domestic livestock but with bone and fuel residue evidence increasing. We suggest that this represents evidence of a change in subsistence strategy at the site, with a possible widening of resource extraction to include sea mammals and control of domestic livestock production at other farms elsewhere in the locality. A partial explanation for this shift in strategy is continuing landscape instability in the vicinity of this settlement.

Acknowledgments

We gratefully acknowledge the financial support of The Leverhulme Trust through the *Landscapes circum Landnám* programme. The Greenland Museum and Archives provided invaluable logistic and field assistance and kindly allowed site access. From the University of Stirling George MacLeod manufactured the thin sections and Bill Jamieson produced the diagrams and tables.

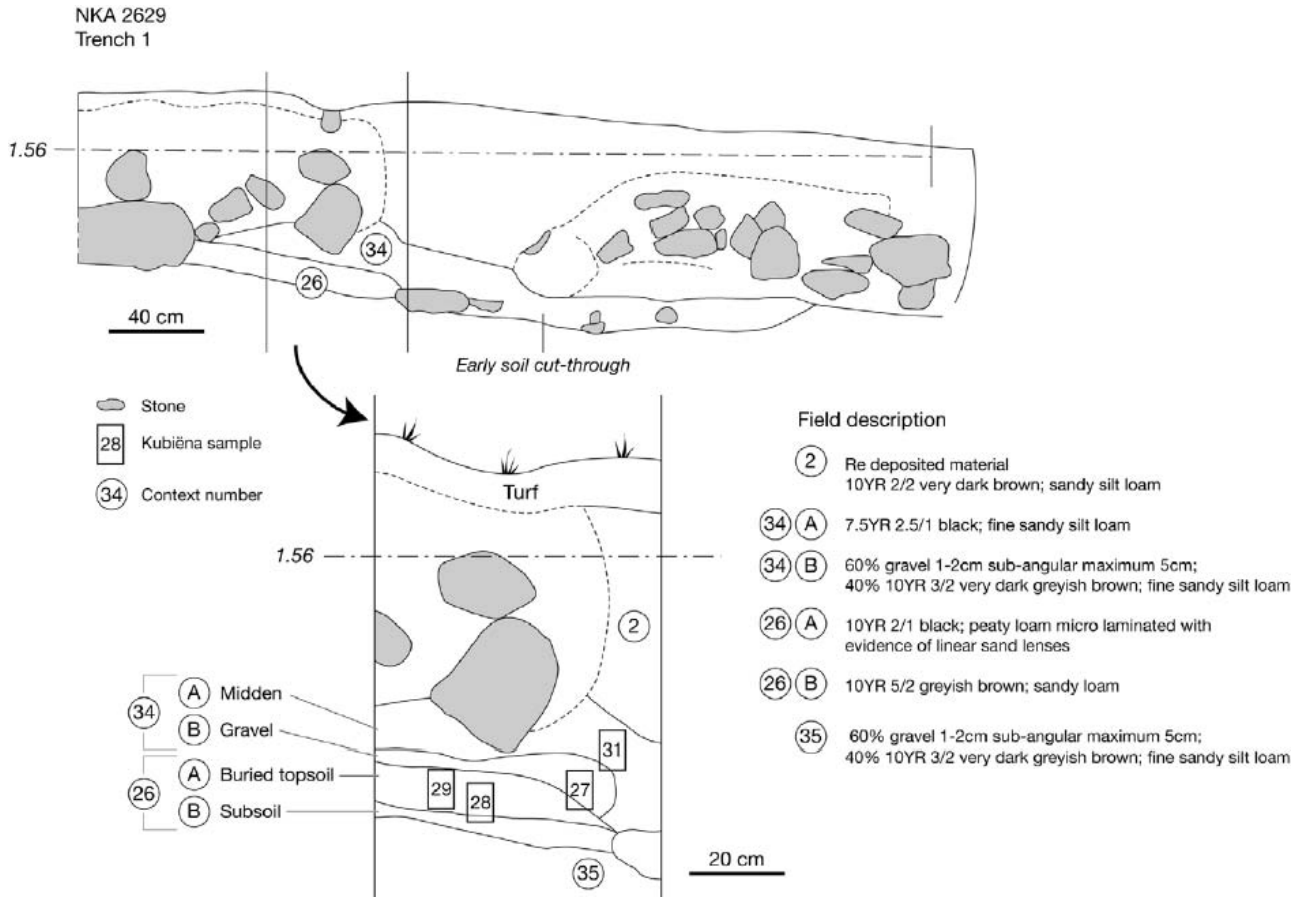
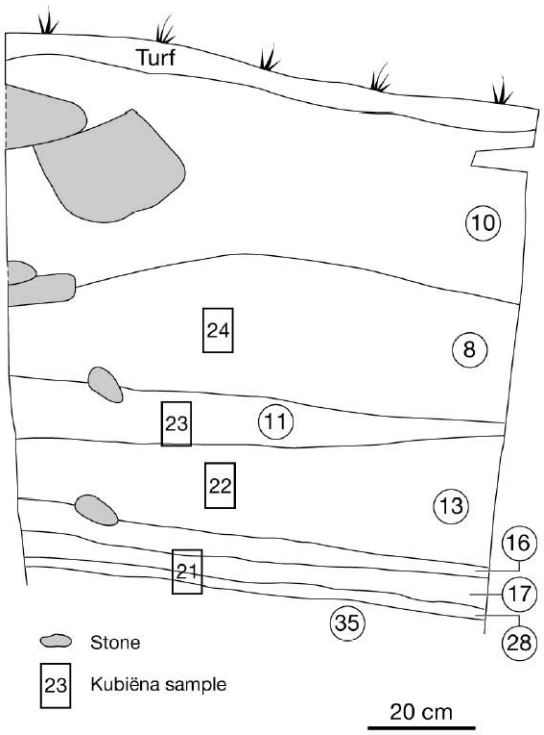


Fig 41. Trench 1.

NKA 2629
Trench 4 South facing section



Field description

Turf 10YR 4/1 dark grey; organic fine sandy silt loam

(10) 10YR 3/1 very dark grey; fine sandy silt loam; charcoal and bone fragments

(8) Micro laminated layer; 10YR 2/1 black; fine sandy silt loam with occasional sand lenses 3-5cm

(11) Micro laminated layer; 5YR 3/3 dark reddish brown-dominantly at base of context; 10YR 4/1 dark grey; 10YR 3/2 dark greyish brown; 5YR 3/2 dark reddish brown; fine sandy silt loam

(13) Micro laminated layer; 10YR 2/1-2/2 black-very dark brown; 10YR 3/2 very dark greyish brown; fine sandy silt loam; bone, charcoal and uncarbonised wood fragments

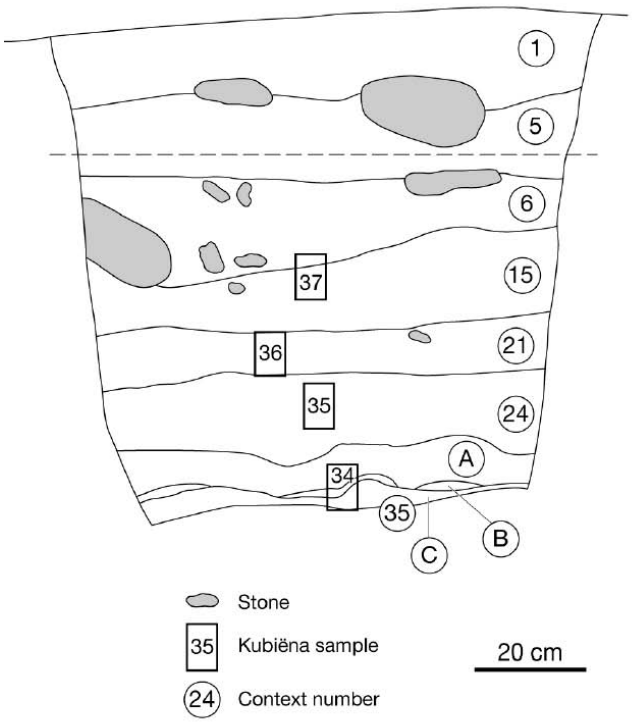
(16) Discontinuous layer; 10YR 5/2 greyish brown; 40% gravel 2-3cm sub-angular and angular; gritty sandy silt loam; bone and uncarbonised wood fragments

(17) 10YR 2/1- black, organic fine sandy silt loam; bone and uncarbonised wood fragments

(28) 10YR 4/2- dark greyish brown; fine sandy silt loam; thin 10YR 2/1 black band 1-2mm towards base

(35) Moderately well sorted gravel 2-3cm maximum 5cm angular and sub-angular

NKA 2629
Trench 6 North facing section



Field description

(1) Turf

(5) 10YR 3/2 greyish brown sandy silt loam; occasional charcoal

(6) 7.5 YR 3/1 very dark grey gritty sandy loam; occasional stone and bone fragments frequent wood fragments

(15) 10YR 2/1 black heterogeneous sandy silt loam; occasional charcoal and wood fragments sandy; 2.5YR 5/3 light olive brown

(21) 7.5YR 3/1 very dark grey gritty sandy loam; occasional charcoal flecks

(24) 5YR 3/2 dark reddish brown fine 7.5YR 4/3 brown peaty loam; occasional wood fragments

(35)(A) 7.5YR 2.5/1 black peaty loam

(35)(B) 10YR 3/2 very dark greyish brown coarse sandy loam

(35)(C) Gravel; 60% subangular and subrounded 2-3cm Matrix 40% 10YR 4/2 dark greyish brown gritty sandy loam

Fig. 42 and 43.

Qassiarsuk Trench 1 (Anthropic sediments)

CONTEXT	SAMPLE	COARSE MINERAL MATERIAL >50µm: Quartz	Feldspar	Biotite	Compound quartz grains	Grotes	Sandstone	Phytoliths	Diatoms	Bone	Rubified mineral	FINE MINERAL MATERIAL	COARSE ORGANIC MATERIAL: Fungal spores	Lignified tissue	Parenchymatic tissue	Charcoal	FINE ORGANIC MATERIAL: Cell residue	Amorphous (black)	Amorphous (red/brown)	Amorphous (yellow/orange)	PEDOFEATURES: Clay coatings	Silt infills	Silt coatings	Amorphous crypto - crystalline (reddish brown)	Depletion	Excremental (mamillate)	Excremental (spheroidal)	Calcium spherulites	MICROSTRUCTURE	COARSE MATERIAL ARRANGEMENT	GROUNDMASS b FABRIC	RELATED DISTRIBUTION
34A	31a	•••	•			•		•		•	•	Organo-mineral dark brown •••			•	•			••	•					•					Intergrain microaggregate	Random poorly sorted	Stipple speckled	Porphyric
	31b														••						•				•					Spongy			
	31c	•••	•	•		•		•	•	•	•	Organo-mineral brown •••	•		••	•			•	•••					•					Granular spongy	Random poorly sorted	Stipple speckled	Porphyric
	31d	••••	•									Organo-mineral brown •																		Single grain	Random moderately sorted	Stipple speckled	Enaulic
34A	27	•••	•	•		•		•		•	•	Organo-mineral brown •			•	••			••	•										Intergrain microaggregate	Random poorly sorted	Stipple speckled	Porphyric
34B	27	••	•	•		••	••				••	Mineral grey •	•			•			•											Intergrain microaggregate	Random moderately sorted	Stipple speckled	Enaulic

Frequency class refers to the appropriate area of section (Bullock *et al.*, 1985) : Trace • Very few •• few ••• Frequent/common •••• Dominant/very dominant.
Frequency class for textural pedofeatures (Bullock *et al.*, 1985) : Trace • Rare •• occasional ••• Many

Qassiarsuk Trench 1 (Fossil soils)

CONTEXT	SAMPLE	COARSE MINERAL MATERIAL >50µm: Quartz	Feldspar	Biotite	Compound quartz grains	Grotes	Sandstone	Phytoliths	Diatoms	Bone	Rubified mineral	FINE MINERAL MATERIAL	COARSE ORGANIC MATERIAL: Fungal spores	Lignified tissue	Parenchymatic tissue	Charcoal	FINE ORGANIC MATERIAL: Cell residue	Amorphous (black)	Amorphous (red/brown)	Amorphous (yellow/orange)	PEDOFEATURES: Clay coatings	Silt infills	Silt coatings	Amorphous crypto - crystalline (reddish brown)	Depletion	Excremental (mamillate)	Excremental (spheroidal)	Calcium spherulites	MICROSTRUCTURE	COARSE MATERIAL ARRANGEMENT	GROUNDMASS b FABRIC	RELATED DISTRIBUTION
26A	27i																•	••••											Spongy			
	27ii	••										Organo-mineral dark brown •••			••		•	••												Spongy	Random moderately sorted	Stipple speckled	Porphyric
	27iii	••	•			•						Organo-mineral light brown •••	•		•		•	•	•											Intergrain microaggregate	Random moderately sorted	Stipple speckled	Porphyric
	27iv	••••	•									Organo-mineral brown •						•	•											Intergrain microaggregate	Linear moderately sorted	Stipple speckled	Enaulic
26A	29i																•	••••											Spongy			
	29ii	••										Organo-mineral brown •••			••		•	••												Spongy	Random moderately sorted	Stipple speckled	Porphyric
	29iii	••	•			•						Organo-mineral light brown •••	•		•		•	•	•											Spongy channel & chamber	Random moderately sorted	Stipple speckled	Porphyric
	29iv	••••	•									Organo-mineral brown •						•	•											Intergrain microaggregate	Linear moderately sorted	Stipple speckled	Enaulic
															••		•	•••											Spongy			
26A	28i																•	••••											Spongy			
	28ii	••										Organo-mineral brown •••			••		•	••												Spongy	Random moderately sorted	Stipple speckled	Porphyric
	28iii	••	•			•						Organo-mineral light brown •••	•		•		•	•	••											Crack channel & chamber	Random moderately sorted	Stipple speckled	Porphyric
	28iv	••••	•									Organo-mineral brown •						•	•											Intergrain microaggregate	Linear moderately sorted	Stipple speckled	Enaulic
															••		•	•••											Spongy			
26B	28	••••	•	•								Mineral grey •																		Compact	Random poorly sorted	Stipple speckled	Enaulic

Frequency class refers to the appropriate area of section (Bullock *et al.*, 1985) : Trace • Very few •• few ••• Frequent/common •••• Dominant/very dominant.
Frequency class for textural pedofeatures (Bullock *et al.*, 1985) : Trace • Rare •• occasional ••• Many

Fig. 44 and 45.

Qassiarsuk Trench 4

CONTEXT	SAMPLE	COARSE MINERAL MATERIAL >50µm: Quartz	Feldspar	Biotite	Compound quartz grains	Gneiss	Sandstone	Phytoliths	Diatoms	Bone	Rubified mineral	FINE MINERAL MATERIAL	COARSE ORGANIC MATERIAL: Fungal Hyphae	Fungal spores	Lignified tissue	Parenchymatic tissue	Charcoal	FINE ORGANIC MATERIAL: Cell residue	Amorphous (black)	Amorphous (red/brown)	Amorphous (yellow/orange)	PEDOFEATURES: Clay coatings	Silt infills	Silt coatings	Amorphous crypto - crystalline (reddish brown)	Depletion	Excremental mamillotex	Excremental (spheroidal)	Calcium sphanulite	Volcanic	MICROSTRUCTURE	COARSE MATERIAL ARRANGEMENT	GROUNDMASS b FABRIC	RELATED DISTRIBUTION
8	24a										•	Orange/red (OSL) brown (PPL) organic •	•						••												Spongy			
	24b	••••	•									Grey mineral •																				Random moderately sorted	Stipple speckled	Enaulic
	24c	•••	•	•				•	•	•	•	Brown organo mineral ••	•	•		•	•	•	•					•							Intergrain microaggregate	Linear moderately sorted	Stipple speckled	Porphyric
	24d	•••	•	•		•	•																								Single grain	Linear well sorted		
11	23a	•••	•	•				•		•		Brown organo mineral ••	•			•			•	•												Intergrain microaggregate	Random poorly sorted	Stipple speckled	Porphyric
	23b	••••	•	•								Grey mineral •	•						•												Intergrain microaggregate	Random moderately sorted	Stipple speckled	Enaulic
	23c	••										Yellow brown •••							•					•							Vughy	Random poorly sorted	Stipple speckled	Porphyric
13	22	••	•	•		•				•		Brown organo mineral •••	•			•			•	••				•				•		•	Spongy	Random poorly sorted	Stipple speckled	Porphyric
16	21									•	•					••			•	•••											Spongy			
	i	••										Organo-mineral brown •••			••				•	••												Spongy	Random moderately sorted	Stipple speckled	Porphyric
	ii						••			•		Organo-mineral light brown •••																							
	iv	••••	•								•	Organo-mineral brown •								•	•											Intergrain microaggregate	Linear moderately sorted	Stipple speckled	Enaulic
28	21	••••	•	•		•	•					Grey mineral •																			Intergrain microaggregate	Random moderately sorted	Stipple speckled	Enaulic
35	21	••••	•	•								Brown organo mineral •																			Compact	Random moderately sorted	Stipple speckled	Enaulic

Frequency class refers to the appropriate area of section (Bullock *et al., 1985*) t Trace • Very few •• few ••• Frequent/common •••• Dominant/very dominant.
Frequency class for textural pedofeatures (Bullock *et al., 1985*) t Trace • Rare •• occasional ••• Many

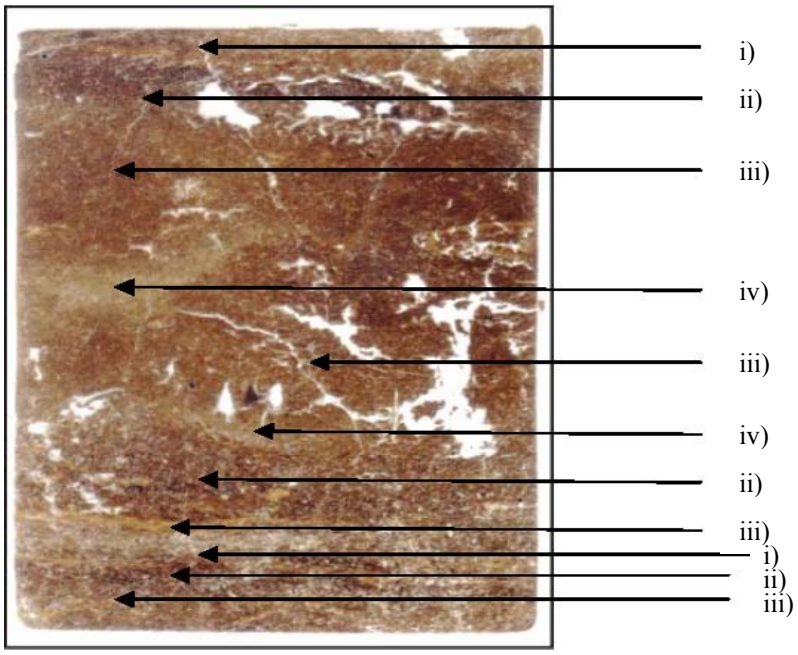
Qassiarsuk Trench 6

CONTEXT	SAMPLE	COARSE MINERAL MATERIAL >50µm: Quartz	Feldspar	Biotite	Compound quartz grains	Gneiss	Sandstone	Phytoliths	Diatoms	Bone	Rubified mineral	FINE MINERAL MATERIAL	COARSE ORGANIC MATERIAL: Fungal spores	Lignified tissue	Parenchymatic tissue	Charcoal	FINE ORGANIC MATERIAL: Cell residue	Amorphous (black)	Amorphous (red/brown)	Amorphous (yellow/orange)	PEDOFEATURES: Clay coatings	Silt infills	Silt coatings	Amorphous crypto - crystalline (reddish brown)	Depletion	Excremental mamillotex	Excremental (spheroidal)	Calcium sphanulite	MICROSTRUCTURE	COARSE MATERIAL ARRANGEMENT	GROUNDMASS b FABRIC	RELATED DISTRIBUTION
6	37	••••	•		•	•		•	•	••	•	Organo-mineral Brown ••			•	••		•	•										Intergrain microaggregate	Random poorly sorted	Stipple speckled	Enaulic
15	37	•••	•			•		•	•	••	••	Organo-mineral dark brown •••			•	••		••	•										Intergrain microaggregate	Random poorly sorted	Stipple speckled	Porphyric
21	36	•••	•					•	•	•	•	Organo-mineral brown •••		•	••	•		•	•••									t	Spongy	Random poorly sorted	Stipple speckled	Porphyric
24	35	••	•					•	•	•	•	Organo-mineral reddish brown •••		•	••	•		•	•••					•				t	Spongy	Random poorly sorted	Stipple speckled	Porphyric
35A	34	••	•									Organic and Organo-mineral dark brown •••		•	•	••		•	••••										Spongy Intergrain microaggregate	Random and linear moderately sorted	Stipple speckled	Porphyric
35B	34	•••	•	•								Mineral grey ••																	Compact	Random poorly sorted	Stipple speckled	Enaulic
35C	34	•••	•	•								Mineral brown •												•					Compact	Random poorly sorted	Stipple speckled	Enaulic

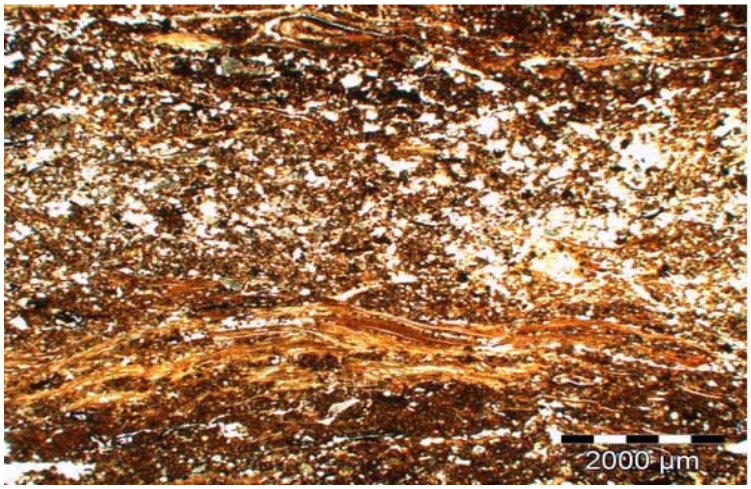
Frequency class refers to the appropriate area of section (Bullock *et al., 1985*) t Trace • Very few •• few ••• Frequent/common •••• Dominant/very dominant.
Frequency class for textural pedofeatures (Bullock *et al., 1985*) t Trace • Rare •• occasional ••• Many

Fig. 46 and 47.

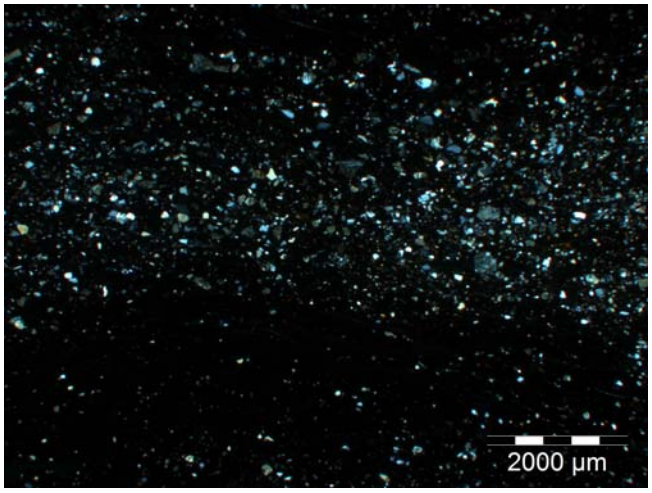
Figure 48 a-c: Qassiarsuk, Trench 1, Context 26A, Thin Section Sample 29. Fossil soil upper horizon.



a) Sample 29, Context 26A. Micro-horizon sequences in fossil soil upper horizon.

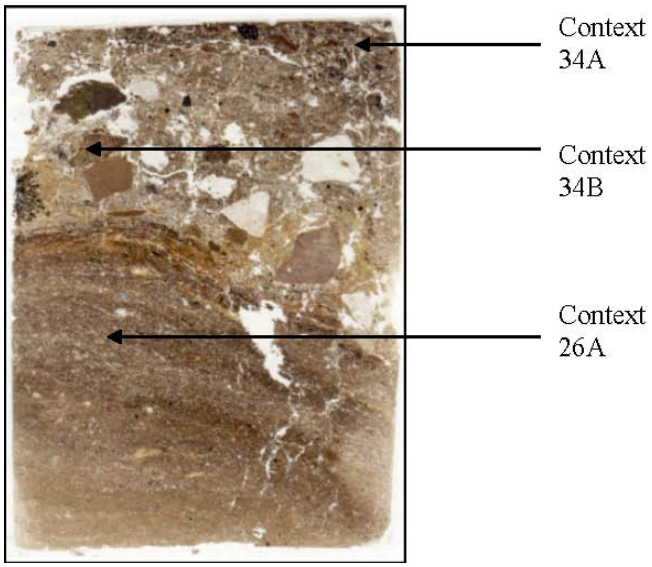


b) Sample 29. Showing sequence of micro-horizons, i), ii) and iv). Plane polarized light.



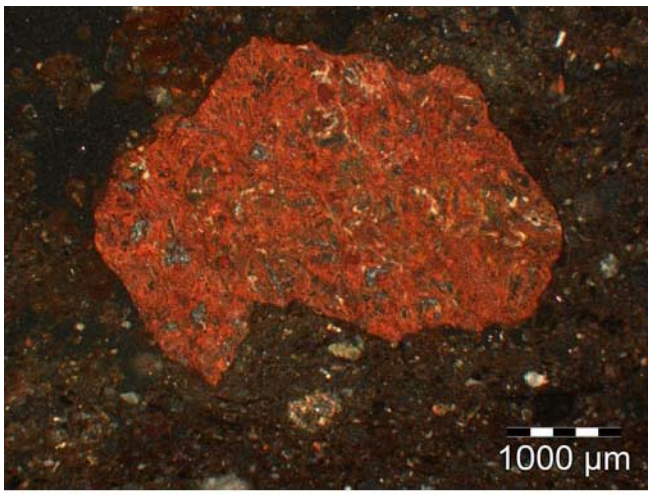
c) Sample 29, the sme field of view as b) above, highlighting the mineral component of micro horizon iv). Cross polars.

Figure 49 a-c: Qassiarsuk, Trench 1, Contexts 34A, 34B and 26A, Thin Section Sample 27.

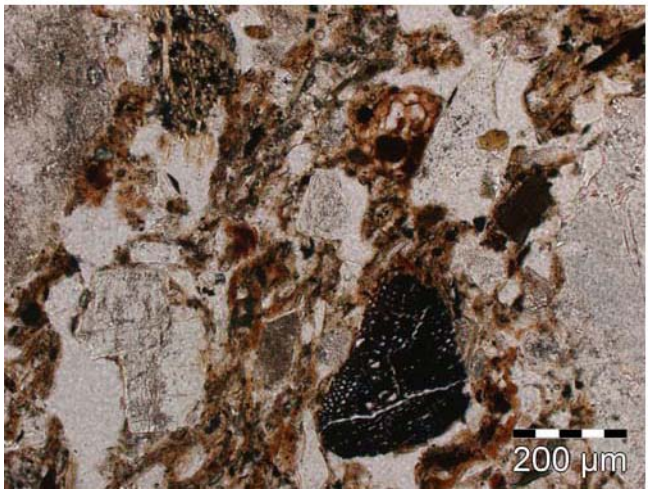


a) **Sample 27, Showing overlying anthropic deposit (context 34A, sand and gravel accumulation (context 34B) and fossil soil with micro-horizon sequences (context 26A).**

2 cm

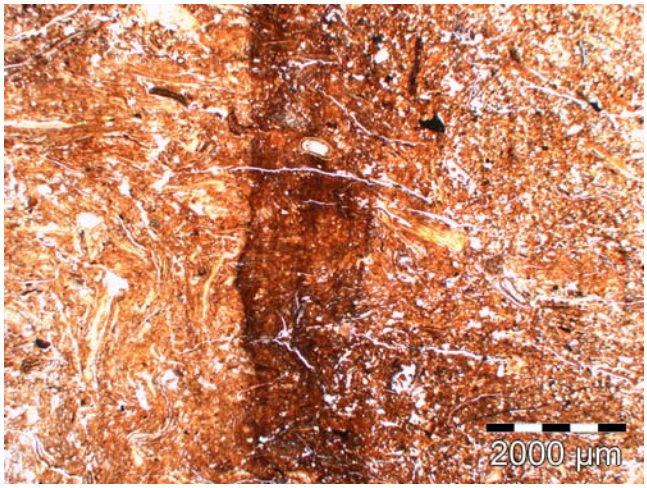


b) Rubified mineral grain. Context 34b, oblique incident light

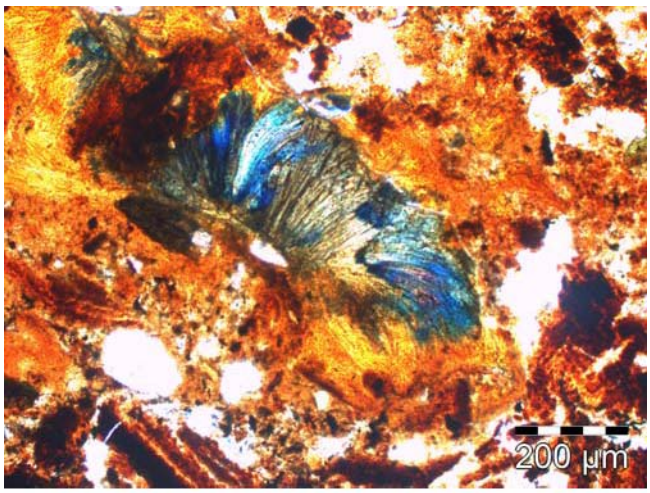


c) Charcoal fragments. Context 34b, plane polarized light.

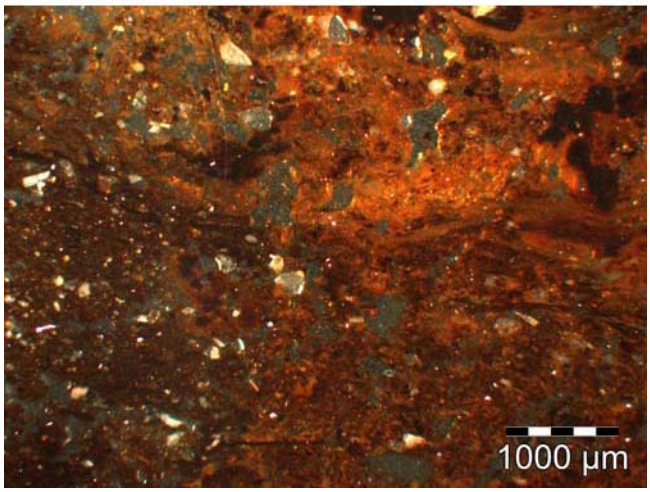
Figure 50 a-c: Micromorphological features from anthropic sediments, Qassiarsuk.



a) Iron pan in turf debris, the vertical nature indicating anthropic deposition, context 24, sample 35, trench 6. Plane polarized light.



b) Vivianite (blue coloring) in thin sections from context 13, sample 22, trench 4. Indicative of bone decomposition and recrystalisation in reducing (wet) conditions. Plane polarized light.



c) Rubified organic turf material, contrasting with the darker sediment matrix. Context 8, sample 24, trench 4. Indicative of combustion. Oblique incident light.

5.4 Artifacts

Caroline Paulsen and Ragnar Edvardsson

The total number of artifacts recorded during the 2006 season was 123 finds, bringing the total finds assemblage from both years to 170 finds. The assemblage from 2006 consisted of; 8 iron pieces (6%), 1 horn (0.8%), 5 flint (4%), 24 bone (20%), 1 metal (0.8%), 72 steatite (58,%), 8 stone (7%) and 4 wood (3%).

Of the total number of finds 18 (14%) were found during cleaning, 3 (2,4%) in unit 44, 12 (10%) in unit 45, 2 (1,6%) in unit 46, 1 (0,8%) in unit 47, 2 (1,6) in unit 50, 8 (6%) in unit 53, 13 (11%) in unit 54, 1 (0,8%) in unit 55, 3 (2,4%) in unit 56, 1 (0,8%) in unit 58, 3 (2,4%) in unit 59, 3 (2,4%) in unit 60, 5 (4%) in unit 61, 12 (10%) in unit 63, 2 (1,6%) in unit 67, 14 (12%) in unit 68, 1 (0,8%) in unit 69, 2 (1,6%) in unit 70, 1 (0,8%) in unit 78, 1 (0,8%) in unit 80, 11 (9%) in unit 81, 1 (0,8%) in unit 82 and 3 (2,4%) in unit 83.

Most of the finds were unidentifiable or 100 (83%) and other finds that were possible to identify were; 1 (0,8) counting stick, 2 (1,6%) dress pins, 1 (0,8%) gaming piece, 1 (0,8%) Loom weight, 4 (3%) nails, 4 (3%) pieces of slag, 2 (1,6%) spindle whorls, 1 (0,8%) spoon, 4 (3%) shards of vessels and 2 (1,6%) whetstones.

Steatite

The largest collection of finds from the 2006 assemblage consisted of finds made of steatite. This is quite common on archaeological excavation in Greenland and objects made of steatite usually form the largest part of any finds assemblage. Steatite is found locally in Greenland and therefore all finds made of steatite are local products. The steatite finds from Ø29a are all small pieces and most of them are vessel fragments.

Three spindle whorl fragments made of steatite were found. Two (KNK262906 – x10) of them probably come from the same whorl and are decorated on the bottom with a incised line. The third whorl (KNK262906 – x26) is broken in half and has no decoration on it.(Pic. 9)

Of the total number of steatite only 4 (KNK262906 – x05, x33, x68, x115) pieces could positively by identified as vessel fragments. Three of them are small body fragments but the fourth is a rimsherd and has raised lines along the rim (x68). (Pic. 10)

One of the steatite finds was a large fragment (KNK2629 – x113) with a hole through it. The piece probably came from a large vessel but later was used probably as a loom weight. Steatite finds with a hole in it are common and many of them probably are loom weights however it is also possible that these holes are repair holes.

Stone and flint

During the excavation 8 stone objects were recorded. Only 2 (KNK2629 – x01, x101) of them could be identified and these were fragments of whetstones. Two pieces were recorded as amber (KNK2629 - x74 and x75) but they are most likely bone objects and could be seal teeth.

Few small fragments of flint (KNK2629 - x18, x27, x89, x99 and x103) were also recorded and are too small to associate to any particular object. However, these small flint pieces were recorded in the midden deposits and therefore were brought on to site

and thrown into it along with other waste. The use of these flint objects is difficult to determine but some of theme may well have been used as cutting tools. Such flint fragments have been found on midden excavations in Iceland (Edvardsson, Ragnar, 2004) and these middens have been dated to the 9^{th} – 10^{th} centuries.

Metal

All metal objects could be identified except one (KNK262906 – x20). There were 4 (KNK262906 – x06, x84, x91 and x94) nails and three of them were made of iron, small and had a square head. They are of a type commonly found in Viking and Medieval contexts and were used for woodwork. Some of them are bent, suggesting that they were pulled out of wood for reuse. The fourth nail had an iron head and possibly a copper shank, but that can only be determined with further analysis.

Four pieces of slag were also recorded (KNK262906 – x37, x43, x80 and x118). These pieces were small, greyish in color and are typical for slag that is produced during the making of an iron object in a smithy. Production slag is larger and courser and no such objects were recorded during the excavation.

Bone and horn

Of the total number of bone objects 4 pieces could be identified. These were 2 (KNK262906 – x02 and x24) dress pins, 1 (x98) gaming piece and 1 (x108) spoon.

Both dress pins are fragmentary, one has only the lower and the other the upper half preserved. The one with the upper half has a square head and is not decorated. The dress pins are probably not of a Viking age type but probably of a later type. (Pic. 11)

The gaming piece is a small worked piece, 2 x 2 cm and it is square in shape with a pointed head. It is undetermined what kind of bone was used in its making. It is possible that it is made of fishbone as gaming pieces made of haddock bones have been found in Iceland.

One object was identified as a spoon made of bone but it is a small piece and needs further analysis to verify the identification. Another small object was found that was made of horn (KNK2629 – x101) but it was to small to identify.

Two finds were made of whalebone (KNK262906 – x72, x81) and were clearly worked. However it was not possible to see what they had been used for and it is possible that they either were a part of a structure or are a part of an artifact. It has been noted on many excavations both in Greenland (Vebæk, C.L.,1993) and Iceland that whalebone was frequently used both as material for tools and also material for house building, such as rafters, etc.

Wood

The midden at KNK2629 has become waterlogged, creating an ideal condition for the preservation of wood. From all the midden deposits large quantities of wood were excavated, most of them were small chips and unworked wood pieces. These were not recorded as finds but sampled for analysis, speciation, etc.

During the excavation 4 wood finds were recorded; 1 counting stick (KNK262906 – x95), 1 part of a decoration (KNK262906 – x63), 1 small square piece with a hole in it (KNK262906 – x106) and 1 unknown find (KNK262906 – x105).

The counting stick was the most beautiful artifact found during the excavation. It is approximately 12 cm long and 2 cm wide. On one end there is a hole and along the side notches are carved into it, 13 on each side or a total of 26 notches (Pic. 12).

One find is a small part of a larger decoration, 2,5 x 2 cm and only a few millimeters thin. It is broken and has a hole in one end were it was probably fastened on another object, chest or something similar (Pic. 13).

The small square object was small, 2 x 1,5 cm and had a hole through the center. It is impossible to determine the function of this object but it is probably a part of a larger piece.

The last recorded wooden object is 6 x 3 cm and is broken of a larger piece. This is probably the upper part of the object as one end is curved. It is also impossible to determine the function of this object.

Discussion

The finds assemblage from 2006 includes a variety of material types but as this is just a preliminary analysis of the assemblage, the object types are only few. The object types may increase as the assemblage is examined in more detail. The assemblage is dominated by finds of steatite, which are probably of a vessel type. This is quite consistent with other excavations in Greenland and the earlier work at Qassiarsuk (Nørlund, Stenberger, 1934, Vebæk). No finds were recorded that can be without a doubt be associated with the Viking age, such as beads, decorated bone pins, combs, etc. One of the dress pins is probably of a later type which suggests that the midden deposits excavated in 2006 belong to the Medieval period.

No production refuse was recorded and no finds, such as production slag, glass, etc., were recorded. The whole assemblage represents domestic refuse and all finds are probably of a local origin. This is consistent with what Nørlund and Stenberger concluded in their 1934 report.

5.5 Conclusions of the 2006 excavation

The 2006 excavation season was a success in terms of the midden excavation and shows that there are still undisturbed midden deposits in the area front of the dwelling. In total 40 archaeological units were recorded and excavated in the 2006 season, with a total of 81 excavated units for both years. The total number of archaeological units recorded now stands at 91 units.

The methodology adapted at Ø29a has also proved to be an excellent method of excavation, giving a better overview and more detailed understanding of the archaeological record, not only the midden deposits but also structures and other features. This excavation method showed that there are still much more to excavate and that the whole story of the farm is far from complete.

In the southwest part of the excavation a gable end of a building emerged that is oriented north to south. The walls of this building are made of stone rows with turf infill. It is highly likely that this is the north end of the building that was excavated in 1932 by Nørlund and Stenberger.

In the case of the 1932 excavation Nørlund and Stenberger had problems locating the north end of this building. This gable end is about 6 meters away from the interpreted gable end, making the building somewhat larger than previously thought. This structure was not visible in the surface and only became visible when each deposit, overlying it, had been removed in reverse order.

A wall was recorded that had also a north to south orientation. This wall disappeared into the north and south sections, suggesting that it continues in both directions. The wall consisted of a single stone row but on both sides of it stones were recorded that probably belonged to it. It is likely that the wall was a boundary wall but fell out of use and was robbed of stones for use elsewhere.

The third stone structure was recorded that had an west east orientation in the northwest part of the excavation. This structure only consists of a few stones and disappears into the west section. What remains of it probably lies to the west but it is likely that it has been robbed and little remains of it.

In the 2005 season a turf wall was recorded that disappeared into the south section of Nørlunds trench. The 2006 season did not get into this structure but in the area south of the wall more turf deposits were appearing at the end of the season, which suggests that there is a small structure in this area. This structure is made of *strengur* turf and could be a building of some sort. The structure is in the lower levels of the midden with most of the midden deposits above it and therefore belongs to the oldest phase of the occupation of the site.

Earlier excavations at the site had mainly focused on the last and the earliest phase of occupation. Little has been done to understand the development of the site between these phases. No archaeological site has only a beginning and an end, the most important information is in what lies in between these first and the last phase. That is where the real story about its evolution and development is found, why it succeeded or failed and what factors affecting it on a temporal scale.

Based on the archaeological data collected during the two season occupation in the area where the excavation was carried out, can be divided into 9 phases. It is important to point out that this phasing is only based on the archaeological data from 2005 and 2006 and no attempt was made to include earlier excavation data into this phasing.

Phase	**Activity**	**Date**
I	Renovation.	Ca. 1990
II	Archaeological excavations.	Ca. 1932 - 1990
III	Abandonment phase.	Ca. 1400 - 1932
IV	Last midden accumulation.	Ca. 1150 - 1400
V	Structure 4 and boundary wall abandoned.	Ca. 1100 - 1150

VI	Building and occupation of struct 4 and boundary wall.	Ca. 1050 - 1100
VII	Midden accumulation.	Ca. 1050 - 1100
VIII	Building of turf structure.	Ca. 1000 - 1050
IX	Occupation of site (landnám).	Ca. 960 - 1000

Table. Phasing of the excavation in 2005 and 2006.

The main conclusion of the two seasons is that the farm KNK2629 is far from completely excavated and only a part of its story has been told. The activity on site since 1932 has only confused the archaeological record. If any more work is to be done on the site it is important to treat earlier work as part of the archaeological record and excavate it as any other archaeological context.

It is also important to adapt an open area excavation and open up as large of an area as possible. Too many trenches have already been excavated at Ø29a and some of them were never recorded and any more small trenches on this site will only add to the confusion and possibly destroy valuable information.

The site Ø29a should be re-opened and the whole area, structures and other features alike, excavated with an open area excavation. The reason for this is the simple fact that the general phasing of the site is poor and the area around the houses has not properly been excavated. It is impossible to understand any activity of any structure without understanding its surroundings and the connection between buildings belonging to a single farm.

6. The Excavation at Ø28b

Ragnar Edvardsson

Along side the excavation at Ø29a the team was asked by the National Museum of Greenland to do some assessment on the site Ø28b (KNK61V3-III-536). The local municipality had build a helipad just south of the main ruin (number 38).

The aim of this research was to assess if the site had been damaged by the construction of the helipad and to survey and measure up the main ruin and finally to excavate a trench into the building in an attempt to discover it function. The aim was also to esimate how long it would take to excavate the whole ruin.

The earliest excavation on this site was by Nørlund and Stenberger in 1932 at the same time they excavated the ruin at Ø29a. They surveyed a number of archaeological features, 12 structures and a number of smaller mounds. Their excavation focused mainly on the small mounds where they discovered fireplaces and booth like structures. They concluded that this site could not possibly be a farm, based on its unfavorable location and was probably the remains of either a Thing-place or a market place. The largest structure which was given the number 38, was interpreted to by an exceptionally large booth like structure (Nørlund, P, Stenberger, M. 1934). Since 1932 a number of archaeological trenches have been excavated into this structure without determining its function with certainty.

The area has seen increased activity in the past 70 years due to increased farming and growing population. West of the site a number of houses have been built, a road runs both above and below the site and the area to the south has both been used for mining and as a garbage dump.

This activity has severely damaged the archaeology and destroyed a number of structures. Ruins 41 -44 are totally destroyed and the helipad is built where 41 and 42 stood, the upper road runs over 41 and structures 43 and 44 have been destroyed by mining and road building. It is possible that something still remains of ruins 32 – 36 but it is likely that 32 and 33 have also been destroyed by road building.

The first part of the assessment was to survey the ruin. The ruin was 20 meters in length and 10 meters in width, measured from the outside. The north end of the ruin was curved but it was not possible to see if the south end was the same as older archaeological trenches had damaged that end. It is however likely that the south end was also curved (Plan 7).

In total 7 earlier archaeological trenches were recorded and surveyed; the first by the north gable, second on the northwestern side, third across the ruin just south of the center of the structure, fourth and fifth just 2 meters south of the trench cutting across the ruin and the sixth and seventh by the south gable end. Two spoil heaps were also surveyed by the south gable (plan 8).

6.1 Description of Archaeological Units

Based on the survey work and earlier work on the site, the ruin was thought to be of a longhouse type. It was therefore decided to put the new trench on the north eastern side as longhouses often have an entrance on this side (Edvardsson, R., 2005, Roberts, H.M., 2002). Finding any indication of flagstones, doorposts, etc., would suggest that the ruin had an entrance on this side. This information, with the shape and size of the ruin would strongly suggest that it was of a longhouse type. The trench was 2 x 4 meters in size.

Unit 1. Topsoil.

Unit 2. Archaeological trench by the south gable, 8, 50 x 1 meters and turning towards the south.

Unit 3. Archaeological trench on the northwestern side, 3 x 0, 80 meters.

Unit 4. Archaeological trench cutting across the ruin, 9 x 1 meters.

Unit 5. Archaeological trench in the south end, 3 x 1 meters.

Unit 6. Archaeological trench in the south end, 3, 50 x 1 meters. About 20 centimeters south of unit 5.

Unit 7. Large excavation trench by the southwestern gable end and continues towards the west.

Unit 8. Archaeological trench by the southeastern gable end, 4,40 x 1 meters.

Unit 9. Mixed deposit. Turf, earth and stones. Structural collapse from walls and probably a roof. Burned.

Unit 10. Row of flagstones in the eastern part of the trench. A pavement by an entrance.

After removal of the 5 – 10 centimeters of topsoil [1] the cultural deposits became visible. In the north part of the trench was a deposit [8] that was mixed with, turf, charcoal, soil and stones. This deposit is probably silts mixed with collapse from the walls of the building. On the south side of the trench flagstones [9] appeared, that were clearly laid out and are probably a part of an pavement by an entrance into this building. Neither of these deposits were removed.

It was decided not to excavate any further into the trench because it was clear that too much trenching had already taken place on the site and one more trench would only add to the damage the was already apparent on the site. This decision was also made based on the fact that the excavation had found flagstones that indicated an entrance in the area (Pic 14).

6.2 Conclusions

The assessment on ø28b showed that the site had sustained heavy damage from the 1932 excavation to the present as a result of activity connected with farming and construction. Many of the structures recorded by Nørlund and Stenberger have been destroyed and only few ruins, number 38 among them, remain. However, ruin 38 has also been damaged but not by farming nor construction but by intense archaeological trenching. Since 1932 7 trenches have been excavated into the structure in various places, each trench 1 meter in width and different in length, but none of these trenches have conclusively managed to solve the puzzle of function for this building.

The assessment suggests, based on the shape of the ruin, its length and width (20 x 10 meters) and an entrance on the south long wall that ruin number 38 is the remains of a longhouse possibly dated to the late 10^{th} early 11^{th} centuries. When ruin number 38 is compared to longhouses that have been excavated in Iceland a certain similarity becomes clear. The longhouses excavated at Vatnsfjörður in Ísafjarðardjúp (Edvardsson, R, 2004) and Aðalstræti in Reykjavík (Roberts, H.M., 2002) are almost identical, both with curved gables, 1 – 2 entrances on the long walls and a hearth in the center. Ruin number 38 is similar in length and width, has curved ends and possibly a entrance on the long wall. This strongly suggests that ruin 38 is of the same type. However, only a total excavation of the site will solve this puzzle.

The numerous archaeological trenches surveyed are a textbook example of how small trenches can do more damage than good. Four of the trenches are located either by or on the walls of the structure. In this case the trenches can only give a minimal information about the construction of the walls but no information about the function of the building. One trench is cut right across the ruin, probably in an attempt to locate the hearth of the building in the center. This trench is located just south of the center and therefore misses the hearth completely. The information this trench would reveal would also be minimal. The last two trenches are very small and are located in the southeast part of the structure. Both the smallness of the trenches and their location in the ruin make them unusable for any concrete data collecting and they possibly could not reveal any information about function.

Ruin 38 is under threat and it is highly likely that it will be further damaged in the future. It is important that open area excavation is carried out on the site and the ruin excavated completely. This would save valuable information from destruction and make the function of the building clear. The total excavation of ruin 38 would only take 4 – 5 weeks based on the soil accumilation an similar condititons from the Northwest of Iceland.

7. Discussion

The excavations in 2005 and 2006 have shown that both Ø29a and Ø28b are far from completely excavated and that with modern methods new data can be collected that will increase our understanding of the economy and the development of Norse farms in this important area of South Greenland. It also may help to shed some light on the reasons for its abandonment and what factors played the most important role in its final demise.

The excavation suggests that earlier work at Ø29a was primarily focused on the last phase of occupation and that little has been done to understand the development of the site from the beginning of occupation until its abandonment. The only recent work on the earlier phase of occupation at Ø29a was done by Knud J. Krogh in the 1960´s and 1970´s and the results of that work suggested an earlier building under the dwelling but no further work as been done to understand the earliest phase of occupation (Knud J. Krogh, 1982).

The excavation at Ø29a was a success from a methodolocial standpoint. The method selected for the excavation, i.e. open area excavation, proved to be ideal for the Greenlandic environment and gave deeper and more detailed understanding of the excavated area. This method has been in use in 10 years in Iceland and since 2002 it has been tested in the NW of Iceland, an environment similar to S-Greenland in many respects (Ragnar Edvardsson, 2003, 2004a, 2005, 2006). In the NW of Iceland soil accumilation is slower than elsewhere in Iceland and ruins stay visible in the surface for longer periods. Archaeological excavations in the NW have shown that the archaeology does not lie deep and in many cases just under the surface. These conditions are ideal for an open area excavation as it gives the archaeologist a chance to extend the excavation trench more outwards than down, as there is not much soil to remove from the top of the ruins. The depth of cultural layers in NW Iceland is sometimes only 20 cm and it is usually only on farm mounds that have been continuously in occupation for hundreds of years that archaeologists encounter deep stratified deposits.

Greenlandic Norse archaeology share many of the conditions that have been encountered in NW Iceland, i.e. ruins clearly visible in the surface, little soil on top of ruins and in many cases no deep cultural deposits. This suggests that the archaeology is best approached in a similar way as in the NW of Iceland and that an open area excavation is most likely to reveal any true results.

The excavation at Ø29a located and recorded structures that have not been recorded before, i.e. a boundary wall, turf structure and a stone building. These buildings show that there is much more to gain from further excavations on the site and that activity outside the main buildings is much more intense than previously recorded.

The survey and excavation at Ø28b show clearly what intense trenching can do to an archaeological site. Ruin 38 has been heavily damaged from small trenches, none of them more than 1 m in width and most of them are positioned in such a place that they can only give a minimal information about the ruin. Ruin 38 is in fact a test-book example of why test-trenching should be avoided at all costs. The narrower the trench is the less it is possible to see and at the same time the archaeology will become more complicated. In the case of ruin 38 it would have been much simpler and less time consuming to open up the whole ruin and would without a doubt solve the puzzle of its function.

The excavation in the midden showed clearly that there are still large deposits of midden left in the area and that Nørlund and Stenberger probably only scratched the surface during the 1932 excavation.

Each individual midden deposit was excavated in the right stratigraphic order. It was the goal to try to distinguish between individual dumps of midden in the same way as has been done at Hrísheimar in the North of Iceland for the past 3 seasons (Edvardsson, Ragnar, 2004b). The midden at Ø29a was more waterlogged than the Hrísheimar midden and therefore it was often impossible to separate small midden dumps on a microscopic level and some dumps were excavated and recorded together. Nevertheless, the midden was excavated on such a scale that it gave detailed information about the economy of the farm on a temporal scale.

The primary result of the analysis of the bone material at Ø29a does not show similar changes in domestic animal management strategy as in Iceland at the same period. The cattle to sheep ratio remain relatively unchanged from AD1200 – 1400 at Ø29a while the Icelandic data suggest a clear shift to mainly sheep/goat heards. This may indicate that the Icelandic Norse were more into producing woolen products for export while the Greenlandic Norse where using wool products for domestic use and focused on other products for export.

Both the Icelandic and Greenlandic data show a clear increase in the use of marine resources from AD1200 and onwards. While Icelanders are more increasing their fishing the Greenlanders increased their exploitation of marine mammals. Icelanders were both using the fish for local consuption but also for trade while the Greenlanders probably used the marine resources primarily for local consumption.

The reason why the Greenlanders did not get involved in fishing on a large scale and the fishing trade in general is difficult to answer but it may simply be explained by the fact that the time Icelandic fish export controlled the marked in the area and that fishing on a large scale may have been more problematic in Greenland than in Iceland due to environmental conditions. Furthermore, it was probably far easier for fish merchants to get fish products from Iceland than Greenland. The Greenlandic export trade was therefore more specilized in other products such as walrus ivory, Narwhal teeth, etc., fishing in Greenland would therefore be mostly on a limited scale and only for domestic use which could at least partially explain the lack of fishbones in the midden deposits.

The soil samples taken during the 2005 and 2006 seasons are still under analysis and will take a few years to fully analyze the total samples. The wood present at Ø29a show an intersting mix of local and exotic species. The local birch wood was probably not suited for house building and was mostly used for fuel but also in roof construction. The

presence of driftwood in the assemblage from Ø29a is very interesting as it signifies that the farmers at Ø29a went seasonally to gather driftwood, probably from the west coast of Greenland, and brought it back to the farm. This suggest that a similar system may have been behind the driftwood harvesting as is well recorded in Iceland. Rich landowners owned smaller farms by the sea where their tenents harvested driftwood. At certain times of the year the drifwood was collected and brought to the main farm. The presecne of driftwood at Ø29a may also indicate that driftwood played an important role in the economy of the farms in South Greenland as it can both be used for house and boat building. This may suggest that farmers in South Greenland were less reliant on imported wood and could have used driftwood for most of their needs.

The geoarchaeological investigations at Ø29a show that the locality was subject to periodic phases of landscape instability prior to settlement. Initial Norse settlement intensified landscape instability and there is evidence of landscape burning and disturbance in the fossil soils. The soil indicate a subsistence strategy based on domestic livestock management and the use of wood and turf as fuel resources. There is a change between 1100 and 1300 which suggests a change in subsistence strategy at the site, with a possible widening of resource extraction to include sea mammals and control of domestic livestock production at other farms elsewhere in the locality. A partial explanation for this shift in strategy is continuing landscape instability in the vicinity of this settlement. Similar change has been noted both in Iceland and the Faroe islands.

The most interesting results of the 2005 and 2006 excavation is that there is still a lot of archaeology un-excavated at Ø29a, especially from the earliest phases. The story of the farm is far from understood and only the last phase of occupation is thoroughly documented. For future work at Ø29a it is recommended that large areas are opened and the cultural deposits excavated with single context recording. The fucus should be in the immediate areas around the buildings, especially the dwelling, this will most likely give better understanding of the earlier phases of the site. In the long run the earlier excavations should also bee opened and recorded as part of the archaeolgoy of the site.

8. Appendices

Here are listed all records, finds, samples, units, etc. beginning with the records from the excavation at Ø29a (KNK2629) in 2005 and ending with the records from Ø28b.

8.1. KNK2629 2005. Finds

Finds

Number	Unit	Type	Material	Quantity	Date	Notes
1	2	Spindle Whorl	Steatite	1	18.8.2005	Half a spindle whorl.
2	6	Vessel	Steatite	1	24.8.2005	rim.
3	2		Wood	1	24.8.2005	Wood fragment.
4	2		Wood	1	24.8.2005	Wood fragment.
5	6		Wood	1	24.8.2005	Wood fragment from a redeposited rubble.
6	0	Nail	Iron	1	24.8.2005	Nail head
7	7		Wood	1	25.8.2005	Wood fragment
8	5	Dress Pin	Bone	1	25.8.2005	Lower part of a possible dress pin.
9	9	Vessel	Steatite	1	25.8.2005	Rim?
10	9	Vessel	Steatite	1	25.8.2005	Rim
11	8	Nail	Iron	1	27.8.2005	Nail head
12	6		Stone	1	27.8.2005	Probably an ordinary stone.
13	2		Wood	1	29.8.2005	Worked wood
14	11		Wood	1	29.8.2005	Possible worked wood
15	12		Steatite	1	29.8.2005	Body fragment
16	13	Nail	Iron	1	30.8.2005	nail head
17	6		Wood	1	30.8.2005	Fossilised wood
18	6		Flint	1	30.8.2005	worked wood
19	6	Vessel	Steatite	1	30.8.2005	
20	2		Horn	1	30.8.2005	
21	2		Steatite	1	30.8.2005	
22	13		Iron	1	30.8.2005	
23	13	Nail	Iron	1	30.8.2005	
24	2		Flint	1	30.8.2005	
25	13		Quartz	1	31.8.2005	Rommel quartz stone. Polished?
26	2		Wood	1	31.8.2005	Wooden peg with cut.
27	18	Vessel	Steatite	1	1.9.2005	
28	22	Hook	Iron	1	1.9.2005	Iron hook with plate attached
29	18	Vessel	Steatite	1	1.9.2005	small fragment.
30	20	Vessel	Steatite	1	1.9.2005	Fragment of body.
31	18	Vessel	Steatite	1	1.9.2005	Fragment of body.
32	18	Vessel	Steatite	1	1.9.2005	
33	21		Wood	1	1.9.2005	Worked wood.

Finds						
Number	Unit	Type	Material	Quantity	Date	Notes
34	22	Hammer	Stone	1	1.9.2005	
35	20		Flint	1	1.9.2005	
36	18	Vessel	Steatite	1	1.9.2005	Fragment of body.
37	18	Vessel	Steatite	1	1.9.2005	
38	18	Vessel	Steatite	1	1.9.2005	
39	18	Vessel	Steatite	1	2.9.2005	
40	24		Horn	1	2.9.2005	Worked
41	18	Vessel	Steatite	1	2.9.2005	
42	18	Nail	Iron	1	2.9.2005	
43	23		Flint	1	2.9.2005	
44	24		Bone	1	2.9.2005	Worked whalebone
45	26	Vessel	Steatite	1	2.9.2005	
46	24		Bone	1	2.9.2005	Worked whalebone
47	24		Iron	1	2.9.2005	

8.2. KNK2629 2005. Archaeological units.

Archaeological units								
Farm	SiteCode	No	NoType	Area	Description	Material	Date	ID
Ø29a	NKA2629	1	Deposit	1	Turf surface	Turf	17.8.2005	RED
Ø29a	NKA2629	2	Deposit	1	Fill of Nörlunds trench, under [5]	Mixed Silts	17.8.2005	RED
Ø29a	NKA2629	3	Cut	1	Nörlunds trench, under [2]	Cut interface	17.8.2005	RED
Ø29a	NKA2629	4	Deposit	1	Collapsed material under 2, in Nörlunds trench, under [3]	Undefined	19.8.2005	RED
Ø29a	NKA2629	5	Deposit	6	Redeposited rubble of earth under topsoil [1]	Mixed Silts	24.8.2005	MC
Ø29a	NKA2629	6	Deposit	6	Dark grey compact silt with some bones/interface on top of midden, under [3]	Organic	24.8.2005	MC
Ø29a	NKA2629	7	Deposit	1	Same as [2]	Mixed Silts	24.8.2005	MH
Ø29a	NKA2629	8	Deposit	4	Possible midden deposit with turf layer, under [10].	Turf	25.8.2005	MC
Ø29a	NKA2629	9	Deposit	1	Mixed deposit possible midden, under [41]	Mixed Silts	25.8.2005	MH
Ø29a	NKA2629	10	Deposit	4	Redeposited rubble over [8], under [1]	Mixed Silts	29.8.2005	MC
Ø29a	NKA2629	11	Deposit	4	Grey to reddish brown turf under [8]	Turf	29.8.2005	MC
Ø29a	NKA2629	12	Deposit	1	Based compact black midden/soil, under [9]	Organic	29.8.2005	MH
Ø29a	NKA2629	13	Deposit	4	Organic black midden with bone/plant material, under [11]	Organic	29.8.2005	MC

Archaeological units

Farm	SiteCode	No	NoType	Area	Description	Material	Date	ID
Ø29a	NKA2629	14	Deposit	1	Midden i SW corner of trench 1, under [37]	Organic	30.8.2005	RED
Ø29a	NKA2629	15	Deposit	6	Midden deposit under [6].	Organic	30.8.2005	JM
Ø29a	NKA2629	16	Deposit	4	Gravel deposit, under [13]	Gravel	30.8.2005	MC
Ø29a	NKA2629	17	Deposit	4	Black soil with some wood and bone under [16]	Organic	31.8.2005	MC
Ø29a	NKA2629	18	Deposit	1	Mixed turf layer in the western end of trench, under [3]	Mixed Silts	31.8.2005	MH
Ø29a	NKA2629	19	Deposit	3	Rubble overburden same as 2, under [1]	Mixed Silts	1.9.2005	MC
Ø29a	NKA2629	20	Deposit	3	Mixed dark brown silt with some turf/midden, under [19].	Mixed Silts	1.9.2005	MC
Ø29a	NKA2629	21	Deposit	6	Mixed midden/turf layer under [15]	Mixed Silts	1.9.2005	JM
Ø29a	NKA2629	22	Deposit	3	Area of turf under [20]	Turf	1.9.2005	MC
Ø29a	NKA2629	23	Deposit	3	Mixed dark brown silt with some charcoal under [22]	Dark earth	1.9.2005	MC
Ø29a	NKA2629	24	Deposit	6	A midden deposit under [21]	Mixed Silts	2.9.2005	JM
Ø29a	NKA2629	25	Deposit	3	Possible burning patch defined by edge set slab, under [22].	Charcoal	2.9.2005	MC
Ø29a	NKA2629	26	Deposit	1	Black midden under, [18].	Charcoal	2.9.2005	MH
Ø29a	NKA2629	27	Deposit	1	Turf island in, under [3].	Turf	2.9.2005	MH
Ø29a	NKA2629	28	Deposit	4	Grey clay subsoil under [17]	Undefined	2.9.2005	MC
Ø29a	NKA2629	29	Deposit	4	Gravel layer under [28]	Gravel	2.9.2005	MC
Ø29a	NKA2629	30	Deposit	6	Turf collapse from wall.	Turf	3.9.2005	JM
Ø29a	NKA2629	31	Deposit	2	Topsoil/rubble layer in top of tr. 2 (Not excavated)	Undefined	3.9.2005	MC
Ø29a	NKA2629	32	Deposit	1	Same as [2]	Mixed Silts	3.9.2005	MH
Ø29a	NKA2629	33	Deposit	5	Topsoil/rubble layer in top of tr. 5.	Mixed Silts	3.9.2005	MC
Ø29a	NKA2629	34	Deposit	1	Midden/turf on top of [26] under [3]	Mixed Silts	5.9.2005	RED
Ø29a	NKA2629	35	Deposit	1	Gravel subsoil, under [14]	Gravel	5.9.2005	RED
Ø29a	NKA2629	36	Deposit	3	Turfline under [19] overlying [20]	Turf	5.9.2005	MC
Ø29a	NKA2629	37	Deposit	1	Turf wall in south part.	Turf	5.9.2005	RED
Ø29a	NKA2629	38	Deposit	1	Structural collapse in SE corner/well structure, under [4]	Undefined	5.9.2005	RED
Ø29a	NKA2629	39	Deposit	1	Mixed turf material in N-trench/ probably redeposited material. Same as [2].	Turf	5.9.2005	RED
Ø29a	NKA2629	40	Deposit	1	Fill in old excavation trench. Visible in S-section. Same as [2].	Mixed Silts	5.9.2005	RED
Ø29a	NKA2629	41	Deposit	1	Midden material/turf. Visible in S-section, under [38].	Mixed Silts	5.9.2005	RED
Ø29a	NKA2629	42	Deposit	1	Midden material in South section, under 41.	Organic	5.9.2005	RED
Ø29a	NKA2629	43	Cut	1	Cut for fill [40]. Old excavation	Interface	5.9.2005	RED

Archaeological units								
Farm	SiteCode	No	NoType	Area	Description	Material	Date	ID
					trench. Same as [3].			

8.3 KNK2629 2005. Wood samples

Wood					
Sample no	Unit	Exc. Method	ProcessType	Vol_est	Count
1	6	Sieve	Dry sieving	0	1 of 1
2	13	Sieve	Dry sieving	0	1 of 2
3	15	Sieve	Dry sieving	0	2 of 3
4	13	Sieve	Dry sieving	0	2 of 2
5	15	Sieve	Dry sieving	0	2 of 4
6	15	Sieve	Dry sieving	0	3 of 4
7	16	Sieve	Dry sieving	0	1 of 1
8	17	Sieve	Dry sieving	0	1 of 1
9	17	Sieve	Dry sieving	0	1 of 2
10	15	Sieve	Dry sieving	0	4 of 4
11	20	Sieve	Dry sieving	0	1 of 1
12	21	Sieve	Dry sieving	0	1 of 2
13	22	Sieve	Dry sieving	0	1 of 1
14	22	Sieve	Dry sieving	0	3 of 3
15	18	Sieve	Dry sieving	0	2 of 2
16	21	Sieve	Dry sieving	0	2 of 2
17	22	Sieve	Dry sieving	0	2 of 2
18	23	Sieve	Dry sieving	0	1 of 3
19	23	Sieve	Dry sieving	0	2 of 3
20	23	Sieve	Dry sieving	0	3 of 3
21	24	Sieve	Dry sieving	0	1 of 2
22	24	Sieve	Dry sieving	0	2 of 2
23	25	Sieve	Dry sieving	0	1 of 1
24	27	Sieve	Dry sieving	0	1 of 1
25	30	Sieve	Dry sieving	0	1 of 1
26	2	hand		0	1 of 2
27	2	hand		0	2 of 2

8.4 KNK2629 2005 Soil samples

Sample						
Sample no	Unit	Grid	Type	Volume	Count	Notes
1	8	Trench 4	Bulk	5	0	1 bag
2	11	Trench	Bulk	5	0	1 bag

Sample						
Sample no	Unit	Grid	Type	Volume	Count	Notes
		4				
3	6	Trench 4	Bulk	5	0	1 bag
4	13	Trench 4	Bulk	5	0	1 bag
5	13	Trench 4	Bulk	5	0	1 bag (beatle sample)
6	15	Trench 6	Bulk	5	0	1 bag
7	13	Trench 4		0	0	1 bone (C14 sample)
8	16	Trench 4	Bulk	2	0	Smaller sample of gravel.
9	17	Trench 4	Bulk	10	0	1 bag
10	17	Trench 4	Bulk	5	0	1 bag
10	17	Trench 4	Bulk	5	0	1 bag
11	15	Trench 6	Bulk	5	0	1 bag
11	15	Trench 6	Bulk	5	0	1 bag
12	21	Trench 6	Bulk	5	0	1 bag
13	18	Trench 1	Bulk	5	0	1 bag
14	20	Trench 3	Bulk	5	0	1 bag
15	22	Trench 3	Bulk	5	0	1 bag
16	24	Trench 6	Bulk	5	0	1 bag
17	23	Trench 3	Bulk	5	0	1 bag
18	25	Trench 3	Bulk	5	0	1 bag
19	25	Trench 3	Bulk	5	0	1 bag
20	24	Trench 6	Bulk	5	0	1 bag
21		Trench 4		0	0	Stirling samples. Kubiena tin.
22	0	Trench 4		0	0	Stirling samples
23	0	Trench		0	0	Stirling samples

Sample						
Sample no	Unit	Grid	Type	Volume	Count	Notes
		4				
24	0	Trench 4		0	0	Stirling samples
25	0	Trench 4	Bulk	0	0	Stirling samples. 0.05
26	0	Trench 4	Bulk	0	0	Stirling samples 0.05
27	0	Trench 1		0	0	Stirling samples. Kubiena tin.
28	0	Trench 1		0	0	Stirling samples. Kubiena tin.
29	0	Trench 1		0	0	Stirling samples. Kubiena tin.
30	0	Trench 1	Bulk	0	0	Stirling samples. 0.05
31	0	Trench 1		0	0	Stirling samples. Kubiena tin.
32	0	Trench 1	Bulk	0	0	Stirling samples. 0.05
33	0	Trench 1	Bulk	0	0	Stirling samples. 0.05
34	0	Trench 6		0	0	Stirling samples. Kubiena tin.
35	0	Trench 6		0	0	Stirling samples. Kubiena tin.
36	0	Trench 6		0	0	Stirling samples. Kubiena tin.
37	0	Trench 6		0	0	Stirling samples. Kubiena tin.
41	24	Trench 6	Bulk	5	0	1 bag
42	0	Trench 4		0	0	Multiple subsamples through section for min mag.
43	17	Trench 4		0	0	Plan 9. 0.01 l. 1 bag.

8.5 KNK2629 2005. Zooarchaeological samples

Bones						
Sample no	Unit	Grid	BoneType	Volume	Count	Notes
1	2		hand	0	1 of 8	
2	2		hand	0	2 of 8	
3	2		hand	0	3 of 8	
4	2		hand	0	4 of 8	

Bones						
Sample no	Unit	Grid	BoneType	Volume	Count	Notes
5	2		hand	0	5 of 8	
6	5		hand	0	1 of 3	
7	5		hand	0	2 of 3	
8	5		hand	0	3 of 3	
9	6		Sieve	0	1 of 4	
10	6		Sieve	0	2 of 4	
11	6		Sieve	0	3 of 4	
12	7		hand	0	1 of 1	
13	8		Sieve	0	1 of 3	
14	8		Sieve	0	2 of 3	
15	8		Sieve	0	3 of 2	
16	9		hand	0	1 of 1	
17	11		Sieve	0	1 of 2	
18	11		Sieve	0	2 of 2	Jawbone
19	13		Sieve	0	1 of 4	
20	2		hand	0	6 of 8	
21	6		Sieve	0	4 of 4	
22	13		Sieve	0	2 of 4	
23	13		Sieve	0	3 of 4	
24	14		hand	0	1 of 2	
25	15		Sieve	0	1 of 4	
26	2		Sieve	0	7 of 8	
27	13		Sieve	0	4 of 4	
28	14		Sieve	0	2 of 2	
29	15		Sieve	0	2 of 4	
30	15		Sieve	0	3 of 4	
31	16		Sieve	0	1 of 1	
32	17		Sieve	0	1 of 1	
33	2		hand	0	8 of 8	
34	15		Sieve	0	4 of 4	
35	18		Sieve	0	1 of 2	
36	20		Sieve	0	1 of 1	
37	21		Sieve	0	1 of 2	
38	22		Sieve	0	1 of 1	
39	13		Sieve	0	5 of 5	
40	18		Sieve	0	2 of 2	

Bones						
Sample no	Unit	Grid	BoneType	Volume	Count	Notes
41	21		Sieve	0	2 of 2	
42	22		Sieve	0	2 of 2	
43	23		Sieve	0	1 of 1	
44	24		Sieve	0	1 of 2	
45	24		Sieve	0	2 of 2	
46	26		Sieve	0	1 of 2	
47	26		Sieve	0	2 of 2	
48	27		Sieve	0	1 of 1	
49	30		Sieve	0	1 of 1	

8.6 KNK2629 2006. Finds

Number	Unit	Type	Material	Quantity	Date	ID	Notes
1	0	Whetstone	Stone	1	10.6.2006	RED	
2	0	Dress Pin	Bone	1	10.6.2006	RED	
3	0		Steatite	2	10.6.2006	RED	
4	0		Steatite	4	10.6.2006	RED	
5	0	Vessel	Steatite	1	10.6.2006	RED	Decorated
6	0	Nail	Iron	1	10.6.2006	RED	
7	0		Steatite	1	10.6.2006	RED	
8	0		Steatite	1	10.6.2006	RED	
9	45		Steatite	1	10.6.2006	RED	
10	45	Spindle Whorl	Steatite	1	10.6.2006	RED	Incised. Two pieces
11	45		Stone	1	10.6.2006	RED	
12	45		Steatite	1	10.6.2006	RED	
13	0		Stone	1	10.6.2006	RED	
14	0		Steatite	1	10.6.2006	RED	
15	47		Steatite	1	10.6.2006	RED	
16	0		Steatite	3	10.6.2006	RED	
17	44		Steatite	1	10.6.2006	RED	
18	44		Flint	2	10.6.2006	RED	
19	0		Steatite	1	10.6.2006	RED	
20	45		Iron	2	10.6.2006	RED	
21	45		Steatite	5	10.6.2006	RED	
22	0		Stone	2	10.6.2006	RED	
23	46		Bone	1	10.6.2006	RED	
24	44	Dress Pin	Bone	1	10.6.2006	RED	

Number	Unit	Type	Material	Quantity	Date	ID	Notes
25	0		Steatite	1	10.6.2006	RED	
26	45	Spindle Whorl	Steatite	1	10.6.2006	RED	
27	45		Flint	1	10.6.2006	RED	
28	45		Steatite	5	10.6.2006	RED	
29	45		Steatite	3	10.6.2006	RED	
30	50		Steatite	1	10.6.2006	RED	
31	56		Steatite	1	10.6.2006	RED	
32	56		Steatite	5	10.6.2006	RED	
33	53	Vessel	Steatite	1	14.6.2006	RED	
34	54		Bone	1	14.6.2006	RED	
35	53		Bone	1	14.6.2006	RED	
36	0		Steatite	1	14.6.2006	RED	
37	53	Slag	Iron	1	14.6.2006	RED	
38	54		Steatite	1	14.6.2006	RED	
39	54		Steatite	1	14.6.2006	RED	
40	45		Steatite	2	14.6.2006	RED	
41	53		Bone	1	14.6.2006	RED	
42	60		Steatite	1	14.6.2006	RED	
43	59	Slag	Iron	1	14.6.2006	RED	
44	54		Steatite	1	14.6.2006	RED	
45	54		Steatite	1	14.6.2006	RED	
46	54		Steatite	2	14.6.2006	RED	
47	59		Steatite	1	14.6.2006	RED	
48	61		Steatite	1	14.6.2006	RED	
49	61		Steatite	1	14.6.2006	RED	
50	59		Steatite	3	14.6.2006	RED	
51	61		Steatite	7	14.6.2006	RED	
52	46		Steatite	1	14.6.2006	RED	
53	58		Bone	1	14.6.2006	RED	
54	61		Bone	1	14.6.2006	RED	
55	55		Bone	1	14.6.2006	RED	
56	56		Steatite	1	14.6.2006	RED	
57	63		Steatite	1	26.6.2006	RED	
58	63		Bone	1	26.6.2006	RED	
59	60		Steatite	1	26.6.2006	RED	
60	54		Steatite	1	26.6.2006	RED	
61	63		Steatite	1	26.6.2006	RED	

Number	Unit	Type	Material	Quantity	Date	ID	Notes
62	63		Steatite	1	26.6.2006	RED	
63	63		Wood	1	26.6.2006	RED	Decoration.
64	63		Steatite	1	26.6.2006	RED	
65	68		Steatite	1	26.6.2006	RED	
66	54		Steatite	1	26.6.2006	RED	
67	68		Steatite	1	26.6.2006	RED	
68	68	Vessel	Steatite	1	26.6.2006	RED	Rimsherd. Decorated
69	69		Steatite	1	26.6.2006	RED	
70	63		Steatite	1	26.6.2006	RED	
71	70		Steatite	1	26.6.2006	RED	
72	63		Bone	1	26.6.2006	RED	whalebone
73	54		Steatite	1	26.6.2006	RED	
74	68		Amber	1	26.6.2006	RED	
75	68		Amber	1	26.6.2006	RED	
76	61		Stone	1	26.6.2006	RED	
77	67		Steatite	1	26.6.2006	RED	Incised
78	63		Steatite	1	26.6.2006	RED	
79	68		Steatite	1	26.6.2006	RED	
80	70	Slag	Iron	1	26.6.2006	RED	
81	63		Bone	1	26.6.2006	RED	whalebone
82	54		Steatite	1	26.6.2006	RED	
83	68		Steatite	1	26.6.2006	RED	
84	68	Nail	Iron	1	26.6.2006	RED	
85	80		Steatite	1	26.6.2006	RED	
86	68		Steatite	1	26.6.2006	RED	
87	50		Bone	1	26.6.2006	RED	
88	67		Steatite	1	26.6.2006	RED	
89	68		Flint	1	26.6.2006	RED	
90	68		Steatite	3	26.6.2006	RED	
91	68	Nail	Iron	1	26.6.2006	RED	
92	68		Steatite	1	26.6.2006	RED	
93	78		Steatite	3	26.6.2006	RED	
94	60	Nail	Metal	1	26.6.2006	RED	Iron head/copper
95	81	Counting stick	Wood	1	26.6.2006	RED	Tællepind
96	81		Bone	1	26.6.2006	RED	Carved. Decorated piece.
97	81		Steatite	2	27.6.2006	RED	

Number	Unit	Type	Material	Quantity	Date	ID	Notes
98	81	Gaming Piece	Bone	1	27.6.2006	RED	
99	81		Flint	1	27.6.2006	RED	
100	82		Steatite	1	27.6.2006	RED	
101	83		Horn	1	27.6.2006	RED	
102	81	Whetstone	Stone	1	27.6.2006	RED	
103	81		Flint	1	27.6.2006	RED	
104	81		Steatite	1	27.6.2006	RED	
105	83		Wood	1	27.6.2006	RED	
106	83		Wood	1	27.6.2006	RED	Square with a hole in it.
107	81		Steatite	1	27.6.2006	RED	
108	68	Spoon	Bone	1	28.6.2006	RED	
109	63		Bone	1	28.6.2006	RED	
110	81		Bone	1	28.6.2006	RED	
111	81		Steatite	1	28.6.2006	RED	
112	63		Bone	1	28.6.2006	RED	
113	0	Loomweight	Steatite	1	28.6.2006	RED	
114	0		Stone	1	28.6.2006	RED	Large stone, incised.
115	53	Vessel	Steatite	1	10.6.2006	RED	
116	53		Bone	1	10.6.2006	RED	
117	0		Stone	1	10.6.2006	RED	
118	53	Slag	Iron	1	10.6.2006	RED	
119	54		Steatite	1	10.6.2006	RED	
120	54		Steatite	1	10.6.2006	RED	
121	45		Steatite	2	10.6.2006	RED	
122	53		Bone	1	10.6.2006	RED	
123	54		Bone	1	10.6.2006	RED	

8.7 KNK2629 2006 Archaeological Units

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
O29a	KNK2629	44	Deposit	0	NE	Midden containing ash and turf.	Mixed Silts	Dump	31.5.2006
O29a	KNK2629	45	Deposit	0	SW	Top of midden. Possibly same as 47.	Mixed Silts	Dump	3.6.2006
O29a	KNK2629	46	Deposit	0	NE	Possible stone collapse, under	Stones	Collapse	3.6.2006

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
						44.			
O29a	KNK2629	47	Deposit	0	SW	Midden possibly same as 45.	Mixed Silts	Dump	3.6.2006
O29a	KNK2629	48	Deposit	0	NE	Dark brown/grey silty charcoal dump below [44]. Above [50].	Mixed Silts	Dump	3.6.2006
O29a	KNK2629	49	Deposit	0	SW	Light brown gravely deposit. Possible remains of a stone lining. Under [45].	Mixed Silts	Dump	5.6.2006
O29a	KNK2629	50	Deposit	0	NE	Dark brown/red/grey. Charcoal rich deposit below [48], above [53].	Mixed Silts	Dump	5.6.2006
O29a	KNK2629	51	Deposit	0		Dark grey compact deposit. Below [045].	Mixed Silts	Dump	5.6.2006
O29a	KNK2629	52	Deposit	0	NE	Black and orange charcoal rich dump. Probably part of [050].	Mixed Silts	Dump	5.6.2006
O29a	KNK2629	53	Deposit	0	NE	Dark brown/grey silt with sparse charcoal flecking. Below [050].	Mixed Silts	Dump	7.6.2006
O29a	KNK2629	54	Deposit	0		Yellowish brown layer with charcoal. Silty	Mixed Silts	Dump	7.6.2006
O29a	KNK2629	55	Deposit	0	NE	Dark brown turfish midden. Below [45] and cleaning, above [58].	Mixed Silts	Dump	8.6.2006
O29a	KNK2629	56	Deposit	0		Grey brown with red brown with spots, silty	Mixed Silts	Dump	8.6.2006

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
						mixed deposit.			
O29a	KNK2629	57	Cut	0		Small modern trench.	Cut interface	Robber trench	9.6.2006
O29a	KNK2629	58	Deposit	0	NE	Dark grey deposit, charcoal and turf lenses. Below [55]	Mixed Silts	Dump	9.6.2006
O29a	KNK2629	59	Deposit	0	SE	Mid-brown/Grey slightly clay silt with orange mottlen and moderate charcoal flecking. Below [001]	Mixed Silts	Dump	12.6.2006
O29a	KNK2629	60	Deposit	0		Below [56]. Grey brown with some redish spots and mixed with turf material in places.	Turves/Ash	Undefined	12.6.2006
O29a	KNK2629	61	Deposit	0	NW	Below [58], above [63]. Dark grey compact gravel.	Mixed Silts	Dump	13.6.2006
O29a	KNK2629	62	Cut	0		Possibly a cut for a fencepost.	Cut interface	Posthole	13.6.2006
O29a	KNK2629	63	Deposit	0	NW	Dark brown midden dep., rich in charcoal, wood. Lenses of white turf. Under [061]	Mixed Silts	Dump	15.6.2006
O29a	KNK2629	64	Deposit	0		Below [060]. Brown, silty deposit with charcoal flecking and some pebbles.	Mixed Silts	Dump	16.6.2006
O29a	KNK2629	65	Deposit	0		Below [64]. Brown silty with red, grey and yellowish flecking.	Mixed Silts	Undefined	18.6.2006
O29a	KNK2629	66	Deposit	0	SE	Mixed silt. With	Mixed Silts	Dump	18.6.2006

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
						charcoal/turf, reddish and grey. Concentrated in south part.			
O29a	KNK2629	67	Deposit	0	SE	Dark brown slightly clay silt with moderate charcoal flecking and orange yellow mottles. Below [54]	Mixed Silts	Dump	18.6.2006
O29a	KNK2629	68	Deposit	0	SE	Dark brown/grey organic silt. Charcoal flecking and stones. Under [66, 67]	Mixed Silts	Dump	19.6.2006
O29a	KNK2629	69	Deposit	0		Dark brown, yellow silt (clayish). Possibly same as [0479	Mixed Silts	Undefined	19.6.2006
O29a	KNK2629	70	Deposit	0	NE	Dark brown silt, wood and charcoal. Patches of ash. Below [063].	Mixed Silts	Dump	20.6.2006
O29a	KNK2629	71	Deposit	0		Possible drain feature. Below [060], above [072].	Stones	Drain	19.6.2006
O29a	KNK2629	72	Deposit	0		Below [060]. Silty, red brown mixed with light grey turfish spots.	Mixed Silts	Undefined	22.6.2006
O29a	KNK2629	73	Deposit	0		Dark brown/grey slightly clay silt (organic). Sparse charcoal and white flecking. Possible lower part of [068].	Mixed Silts	Dump	23.6.2006
O29a	KNK2629	74	Deposit	0		Mixed deposit. Turf and charcoal. Dark	Mixed Silts	Collapse	23.6.2006

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
						brown. Collapse. Mixed infill from wall			
O29a	KNK2629	75	Deposit	0		Brown/silt mixed with gravel and stones.	Mixed Silts	Undefined	23.6.2006
O29a	KNK2629	76	Deposit	0		Red/brown silty material. Mixed with pebbles and stones.	Mixed Silts	Undefined	23.6.2006
O29a	KNK2629	77	Deposit	0		Gray silty deposit, mixed with gravel. Dark brown lenses. Possible part of wall lining.	Mixed Silts	Undefined	24.6.2006
O29a	KNK2629	78	Deposit	0		Dark gray silty deposit. Charcoal flecking. Below [071].	Mixed Silts	Undefined	24.6.2006
O29a	KNK2629	79	Deposit	0		Dark brown to grey.	Mixed Silts	Undefined	24.6.2006
O29a	KNK2629	80	Deposit	0		Silty dark brown with turf and pebbles.	Mixed Silts	Undefined	24.6.2006
O29a	KNK2629	81	Deposit	0	SE	Black/gray deposit. Mixed with charcoal, turf, bones etc. Midden dump.	Mixed Silts	Dump	25.6.2006
O29a	KNK2629	82	Deposit	0		Mixed turfish layer. Possible infill or collapse. Below [078]	Mixed Silts	Undefined	25.6.2006
O29a	KNK2629	83	Deposit	0	NE	Black gray deposit, mixed. Probably same as 81.	Mixed Silts	Dump	25.6.2006
O29a	KNK2629	84	Deposit	0		Grey/white turf deposit along outer boundry wall.	Turf		28.6.2006
O29a	KNK2629	85	Deposit	0	SW	Wall of structure in southwest part	Turves/Stones	Wall	24.11.2006

Archaeological units									
FarmNo	SiteCode	No	NoType	GroupNo	Area	Description	Material	Contextual	Date
						of excavation (Not excavated).			
		86	Deposit	0	SW	Collapse from wall in southwest part of excavation, inner (Not excavated)	Mixed Silts	Collapse	24.11.2006
		87	Deposit	0	SW	Collapse from wall in southwest part of excavation, outer. (Not excavated)	Mixed Silts	Collapse	24.11.2006
		88	Deposit	0	SW	Stone wall extending from the north to south through the excavation. (Not excavated)	Stones	Wall	24.11.2006
		89	Deposit	0		Midden deposit that extends from [88] towards the east. (Not excavated).	Mixed Silts	Dump	24.11.2006
		90	Deposit	0		Collapse of stones in the northwest part of the excavation. (Not excavated)	Stones	Collapse	24.11.2006
		91	Deposit	0		Row of stones in the north part of the excavation, by Nørlunds trench. (Not excavated)	Stones	Wall	24.11.2006

8.8 KNK2629 2006. Wood samples

Wood							
WoodNo	No	Grid	WoodType	WoodMethod	ProcessType	Vol_est	Count
1	44		Sieve	Macro	Identification	0	1/1
2	45		Sieve	Macro	Identification	0	1/1

Wood							
WoodNo	No	Grid	WoodType	WoodMethod	ProcessType	Vol_est	Count
3	46		Sieve	Macro	Identification	0	1/1
4	47		Sieve	Macro	Identification	0	1/1
5	48		Sieve	Macro	Identification	0	1/1
6	50		Sieve	Macro	Identification	0	1/1
7	51		Sieve	Macro	Identification	0	1/1
8	53		Sieve	Macro	Identification	0	1/2
9	53		Sieve	Macro	Identification	0	2/2
10	55		Sieve	Macro	Identification	0	1/1
11	56		Sieve	Macro	Identification	0	1/1
12	58		Sieve	Macro	Identification	0	1/1
13	59		Sieve	Macro	Identification	0	1/1
14	61		Sieve	Macro	Identification	0	1/1
15	63		Sieve	Macro	Identification	0	1/1
16	65		Sieve	Macro	Identification	0	1/1
17	68		Sieve	Macro	Identification	0	1/1
18	69		Sieve	Macro	Identification	0	1/1
19	70		Sieve	Macro	Identification	0	1/1
20	79		Sieve	Macro	Identification	0	1/1
21	81		Sieve	Macro	Identification	0	1/3
22	81		Sieve	Macro	Identification	0	2/3
23	81		Sieve	Macro	Identification	0	3/3
24	82		Sieve	Macro	Identification	0	1/1
25	83		Sieve	Macro	Identification	0	1/1
26	0		Sieve	Macro	Identification	0	1/1

8.9 KNK2629 2006. Soil Samples

Sample							
SampleNo	No	Grid	SampleType	SampleMethod	ProcessType	Vol_est	Count
1	44		Block	Macro	Wet sieving	5	1
2	45		Block	Macro	Wet sieving	5	1
3	48		Block	Macro	Wet sieving	5	1
4	51		Block	Macro	Wet sieving	5	1
5	53		Block	Macro	Wet sieving	5	1
6	67		Block	Macro	Wet sieving	5	1
7	54		Block	Macro	Wet sieving	5	1
8	68		Block	Macro	Wet sieving	5	1

Sample							
SampleNo	No	Grid	SampleType	SampleMethod	ProcessType	Vol_est	Count
9	68		Block	Macro	Wet sieving	5	1
10	69		Block	Macro	Wet sieving	5	1
11	63		Block	Macro	Wet sieving	5	1
12	70		Block	Macro	Wet sieving	5	1
13	72		Block	Macro	Wet sieving	5	1
14	75		Block	Macro	Wet sieving	5	1
15	76		Block	Macro	Wet sieving	5	1
16	78		Block	Macro	Wet sieving	5	1
17	79		Block	Macro	Wet sieving	5	1
18	80		Block	Macro	Wet sieving	5	1
19	82		Block	Macro	Wet sieving	5	1
20	81		Block	Macro	Wet sieving	5	1
21	83		Block	Macro	Wet sieving	5	1

8.10 KNK2629 2006 Zooarchaeological Samples

Bones								
Sample no	Unit	Grid	Sample method	BoneMethod	ProcessType	Vol_est	Count	Notes
1	0		Sieve	Macro	Identification	5	1/5	Cleaning
2	0		Sieve	Macro	Identification	5	2/5	Cleaning
3	0		Sieve	Macro	Identification	5	3/5	Cleaning
4	0		Sieve	Macro	Identification	5	4/5	Cleaning
5	0		Sieve	Macro	Identification	5	5/5	Cleaning
6	44	NE quadrant	Sieve	Macro	Identification	5	1/1	
7	45	SW quadrant	Sieve	Macro	Identification	5	1/2	
8	45	SW quadrant	Sieve	Macro	Identification	5	2/2	
9	46	NE quadrant	Sieve	Macro	Identification	5	1/1	
10	47	SW quadrant	Sieve	Macro	Identification	5	1/1	
11	48	NE quadrant	Sieve	Macro	Identification	5	1/1	
12	50	NE quadrant	Sieve	Macro	Identification	5	1/1	
13	51	NE quadrant	Sieve	Macro	Identification	5	1/1	
14	53	NE	Sieve	Macro	Identification	5	1/3	

Bones								
Sample no	Unit	Grid	Sample method	BoneMethod	ProcessType	Vol_est	Count	Notes
		quadrant						
15	53	NE quadrant	Sieve	Macro	Identification	5	2/3	
16	53	NE quadrant	Sieve	Macro	Identification	5	3/3	
17	55	NW quadrant	Sieve	Macro	Identification	5	1/1	
18	58	NW quadrant	Sieve	Macro	Identification	5	1/1	
19	56		Sieve	Macro	Identification	5	1/1	
20	59	SE quadrant	Sieve	Macro	Identification	5	1/1	
21	61	NW quadrant	Sieve	Macro	Identification	5	1/1	
22	54		Sieve	Macro	Identification	5	1/1	
23	60		Sieve	Macro	Identification	5	1/1	
24	63	NW quad	Sieve	Macro	Identification	5	1/1	
25	66	SE quad	Sieve	Macro	Identification	5	1/1	
26	67	SE quad	Sieve	Macro	Identification	5	1/1	
27	68	SE quad	Sieve	Macro	Identification	5	1/4	
28	68	SE quad	Sieve	Macro	Identification	5	2/4	
29	69		Sieve	Macro	Identification	5	1/1	
30	70	NW quad	Sieve	Macro	Identification	5	1/1	
31	72		Sieve	Macro	Identification	5	1/1	
32	73	SE quad	Sieve	Macro	Identification	5	1/1	
33	77	SW quad	Sieve	Macro	Identification	5	1/1	
34	68	SW/SE quad	Sieve	Macro	Identification	5	3/4	
35	68	SW/SE quads	Sieve	Macro	Identification	5	4/4	
36	79	SW/SE quads	Sieve	Macro	Identification	5	1/1	
37	82	SW/SE quads	Sieve	Macro	Identification	5	1/1	
38	83	NE quad	Sieve	Macro	Identification	5	1/1	
39	81	SW/SE quad	Sieve	Macro	Identification	5	1/8	
40	81	SW/SE quad	Sieve	Macro	Identification	5	2/8	
41	81	SW/SE quad	Sieve	Macro	Identification	5	3/8	

Bones								
Sample no	Unit	Grid	Sample method	BoneMethod	ProcessType	Vol_est	Count	Notes
42	81	SW/SE quad	Sieve	Macro	Identification	5	4/8	
43	81	SW/SE quad	Sieve	Macro	Identification	5	5/8	
44	81	SW/SE quad	Sieve	Macro	Identification	5	6/8	
45	81	SW/SE quad	Sieve	Macro	Identification	5	7/8	
46	81	SW/SE quad	Sieve	Macro	Identification	5	8/8	

9. Matrices

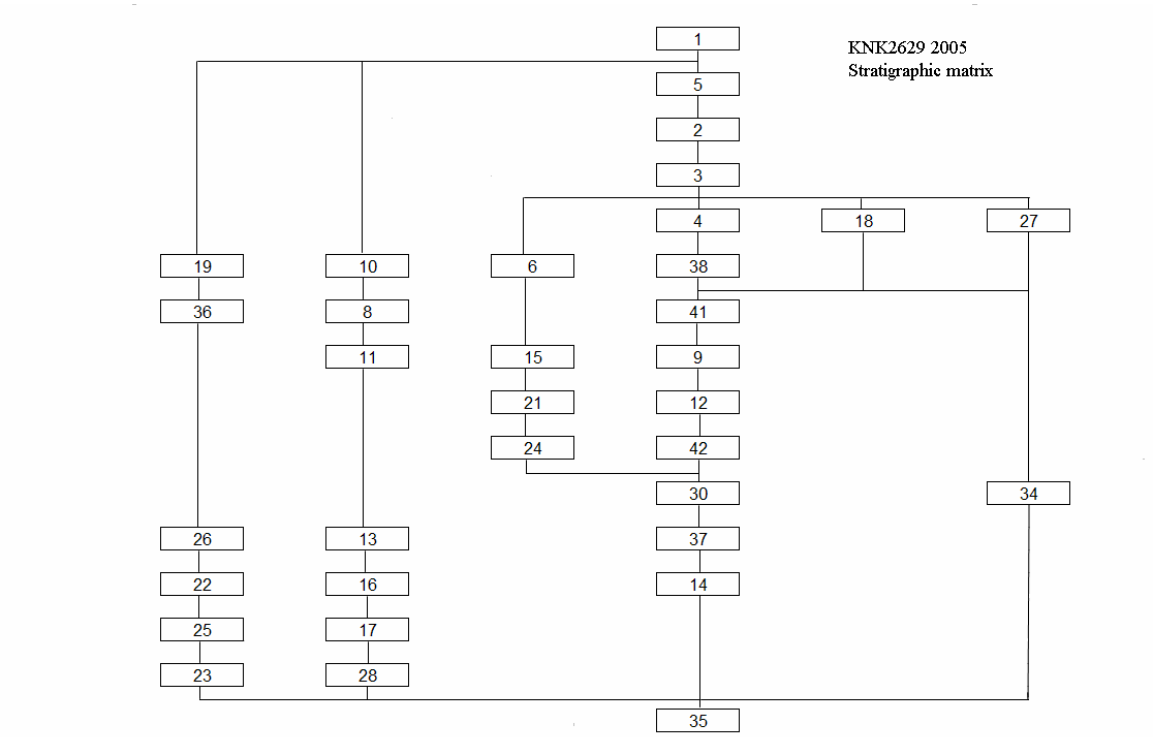


Fig. The stratigraphic matrix for the 2005 season.

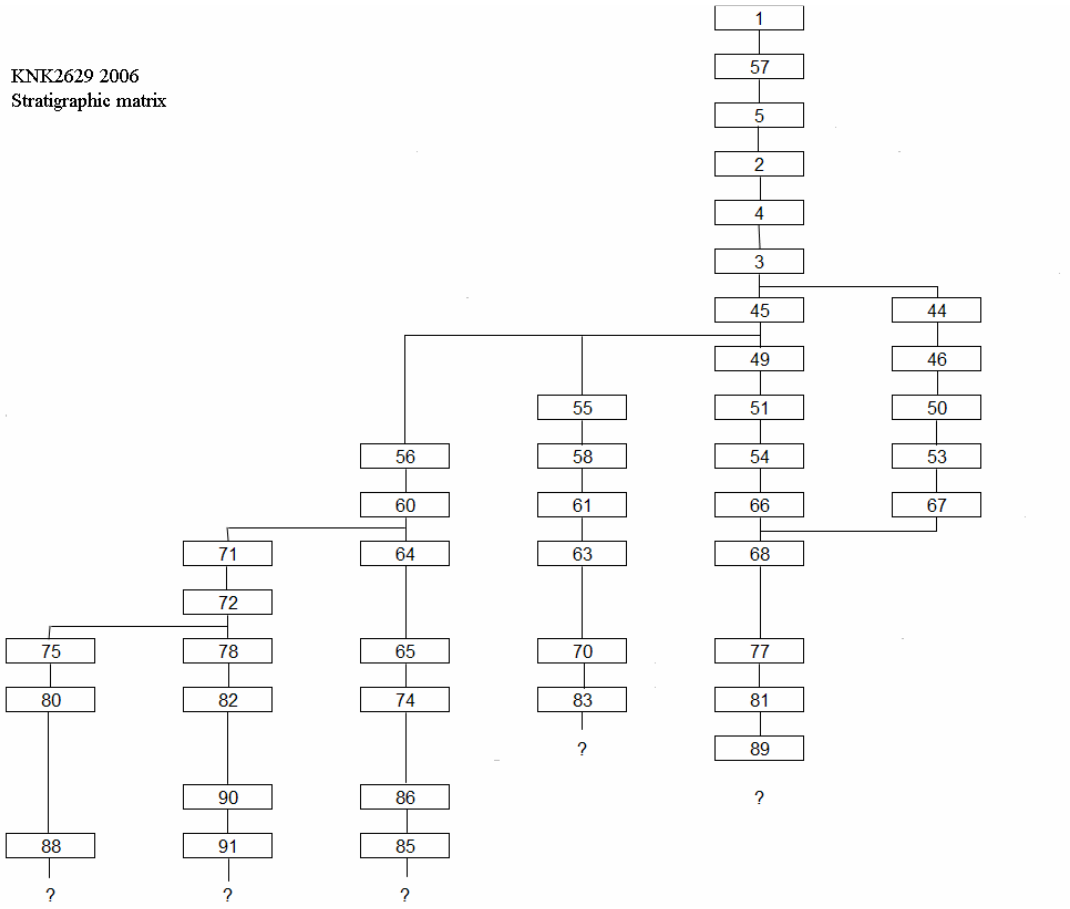
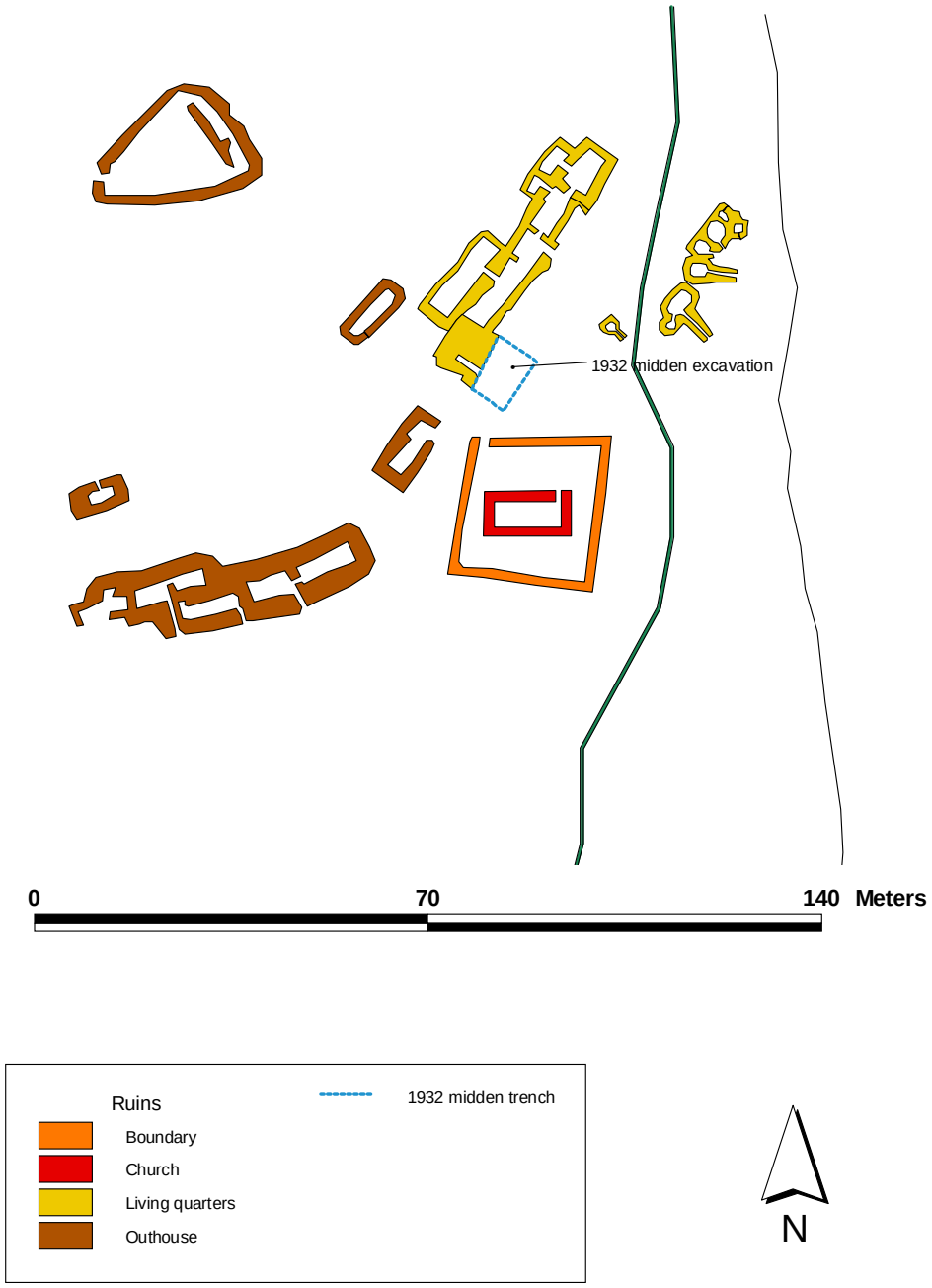
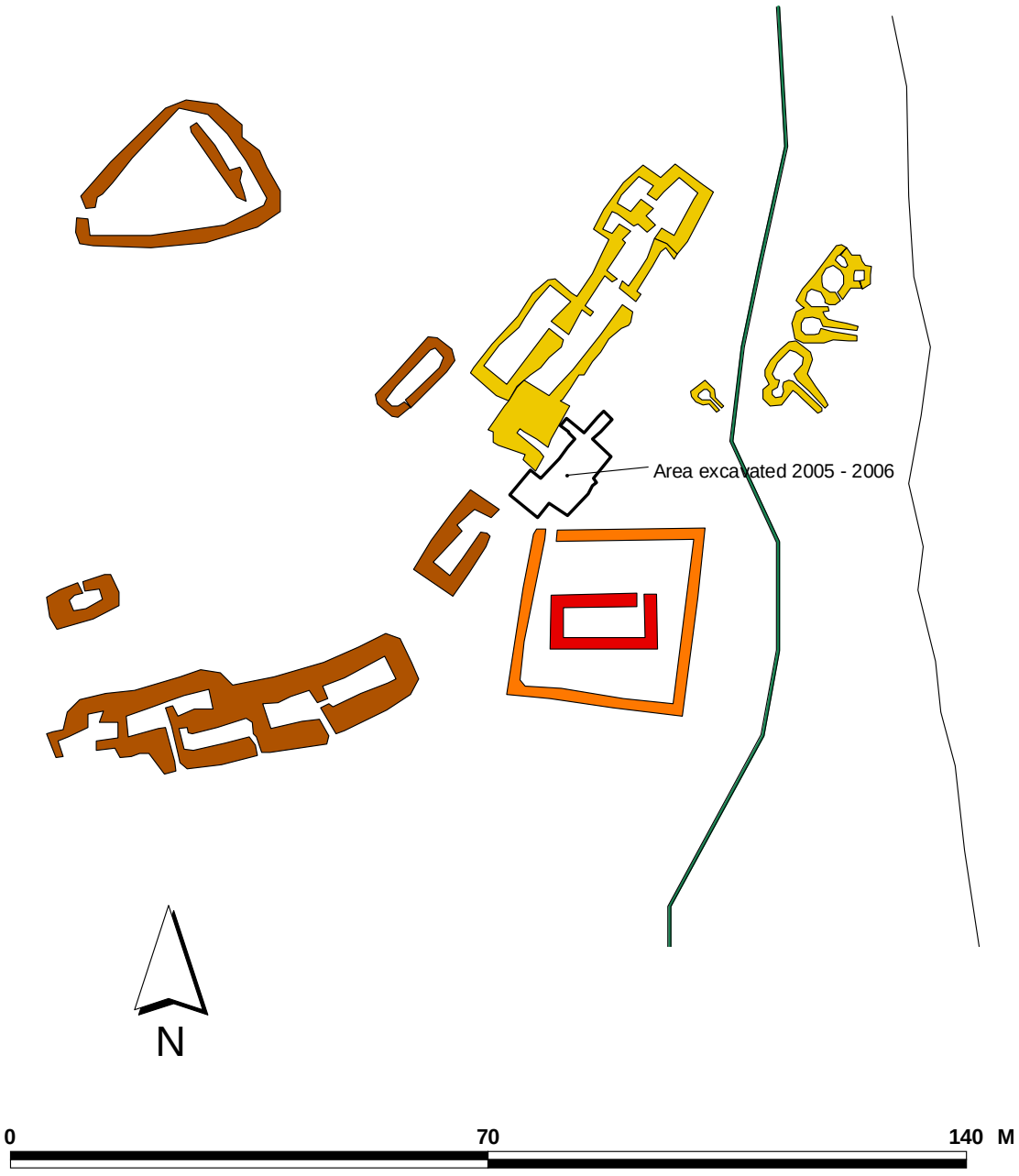


Fig. The stratigraphic matrix for the 2006 season. Note the question marks in the lower part of the matrix, which shows that the area was not excavated to the natural.

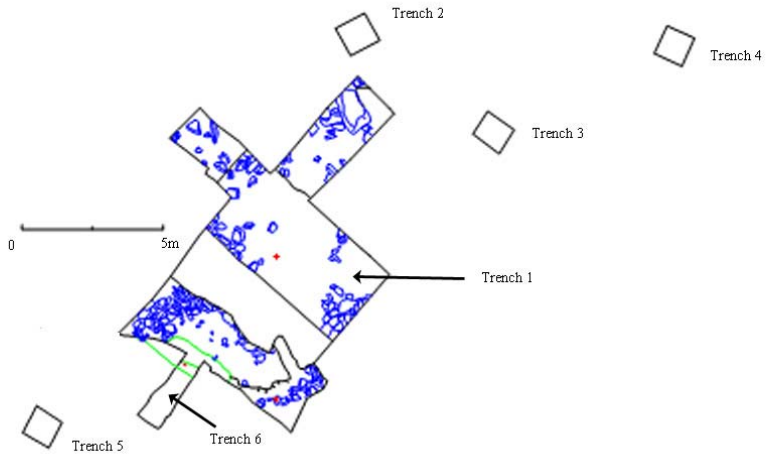
9. Plans and Sections



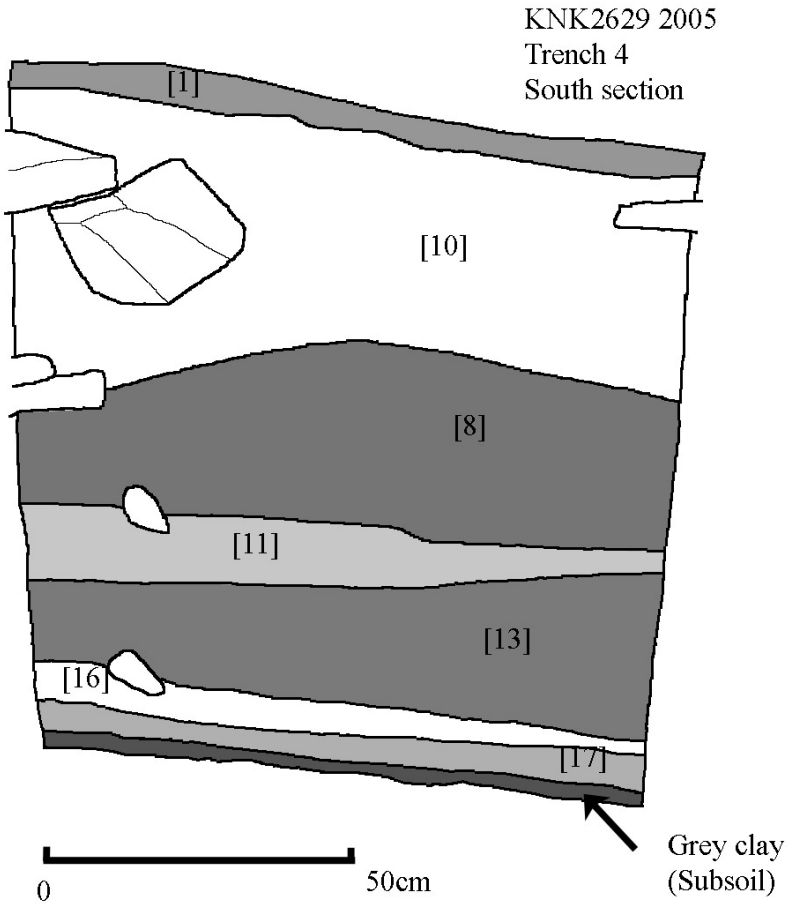
Plan 1. Overview of the KNK2629, showing the location of the 1932 midden excavation.



Plan 2. Qassiarsuk, the area excavated 2005 and 2006.

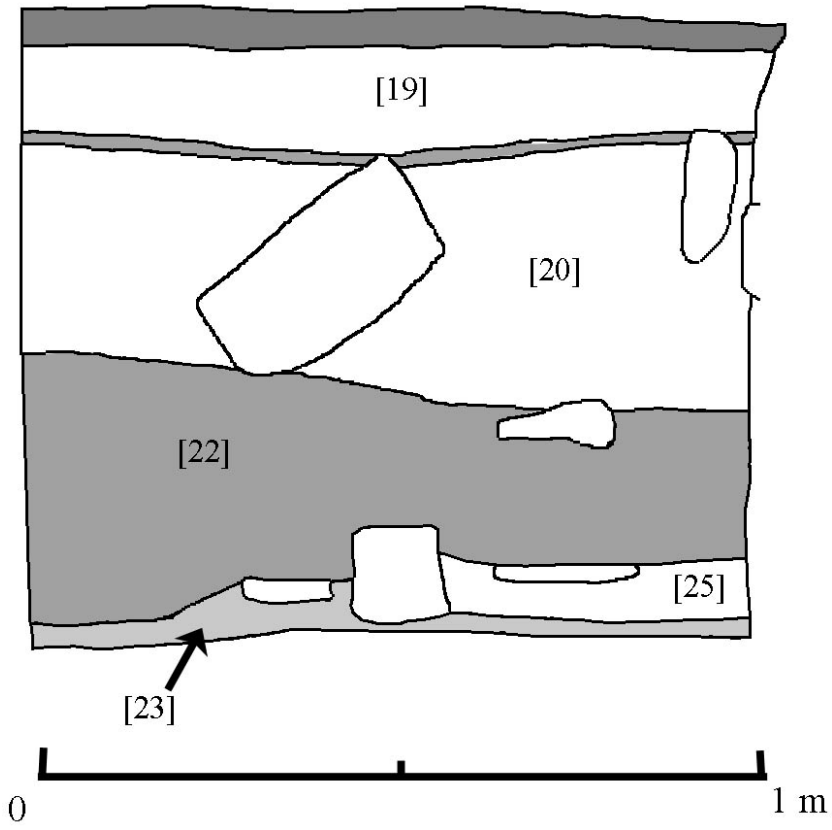


Plan 3. Overview of the excavated area in 2005. Showing the test trenches.



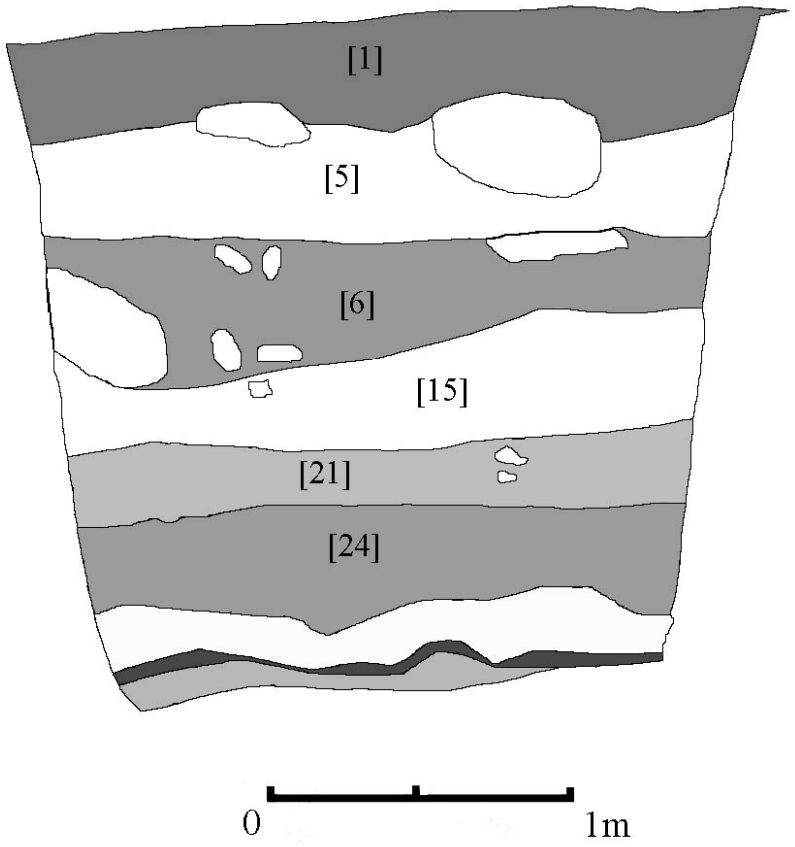
Sect. 1. South section in trench 4.

KNK 2629 2005
Trench 3
South section

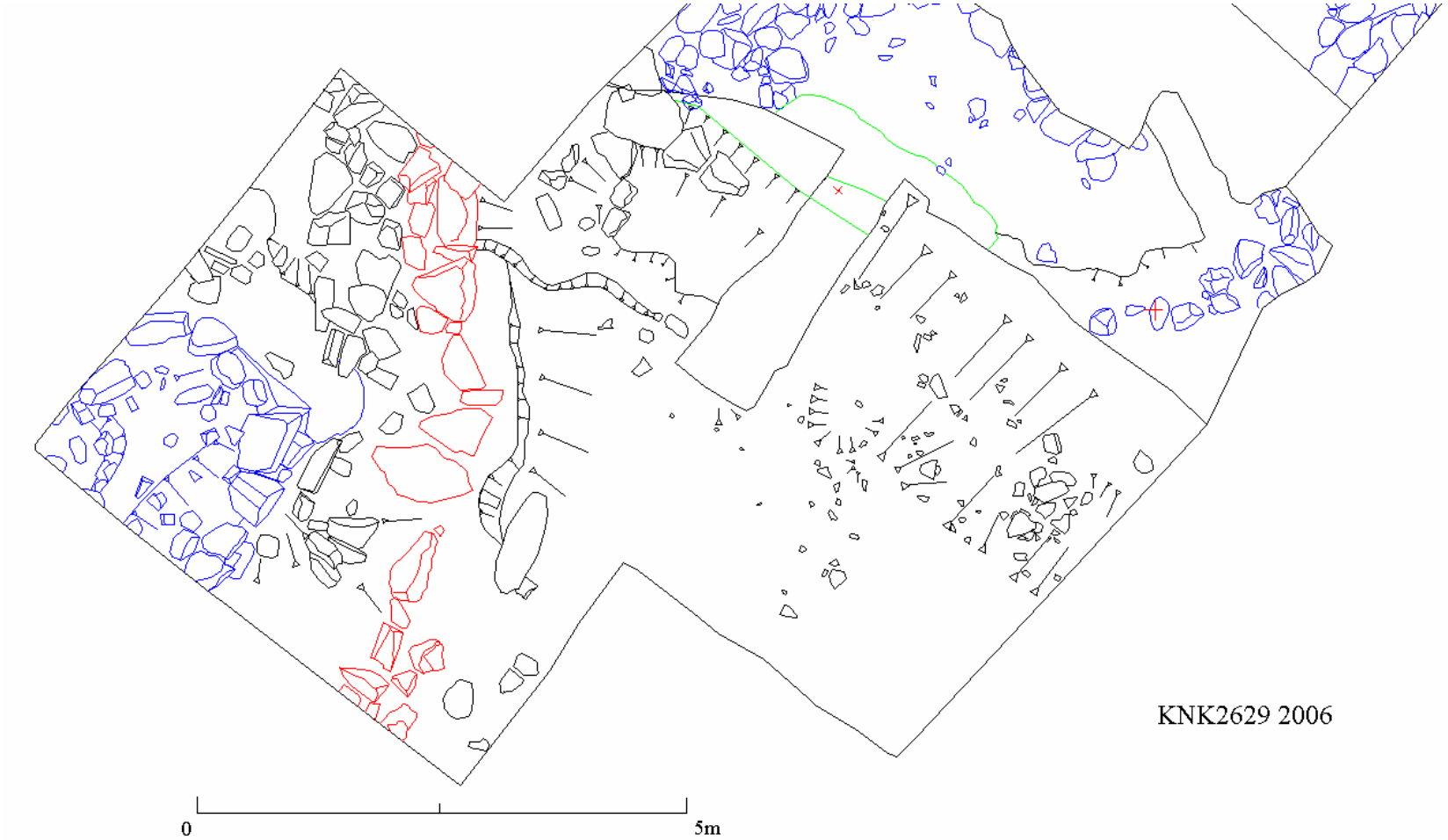


Section 2. South section in trench 3.

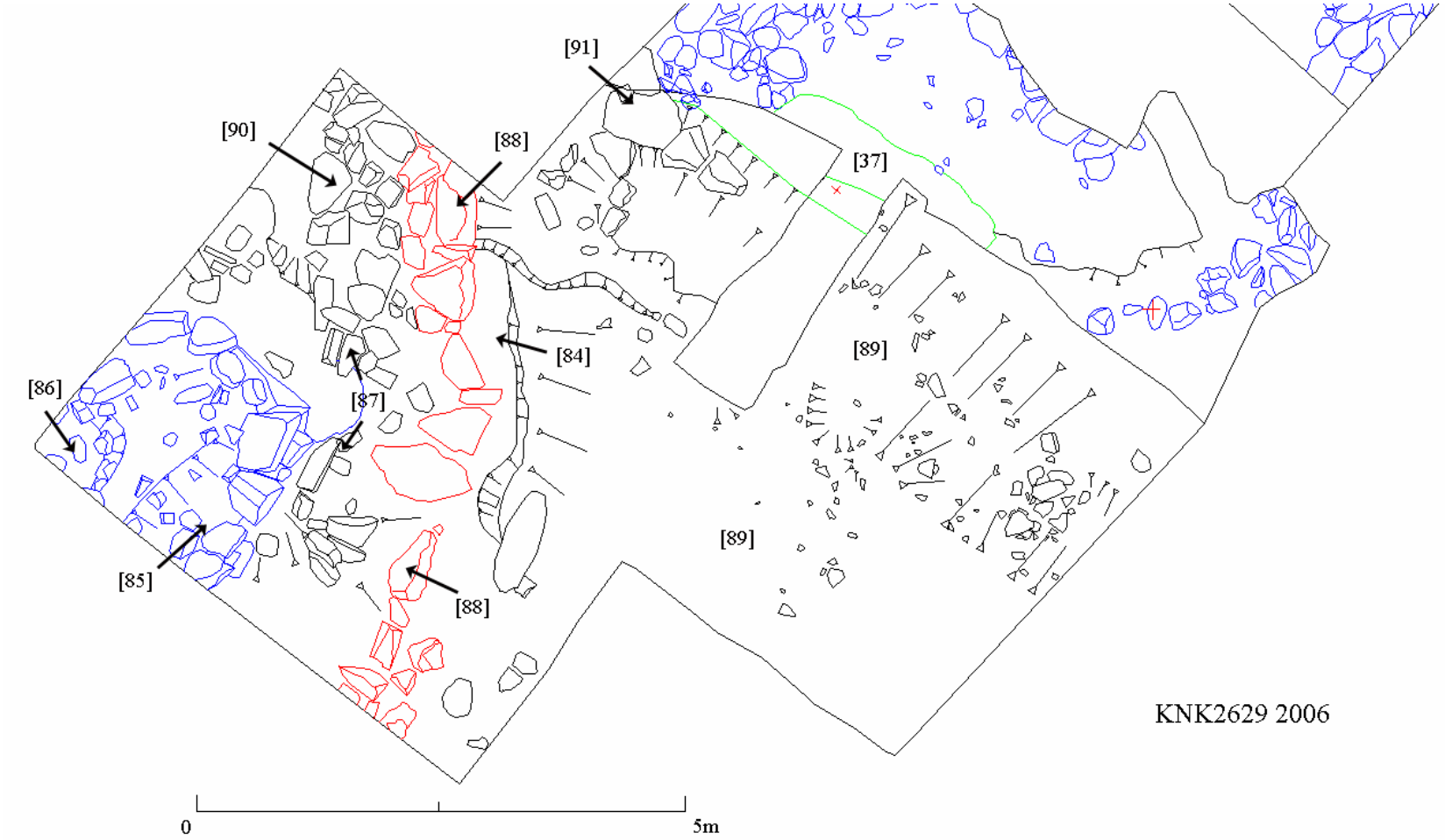
KNK 2629
Trench 6
South section



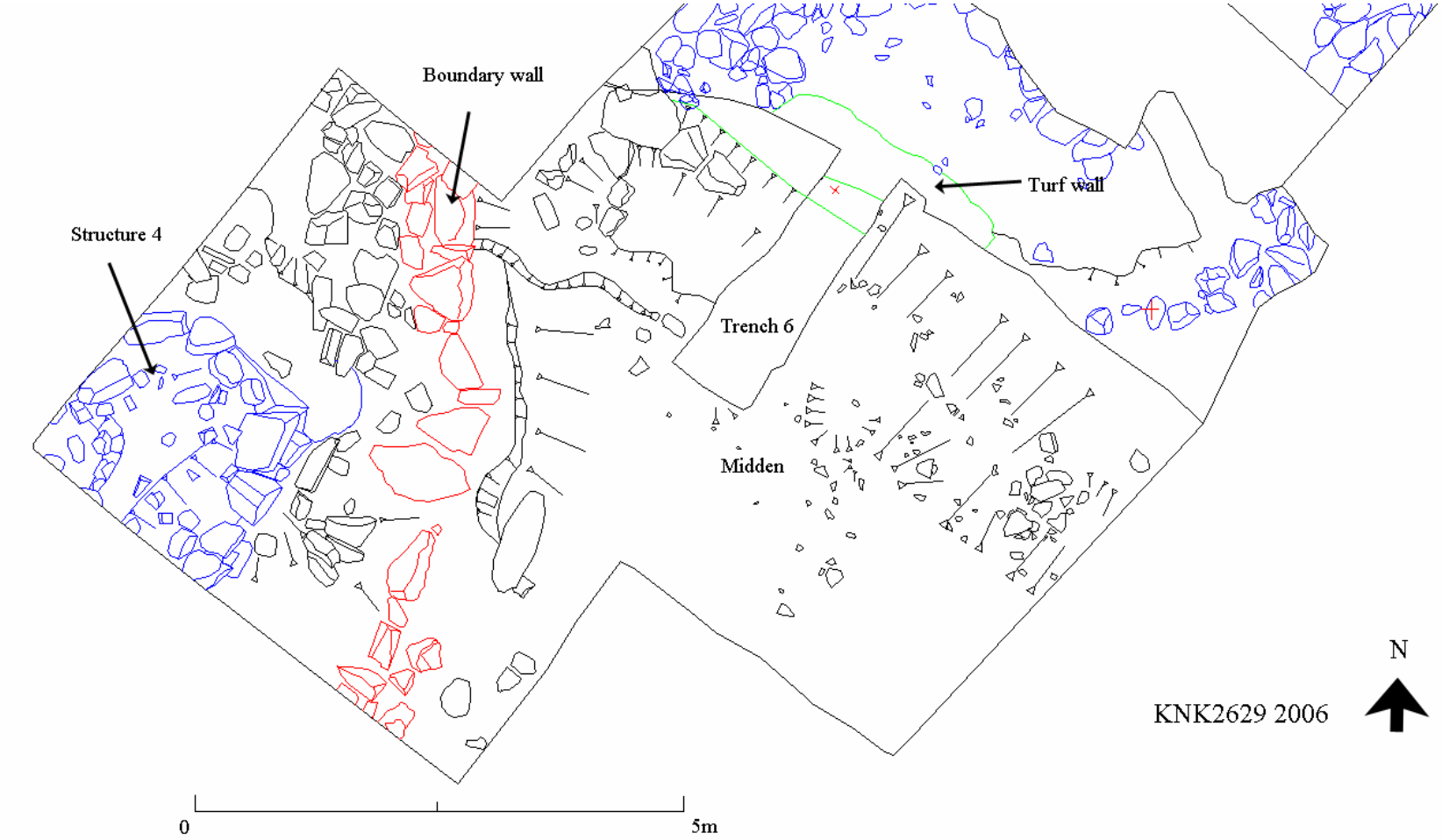
Section 3. South section in trench 6.



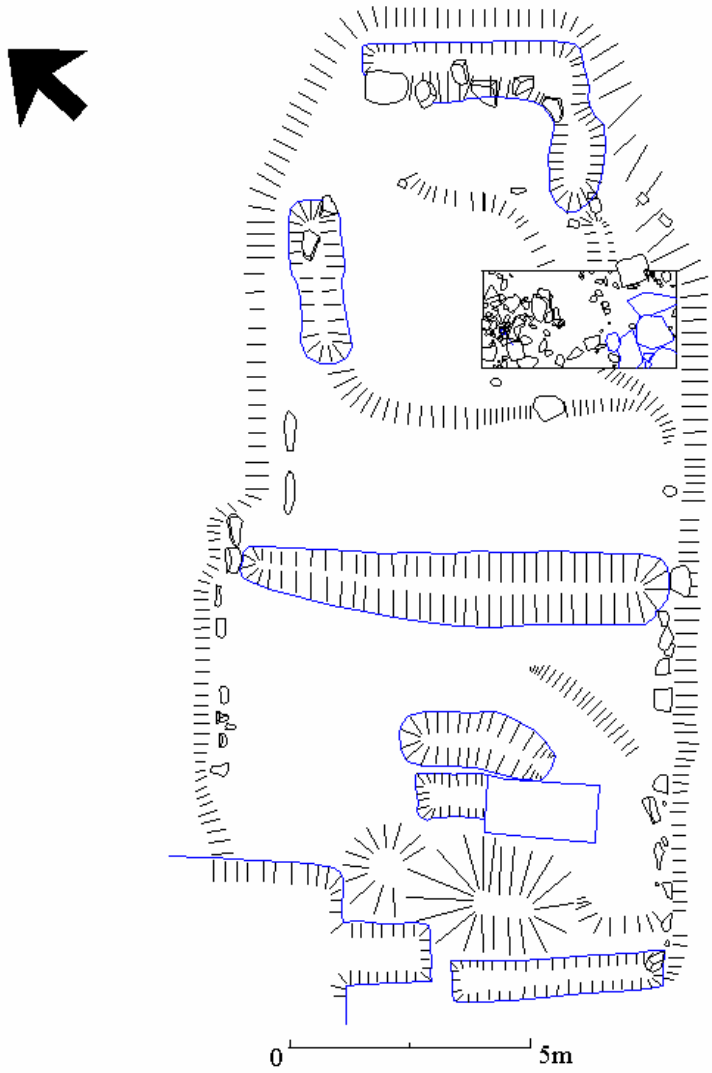
Plan 4. The excavation area in 2006 at the end of the season.



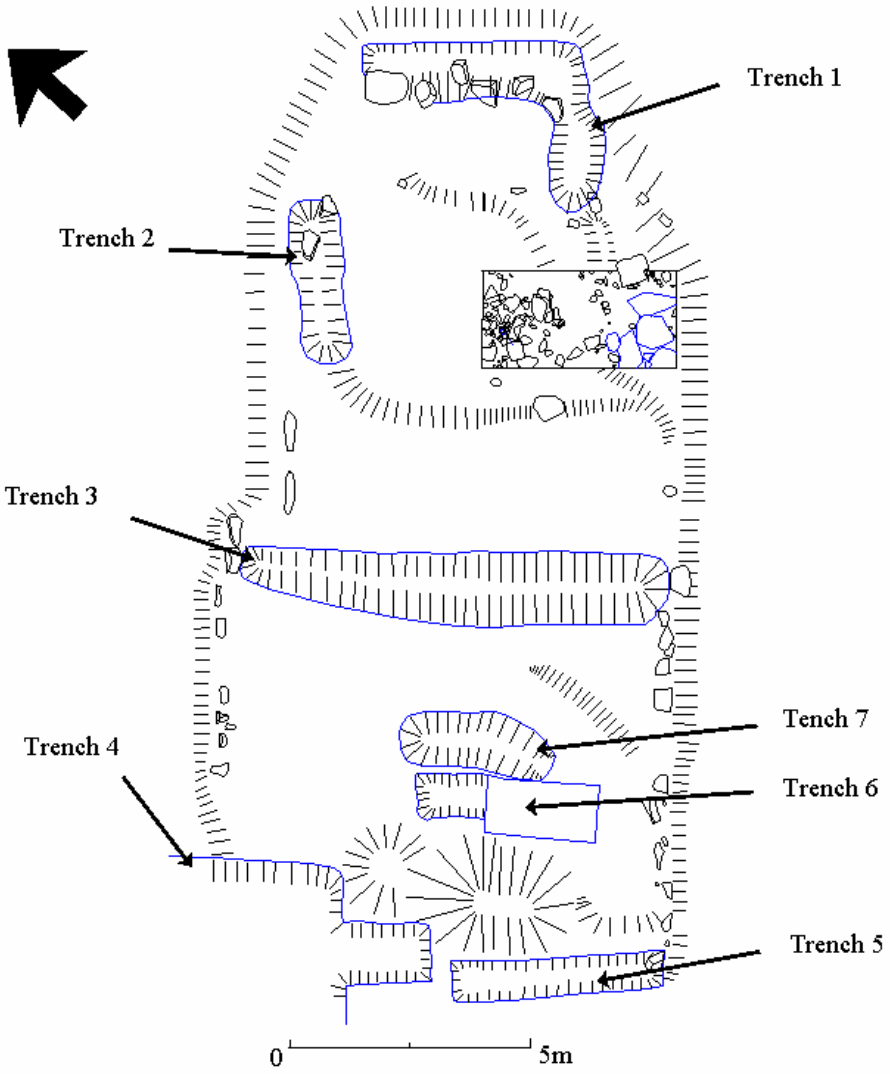
Plan 5. Location of non-excavated archaeological units at the end of excavation.



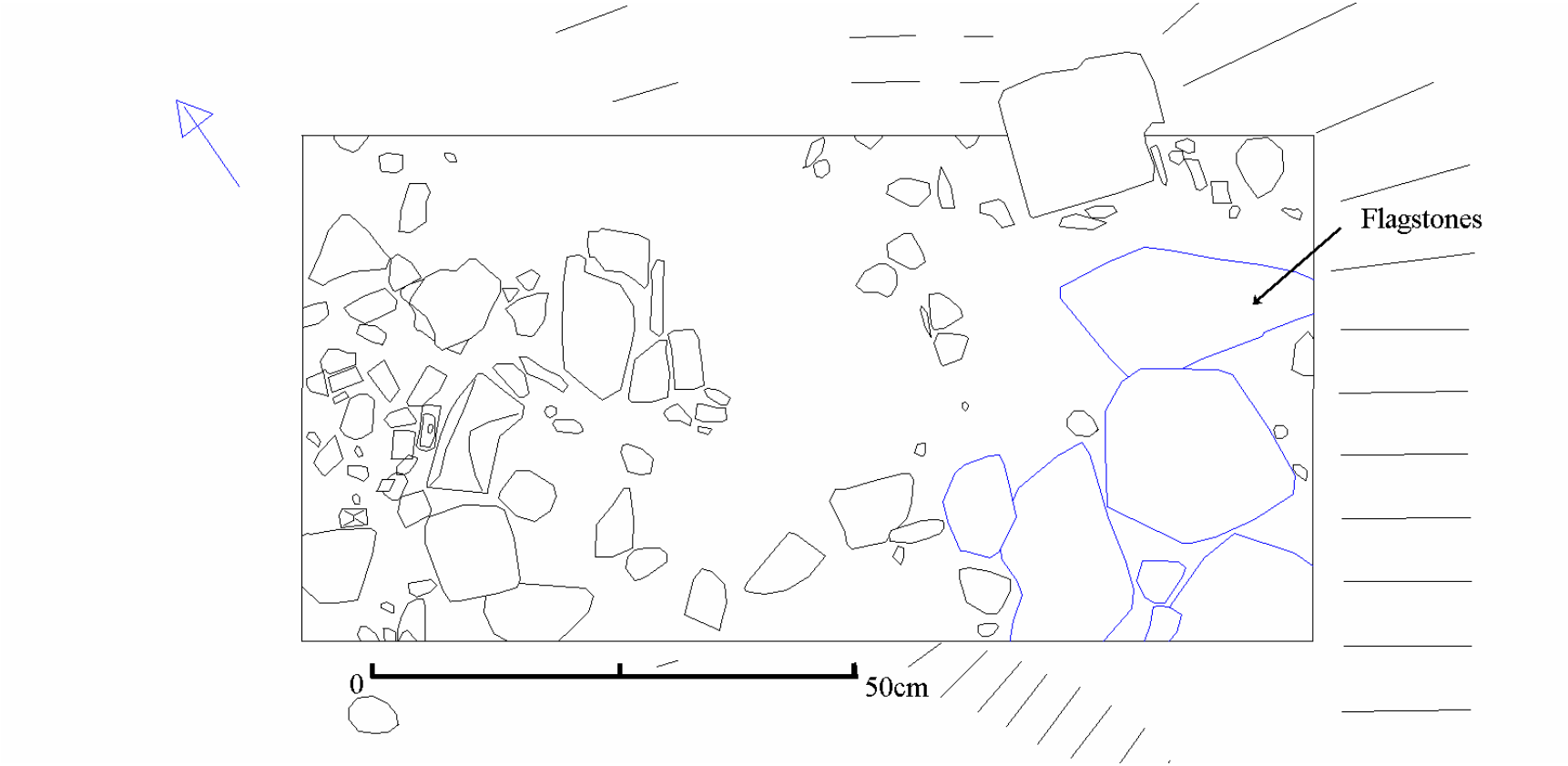
Plan 6. Main structures in the excavation area (not excavated).



Plan 7. The ruin number 38 at the site ø28b.



Plan 8. Ruin 38 at the site ø28b, showing earlier archaeological trenches.



Plan. The excavation trench dug in the northeastern part of ruin 38. No cultural layers were removed. Note the flagstones on the eastern side.

10. Photographs

Pic. 3. The midden under excavation.

Pic. 4. The midden and the s-edge of Nørlunds trench. Note the turf wall in the right corner of the picture.

Pic. 5. The excavation area at the end of the 2006 season.

Pic. 6. Boundry wall and gable end of an unknown structure.

Pic 7. Gable end of an unrecorded structure. It is possible that it is the gable end of structure 4 which is visible in the background.

Pic. 8. S end of Nørlunds trench.

Pic. 9. Fragment of a spindle whorle.

Pic. 10. Decorated vessel fragment.

Pic. 11. Head of a dress pin made of bone.

Pic. 12. Counting stick made of wood.

Pic. 13. Small pice of decoration made of bone.

Pic. 14. The trench excavated at o28b, ruin 38. Note the flagstones.

11. References

Adderley, W. P. and Simpson, I. A.

2006. Soils and palaeo-climate based evidence for irrigation requirements in Norse Greenland. *Journal of Archaeological Science* **33,** 1666-1679.

Adderley, W.P., Simpson, I.A. and Davidson, D.A.

2006 Historic landscape management: a validation of quantitative soil thin section analyses. Journal of Archaeological Science 33, 320-334.

Arneborg, Jette,

2000 "Greenland and Europe", *Vikings: the North Atlantic Saga*,W.W. Fitzhugh & E.I. Ward eds. Pp 281-284. Washington and London; Smithsonian Institution Press.

Arneborg Jette, Jan Heinemeier, Niels Lynnerup, Henrik L. Nielsen, Niels Rud and Arný E. Sveinbjörnsdóttir

1999 "Change of diet of the Greenland vikings determined from stable carbon isotope analysis and C14 dating of their bones". *Radiocarbon, 41*: 157-168.

Bruun,, D.

1895 Arkæologiske Undersøgelser I Julianehaabs Distrikt. Meddelelser om Grønland 16 (3).

Bullock, P., Fedoroff, N., Jongerius, A., Stoops, G., Tursina, T. and Babel, U.

1985 Handbook for Soil Thin Section Description. Waine Research, Wolverhampton

Canti, M. G.

1997 An investigation of microscopic calcareous spherulites from herbivore dungs. Journal of Archaeological Science 24, 219-231.

Church, M. J., Arge, S. V., Brewington, S., McGovern, T. H., Woollett, J., Perdikaris, S., Lawson, I. T., Cook, G. T., Amundsen, C., Harrison R., Krivogorskaya, K. and Dunbar, E.

2005 "Puffins, Pigs, Cod, and Barley: Palaeoeconomy at Undir Junkarinsfløtti, Sandoy, Faroe Islands". *Environmental Archaeology* 10, 179-197

Cossimmo, R.G., Nelson, D.E.

2007 Patterns of $\delta^{15}N$ values on a Greenland Norse farm. Journal of Archaeological Science 34, 440-450.

Dean, W. E.

1974 Determination of carbonate and organic matter in calcareous sediments and sedimentary rocks by loss on ignition: comparison with other methods. *Journal of Sedimentary Petrology* **44,** 242-248.

Dearing, J. A.

1999 Magnetic susceptibility, pp. 35–62 in Walden, J., *et al.* (eds.), *Environmental Magnetism: A Practical Guide, Technical Guide No. 6*. London: Quaternary Research Association.

Degerbøl, Magnus

1934, "Animal Bones from the Norse ruins at Brattahlið", *Meddelelser om Grønland* 88:149-155.

1941 "The Osseous material from Austmannadal and Tungmeralik", *Meddelelser om Grønland* 89:345-354.

Dugmore, Andrew, Christian Keller & Thomas H. McGovern

2007, "Reflections on climate change, trade, and the contrasting fates of human settlements in the North Atlantic islands", *Arctic Anthropology*, in press.

Edvardsson, Ragnar, McGovern, Thomas H., Batey, Colleen, Woollett, Jim,

2003 *Hrísheimar 2003,* Fornleifastofnun Íslands, FS223 – 0322, Reykjavík.

Edvardsson, Ragnar,

2004 *Fornleifarannsókn í Vatnsfirði við Ísafjarðardjúp 2004*, Fornleifastofnun Íslands, FS249-03093, Reykjavík.

Enghoff, I. B.

2003, "Hunting, fishing, and animal husbandry at the Farm Beneath the Sand, Western Greenland: an archaeozoological analysis of a Norse farm in the Western Settlement", *Meddelelser om Grønland Man & Society* 28. Copenhagen

Geological Survey of Greenland (1973).Geological map 61 V.3 Syd, Narssarsuaq. 1:100,000 Complied by J.H. Allaart, Geological Survey of Denmark and Greenland (GEUS), Copenhagen.

Gotfredsen, Anne Birgitte,

1997 "Sea bird exploitation on coastal Inuit sites, west and southwest Greenland", *International Journal of Osteoarchaeology* 7(4) 271-286.

Grumet, N., C. Wake, P. Mayewski, G. Zeilinski, S. Whitlow, R. Koerner, D. Fisher, and J. Woollett

2001, "Variability of Sea-Ice Extent in the Baffin Bay over the Last Millennium". *Climatic Change 49*: 129-145.

Guldager, O., Stummann-Hansen, S., Gleie, S.

2002 Medieval farmsteads in Greenland; The Brattahlið region 1999-2000. Danish Polar centre, Copenhagen.

Hather, J. G.

2000. *The identification of the Northern European Woods*. London: Archetype Publications.

Halldórsson, Ólafur.

1978 *Grænland í miðaldaritum*. Reykjavík: Sögufélag, 1978.

Heiri, O., Lotter, A. F. and Lemcke, G.

2001. Loss on ignition as a method for estimating organic and carbonate content in sediments: reproducibility and compatibility of results. *Journal of Palaeolimnology* **25,** 101-110.

Hodgson, J. M. ed.

1976 *Soil Survey Field Handbook*. London: Soil survey of England and Wales Technical Monograph 5.

Jennings Anne E & N. J. Weiner

1996, "Environmental change in eastern Greenland during the last 1300 years: evidence from foraminifera and lithofacies in Nansen Fjord 68N", *The Holocene* 6/2:179-191

Jennings, A. E., S. Hagen, J. Harðardóttir, R. Stein, A. E. J. Ogilvie, and I. Jónsdóttir.

2001. "Oceanographic Change and Terrestrial Human Impacts in a Post A.D. 1400 Sediment Record from the Southwest Iceland Shelf.," in *The Iceberg in the Mist: Northern Research in Pursuit of a "Little Ice Age"*. Edited by A. E. J. Ogilvie and T. Jónsson. London: Kluwer Academic Publishers.

Jones, M. K.

1991 Sampling in palaeoethnobotany, pp. 53-62 in Zeist, W.v., *et al.* (eds.), *Progress in Old World Palaeoethnobotany*. Rotterdam: A A Balkema.

Kaplan, S. and J. Woollett.

2000, "Challenges and Changes: Interplay of Climate and Culture in 18th Century Labrador. Arctic", *Antarctic and Alpine Research, 32(3)*: 351-359.

Krogh, Knud J.

1967 *Viking Greenland*. Copenhagen, 1967.

1982 *Erik den Rødes Grønland*. Nationalmuseet, Copenhagen.

Meldgaard, J.

1982 Tjodhildes Kirke; den forste fundberetning, Grønland 1982 151-162.

Mainland, Ingrid & Paul Halstead

2005, "The economics of sheep and goat husbandry in Norse Greenland", *Arctic Anthropology* 42 (1):103-120.

McGovern, T.H.

1985a, "The arctic frontier of Norse Greenland", in: S. Green & S. Perlman (eds.) *The Archaeology of Frontiers and Boundaries,* Academic Press, New York, pp. 275-323.

1985b, "Contributions to the Paleoeconomy of Norse Greenland", *Acta Archaeologica*, Vol 54 : 73-122.

1992a "Bones, Buildings, and Boundaries: Paleoeconomic approaches to Norse Greenland," in: C.D. Morris & James Rackham (ed.s), *Norse & later Settlement & Subsistence in the North Atlantic G*lasgow U. Press pp 157-186.

1992b, "Zooarchaeology of the Vatnahverfi", in: C.L.Vebaek, *Vatnahverfi ,Meddelelser om Grønland Man & Society,* 17:93-107.

2004. North Atlantic Biocultural Organization (NABO) 10 years on: Science, education, and community, pp. 254-259 in Housley, R. and Coles, G.M. (eds.), *Atlantic connections and adaptations: economies, environments and subsistence in lands bordering the North Atlantic*. Oxford: Oxbow Books.

McGovern, T.H. & R. H. Jordan

1982, "Settlement and land use in in the inner fjords of Godthaab District, West Greenland", *Arctic Anthropology* 19(1):63-80.

McGovern, T.H., G.F. Bigelow T. Amorosi, J. Woolett & S.Perdikaris

1993 "Animal bones from E17a Narsaq, in: C.L.Vebaek Narsaq- A Norse Landnama Farm", *Meddelelser om Grønland Man & Society,* 18

McGovern T.H., Amorosi T., Perdikaris S. & Woollett J.W.

1996, "Zooarchaeology of Sandnes V51: Economic Change at a Chieftain's Farm in West Greenland", *Arctic Anthropology* 33(2)94-122.

McGovern T.H., Sophia Perdikaris, Clayton Tinsley

2001, "Economy of Landnám: the Evidence of Zooarchaeology", in A. Wawn & Thorunn Sigurdardottir (eds) *Approaches to Vinland*, Sigurdur Nordal Inst. Studies 4 Reykjavik. 154-165.

McGovern, T. H., Vésteinsson, O., Friðriksson, A., Church, M. J., Lawson, I. T., Simpson, I. A., Einarsson, A., Dugmore, A. J., Cook, G. T., Perdikaris, S., Edwards, K. J., Thomson, A.M., Adderley W.P., Newton, A. J., Gavin Lucas, Ragnar Edvardsson, Aldred, O. & Dunbar Elaine.

2007. "Settlement, sustainability, and environmental catastrophe in Northern Iceland", *American Anthropologist* 109 (1) 27-51.

Mulville, Jacqui and J. Thoms

2005, "Animals and Ambiguity in the Iron Age of the Western Isles", in: Val Turner, R.A. Nicholson, S.J. Dockrill, and J.M.Bond (eds.), *Tall Stories? Two Millennia of Brochs*, Shetland Amenity Trust, Lerwick, pp 235-246.

Moore, P. D., Webb, J. A. and Collinson, M. E.

1991 *Pollen Analysis*. Oxford: Blackwell.

Nørlund, P., Stenberger, M.

1934 "Brattahlið". *Meddelelser om Grønland* 88 (1) 539-579.

Roesdahl, Else

2005 "Walrus Ivory- demand, supply, workshops, and Greenland", in: Andras Mortensen and Simun Arge (eds.) *Viking and Norse in the North Atlantic: Select Papers from the Proceedings of the 14th Viking Congress, Tórshavn 2001*. Annales Societatis Scientarium Faeroensis XLIV, Tóshavn Faroe Islands, pp 182-192.

Roussell, Aage

1941 "Farms and churches in the medieval Norse settlements in Greenland", *Meddelelser om Grønland* 89 (1):1-235.

Schweingruber, F. H.

1990 *Microscopic Wood Anatomy*. Geneva: Swiss Federal Institute for Forest, Snow and Landscape Research.

Simpson, I.A., Adderley, W.P., Guðmundsson, G., Hallsdóttir, M., Sigurgeirsson, M.Á., and Snæsdóttir, M.

2002 "Land management for surplus grain production in early Iceland". *Human Ecology 30,* 423-443.

Simpson, Ian A., Vésteinsson, Orri, Adderley, W. Paul and Thomas H. McGovern

2003 "Fuel resources in landscapes of settlement" *Journal of Archaeological Science* 30:1401-1420.

Simpson, Ian A., Guðmundsson, Garðar, Thomson, Amanda M., and Jon Cluett

2004 "Assessing the role of winter grazing in historic land degradation, Mývatnssveit, north-east Iceland". *Geoarchaeology 19*:471-503.

Simpson, I.A., Milek, K.B., Guðmundsson, G.

1999 A reinterpretation of the great pit at Hofstaðir, Iceland, using sediment thin section micromorphology. Geoarchaeology 14, 511530.

Simpson, I.A., Perdikaris, S., Cook, G., Campbell, J.L., Teesdale, W.J.

2000 Cultural sediment analyses and transitions in early fishing activity at Langenesværet, Vesterålen, northern Norway. Geoarchaeology 15, 743-763.

Simpson, I.A., Barrett, J.H., Milek, K.B.

2005. Interpreting the Viking age to Medieval period transition in Norse Orkney through cultural soil and sediment analyses. Geoarchaeology 20, 355-377.

Smith Helen and Jacqui Mulville

2004 "Resource Management in the Outer Hebrides", in: R.A. Housely and G. Coles, *Atlantic Connections and Adaptations; Economies, environments and subsistence in lands bordering the North Atlantic*, AEA/NABO 21, Oxbow Books, Oxford. pp 48-65

Stoops, G.

2003 Guidelines for the analysis and description of soil and regolith thin sections. Soil Science Society of America, Madison.

Vebæk C.L.

1993 "Narsaq- A Norse Landnama Farm". *Meddelelser om Grønland Man & Society,* 18

Vibe, Christian

1967 "Arctic animals in relation to climatic fluctuations". *Meddelelser om Grønland* 170(5).

Woollett, James W., Anne Henshaw, & Cameron Wake

2000 "Palaeoecological implications of archaeological seal bone assemblages: case studies from Labrador and Baffin Island", *Arctic* 53(4):395-413.

Woollett, J.

1999 "Living in the Narrows: Labrador Inuit Subsistence in Hamilton Inlet." *World Archaeology 31 (1):* 370-387.

1997 "Feasts of Winter: Zooarchaeological Perspectives on Labrador Inuit Subsistence During the Contact Period." In: M.A.P. Renouf (ed.), *Proceedings of the North Atlantic Biocultural Organization Conference.* A Summit of the Sea Conference for the Cabot 500 Celebrations, St. John's, Newfoundland, May 1997.