VATNSFJÖRÐUR 2008

FRAMVINDUSKÝRSLUR / INTERIM REPORT

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EFNI / CONTENTS

Appendices

SAMANTEKT

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Árið 2008 var sjötta ár rannsókna í Vatnsfirði við Ísafjarðardjúp. Þær eru liður í samstarfi nokkurra aðila sem standa að félaginu Vestfirðir á miðöldum. Markmið þessa félags er að stuðla að nýjum rannsóknum á sögu og menningu Vestfjarða á miðöldum og að því standa Fornleifastofnun Íslands ses, Vestfirðir á miðöldum, Háskólasetur Vestfjarða á Ísafirði, Háskóli Íslands, Atvinnuþróunarfélag Vestfirðinga, Byggðasafn Vestfjarða, Súðavíkurhreppur, Oslóarháskóli, North Atlantic Biocultural Organization (NABO), International Polar Year Program, Northern Science and Education Centre, City University of New York (CUNY) og Háskólinn í Aberdeen. Vestfirðir á Miðöldum stendur m.a. fyrir ráðstefnuhaldi, útgáfu á fræðiritum og fræðsluefni, og umfangsmiklum fornleifarannsóknum. Í þessu stutta yfirliti er gerð grein fyrir athugunum á fornleifum. Sumarið 2005 barst verkefninu góður liðsauki því Fornleifaskólinn, sem Fornleifastofnun og NABO höfðu starfrækt í Mývatnssveit frá 1997-2004 flutti sig um set, kom sér upp bækistöðvum í Reykjanesi og varð þátttakandi í rannsóknunum við Ísafjarðardjúp. Verkefnið hefur verið styrkt m.a. Alþingi og Fornleifasjóði.

Fyrir velvilja og liðveislu í hvívetna viljum við þakka presthjónunum í Vatnsfirði, séra Baldri Vilhelmssyni og Ólafíu Salvarsdóttur. Einnig Guðbrandi Baldurssyni í Vatnsfirði, starfsmönnum Náttúrustofu Vesfjarða í Bolungarvík, - Byggðasafns Vestfjarða á Ísafirði, - Biskupsstofu, - Súðavíkuhrepps, - Háskólaseturs Vestfjarða og - Hótels Reykjaness.

Yfirlit rannsókna

Fyrsti áfangi fornleifarannsókna fólst í því að taka saman yfirlit yfir fornleifar á Vestfjörðum og stöðu rannsókna í þeim tilgangi að meta hvaða minjaflokka og staði væri heppilegast að hefja rannsóknir á. Hefur samantektin verið birt í Ársriti Sögufélags Ísfirðinga[1]. Mðal markverðustu minjastaða er Vatnsfjörður við Ísafjarðardjúp, enda er hann með helstu sögustöðum héraðsins. Var því ákveðið að leggja sérstaka áherslu á athuganir þar. Andrea S. Harðardóttir sagnfræðingur hefur tekið saman sögulegt yfirlit og safnað helstu heimildum um Vatnsfjörð og búsetu þar.[2] Ragnar Edvardsson fornleifafræðingur gerði sérstaka fornleifaskrá yfir Vatnsfjörð og fann 52 fornleifar á jörðinni. Er nú fengið gott yfirlit yfir þekktar og sýnilegar minjar í Vatnsfirði.[3] Ragnar stjórnaði jafnframt forkönnun á bæjarstæði Vatnsfjarðar **sumarið 2003**. Grafnir voru nokkrir könnunarskurðir, sem m.a. leiddu í ljós að fornleifar í bæjarhól og túni voru vel varðveittar og því ákjósanlegt rannsóknarefni. Í túninu fundust leifar skála með langeld í miðju.[4]

Árið 2004 var rannsókn haldið áfram á skálanum, en hann eru um 100 m norðan við gamla bæjarhólinn[5]. Uppgraftarsvæðið var 70 m^2 að stærð, en hvergi dýpra en um 20 sentimetrar. Minjarnar voru aðeins nokkra sentimetra undir yfirborði. Skálinn er um 16 m langur og 6 m breiður að innanmáli og sneri norður og suður. Skilyrði til varðveislu voru ekki góð, jarðvegur var súr og því fá dýrabein varðveitt.

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[1] Adolf Friðriksson (2003). „Fornleifar á Vestfjörðum." *Ársrit Sögufélags Ísfirðinga* 43: 43-51.

[2] Andrea S. Harðardóttir (2003). „Vatnsfjörður við Djúp." *Vatnsfjörður við Ísafjarðardjúp. Rannsóknir sumarið 2003*. Adolf Friðriksson and Torfi H. Tulinius. Reykjavík, Fornleifastofnun Íslands. FS213-03092: 10-14.

[3] Ragnar Edvardsson (2003). „Fornleifaskráning í Vatnsfirði við Ísafjarðardjúp sumarið 2003." *Vatnsfjörður við Ísafjarðardjúp. Rannsóknir sumarið 2003*….s. 15-29.

[4] Ragnar Edvardsson (2003). „Fornleifarannsókn í Vatnsfirði 2003." *Vatnsfjörður við Ísafjarðardjúp. Rannsóknir sumarið 2003*. …s. 30-47.

[5] Sbr. Ragnar Edvardsson (2004). *Fornleifarannsókn í Vatnsfirði við Ísafjarðardjúp* 2004. Fornleifastofnun Íslands. Reykjavik.

Árið 2005 var uppgraftarsvæðið stækkað verulega til austurs, eða um 310 m^2. Stjórnandi rannsóknarinnar var Karen Milek. Suðaustast á svæðinu fundust leifar lítillar byggingar sem voru rannsakaðar að hluta það sumar. Í ljós kom að húsið hefur líklega verið smiðja sem gæti hafa orðið eldi að bráð. Rannsóknir á fornum bæjum á Íslandi hafa takmarkast við húsin sjálf. Hér var ráðist í þá nýjung að grafa fram og rannsaka opin svæði utan húsa. Að þessu sinni var svæðið milli skála og smiðju opnað og til norðurs á móts við norðurgafl skála. Þar komu fram áberandi, tröðkuð mannvistarlög, svo sem vænta mátti, en athyglisvert var að sjá að þar leyndust einnig soðhola og tvö lítil eldstæði. Líklega hefur eldamennska verið stunduð utandyra og má vera að þessi niðurstaða kalli á frekari athuganir á athöfnum fólks utandyra að fornu en hingað til hefur verið gert. Þetta ár varð verkefn í Vatnsfirði mun viðameira. Fornleifaskólinn var fluttur frá Mývatni til Vatnsfjarðar og 11 nemendur víða að úr heiminum stunduðu nám í uppgraftartækni undir leiðsögn kennara. Þá bættist við nýr rannsóknarþáttur þar sem lögð er áhersla á að kanna staðhætti í því augnmiði að varpa ljósi á uppruna og þróun byggðar í Vatnsfirði. Landslagsathuganir eru nýleg en ört vaxandi grein innan fornleifafræði en þar eru minjar og landslag skoðað í nýju ljósi og staðfræðilegu samhengi. Einnig var byrjað á verkefni sem lýtur að því að rannsaka frjósemi jarðvegs og hvernig henni er viðhaldið með áburði. Vonir standa til að með slíkum rannsóknum verði hægt meta grasnytjar og hagvöxt jarðarinnar og hve stóran þátt jarðnytjar túnsins áttu í vexti og framgangi búsins.

Árið 2006 var opnað enn stærra svæði við skálann og þrjár nýjar byggingar fundust – allar frá víkingaöld. Þá hófust einnig rannsóknir á bæjarhól Vatnsfjarðar en þangað er talið að bærinn hafi verið fluttur í öndverðu og verið fram á 20. öld. Þar fundust vel varðveittar leifar seinasta torfbæjar Vatnsfjarðar. Auk þess voru grafnir könnunarskurðir til að kanna dýpt og umfang bæjarhólsins í því augnmiði að afmarka og staðsetja rannsóknarsvæði framtíðarinnar. Fornleifaskólinn var starfræktur áfram og 17 nemendur og 2 sjálfboðaliðar frá ýmsum löndum sóttu hann: Noregi, Danmörku, Englandi, Skotlandi, Írlandi, Frakklandi, Bandaríkjunum, Kanada, Ástralíu og Nýja-Sjálandi.

Sumarið 2007 kom enn ein rúst í ljós á víkingaaldarsvæðinu og var hafinn uppgröftur á henni auk þess sem lokið var við að grafa fram minjar sem fundust sumarið á undan. Á bæjarhólnum var opnað um rúmlega 400 m^2 svæði og austari hluti yngsta torfbæjarins í Vatnsfirði afhjúpaður. Sá bær fór í gegnum umtalsverðar breytingar frá því hann var byggður 1884 og þar til hann lauk hlutverki sínu í gerbreyttri mynd á 6. áratug síðustu aldar, þá sem skemma og smiðja. Einnig voru gerðar viðnámsmælingar á hólnum í því augnamiði að kanna eðli, þykkt og umfang mannvistarlaganna. Landslagsrannsóknir héldu áfram, gengið var um Vatnfjarðardal og minjar skráðar, en einnig var landslagið skoðað af sjó, siglingaleiðir farnar og mið skoðuð. Þá voru aðstæður til þess að gera rannsóknir á sjávarstöðubreytingum kannaðar, einnig tekin sýni úr seti í vötnum til að kanna jarðvegsþykknun, gjóskulög, gróðurfar og loftlagsbreytingar.

Sem fyrr voru nemendur víða að, 15 talsins auk 4 sjálfboðaliða sem eru meistara og doktorsnemar og vinna jafnframt að sínum rannsóknum.

Sumarið 2008

Grafið var í Vatnsfirði í 4 vikur í Vatnsfirði frá 7. júlí til 1. ágúst. Rannsóknirnar hófust viku fyrr eða 28. júní en þá voru snið í niðurgröfnum lækjarfarvegi vestantil í bæjarhólnum könnuð af prófessor Ian A. Simpson jarðvegsfræðingi við Stirling háskóla í Skotlandi og nemendum hans. Tekin voru sýni úr mismunandi mannvistarlögum til að fá hugmynd um eldsneytisnotkun í gegnum aldirnar. Einnig voru tekin sýni til aldursgreingar og sýna þau að elstu minjar í bæjarhólnum eru frá því í kringum 1000 (sjá skýrslu Simon Parkin, Stuart Morison og Ian A. Simpson). Sem fyrr stýrði Garðar Guðmundsson fornleifafræðingur verkefninu en fornleifafræðingarnir Guðrún Alda Gísladóttir og Uggi Ævarsson stjórnuðu uppgreftinum og unnu úrvinnslu auk Asridar Daxböck. Auk þess unnu á bæjarhólnum meistaranemi í fornvistfræði, Véronique Forbes frá Háskólanum í Laval, Quebeck. Hún sá um

að taka skordýrasýni og vinna úr þeim (sjá skýrslu) og Gunnhildur Garðarsdóttir sem vann sitt 3 sumar sem grafari. Markmiðið var að afhjúpa síðasta torfhúsið á bæjarhólnum og hefja rannsókn á því og hafa þau markmið náð fram að ganga. Hús þetta (kallað mannvirki 7500) var byggt árið 1884 en rifið að stórum hluta 1907 þegar timburhús með niðurgröfnum kjallara var byggt suðvestan þess. Leifar þessa húss frá 1907 má núna sjá í suðvesturhorni uppgraftarsvæðisins. Ljóst er eftir sumarið 2008 að mannvirki 7500 var marg oft breytt á sinni stuttu ævi. Þegar 1907 húsið var byggt var hið eldra rifið að stórum hluta, sennilega til að nýta grjót og viði úr því. Eftir stóð aðeins austasta húsið og það áfram notað fram á miðja 20. öld sem smiðja og geymsla. Margir gripir hafa komið upp frá því rannsóknirnar hófust, nálægt 5000 í allt. Gripirnir, dýrabein (matarleifar), jurta – skordýraleifar mun einnig segja sína sögu og saman mun rannsókn sérfræðinga á þessum minjaflokkum gefa okkur mynd af lífshlaupi og háttum manna í Vatnsfirði og endurspegla líf á reisilegum bæ á Vestfjörðum í lok 19. aldar og í byrjun þeirrar 20. Sumarið 2009 er áætlað að mannvirki 7500 verða kannað áfram og markmiðið er að reyna að ljúka þeirri rannsókn og komast niður á eldri minjar. Fyrsti hluti fornleifauppgraftarins á bæjarhólnum yrði þá langt kominn í lok uppgraftartímabilsins 2009.

Norður í túninu, um 100 metra frá uppgreftinum á bæjarhólnum, fara fram rannsóknir á fyrstu búsetu í Vatnsfirði, minjum frá 10. öld. Á víkingaaldarsvæðinu stjórnar Karem Milek uppgreftri auk þess að vera skólastjóri Fornleifaskólans sem nú var starfræktur 4ja árið í röð í Vatnsfirði. Með Karen unnu fornleifafræðingarnir Astrid Daxböck, sem einnig bar hitann og þungann af innslætti gagna frá Vatnsfirði, og Ramona Harrison, sem einnig sá um dýrabeinin á vettvangi og að kenna þau fræði í Fornleifaskólanum. Svæðið var stækkað umtalsvert og nú var áherslan lögð á ´útisvæði´, svæðið austan við aðal rústasvæðið. Í ljós komu vísbendingar um mikil umsvif m.a. tvær djúpar og umfangsmiklar eldaholur fullar af eldasteinum og kolum. Einnig kom í ljós ræfill af byggingu austast á svæðinu og þar í hruni perla frá Víkingaöld. Auk þess voru grafnir tveir könnunarskurðir í vænlegar þústir norðan skálans og í þeim fundust mannvistarleifar sem rannsakaðar munu verða á sumri komanda. Rannsóknir á Víkingaaldarsvæðinu í Vatnsfjarðar komast langt í sumar og mun verða lagst í úrvinnslu þeirra þátta á vetri komanda.

Sem fyrr fóru fram landsháttarannsóknir í Vatnsfirði, af sjó og landi og skráning á fornleifum í Vatnsfjarðardal og nágrenni.

Framundan sumarið 2009

- Framundan er áframhaldandi uppgröftur á víkingaraldarsvæðinu. Þar mun, sem áður, meginstarfsemi Fornleifaskólans fara fram.
- Áframhaldandi rannsóknir á bæarhól; 19. aldar bærinn rannsakaður.
- Stefnt er að halda áfram landshátta- og samfélagsrannsóknum í Vatnsfirði og nágrenni: Skoða samspil manns og náttúru auk fornleifaskráningar og taka viðtöl við ábúendur og staðkunnuga.

Verkáætlun

Árið 2010-2012 er stefnt að útgáfu niðurstaðna á elstu og yngstu minjum Vatnsfjarðar, minjum frá víkingaöld og frá 18 og 19. öld.

Einnig verður gerð grein fyrir rannsóknum á landsháttum, m.a. áhrifum landfræðilegra aðstæðna á þróun menningarlandslag svo og skráningu jarða, leiða, selja, verbúða, kumla og kirkna og samfélagi síðari alda. Viðtöl við síðustu ábúendur jarða í Vatnsfjarðadal og nágrenni mun einnig verða þáttur í greinargerð þessari. Einnig verða gefnar út niðurstöður úr umhverfisrannsóknunum: s.s. svæðisbundnum breytingum á hæð sjávar og áhrif þeirra á hafnir og lendingastaði. Þar verður og umfjöllun um veðurfar, breytingar af mannavöldum á gróður og jarðveg og áhrif þeirra á jarðarauð og landbúnað.

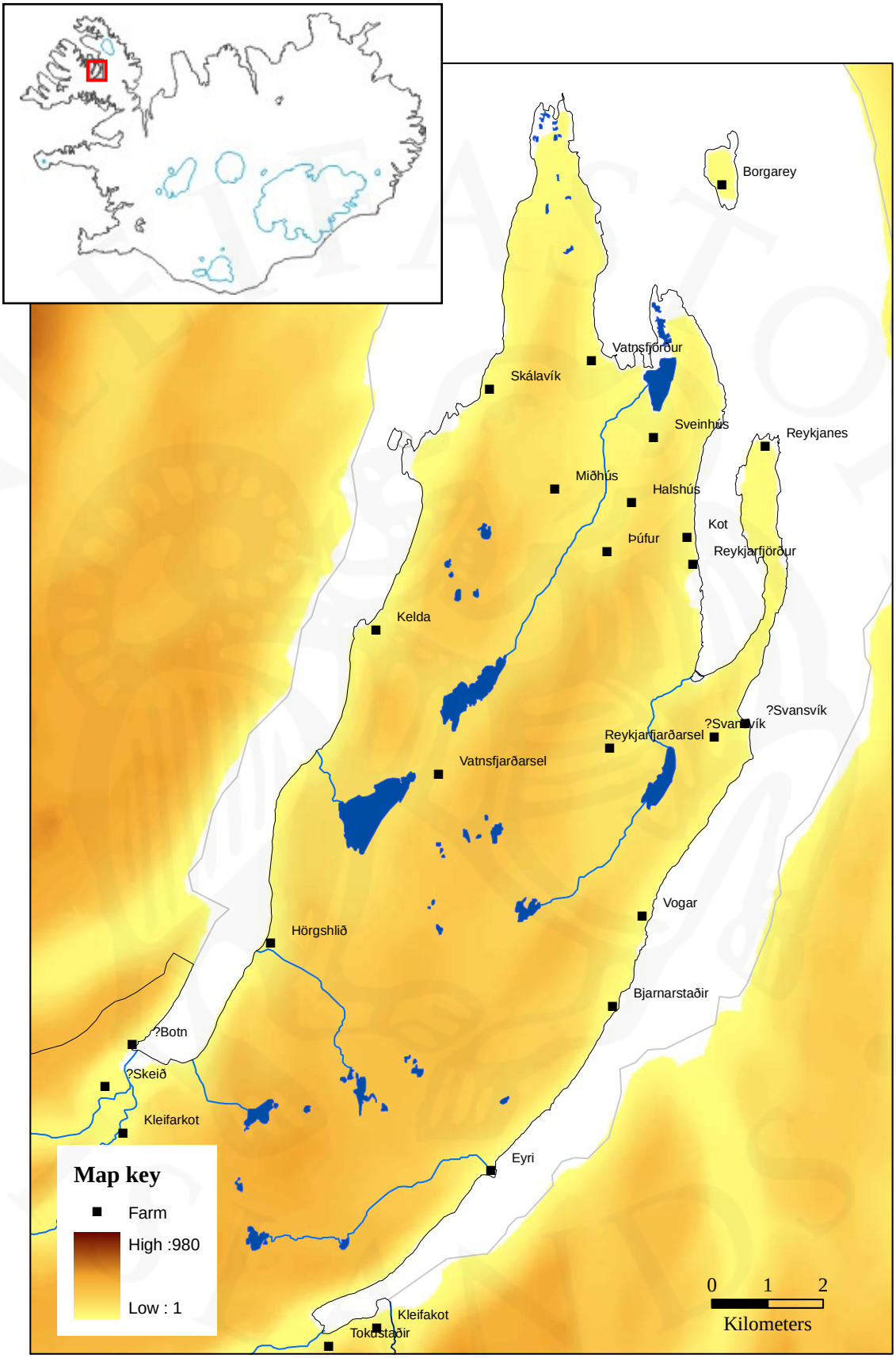

Figure 1. *The location of Vatnsfjörður and other farms within the study area (by Oscar Aldred).*

Figure 2. *The church farm of Vatnsfjörður in its landscape context, including Vatnsfjörður (Lake Fjord, on the left) and Sveinhúsavatn (Sveinhus Lake, in the background), facking east.*

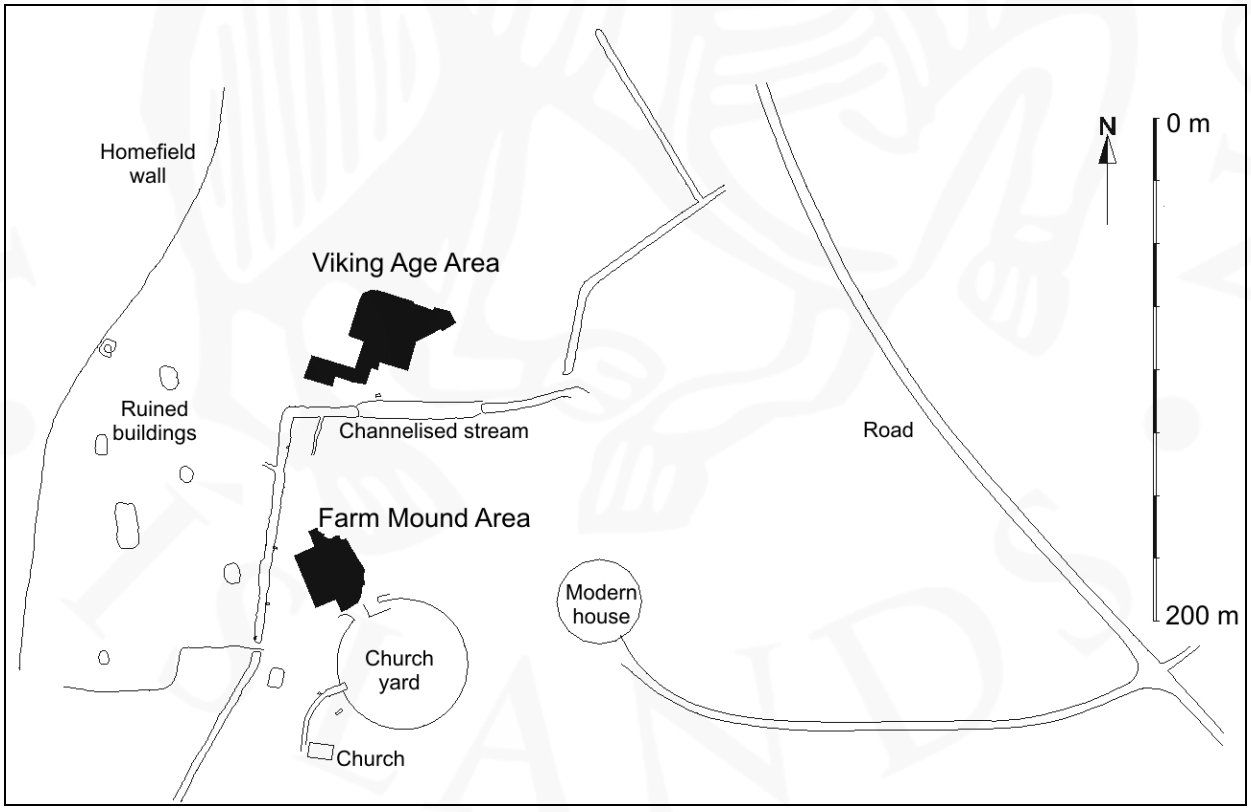

Figure 3. *Map of Vatnsfjörður 2008, showing the new extent of the two excavation areas – the Viking Age Area and the Farm Mound Area.*

OVERVIEW

Karen Milek
University of Aberdeen

Introduction and Acknowledgements

The sixth field season of archaeological excavation and landscape survey at Vatnsfjörður took place from June 29-August 1, 2008. Since 2003, a multidisciplinary, international team of archaeologists, historians, and natural scientists has been investigating the social, economic and environmental changes that occured at the farm of Vatnsfjörður in Ísafjarðardjúp and its landscape context between the tenth and twentieth centuries AD (Figures 1 and 2, above). By integrating textual, archaeological, and environmental evidence, the project aims to explain why this apparently infertile farm was chosen as a chieftain's seat, what factors and social processes enabled Vatnsfjörður to flourish as a social, economic and cultural powerhouse between the thirteenth and seventeenth centuries, and why the importance of the farm declined after the seventeenth century. Our study is amassing new evidence for Vatnsfjörður as a literal and cognitive central place in the Westfjords and it is clear that the changing fortunes of this farm must have reflected and also significantly affected the fortunes of the entire region. The investigations at Vatnsfjörður therefore provide a window onto the whole of the Westfjords, a region that has experienced dramatic economic, cultural, demographic, and environmental changes over the last 1000 years. The goal of this interdisciplinary project is to explore the dynamism of this cultural landscape in the past in order to better understand its potential and direction for the future.

Importantly, this project also aims to transfer knowledge about the cultural heritage of the Westfjords to residents of the local community and to visitors, and to actively stimulate heritage tourism in the region. The project team has therefore developed a public archaeology programme that includes an annual Open Day, multi-lingual signs at the site, and a pamphlet about the site that is distributed at tourist information centres around the country as well as hotels in the Westfjord region. In 2008, the site was visited by a group of children from Suðavík, as well as a group of students from the University of Manitoba, Canada, who were attending a summer school in Icelandic history and culture coordinated by the University Centre of the Westfjords.

The Vatnsfjörður Project is made possible through the involvement of a large team of professionals, volunteers, and students from Iceland, North America, Europe, and further afield, who contribute enormous amounts of time, expertise and labour to the project. The project also owes its existence to the support of the Icelandic church and to Baldur Vilhelmsson, Ólöf Salvarsdóttir, and Guðbrandur Baldursson, who have kindly permitted us to excavate at Vatnsfjörður, and who have provided us with facilities and assistance in the field. In 2008, the Vatnsfjörður excavation was funded by the Icelandic parliament (Alþingi), the University Centre of the Westfjords (Háskólasetrið Vestfjarða), the Medieval Westfjords Society (Vestfirðir á Miðöldum), the Icelandic Archaeological Fund (Fornleifasjóður), and the Carnegie Trust for the Universities of Scotland, and the International Polar Year Program.

The project received invaluable support in the form of staff, facilities, equipment, and logistical help from the Institute of Archaeology, Iceland (Fornleifastofnun Íslands), the National Museum of Iceland (Þjóðminjasafn Íslands), the Centre for Research in the Humanities, University of Iceland (Hugvísindastofnun HÍ), the University of Aberdeen, the University of Oslo, the University of Stirling, the Northern Science and Education Centre at the City University of New York, the North Atlantic Biocultural Organisation (NABO), Hotel Reykjanes (Ferðaþjónustan Reykjanesi), Atvinnuþróunarfélag Vestfirðinga, Súðavíkur-hreppur, the Natural History Museum in Bolungarvík (Náttúrustofu Vesfjarða í Bolungarvík),

the Maritime Museum in Ísafjörður (Byggðasafnið á Ísafirði), Biskupsstofa, and the Education Centre of the Westfjords (Fræðslumiðstöð Vestfjarða). The project team is also grateful to Ragnar Edvardsson for his continued interest in and support for the project.

Summary of the Vatnsfjörður Research Project, 2003-2007

Research at Vatnsfjörður began in **2003**, when low earthworks in the homefield – one of which appeared to be in the shape of a Viking Age *skáli* – attracted the attention of the archaeologist Ragnar Edvardsson and the Institute of Archaeology. In order to assess the potential of the site for archaeological investigation, a surface contour survey was conducted by Garðar Guðmundsson, three evaluation trenches were excavated by Ragnar Edvardsson, and a survey of relevant historical sources was conducted by Andrea Harðardóttir (Adolf Friðriksson and Torfi Tulinius 2003). The evaluation trench excavated on the farm mound found only disturbed deposits, but the two evaluation trenches in the area that has now come to be known as the Viking Age area revealed walls and preserved floor deposits of two buildings (later called Structures 1 and 3) (Ragnar Edvardsson 2003). In **2004**, the putative *skáli*, the larger of the two buildings, was subject to a more intensive, open-area excavation (Area 1) (Ragnar Edvardsson 2004). This did indeed turn out to be a Viking Age house, which was subsequently dated to the tenth or early eleventh century on the basis of a radiocarbon date from a cattle bone found on the floor of the building (Milek 2007). In **2005**, when the excavation of the house was completed, this radiocarbon date was further supported by the discovery of a number of tenth-century artefacts in the fill of a pit cut into the east wall of the building, including five glass beads and a gold foil pendant that had originally been mounted on an Irish brooch (Adolf Friðriksson et al. 2005) (Figure 4, left). The tenth-century house was very similar in size, shape, and internal organization to other contemporary dwellings in Iceland, and included two entrances in the east long wall, a central hearth, a three-aisled structure, and a stone box in the main entrance passageway (Ragnar Edvardsson and McGovern 2005).

Figure 4. *The gold foil pendant found in 2005, which was probably originally mounted on an Irish brooch, and which dates to AD c.850-1000 (width = 16mm)*

In **2005**, when the Field School in North Atlantic Archaeology was moved to Vatnsfjörður, the scale of the excavation doubled. In addition to the completion of the Viking Age house in Area 1, a new excavation area (Area 2) was opened up to the east and southeast of the house. In this area, a smithy was found, as well as an outdoor cooking pit, a couple of temporary outdoor hearths, extensive sheet midden deposits, and a gully on the eastern edge of the *skáli*, which was filled with domestic rubbish (Milek 2005). There was no stratigraphic connection between the smithy (Structure 3) and the well-dated Viking Age house (Structure 1), and although its proximity to a Viking Age dwelling suggests contemporaneity, the lack of diagnostic artefacts in the smithy means that it is not possible to be sure about its date.

In **2006** the area around Structure 3 was reopened in order to continue the excavation of the smithy, and a new excavation area was opened up south of the *skáli* (Area 6), where a new building that had been identified in a test pit in 2005. This open area excavation brought to light three new outbuildings. The eastern long wall of the smithy was abutted by a very small oblong building (Structure 6) that had no diagnostic features or finds in it and was probably used for storage – perhaps the storage of fuel for the smithy. The other fully excavated outbuilding was rectangular, with an entrance in one of its gable walls, a central flag stone, and a very thin floor lens containing charcoal, charred seeds, and decomposed plant matter

(Structure 5). The only significant find in the building was a small grinding wheel, and this, together with the lack of diagnostic features, the thin floor deposit, and the lack of synanthropic insects in the building, led this building to be interpreted as an unheated workroom and/or a storeroom. Surrounding the Viking Age buildings were widespread sheet middens and trampled deposits, which produced a Borre-style strap end and a multi-coloured Viking Age glass bead (Milek 2007).

In **2006** nine evaluation trenches were also excavated on the farm mound south of the Viking Age excavation area in order to assess its size, the depth of its cultural deposits, and the quality of its preservation. These evaluation trenches revealed that the farm mound is exceptionally large: around 90 m long (north-south) and 60 m wide, with cultural deposits reaching thicknesses of around 1.5 m. The evaluation trench at the top of the farm mound found the last turf dwelling house at Vatnsfjörður (1884-1906), and the trench was extended to reveal very well-preserved wall foundations and a deep cellar infilled with early twentieth-century household rubbish. Three radiocarbon dates from birch charcoal recovered from a section in the farm mound suggested that the occupation of this part of the site may have began as early as the tenth century (Milek 2007).

Figure 5. *Excavation on the farm mound at the end of the 2007 field season.*

In **2007**, a large open-area excavation some 400 m^2 began at the top of the farm mound (Figure 5, right). Thousands of artefacts and bones dating to the late nineteenth and early twentieth century were recovered from the fill of another, even deeper cellar and from layers post-dating the abandonment of the late nineteenth-century house, where rooms had sub-sequently used as storage rooms and a smithy (Guðrún Alda Gísladóttir and Uggi Ævarsson, in Milek 2008).

In **2007** excavations also continued in the Viking Age part of the site to the north of the farm mound. The excavation of Structure 3 (the smithy) was completed, as was Structure 4, a small, slightly-sunken rectangular building south of Structure 5 that contained a stone pavement on the northeastern half of its floor and a curious hole in its northeastern wall at knee level. A piece of whale bone found under the north wall of Structure 4 probably represents a foundation deposit, but the function of the building remains elusive, and it is tentatively interpreted as a fish drying or storage room. A new excavation area opened up to the west of Structure 4 uncovered a small rectangular building with a stone pavement and two entrances, one on its eastern side, and one on its southern gable end, at the top of a short slope. This new building, Structure 7, was fully exposed by the end of the 2007 field season, but its internal deposits were left for 2008.

In addition to the excavations at Vatnsfjörður itself, archaeological surveys in the region around the farm have been ongoing since 2003 (Ragnar Edvardsson 2003; Aldred 2005; Aldred 2006; Aldred in Milek 2007). In 2006 65 new sites were recorded, and in 2007 333 new sites were recorded, bringing the total number of cairns, structures, tracks, boat landing

places, fox traps, walls, and bridges in the study area to 599. The most abundant sites in the region are stone-built cairns, which Oscar Aldred and Poul Baltzer Heide began to group into types in 2007 – work they have now further refined (see Oscar Aldred's report, this volume). The extensive network of cairns in the hills around Vatnsfjörður served as route markers, boundary markers, navigation aids and boat-landing markers (those visible from the sea), and the distribution of these cairns lends support to the idea that Vatnsfjörður was a central place in this landscape.

During the **2007** field season, a preliminary coring programme was conducted on three lakes in Vatnsfjarðardalur by Pete Langdon (an expert on the use of midges to infer temperature change), Chris Caseldine (palynologist) and Jerry Lloyd (an expert in sea-level reconstruction), which demonstrated the potential of these lakes to provide high-resolution data on temperature, vegetation and sea-level changes in the immediate vicinity of Vatnsfjörður over the last 1100 years. While the temperature data is still being processed, Jerry Lloyd will be returning in 2009 in order to take longer cores from Sveinhúsavatn (the lake visible in the background in Figure 2, above) and to continue his work on the reconstruction of the ancient shoreline around Vatnsfjörður.

2007 also saw a continuation of the work on the soils of Vatnsfjörður's homefield. Ian Simpson, a geoarchaeologist who has been investigating the homefield soils at Vatnsfjörður since 2005, was joined in 2007 by Doug Bolender, who conducted a preliminary survey of soil depths and phosphorus levels in the homefield (Bolender in Milek 2008). So far there is little evidence for active improvement of the homefield at Vatnfjörður, but since the wet meadow downslope (east) of the Viking Age part of the site is known to post-date the tenth century, its development is likely to be connected with human activity on the site.

Vatnsfjörður 2008

Because of the fertility of the homefield would have had a direct and vital impact on the wealth of the farm, the investigation of the **homefield soils** was intensified in 2008. Froom June 30-July 4 Ian Simpson and Eileen Tisdall, from the University of Stirling, sampled a number of soil test pits for pollen and micromorphological analysis, concentrating particularly on the wet meadow area on the lower slopes of the homefield. Claire Cavaleri and the author also spent the 2008 field season conducting a soil auger survey of the homefield in order to map the depths of soil across the site and the extent of the wetter areas where peat had developed. Although the data from this geoarchaeological work is still being processed, and further test-pitting needs to be done in 2009, preliminary results suggest that the peat on the eastern (downslope) edge of the homefield developed up against, and is therefore later than, the eastern boundary wall of the homefield. It is possible that the turf wall acted as a sort of dam, impeding water drainage and promoting the development of the wet meadow area, thereby improving the fertility of the homefield.

In 2008, Oscar Aldred and Poul Baltzer Heide continued their **landscape survey** programme, identifying 224 more sites, 140 of which were cairns (Aldred, this volume). They also continued to make an important contribution to our understanding of how people interacted with their environment in Vatnsfjarðardalur, in particular how they moved through the landscape, how they experienced sights and sounds, and how they made decisions about where to situate their settlement sites, landscape markers, etc. Of growing importance to their research is the issue of intervisibility and interaudibiligy between farms and the "landscape rooms" visible from each farm. Unfortunately, the cairns and many other sites in Vatnsfjarðardalur remain undated, and the exploration of potential dating methods remains a priority for 2009.

On the **farm mound**, the excavation area was expanded further west in 2008 in order to expose the western part of house 7500, a conventional turf- and stone-built house that had been built in 1884, and which had south-facing timber-panelled front gables. The house had

been partially demolished (particularly on its northern end) after 1906, and most of the field season was spent removing post-abandonment and destruction layers. By the end of the 2008 field season the layout of the walls, doorways, and stone pavements of structure 7500 had been clarified, and 1661 artefacts and 38 kg of animal bone had been recovered. The excavation area on the farm mound now totals around 700 m^2 (see Figure 6, below).

In the **Viking Age excavation area**, six evaluation trenches were excavated at the beginning and end of the field season, two of which prompted the excavation of a new area to the west and north of Area 2 and Structure 3 (the smithy). This new area, Area 23, contained two large cooking pits filled with charcoal and fire-cracked rock, a small, poorly preserved Viking Age building (Structure 8), and thin but extensive sheet midden deposits. The excavation of Structure 7 in Area 14 was continued in 2008, and the occupation deposits belonging to the last phase of the stone-paved building were removed. Below this phase there was an earlier stone pavement, and earlier phases of walls containing the greyish turf so common in the earlier Viking Age buildings at Vatnsfjörður. The earliest phase of this building will continue to be excavated in 2009.

Future work: Vatnsfjörður 2009

The 2009 field season at Vatnsfjörður will have the following goals:

• In the Viking Age part of the site, the excavation of Structure 7 will be completed and a new area will be opened up to the north and west of the *skáli*, in the location of Evaluation Trenches 26 and 31, which had revealed midden material and an apparent turf wall.

• On the farm mound, excavations will continue on the nineteenth-century turf house in order to clear out the post-abandonment rubbish and collapse deposits, and to begin investigating how the building had originally been organised and used.

• Oscar Aldred will aim to complete the landscape survey of the main peninsular area around Vatnsfjörður, focussing on the area between Reykjarfjarðasel and the route to Vatnsfjarðarsel, and the area between Kelda and Hörgshlíð. In addition, an exploratory survey will take place in the more interior areas of Húsadalur and Bessárdalur, and a random sample of one or two areas will be walked systematically (possibly the venue for student teaching) in order to test the quality of the survey data.

• Two to three test pits will be excavated through the homefield boundary wall in order to (a) confirm the hypothesis that it pre-dates the development of the wet meadow on the eastern side of the homefield, and (b) to obtain a clear section through a well-preserved part of the wall, in order to search for datable material.

• Jerry Lloyd will take another, longer core from Sveinhúsavatn and other isolation basins in the vicinity of Vatnsfjörður in order to obtain sequences of foraminifera and diatoms that will enable him to reconstruct the changes in sea level and the appearance of the shoreline over the last 1100 years.

• Rock samples and sediment samples will be taken in order to determine if feldspar is present in the basaltic bedrock and soils of the region, since the presence of this mineral would make it possible to use optically stimulated luminscence techniques to date the construction of the cairns and turf walls around the site (i.e. the last time they were exposed to sunlight).

• The public archaeology programme will be further developed, with a well-advertised Open Day, signs on the nearby road to inform motorists that they are welcome to visit us at the site, the publication of a pamphlet about the site (and possibly an additional leaflet describing a recommended landscape walk), and increased signage at the site.

Credits: Staff and Students of the 2008 Field School in North Atlantic Archaeology

Since it was founded in 1997, the Field School in North Atlantic Archaeology has served as a focal point for interdisciplinary, cooperative teaching and research by archaeologists and natural scientists from Iceland, Europe, and North America. This tradition continued in 2008 at Vatnsfjörður, with archaeologists and palaeoecologists from Canada, the United States, Iceland, the United Kingdom, and Norway contributing to the field school teaching curriculum while carrying out original research at Vatnsfjörður and the surrounding region.

The 2008 field school was directed by the author, with all excavation and survey staff contributing to the teaching and supervision of field work and post-excavation work, including Astrid Daxböck, Garðar Guðmundsson, Guðrún Alda Gísladóttir, Gunnhildur Garðarsdóttir, Konrad Śmiarowski, Oscar Adred, Poul Baltzer Heide, Ramona Harrison, and Uggi Ævarsson. Several graduate students, who were conducting research projects on material from Vatnsfjörður, also contributed to the teaching, including Claire Cavaleri (University of Oslo), Dawn Elise Mooney (University of Cambridge), and Véronique Forbes (Université Laval). Finally, a number of visiting scholars made important contributions to the teaching and research programme, including Adolf Friðriksson (Fornleifastofnun Íslands), Christian Keller (University of Oslo), Graham Langford (National Museum of Iceland), Thomas McGovern (City University of New York), Torfi Tulinius (University of Iceland), and Már Jónsson (University of Iceland).

As in previous years, the field school greatly benefited from the support of Christian Keller of the University of Oslo, Tom McGovern of the City University of New York, who managed student recruitment from the European Union and North America. Eleven university students attended the field school in 2008: Ann Eileen Lennert (University of Greenland), Alexander Partridge (University of Aberdeen, UK), Céline Dupont-Hébert (Université Laval, Canada), Elise Alexander (City University of New York, USA), Ester Oras (University of Tartu, Estonia), James Curtis (University of Nottingham, UK), Liam Lanigan (University of Saskatchewan, Canada), Marjorie (Meg) Gorsline (City University of New York, USA), Norie Manigault (City University of New York, USA), Sarah Croix (University of Aarhus, Denmark), Patrycja Kupiec (University of Aberdeen,UK).

Figure 6. *The Vatnsfjörður 2008 team. Back row, from left to right: Garðar Guðmundsson, Poul Baltzer Heide, Uggi Ævarsson, James Curtis, Patrycja Kupiec, Guðrún Alda Gísladóttir, Liam Lanigan, Céline Dupont-Hébert, Sarah Croix, Ann Eileen Lennert, Gunnhildur Garðarsdóttir, Alexander Partridge, Claire Cavaleri, Ester Oras. Front row, from left to right: Ramona Harrison, Karen Milek, Véronique Forbes, Astrid Daxböck, Marjorie (Meg) Gorsline, Dawn Elise Mooney, Elise Alexander, Norie Manigault. Missing: Oscar Aldred.*

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VATNSFJÖRÐUR LANDSCAPE SURVEY 2008

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Introduction

Like many areas in the northwest of Iceland, the availability of 'productive' or usable land is constrained and limited by the natural topography. The underlying geological structure of the landscape has structured the way in which the cultural landscape has developed. Settlement for instance is often confined to a narrow strip of land close to the sea in the north west, and Vatnsfjörður's is no exception. Although its core central area in Vatnsfjarðardalur – Vatnsfjörður's valley – contains settlements, which have formed the foci for landscape survey before 2008, the majority of settlements, and hence the main areas of farm activity, lie around the coastal area. The connection then between land and sea is a close one, which has manifested itself culturally in the positioning of settlements connected with good harbouring and landing spots, but with enough land resources to cultivate and provide winter fodder for the animals. Vatnsfjörður's role as a central place provided it with the opportunity to accommodate its own affordable summer pasturing and tending of sheep through its tenants who were located in the resource-rich valley environment. Is this the reason why Vatnsfjörður is located where it is?

Such a view directed towards the deterministic presence and influence of the natural conditions of the landscape are contradicted and contravened in several ways; quite simply, nature is not the only determination in locating place, or where activity occurred. It is fundamentally important, but it rather shapes those processes in a profound way, with the possibility of other influences. In particular, the routes that connect settlements and other activity areas suggest some improbable contradict the most logical paths suggested by the environment. Similarly, where one would expect there to be summer pasturing and associated features in the form of semi-permanent features such as shelters or dwellings there is no archaeological evidence. In fact, one could surmise that away from the coastal strip between the inhabited or 'domestic' land and the sea and the 'wild' upland areas, the traditional view of the nature–culture dichotomy becomes less clear. One is left with an uncomfortable contradiction: is activity primarily shaped by natural features or were there other cultural processes at play. Another way to think about this, however, is not to begin by separating the two fundamental categories of being-in-the-world (nature and culture), but rather to start with an already in the midst of things attitude, whereby archaeological sites enter into a complexity that is only unravelled when connections between things are made: for example, a cairn is not only related to its location on the land, but as sites of activities of people and animals, and within the communities in which it is located. This landscape survey report begins such a proposition, through descriptions of observations in the field and the types of sites found while surveying, and with some reflections on practicing landscape.

Methodology and aims

Previous reports about the landscape survey (2005 to 2007) focused on the motivation behind the landscape survey, and what landscape means both to the archaeologists (the *present* past ie our engagement with the past in the present) and what it meant to people from the past (the present *past* ie the remnants of the past that are left in the present). There will be a limited reflection on this here, and instead a general focus made on methodologies employed and the descriptions of the surveys undertaken.

Landscape is fundamentally about people and their relationship to the world around them: other people, animals, plants, the land and materials, as well as beyond material things,

and the ways in which aspects of politics, belief and cosmology (world-views) interconnect with those meanings. This particular perspective of being-in-the-world is expressed through a dwelling perspective, or perhaps more specifically through inhabitation (Barrett 1994) and taskscapes (Ingold 1993), in which places and spaces are *actively* (re)produced. These types of landscapes are *emergent*, both in a practical and meaningful sense, and are connected to the everyday as well as the less frequent practices. The remnants of the past (archaeological sites) have much currency and relevance in our attempts to understand how the landscapes and worlds around were shaped and understood by people in the past. This perspective considers not just one moment or event in the past, but how sites continued to have presence through to the present-day (Aldred and Lucas *forthcoming*).

Through the relatively mundane and repeatable processes of archaeological survey – literally recording all archaeology that is encountered whilst surveying – we begin to ascertain how things were made, used, appropriated and understood. For example, a standard record for a cairn would be a photograph, a drawn record, spatial measurements (GPS) and observations (height, width at base and top), construction details (stone size, arrangement, etc.), and notes relating to its position and location, and visibility to other features (close or distant). Importantly, an in-the-field interpretation (understanding the cairn as a waymarker, timemarker, boundary marker, navigation marker, or in a typological interpretation – see appendix) allows further reflection. Through such a recording, the information is entered into a database and multiple variables analysed together. However, the use of such an analysis is fundamentally related to a recursive process in which the in-the-field observations are taken together with out-of-the-field observations through which further possible interpretative complexities are suggested. The primacy of survey and analysis away from the field are then paramount to the understanding of the landscape; taking one or the other makes our landscape understanding severely impoverished.

Multiple 'experiences' should be drawn upon therefore. For example, fieldwork is in itself an experience of landscape – as Ingold would say 'archaeology is in itself a form of dwelling' (Ingold 1993) – not only in understanding our own roles in the production of knowledge, but also, in some manner, putting something of ourselves into the people who lived and constructed the pasts that we are interested in. However, such phenomenological perspectives have come under scrutiny lately (Bruck 2005; Fleming 1999; 2005; 2006; 2007) mainly because they lack a coherent methodology. But this elides the point of *doing* landscape archaeology. Experience nonetheless has currency regarding the practices of doing fieldwork and how our own biases come into to play at different times in the interpretative processes. Because landscape is fundamentally a subjective concept that is highly personal and subject to an individual's politics and previous experiences, a phenomenology inherent connects with landscape survey, and as such is used here as a method for understanding the types of interpretations we make during landscape observation. This is carried out through formal practices in the field, as well as through processes of remembering past events derived from fieldwork that emanate from the recorded and photographic archives, or through the reflections made in the field and recorded in the survey note books and in other places.

For example, one group of students who had surveyed the island of Borgarey were asked immediately after the survey to illustrate their mental map of the island and what they had just experienced. These representations have a possible insight not only into the accuracy of the student's memories, but also their spatial awareness and abilities to connect with landscape meanings through the immediacy of the experience. These types of devices recognise the value of understanding experiences in practice, and how awareness of landscape is fundamentally connected to its field practices, previous experiences and memory – in particular, the amount of surveying done, walking in wide open spaces, and being in Iceland, which are all inherently connected to wayfinding and movement.

The aims of the landscape survey since 2005 has been to record and locate archaeological sites as they were encountered; to interpret their function (practical) and

meaning (symbolic), as well as reflect on the practices of making the archaeological record through detailed recording; to integrate this information in such a way that there was a multi-sited transparency and a link between the field to the office. Furthermore, the landscape survey has aimed to teach and impart the experience of the teachers, and their knowledge concerning landscape archaeology and survey to the students attending the field school.

Summary of survey completed before 2008

Landscape survey has been conducted in the environs of Vatnsfjörður as part of the field school since 2005: in 2005 for 4 weeks, in 2006 for 2 weeks, in 2007 for 4 weeks, and in 2008 for 4 weeks (a total of 4 of these weeks have been dedicated to teaching). The area of survey is 254.5km^2, though the main area is c. 135km^2 in size. The survey work has been conducted primarily by the author in 2005 to 2008, but also substantially by Poul Heide in 2007 and 2008. In addition several others have taken part: Adrian Chadwick, Christian Keller and Christian Madsen, as well as all students attending the field school and some staff.

In 2005 the landscape survey concentrated on the coastal strip, especially on the east side, and around Vatnsfjörður (and Halshús, Sveinhús) and Reykjafjörður (198 sites). In 2006 the area around Sveinshús and the north-eastern side of Vatnsfjarðarháls was surveyed (66 sites). In 2007 the majority of Vatnsfjarðardalur was surveyed, and the main route between the two fjörds Ísafjörður and Mjóifjörður (333 sites). In 2008 the area south of Vatnsfjarðarsel was surveyed (224 sites). There was a clear drop off in the number of sites, an increase in land mass and therefore an increased dispersal of sites.

Landscape survey 2008

In 2008 the main area of survey was south of Vatnsfjarðarsel and Vatnsfjarðardalur. The topography is primarily low lying upland which rises gradually into the interior towards Breiðafjörður in the south. A plateau area is formed with steep sides down to the coastal strip, but which gradually inclines towards the south. Much of the farm and locales for everyday practices of living and working are confined to this coastal strip – in close connection to the farm – but other types of activities and markings were taking place in the plateau area, perhaps relating to seasonal and more sporadic practices.

Several survey areas form the main point of departure for the following description and discussion of the survey work that was carried out in 2008. Excluded are two areas north and close to Vatnsfjörður (a series of walls, fox traps and cairns) and some cairns that were found when exploring a jeep-track that followed Ísafjarðará, along Miðdalur – towards the south-western interior. The first few survey texts explore the narrative and reflexivity of survey and movement, contextualised by the actual survey data, to give an impression of the archaeological processes (survey 1-2). The other survey texts are descriptive observations of what was encountered with some interpretation.

Survey 1: Hestarkleif – Botn (9/7/08)

In 2007 a substantial part of cairn network was surveyed that marked a route between the bottom of Ísafjörður to the farm of Botn located at the end of Mjöifjörður. The route consisted of closely built cairns (c. 50m apart), predominantly conical types. A remaining portion of this series of cairns on the north-west slope, close to Botn, remained unsurveyed, and this was completed in 2008. The route consisted again of primarily conical cairns, though closer to the lower slopes and the farm there was a beehive type. Areas of worn and trodden walkways were identified in which it was possible to trace the actual use of the trackway connected with the cairns. On the lower slopes, several of the cairns had collapsed, or had been rebuilt fairly recently (?early 20th century).

The route itself, when taken together with the survey in both 2007 and 2008, which was

approximately 5km long, suggests a specific planning and organisation through the consistent use of one particular type of cairn construction: the conical cairn. The route passes over the low lying upland between two fjords, and would have perhaps been a well used and often trodden trackway, perhaps accounting for the well marked, consistent use of a particular cairn construction, as well as the proximity and equidistant placement of cairns (especially on the upper most plateau area). Inclement weather such as snow and fog would have made movement across this part of the peninsula hazardous, and a well marked route would have been essential.

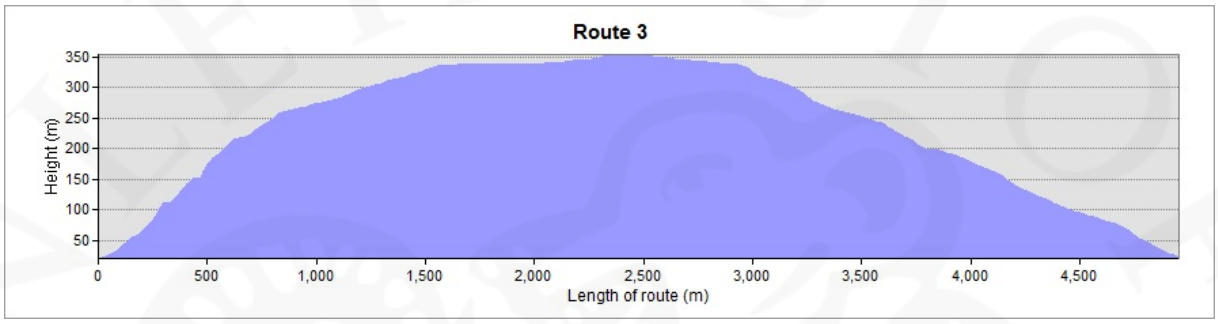

Figure 1. *Height profile generated from dtm data (LMÍ). Looking south-west through Eyrarfjall, and from left to right east to west.*

The height and slope profile of the route shows that the eastern side of the route is much steeper, and more hazardous than the western side, and this was experienced during surveying – so much so, that there was some discussion about how feasible it would be to walk up this slope in bad weather, let alone with horses and baggage. On the western side of the slope, close to the surveyed trackway, remnants of a Danish cooking range was found (?19th century). It is tempting to imagine the conditions under which this was left: a heavy iron made cooking range left on the slopes because it was too heavy to take upslope, and perhaps unfeasible to take downslope on the eastern side. In all likelihood, this route was an important communication route between the two fjords, as well as perhaps in connecting regions from the south to northwest Iceland. In c. 1930 a modern road was constructed over this pass, specifically designed for motorised transport, and when this was built it possibly removed any traces of other routes on the eastern slopes (more feasible ones), though remnants of cairns exist along the ravine Eyragil and there are some indications of a trackway connected with Eyri.

Survey 2: Eyri – Bjarnarstaðir – Vogar – Svansvík (10-11/7/08)

The survey was conducted over two days, starting in the south from Eyrafjall and moving towards the north to Vogar and Svansvík, primarily along the upland plateau. The main emphasis was to visually find sites based on horizonal observations (literally viewing cairns from a distance against distinct but visibly different backgrounds), and to move between prominent places along the journey to expand the visible scope of the survey. As there were three of us, we covered more ground by being spread out along a flat line (c. 500-700m wide) that ran east to west as we moved. In doing so, we covered the majority of the eastern area whilst recognising other possible markers to the east and the west (which were noted as areas for future survey).

Immediately after leaving the Eyrafjall route area the high point was approached, and from there the plateau was observed, identifying several cairns in the distance. Three cairns were recorded in the vicinity of the hill Álftaborg, perhaps marking three boundaries which converge on this hill. To the north is an area called Smávötn, referring to the small lakes

scattered in this area. However, this area was extremely hard to traverse, and in all likelihood the cairns that we encountered beyond this area were connected to boundaries and other types of functions or markings, rather than to movement, which would have been extremely difficult. Beyond Smávötn there was a small cluster of two cairns close to a possible sheiling or pasture area called Selteigur – sheiling meadow land. Beyond this, a small isolated conical cairn was located on a hill (32m above sea level). Following this, a ridgeway contained several cairns: conical, pile and natural with marking cairns. This lay above and to the east of what seemed to be a good pasture area, though there appeared to be very little archaeology that would support such a statement, besides two possible shelters, both very badly preserved and ephemeral. It was noted however, that there were more features on the western slopes above this area, which were subsequently surveyed (see survey 5). Beyond this area few other sites were encountered, besides a few more cairns, and a sheep enclosure close to Svansvík that was nestled into the side of the cliff face.

Survey 3: Reykjafjarðarhals (14/7/08)

This survey was conducted when the visibility was poor due to low lying mist and rain, making the experience of surveying more realistic in terms of the potential usage of the cairns as waymarkers; these were the majority of sites that were found, though one peat cutting area up slope, on one of the benches, was also recorded. A couple of the cairns that were surveyed in 2008 had already been surveyed in 2007.

It is possible that some of these cairns, particularly those on the tops of the ridges, were connected to the boundary between Reykjafjarðarhals and Þúfur. Also, some of these cairns, rather than relating to inter-settlement routes, marked routes to specific resource places. A peat cutting place was surveyed around which several cairns were located.

Survey 4: Eyri - Bjarnarstaðir – Vogar (15-18/7/08)

This survey concentrated on the basalt plateau immediately above the farms of Eyri, Bjarnarstaðir and Vogar. The survey took place over several days, covering a 10km strip. The first area was south of Eyri, in order to find out whether there were sites placed upslope towards the south – on Fjalleyrar and Eyrargil; several cairns were surveyed. There appears to be a track that is located obliquely upslope from Eyri and was perhaps partially replaced by the modern road marked by several cairns that suggested a route that weaved along the ravine Eyrargil.

Towards Bjarnarstaðir more cairns were found, perhaps marking a route upslope that joined another network of cairns on the ridge that were found as part of Survey 2. However, the majority of the cairns may have marked activity areas rather than routes. Two sites were found which contained structural and enclosure components. One was related to two attached enclosures. The second was a more extensive mound of possible structural features: a small multi-roomed structure, as well as one outer building. However, these features had been effected by frost and thaw weathering process, which made their identification as structural remains a little suspect. Cairns at both locations were used to mark the sites, which were clearly visible from above as horizon markers that would have allowed safe passage down to Bjarnarstaðir. The third area surveyed was above Vogar, in which a number of cairns were surveyed, as well as a small enclosure and fold that utilised the small natural outcrop in its construction.

Survey 5: Fremraselvatn – Viðidalir – Vatnsfjarðarsel (21/7/08)

This central area of the peninsular contained many sites, the majority of which were cairns. However, not all of the cairns were route markers; rather, many of them were boundary markers, an interpretation made when the farm boundaries were overlaid with the

survey data. There was a clear relationship between the cairns that ran in a southwest to northeast direction, mirroring the boundary between Vatnsfjarðarsel and Reykjarfjörður. In addition to these cairns there were several that lay on the lower slopes on the Vatnsfjarðarsel side, which perhaps related to specific activity areas; to begin to address this issue there will be an analysis with the place-name sketch map.

A major route was identified during this survey, running from the farmland of Reykjarfjörður and Reykjarfjarðarsel in the east towards Vatnsfjarðarsel in the west, just below the end of the Reykjarfjarðarhals ridge. This route was marked by closely spaced cairns, approximately 50-100m apart, consisting of a mix of different cairn types: generally conical and towers. The cairns were in a located sequentially in a line except in one place where there were two cairns that lay c. 15m apart, perpendicular to the route. Similar 'gateways' have been seen in other places. They perhaps indicate a transition place between properties along a route, that provide both a homecoming but also a statement of ownership. One could read this as a material statement of property, and was probably intended to be viewed in connection to those moving into or out of Vatnsfjarðarsel or Reykjarfjarðarsel.

Survey 6: Borgarey (23 – 25/7/08)

The island of Borgarey has already been surveyed in 2005, though this was a rather rapid survey and the island had not been walked systematically. In 2008 it was decided that the island would be the locale for the landscape teaching for the field school, in which a major component would be walking the entirety of the island in survey lines (where its topography permitted). Several new sites were found, including a harbouring facility on the north side of the island, but the farm site with its structures, as well as cairns and fox trap on the east side of the island were surveyed again. The students were exposed to a range of different survey techniques, and at the end of second group's survey, they were asked to produce a mental map of their survey experience. This was primarily used to reflect on the survey techniques that they had been exposed to, and to gauge their perception of the landscape: how connected they were. The distinctively different impressions, use of coding and figuring of the paths taken during the survey were clearly seen on the students' maps.

Survey 7: Fremraselvatn – Neðraselvatn (28/7/08)

An additional survey was undertaken around the western side of Fremraselvatn. The sites surveyed were primarily cairns, and probably related to the boundary between Kelda and Vatnsfjarðarsel. Also, a shelter and enclosure on the very edge of the lake were found.

Practicing landscape, making meaning

Following on from the summary of the survey conducted in 2008, I want now to discuss several issues relating to landscape survey and the interpretative processes. Landscape survey is about more than locating sites; it is about attributing meaning to places and articulating one's connection to the surveyed landscape. The cairns for example mark specific places, but are in themselves bringing an array of attachments and activities through their marking that are reflected upon: as a location, through a sense of place, and in establishing locales and the formation of wider connections to *other* spaces. Therefore, survey in this context is about making connections between a circulation of entities: place, space, humans (and non-humans), and environments. This constellation of entities circulate and connect, and is what fundamentally constitutes the landscape. Arguably those connections can only be established through a dynamic type of survey in which meaning and practice merge and synchronise to form meaningful *and* practical experiences of landscape. This is not, it should be noted, a disregard of the important routinised practices of survey and detailed recording, but a

combination of objective record and subjective experience. And this is not a phenomenology in which the experiences of landscape are 'sensed' and relational to the body alone (cf Tilley 2004), but are connected to the *archaeological* experiences of carrying out survey: an understanding of how landscape works through practice, and interpreting the histories inscribed and woven into the land.

This epistemology in practice is always a circulation of evidence both as it is experienced in the field, and as it is reproduced through analysis and writing reports like this one. Landscape necessitates a multi-sited archaeology in which scales of recording, analysis, perspectives, reflections and experiences are mediated in the production of many possible interpretations. For example, the reflection in the field of the 'gateway' found during Survey 5 suggested it was a statement of entering or leaving one land to another. But its placement in relation to other cairns, contextualised via the GIS, suggested it lay along the boundary between the two farms. Here its location, locale and construction compared to others along the network, as well as its visibility in the field, all came together to form that particular interpretation of a 'statement of property'.

Perhaps such comments are overly theoretical and reflective for a grey report that summarises survey fieldwork? However, its importance is central to what is being attempted in the landscape survey, and in the whole transdisciplinary Vatnsfjörður project, in which the main aim is an understanding of the relationship between Vatnsfjörður and its environs through time (for an interesting study, but a different context, see also Bender, Hamilton and Tilley 2007). Landscape, as suggested in the first part of this summary, is not only determined by the underlying geological structure. Such an influence is important to recognise, but places for activity were shaped by the social, political and economic conditions held in places of power such as Vatnsfjörður in profound ways. Such power structures were also contested in novel ways, such as through alterations, reuses and abandonments of existing material structures. Therefore, the connection between Vatnsfjörður and its wider landscape is often portrayed in minute detail in the sites that are surveyed in the landscape, if not directly then tangently. For example, particular routes and their markings work at different scales of inquiry that lead one towards an interpretation concering who made the cairns, when, and in what ways they connected places east and west. of Vantsfjarðardalur. Disentangling this complexity is the next step, through an archaeology that values what is brought to its interpretation from multiple sources and sites.

Conclusions

The landscape survey in 2008 found a total of 224 sites, 140 of which were cairns. The other sites consisted of tracks, turf and stone structures, enclosures, landing spots, as well as fox traps (as in other years). In the next season of fieldwork it is expected that the survey will be completed in the main peninsular area. In 2009 there will be a focus on the area between Reykjarfjarðasel and the route to Vatnsfjarðarsel and the area between Kelda and Hörgshlíð. In addition, a random sample of one or two areas will be walked systematically (possibly the venue for student teaching) in order to test the quality of the survey data. Although the area towards the interior in the south-west presents some logistical issues, an exploratory survey will take place, particularly in Húsadalur and Bessárdalur.

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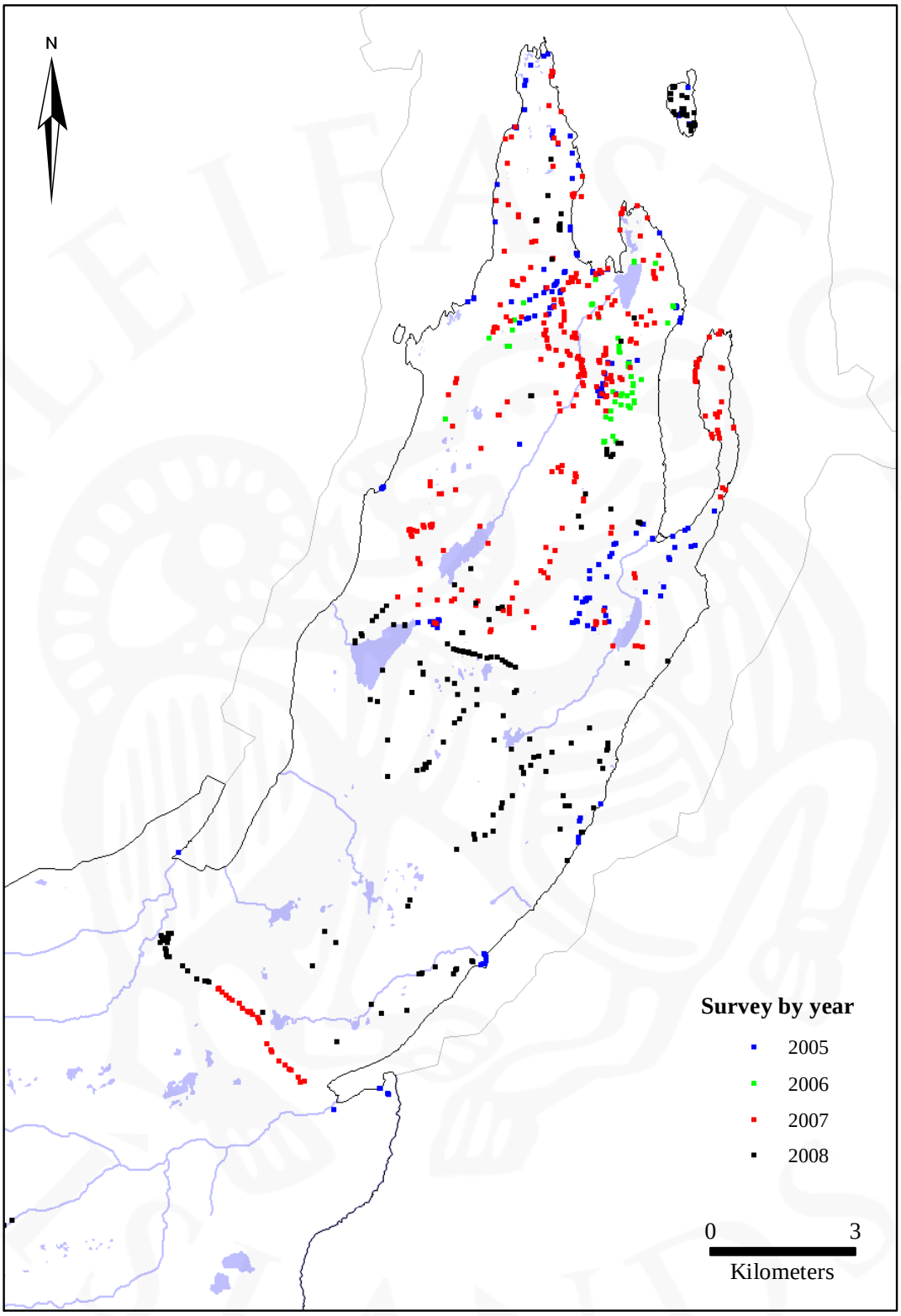


Figure 2. *All sites found by landscape survey in 2005- 2008.*

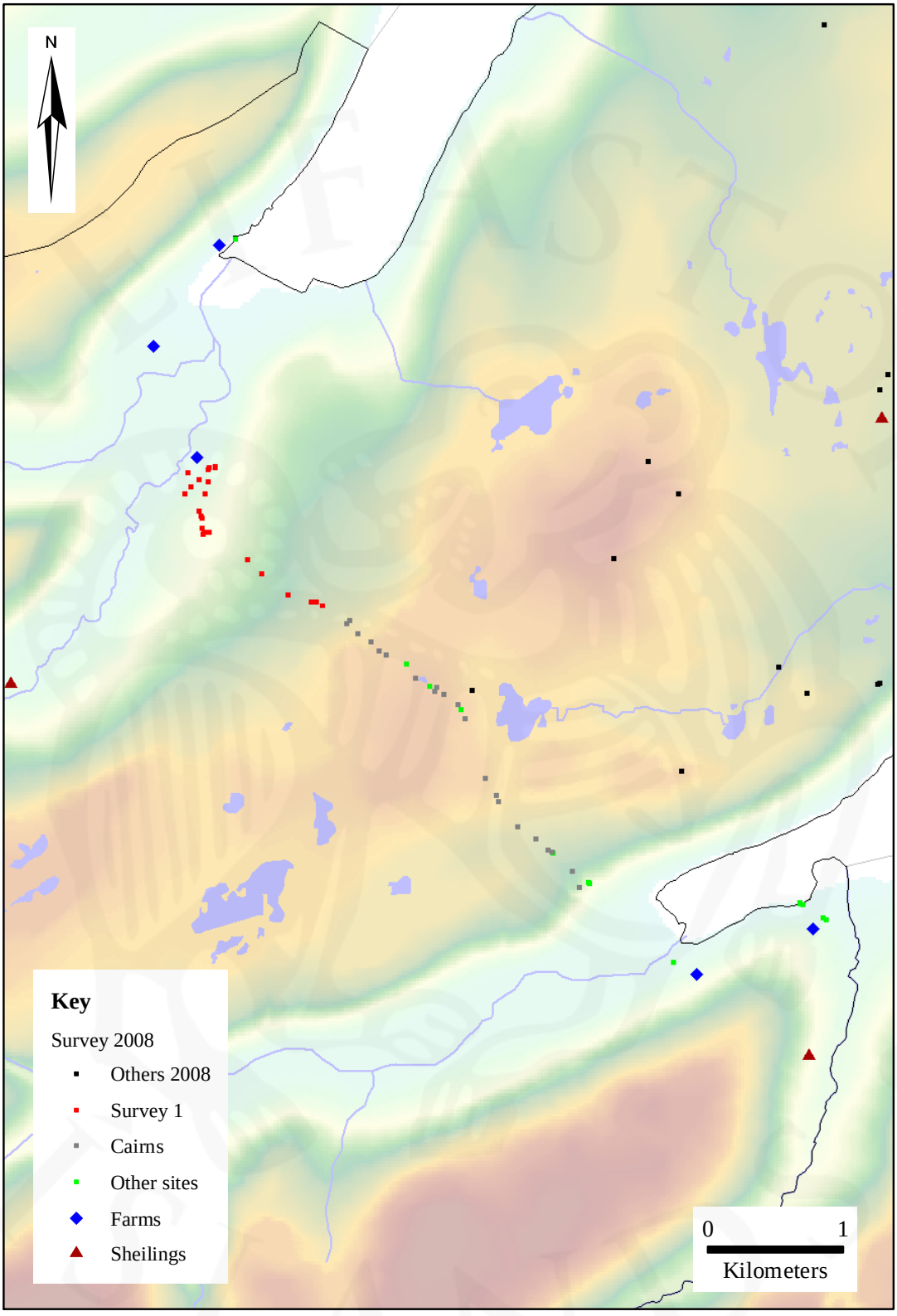


Figure 3. *Survey 1: Hestakleif – Botn.*

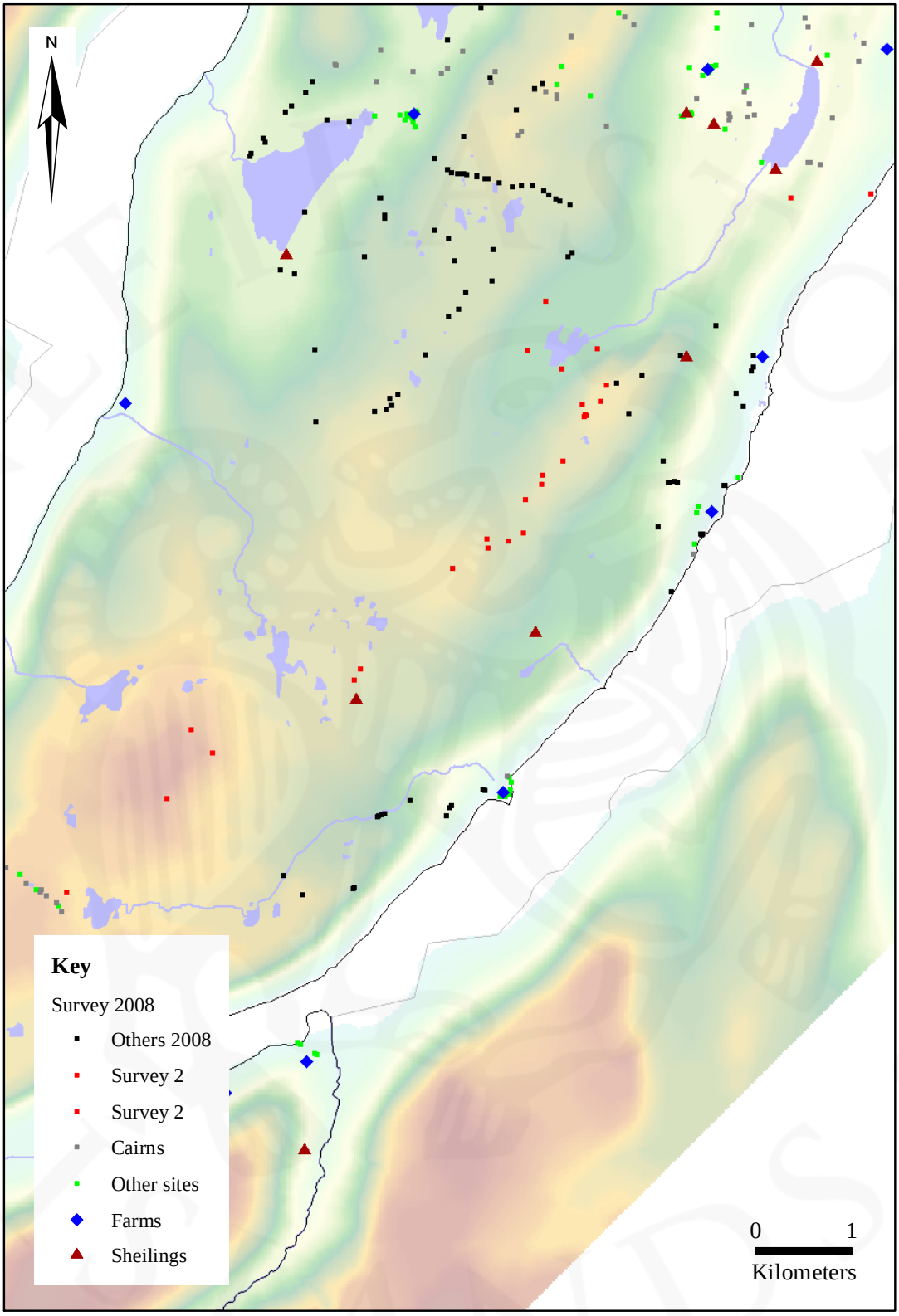


Figure 4. *Survey 2: Eyri – Bjarnarstaðir – Vogar – Svansvík.*

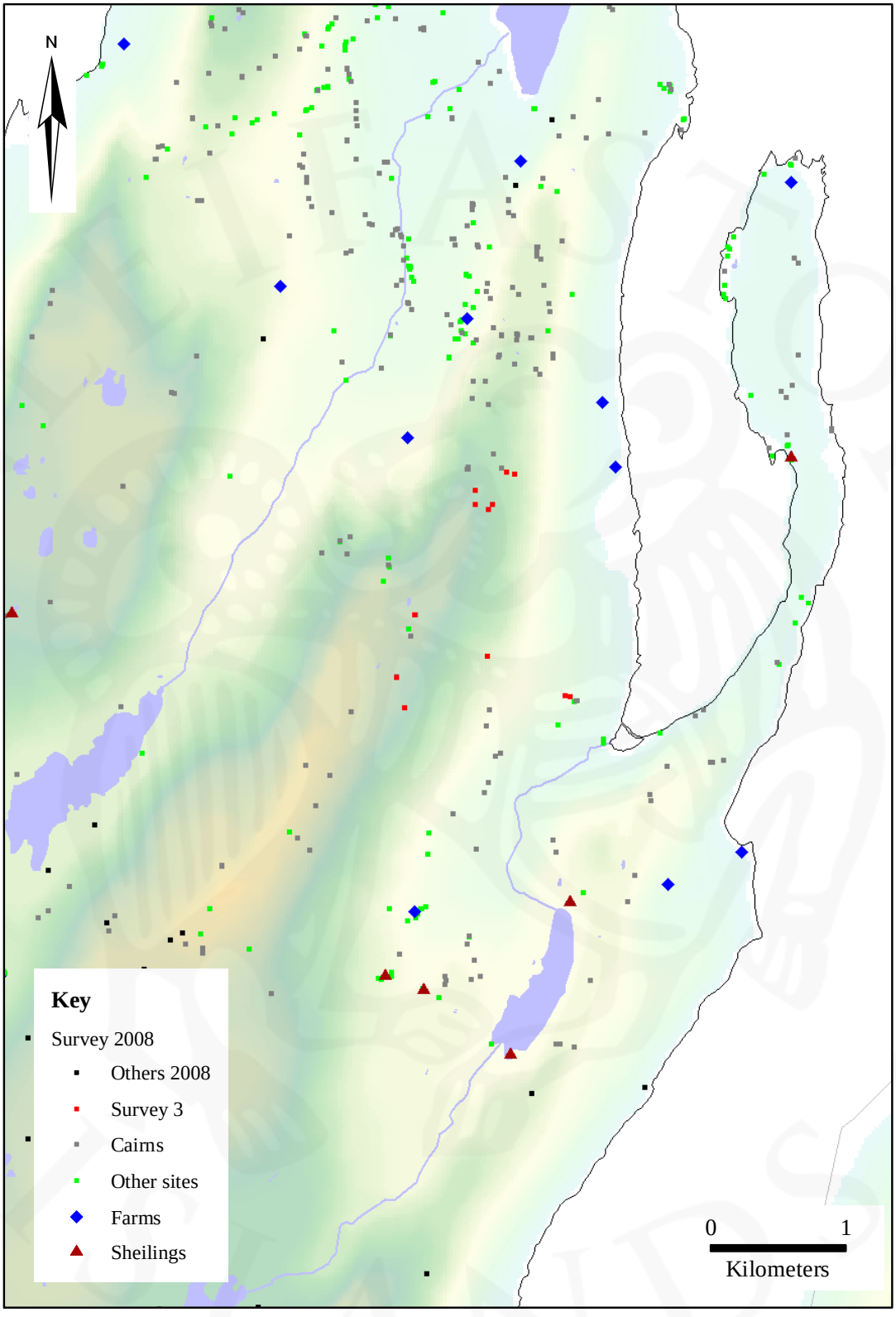


Figure 5. *Survey 3: Reykjafjarðarhals.*

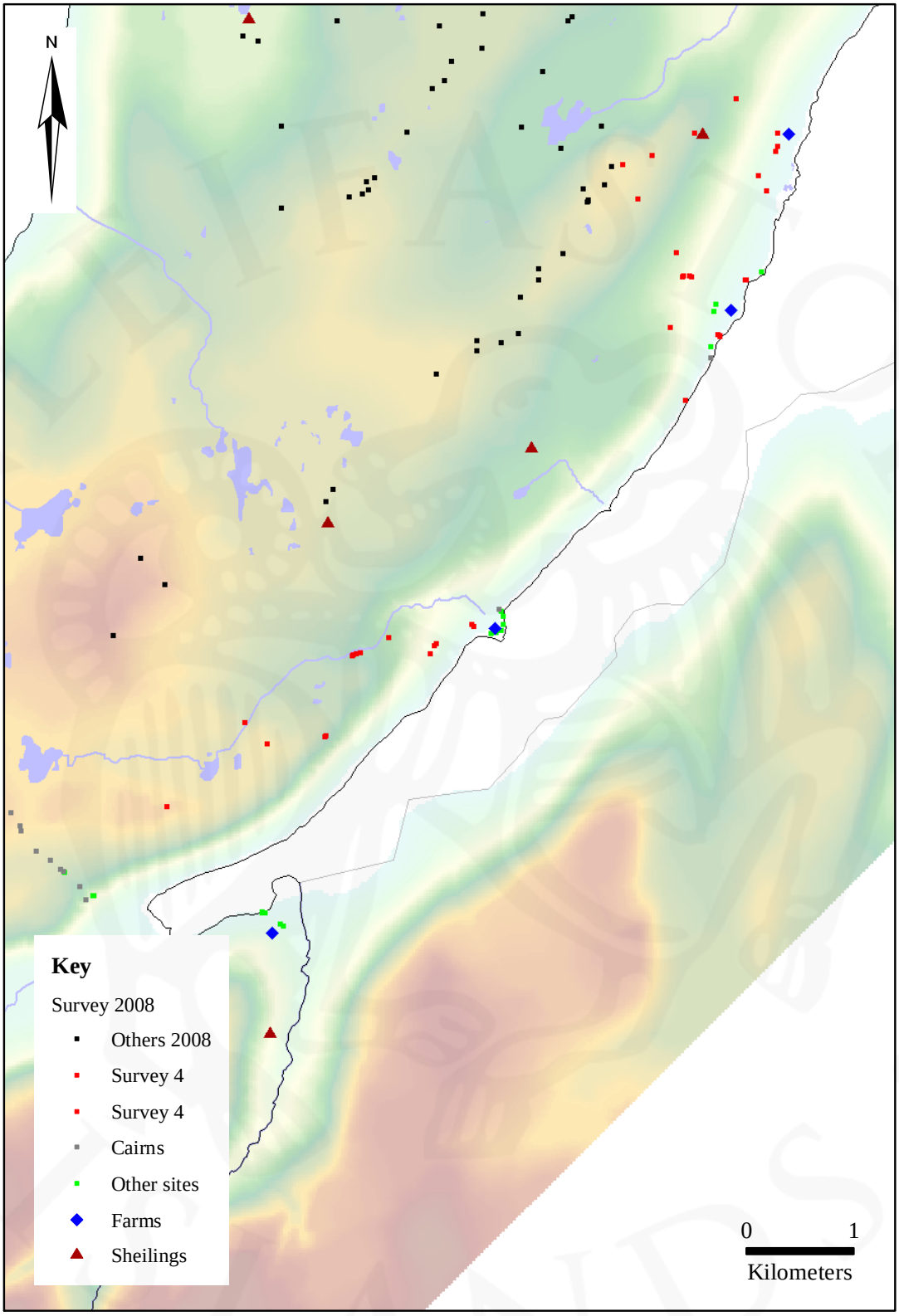


Figure 6. *Survey 4: Eyri – Bjarnarstaðir – Vogar.*

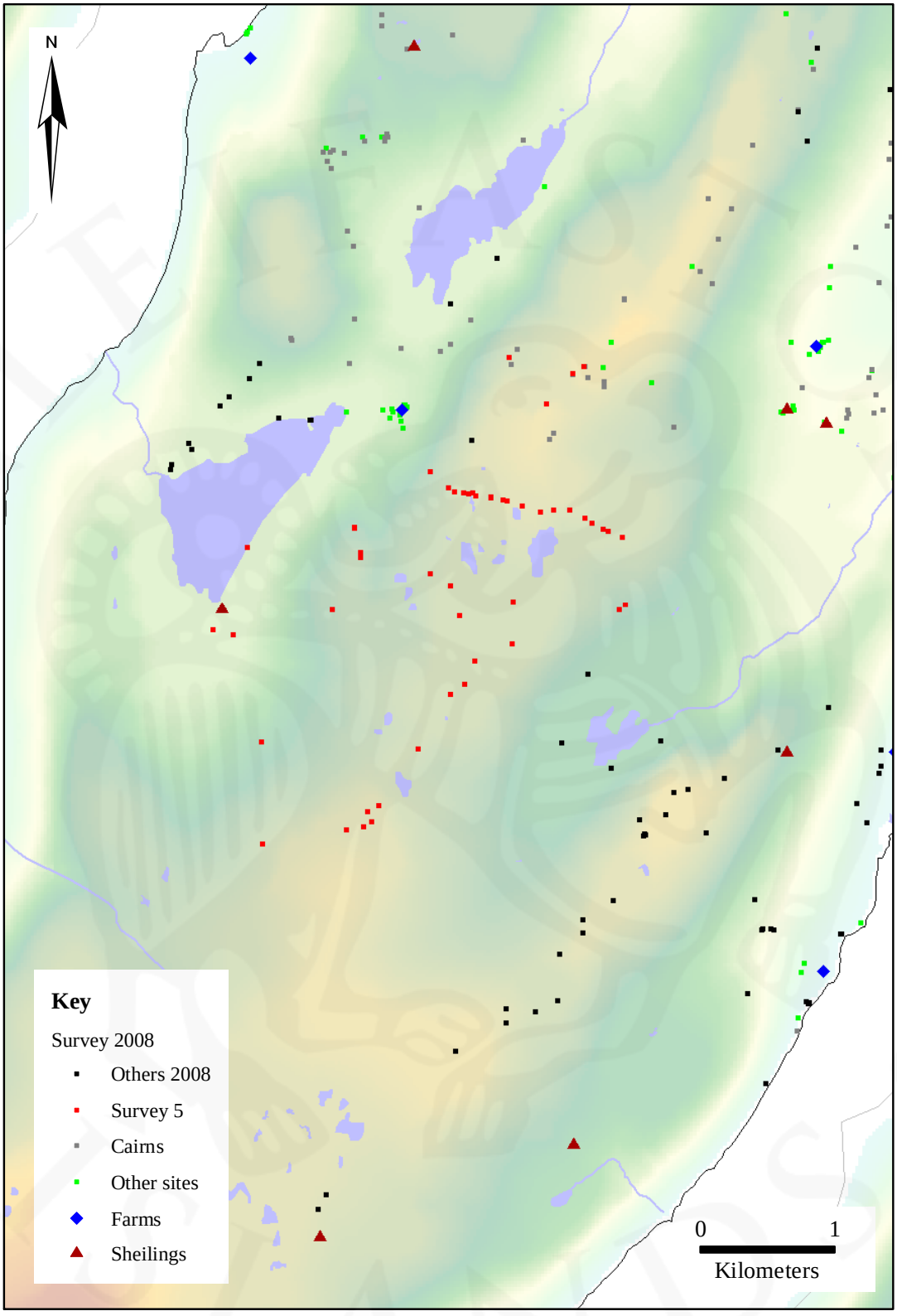


Figure 7. *Survey 5: Fremraselvatn – Viðidalir – Vatnsfjarðarsel.*

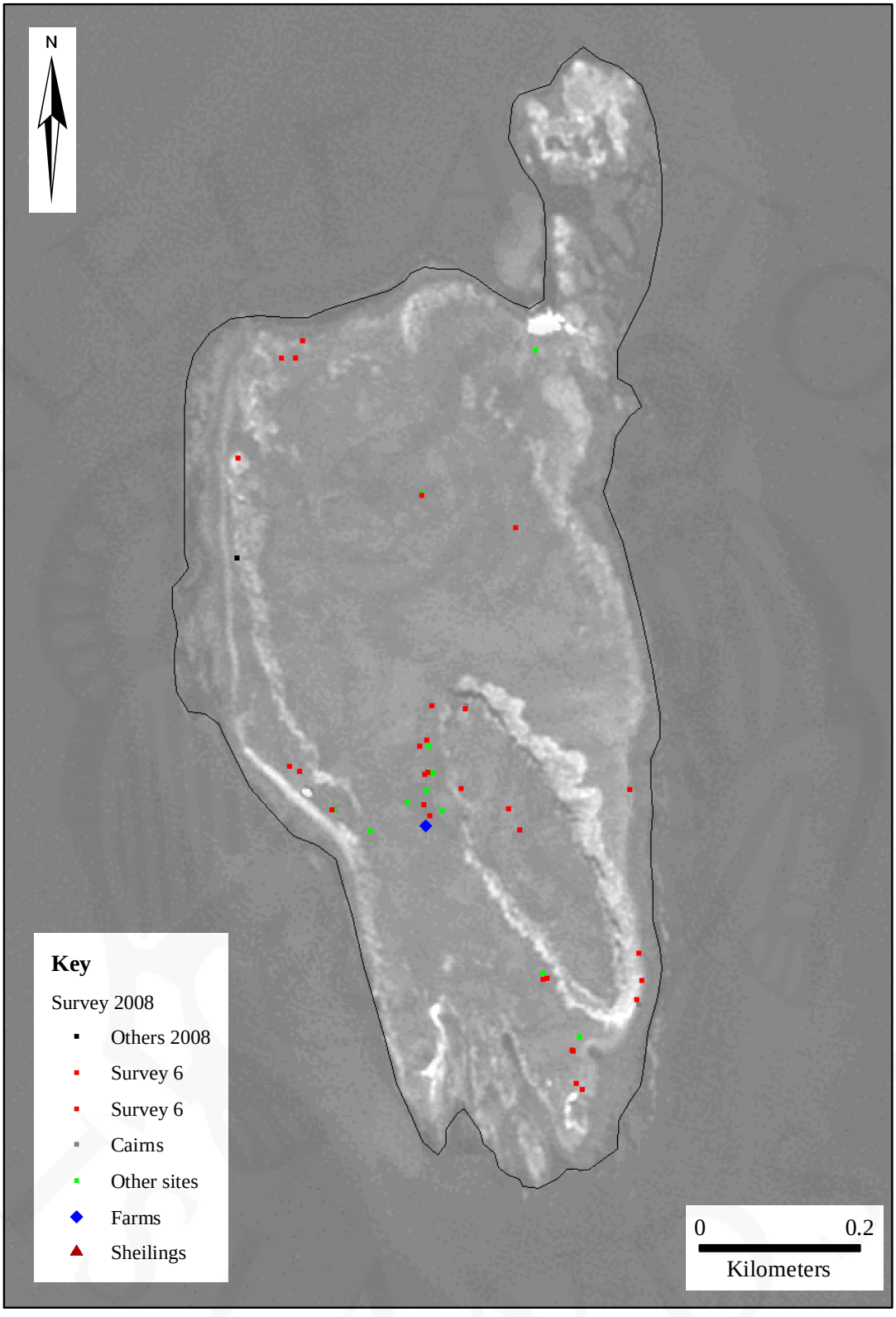


Figure 8. *Survey 6: Borgarey.*

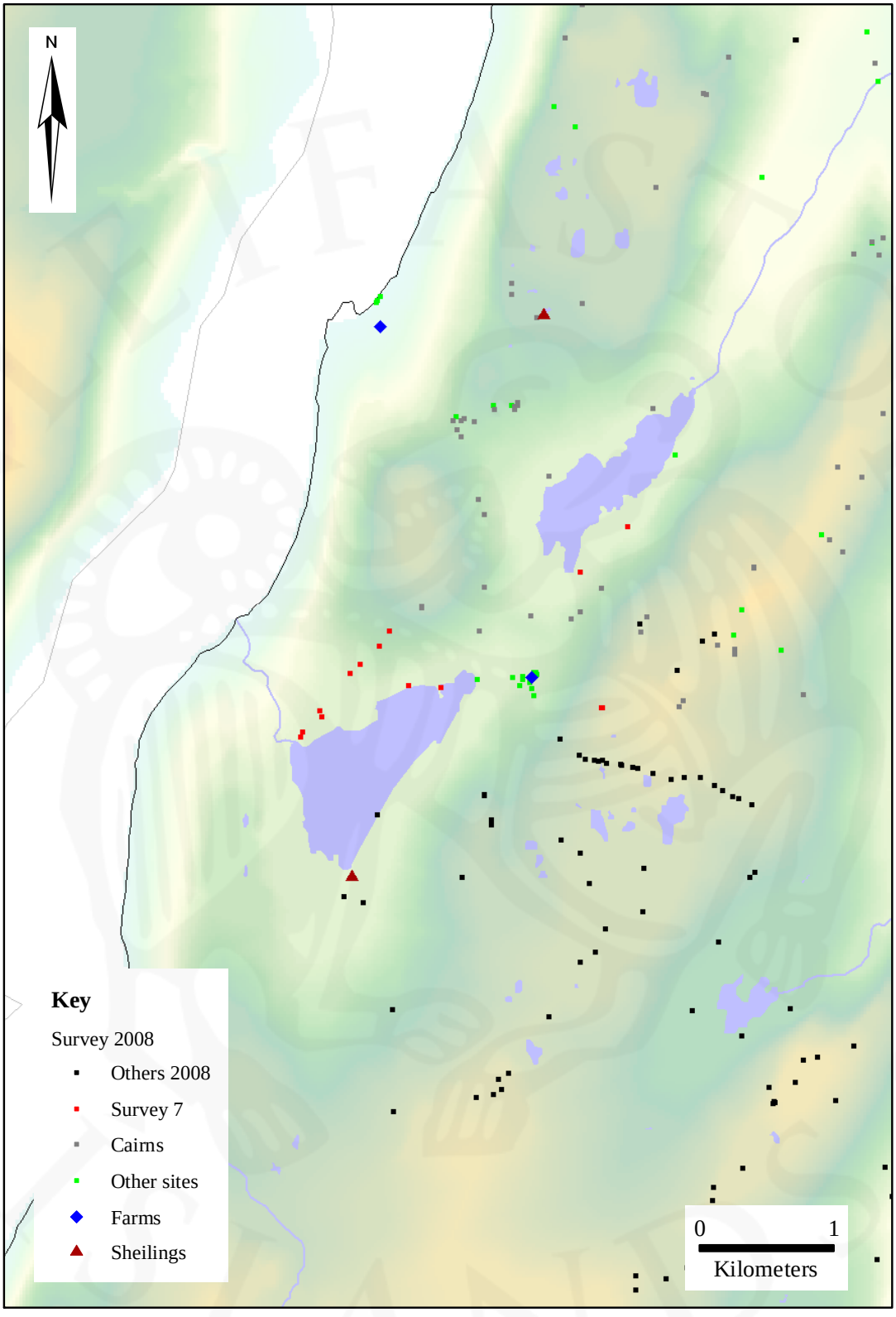


Figure 9. *Survey 7: Fremraselvatn – Neðraselvatn.*

Appendix 1:
Cairn typology

Beehive (UID 581)

Pile (right UID 147)

Box (UID 725)

Natural with markings (UID 209)

Conical (UID 310)

Simple (UID 673)

Single 1 (UID 768)

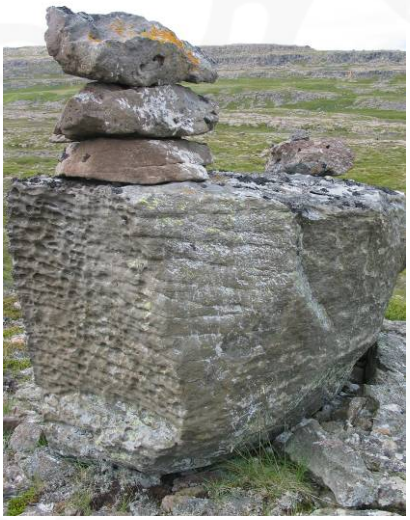
Vat (UID 305)

Single 2 (Sticky-uppy) (UID 573)

Tower 1 (UID 96)

Ship’s keel (UID 123)

Tower 2 (UID 200)



Variations

Collapsed cairns

Tyre and stones

Bird shit and stone (UID 636)

Holey cairn (UID 415)

Definitions (Poul Heide and Oscar Aldred)

Beehive	Straight sided, curved or shaped top, with sides and base more or less the same dimensions
Box	Straight sided and flat tops, often square or rectangular *dimensions more or less equal
Conical	Cone shaped, with at least 2 sides meeting at an angle *almost triangular
Pile	Collected stones shaped into a cairn that reflects the stone's natural angle of rest
Natural with marking	Large boulder or erratic which has been marked on top with a group of roughly placed stones
Simple	No discernable shape, small, not well constructed, a heap of stones without a coherent structure * should not used as a catch-all type
Single 1	Single stone that marks a natural boulder or erratic in an extremely obvious way, often an upright that breaks the outline of the natural boulder
Single 2	An upright that is a single stone placed on its end without a group of stones placed around its base
Ship's keel	A sharp edged cairn that can be triangular in form and shaped like a ship's keel
Vat	An upright that rises above and is set and placed within a group of stones
Tower 1	Tall cairn in which the height exceeds the width, often almost vertically sided, well constructed and extremely stable
Tower 2	Tall cairn in which the height exceeds the width, often almost vertically sided but is constructed by a stack of single stones, can be relatively unstable

Appendix 2:
Sites surveyed in 2008

UID	SiteID	Type	Date
600	1	Wall	08/07/2008
601	2	Cairn	09/07/2008
602	3	Cairn	09/07/2008
603	4	Void	
604	5	Cairn	09/07/2008
605	6	Track	09/07/2008
606	7	Cairn	09/07/2008
607	8	Shelter wall	09/07/2008
608	9	Cairn	09/07/2008
609	10	Track	09/07/2008
610	11	Cairn	09/07/2008
611	12	Cairn	09/07/2008
612	13	Cairn	09/07/2008
613	14	Cairn	09/07/2008
614	15	Track	09/07/2008
615	16	Step stones	09/07/2008
616	17	Track	09/07/2008
617	18	Track	09/07/2008
618	19	Track	09/07/2008
619	20	Track	09/07/2008
620	21	Cairn	09/07/2008
621	22	Track	09/07/2008
622	23	Track	09/07/2008
623	24	Track	09/07/2008
624	25	Track	09/07/2008
625	26	Track	09/07/2008
626	27	Track	09/07/2008
627	28	Track	09/07/2008
628	29	Cairn	09/07/2008
629	30	Cairn	09/07/2008
630	31	Cairn	09/07/2008
631	1	Cairn	10/07/2008
632	2	Cairn	10/07/2008
633	3	Cairn	10/07/2008
634	4	Cairn	10/07/2008
635	5	Cairn	10/07/2008
636	6	Cairn	10/07/2008
637	7	Cairn	10/07/2008
638	8	Cairn	10/07/2008
639	9	Cairn	10/07/2008
640	10	Cairn	10/07/2008
641	11	Cairn	10/07/2008
642	12	Cairn	10/07/2008
643	13	Cairn	10/07/2008
644	14	Cairn	10/07/2008
645	15	Cairn	10/07/2008
646	16	Cairn	10/07/2008
647	17	Cairn	10/07/2008
648	18	Track	10/07/2008
649	19	Track	10/07/2008
650	20	Cairn	10/07/2008
651	21	Shelter	11/07/2008
652	22	Shelter	11/07/2008
653	23	Cairn	11/07/2008
654	24	Cairn	11/07/2008
655	25	Enclosure	11/07/2008
656	1	Cairn	14/07/2008
657	2	Cairn	14/07/2008
658	3	Cairn	14/07/2008
659	4	Cairn	14/07/2008
660	5	Cairn	14/07/2008
661	6	Cairn	14/07/2008
662	7	Cairn	14/07/2008
663	8	Cairn	14/07/2008
664	9	Cairn	14/07/2008
665	10	Cairn	14/07/2008
666	11	Peat cutting	14/07/2008
667	12	Cairn	14/07/2008
668	13	Cairn	14/07/2008
669	7	Cairn	10/07/2008
670	8	Modern antenna structure	10/07/2008
671	10	Cairn	11/07/2008
672	17	Cairn	15/07/2008
673	18	Cairn	15/07/2008
674	19	Cairn	15/07/2008
675	20	Cairn	15/07/2008
676	21	Cairn	15/07/2008
677	22	Cairn	15/07/2008
678	23	Cairn	15/07/2008
679	24	Structure	15/07/2008
680	25	Fox trap	15/07/2008
681	1	Enclosure	15/07/2008
682	2	Cairn	15/07/2008
683	3	Structure	15/07/2008
684	4	Structure	15/07/2008
685	5	Cairn	15/07/2008
686	6	Cairn	15/07/2008
687	7	Natural	15/07/2008
688	8	Cairn	15/07/2008

689	9	Fold	15/07/2008
690	10	Cairn	15/07/2008
691	11	Fox trap	15/07/2008
692	12	Cairn	15/07/2008
693	13	Wall	15/07/2008
694	14	Wall	15/07/2008
695	26	Cairn	15/07/2008
696	27	Cairn	15/07/2008
697	28	Cairn	15/07/2008
698	29	Cairn	15/07/2008
699	30	Cairn	15/07/2008
700	32	Cairn	15/07/2008
701	33	Cairn	15/07/2008
702	34	Cairn	15/07/2008
703	35	Cairn	15/07/2008
704	36	Cairn	15/07/2008
705	37	Cairn	15/07/2008
706	38	Cairn	15/07/2008
707	39	Cairn	15/07/2008
708	40	Cairn	15/07/2008
709	41	Cairn	15/07/2008
710	1	Cairn	18/07/2008
711	2	Enclosure	18/07/2008
712	3	Cairn	18/07/2008
713	4	Track	18/07/2008
714	5	Track	18/07/2008
715	6	Track	18/07/2008
716	7	Track	18/07/2008
717	8	Enclosure	18/07/2008
718	9	Enclosure	18/07/2008
719	10	Boat landing	18/07/2008
720	11	Boat house	18/07/2008
721	12	Enclosure	18/07/2008
722	13	Enclosure	18/07/2008
723	1	Mound	21/07/2008
724	2	Enclosure	21/07/2008
725	3	Cairn	21/07/2008
726	4	Cairn	21/07/2008
727	5	Cairn	21/07/2008
728	6	Cairn	21/07/2008
729	7	Cairn	21/07/2008
730	8	Cairn	21/07/2008
731	9	Cairn	21/07/2008
732	10	Cairn	21/07/2008
733	11	Cairn	21/07/2008
734	12	Horse track	21/07/2008
735	16	Cairn	21/07/2008
736	17	Cairn	21/07/2008
737	18	Cairn	21/07/2008
738	19	Cairn	21/07/2008
739	20	Cairn	21/07/2008
740	21	Peat cutting	21/07/2008
741	22	Cairn	21/07/2008
742	23	Cairn	21/07/2008
743	24	Cairn	21/07/2008
744	25	Cairn	21/07/2008
745	26	Cairn	21/07/2008
746	27	Cairn	21/07/2008
747	1	Cairn	21/07/2008
748	2	Cairn	21/07/2008
749	3	Cairn	21/07/2008
750	4	Cairn	21/07/2008
751	5	Cairn	21/07/2008
752	6	Shelter	21/07/2008
753	7	Cairn	21/07/2008
754	8	Cairn	21/07/2008
755	9	Cairn	21/07/2008
756	10	Cairn	21/07/2008
757	11	Cairn	21/07/2008
758	12	Cairn	21/07/2008
759	13	Cairn	21/07/2008
760	14	Cairn	21/07/2008
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762	16	Cairn	21/07/2008
763	17	Cairn	21/07/2008
764	18	Cairn	21/07/2008
765	19	Cairn	21/07/2008
766	20	Cairn	21/07/2008
767	21	Cairn	21/07/2008
768	22	Cairn	21/07/2008
769	23	Track	21/07/2008
770	24	Cairn	21/07/2008
771	25	Cairn	21/07/2008
772	26	Cairn	21/07/2008
773	27	Track	21/07/2008
774	28	Cairn	21/07/2008
775	1	Structure	23/07/2008
776	2	Mound	23/07/2008
777	3	Boat house	23/07/2008
778	4	Structure	23/07/2008
779	5	Structure	23/07/2008
780	6	Peat cutting	23/07/2008
781	7	Folklore site	23/07/2008
782	8	Enclosure	23/07/2008
783	9	Structure	23/07/2008
784	1	Structure	23/07/2008

785	2	Harbouring facility	23/07/2008
786	3	Landing spot	23/07/2008
787	4	Structure	23/07/2008
788	5	Boundary	23/07/2008
789	6	Structure	23/07/2008
790	7	Cairn	23/07/2008
791	8	Cairn	23/07/2008
792	9	Fox trap	23/07/2008
793	10	Void	25/07/2008
794	11	Cairn	25/07/2008
795	12	Peat cutting	25/07/2008
796	13	Peat cutting	25/07/2008
797	14	Peat cutting	25/07/2008
798	15	Enclosure	25/07/2008
799	16	Cairn	25/07/2008
800	17	Peat cutting	25/07/2008
801	18	Nesting boxes	25/07/2008
802	19	Nesting boxes	25/07/2008
803	20	Cairn	25/07/2008
804	21	Cairn	25/07/2008
805	22	Void	
806	23	Void	
807	24	Structure	25/07/2008
808	25	Cairn	26/07/2008
809	26	Cairn	26/07/2008
810	27	Cairn	26/07/2008
811	28	Cairn	26/07/2008
812	29	Cairn	26/07/2008
813	30	Cairn	26/07/2008
814	31	Cairn	26/07/2008
815	32	Cairn	26/07/2008
816	33	Cairn	26/07/2008
817	34	Stone wall	26/07/2008
818	35	Cairn	26/07/2008
819	36	Cairn	26/07/2008
820	37	Enclosure	26/07/2008
821	38	Shelter	26/07/2008
822	39	Track	26/07/2008
823	40	Cairn	28/07/2008

PERCEPTIONAL LANDSCAPE ANALYSIS IN THE VATNSFJÖRÐUR AREA, 2008

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Perception based approaches to landscape studies is not a new thing to the archaeological efforts in Vatnsfjörður, but the 2008 season gave opportunity to work much more intensively with this concept. From doing systematic surveys and landscape room analysis, we have now included a wider range of phenomenological tools. We have continued doing different types of visual analysis on, around and between the farm sites, and in addition to that we have initiated soundscape observations this year. With this years work we wanted to test a new set of methods suitable for describing the landscape in a phenomenologically interesting way. At the beginning of the season we were thus not certain of the outcome, but we have fortunately been able to conclude not only that the methods we tested were suitable for answering the questions we ask, but also that they have already generated datasets that enhance our understanding of the ancient life in this part of Iceland. Fortunately, we were able to include the field school students in the perceptional analysis this season. This not only gave us opportunity for doing more extensive analysis because of the increase in the number of people involved, but also made it possible to test some of our methods, e.g. the landscape room analysis on fresh eyes.

Visual Analysis

Visual analysis has so far been the scope of the landscape work in Vatnsfjörður, though in various shapes. Most of the landscape work has been done as systematic surveys, and the in-the-field interpretation of structures has been an integrated part of this. One element of this interpretive process has been to evaluate any possible visual connections to other sites, large and small – a sort of intervisibility analysis. Furthermore a series of landscape room analyses have been carried out, instigated by the work of Christian Keller. In 2008 we have continued the work on landscape rooms, and furthermore included a new range of visual analytical tools. Firstly, the intervisibility analysis that has automatically been done for the small sites recorded in the systematic surveys was transposed unto the farm sites. Secondly, we introduced a new recording technique: horizontal maps.

Landscape Room Analysis

In 2008 we continued the landscape room analysis, building onto the good results achieved in the work from 2007 and Christian Keller's work from previous years. The scope of the landscape room work this year was to get recordings from as many farms as possible, in order to understand if the rooms could be used to describe the relationships between the farmsteads and between an individual farmstead and its resource area.

The landscape rooms recorded in 2008 can be seen in Figures 1 and 2. All rooms were recorded by drawing on transparent sheets from a combined aerial photography and topographic map. Unfortunately, none of the sites recorded in 2008 offered the same diachronic resolution as Vatnsfjörður, where at least two phases can be identified. It has thus not been possible to identify the same interesting development within the individual sites as it was for Vatnsfjörður (Aldred 2007).

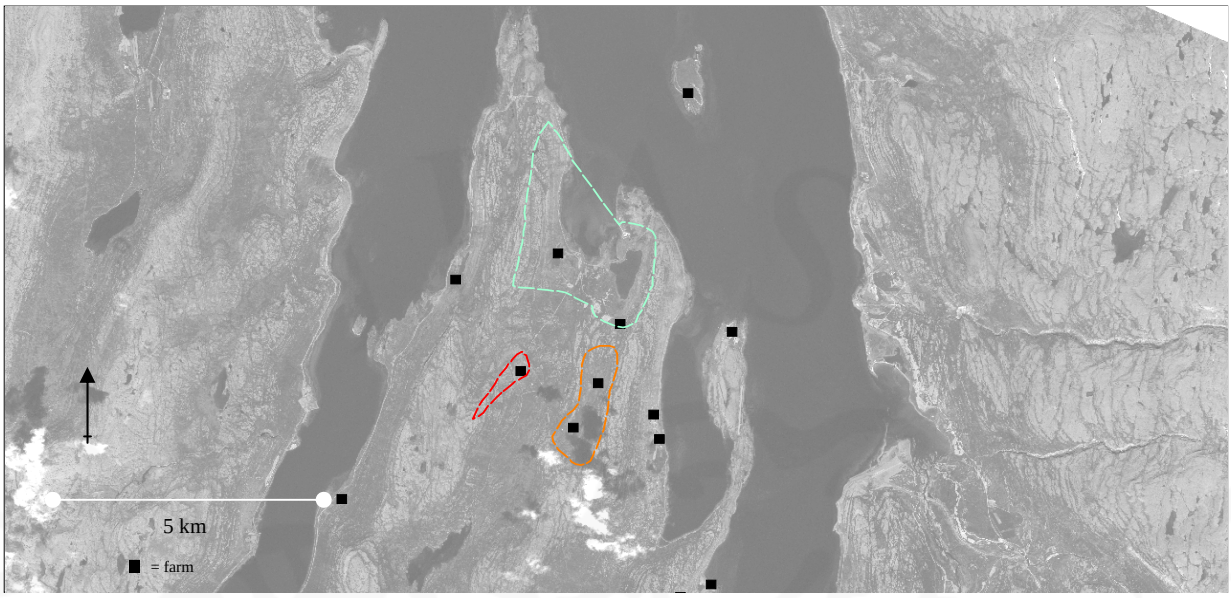


Figure 1. *The landscape rooms related to Sveinhús (top), Miðhús (lower left) and Hálshús (lower right). Note the difference in the size of the rooms, which increases by the coast. The extent of the room around Hálshús might be too large, and in fact only stretch southward 2/3 of the recording. Recent drainage work and fencing have altered the landscape to such a degree that it is impossible to see.*

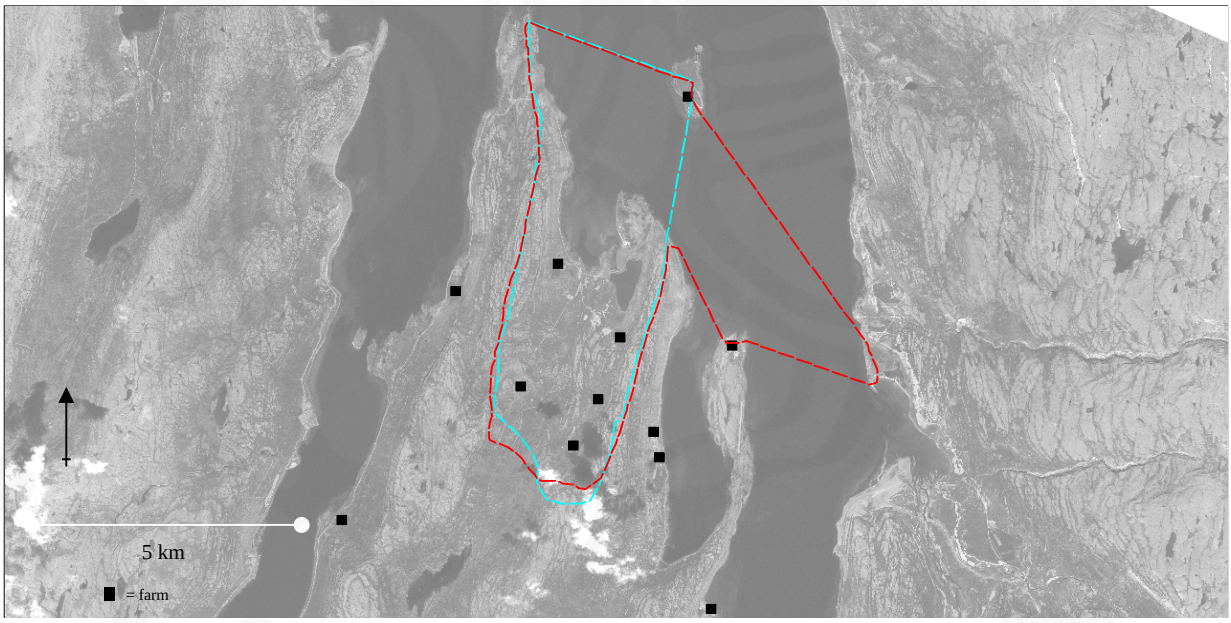


Figure 2. *The landscape room related to the farm at Borgarey. The light line represents the room as perceived by the surveyor, the darker the room as perceived by the field school students, who all included Reykjanes and Hafnardalur in the room. Note how far up in the valley the room stretches, including the rooms and territories of the farms here.*

The rooms recorded in 2008 are, just as Vatnsfjörður's rooms, shaped by the rugged terrain, and thus make oblong shapes with clear orientations. Because the farms included in 2008 are located in similar ways, slightly raised above the valley floor, the rooms in many ways have the same characteristics, with a short extent towards the valley side, a larger extent along the ridges, and the largest extent out in the valley space. The sideward extents are affected by the local terrain, and small terrain elements have significant effect on the size and

shape on the room. The low ridge separating Sveinhús and Hálshús thus has a strong impact on the extent of the room as perceived from those two farms, blocking the view in and out of the valley. Since the location on a plateau or slope, raised slightly above the bottom of the valley seems to be a common characteristic to all the farms in the area, the relation between the farms and these lateral obstacles (visualized through the landscape rooms) might be a way to understand the visual concerns behind the location of the farms, since this is the most affective agent in the design of the visual structure of the farm in the landscape.

A particularly interesting set of observations collected in 2008 was the landscape room recordings done at Borgarey, just off Vatnsfjörður. Despite an apparently infinite number of holms and skerries in the Icelandic seas, there are only relatively few islands large enough to support individual farm steads, particularly in the Westfjords. Borgarey is one of these islands, and the ruins are extant on the southern side of the island (Figure 3). I shall return to in a while how the island and fjord coast farms play a special role in the visual network formation of the larger fjord system.

Figure 3. *Borgarey in Ísafjarðardjúp. The ancient farm is located just right of the centre of the island, sheltered by the crest, Borg. There are puffin colonies at the back of the Borg, and along the cliff to the right. Picture facing NE. Photo: PBH.*

The landscape room connected to Borgarey is significantly larger than the ones in the valley (see Figures 1 and 2 for comparison), because water bodies generally allow for larger rooms, having no obstacles in them. The room includes not only the sea between Borgarey and Vatnsfjarðardalur, but also a large portion of the valley, including some of the farms in here. This is in itself an interesting phenomenon. At a shorter distance, the physical boundaries around and between the farms would be likely to affect the extent of the rooms. However, at this distance, the boundaries have lost their importance, visually speaking, and

we therefore experience a more or less total inclusion of the landscape rooms of the other farms. Though we do not know if Borgarey was a farm of any particular importance, the visual capacities of this farm by far exceed the other subjugated farms. In rough numbers, the visual resource area is by far larger, and it also includes areas otherwise controlled by other farms. We have no way of knowing if and how this was exploited by the ancient islanders; we can only conclude that Borgarey in this respect holds an important location in the wider landscape. Apart from the valley farms, Borgarey is also visually connected to a number of other farms around Ísafjörður. I shall return to in my conclusion how this can be perceived as significant. Suffice it to say, it enables Borgarey to act as a hub in the visual network of the fjord system.

The landscape room recordings from 2008 have shown that the farms all conform to a similar pattern in terms of the landscape room characteristics, a result of the practice of locating farms on the lower part of a slope or plateau, slightly raised and sheltered by a ridge to the back. The major sources of difference are the terrain features that limit the lateral extents of the landscape rooms, and though we cannot tell, these might have been used actively to create the best visual situation for the individual farmsteads. The present stage of investigations at these sites does not allow for diachronic analysis of the development in landscape rooms.

Borgarey displays a unique status in terms of landscape rooms, in that the room here is much larger than the valley rooms, and that it includes a number of farms. Furthermore there is direct visual contact to other farms around Ísafjörður. This has provided Borgarey with a significant visual resource, and it is possible that the farm has had a function as a hub between the different visual networks around Ísafjörður (see below).

Horizontal Mapping

Horizontal mapping is not as much an analytical tool as a recording technique. In the horizontal map, the three dimensional view of 360° around the observer is recorded as it is actually seen. It is thus in some ways similar to a normal view shed, but also different, because the record will show the actual view, and not a two dimensional representation of the area that can be seen.

Another aspect to the horizontal map is that it represents the landscape as humans see and perceive it. Though we in theory see all points in our view evenly well, the mind sorts out what it is programmed to find important and unimportant. What is considered important of course changes from individual to individual, but there are general characteristics to be found with almost everybody. In a view dominated by nature, and with a few cultural elements in it, the culture will often stand out, where as the nature will blend in. We pick out the anomalies in the overall picture, but we are also bound to notice the cultural elements, because they potentially carry more meaning relevant to us than natural features. In the horizontal map, these features that stand out will be recorded accordingly (often slightly exaggerated) and the horizontal map is thus a detailed picture of not the view, but the visual landscape as perceived by man.

Horizontal maps have not been used very often in archaeology, and our inspiration to test this method comes from the only publication, known to us, where they have been used (Hamilton and Whitehouse 2006). This also means that there is no established methodology behind the concept, and part of the challenge in using this recording concept was in fact to develop a proper technique.

Based on the suggestions in the Hamilton and Whitehouse (2006) we used a premade schedule as the key component in the recording procedure (see Figure 4). On the schedule can be recorded information about site, terrain, weather conditions and recording situation. The central part of the schedule consists of three concentric circles linked by a crosshair. The centre represents the position of the observer, and the circles should only be used as guidelines for the drawing. In the first attempts the map was drawn directly on the paper, but

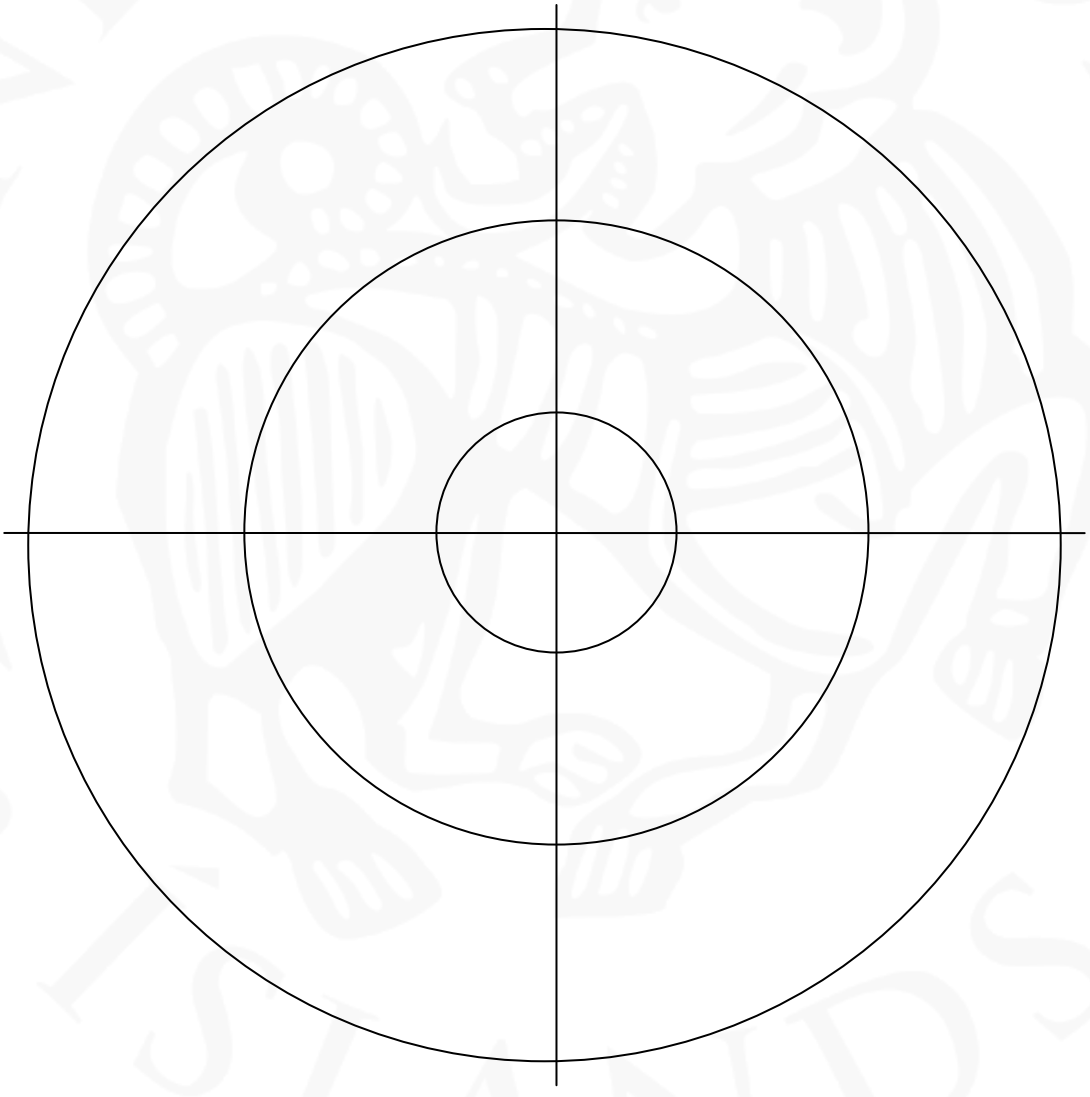
in the damp Icelandic climate it soon proved necessary to put a sheet of drawing film on top of the schedule. The physical setup consisted of a central peg and four directional pegs. The central peg should be a ca 40 cm long peg, strong enough to be kicked lightly now and then by boots without moving or breaking. The directional pegs should be placed circa 2 m from the centre according to the four points of the compass. It is important that they are placed so that they will show on the subsequent photo series (see below). The observer should stand in the centre with a foot on each site of the centre peg, thus being able to turn around on the spot without deviating from that exact point. The drawing can be orientated by the help of the directional pegs. After the recording, a photographic record should be made for cross reference. I have done this by taking a series of pictures along the horizon. In the photos should be the directional pegs, so that the pictures can be referenced to the drawing and regular maps. In my experience, this method is the most efficient when having to record alone. The setup is quick and easy, and requires only a minimum of light equipment. It can thus also be used in remote areas that can only be reached by foot.

In 2008 records were collected from four farmsteads, some of those under various weather conditions. There are thus records from Vatnsfjörður, Sveinhús, Hálshús and Miðhús. The maps (Figure 5) show the view from a point close to the supposedly oldest part of the farm steads, and all the maps shown here were made under weather conditions with good visiblity.

The horizontal maps are, as mentioned, more a type of recording method than an analytical tool. It is thus also hard to identify a result directly derived from the recording process, other than that we now have access to good records of the visual resources related to each of these farmsteads. The horizontal maps should, based on the experiences from 2008, be considered a supporting tool for landscape room and intervisibility studies. This method produces a neutral record of the perceived landscape, and can therefore be used as a reference tool for other types of perceptional analysis. The horizontal map should always be accompanied by a photographic record for reference, but it should be kept in mind that the photographic record does not replace the desired subjectivity in the horizontal map.

Horizontal Mapping of Landscape Rooms 1.1

Register code				
Site name		Date	Initials	
Coordinates E N		Conditions	Time	
Altitude		Clear		
Sketch plan	Land form	Fog:		
		Rain:		
		Other:		
		Dominant view		



Notes	Reference information

PBH 13.7.2008 and 11.5.2009 after Hamilton and Whitehouse 2006

Figure 4. *The recording sheet we used for the horizontal maps in 2008. The actual drawing is made around the circles. Sheet should be used with a layer of drawing film to protect the drawing. Examples of the drawings can be seen in Figure 5.*

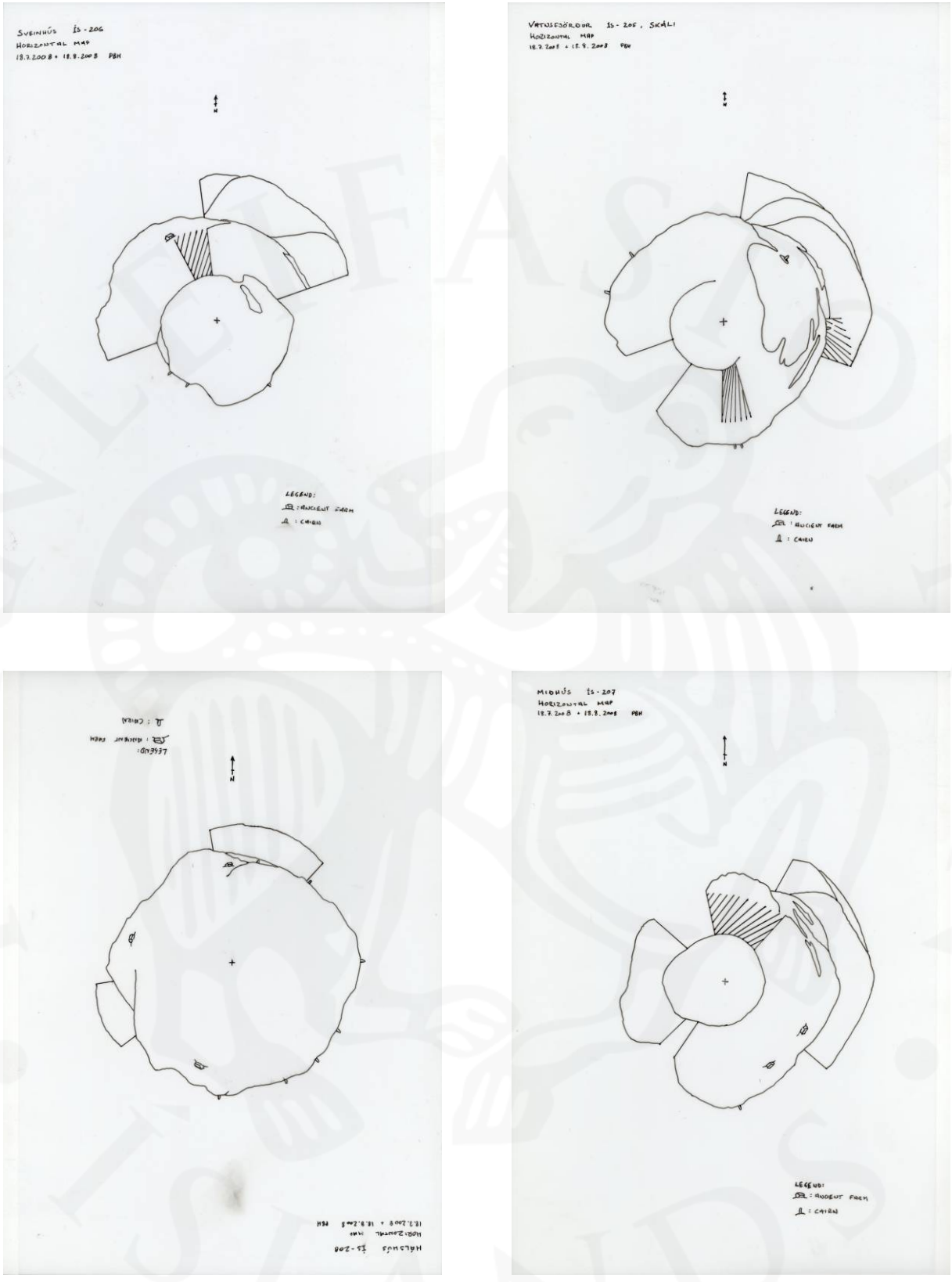


Figure 5. *Horizontal maps recorded at Sveinhús (top left), Vatnsfjörður (top right), Hálshús (lower left) and Miðhús (lower right). The observer's location is marked by the '+' in the centre of the map. If we use Vatnsfjörður as an example, we see that the sea is located NE of the farm. In the fjord is a small island with a cairn, and Borgarey can be seen in the distance. Behind the sea is the opposite shore with high mountains. Four cairns can be seen along the horizon. The view to the south is partly blocked by the modern house (hatching).*

Intervisibility

Intervisibility is a strong agent in larger settlement design. The ability to see directly between two settlements has consequences to the inhabitants of the sites. Intervisibility creates security – keeping an eye on how the neighbours are doing and if they need assistance. On the other hand it can be a matter of dominance – the deliberate depriving of the privacy of the subject from the lord. It is certain that two or more sites that share a visual connection share a greater level of contact than sites that do not.

Doing intervisibility analysis in the modern landscape is not unproblematic. As for most of the investigations described here, a central problem is to determine the outer limits of 'the farm', that is which parts of the farmland constituted the home in the past. If we consider 'intervisibility' a state of constant visual connection, it is important to consider the homes between which there is an unblocked view as not only the actual dwelling, but also as the larger area on which activities would take place on a daily or at least regular basis. With this in mind, I have recorded a direct line of sight from farm to farm in the cases where at least some of the supposed home field is visible to the naked eye.

Another challenge, not unrelated to this, is that we only know little of the farms' appearance in the past. We have some indications, such as the size and the building materials, but the height of the buildings, the amount of grass growing on the turf compared to the surroundings, and if the buildings featured some sort of colourful or otherwise conspicuous decoration remains unknown. We have some indications of the overall appearance from modern reconstructions (see example from Qassiarsuk/Brattahlið Greenland in Figure 6). The green and brown nuances of the building materials combined with the rounded, organic shape clearly makes the building fall in with the surroundings.

Figure 6. *Qassiarsuk in South Greenland. A reconstruction of a turf house (thin dark line) is seen underneath the house with the white windows in the centre of the picture. Note how hard it is to see the turf house compared to the modern buildings. The viewing distance is app. 900m. Photo: PBH.*

We can be certain that the buildings must have been quite unlike the modern Icelandic farm houses, which are generally built from white metal. That we can see these modern and very conspicuous buildings at a long distance does not mean that a turf house on the same

spot would be recognizable. In the past, however, there might also have been some highly visible features that we do not see today. Rising smoke could under good conditions be seen from a larger area than the house it came from. A larger level of activity will have caused a higher conspicuousness than today, where most of the sites are either abandoned or only used for periods of time, and not for regular farming. Thus, even though the buildings themselves might have better camouflaged than the modern ones, many sites will have been quite visible because of e.g. smoke or activities that does not take place today. I have kept this in mind when making these recordings, and thus noted intervisibility in the cases where terrain changes, such as changes in vegetation, low hills or the like can be distinguished with the naked eye.

In 2008 observations regarding intervisibility were made from six of the farms in the Vatnsfjörður area (see below). The result of the survey can be seen on the map in Figure 7. Each of the sites has between two and four visibility links to other sites, with the majority towards the high end. The average number of links per site is 3.34.

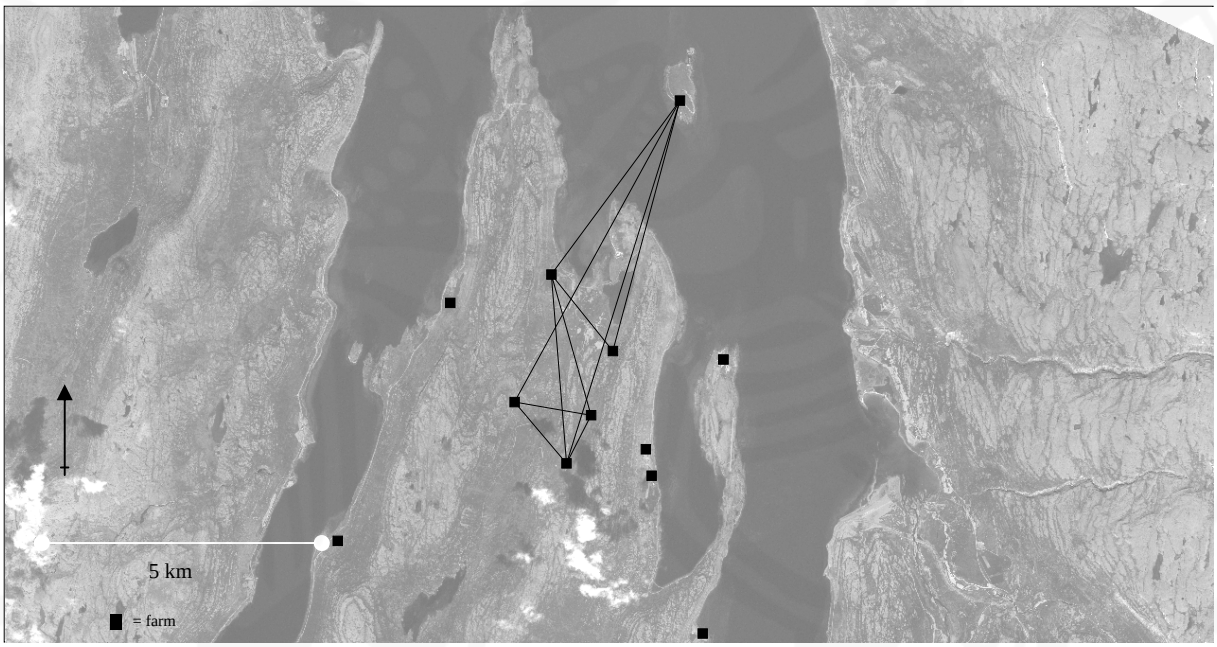


Figure 7. *Map of the intervisibility links between the farms around Vatnsfjörður. This diagram does not show the links from Vatnsfjörður and Borgarey to the farms outside of this cluster.*

Table 1. *Visual links from the farmsteads around Vatnsfjörður. The dates in the table are based on the Ísleif database and extracted from Aldred 2007.*

Site	Date	Visual links	Visual links (excluding Borgarey)
Borgarey	1367	4	-
Hálshús	1327	3	3
Miðhús	1382	3	2
Sveinhús	1495	2	1
Þúfur	1222	4	3
Vatnsfjörður	c. 900	4	3

The results of the survey of intervisibility between the farmsteads of the Vatnsfjarðardalur reveal a generally high level of visual interconnectedness. Particularly the farms in the southern part of the valley can see between each other, but even the northern

farms are linked to this group by several connections.

One farm takes a special stand in relation to this: Borgarey. Sitting right off the centre of the valley, Borgarey is visually linked to all the farms in Vatnsfjarðardalur except Hálshús, and has thus been one of the most visually well connected of the northern farms. If we furthermore look at not only the centre of the farms, but also the homefields and other close areas, Borgarey with its remote location has visual access to these as well, something that is not shared by any of the other farms with the same number of visual links. Though we do not know if Borgarey played a particularly significant role in the past society, we can conclude that the location alone has provided the islanders with a resource unlike any other site in the valley, with the possible exception of Vatnsfjörður.

In a physical landscape whose main components are valleys, mountain ridges and fjords, it is not surprising that the landscape from a visual perspective accommodates a rather high level of compartmentalization. The visual properties of the valleys and fjords are good, but are blocked of by the mountain ridges. To us it is interesting to observe how the settlements have negotiated these terrain conditions, and the Vatnsfjörður area gives us a clear picture of one way to do this.

The settlements can be divided into three groups: the valley farms, the farms of the side fjords and the farms of the main fjords. Farms in valleys only have contact to farms in the same valley, because the ridges surrounding the valley block of the view in those directions. The farms can also have visual connections to farms on the coastline between the valley and the fjord. In this landscape we generally find the valleys in two places: in the bottom of the smaller side fjords and in the central part of the peninsulas, separating the smaller fjords. These valleys open up to the central fjords (such as Vatnsfjarðardalur).

The coastal farms in both the smaller and the larger fjords are often able to see across the fjord and to the farms on the opposite shore. It is rarer that neighbouring farms on the same shore can see each other due to the terrain shape. However, if the sea is considered part of the area of every day activities, the farms on the same coast will often also be visible from the sea. Some sites along the fjords will be visually connected to some of the valley farms.

With those two types of farms we get a rough pattern of four settlement compartments: the central fjords, the smaller fjords, the valleys that open up to the central fjords and the valleys that open up to the smaller fjords. These link to each other, as illustrated in Figure 8. The central fjord links to both the smaller fjords and the valleys that open up into it. The valleys that open up into the smaller fjords are connected to those.

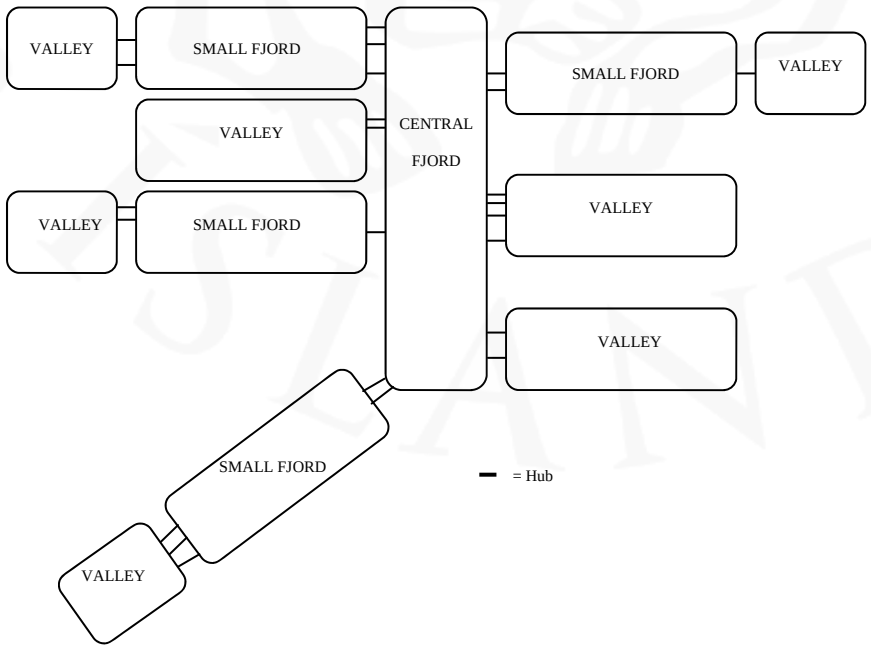


Figure 8. *Diagram of the principles of the visual network connecting the individual settlement clusters in an area like the Westfjords. In the centre we find the central fjord, connected to the smaller fjords and the valleys by hub farms, such as Vatnsfjörður and Borgarey. Behind the smaller fjords we find another set of valleys, structurally the most isolated part of this visual network.*

This arrangement leaves some farms in a stronger or at least better connected position than others. The farms that act as hubs between the different compartments are likely to have more visual connections than the other sites, but will unquestionably have access to more diverse areas than e.g. the valley farms, in that they link two compartments Though the foundation of an important farm like Vatnsfjörður in this specific location might have been determined by a range of other factors, the preservation of its importance could very well have been aided by the fact that its location permitted it to act as a central hub. Such a location will have supported the maintenance of power of this particular site through the years.

Audibility Analysis

As already mentioned, audibility analysis is a new approach to phenomenological fieldwork in the Vatnsfjörður project. None of us had any previous experience with this type of work, and a large part of the work in 2008 was therefore centred on establishing a way of testing and recording the experience of the soundscape. The purpose of this survey exercise was to establish a general picture of on one hand, how various culturally generated sounds travel in the general landscape of the study area, and on the other, how the terrain around the individual farmsteads facilitates the carrying of sound. A further study could have included sources of natural sounds from terrain and fauna, but an opportunity to do this time consuming study did not present itself in 2008.

Just as views consist of a series of discrete elements, which together determine the observers' visual experience, so too the sum of individual sounds that we are at any time exposed to forms a complete aural perception. This overall picture is referred to as *soundscape*, and is on equal terms with the *visible landscape* as an agent generating the total experience of the surroundings that individuals have, the *landscape*.

Whereas the visual landscape might have undergone severe changes, it is hard to find a landscape in Iceland without some resemblance to its past appearance. However, when the source of a sound is gone, it is completely obliterated. Even small changes in settlements, terrain, climate, flora and fauna might thus completely change the soundscape, making it unrecognizable to the people of the past. Doing a survey of the natural soundscape therefore requires serious consideration regarding such changes, otherwise it might be pointless.

We only had very limited time to perform the soundscape analysis, and therefore only two sets of data were brought home from the 2008 season. In connection with the first round of student survey exercises on Borgarey we did a systematic recording of the audibility of a range of culturally generated sounds in the open land. Secondly, a smaller survey of the audiological capacities of the landscape around some of the ancient farmsteads in the area was carried out.

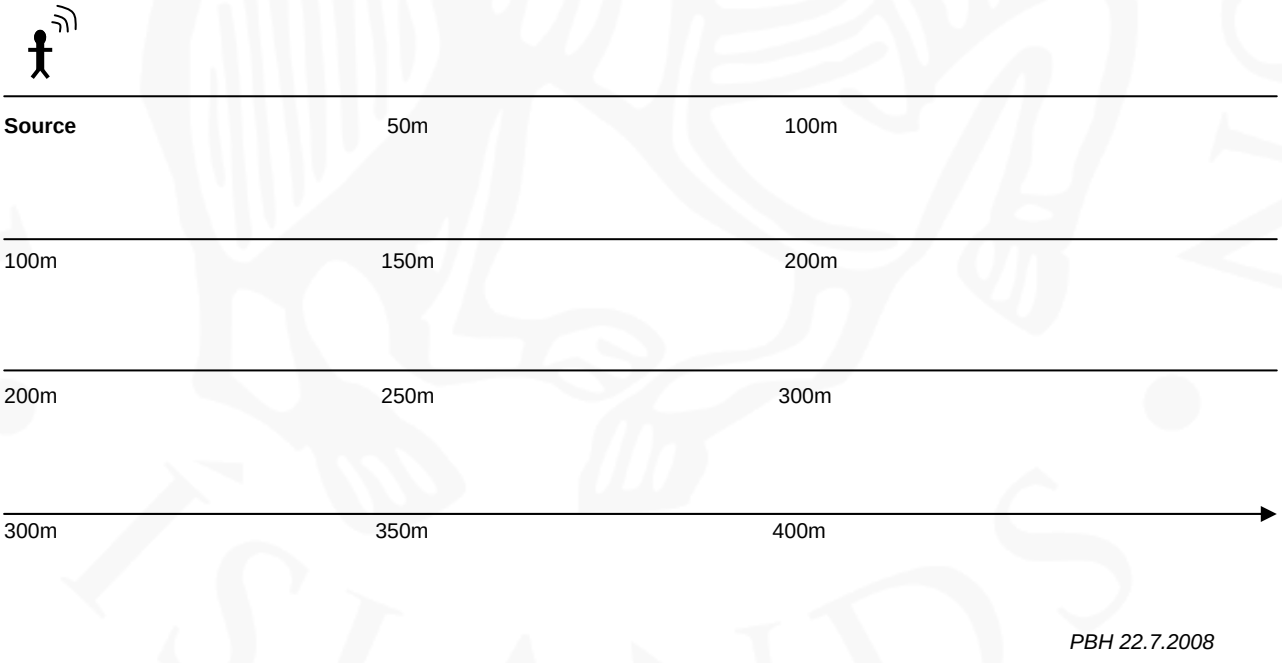
Table 2. *Audible distances for various culturally generated sounds, test performed on Borgarey.*

Sound	Audible distance (m)
Male conversation	25
Female conversation	30
Male raised voice	115
Female raised voice	125
Male song	130
Female song	145
Stone on stone	220
Metal on stone	275
Metal on metal	310
Male cry for help	315
Female cry for help	345

SOUNDSCAPE SURVEY SCHEME 1.01

Ref. code					**Date**	
Site name					**Test superv.:**	
Terrain					**Weather conditions**	
					Sun	
Other sources of sound:					Cloudy	
Vegetation					Mist	
					Light rain	
					Normal rain	
Source point		**Test Crew**			Heavy rain	
Coordinates		M	F	Age	Snow	
Height						
GPS code						
Limit of audibility					**Wind**	
Coordinates					Strength	
Height					Direction	
GPS code						
Bearing along test range	°					
Height difference						
Sound tested						
Performer (for vocals): Sex	Age					
Sound level by source	dB	**Audible distance**				

Recordings should use following signatures: Audible (AU), Faint (FA), Limit of Audibility (LA) and Not Audible (NA)



PBH 22.7.2008

Figure 9. *The scheme used for the soundscape experiment on Borgarey. Though the scheme allows for a very thorough registration, it might not be necessary for all types of investigations. It is important to make a detailed record about the test conditions, because these have a strong effect on the test results. Individual schemes should be used for each sound being tested.*

The results were recorded on schemes similar to the one in Figure 9. Apart from the audible distance, we recorded the conditions for the experiment, including the weather, the

terrain characteristics and data on the test persons. As the test clearly shows, female voices are carried on average 12% further than male voices, so it is not unimportant to be aware of and note the test person's sex. Similarly, the hearing ability can change significantly from person to person depending on age, damage to the ears, sex and general hearing ability. It is thus useful to have a group of people testing the audible distance, rather than just one. On the particular test day the weather was so stormy that we got stranded on Borgarey, and even though we tested along with the storm, the turbulence might have had a negative effect on the sound carrying distance.

We did not have access to sophisticated recording equipment, and it was therefore not possible to measure the strength and composition of the sounds we tested. However, for the results we wanted, these data might have added another, but not crucial layer to our recordings. If we wanted to model the data onto other areas such details would be necessary, but for this initial work, it was not a severe problem. For cross reference the entire test on Borgarey was recorded on video.

The results show how even fairly quiet sounds travel more than 100m, and that even normal tool sounds can be heard around 250m away. Compared to the central activity areas of the farms (the area surrounded by the building cluster of the farm), which can in itself cover an area of 75x75m, the sounds produced by a single farmstead could easily cover a circular area of 1,5km^2. The size is obviously dependent on the terrain and buildings in the area, and must be tested individually for sites of interest.

In addition to the systematic soundscape test on Borgarey, it was on a few occasions possible to make chance observations on Sveinhús, Hálshús and Vatnsfjörður.

Table 3. *Chance recordings of soundscape details in the Vatnsfjarðardalur.*

Site	**Sound**	**Observations**
Sveinhús	Sharp whistle	The sound produces a significant echo from the ridge east of the farm.
Hálshús	Sheep around Þufur	Clearly audible. Individual specimens can be identified.
	Children playing at Þufur	Audible.
	Sharp whistle	The sound produces a faint echo from the other side of the Vatnsfjarðardalur, possibly the area south of Miðhús. This suggests that this sound is audible on Miðhús as well.
Vatnsfjörður	Church bell	The modern church bell was <u>not</u> audible on Borgarey (this result might have been affected by the fact that the bell is enclosed in the small church tower and by the strong wind on the test day)

Alhough the data brought home this season only represents a fraction of the tests and observations necessary to understand the full scale of the soundscape in an area, they do hint at some interesting facets of not only the general soundscape, but also in particular the level of potential audible communication, deliberate or accidental, between some of the farmsteads here. From the systematic survey we can deduct that the sounds produced on a farm (not including the often very audible animal sounds), can be heard regularly in an area of 1.5km^2 depending on the terrain, vegetation and wind conditions. This area most often exceeds the size of the homefields, and in some cases stretches out into what we can interpret as the main, transport routes in the landscape. Combined with the chance observations, which revealed that some farms are located in places with remarkable audiological qualities, such as echoes, this gives a picture of a quite dense soundscape with overlaps between the farms, the resource areas and the routes. A network of this density will have resulted in regular contact between

the inhabitants of the valley.

Conclusion

Two important results were achieved through the work on perceptional landscape analysis in the 2008 season in Vatnsfjörður:

- We have tested a range of methods that we have not used before, including horizontal mapping, systematic intervisibility analysis and soundscape analysis. The methods produce very different results, but each of them has proven able to contribute to our understanding of the life and settlements of the area.
- Based on the perceptional analysis we can describe a communicative network that connects an otherwise compartmentalized settlement pattern through a series of hubs.

The methods tested this year have shown strengths towards perceptional analytical work in that they produce good records that can in most cases be easily tested and cross-referenced. Furthermore, the necessity of using light equipment in areas that in some cases can only be reached by foot forced us to develop methodologies that can be used in almost any area. I have aimed at describing the methods we used in such a way that others can use our experiences and build on them for future phenomenological field work.

Soundscape surveys were a new addition to our otherwise visually based work, and produced interesting results, illuminating the potential for audiological chance communication in the southern part of the Vatnsfjarðardalur settlements. However, some challenges in using this method also became clear, and should be considered before using soundscape surveys systematically. With this in mind, we approached the soundscape differently, trying to analyse culturally generated sounds. In addition to this I recorded some audiological features around certain locations, such as the echo that is produced by the mountains around Sveinhús. Apart from giving us experience with the set of new methods we tested, the tests also produced data enabling us to draw up a basic pattern for the constant communication network between the settlements around Vatnsfjörður.

Intervisibility analysis reveals a pattern of smaller clusters of farms, in the valleys or around the smaller fjords, connected by a set of hubs. Vatnsfjörður is an example of such a hub, sitting with visual connection to both the valley farms and some of the farms around Ísafjörður. This, and similar farms in other parts of Ísafjörður, can be expected to have played a special role, because of their dominance in local communication networks.

Acknowledgments

PBH wishes to thank Oscar Aldred, Christian Keller, Christian Koch Madsen and the field school students and staff for their positive and open-minded contributions to this part of the project.

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EXCAVATIONS IN THE VIKING AGE AREA: INTRODUCTION

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In 2008, excavations continued in the Viking Age Area. This was the fifth major campaign in this area, which had started in 2004 with the excavation of a tenth-century house, or *skáli* (Structure 1). Six outbuildings were excavated in this area between 2005 and 2007, including a building with a large cooking pit (Structure 2, a later, smaller phase of Structure 1), a smithy (Structure 3), a small building with a stone pavement, which is thought to have been used for storage or for drying fish (Structure 4), a small building with had a single flat paving stone and a grinding stone in it, which might have been a workshop (Structure 5), a small storage room next to the smithy, which had probably held fuel (Structure 6), and a small building with a substantial pavement and organic floor deposits, which might have been a sheephouse (Structure 7) (Figure 1).

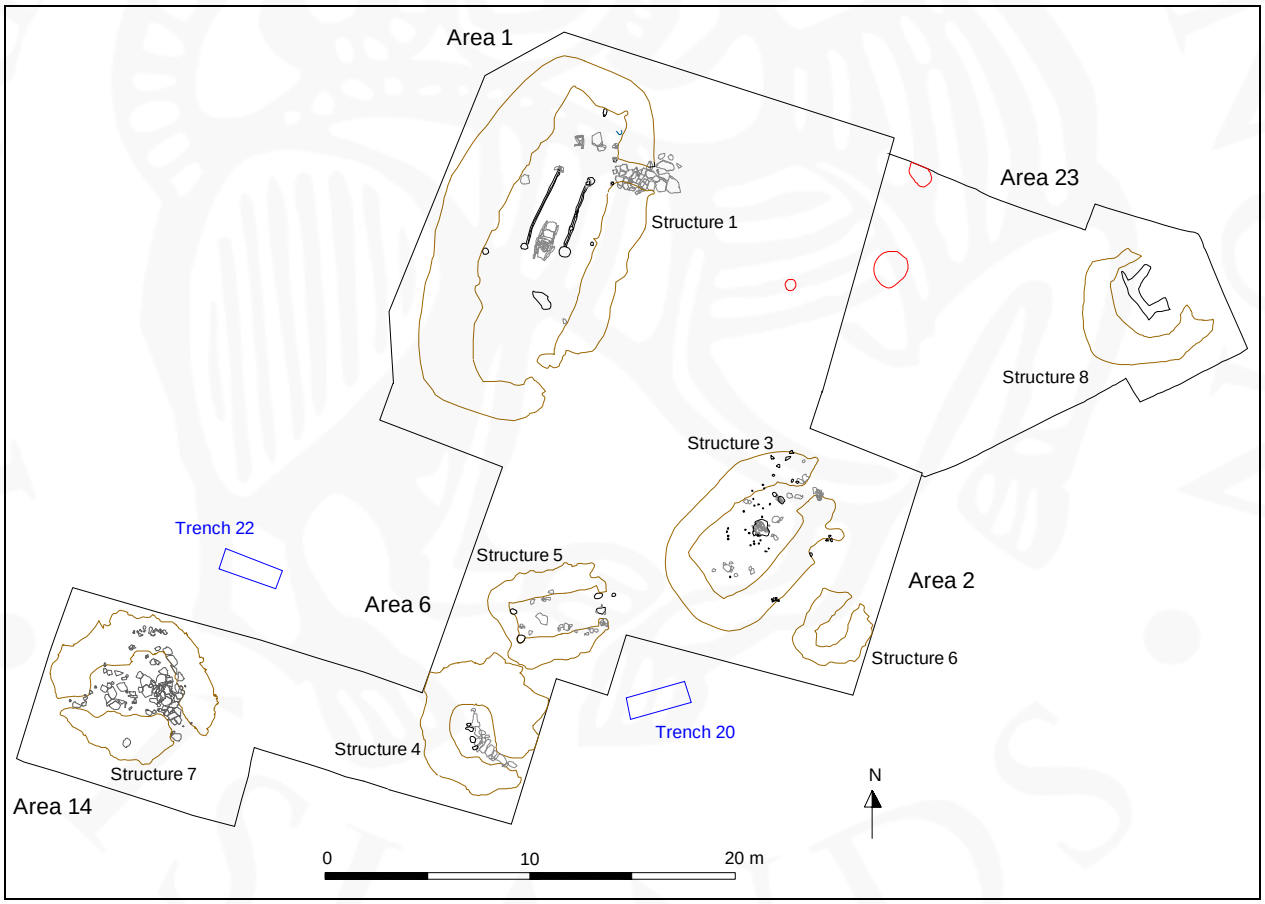

Figure 1. *Plan of the Viking Age area at Vatnsfjörður, showing the new excavation area (Area 23), all of the buildings (brown) and cooking pits (red) that have been excavated to date, and the locations of the evaluation trenches. Structure 7 is shown in its later phase. Structure 2, a smaller, later phase of Structure 1, is not shown.*

In 2008, in the new excavation area, Area 23, the remains of another building were excavated, though this one was very poorly preserved compared to the others, probably because it was situated on a slope (Structure 8) (Figure 1). This structure contained an unusual

feature – a π-shaped slot trench that might have held beam slots for a wooden floor. This interpretation is supported by the fact that the building did not contain a clear floor layer, and the fact that the turf collapse was directly overlying large cobble stones that could only have been walked on with difficulty (see report by Harrison and Milek, below). Like the other buildings at the site, Structure 8 was constructed with turf cut from the grey podsol that was present here in the ninth and tenth-century (and possibly into the eleventh century), and was associated with Viking Age beads. This building has therefore been tentatively attributed a tenth-century date, which will have to be confirmed by radiocarbon dating of associated bones.

In addition to the new structure, two large cooking pits were discovered in Area 23 (shown in red in Figure 1, above). These were in the same vicinity as the cooking pit excavated in 2005, but were substantially larger, and contained large quantities of charcoal and fire-cracked rock (see report by Daxböck, below). These pits, which were 1.5 m in diameter, would have been able to roast one or two lambs or several cuts of meat, and were probably used for large gatherings or feasts (Figure 2). This lends further support to the growing body of evidence that Vatnsfjörður was a high status farm already in the tenth century. In addition to the unusual find of a gold pendant (see the overview chapter by Milek, above), zooarchaeological analysis of the bones from the Viking Age area has revealed that there was a high proportion of cattle consumption (nearly equal to caprine), 10 percent of which were young calves, a pattern normally associated in the North Atlantic context with higher status farms engaged in dairying (Albína Pálsdóttir et al. 2008). The sum of the evidence so far suggests that even though the homefield at Vatnsfjörður consisted of thin, leached, and infertile soils, the farm's prosperity was comparable to high status farms in much more fertile parts of Iceland. Where this wealth came from is still open to debate, but it seems likely that the meat roasted at the parties held at Vatnsfjörður were supplied by other farms in the vicinity.

Figure 2. *Area 23, facing east, with cooking pit 1 in the foreground, surrounded by sheet midden layer [8037]. In the background, Ramona Harrison is working on Structure 8.*

As in previous years, an open-area excavation policy was adopted, so that the new building would not be excavated in stratigraphic isolation from the rest of the Viking Age area. Although this policy adds to the time and labour required for the excavation, it has proven worthwhile in the past because there have often been surprises hidden below the turf layer that had not been visible on the surface. In 2008, the open area excavation technique produced the second (northernmost) cooking pit, as well as two thin but extensive charcoal-rich sheet midden layers (see Figure 2, above, and Figure 1 in Daxböck et al., below). Unfortunately, however, no other structures were present in the large exposed area, and the sheet middens did not contain any artefacts. Nor did they extend as far east as Structure 8, which is therefore stratigraphically isolated from the rest of the Viking Age area.

In 2008, Area 14 was reopened so that excavations could continue in and around Structure 7, a small rectangular building with a substantial stone pavement and organic occupation deposits that had been exposed in 2007 (Milek 2008). This building is also stratigraphically isolated from the rest of the Viking Age area, its turf collapse layers

unfortunately not stretching as far east as the deposits associated with Structure 4 (see Figure 1, above). Hopes that this building might be linked to the stratigraphy associated with the *skáli* were dashed at the beginning of the 2008 field season, when the evaluation trench excavated north of Area 14 (Trench 22) was found to be completely devoid of anthropogenic deposits (see report by Daxböck and Milek, below). Like Structure 8, this building will therefore have to be independently dated, and it appears that it will never be possible to tie it precisely to the phasing of the rest of the site. Dating evidence is so far sparse, but is suggestive of a Viking Age or Medieval date. Structure 7 had collapsed some time before the H-1693 tephra fell, and is therefore likely to be at least Medieval. The only datable artefact associated with it so far (unfortunately, in a collapse layer) is a conical-shaped spindle whorl belonging to the Type A spindle whorls in the Bryggen sequence, which date to the Viking Age (Guðrún Alda Gísladóttir 2008). During the 2008 field season, it was discovered that Structure 7 had two distinct phases marked by two separate layers of paving stones. There are also two distinct types of turf in the walls, the upper of which is black and red in colour, and the lower of which is the greyish colour of the podsols that were present on the site in the ninth and tenth centuries, and which was used to construct all the earlier buildings. This supports the hypothesis that the building is originally Viking Age in date.

Excavation Methods

The excavation of the Viking Age area was directed by the author, with the able assistance of Astrid Daxböck and Ramona Harrison, and a team composed of students attending in the Field School in North Atlantic Archaeology. The excavation was conducted entirely by hand using the single context recording system, and followed the guidelines issued by the Institute of Archaeology, Iceland (Lucas 2003). The aeolian deposits that covered the site were excavated using a combination of trowelling and controlled hoeing and spading, and 25% of this material was dry sieved using a 4 mm standing screen. All of the underlying deposits were excavated by trowel, and were 25-100% sieved, depending on their apparent sterility or richness. Turf collapse deposits, for example, were 25% sieved, while midden layers, pit fills and floors were 100% sieved. The floor layers of Structure 7 were also sampled for geochemical, micromorphological and entomological analysis.

Closing of the Viking Age Area

Since one of the priorities of the Vatnsfjörður Project is to contribute to community knowledge about local cultural history, and to promote cultural tourism in the Westfjords, all the structures in the Viking Age area have been reconstructed following their excavation, to make it easier for visiting members of the public to view and understand them. At the end of the 2008 field season, the surviving turf wall of Structure 8 was built up with turf to make it easier to see, and cooking pit 1 was consolidated and reconstructed (see Figure 2, right). Together with the signs being developed for the site,

Figure 3. *Reconstruction of cooking pit 1 at the end of the 2008 excavation, facing south.*

these reconstructed features will help to make the Vatnsfjörður a permanent site of historical interest and a stopping place for visitors to the region.

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EVALUATION TRENCHES IN THE VIKING AGE AREA

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Introduction

In order to assess how much archaeology remains in the Viking Age Area, and to help plan future excavation strategies, four evaluation trenches were excavated by Karen Milek at the beginning of the 2008 field season (Evaluation Trenches 20, 22, 23, 24), and three were excavated by Astrid Daxböck at the end of the field season (Evaluation Trenches 26, 30, and 31) (for trench locations, see Figure 1 of the introduction to the Viking Area by Milek, above, and Figure 1 of Daxböck et al., below). The results of this work steered the research design of the 2008 field season, and will help to structure the work planned for 2009.

Evaluation Trenches 20 and 22

Trench 20, a 1x3m trench east of Structure 4 that had first been excavated by Ramona Harrison in 2007, was re-opened in order to re-examine the deposits within it. It was confirmed that the archaeological deposits were limited to extremely thin, small patches of turf debris lying directly on top of beach gravel. The turf debris is likely to be from Structure 3 or 5, and there does not appear to be another building in the immediate vicinity.

Trench 22, a 1x3m trench, was placed between Area 14 and the southern end of the *skáli*, south of the old excavation huts, where some lumps and bumps could be felt in the grass. Surprisingly, absolutely no cultural deposits were found, not even turf collapse or midden layers, which would really be expected at such close proximity to Structure 7 (Figure 1, right).

Figure 1. *Evaluation Trench 22, located in the unexcavated area between Areas 1 and 14. Surprisingly, there were no archaeological deposits here, and the turf lay directly ontop of the gravelly subsoil.*

Evaluation Trenches 23 and 24

In contrast to Evaluation Trenches 20 and 22, the two evaluation trenches excavated east and north of Area 2 revealed interesting archaelogical deposits, and formed the basis of the open area excavation in Area 23 (see Figure 1 in Daxböck et al., below). Trench 23, a 2.5x1 m trench placed where a shallow depression had been noticed in 2007, revealed a modern midden deposit immediately under the turf. This contained modern glass and ceramics, charcoal, unburnt and calcined bone, fire-cracked rock, and vitrified ash, and was clearly infilling the cut of a pit.

Trench 24, also 2.5x1 m, was placed 10 m east of Trench 23, where a very shallow bump had been detected by GPS contour survey conducted by Garðar Guðmundsson in 2003 (Guðrún Alda Gísladóttir and Uggi Ævarsson 2007, Figure 3). Upon removal of the turf, this bump was revealed to be the very low remains of a wall constructed of the greyish turf (podsol) characteristic of the turf used to construct the Viking Age buildings on the site (Figure 2, left). Since both Trenches 23 and 24 contained interesting deposits, a wide excavation area (Area 23) was opened up around them (Daxböck et al., below).

Figure 2. *Evaluation Trench 24, facing NW, showing a low ridge of grayish turf. The small square sondage was excavated in order to verify that the feature was indeed a low wall and not a natural soil accumulation.*

Evaluation Trench 26

Trench 26 was 2x1 m long and orientated E-W (see Figure 3, right). It was placed c. 10 m north of Structure 8 (Area 23), on a small terrace. A 1x1 m test pit (Test Trench 3) had first been opened there in 2005 because core transects had indicated thick cultural deposits (McGovern et al. 2005). In 2008 it was decided to open a larger trench in the same place in order to further investigate this area and hopefully shed more light on the stratigraphy and archaeological remains there.

The cultural layers and the clayish, dark greyish-brown backfill from Test Pit 3 (2005) which contained silt and some peat ash, were c. 20-25 cm beneath the ground surface. After the removal

Figure 3. *Evaluation Trench 26 with the truncation of Test Pit 3 (2005) in the southern part of the trench, facing north.*

of the topsoil – in which a fragment of clear glass was found (find 32) – and the removal of the modern backfill, a layer of reddish-, orangey-, yellowish-brown turf [8048] and part of the square Test Trench 3 emerged.

The sections of Test Trench 3 provided a helpful look at the stratigraphy of the cultural deposits in Trench 26. Contrary to the interpretations made in 2005, it appeared more likely that the different layers observed in section belonged to the same unit, and that Test Pit 3 truncated parts of a possible wall that survived to a thickenss of 9-12 cm (see Figure 4, below). Underneath it was a 0.2-0.3 cm thick greyish-white ash layer, which overlay the natural subsoil. Unlike the materials recorded in the investigations in 2005, no traces of slag, animal bones or peat ash were noted. The small iron lumps which were originally interpreted as slag are most likely naturally forming iron nodules, which are common inclusions in turf from wet environments (compare to McGovern et al. 2005). To sum up, the stratigraphy of the 2005-sections of Test Pit 3 and the turf layer [8048] identified in 2008 suggest that there were remains of a possible wall here and therefore an activity area north of Area 23.

Figure 4. *Section of Test pit 3showing the section of a possible wall foundation, camera facing north.*

Evaluation Trench 30

Figure 5. *Evaluation trench 30, west of Area 1, facing west.*

Trench 30 was 2x1 m long, had an ESE-WNW orientation and was ca. 7 m west of the Viking Age *skáli* (Structure 1 in Area 1). The trench aimed to investigate the vicinity of the house in order to find archaeological remains which can be associated with the Viking Age areas.

Approximately 25-30 cm beneath the ground surface – under the aeolian silt-topsoil with the H-1693 tephra layer *in situ* – there was only evidence of a very thin and patchy, friable red- to pinkish, greyish black mixed deposit [8054] which contained silt and some charcoal, peat ash and turf. This overlay the natural subsoil (see Figure 5). It can be suggested though that this deposit is probably the edge of a cultural layer of larger extent, perhaps a midden layer. Other signs of archaeological remains were not visible in this trench.

Evaluation Trench 31

Trench 31 was 2x1 m long and was orientated NNE-SSW. It was located about 5 m north of Area 1. It was decided to place this trench there since cultural deposits, such as the sheet midden layers from Area 2 (Milek 2005), extended further north, past the edge of the excavation area.

Figure 6. *Evaluation trench 31, north of Area 1, facing east. Note the dark charcoal spread [8071] covering the largest area of the trench and the reddish brown turf patch [8072] in the northeastern corner whose extent is limited by the edge of the trench..*

Two cultural layers were found about 29-35 cm under the ground surface, below the topsoil with H-1693 tephra layer *in situ* (see Figure 6). A thin friable charcoal spread [8071] overlay the natural subsoil in the largest part of the trench and also contained one find: a fragmented and corroded iron artefact, (find 34). This charcoal spread slightly overlapped friable reddish orange turf [8072] which was located in the northeastern corner of the trench.

Unlike Trench 30 there was more activity north of Area 1. The cultural deposits can be clearly dated to pre-1693, and it seems that this trench was placed on a sheet midden layer which is apparently the extent of one of the charcaol spreads partly excavated in 2005 but were limited in the north by the excavation trench of Area 2 (Milek 2005).

The remains of the turf [8072] were too small to be interpreted since it was limited by the edges of the trench. It could therefore not be decided if it was part of a turf collapse deposit or something else, but this area certainly seems to merit further investigation.

Conclusion

The results of the test trenching in the Viking Age Area were somewhat surprising, since only the thinnest anthropogenic deposits were found west of the *skáli*, and none at all in the narrow strip of land south of the *skáli* and north of Area 14. In contrast, there appears to be significant activity and additional buildings to the north of the *skáli* and Area 2, meriting further investigation of these areas in 2009.

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EXCAVATIONS IN AREA 14

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Introduction

In 2008, the western part of Area 14 was reopened in order to continue excavations in and around Structure 7. During the summer of 2007, aeolian silt layers and substantial deposits of turf roof and wall collapse from Structure 7 were removed, as well as a thick deposit of turf wall collapse from a post-1693 building situated just south of Area 14 (Milek 2008). By the end of the 2007 field season, the walls, entrances, paving stones and occupation deposits of what is now known to be the last phase of Structure 7 had been exposed (Figure 1). During the 2008 field season, this final occupation phase was removed, revealing an earlier stone pavement and between them another set of occupation deposits. Each of these phases will be described in turn, although the description of the earliest phase, which is not yet fully excavated, will be somewhat brief.

Figure 1. *The last phase of Structure 7, showing the upper stone pavement and associated floor layer [7164]. Note the narrow trench that cuts across the building from left to right, which was thought to have been a modern intrusion – a plough scar or a trench for laying cables. Facing east-northeast.*

Abandonment phase

When excavations began in 2008, it became clear that there were still some collapse layers to be removed, especially around the outside of the building. These were removed first, so that the entire area – inside and outside of the building – could be excavated in phase, and to ensure that photographs of the internal occupation deposits would include accurately and clearly defined walls. The collapse layers on the outside of the building were dominated by mixed red, brown and black turf construction materials ([8011], [8014], [8018], [8023], and [8049]), but gravel inclusions were common, and some layers, such as [8009] and [8020],

were dominated by gravel and small, fist-sized stones. The ubiquity of gravel in these collapse layers is due to the presence of gravel layers alternating with turf layers within the wall construction, a building technique that had previously been observed in Structures 1, 3, and 4. Unfortunately, the tendency of these gravel layers to slip outwards once the wall has started to degrade and collapse made it very difficult to clearly define the edges of walls from the top, and it was sometimes necessary to approach their excavation with heavy cleaning from the side. Luckily, the walls also appear to have been constructed with a core of mixed gravel and soil, with inner and outer linings of turf, which helped to clarify the edges of the walls from the top (see the walls in Figure 1, above). The use of inner and outer turf linings and a wall core made up of mixed stones and soil has also been observed in other Viking Age buildings on the site, most notably Structures 3 and 4 (Daxböck and Milek 2008; Śmiarowski and Harrison 2008).

Within Structure 7, only two very small patches of turf collapse were found to overly the upper occupation deposits. Unit [8030], a narrow layer lying against the south wall within Structure 7, contained a mixture of brown and dark brown, but also whitish-grey turf, the latter of which has been observed underlying the black and red turf in several of the walls. Unit [8033], another small turf collapse deposit just within the south wall the building, this time next to its southeast entrance, was composed of a mixture of the dark and light brown, reddish brown, and orangey silts that characterise the upper part of the walls.

Later occupation phase

While in use, Structure 7 was a slightly rectangular building, with internal dimensions of about 3.1x4.4m, and walls about 1.6m thick. The northeast gable wall had a stone lining on its inner side, and there were two entrances: one on the eastern end of its southeast-facing long wall, and one in the middle of its southwest gable. The dominant feature of the building was a substantial stone pavement that filled much of its inner floor area, and that was especially concentrated within the southeast entrance (units [7171], [7181], [8034], and [8044]) (Figure 2). The southwest side of the building was slightly upslope, and the stone pavement rose up the slope towards the entrance in this wall.

Overlapping and lying between these paving stones was a distinctive occupation deposit, [7164] (Figure 2). This layer, which reached a maximum thickness of 5 cm (against the edges of stones), was a soft, very dark brown, organic silt containing some charcoal flecks and occasional small charcoal lenses. The layer appears to consist of significant quantities of decomposed organic matter, although whether this was grassy material, dung, or a combination of the two, it is difficult to say. The layer was intensively sampled for soil micromorphological analysis, organic content, and insects, in the hopes of determining the original composition of the floor layers and thereby the function of the building. For the time being, the hypothesis is that the building could have served as a sheephouse or a cattle byre; if the latter, it could only have held a coupe of animals. Since there was no hearth in the building, charcoal pieces and lenses probably arrived by intentional dumping of wood ash – possibly to keep the floors dry. This practice was commonplace in the early twentieth century in houses, cattle byres, and sheephouses (Milek 2006).

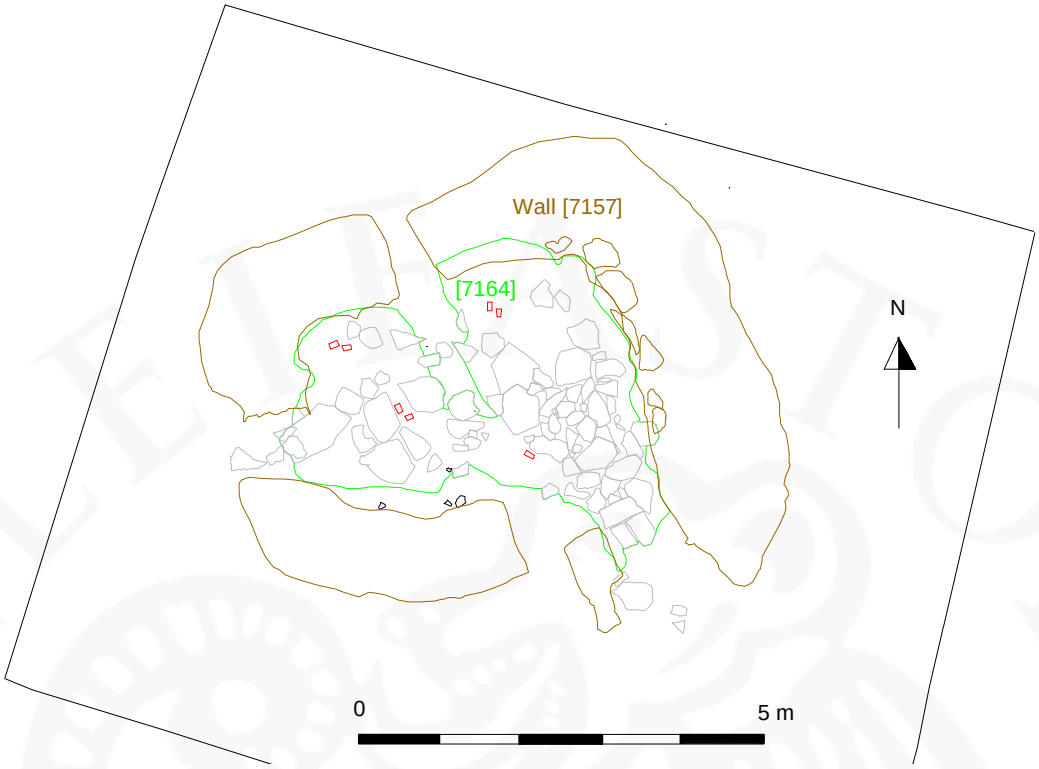

Figure 2. *Last phase of Structure 7, showing the floor layer [7164] in green and associated stone pavement [7171], [7181], [8034], [8044]. The micromorphology samples taken from floor [7164] are shown in red.*

Earlier occupation phase

Upon the removal of the upper layer of stone paving, a number of occupation deposits were identified. These were relatively thin and patchy, and the underlying stone pavement was usually visible below them. The layers appeared to be the result of trampling and intentionally depositing material on the earlier stone pavement; the lack of any identifiable aeolian component makes it unlikely that these layers accumulated during a phase of abandonment, disuse or repair of the building. Most of these deposits were dark brown, organic silt layers, which have been represented in green in Figure 3 (below).

Units [8028] and [8038] were dark brown, organic silt layers that accumulated between the two phases of paving stones in the southwest entrance and beside the eastern wall of Structure 7. [8038] was much thinner than [8028], which had accumulated over a sloping stone, but viewed in plan it is clear that these two deposits should be lumped together. Against the southern wall of Structure 7, there was another dark brown organic silt layer, [8047], which had slightly more charcoal flecking than [8038]. In the narrow, western entrance, a medium brown silt ([8045]) up to 5 cm thick had accumulated under the stones of pavement [8044]. Just within the narrow western entrance, a slightly more reddish and more organic deposit accumulated under paving stone [7181] (unit [8045]).

In the central (and lowermost) part of the building, the occupation deposits had a slightly different character (see Figure 3). Unit [8042] which overlay stone pavement [8043] in the lowest part of the building (see Figure 4), was more compact than the other deposits, and was a distinctive orange-brown colour. Just to the west of this layer was a small patch of charcoal, [8036], which had clearly been dumped as a discrete unit – probably a single bucket toss. Once again, if organic matter (and possibly dung and urine) were accumulating in this building, wood ash could have been dumped there in order to absorb moisture and odours. Since there is no hearth in either building phase, the ash did not originate in the building, but was carried here intentionally.

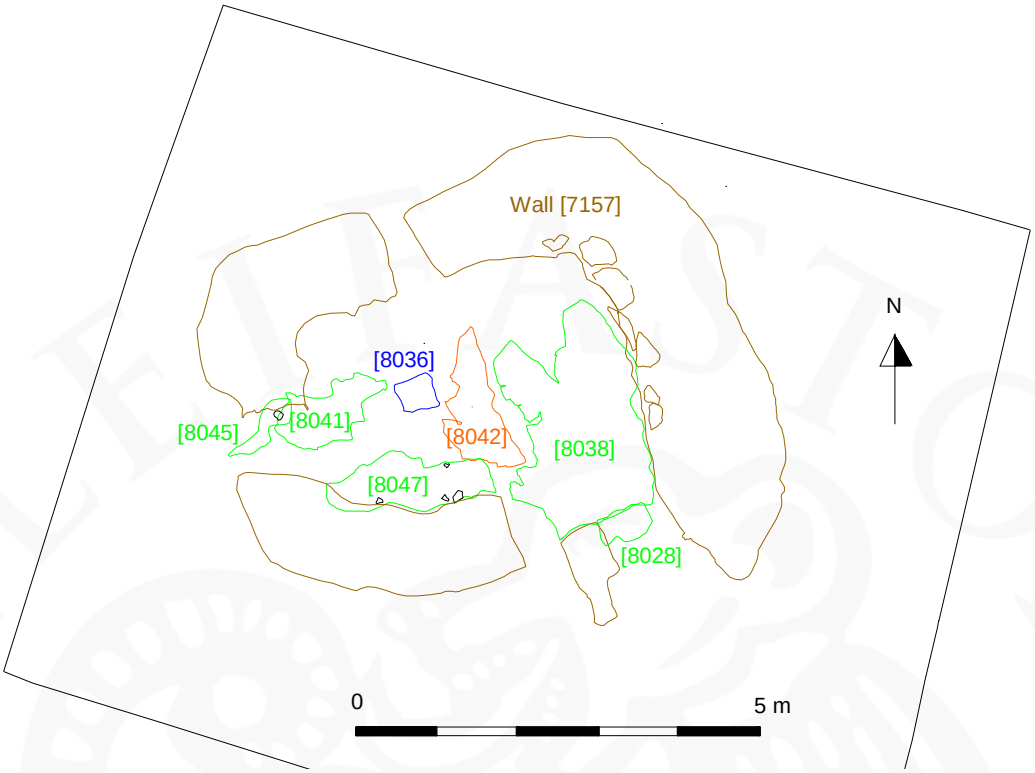

Figure 3. *Structure 7, with the deposits that accumulated between the two phases of stone paving. The dark brown, organic layers are shown in green, the charcoal dump [8036] is shown in blue, and the compact orange-brown silt in the lowermost, central strip through the building, [8042], is shown in red. Note that [8042] coincides with the narrow trench across the building that had been assumed to be modern.*

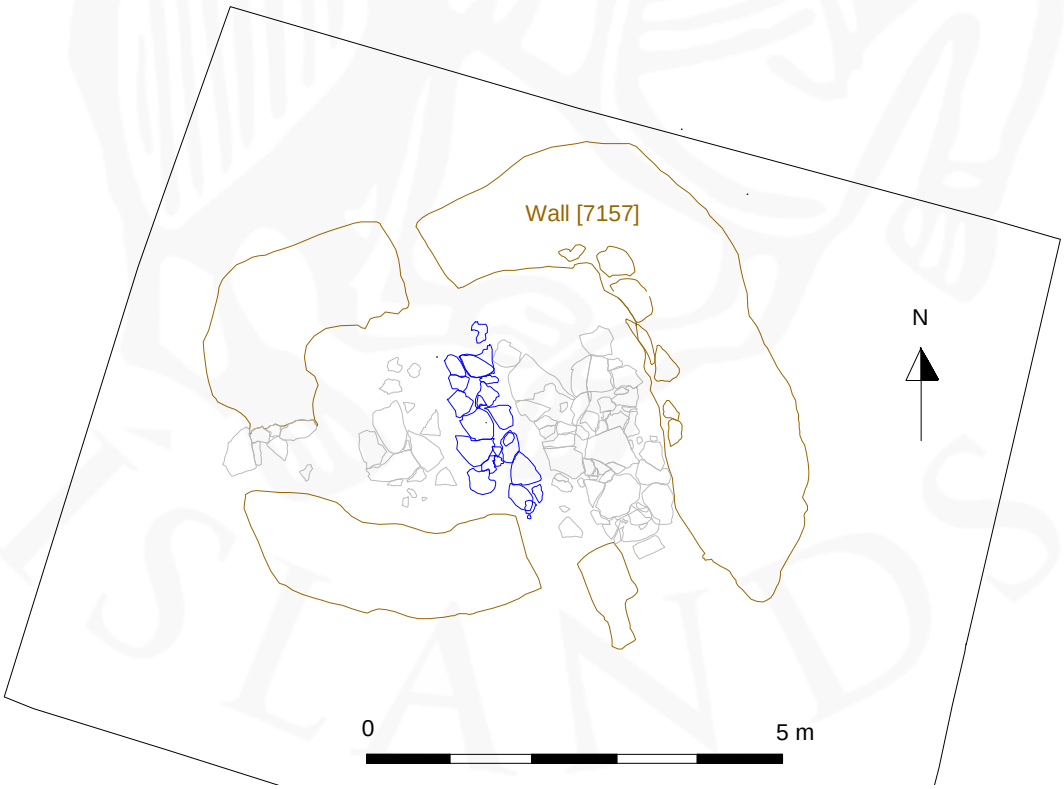

Figure 4. *Structure 7 at the end of the 2008 field season, showing the earlier phase of stone pavements. The higher, slightly sloping pavements are shown in grey, and the lower, flat pavement that lines the depression in the centre of the room, [8043], is shown in blue. Note that [8043] coincides with the putative modern slot trench.*

Upon the removal of these occupation deposits, the earlier stone pavement was fully exposed. Like the later pavement, it was concentrated (and best laid) within the southwest entrance, against the eastern gable wall, and against the southern long wall. However, the lower pavement also has a distinctive central section, where the stones are lying flatter and lower down, apparently lining the bottom of a narrow trench or drain (pavement [8043]) (see Figures 4 and 5). The location of this distinct pavement coincided with the location of a narrow, flat-bottomed trench that had been visible in Area 14 since the turf was first removed. Because this trench had been filled with homogenous topsoil and earthworm granules (excrement), it was assumed that it was a modern intrusion, either created by a bulldozer in order to help flatten and improve the homefield, or in order to lay service cables or pipes. However, since the location of this feature coincides with the distinctive stone pavement and organic-rich occupation deposits in the centre of the building, an alternative scenario can now be presented: that this was a drain through the building, which had outlets in both long walls. The concentration of organic material within this drain presumably attracted earthworms, which subsequently reworked the soil vertically between the fill of the drain and the surface – a depth of only 20-30 cm.

Figure 5. *Structure 7 at the end of the 2008 field season, showing the earlier phase of stone pavement. Facing east-northeast.*

Discussion

The evidence to date, including the stone pavement, the downward slope of the floors towards a drain, and the organic-rich occupation deposits, suggests that Structure 7 was a building used for housing either sheep or cattle (see Berson 2002 for survey of known Viking Age and Medieval cattle byres). Considering its small size, it seems most likely that it held sheep, but cattle were significantly smaller in the Viking Age than they are today, and it is not out of the question that the building could have held two or three cows. Soil micromorphology and archaeoentomological analysis should be able to confirm this hypothesis, and, with some luck, could even distinguish which animal species were housed here.

Structure 7 was clearly used for a considerable period of time, long enough for the farmers at Vatnsfjörður to consider repaving it. It is also possible that the walls have undergone some modification, and that there are different types of turf in the walls (the

greyish podsol below, capped by the reddish black turf), but only further excavation will clarify whether the podsols spied below the black and red turf are construction materials or whether they merely represent the natural soil surface when the structure was built. The excavation of this interesting building will be completed in 2009, and it will be a priority to obtain material for dating. So far, the material with the best potential for radiocarbon dating is the charcoal (and seeds, if present) from the floor deposits that accumulated between the two phases of pavement.

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EXCAVATIONS IN AREA 23

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Introduction

The 2008 field season began with the excavation of two evaluation trenches on the north and east sides of Area 2, which had been excavated between 2005 and 2007 (Milek 2005; Milek 2007b; Daxböck and Milek 2008). Evaluation Trenches 23 and 24 were placed to the north and east of Structure 3 in order to investigate a depression and low earthwork which had been slightly visible on the ground surface (Daxböck and Milek, this volume). The archaeological features revealed by the evalution trenches – a midden-filled pit and a low turf wall – became the focal points of a new open-area excavation encompassing about 195 m²: Area 23 (Figure 1). It was decided to open the whole area between Evaluation Trenches 23 and 24, in the hopes that the pit in Trench 23 and the ruined structure in Trench 24 could be tied together stratigraphically, and that there would be additional features in this area. Unfortunately, although additional features (in particular, another large pit) and archaeological layers were found, there no cultural deposits linked the pits in the western part of Area 23 with the new structure in the eastern part of Area 23.

The excavation in Area 23 started with the removal of the top soil layers [8000] and [8010], brown aeolian silt, which covered the whole site. The topsoil contained bone and burnt bone fragments (bone numbers 3, 8), a tiny ceramic sherd (find 1), modern window and vessel glass fragments (finds 2, 3 and 32), a dark blue bead (find 11) and some iron objects (finds 4, 5, 6 and 7). While removing the topsoil, it became clear that the H-1693 tephra layer was *in situ* over most of Area 23 with an exception of two depressions in the northwestern part of the area, where the tephra layer was later found to underly early modern midden deposits. At this stage it was also apparent that the topsoil layers directly overlay the natural subsoil in the area between the archaeological features in the western part and the later Structure 8 and its associated deposits in the eastern part of Area 23. This actually made it possible for investigations to be focused on these two areas in the western and eastern part of Area 23, and since there was no stratigraphical relation in between them, they were excavated independently from each other.

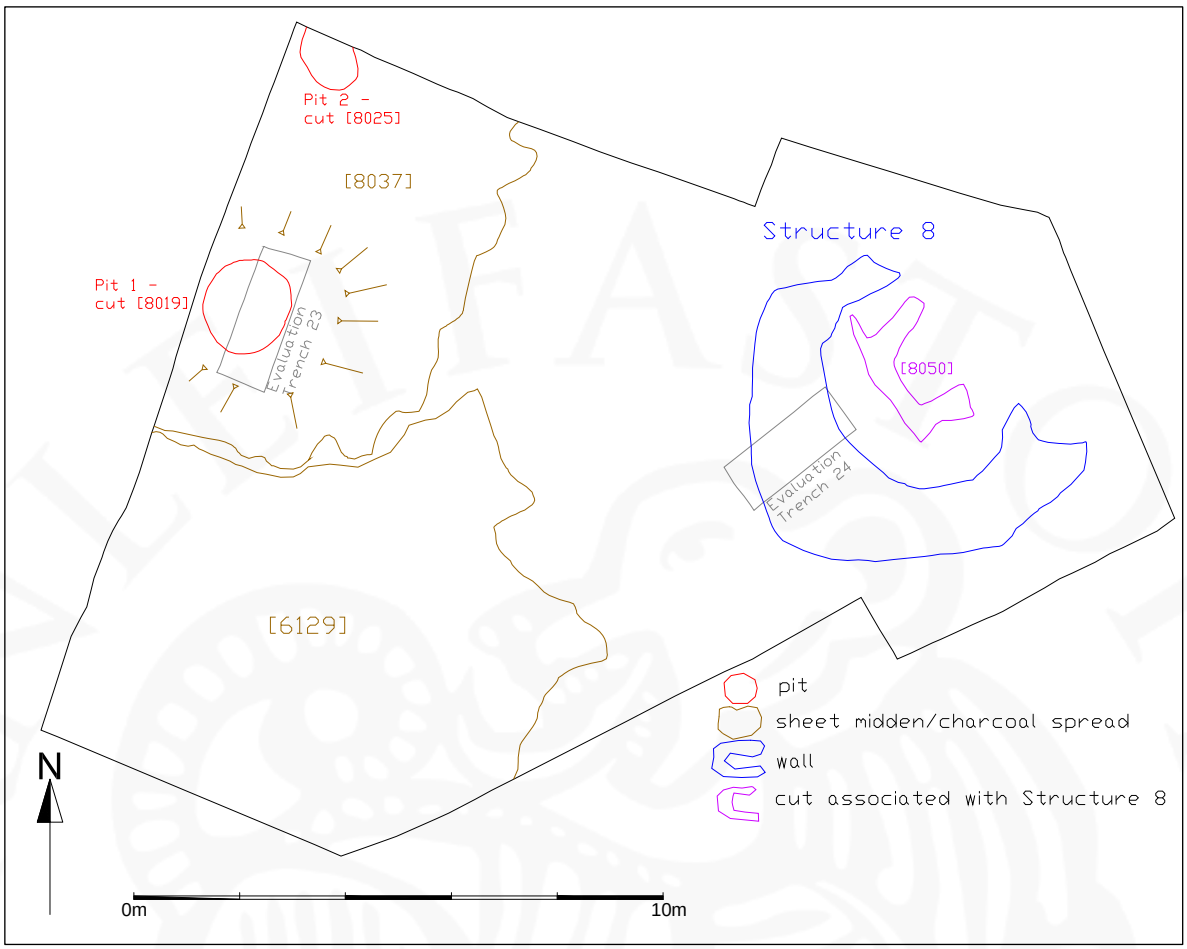

***Figure 1**. Plan of Area 23, showing the most important features such as the pits (red), sheet midden layers/charcoal spread (brown) in the western part and the walls of Structure 8 (blue) and its associated cut (purple) in the eastern part of the area. The ridge which is part of the charcoal spread [8037] is indicated with hatches.*

Archaeological Features in the Western Part of Area 23

(Astrid Daxböck)

Already after the removal of topsoil [8000] in Evalution Trench 23, a friable, homogeneous, circular midden deposit [8005] of dark brown colour and 5-10 cm thickness emerged. This layer contained some burnt bone fragments, slag (11,03 g; find 20) and modern artefacts, including plastic, a glass vessel fragment and several iron objects (finds 10, 14-18).This modern midden deposit was on top of a light brownish-orange turf deposit [8006] with a few burnt bone fragments (bone 7), and modern artefacts (finds 22-24, 27-29). It covered aeolian silt [8007], which contained the H-1693 tephra layer *in situ*, and which contained a flat copper alloy ring, find 21.

In the northwestern corner of Area 23 a midden deposit sectioned by the northern edge of the excavation area, [8001], was uncovered, which was very similar to [8005] in its texture and colour. It contained some bone fragments (bone 1), slag (8,25 g; find 35), an iron nail (find 8), and a fragment of clear glass (find 9). Underneath this modern midden deposit, there was reddish brown turf, [8002], of 2-10 cm thickness, with some bone fragments (bone 2), which was situated on windblown aeolian silt [8073] containing *in situ* tephra H-1693. A small fragment of clear glass (find 12) was found in this deposit.

Based on the finds and the site's stratigraphy, the four deposits [8001], [8002], [8005] and [8006] can be dated to the mid-twentieth century. After removing these later deposits, it

became apparent that these modern turf and rubbish layers were infilling negative features: two large pits that were dug into the gravely subsoil, leaving distinctive depressions on the surface (see Figure 1). The intentional infillig of these depressions was probably a result of homefield flattening during the mid-twentieth century.

Pit 1, Group 8074

Pit 1, group [8074], was located approximately 9 m northeast of Structure 3. The excavation of it started with the removal of the uppermost fill, [8008]. This 7 cm thick, greyish-brown deposit with pinkish spots was friable to firm in its texture and consisted of a mix of charcoal, peat ash, wood ash and shattered fire-cracked rocks. Next in the sequence was a greyish-brown to black mixed charcoal and silt fill, [8012] (Figure 2, left), of 20 cm thickness, which included pebbles, clusters of fire-cracked stones of different sizes and a few burnt bone and teeth fragments (bones 10, 11). Under it was the basal fill [8017], a friable charcoal deposit, which was covering the whole base of the pit and sloped upwards on all sides. It was 5-6 cm thick, and contained a few burnt bone fragments (bone 12). Medium to large fire-cracked rocks of flat and angular shape were still *in situ* lining the base and the lower sides of the pit. In total 324 fire-cracked rocks were recovered from the fills, and it is apparent that these stones were carefully selected and placed at the pit's base and along its lower sides in order to prevent the sides from collapsing, because the pit was dug deep into the natural beach gravels that underly the site. The cut for pit [8019] was rounded, had a slightly concave to flat base, was 1,59 to 1,74 m in diameter, and about 0,5 m deep (Figure 2, right). The thickness and homogeneity of the charcoal deposit and the large number of fire-cracked rocks strongly suggest that this feature was used as a cooking pit , rather than a pit used to dispose of hearth refuse.

Figure 2. *Pit 1, group [8075]. Left: Working picture of the pit with the deposit [8012] which contained mixed charcoal and silt and was already partly excavated at this stage. Right: The cut [8019] of Pit 1 at the end of the field season.*

Pit 2, Group 8075

Another pit, Pit 2 (group [8075]), was situated c. 3,5 m north of Pit 1 in the northwest corner of Area 23. Only its southern part was excavated because it was limited by the edge of the excavation area, and the pit was therefore half sectioned. However, this provided the opportunity to record a section and to gain valuable information about the stratigraphy and construction of the pit.

Figure 3. *Pit 2, group [8075], located in the northwestern corner of Area 23. Here with the basal fill [8021], a thick charcoal deposit with* in situ *fire-cracked rocks, before excavation. Camera facing north.*

The pit was c. 0,5 m deep, had steep sloping sides and a concave undercut, which probably originated from the time when the pit was abandoned and its edges started to slump. As the northern half of Pit 2 remains unexcavated, the pit's full dimensions and shape are undetermined, though it is 1.5 m wide in section and looks slightly more oblong than Pit 1.

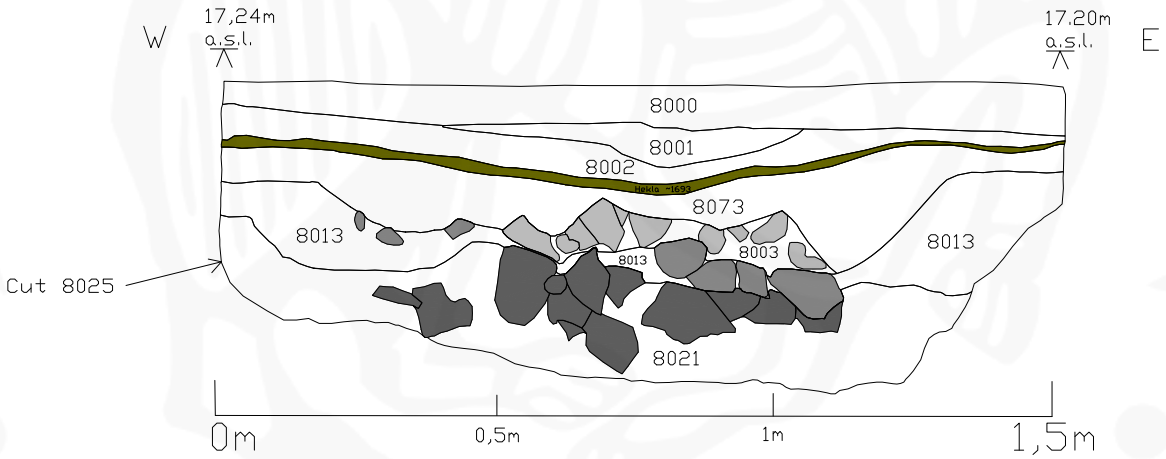

Figure 4. *The south-facing section of Pit 2, showing the stratigraphic sequence of the various -fills as well as the modern deposits that post-date H-1693 (green). Note the thick charcoal deposit [8021], which covered the base of the pit.*

A very similar stratigraphic sequence of fills to Pit 1 was observed in Pit 2 (Figure 4). The uppermost deposit [8003] was again a 10 cm thick friable to firm, dark greyish-brown mix of silt, charcoal, peat ash and wood ash, which contained small fire-cracked rock fragments. It overlay a mottled, firm greyish-brown to black layer [8013], which consisted of clay, silt, fire-cracked rocks, and a few burnt bone fragments (bone 9). Below this midden deposit was a thick (18 cm) friable charcoal layer [8021] (Figure 3). It covered the whole flat base and contained *in situ* flat, angular rocks. Of particular note were the large pieces of charcoal and charred twigs, which were well preserved in this layer and were taken as samples for further wood identification as well as radiocarbon dating. Like Pit 1, Pit 2 is

interpreted as a cooking pit.

Features associated with Pits 1 and 2

A third pit in the vicinity of Pits 1 and 2 had been excavated in 2005 (group 345; Milek 2005). This rounded pit with flat base was c. 50 cm in diameter and had a depth of 30 cm. Based on its mainly ashy fills and dimensions it was interpreted as an outdoor cooking pit, which was probably contemporary with or even slightly earlier than the house, Structure 1, and can be therefore dated to the early 10th century (Milek 2005).

A c. 5 cm thick charcoal spread around Pits 1 and 2, [8037], was encountered in the northwestern part of Area 23 overlying the natural topsoil. Before it could be recorded and excavated, a mottled reddish-brown and dark greenish-grey turf spread, [8004], had to be removed because it was on top of [8037]. It was located 1,5 m northeast from Pit 1, max. 1,5 m in length, 1 m wide and approximately 10-15 cm thick. This charcoal spread consisted of silt with occasional small clayey turf patches. This deposit can be probably associated with the use of at least Pit 1 but maybe also with Pit 2. The deposit [8037] is probably the continuation of sheet midden deposits [252] from Area 2, which was excavated in 2005. At this time, this the sheet midden was thought to be associated with Structure 2 (Milek 2005), but its association with Pits 1 and 2 is now very clear.

A remarkable feature associated with Pit 1 was the mixed gravel and charcoal ridge that surrounded the pit. This feature was 10-18 cm thick and in some places 1,20 to 1,50 m wide (Figure 5). In the beginning of the 2008 field season it was assumed that this ridge was created when the pit was dug into the subsoil and later covered with the charcoal spread [8037], but during excavation this ridge was indistinguishable from sheet midden [8037].

Figure 5. *A northwest-facing section through the ridge around Pit 1, which was part of sheet midden[8037].*

This leads to the conclusion that both the charcoal spread [8037] in this area and the ridge are the result of the cleaning out of Pit 1. Unfortunately, there were no finds in [8037] except a few burnt bone fragments (bone 22). Its full extent is not yet uncovered because it extends beyond the northern limit of Area 23.

In the southwest part of Area 23 there was a 1-5 cm thick charcoal spread found right underneath the topsoil and on top of the natural subsoil. This deposit is the continuation of sheet midden [6129], which was revealed in 2006 and partially excavated in 2007, when it extended beyond the excavation limit of Area 2 (Milek 2006; Daxböck and Milek 2007). In 2008 the northern and northeastern boundaries of this sheet midden could finally be defined. The layer was constantly thinning out towards its edges and only contained a few tooth fragments (bone 17). No further artefacts were found in this deposit, even though it was 100% floated and wet sieved with 1 mm mesh. A black polychrome glass bead that had been retrieved from this sheet midden in 2006 (2006 find 31), provides a *terminus postquem* of the 10th century (Gisladóttir 2007: 70; Milek 2007b).

According to the stratigraphy of Area 2, it is very likely that this deposit is associated with the use of Structure 3 and Structure 6 (Daxböck and Milek 2007). The full extent of [6129] to the east is still unknown since the layer is limited by the eastern edges of Areas 2 and 23.

Discussion

The similarity of Pits 1 and 2 in their shape, construction, and stratigraphy suggest that they were created, used and abandoned at around the same time. These pits, both impressive in their size and construction, are certainly part of the Viking Age outdoor activity area east of Structures 1 and 2 (see Milek 2005).

Because the thick charcoal-basal fills of both pits consisted were containing large charcoal chunks and charred twig fragments and the charcoal traces around the pits which may originate from spilling and breaking of charcoal (Mike Church, pers.comm.), it is not impossible that charcoal was taken out for further use, i.e. for iron working activities which were mainly carried out in Area 2 (for information on charcoal production pits in Norse and Medieval Iceland see Church et al. 2007; Smith)

However, based on the pits' dimensions, careful construction with the stone lining, large amount of fire-cracked rocks and fill-deposists are strongly suggestive of cooking pits.

Concerning the stratigraphy of the Viking Age site and the location of the pits, it is most likely that they can be associated with the outdoor activities in Area 2.

The stratigraphy of the western part in Area 23 may be linked to that of Area 2 by charcoal spread [8037], which is probably equivalent to the sheet midden layer [252] in Area 2. If this link can be further confirmed by future investigations to the north of both areas, it would mean that the pits were most likely associated with the use of Structure 2. The general lack of finds in the pit-fills and sheet midden layers does not allow a very accurate dating of them, but since it is possible to connect the pits and other layers to the Viking Age stratigraphy, it is likely that Pits 1 and 2 were created in the early 10th century. They were probably still in use in the late 10th century, when the ridge around Pit 1 and the charcoal spread [8037] were created, and finally abandoned at the end of the same century (compare to Phase 1 and Phase 2 in Edvardsson 2005; Milek 2005).

Archaeological features in the eastern part of Area 23

(Ramona Harrison and Karen Milek)

The eastern part of Area 23 contained the poorly preserved ruins of a structure, designated Structure 8 (see Figure 1). The very low remains of the southwest wall of this structure, [8051], were identified in Evaluation Trench 24 with the aid of sections exposed on the edges of a deeper sondage (see Figure 6). Subsequently, the open excavation in Area 23 was extended to include all the archaeological features and layers around this wall.

After the removal of top soil [8000], which contained the *in situ* H-1693 tephra layer, excavation concentrated on the removal of a series of turf collapse layers, which were a challenge to differentiate from each other and from the low remains of the base of the wall (contexts 8015, 8016, 8022, 8024, 8026, 8029, 8032, 8035, 8040). The removal of these collapse layers revealed a semicircular structure with seemingly no complete wall structure on the northeast side of the building, and a slot trench that might have served as some sort of foundation trench for a wooden floor (Figure 7). The excavation of this ephemeral structure was completed before the end of the field season, and will be discussed here by phase.

Construction phase

The only clear features identified with the original construction of Structure 8 were the 30-cm high base of wall [8051], and the cut [8050] for what may have been a π-shaped slot

trench for the anchoring of a wooden floor (Figures 6 and 7). Wall [8051] had been constructed of a distinctive grey turf, the colour of which identifies it as the eluviated E horizon of a podsol that had developed on the site prior to settlement. At the wall's highest and widest point, there were three courses of turf left, while the rest of the remaining wall deposit consisted of only two layers of turf. This grey turf was identical to the turf used in the construction of the main house on the site, Structure 1, as well as in Structures 4 and 5, and the earlier phase of Structure 7.

Although there is little independent dating evidence for the building so far, this type of turf – cut from a thin podsol – is believed to be associated only with the earliest phase of buildings on the site, which date to the tenth century and possibly into the eleventh century. The abandoned Viking Age buildings are all capped by wind-blown andosols, so the construction of Structure 8 must pre-date the change in soil type. In addition, three Viking Age beads were found associated with Structure 8, two in turf collapse layer [8035], on the eastern edge of the structure, and one at the bottom of the aeolian layer [8000], on the northern edge of the excavation just north of Structure 8. The two blue blown glass beads in turf collapse [8035] were very common throughout the Viking Age, but the cut blue glass bead in [8000] provides a more specific date: it post-dates AD 915 (see report and figure by Elín Ósk Hreiðarsdóttir, below).

Figure 6. *Structure 8 at the end of the excavation: the wall [8051] on the top, and the cut for a possible wooden floor slot trench [8050] in the center. The small square trench in the wall was excavated by K. M. during the evaluation phase, in order to confirm that it was a wall and not an accumulated soil layer. Camera facing southwest.*

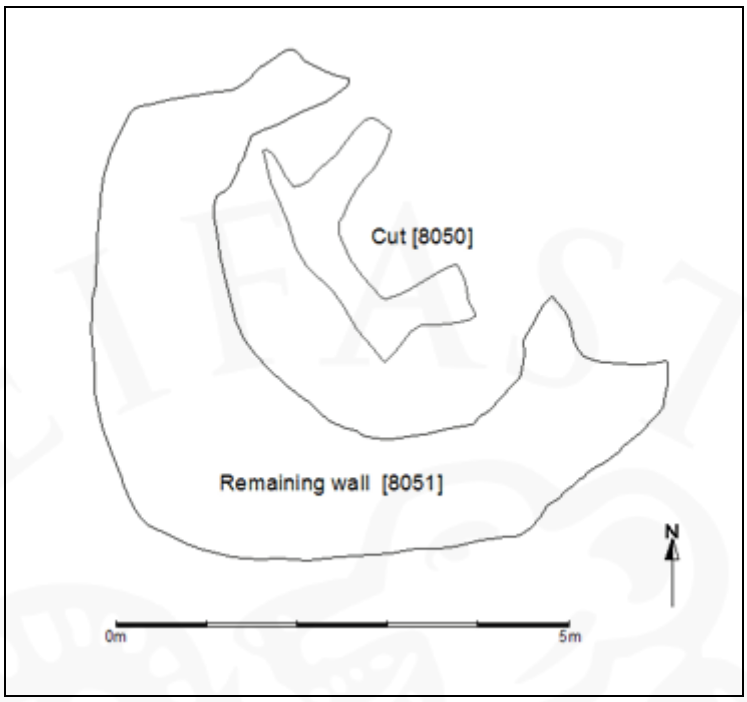

Figure 7. *Structure 8, showing features associated with construction phase.*

Potential occupation phase

Below the layers of turf collapse, and seemingly associated with cut [8050], there was a soft, 1-2 cm thick, layer, coloured blackish-brown to black layer and composed of a silt and turf mixture. Included in the layer were several pebbles and cobbles (less than 15 %) and the entire layer was disturbed through root growth. This layer (context [8046]) can be tentatively interpreted as occupational layer because of its very dark colour and its location within the structure, as well as the several stones associated with this layer. Figure 8 (below) shows deposit [8046] inclusive of four stones that are all between 15-20 cm wide and 30-40 cm long and that could be interpreted as post pads that have slid down slope, with only one stone remaining in the center of the building The only find in this layer was a tooth fragment, possibly a pig tooth (bone 15).

Stratigraphically, [8046] must be associated with the occupation of Structure 8 or the first phases of its abandonment. If the former, this potential occupational layer may be a trampled organic deposit created by humans and/or animals moving around in the enclosed or semi-enclosed space in Structure 8. If the latter, [8046] could represent a layer created by the decay and/or removal of wooden floors, or even the collapse of a wood and turf roof. Considering the pronounced slope of the building and the fact that the large rounded beach cobbles would have been difficult to walk on – especially in the leather-soled or fish-skin shoes worn in the Viking Age – it seems most likely that the floor of this building was raised on floor boards, supported by wooden sill beams in the π-shaped slot trenches.

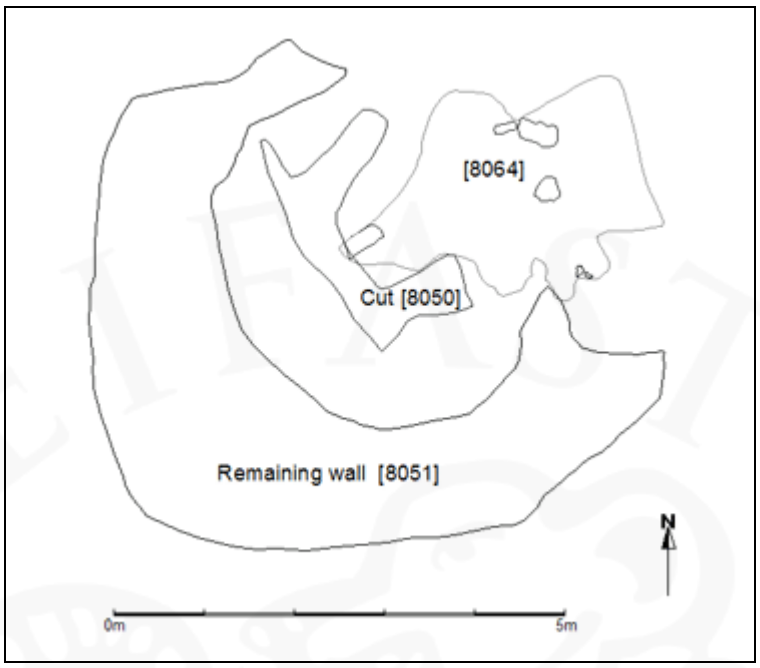

Figure 8. *Structure 8, showing the potential occupational layer [8046].*

Abandonment phase

Most of the layers removed in the eastern part of Area 23 were mixed layers containing turf fragments, which are interpreted as the turf collapse of Structure 8 (contexts 8015, 8016, 8022, 8024, 8026, 8029, 8032, 8035, and 8040). While these layers were found to be distinct from one another during excavation, they bore many similarities: generally friable to soft in compaction, they were colored brown, orange, and grey, with occasional white, black, and red mixed in. The proportion of their composition was almost uniformly 60% turf (organic materials) and 40 % silt, and the layers almost always had inclusions of several pebbles and cobbles, with the occasional charcoal (contexts 8016, and 8022). They varied in thickness and the thickest layer, [8029], was up to 15 cm thick, while the thinnest one, [0826] was barely 2 cm thick. All of them were disturbed by root growth. Because the structure was erected on a slope that slopes down to the east, the wall collapse naturally accumulated on the east side of wall [8051]. Figure 9 shows a layer of turf collapse [8035], containing rocks and pebbles that may have been used for wall support, not unlike the wall constructions encountered in other Viking Age ruins from Vatnsfjörður (Milek 2008).

The only artefacts associated with Structure 8 were unfortunately found in turf collapse layers, and therefore cannot be associated with the function of the building. Find 25, a badly corroded iron object that may have been used as a fitting or fastening device, was found in turf collapse layer [8016]. The same context produced a few animal teeth (bone 13). Two barrel-shaped blue glass beads were found in turf collapse [8035] (find 33), which date to the Viking Age, provide a rough *terminus post quem* date for the building (see report by Elín Ósk Hreiðarsdóttir, below).

Figure 9. *Structure 8, context [8035], a turf collapse layer mixed with rocks and pebbles. Camera facing southwest*

Discussion

The interior of the structure measures about 5 m², potentially offering enough standing room for two relatively small medieval cows (McGovern, personal communication, March 2009).While the only two clear features in this building are the cut [8050], and the remains of the base of wall [8051], there is one deposit that could potentially be viewed as organic occupation layer, or at least a mix of turf collapse and organic materials derived from trampling: [8046]. This layer, tentatively interpreted as 'Turf collapse in centre of Structure 8' during the excavation, may eventually have to be re-interpreted if the geochemical sample produces interesting results. There were four stones in this possible occupation deposit that could be interpreted as paving stones that seem to have slid slightly down the slope, further supporting the possibility that [8046] was associated with the occupation of the building.

While the function of Structure 8 is not entirely clear because of the poor preservation of the building and the unique appearance of the slot trench within the building, the layout as well as the placement of this structure hint towards a possible sheltering construction for animals:

- The cut [8050] that can potentially be identified as a slot for a more substantial, wooden floor foundation, is defining an area of about 5 m² – large enough for two small medieval cows, with the holding area possibly divided in two. Since no postholes, or post pads, could be positively identified as *in situ*, the exact layout of the building's interior, exact exterior, and further a potential roof structure cannot be reconstructed.

- The fact that the building was placed on a slope may be the most plausible argument that this structure/shelter was indeed an animal holding pen, or byre, because the manure could be removed easiest this way. While it is often ususal for poorly

drained sites to find byres on a slope for easier run-off or urine, this specific structure could secondly have been placed into this location because it facilitated fertilizing the home field (for a discussion on placement of animal byres see Berson 2002: 60).

- Contexts [8016], [8027] and [8046] were sampled for geochemical analysis (samples 13 and 50-52) and may yet add another level of information.

Concluding remarks on Area 23
(Astrid Daxböck, Ramona Harrison and Karen Milek)

The large open area excavation in Area 23 resulted in several new and unusual features that are so far unique on Viking Age farmsteads in Iceland. The large pits, which might either have been used for cooking or charcoal burning are far deeper than was was previously thought possible at Vatnsfjörður, where the beach gravels underlying the site would logically deter the digging of large pits. The presence of these features, cunningly constructed with a layer of revetment stones to prevent the collapse of the steep sides, demonstrates how important these features were to the necessary functioning of the site, how determined the occupants of Vatnsfjörður were have large pits, even where soils were shallow and pit-digging was difficult, and how innovative they could be in the methods used to construct and maintain large pits. The presence of these features also furthers our understanding of the outdoor activities that occurred at Vatnsfjörður during the Viking Age. The closest Icelandic parallels to these large pits are the cooking pits excavated at Herjólfsdalur, in the Westmann Islands; these were, however, found within buildings, rather than out of doors (Margrét Hermanns-Auðardóttir 1989: 104-108).

The interpretation of Structure 8 presents a challenge, but regardless of the building's function, it is interesting to note that the pronounced slope of the building and the π-shaped slot trench within it are so far unparalleled in Iceland. As it was pointed out above, there was no stratigraphic relationship between the pit features and sheet middens in the western and southern parts of Area 23 and Structure 8 in the eastern part of the area. This is infortunate from the point of view of trying to phase the site, but it at least suggests that the activities associated with the large pits were probably not connected in any with with the function of Structure 8.

The excavation of Area 23 was completed during the 2008 field season. The area was excavated down to the natural subsoil in all places, with only the walls of Structure 8 left *in situ.* Prior to returfing Area 23 at the end of the field season, wall [8051] was built up with turf in order to make it more visible and more suitable for presentation to the public. This work was done by several students, who had been involved with initial excavation of the structure.

Pit 1 was also consolidated and reconstructed so that it could be presented to the public in an understandable way (see Figure 3 in the introductory section by Milek, above). Students who had excavated the pit were involved in the reconstruction work. They rebuilt the stone lining of the pit using soil and the original fire-cracked rocks. They also rebuilt the ridge around Pit 1 using beach gravel and covering it with turf.

In order make it easier to re-open and finish excavating Pit 2 in the future, the excavated half and the section were covered with Terramatting and the cut was filled with up with turf.

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EXCAVATIONS IN THE FARM MOUND AREA

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Fornleifastofnun Íslands

Introduction

2008 was the fourth field season on the farm mound at Vatnsfjörður. In previous field seasons the farm mound was defined by test-trenching[6] and part of the last dwelling house, made of turf and stones, was located. The western part of that house had not been exposed in 2007, therefore the field season of 2008 started by extending the excavation area westward. The extended area is approximately 23 m N-S and 10 m A-W. Overall, the whole excavation area on the farm mound is now approximately 28 m NNW by 25 m SSE, measuring some 700 m^2 in total. The primary aim of the farm mound excavation project was to find the last turf dwelling house on the farm mound, expose it and excavate it.

The last turf and stone dwelling house was, according to documentary sources, built in 1884, and was lived in until 1906, when a new dwelling house was built near the SW corner of it (Tryggvi Þorsteinsson 2006). The location of the 1906 house is now believed to be visible in the SW corner of the excavation area. The turf house (called structure [7500]) was partly demolished when, or shortly after, the 1906 house was built, but the easternmost division was used as a storage room and a smithy probably until the mid-twentieth century. The 1884 house is probably fully exposed now apart from the northernmost element where 20th century outhouse complex is located and has apparently damaged that that part of the ruin.

The field season started on June the 28th, the excavation proper a week later and ended August 1st. The weather was fine the whole time, even though little less sun and wind and more rain would have been appreciated.

As before the project manager was Garðar Guðmundsson who also supervised along with archaeologists Guðrún Alda Gísladóttir and Uggi Ævarsson. Other staff members on the farm mound were Véronique Forbes, a graduate student from the University of Laval, Quebec, Canada, and Gunnhildur Garðarsdóttir, who served her third field season on the farm mound. Véronique Forbes also acted as the head of archaeoentomological reseach at Vatnsfjörður. Four to eight students of the field school rotated between the Viking Age Area and the Farm mound over the whole excavation period. The post-excavation work was carried out by Uggi Ævarsson, Garðar Guðmundsson and Guðrún Alda Gísladóttir, but data entry and the digitization of drawings was chiefly in the hands of Astrid Daxböck.

The 2008 Field Season

The farm mound second last dwelling house on the farm mound, structure [7500], is now exposed, even though the west outer wall has not yet come properly to light. Most likely the western part of the house was demolished when, or shortly after, the new dwelling house was built (post-1906). Also the northernmost wall had probably partly been demolished by the 20th-century outhouse complex.

[6] See Preliminary Reports in Milek (2007; 2008).

Figure 1. *The Farm Mound Area. Overview of building [7500], facing north.*

In the field 2008 season the emphasis was on exposing and excavating the remnants of the second last dwelling structure of the farm mound and the removal of deposits which covered this turf and stone structure [7500], in the newly opened area. The archaeology was immediately below the turf strata and most of the excavated deposits were post-abandonment and destruction layers: 20th-century rubbish dumps, scattered stones and turf collapse from walls and roofs. The cultural layers had been affected considerably when the western part of the 1884 turf house was demolished post 1906, as well as when the home field was levelled after the mid 20th century. After removing the overlaying deposits the layout of the house started to become clearer and different rooms/houses were identified.

Excavation Methods

The excavation method followed the FSÍ protocol, using 'single context planning' – the method by which every deposit is identified, recorded, photographed, planned, and its extend and thickness measured. Each deposit is described individually and systematically and thereafter removed. A Harris matrix was established on site, and refined during the post-excavation phase.

Finds were categorized and labelled on site, washed, dried, packed and registered in the excavation database after each day. Finds were given basic conservation attention if necessary. All **bones** were collected, bagged and sent to the University of Laval for identification and analysis.

Bulk soil **samples** for chemical analysis were taken on an *ad hoc* basis. Relatively few samples were taken in 2008, as the work this year chiefly involved post-abandonment deposits. Samples were mainly taken from *in situ* midden deposits [8554, 8566] and [8583] in the 'midden room' group [8562]. Samples were also taken from deposit [8576] in group [8574], a concentration of birch twigs, and from a mottled deposit, [8587], for seed identification. Véronique Forbes was in charge of archaeoentomology sampling and processing (see her report below). Garðar Guðmundsson and Dawn Elise Mooney piloted the archaeobotany sampling programme and Dawn did the bulk of the processing work (see her report below). Also, Simon Parkin, Stuart Morison and Ian A. Simpson took micromorphology samples from a section on the west side of the farm mound in order to examine fuel resource utilization (see the report by Parkin et al., below).

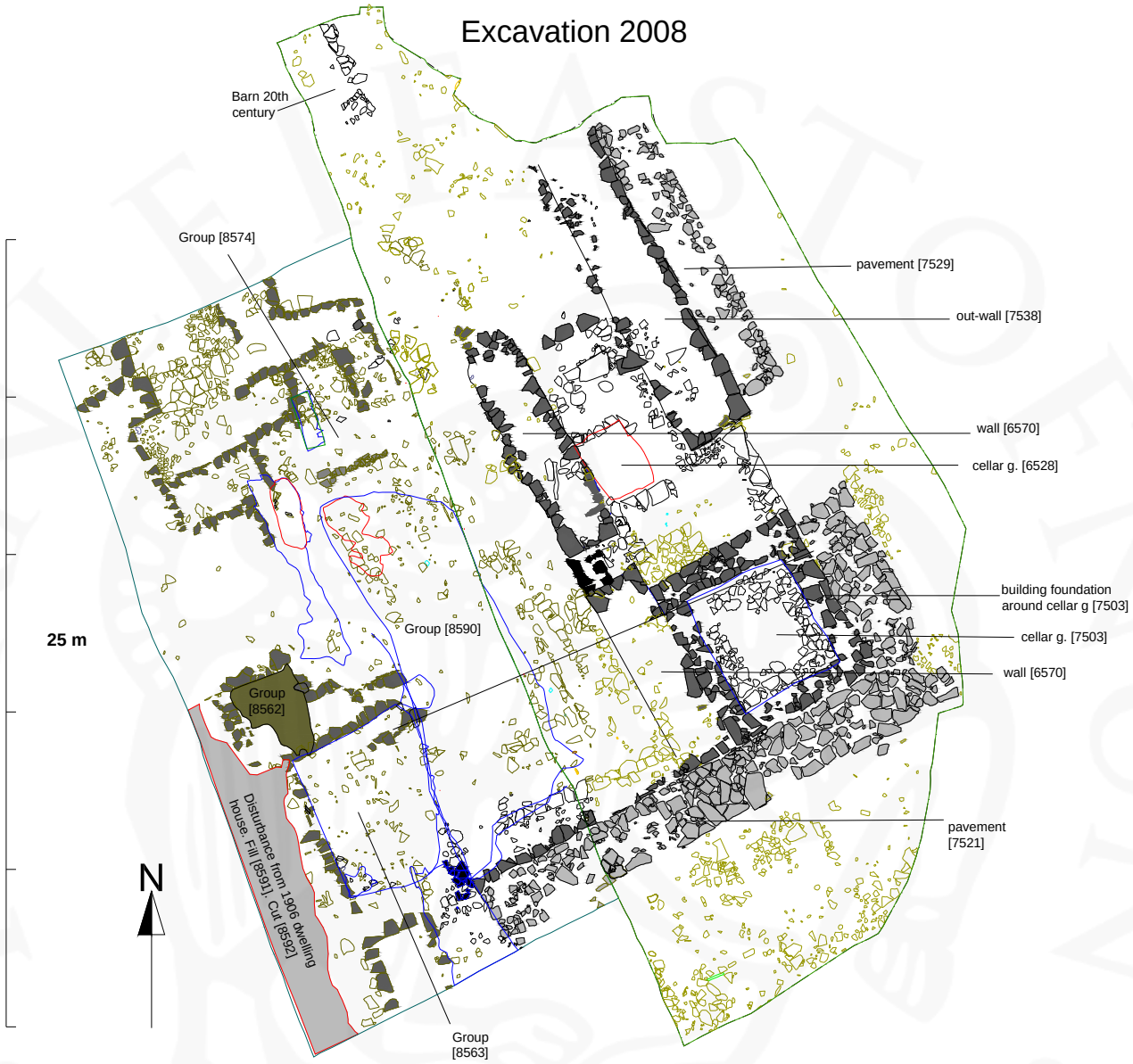

Figure 2. *Overview of the Farm Mound Excavation Area. The area opened in the 2008 field season is to the left on the map. Dark grey fill represent walls, light grey paving. Red lines represent cuts and blue lines deposits. Stones outlined with green have not yet been given unit numbers.*

Excavation Results

Structure [7500]: Turf and stone house 1884-1906

As stated above the first aim of the work on the farm mound was to expose and excavate the last turf dwelling house on the farm mound – a conventional turf house with south-facing timber-panelled front gables. That house has now been fully exposed except for the northern part which was partly destroyed when a 20th-century outhouse complex was erected. By the end of the field season when the western part of the excavation area had been cleaned of post-abandonment and destruction deposits the layout of the whole structure [7500] became clearer: the plinth, walls, outside and inside stone paving's and rooms.

Five groups were identified on the Farm mound to allow discussion of the site: [8560], [8562], [8563], [8574] and [8590]. Those will be discussed individually below.

Figure 3. *Left: Over view of location of group [8560], facing east. Right: Cut [8589] after excavation, facing north*

Group [8560]

Group [8560] consists of stone collapse [8527 and 8556] in an elongated cut [8589] located northwest of the northwest corner of Group [8590] (the ´middle´ area). The cut measures 2,2m NW-SE and 0,8m SW-NE and was 54 cm deep. The function of the cut is not known. Badly preserved wood remains were present between the stones.

Group [8562]

Group [8562] is a room that has been filled with rubbish, chiefly charcoal, ash (wood and peat) mixed with rich amount of animal bones (fish and mammal). This room is located by the western limit of the excavation area and slightly disturbed by cut [8592] for the 1906 house. This group includes eight registered deposits: [8529, 8532, 8550, 8552, 8554, 8566, 8583 and 8588]. Bones from one deposit, [8566], have been analyzed by Céline Dupont-Hébert (see her report below). Ovis and/or Capra (sheep and/or goat) represented 35% of all mammal bones but the fish bones are yet to be fully analyzed. The preliminary results indicate that the bone collection from [8566] is rather typical for bone assemblages from the same period in Iceland. Only two bones from cattle were found and according to the preliminary fish bone analyzes wolf-fish bones (Steinbítur) seems to be in abundance. Interestingly two skulls from horses also originate from this layer.

The midden fill predates the 1906 dwelling house as the cut [8592] partly disturbs it, but could well have been a rubbish dump from structure [7500]. The act of filling abandoned and out-of-use houses with rubbish is well known in Iceland through the centuries and has apparently been the case in room group [8562].

Figure 4 . *Group [8562]. Room filled with waste: animal bones and ash. Camera facing east.*

Group [8563]

Group [8563] is a room in the SW-corner of the excavation area. Its limits are clear to the west and north but southern and eastern limits are fuzzier. The south wall has partly been disturbed and robbed of stones and the eastern limits have been badly disturbed when the western part of structure [7500] was dismantled and the structure made smaller. There are 14 excavated deposits within this group: [8542, 8544, 8549, 8564, 8565, 8567, 8568, 8570, 8571, 8573, 8580, 8582, 8584 and 8586]. The deposits comprise mainly of post-abandonment turf debris and collapse. In situ deposits were starting to emerge by the end of the field season. The relationship between [8563] and [7500] is yet somewhat unclear as the boundaries are very disturbed. The western wall has also been partly cut when the 1906 dwelling house was erected. In the continuation of room [8563], SE of it, there seems to be emerging a corridor/room with a vague pavement [8553]. Over this pavement a few turf and stone collapse deposits were removed but those deposits stretched into both those rooms. These deposits are [8555, 8582 and 8584].

The pavement [7521] that is parallel to structure [7500] originally reached the east side of the corridor/room. The pavement is intact until opposite the point where the western houses/rooms in structure [7500] were located. The western part of the pavement was clearly robbed of stones when the house was shortened and torn down after 1906.

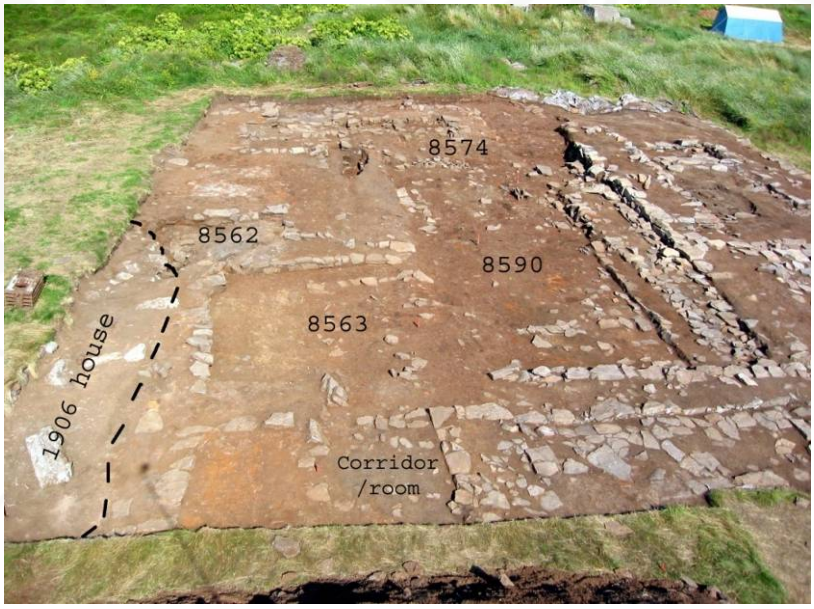

Figure 5. *Overview and location of [8563] and corridor/room. The remains of the western part of pavement [7521] can be seen in the lower right corner. Camera facing north.*

Figure 6. *The robbing of stones from the western part of pavement [7521]. Camera facing north.*

Group [8574]

Group [8574] is north of the ´middle´ area, [8590]. This area is very disturbed, probably both due to levelling of the homefield, shortening of structure [7500], and 20th-century activity. Strangely, a sub-rectangular cut ca. 2,8m NW-SE and 1,3m SW-NE was evident under the top-soil. After removal of turf debris and turf collapses [8538, 8539, 8545, 8546 and 8547], several concentrated deposits [8575, 8576, 8577, 8578 and 8581] were excavated. These were two opposite rows of stones and stone scatters, with turf debris and birch twigs between them. This area and its relationship with nearby group [8590], remnants of [7500] etc., and the function of this regular cut [8593] remain at present a mystery.

Group [8590]

Group [8590] had the working title ´middle´ area. It is a big area in structure [7500], west of the remnants of the last standing easternmost house/room, roughly in the middle of the excavation area. The area measures ca. 13,5m NW-SE and 5,5m SW-NE. After removal of several extensive levelling deposits [8528, 8531 and 8541] ca. 20-30 cm deep, and dumped, turf collapse and turf debris deposits [8534, 8537, 8557, 8569 and 8570] a clearer picture started to emerge. This area is most likely to originate from the time when structure [7500] was shortened after 1906. The house(s)/room/s that was/were located in this area must have been completely removed, possibly in order to reuse construction wood and stones, and to make space in front of the new dwelling house. After the demolition the area seems to have been filled in and levelled. The boundaries of the area are clear on the east side by wall [6570] and on the south side by an as yet unnumbered wall and the rest of pavement [7521]. The boundaries of the area are somewhat unclear due to how crudely the house was torn down. Its western borders are unclear because of

Figure 8. *After cleaning of top soil. ´Middle´area or group [8590] can be seen in the middle of the picture and its location in connection to other areas. Facing east.*

the demolition (as has been discussed in group [8563]) and some deposits stretch from group [8563] into group [8590]. The area's northern boundaries are also unclear as well as its relationship with group [8574], to the north. Stone wall remnants can be seen in the northern end at the west side, but the area is badly disturbed on the east side.

At the end of the 2008 excavation season layers and structures from earlier occupation phases started to emerge. Further investigation of these will await forthcoming seasons.

Figure 9. *The still entangled area north of [8590].*

Area North of [8590] and [8574]

In the northernmost part of the excavation area, north of [8590] and [8574], a number of features, including turf and stone walls, corridors and rooms, emerged during the 2008 season. The initial theory is that these deposits reflect the shortening of the second last building (structure [7500]) on the farm mound and/or possible rebuilding of temporary or still earlier buildings. These remains have not yet been clearly defined and hence are not yet fully understood and wait further investigation in the 2009 excavation season.

Summary

The excavation area on the farm mound at Vatnsfjörður is now 700 m^2 and the structure targetted for research been more or less exposed and excavation has begun.

It became clear during 2008 field season that the site was considerably disturbed, firstly when the 1884 turf house was built, partly on top of an earlier house that had been torn down. Sources say that the 1884 house was more extensive than a previous house so the building activity made an impact on earlier remains. Secondly, there was further disturbance of the area when the 1884 house was partly demolished and shortened in 1906, and the 1906 house erected. All this has made a considerable impact on the archaeology.[7]

The layout of the house [7500] has slowly started to emerge: there are now clear rooms, corridors and areas where houses/rooms have been ripped out. Still one area has not been touched at al, the area north of [8562], but there top of turf walls can be seen. The agenda for the 2009 season is to continue the excavation of structure [7500] and hopefully that operation will progress successfully. The aim is to remove the largest portion of it to get down to earlier phases, but probably the eastern part will be left more or less intact as the ruins are very well preserved. Decision of what parts to remove and what to keep for display for later generations will be taken in the field next summer as the ruin reveals itself.

[7] Tryggvi Þorsteinsson (2006), 37-39; Indriði Indriðason (1947), 77-78.

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ASSESSMENT OF THE ARTEFACTS FROM VATNSFJÖRÐUR 2008

Guðrún Alda Gísladóttir
Fornleifastofnun Íslands

Finds from the Viking Age Area: Areas 14, 23, 26, 31

In total 59 finds units and 19,3 g of slag were registered under 35 finds numbers in the excavation finds database (see Appendix 2: Register of Finds). One find, no. 24, was discarded during post-excavation process as being fragmented shell skin remains. Astrid Daxböck processed the finds and registered them in the excavation database. Conservation work is concluded by the National Museum but finds are temporarily stored at FSÍ until the end of the project and finds processing is completed. The iron objects are in the process of being x-rayed and analysed.

The preservation of artefacts in the Viking Age Area is on average poor. Iron objects are greatly corroded whilst copper alloys are very well preserved. Organic material is almost absent in the assemblage and rather few bones (i.e. food waste) have come from the areas in general.

The majority of the finds from the site are made of iron and glass. Other finds categories are wood, textile, pottery, copper alloy, plastic, aluminum and metalworking slag (see Table 1).

Table 1. *Artefact materials in the Viking Age Area.*

Material	**Quantity**	**Material**	**Quantity**
Iron	24	Plastic	1
Glass	17	Copper alloy	1
Wood	10	Aluminum	1
Textile	4	Pottery	1

From **Area 14** came five finds from three deposits [7157, 8020 and 8038]. The finds are all iron objects; no. 26 and 31 both unidentifiable fragments and no. 30 is possibly a nail shank.

Most of the finds come from **Area 23**, an outdoor activity area east of *skáli* and other structures, in total 52 finds, within 27 finds numbers. The finds come from nine deposits: [8000, 8001, 8005, 8006, 8007, 8013, 8016, 8035 and 8073]. The finds from this area are miscellaneous and are datable to the Viking Age and also to the 19th -20th century. Within the top soil deposit [8000] a Viking Age bead, find no. 11, was recovered (see report by Elín Ósk Hreiðarsdóttir, below) as well as glass and ceramic dated to the 19th/20th century. Datable finds from deposit [8001, 8005 and 8006] are all modern.

In aeolian deposit [8007] a nice plain object of copper alloy was retrieved, possibly a buckle (find no. 21). The object is roughly D-shaped and partly open on the straighter side. It is sub-rectangular in cross-section (4x2mm) and has worn marks on one side (see Figure 1). From the turf collapse (wall?) [8016] a possible iron fitting, find no. 25, was found. Two other glass beads were discovered within a turf collapse by the eastern wall of Structure 8. The beads date to the Viking Age and were given the find numbers 33a and 33b (see report by Elín Ósk Hreiðarsdóttir, below). Finally, from mixed deposit [8073], a modern glass fragment was found.

Figure 1. *Buckle? Find no. 21.*

From **Test Trench 26**, located ca. 10m north of Area 23, a modern glass fragment, no. 23, was recovered and from **Test Trench 31,** ca. 5 m north of the *skáli*, a possible punch, no. 34, was found. This fragmented artefact resembles punches found in Coppergate, York.[8]

Discussion

Datable finds from the Viking Age Area are, on the one hand from the Viking age period and on the other hand, from the 19th/20th century. The Viking Age archaeological remains in the "open" area, Area 23, have suffered modern disturbance but the division between the two time periods is rather convincing. One must, however, take into consideration that some of the finds are "timeless" every day artefacts that often have been in use for centuries and are therefore generally impossible to assign to a certain date. Further, the poor preservation of some of these finds renders them impossible to date accurately.

Area 23 is the find richest area and there – within datable deposits – beads from Viking Age were recovered. These suggest a Viking Age date for Structure 8, the same period as other structures within this area. Also a possible punch found in Test Trench 31is likely to be of Viking Age origin. Punch tools have been found in Vatnsfjörður in earlier excavation seasons.[9]

The modern artefacts in Area 23 originate from two modern rubbish dumps, [8001] and [8005] which had been used to infill two depressions in the homefield created by underlying Viking Age pits (see Astrid Daxböck's report on Area 23).

Finds from the Farm Mound Area

The finds database from field season 2008 on the Farm Mound in Vatnsfjörður comprises 1661 artefacts registered under 302 finds numbers. Included in the finds assemblage are ca. 38 kg of animal bones (see the faunal report by Céline Dupont-Hébert, this volume) and 900 g of slag. Two finds were discarded during post-excavation processing, finds 145 and 147 as being natural features. Also, the remains of an iron barrel and corrugated iron from the top soil deposit [8500], and concrete fragments from deposit [8534] were discarded at the site.

All finds were processed and given basic conservation care on site but further conservation work was carried out during post-excavation work and by the National Museum. The finds are stored at the Westfjords Heritage Museum (Byggðasafn Vestfjarða), in the town of Ísafjörður, and finds processing was completed there and at the Institute of Archaeology, Reykjavik (Fornleifastofnun Íslands).

The finds from the 2008 field season are mainly from a post-abandonment, disturbed deposit created by the levelling of the homefield and building activity on the farm mound. Preservation conditions in the upper deposits range from poor/average to excellent. Organic material is rather well preserved but iron objects are in general heavily corroded.

[8] Ottaway, Patrick (1992) Anglo-Scandinavian Ironwork from Coppergate, 516.

[9] Guðrun Alda Gísladóttir (2007) The finds from area 2 and 6, 66-67.

The finds recovered are from 45 separate deposits. The richest deposits in terms of the number of finds were top soil deposit [8500], gravel dump [8534], turf debris [8541] and disturbed deposit [8585]. In those four above mentioned layers originate just more than one half of all recovered artefacts, 876 out of 1661.

The majority, 89%, of the finds are of iron, glass and ceramic.

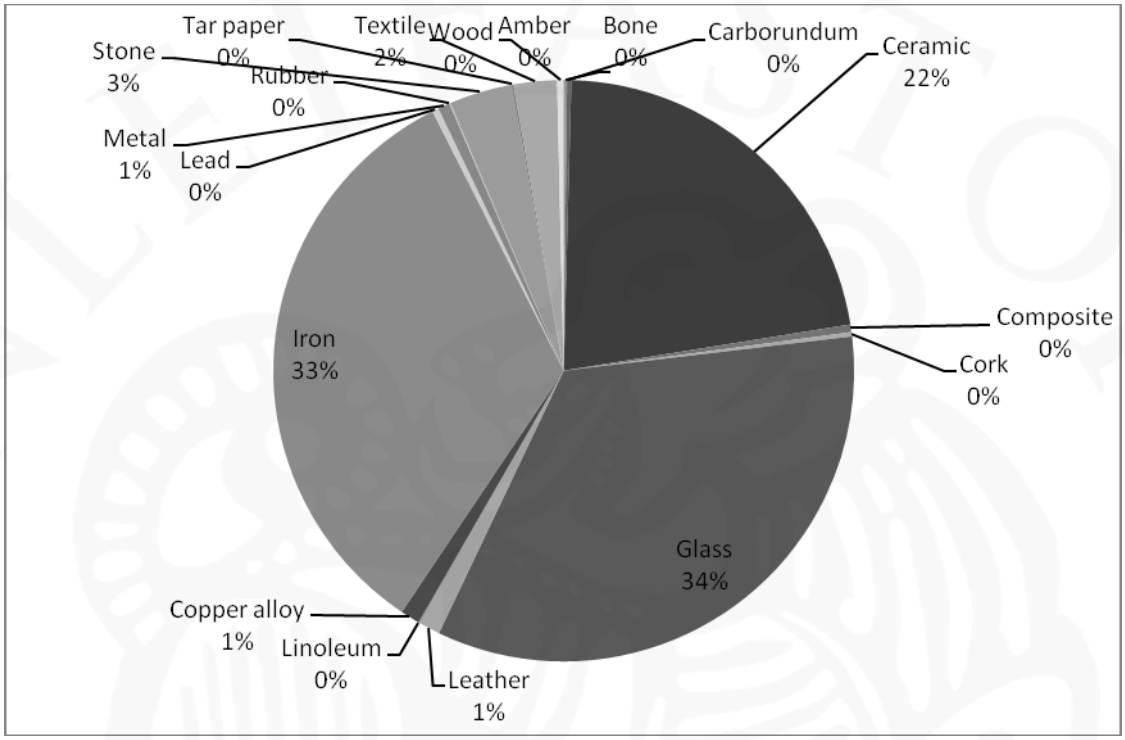

Figure 3. *Proportions of materials found in the Farm Mound Area.*

In the 2007 and 2008 field seasons chiefly post-abandonment deposits have been excavated as the main focus has been on opening up a large excavation area and to expose structure [7500] (see excavation report by Ævarsson and Gísladóttir above). This is the main reason for few artefacts being found in situ. As the material the find types diverse highly, they include domestic and agricultural objects, fishing equipment, riding gear, personal items etc. (see Appendix 2, Register of Finds, below). Nails are by far the largest category of the diverse types e.g. wire nails, post-1890, and machine-made 19th-century nails to name but a few. The assemblage can chiefly be dated to late 19th-20th century but more detailed analysis is expected to refine these preliminary results.

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THE BEADS FROM VATNSFJÖRÐUR 2008

Elín Ósk Hreiðarsdóttir
Fornleifastofnun Íslands

During the excavation at Vatnsfjörður in the summer of 2008 four beads were recovered. Out of these, three came from the Viking Age area and one from the farm mound. Previously, nine beads had been recovered from the Viking Age area making the grand total of 12 beads from the area at the end of the field season 2008. The fourth bead, recovered from the farm mound, was the first bead from that area and also the first none-glass bead from Vatnsfjörður.

The beads were examined both macroscopically and with the aid of a Leica MZ 6 microscope at 40X magnification. The bead from the farm mound is an amber bead and in rather poor condition. All the beads from the skáli-area are glass beads and in good condition. The glass beads were classified according to Johans Callmers system of Scandinavian beads with reference to Icelandic parallels (Callmer 1977; Hreiðarsdóttir 2005).

All three of the beads recovered around the Viking Age area are Viking Age in date, but two out of three (VSF08-033a and -033b) are of a type that was common throughout the Viking Age and therefore cannot be dated with precision. The third bead (VSF08-011) is from AD 915 or later. The two blown glass beads (VSF08-033a and -033b) are probably from the Eastern Mediterranean but the oblong one (VSF08-011) could well have been made in Scandinavia. The fourth bead is probably early modern and is most likely made out of the so called Baltic amber. Detailed descriptions of each bead are given below.

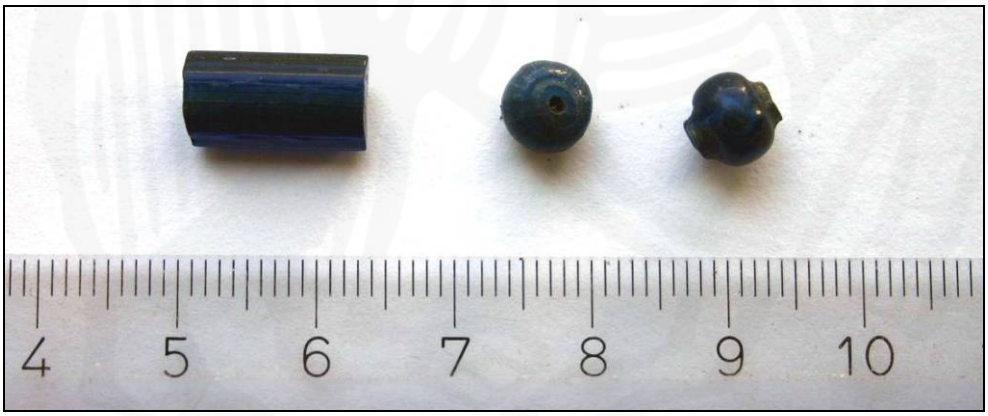

Figure 1. *From left: Bead 11, bead 33b and 33a.*

VSF08-033a

Material: Glass.
Condition: The bead is whole and the glass is in good condition.
Shape: Rounded.
Size: Length 0,68 cm, diam. 0,68 cm, diam. of hole: <0,1 cm.
Method of manufacture: Blown glass.
Colour: Dark blue.
Found in context: Area 23, context 8035.

Bead VSF08-033a was found with another very similar bead (see 033b) in a turf collapse layer on the eastern edge of Structure 8 (Area 23). It is a simple, blown bead of dark blue colour. The bead is well made with even surface and has clear, tortated ends. The bead is in good condition. It is of type E060. Until 2004 a total of 83 such beads had been recovered

in Iceland making it one of the most common bead types from Viking Age Iceland. This type of bead is most commonly found in the east and northeast although it has been found all across the country. Callmer groups together dark blue, blown beads of this type whether they are simple or segmented. In Iceland most of the dark blue beads of this type are segmented (either double or triple) and less than 25% are simple, like the bead from Vatnsfjörður. Most of the beads of type E060 found in Iceland come from heathen burials but beads of this type have been recovered from settlements twice before, from Hrísheimar in S-Þingeyjarsýsla and from Hrísbrú in Mosfellssveit. This type of bead is found throughout the whole of Viking Age. Callmer suggests the eastern Mediterranean as a likely area of origin.

VSF08-033b (stored in the same box as 033a but is slightly shorter and lighter in colour)

Material: Glass.
Condition: The bead is whole and the glass is in good condition.
Shape: Rounded.
Size: Length 0,55 cm, diam. 0,68 cm, diam. of hole: <0,1 cm.
Method of manufacture: Blown glass.
Colour: Dark blue.
Found in context: Area 23, context 8035.

Bead VSF08-033b was found with another very similar bead (see 033a) in a turf collapse near the eastern wall of Structure 8 (Area 23). It is a simple, blown bead of dark blue colour, but it is of a shade lighter blue than bead 033a. Like that bead it is well made and has tortated ends that are slightly oblong. The bead is in good condition but on the surface there are fine lines and holes that have been filled up with earth. It is of same type as 033a, type E060, which was common throughout the whole Viking Age and was most likely made in the eastern Mediterranean.

VSF08-011

Material: Glass.
Condition: The bead is whole and the glass is in good condition.
Shape: Rounded.
Size: Length 1,32 cm, diam. 0,49-0,7 cm, diam. of hole: 0,1-1,5 cm.
Method of manufacture: Cold made (cut) from glass
Colour: Dark blue.
Found in context: Area 23, context 8000.

Bead VSF08-011 was found in a reddish brown, aeolian silt topsoil near the limit of the excavation area north of Structure 8 (Area 23). It is a dark blue, oblong glass bead of an unusual type. This type of bead was made in similar way to many stone beads; it was cut, a hole was drilled through the bead body and then the bead was polished. It is likely that this type of bead was originally made as an imitation of rock crystal and carnelian beads. The bead was probably originally prismatic and most likely hexagonal but its sides are now too worn for this to be stated conclusively. The ends are sharp and the bead is well made. Only three beads of this group have been found before in Iceland, all oblong and prismatic, one is green but two dark blue and very similar to the one from Vatnsfjörður. The two dark blue beads come from the excavation at Hólmur in Skaftafellssýsla and the green bead from the so-called "bead burial" at Vestdalsvatn in the east. It is likely that this type of beads were manufactured in Scandinavia and fractured beads of this type (possibly production waste) have, for example been found in Hedeby.[10] According to Callmer these beads first appear around AD 915.

[10] Callmer, J. 1977: 99.

VSF08-259

Material: Amber
Condition: The bead is whole but the amber is in poor condition.
Shape: Polyhedral with eight facets.
Size: Length 0,92 cm, diam. 0,94-1,05 cm, diam. of hole: 0,25 cm.
Method of manufacture: Cut/carved and polished
Colour: Brownish red.
Found in context: Area FM, context 8530.

Bead VSF08-011 was found on a flat stone surface (possible pavement) on the farm mound. It is a polyhedral amber bead comprised of eight facets. The bead is in a bad condition. Its surface is covered in cracks and in a few places small fragments of the amber have broken away. Part of the surface has dried out and is now of a light yellow colour.

The bead was probably made by first cutting the amber roughly into the right shape, then a hole was drilled from both sides before final carving and polishing.[11] The hole in the bead is a little elongated.

A good chronology has not yet been developed for amber beads and therefore it is difficult to determine a date for the Vatnsfjörður bead. It is however most likely early modern or from the 17th-19th century. Amber beads with the same or similar form have been found in Iceland before. One such bead comes from the excavation at Hólar in the north and two come from the excavation at Skálholt in the south, both sides being bishopric's. The latter two are dated to the 18-19th centuries.[12] The Vatnsfjörður amber bead is most likely made of Baltic Amber, which dominated the European market during this period but it is not possible to determine a the production area.

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[11] See for example Egan and Pritchard 2002: 307.
[12] But dating for the Hólar bead was not available.

CERAMICS AND GLASS FROM VATNSFJÖRÐUR 2008

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Apart from a few fragments of glass and one sherd of pottery from the Viking settlement excavation area, all of which date to the late 19th/20th century, the majority of material came from the farm mound. This material broadly dates from the early 17th century right through to the early 20th century, with the majority dating to the late 19th/early 20th century. Two coins of Christian IX (reigned 1863-1906) came from related deposits (8555 and 8531). Only the material from the farm mound is discussed in more detail below.

Glass

A total of 273 glass vessel fragments (2698g) and 289 window pane fragments (1037g) came from the farm mound, as well as two white glass moulded buttons and some kerosene lamp chimney fragments (counted with vessel glass totals above).

The majority of the window glass is 20th century machine rolled panes, with large groups coming from units 8541 and 8534; there was also some earlier green crown and/or cylinder glass, especially from 8547 and 8581, 8585. A particularly nice piece with edge retouch/chipping came from 8548.

The two glass buttons were simple moulded items in white glass, which date from the late 19th century; they came from 8529 and 8588. Fragments of kerosene lamp chimneys were also identified (8537, 8534).

The glass vessels were varied but predominantly consisted of green bottles for holding wine, beer or soda; most had tooled, applied lips onto a moulded body and date to the late 19th century; good examples come from 8541, 8586, 8500, 8534. A nice example of an earlier string rim bottle came from 8566 and may date back to the late 17th/early 18th century. The second most common group were cylindrical medicine phials and bottles, mostly in clear glass (8587, 8588, 8500, 8534) but also some in green glass (8548). Several fragments from enamelled flasks/bottles in clear glass were identified, from more than one vessel from contexts 8528, 8541, 8548, 8586, 8500 – these date broadly to the 18th/19th century. There was also one fragment from the base of a square blue and white bottle/flask which probably dates to the 18th century (8540)[13]. A few fragments of press-moulded vessels were also noted, in clear and blue glass (8537, 8500) and date after the mid-19th century. Finally, a complete ink bottle in green glass came from 8500.

Tobacco pipes

A total of 64 fragments (193g) from clay tobacco pipes were recovered, the majority being stems, many of which were unpolished. Only one stem was noted with any decoration, and that was roulletted and attached to a bowl with an illegible heel stamp (8588). A large collection came from this unit 8588 and included several other bowls, all 18th century types: one with the Gouda shield on the side and a heel stamp of 97 under a crown (dated 1705-1780), another with the Gouda shield and heel stamp of a hand (dated 1680-1784). There was also fragments from a moulded bowl with a lion and other plain bowls. Apart from this 18th century group, there were some earlier examples, particularly an early 17th century bowl from 8500 and a late 17th bowl from 8541. Possible fragment of a bowl in red clay/terracotta came from the same context.

[13] This piece has been catalogued with the pottery and presumably mistaken for porcelain

Pottery

A total of 277 sherds (1478g) from ceramic vessels was indentified, as well as 7 fragments of salt-glazed stoneware drain sections (1824g), 19 brick pieces (3872 g). The pottery was a diverse group and dates broadly from the 17th to 20th century. On the whole, however, most of the units date to the 19th/early 20th century, but two are potentially earlier – 8530 and 8585; both have one piece of 19th century pottery in them but are otherwise 17th/18th century in date.

The most common group were industrial whitewares, many of which we undecorated but also many with various decorative styles, tissue printing and sponging being the more common, but there was also some hand painted examples and some factory slipwares, including a marbled slipware from 8529, probably dating to the early 19th century. Other industrial refined earthenwares included several fragments from two or more yelloware pots (8531, 8500). These refined earthenwares all date to the 19th and early 20th century, but a nice late 18th century creamware plate came from 8544.

Tin-glazed earthenwares were present in remarkably high numbers and from a variety of different vessel forms; matching pieces of a tea bowl/cup came from 8530 and 8585, while a plate/dish also came from 8585 and a bowl from 8528.

Glazed red earthenwares were also common and included tripod cooking pots (e.g. 8530) as well as several slipware dishes, many of which had a green glaze (e.g. 8547, 8587), these vessels date broadly to the 17th-19th century.

Stonewares were predominantly Westerwald jugs/bottles, fragments of which came from 8540, 8530, 8585 and 8500. A fragment of Frechen jug came from 8586. Other stonewares include an English grey dipglazed preserve jar from 8531, dating too the late 19th/early 20th century.

Chinese porcelain was also present, including some Batavian tea bowls (8530, 8500) and a plate (8500), the latter of which dates to the 19th century.

Red sandstone fragments

A number of fragments of carved red sandstone were identified[14], including a face (8547), part of an oil lamp (8566) and other items (8576); it is possible they are all parts of oil lamps.

[14] These were found with the ceramics and may have been misidentified as ceramic.

VATNSFJÖRÐUR 2008 PRELIMINARY ZOOARCHAEOLOGICAL ANALYSIS

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Introduction

The summer 2008 excavation campaign at Vatnsfjörður, in the Westfjords of Iceland, was, from a zooarchaeological perspective, one of the most proactive. The Farm Mound and Viking Age excavation areas both yielded significant quantities of faunal remains. As well, new contexts contributed to a better understanding of past activities at the site, such as Viking Age cooking pits and a midden-filled room in the early modern farm mound. The year 2008 also saw the beginning of a new partnership between Université Laval and the organization of the field school. The site's faunal assemblage was shipped from Iceland to Quebec City where they will be the object of a MA thesis by the author concerning subsistence dynamics in the early modern Westfjords. Faunal remains recovered in 2007 and 2008 arrived in Quebec City in mid-February 2009 and therefore this preliminary report details an analysis still in an embryonic state. Nevertheless, enough analyses have been done to present a very initial inventory and whet the appetite for further results.

Field Methods

Excavations at Vatnsfjörður in 2008 followed established FSÍ protocols of single context excavations. Contexts on the Farm Mound and in the Viking Age area were excavated by trowelling and bones and artefacts were recovered by hand, supplemented as needed by dry sieving. Each deposit was photographed and drawn on recording sheets where their attributes and elevation points were also registered. Specific deposits interpreted as midden, pit or floor layers were removed by trowelling and were 100% dry sieved with a 4mm mesh. Some soil samples and organic samples recovered through flotation in the field were taken for archaeoentomological and archaeobotanical analyses. At the end of each working day, artefacts and faunal remains were sorted, cleaned and dried, and repackaged with their context and find numbers attached. A list of all registered bones and the weight of faunal material in each context is provided in Tables 1 and 2.

Laboratory Methods

Prior to shipping, each bone bag was weighed and carefully wrapped at the Institute of Archaeology of Iceland (FSÌ). Upon arrival in Québec, all bags were reopened to allow their contents to dry slowly. All bone remains reported in this report were gently cleaned using a soft brush and then sorted by taxonomic group, to species level where possible and to more generic categories where precise identification were not possible (see Table 3). Data recording was done following the protocols of the NABONE package, 8th edition (NABO Zooarchaeology Working Group, 2004). Identifications were made using the osteological reference collections of Université Laval, supplemented by reference manuals reported in the bibliography.

Table 1. *Faunal material recovered from the Farm Mound Area in 2008.*

Area	Unit No.	Weight (g)	Description
Farm mound	8500	3816	Food waste
21	8502	94	Food waste
21	8503	79	Food waste
21	8504	404	Food waste
21	8505	59	Food waste
21	8512	6	Food waste
21	8513	15	Food waste
21	8514	3	Food waste
21	8517	3	Food waste
21	8518	9	Food waste
21	8519	1	Food waste
21	8520	7	Food waste
21	8522	9	Food waste
21	8523	2	Food waste
Farm mound	8528	179	Food waste
Farm mound	8529	235	Food waste
Farm mound	8530	46	Food waste
Farm mound	8534	308	Food waste
Farm mound	8537	1061	Food waste
Farm mound	8548	77	Food waste
Farm mound	8544	163	Food waste
Farm mound	8532	1687	Food waste
Farm mound	8554	2290	Food waste
Farm mound	8541	316	Food waste
Farm mound	8549	131	Food waste
Farm mound	8552	10	Food waste
Farm mound	unstratified	706	Food waste
Farm mound	8566	20324	Food waste
Farm mound	8583	5074	Food waste
Farm mound	8556	47	Food waste
Farm mound	8559	284	Food waste
Farm mound	8567	56	Food waste
Farm mound	8573	56	Food waste
Farm mound	8579	5	Food waste
Farm mound	8585	261	Food waste
Farm mound	8588	534	Food waste
Farm mound	8582	45	Food waste
Farm mound	8586	88	Food waste

Table 2. *Faunal material recovered from the Viking Age Area in 2008.*

Area No.	Unit No.	Weight (g)	Description
23	8001	10	Bone fragments
23	8002	4	Bone fragments, medium preservation
23	8000	6	Burnt bone fragments
23	8005	63	Medium to poor preserved burnt bone frag.
23	8005	53	Bone fragments from sieving
14	8009	3	Bone and tooth fragments
23	8006	4	Bone fragments
23	8000	7	Bone fragments from cleaning
23	8013	3	Burnt bone fragments
23	8012	17	Teeth
23	8012	12	Burnt bone fragments
23	8017	4	Burnt bone fragments
23	8016	4	Piece of animal teeth
23	8053	9	Tooth fragment; sheep?
23	8046	6	Tooth fragment; pig?
14	8030	1	Burnt bone fragments
23	6129	9	Teeth fragments
14	8038	14	Fish bone including vertebra
14	8038	6	Tooth enamel
14	8041	60	Bone fragments: vertebra, shell-fish
14	8042	3	Bone fragments
23	8037	10	Burnt bone fragments
14	8047	6	Bone fragments
14	8056	5	Bone fragments
14	8056	4	Burnt bone fragments

Table 3. *Overview of identified faunal material from context [8566] of the Farm Mound Area and of all remains from the Viking Age Area. The -n.d.*- code indicates that pertinent specimens have been identified but have not yet been counted.*

List of identified species	***Farm Mound (8566)***	***Viking Age Area***
Domestic Mammals		
Pig (*Sus scrofa)*		1
Caprines (*Sheep/goat*)	202	2
Sheep (*Ovis aries*)	26	
Goat (*Capra hircus*)		
Cattle (*Bos taurus*)	24	8
Horse (*Equus sp.*)	4	
Avian Species		
Puffin(*Fratercula arctica)*	17	
Eider(*Somateria molissima)*	2	
Guillemot family(*Uria sp.)*	8	
Small avian species	2	12
Medium avian species		
Large avain species		
Avian species	29	
Seals and Cetaceans Species		
Small Phocids	6	
Phocid species		
Cetacean species	3	
Fish Species		
Cod(*Gadus morhua*)	40	
Haddock(*Melanogrammus aeglefinus*)	7	
Ling (*Molva molva*)	17	
Gadid species	18	
Wolf fish(*Anarhichas lupus*)	31	
Fish species	18	10
Mollusca Species	n.d.*	3
Small terrestrial mammal		
Medium terrestrial mammal	212	9
Large terrestrial mammal	16	7
Indeterminate mammal	n.d*	475
Unidentified fragments	n.d.*	153
Total Number of Fragments	***664***	***680***
Total: ***1344***		

Farm Mound Context [8566]: Domestic and Wild Species (Tables 1 and 3)

This context contains a heterogeneous mix of domestic refuse and brightly coloured soil derived from decomposed turf. A total of 664 bone fragments were recovered in the context and have been identified in a preliminary fashion. Since the identification process is not yet complete, the following discussion presents a descriptive and qualitative overview of what has been done to date. Nevertheless, these preliminary data permit an initial characterization of the diversity of fauna used and consumed by the site's inhabitants, and an initial comparison with faunas of other early modern Icelandic sites.

Genus Ovis and Capra

At this point of the analysis, specimens of Ovis and Capra represent over 35% of all identified specimens. It should be noted here that fish identifications have only begun and once these data are available the relative statistical importance of caprines (and of all mammals in general) will decline. Sheep and goats are normally very well represented in Icelandic assemblages of all periods. All portions of the skeleton are represented and no preference for axial or appendicular skeleton elements has been noted as yet. A diversity of taphonomic traces have been noted, including metapodial biperforations (up to 3 drilled holes per metapodial), cut marks located on the anterior surface of lumbar vertebrae, sagitally-split sheep-goat crania (*svið*) and horn removal. A majority of identified mandibles and maxillas represented adults of more than 2 years of age based on tooth eruption and wear (Amorisi 1985). Age estimation based on long bones fusion has not yet been conducted.

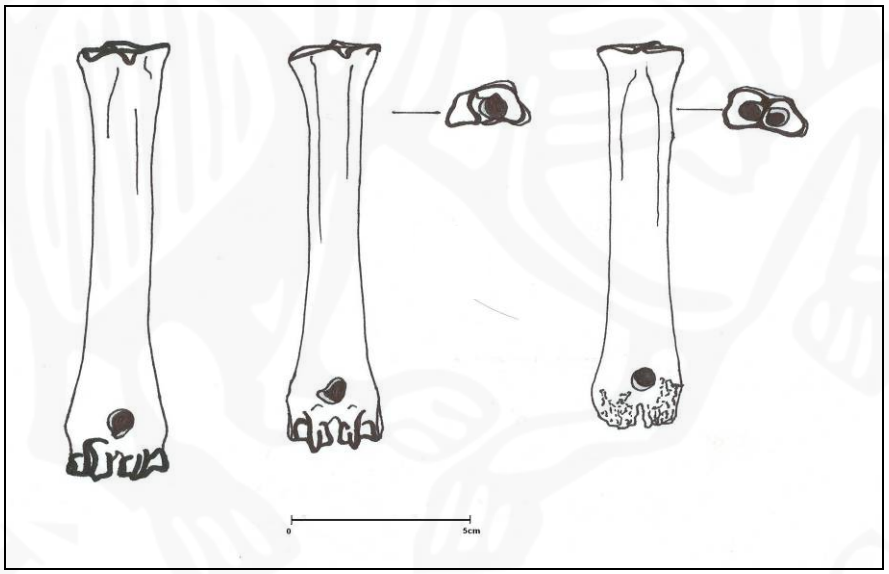

Figure 1. *Location of metapodial biperforation. Context [8566], early modern farm mound.*

Cattle

In the single context of the farm mound analysed to date, only four bone fragments were positively identified as neonatal cattle or cattle younger than 2 months of age. In most Icelandic archaeofauna of all periods, substantial numbers of bones of young calves have been identified, and this pattern is normally interpreted as reflecting the culling of superfluous calves in a dairy-oriented economy (Pálsdóttir 2008). At this point, we are unable to discern a dairying orientation in the cattle herding strategy, but analyses on other contexts of the midden may allow a more in-depth examination of herding strategies.

Horse

A surprising element of the [8566] context was the presence of two well-preserved horse skulls and multiple associated fragments. Harrison (2008) mentions that it was not customary to eat horse meat in Iceland in 18th-century Iceland, except when there was a lack of other food. One might accordingly attribute the presence of these horses in a domestic refuse deposit to the economic hardships of the 18th century (Edvardsson et al. 2004). Nevertheless, the nature of the elements represented here does not reflect any food consumption (cut marks and other butchery traces were not observed, nor were skeletal elements more directly associated with food observed). The presence of the isolated horse skulls might be considered as a special deposition event.

Figure 2. *Horse skulls found in midden context [8566], farm mound.*

Dog

No dog bones were identified in this context but their presence on the site is demonstrated by the number of bones that bear gnawing traces. As much as 12% of all bones, mostly long bones, ribs and vertebras, displayed chewing marks.

Seals and cetacean species

All seal bones identified have been attributed to neonatal pups. This age profile demonstrates that seal hunting was concentrated on the spring pupping season and suggests a certain degree of knowledge of seal behaviour. Still today, some common seals (*Phoca vitulina*) can be seen close to the Vatnsfjörður site, but post-cranial bones from neonatal seals cannot be readily identified to species and no cranial elements were recovered. Only two whalebone fragments were observed. These were both vertebra fragments which bear clearly visible working tool marks possibly for craft work as already proposed in earlier preliminary analyses of faunal remains from Vatnsfjörður (Pálsdóttir 2008).

Birds

Bird species found in this early modern context represent the diversity of species that live presently in the area, including puffins (*Fratercula arctica),* guillemots (*Uria sp.)* and eider ducks (*Somateria molissima).* Puffin colonies are currently present on Borgarey Island just offshore of the Vatnsfjörður site. Landscape surveys conducted during the 2008 field school and in previous years have attested to the presence of old and recent artificial nests made of wood and stones that were used to collect eggs.

Fish

Remains of fish consumption and processing are a very important component of this context and probably others from this midden. Like other modern Icelandic assemblages, fish was more than an occasional meal and appears to be a resource of fundamental importance. At this point in the analysis, only identified fish elements have been registered and there is much yet to do before reliable interpretations of fishing, fish processing or consumption may be offered. Nevertheless, the presence/absence of certain species and initial measures of species abundance allows some tentative discussion.

With a majority of gadid species like the Atlantic Cod (*Gadus morhua*), Common Ling (*Molva molva*) and Haddock (*Melanogramus aeglefinus*), this midden unit appears to be comparable to other modern zooarchaeological collections. At first sight, all skeletal elements observed in the midden are represented but further identification and bone counts might indicate consumption rather than processing. An interesting feature in fish species diversity observed so far is the high presence of wolf fish (*Anarhichas lupus*) dentaries. Up to date, it seems that they are more frequent than the dentaries of all gadid species combined (only dentaries have been registered in Table 3 for the wolf fish species). Due to the absence of the species in the U. Laval osteological comparative collection, it is not yet possible to identify the species through other elements and in so doing verify if the species is indeed so well represented. It should be noted as well that the wolf fish dentary is a thick and dense cranial bone and bigger that of gadids. Their relatively high frequency might therefore be the result of taphonomic processes even if overall bone preservation is good.

Viking Age Area: All Contexts (Tables 2-3)

The low rate of identification to species (less than 1%) in the Viking Age Area was largely due to poor preservation conditions. As shown in Table 3, pig and cattle bones (in the form of tooth fragments) and an ovis-caprine vertebra were identified. Some fish and mollusca remains have also been recovered in contexts from superior layers. Due to these preservation conditions, the data presented below will concern fragmentation degree and other taphonomic processes.

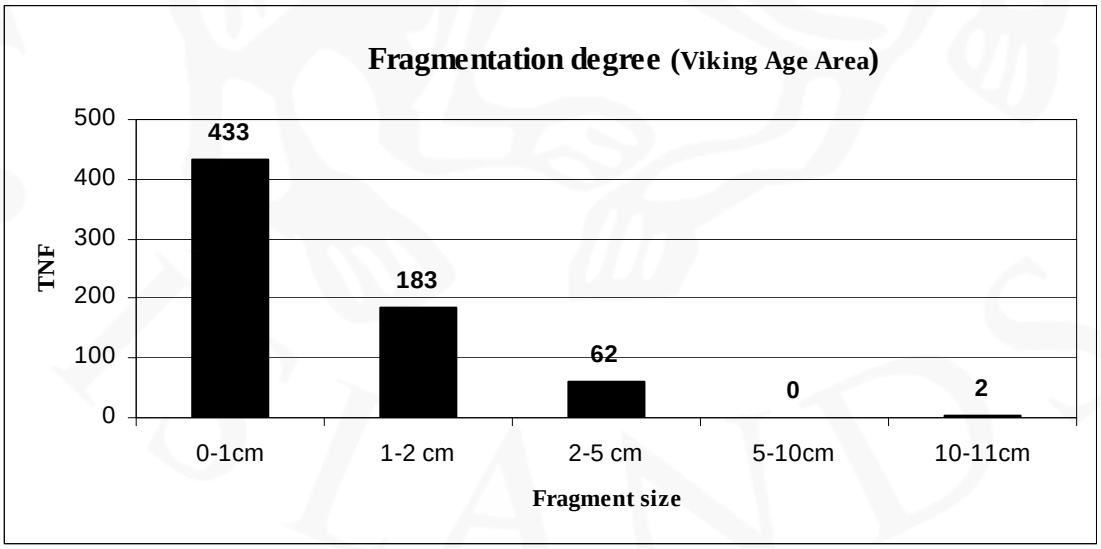

Figure 2. *Classification of bones according to their size following Nabone registering templates.*

Figure 2 shows patterns of fragmentation in the Viking Age Area contexts. Fragments of 1 cm or smaller represent as much as 64% of all remains recovered in the area. Not much can be said about the subsistence economy or species diversity on the basis of these data but

confronted with consideration of other variables, some interpretations are be possible.

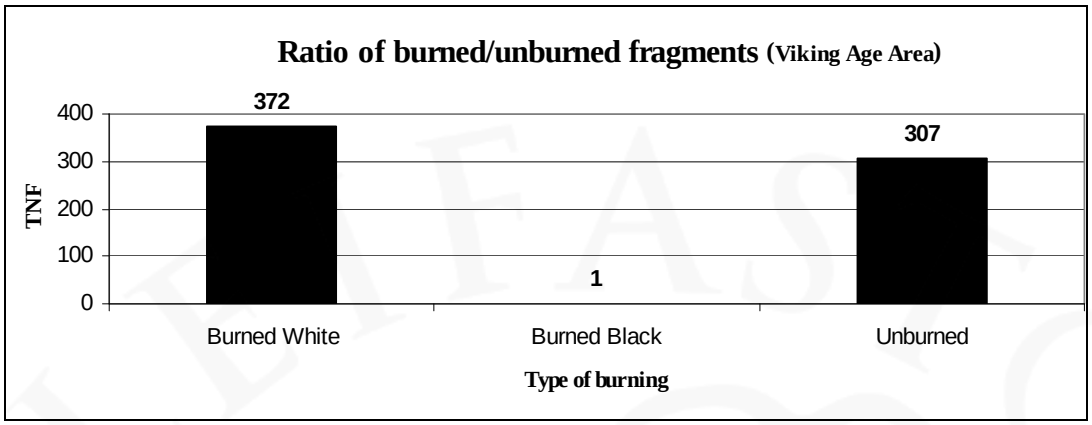

Figure 3. *The ratio of burned to unburned bones from Viking Age Area contexts.*

The frequencies of burned and unburned bones are graphed in Figure 3. Considerably more than 50% of the assemblage was calcined, or completely burned. The combination of those two elements (fragmentation and frequency of complete burning at high temperatures) may reflect the accumulation of refuse from daily domestic activities such as floor or hearth cleaning, cooking pit content, trampling, or the dispersal of such wastes as fertilizer.

Figure 4 graphs the frequencies of tooth fragments, long bone fragments and of bone fragments in the Viking Age Area assemblage. The graph strongly suggests that this is a very highly ravaged assemblage. After years and years of chemical and physical attacks, it is principally bones with high densities and durability, such as long bones and teeth, that tend to be well preserved and it is these which remain as witnesses of human activities in this context.

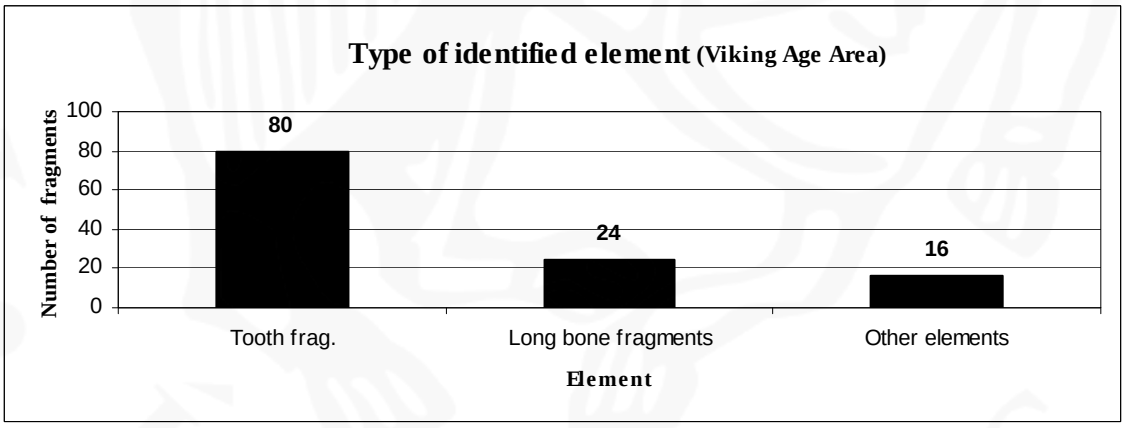

Figure 4. *Type of identified fragments in the Viking Age Area contexts showing preservation of high density elements.*

Conclusions

Analysis of faunal remains from the Vatnsfjörður site is still underway but it is clear that with the discovery of the midden-filled room in the Farm Mound Area, there is much new potential for understanding household dynamics, diachronic or regional studies in the Westfjords. Also, this assemblage offers substantial new data regarding the modern period, a period that is increasingly the focus of new archaeological studies around the world.

Even though the Viking Age area has not yet demonstrated exceptional preservation conditions nor an assemblage similar to that of the modern farm mound, continuing

excavations at Vatnsjörður could provide much new detail about the farm layout and outdoor activities. Traces of human activities around the houses and outbuildings are spread in a large area and are as yet under-examined, but zooarchaeology may provide a means to discern ephemeral uses of these complex domestic areas.

Acknowledgements

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ASSESSMENT OF INSECT REMAINS FROM THE FARM MOUND AREA

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Introduction

Since 2006, archaeoentomological analyses at Vatnsfjörður have generated interesting data which have provided a better understanding of the lives of the site's 20th-century occupants. Samples taken from the farm mound deposits turned out to be far richer in insect remains than the ones from the Viking Age area, mostly due to differential preservation conditions. The results of the analysis of insects preserved in 20th-century deposits helped identify and locate several activities (hay storage, food product storage, fertilization of soils, importation of cereals), reconstituted past ecological conditions within certain buildings, and identified elements of the surrounding environment (Forbes 2007; 2008). Given our understanding of the differential preservation across the site, it was decided to pursue archaeoentomological analyses at the farm mound at Vatnsfjörður. This report presents the results of the analysis of six samples taken from 20th-century deposits associated with the use of the last turf building of Vatnsfjörður, after it had stopped being used as a dwelling.

Methodology

Sediment samples were taken during the 2008 season, in contexts deemed interesting for archaeoentomological analyses. Four samples were taken from the floor of Structure 7 (S-16, S-17, S-19 and S-24) and one from a pit (S-23) in the Viking Age area, but these have not yet been analyzed. Therefore, the three samples S-13, S-14 and S-17 taken from the farm mound will be presented here. They were taken from the room deposit [8562], which, because of its high concentration of debris, including a large amount of animal bones, turf, peat and wood ash and charcoal, was nicknamed the "midden room". The present report will detail the results of the analysis of these three samples, along with other farm mound samples taken in 2007. Table 1 presents a list of those samples and a short explanation of their contexts.

Table 1. *List of samples analysed and context data.*

Sample #	Context	Interpretation
S-13	[8554]	Filling of the "midden room" (gr. [8562])
S-14	[8566]	
S-17	[8583]	
S-502	[7504]	Filling of the cellar [7503]
S-520	[7542]	Levelling layer [7542]
S-521		

The volume of each of the samples was between 2.5 and 4 litres, except in the case of S-502. This sample was taken from a huge deposit, interpreted as the backfill of the cellar [7503]. It was decided to take three different bags of sediments – one at the top, one at the middle and one at the bottom, each of varied in volume from 3.5 to 4 litres, in order to assess the variations occurring within the layer. It was hoped that the analysis of such contexts, associated with filling and levelling activities, would allow comparisons between insect

assemblages and perhaps reveal whether archaeoentomology can help identifying such activities, as well as the materials and means used to undertake them. Moreover, insect remains from such contexts are useful in reconstructing general environmental conditions on the site and its surrounding landscape.

All samples were submitted to washing and kerosene flotation, following the standard procedure used by palaeoentomologists and archaeoloentomologists to recover insect remains from sediment samples (Buckland P. I. 2000; Kenward 1974). Coleoptera heads, pronota and elytra (wings) were then sorted from the flots, along with ectoparasites, Hemiptera (or true bugs) body parts, and fly puparia. The identifications were done using entomological publications, taxonomic keys and anatomical comparisons between insect parts recovered in the samples and the author's reference collection of Icelandic beetles, as well as specimens from the Insectarium René-Martineau of the Canadian Forest Service of Natural Resources Canada.

Results

The matrix of the three samples taken from inside room [8562] was composed of brown silt and organic matter, with a large amount of bones, mostly from fish. Samples S-520 and S-521, taken from context [7542], which has been interpreted as a levelling layer, were mostly composed of wet organic matter (turf). The three bags of sediment (S-502) taken in the backfill of the cellar [7503], were all composed of a mix of silt and organic matter, with varied inclusions. Table 2 presents a more complete description of the sample composition.

Table 2. *Descriptions of analysed sediment samples.*

Sample #	Context	Description of the sediment	Inclusions*
S-13	[8554]	Brown silt with organic matter and peat ash,	unburnt and burnt bones (mostly fish) (50%), charcoal (7%)
S-14	[8566]	Dark brown silt with organic matter	unburnt and burnt bones (mostly fish) (80%), charcoal (7%), wood (2%), glass (<1%)
S-17	[8583]	Brown silt with organic matter	unburnt and burnt bones (20%), slag (1%), wood (1%)
S-502 (1/3)	[7504]	Wet silt and organic matter	window glass (5%), metal (5%), bones (mammal, fish and bird) (3%), slag (2%)
S-502 (2/3)	[7504]	Wet silt and organic matter	concrete (5%), metal (2%), burnt bone fragments (<1%)
S-502 (3/3)	[7504]	Wet silt and organic matter	metal/slag (5%), wood (5%), glass (2%), concrete (2%)
S- 520	[7542]	Dark brown organic matter (turf)	brick (5%), charcoal (2%), wood (2%), coal (1%)
S-521	[7542]	Silt and organic matter (turf)	coal (3%), brick (2%), slag (1%), wood (1%), ceramic (<1%)

* Note: percentages show the proportion of inclusions relative to the volume of the heavy residue.

Table 3. *Identified insects from deposits associated to the filling of room [8562], the levelling layer [7542] and the filling of the cellar [7503].*

	S-13	S-14	S-17	S-520	S-521	S-502 (1/3)	S-502 (2/3)	S-502 (3/3)	Total
PHTIRAPTERA									
Pediculidae									
Pediculus humanus Linnaeus				1	2				**3**
HEMIPTERA									
Nysius groenlandicus (Zetterstedt)	1		1	1					**3**
Hemiptera indet.								1	**1**
COLEOPTERA									
Carabidae									
Nebria rufescens (Ström)							1		**1**
Notiophilus aquaticus (Linnaeus)				1	1			5	**7**
Notiophilus sp.		1							**1**
Bembidion sp.							1		**1**
Patrobus septentrionis (Dejean)					2		1	1	**4**
Calathus melanocephalus (Linnaeus)				1		1	2	7	**11**
Amara quenseli (Schönherr)					1		1		**2**
Trichocellus cognatus (Gyllenhal)						1	3	5	**9**
Dysticidae									
Hydroporus nigrita (Fabricius)				1	2	1	1	1	**6**
Staphylinidae									
Philonthus spp.	3	1	3					1	**8**
Quedius mesomelinus (Marsham)	1		3			1		2	**7**
Quedius cf. *mesomelinus* (Marsham)	1			1					**2**
Quedius spp.	1	2	3	6	9	13	8	79	**121**
Staphylininae indet.	1	3	2	2	3	1	3	1	**16**
Omalium excavatum Stephens	2			5		1		6	**14**
Omalium spp.		1	1		1	2	2		**7**
Xylodromus spp.	14	5	11	15	17	7	5	10	**84**
Acidota crenata (Fabricius)			1		2			7	**10**
Omaliinae indet.	15	1							**16**
Tachinus corticinus Gravenhorst				1					**1**
Aleocharinae indet.	12	12	9	47	35	58	50	324	**547**
Stenus spp.				4	8	2	4	1	**19**
Scarabaeidae									
Aphodius lapponum Gyllenhal		1			1	1		2	**5**
Anobiidae									
Tipnus unicolor (Piller & Mitterpacher)	1	2		3	3	6	3	12	**30**
Cryptophagidae									
Cryptophagus distinguendus Sturm							2		**2**
Cryptophagus pilosus Gyllenhal	1								**1**
Cryptophagus spp.	3				2	3	2	4	**14**
Atomaria spp.	4	4	2		1	3		1	**15**
Lathridiidae									
Lathridius sp.	9	4	3	3	3	4	5	14	**45**
Corticaria elongata (Gyllenhal)	56	17	10	1	5				**89**
Corticaria sp.			2	3		2	1	1	**9**
Byrrhidae									
Byrrhus fasciatus (Forster)				1		1		1	**3**
Coccinellidae									
Nephus limonii Donisthorpe								2	**2**
Coccinella undecimpunctata Linnaeus							1		**1**
Curculionidae									
Otiorhynchus arcticus (O. Fabricius)	1	1			2	5	4	3	**16**
cf. *Otiorhynchus arcticus* (O. Fabricius)	1		1						**2**
Otiorhynchus nodosus (O. F. Müller)				3	1	3	3	1	**11**
Otiorhynchus cf. *nodosus* (O. F. Müller)	1								**1**
Curculionidae indet.			1						**1**
DIPTERA									
Melophagus ovinus (Linnaeus)	4	2	2	2					**10**
SIPHONAPTERA									
Siphonaptera indet.							4	21	**25**
Total	**132**	**57**	**55**	**102**	**101**	**116**	**107**	**513**	**1183**

A total of 1183 insects were identified (see Table 3). Four orders of insects are represented: Phtiraptera (lice), Hemiptera (true bugs), Coleoptera (beetles) and Diptera (flies). The description of the ecology and habitats of most of the taxa represented here has been

already discussed in previous reports (Forbes 2006; 2007). Thus, as the habitats of identified taxa will be treated in the following section, only the newly identified species will be discussed here in detail. These include the true bug *Nysius groelandicus*, the beetles *Trichocellus cognatus*, *Agabus sp.*, *Tachinus corticinus*, *Byrrhus fasciatus*, *Nephus limonii* and *Coccinella undecimpunctata*, and the ectoparasite *Melophagus ovinus.*

Two different species of true bugs have been found in the assemblages, but only one of these could be identified to species: *Nysius groenlandicus.* Similar to other members of the subfamily Lygaeidae, *N. groenlandicus* is mostly phytophagous, feeding on plant seeds, but is also an occasional predator and is able to fly for long distances (Judd & Hodkinson 1998: 227; Linsemaier 1972: 119).

The ground beetle *Trichocellus cognatus* is a predator that occurs in hayfields and pastures in Iceland (Gudleifsson 2005). Its habitat of preference seems to be both dry and humid soils covered with sparse vegetation (Böcher 1988: 14).

Agabus is a genus of the beetle family Dysticidae, which regroups beetles associated with aquatic habitats (Arnett Jr. & Thomas 2001: 159). In Iceland, there are two species of this genus: *Agabus bipustulatus* (Linnaeus) and *A. uliginosus* (Linnaeus). They are both found in stagnant waters of all kinds, including ponds, glacial pools, ponds in forests and other locations with luxuriant vegetation (Larsson & Gígja 1959: 52-53).

The rove beetle (fam. Staphylinidae) *Tachinus corticinus* is associated to vegetal organic matter. It is often found in synanthropic situations, in cultivated fields, but it can also be found in natural settings on wet ground (Buckland & Buckland 2006).

The beetle *Byrrhus fasciatus* is a moss-feeder associated with meagre, sparsely vegetated grounds (Böcher 1988: 47; Larsson & Gígja 1959: 158).

Two different members of the family Coccinellidae, commonly called ladybugs, have been identified. *Nephus limonii* feeds on aphids and mites, and has been found in Icelandic grasslands, dry heaths, and along water courses (Böcher 1988: 52). *Coccinella undecimpunctata* is found in similar habitats, but also in forests, and it has already been found near the sea (Buckland & Buckland 2006; Larsson & Gígja 1959: 152).

Only one species of the order Diptera (flies) could be identified: *Melophagus ovinus*, the sheep ked. This ectoparasite is a wingless fly feeding exclusively on sheep blood, on which it depends for its whole life cycle. Animals infested by the sheep ked are susceptible to contracting secondary infections, and the wounds caused by the bites are annoying for the infested animals, and make their skin unsuitable for making good quality skin and leather clothing (Lloyd 2002: 352-358).

Discussion

Interpreting archaeoentomological data basically consists of reconstituting past environmental conditions based on the habitats of identified species. However, it is important to consider that archaeoentomological assemblages are constituted of insects whose habitats correspond to the deposit in which they have been preserved, but also of insects that have been transported accidentally to the context of deposition by flight, crawling, in human clothes, bird pellets or with the wind (Carrot & Kenward 2001: 887, Kenward 1975: 88; Kenward 1976: 9). This transported component of archaeoentomological assemblages, which have been called “background fauna” or “background noise” (Kenward 1975; 1976), not only helps to interpret the deposit itself, but can be useful in reconstructing the local and regional landscapes (Kenward 1976: 14). Moreover, it is important to keep in mind that some beetle species can occur in a wide range of habitats, which means that habitats represented by the faunas may overlap. That is why, to be able to make valuable archaeoentomological reconstructions, it is important to think in terms of groups of indicator species instead of basing our interpretations on single species, though there are a few exceptions (Kenward 1976: 9).

***Table 4**. Habitats of identified Coleoptera species. The symbol "X" shows habitats where the species have been found, while "√" shows their preferred habitat in Iceland.*

	plant debris	wet habitats	mouldy hay	carrion	mammal dung	moss	leaf litter	compost	stored products	nest or burrows	wood or bark	fungi	outdoor	indoor
Nebria rufescens (Ström)		X											√	
Notiophilus aquaticus (Linnaeus)													√	
Notiophilus sp.													√	
Bembidion sp.													√	X
Patrobus septentrionis (Dejean)		X											√	
Calathus melanocephalus (Linnaeus)													√	
Amara quenseli (Schönherr)													√	
Trichocellus cognatus (Gyllenhal)		X											√	
Hydroporus nigrita (Fabricius)		X											√	
Agabus sp.		X											√	
Philonthus spp.	X	X	X	X	X			X						X
Quedius mesomelinus (Marsham)	√	X	X		X			X			X		X	X
Quedius spp.	X	X	X		X			X			X		X	X
Staphylininae indet.	X	X	X	X	X			X			X		X	X
Omalium excavatum Stephens	√	X	X		X			X		X			X	X
Omalium spp.	X	X	X	X	X		X	X		X	X	X	X	X
Xylodromus spp.	X	X	√		X		X	X					X	X
Acidota crenata (Fabricius)		X					X						√	
Omaliinae indet.	X	X	X	X	X	X	X	X		X	X	X	X	X
Tachinus corticinus Gravenhorst	√	X	X		X			X					X	
Aleocharinae indet.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stenus spp.	X	X	X			X	X						√	
Aphodius lapponum Gyllenhal					√								X	X
Tipnus unicolor (Piller & Mitterpacher)		X							√		X			X
Cryptophagus distinguendus Sturm	X		√		X			X	X	X		X	X	X
Cryptophagus pilosus Gyllenhal	X		√				X		X		X	X	X	X
Cryptophagus spp.	X		√		X		X	X	X	X		X	X	X
Atomaria spp.	X	X	√		X	X	X	X	X		X	X	X	X
Lathridius sp.	X		√						X	X	X	X	X	X
Corticaria elongata (Gyllenhal)	X		√		X	X	X	X	X	X		X		X
Corticaria sp.	X		√		X	X	X	X	X	X		X	X	X
Byrrhus fasciatus (Forster)		X				X							√	
Nephus limonii Donisthorpe		X											√	
Coccinella undecimpunctata Linnaeus		X	X				X						√	
Otiorhynchus arcticus (O. Fabricius)		X	X			X	X				X		√	X
Otiorhynchus nodosus (O. F. Müller)		X					X				X		√	X
Otiorhynchus sp.	X	X	X			X	X				X		√	X

Table 4 shows the habitats of beetle species which have been analyzed from the three different contexts that are the subject of this report. Most of the data used to build this table come from Larsson & Gígja (1959) and Buckland & Buckland (2006).

The compilation of the data allowed the identification of 5 different "ecological groups" in the beetle assemblage: (1) the outdoor fauna, (2) the fauna associated with mouldy hay, (3) the fauna associated with plant debris and compost, (4) the pests of stored products, and (5) the dung feeders (see Figure 1). The taxa for which no preferred habitat could be determined,

either because the specimens could not be identified to a satisfactory taxonomical level or because the species was not host specific, were regrouped under the label of “fauna associated with organic matter” as they all are members of the Staphylinidae family, generally associated with rotting organic matter of various kinds.

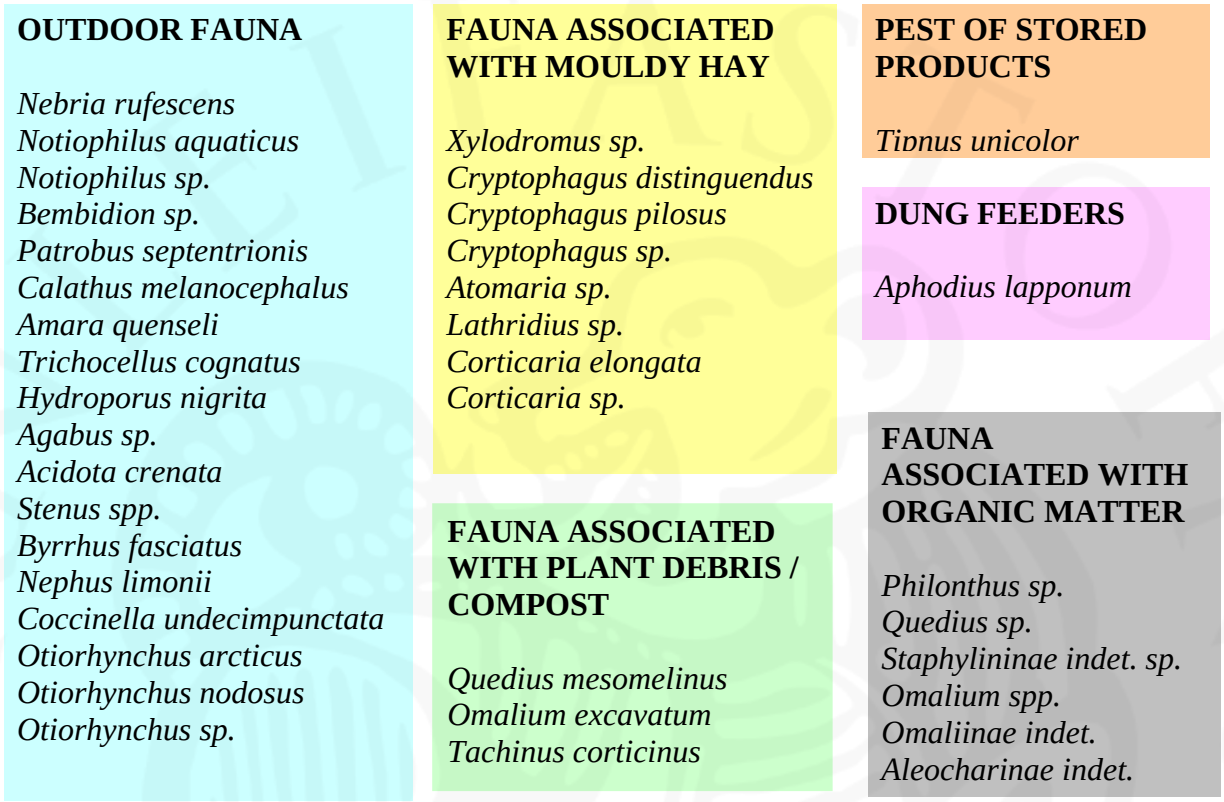

Figure 1. *Ecological groupings of identified beetle taxa.*

Insects from deposits associated with the filling of room [8562]

Fungus feeders associated with mouldy hay clearly dominate the archaeoentomological assemblage from room [8562] (see Figure 2). These include the silken fungus beetles (fam. Cryptophagidae) *Cryptophagus pilosus*, *Cryptophagus sp.* and *Atomaria sp.* as well as the minute brown scavenger beetles (fam. Lathridiidae) *Lathridius sp.*, *Corticaria elongata* and *Corticaria sp.* These beetles feed on fungi, moulds and spores in old hay. They are often encountered in Icelandic farm buildings, where they are commonly associated with hay stored for feeding animals during the winter season (Buckland 2000: 149). Some predacious members of the genus *Xylodromus*, were also identified with the aforementioned mould feeders. A single individual dung beetle, *Aphodius lapponum*, was probably transported in hay, perhaps associated with the practice of using animal manure as fertilizer.

The deposits from room [8562] contained large amounts of animal bones as well as turf and plant debris. Thus, it is not surprising to find a high proportion of beetles associated with decaying matter. Even though no beetle strictly associated with animal carcasses was found, some of the taxa identified are known to be able to live on carrion. These include the *Philonthus*, Staphylininae, *Omalium* and Aleocharinae species. The presence of representatives of these subfamilies and genera in the deposits from the midden room, as well as the presence of a few sheep keds, which can only survive a few days after removal from its host (Lloyd 2002: 354), is probably due to the fact that animal bones and other animal wastes were thrown there. The presence of three specimens of *Tipnus unicolor*, which in Iceland is

mostly found in stored vegetal and animal products (Larsson & Gígja 1959: 166-165), may be the result of warehouse sweepings or other refuse materials.

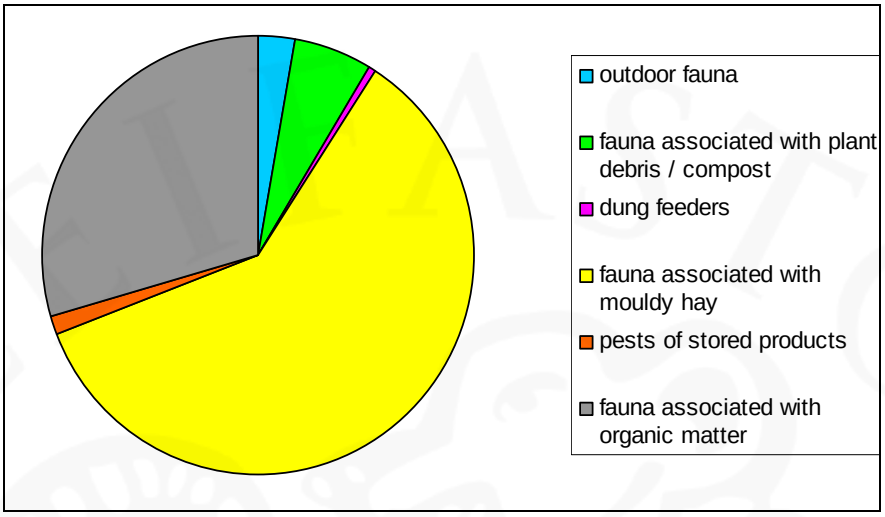

Figure 2. *Distribution of insects from S-13, S-14 and S-17 according to their preferred habitats.*

It is interesting to note that the outdoor component of this assemblage is relatively limited, represented by only two specimens of true bugs, one ground beetle, six weevils and one specimen of the rove beetle *Acidota crenata*. This may be due to the fact that the midden room was not easily accessible to insects living in Vatnsfjörður's surrounding environment, suggesting that the room was probably closed and still roofed at the time it was in use.

The archaeoentomological assemblage confirmed the function of the room [8562] as a trash repository. It was interesting to see what types of insects were likely to colonize this type of deposit. It seems that not only turf and plant debris were thrown in the room, but also a large amount of animal remains.

Insects from deposits associated with the fill of the cellar [7503]

After the cellar [7503] was no longer used for the storage for food products, it was filled in with the material making up the deposit [7504]. This included large stones, soil, turf, domestic rubbish, and large metal artefacts, amongst other things (Ævarsson & Gísladóttir 2008: 73). As this layer was found to be very rich in organic matter, it was decided to sample it as it would probably yield a rich fauna that could be used for comparative purposes. As previously stated, three bags of samples were taken – one from the top of the deposit, one from the middle and one from the bottom – to see if there were important notable variations in the beetle assemblage depending on the location of the sample in the deposit. The right part of Figure 3 shows differences in the distribution of insects found in the three different sub-samples.

The assemblage from sample S-502 was very rich, containing 737 individual insects. The material that was used to fill the cellar can be compared with deposits from room [8562], even though it contained fewer bones and more large elements like rocks, big artefacts and architectural elements. The most important difference between these two beetle assemblages is that the proportion and diversity of species living in natural environments was much higher in S-502 than in S-13, S-14 and S-17. This could partly be due to the fact that the presence of large rocks, artefacts and turf pieces produced gaps in the deposit, allowing carabids and other species living in natural settings to fall in. It is also possible that some outdoor fauna had been in the turf construction materials since they had first been cut, and therefore ended up in the

cellar when the turf waste was thrown in. Apart from the species living in natural environments, the coleopteran species encountered in this deposit are almost the same as in the midden room.

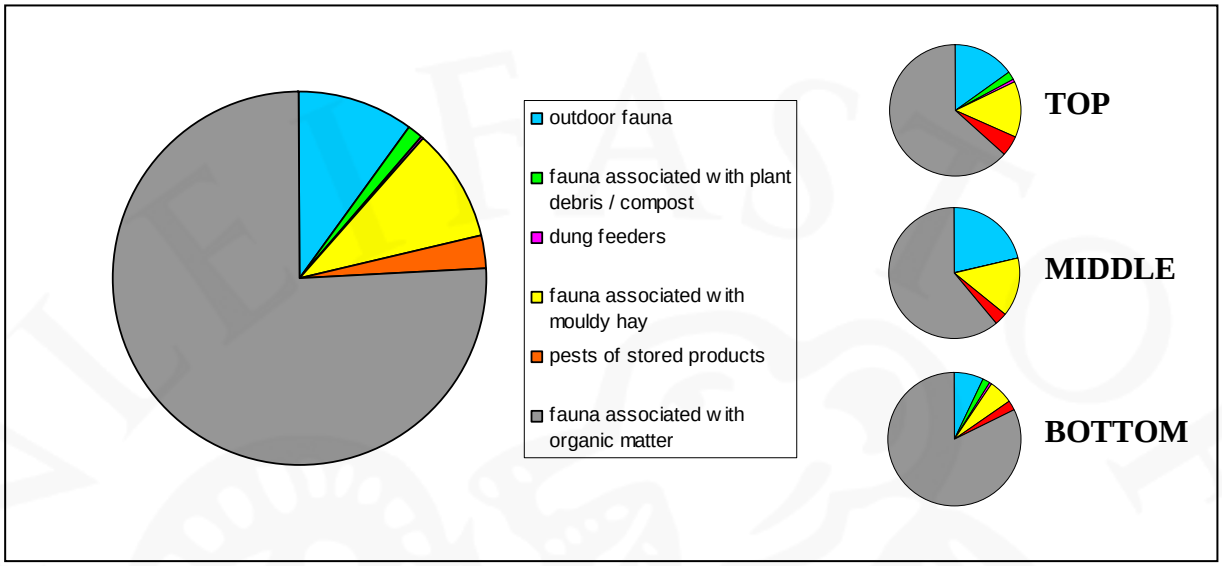

Figure 3. *Distribution of insects from S-502 by preferred habitats.*

Sample S-502 did not contain any sheep keds, but yielded 25 fleas. As the fleas have not been identified yet, it is difficult to say whether they ended up there along with rubbish generated by human activities, or if they arrived with turf and soil used to backfill the cellar. Finally, the proportion of insects associated with decaying matter is much higher in S-502 than in samples from room [8562].

When comparing the three subsamples that were taken at various elevations inside the deposit, the only major difference that can be pointed out is that the one taken at the bottom yielded more beetles associated with decaying organic matter than the others. This is probably due to the fact that the decomposition process was encouraged by warm conditions at the bottom of the layer, attracting decomposer insects and their predators, which ended up accumulating there. Apart from that, it seems that the insect fauna inside the deposit was more or less uniformly distributed.

Insects from levelling deposit [7542]

Context [7542] was interpreted as being a levelling layer for the corridor of the building. The two samples taken from this deposit yielded an assemblage of 203 individuals, including 198 beetles and five ectoparasites. This deposit was mainly composed of turf, which may explain the component of the assemblages which is associated with decaying plant debris, as well as the fauna associated with decaying hay (see Figure 4). The turf used to level the floor of the corridor could perhaps have been taken near an aquatic environment, as three specimens of *Hydroporus nigrita*, a beetle strictly associated with water, were found inside it. The presence of the outdoor fauna in these samples may be due either to people circulating in the corridor, or simply to the fact that those beetles were perhaps hidden within the outdoor material that was used to level the floor.

Three human lice (*Pediculus humanus*) were also found in this sample. Their presence suggests that the inhabitants of the site were suffering from lice in the early modern period, but due to the low number of specimens found, it would be highly speculative to comment on their personal hygiene. The two *Melophagus ovinus* indicate the presence of sheep on the site, and could have ended up in the corridor along with residue from wool processing, or floor

sweepings.

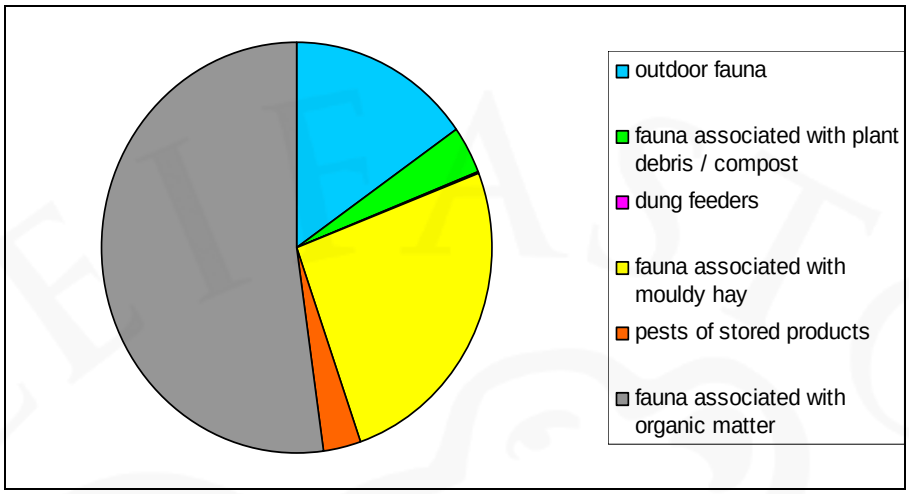

Figure 4. Distribution of insects from S-520 and S-521 by preferred habitats.

The 20th century environment around Vatnsfjörður

The insects associated with natural environments that ended up inside archaeological deposits can help us reconstruct the local 20th-century environment around Vatnsfjörður. Using the ecological requirements of all the outdoor species found in the six samples analyzed (see Table 4), it was possible to group most of the taxa into four different clusters: (1) beetles associated with grasslands, (2) beetles associated with heath or other dry and sparsely vegetated environments, (4) beetles associated with wet meadows and bogs, and (4) beetles associated with water. Four of the outdoor beetle taxa are not restricted to any particular kind of natural environment in Iceland, so they were regrouped in the category of beetles associated with "various habitats" (see Figure 5).

Figure 6 shows that most of the outdoor species found in Vatnsfjörður samples are commonly found in grasslands, including cultivated areas. The presence of *Patrobus septentrionis*, which is very common in wet meadows in Iceland (Larsson & Gígja 1959: 29) and of beetles which prefer dryer grounds, such as the ground beetles from the *Notiophilus* genus, *Amara quenseli* and *Trichocellus cognatus*, as well as the moss-eater *Byrrhus fasciatus*, indicate that environments varying from dry heaths or grassy commons to wet meadows characterized the landscape surrounding Vatnsfjörður in the past. The occurrence of beetles strictly associated with water also suggests the proximity of ponds, lakes and/or other stagnant waters near the site. This mosaic of environments also characterizes present-day Vatnsfjörður landscape. Thus, the outdoor beetle species do not suggest that any major change in the environment of the site occurred during the last two decades.

***Table 4**. Habitats of identified Coleoptera species associated with outdoor environments. The symbol "X" shows habitats where the species have been found, while "√" shows their preferred habitat in Iceland.*

	marine littoral	water banks	aquatic environment	bogs / wet meadows	grasslands	cultivated areas	dry heaths / sparse vegetation	alpine environment	forest	near hot springs
COLEOPTERA										
Carabidae										
Nebria rufescens (Ström)	X	X		X	X	X			X	
Notiophilus aquaticus (Linnaeus)						X	√			
Notiophilus sp.	X					X	√		X	
Bembidion sp.	X	X			X		√			X
Patrobus septentrionis (Dejean)		X		√	X	X			X	
Calathus melanocephalus (Linnaeus)		X		X	√	X	X		X	
Amara quenseli (Schönherr)	X						√			
Trichocellus cognatus (Gyllenhal)					X		√			
Dysticidae										
Hydroporus nigrita (Fabricius)			√	X				X		X
Agabus sp.	X		√					X	X	X
Staphylinidae										
Acidota crenata (Fabricius)					√	X	X		X	
Stenus spp.	X	X		X	X				X	
Byrrhidae										
Byrrhus fasciatus (Forster)		X					√			
Coccinellidae										
Nephus limonii Donisthorpe		X			√		X			
Coccinella undecimpunctata Linnaeus	X				√	X			X	
Curculionidae										
Otiorhynchus arcticus (O. Fabricius)	X	X			√	X	X	X		X
Otiorhynchus nodosus (O. F. Müller)	X			X	√	X				
Otiorhynchus sp.	X			X	X	X				

GRASSLANDS

Calathus melanocephalus
Acidota crenata
Nephus limonii
Coccinella undecimpunctata
Otiorhynchus arcticus
Otiorhychus nodosus

HEATS / DRY AND SPARSELY VEGETATED ENVIRONMENTS

Notiophilus aquaticus
Notiophilus sp.
Amara quenseli
Trichocellus cognatus
Byrrhus fasciatus

WET MEADOWS / BOGS

Patrobus septentrionis

AQUATIC ENVIRONMENTS

Hydroporus nigrita
Agabus sp.

VARIOUS HABITATS

Nebria rufescens
Bembidion sp.
Stenus spp.
Tropiphorus obtusus

***Figure 5.** Ecological groupings of identified beetle taxa associated with outdoor environments.*

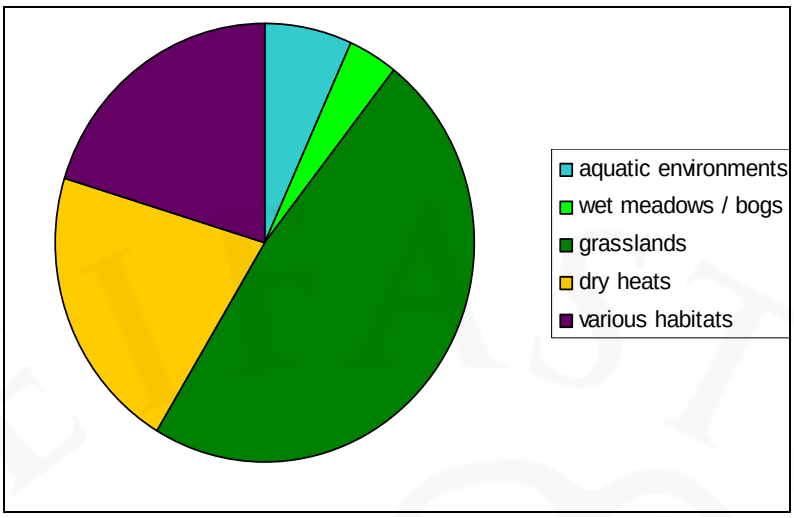

Figure 6. *Distribution of outdoor insects from S-13, S-14, S-17, S-502, S-520 and S-521 by preferred habitats.*

Conclusions

The analysis of beetles associated with the fill of room [8562], the cellar fill [7503] and the levelling event yielded interesting information that has helped to reconstruct daily life on site, as well as past environmental conditions in and around the site. The results of this analysis suggest that people living at Vatnsfjörður in the 20th century used a closed room to dispose of animal carcasses, turf, and other debris, and that they were subject to lice infestations. This study also indicates that Vatnsfjörður's surrounding environment was composed of wet meadows, grasslands and sparsely vegetated areas, and that some stagnant water was probably within the site's vicinity.

The study of insect remains also yielded interesting comparative data useful for understanding the dynamics and processes involved in the formation of archaeological deposits associated with dumping, levelling and filling activities, as well as of the composition and formation of archaeoentomological assemblages.

As the results of this study are still preliminary, it is hoped that future work on archaeoentomological remains from Vatnsfjörður will allow further understanding of the daily life of the site's past inhabitants.

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FUEL RESOURCES AT VATNSFJÖRÐUR: AN ARCHAEOBOTANICAL PERSPECTIVE

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Introduction

Every human society since the Palaeolithic has relied on the presence of some sort of fuel for heat, light, cooking, protection and industry – access to fuel is fundamental to the survival of a community. At the time of colonisation, woodland covered around one quarter of Iceland (Hermannsson 1930, Einarsson 1963, Hallsdóttir 1987). However, after *Landnám* these woodlands rapidly declined under the burden of clearance for agriculture and overgrazing by sheep (Smith 1995, Rafnsson 1997). Archaeological evidence suggests that the inhabitants of the island used a variety of alternative fuels as the woodlands disappeared (e.g. Vésteinsson & Simpson 2004, Sveinbjarnardóttir 2004). This report will discuss the variety of fuels used at the site of Vatnsfjörður in the 10th century, with a view to understanding the ways in which local resources were utilised and managed in the Viking Age. As well as archaeobotanical methods, this paper will draw upon ethnohistorical and experimental projects, comparative research, historical sources and other avenues of research to give as broad an understanding of the research area as possible.

Research Questions and Methods

I believe that the study of fuel use through archaeobotanical means allows the archaeologist to get as close as possible to the material actually used by the Viking Age inhabitants of Vatnsfjörður. The samples we take contain the remains of the material used by the inhabitants, in the context in which it was desposited: they are a direct link to the activities of the past inhabitants of the site. The main two possible fuels I expected to find in the samples were wood and seaweed, with other fuels such as turf, peat and animal dung more likely to be identified through soil micromorphological analysis (see Parkins et al., this volume). The perceived shortage of wood in Iceland after *Landnám* led me to expect not all the wood present to be local: driftwood, which is commonly found on the coasts of the Westfjords, might also have been used as fuel. I expected to be able to identify local wood and driftwood through analysis of the wood anatomy of charcoal found at the site, and to identify seaweed in the samples using a stereomicroscope. The two are easily distinguished as while seaweed remains appear smooth, with a porous core, wood breaks along clear planes relating to its inner structure. My aim was to use this methodology to answer questions centred on how fuel resources were managed at Vatnsfjörður, and how the community adapted to their environment and made use of the resources available.

Sampling for Archaeobotanical Fuel Remains

Sampling Strategy

During the excavations at Vatnsfjörður, much attention has been paid to the collection of samples for scientific analysis. Any middens or hearth features found are sampled 100% for flotation, and from floor layers flotation samples are taken on a 0.5m grid, to give potential to discuss the use of space within the structure. Sampling on site aside from this is subjective and opportunistic: any layer which seems to contain charred organic material is sampled for flotation. This comprehensive sampling strategy gives the archaeobotanist scope

to investigate variation between any two contexts on site, and has provided me with a large selection of samples to use in my research. In order to discuss the differences in archaeobotanical remains between Structure 1, the *skáli*, and Structure 3, the smithy, it is necessary to conduct a direct comparison between the two buildings. These two structures were chosen for analysis on the basis of preliminary work conducted as part of a field school student project during the 2007 field season (Mooney 2008), which highlighted differences in the quantities of wood charcoal and burnt seaweed recovered from the two buildings. These two structures also provide the best possible contrast between areas identified as domestic (Structure 1) and industrial (Structure 3). I wanted to achieve the most thorough investigation possible of the two areas, and with this in mind, Table 1 below shows the samples that were selected for analysis in this project, and Figure 1 shows the location of the samples taken on the site plan. These contexts were primarily chosen because they will give a precise comparison between not only the two structures, but also separate contexts within the buildings. It is vital to have such a comparison as otherwise any differences could be due to the context of the remains rather than a significant difference in terms of fuel choice, and this would compromise the scientific value of my research. Secondly, this range of samples will allow for a wider window of analysis. For example, if quantities of seaweed were to be recovered from the midden samples but not from the hearths or floor layers, we could perhaps conclude that seaweed was being burnt elsewhere on site for some other purpose.

Sample Processing

Once the samples had been taken from the excavation at Vatnsfjörður, they were processed by myself and by students at the Field School in North Atlantic Archaeology. All flotation of archaeobotanical samples was conducted on site. Until 2007, the samples were processed using the bucket flotation technique. In 2008, the project acquired an Ankara-style flotation machine, which substantially increased the speed and efficiency of the processing of archaeobotanical samples at the site. Flotation works on the basic idea that charred botanical material is lighter than water. When a soil sample is placed in water and the soil broken up, the charred botanical material will float to the top, and can then be skimmed off and collected before being dried and sorted. All processing of samples before sorting and analysis was conducted on site at Vatnsfjörður or at the Field School base at Reykjanes in Ísafjarðardjúp, where samples were dried in the geothermal heat of the hotel basement. During the field season, preliminary analyses are also carried out to assess the archaeobotanical potential of different areas of the site. After the 2007 field season, the selected samples as shown in Table 1 were shipped to the George Pitt-Rivers Laboratory for Bioarchaeology at the McDonald Institute for Archaeological Research, University of Cambridge. Separate analyses were carried out to study charcoal and seaweed remains in the samples; these are explained in the following text.

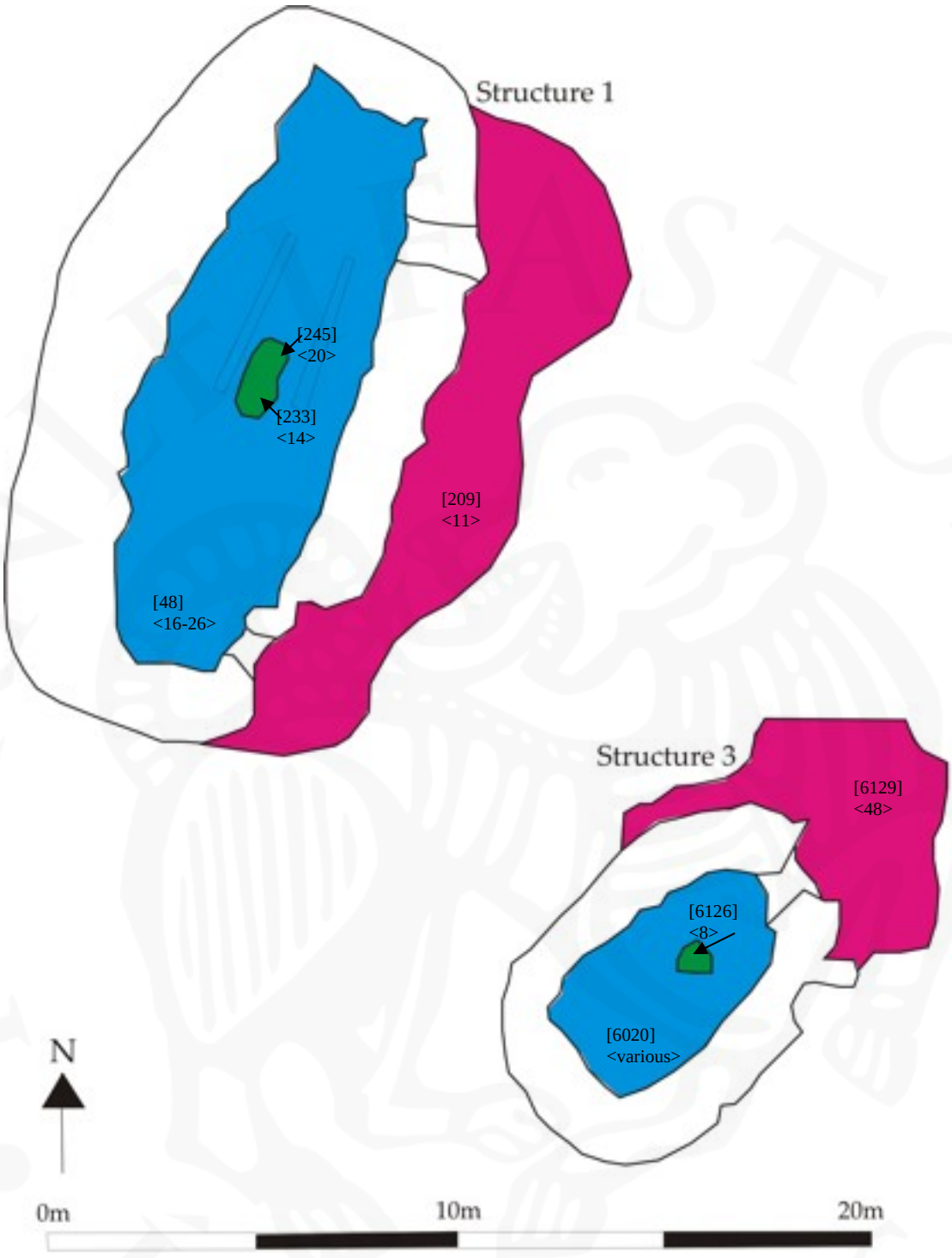

Figure 1 Simplified plan of Structures 1 and 3 at Vatnsfjörður, showing samples used in this investigation.

Floor Hearth Midden

Table 1. *Samples analysed for seaweed and charcoal remains.*

Year	Context Number	Structure	Sample Number	Context Type
VSF04	[48]	1	<16>	Floor
VSF04	[48]	1	<17>	Floor
VSF04	[48]	1	<18>	Floor
VSF04	[48]	1	<19>	Floor
VSF04	[48]	1	<20>	Floor
VSF04	[48]	1	<21>	Floor
VSF04	[48]	1	<22>	Floor
VSF04	[48]	1	<23>	Floor
VSF04	[48]	1	<24>	Floor
VSF04	[48]	1	<25>	Floor
VSF04	[48]	1	<26>	Floor
VSF05	[209]	1	<11>	Midden
VSF05	[233]	1	<14>	Hearth
VSF05	[245]	1	<20>	Ember Pit
VSF06	[6020]	3	<114>	Floor
VSF06	[6020]	3	<115>	Floor
VSF06	[6020]	3	<116>	Floor
VSF06	[6020]	3	<117>	Floor
VSF06	[6020]	3	<119>	Floor
VSF06	[6020]	3	<120>	Floor
VSF06	[6020]	3	<121>	Floor
VSF06	[6020]	3	<123>	Floor
VSF06	[6020]	3	<124>	Floor
VSF06	[6020]	3	<125>	Floor
VSF06	[6020]	3	<126>	Floor
VSF06	[6020]	3	<127>	Floor
VSF06	[6020]	3	<128>	Floor
VSF06	[6020]	3	<131>	Floor
VSF06	[6020]	3	<132>	Floor
VSF06	[6020]	3	<133>	Floor
VSF06	[6020]	3	<134>	Floor
VSF06	[6020]	3	<135>	Floor
VSF06	[6020]	3	<154>	Floor
VSF06	[6020]	3	<157>	Floor
VSF06	[6020]	3	<158>	Floor
VSF06	[6020]	3	<159>	Floor
VSF06	[6020]	3	<160>	Floor
VSF06	[6020]	3	<161>	Floor
VSF06	[6020]	3	<162>	Floor
VSF06	[6020]	3	<165>	Floor
VSF06	[6020]	3	<167>	Floor
VSF06	[6020]	3	<168>	Floor
VSF06	[6020]	3	<178>	Floor
VSF07	[6126]	3	<8>	Hearth
VSF07	[6129]	3	<48>	Midden

Charcoal Analysis

In order to assess the composition of the wood charcoal at the site, in terms of local, imported or driftwood, up to seven pieces of charcoal were analysed from fifteen samples across six of the seven contexts. Unfortunately, the material from the midden adjacent to Structure 3, context [6129], contained no pieces of charcoal large enough for identification, and so no wood charcoal was analysed from this context. The samples from the remaining contexts were analysed under a polarising light microscope at 50x, 100x, and 200x magnification. Each piece of charcoal was examined in transverse section, radial section and tangential section (see Figure 15), with the aim of identifying the species of wood from which each charcoal fragment originated. Identification of wood species through wood anatomy is a difficult process, involving the examination of anatomical features visible in three different sections. Each species of wood grows in a different way, creating variations in the anatomical features. It is the combination of the variations in all these features which leads the archaeobotanist to an identification of a particular species of wood. The sections used in wood anatomical analysis and the features visible in each are listed below.

A. **Transverse Section (TS)** This is the section across the trunk. Visible are growth rings, vessels (in deciduous wood), axial resin canals (in conifer wood), and rays in lengthwise section.

B. **Tangential Longitudinal Section (TLS)** This is the section along the lines of the growth rings. Visible are rays in cross-section, radial resin canals (in conifer wood), and vessels in lengthwise section.

C. **Radial Longitudinal Section (RLS)** This is the section along the radius of the trunk. Visible are crossfields where the ray tracheids and longitudinal tracheids meet, pits in the ray tracheids, crossfield pits, features in the ray tracheid walls, vessels in lengthwise section, and perforation plates (cross-sections across the vessels).

Native Icelandic wood and driftwood can be easily differentiated as no species found as driftwood on the island are native to Iceland. There are, according to *Flora Europaea*, three genera of trees native to Iceland: *Betula* (Birch), *Salix* (Willow), and *Populus* (Aspen) (Tutin *et al* 1993). Of the latter genus only one species grows on the island: *Populus tremula*. Two species of Birch are native, *Betula nana* (Dwarf Birch) and *Betula pubescens* ssp. *tortuosa* (Mountain Birch). The five species of willow found in Iceland are *Salix herbacea* (Dwarf Willow), *Salix lanata* (Woolly Willow), *Salix glauca* ssp. *callicarpaea* (Bluish Willow), *Salix arctica* (Arctic Willow) and *Salix phylicifolia* (Tea-leaved Willow) (Tutin *et al* 1993). Kristinsson (1998) states that *Sorbus aucuparia* (Rowan) is also native to the island. The existence of so few native species gives the archaeobotanist a great advantage in terms of identification: one is guided by this fact to the most likely species, which saves a lot of time in the identification process. While the native trees of Iceland are all deciduous, the driftwood is comprised of conifers: around 70% *Pinus* (Pine) species and 30% *Picea* and *Larix* (Spruce and Larch), mostly of Siberian origin (Eggertsson 1993). Conifers are immediately distinguishable in terms of wood anatomy from deciduous trees in transverse section, as in conifers water transport within the tree occurs via the tracheids, therefore conifer wood lacks the vessel elements that are seen as pores in deciduous wood. This factor alone facilitates the differentiation of any driftwood present in the samples from local wood. It is these differences which were used to distinguish local wood from driftwood in the samples from Vatnsfjörður.

Seaweed Analysis

A second analysis was employed to investigate the amount of seaweed found in each of the contexts. I chose to discuss the amount to seaweed present in terms of relative quantities rather than by quantifying every piece of seaweed found. Firstly, I feel that to count every piece of charred seaweed present would not be a productive activity: one frond of seaweed could break into three or thirty pieces during charring and after deposition. Secondly, it is important that the results I obtain through this analysis would be able to be reproduced by another investigator. With this in mind, each of the samples was spread out until one layer thick, therefore visible in two dimensions, and assigned by visual analysis to a 'Seaweed Value' as illustrated below in Table 2. This allowed for the comparison of all samples on a level field, to give immediately comparable results.

Table 2. *Explanation of 'Seaweed Values'.*

Seaweed Value	Explanation
1	Virtually no charred seaweed present
2	Substantially more wood charcoal than charred seaweed
3	Slightly more wood charcoal than charred seaweed
4	Equal quantities of wood charcoal and charred seaweed
5	Slightly more charred seaweed than wood charcoal
6	Substantially more charred seaweed than wood charcoal
7	Virtually no wood charcoal present

Seaweeds are forms of algae. The term 'seaweed' refers to large, attached marine algae belonging to the Chlorophyceae (green algae), Rhodophyceae (red algae), and Phaeophyceae (brown algae) families (Chapman & Chapman 1980). Seaweeds differ from higher plants in that they have no actual roots, stems or leaves. Larger species possess attachment organs resembling roots, and 'stipes' or stem-like structures which "flatten out into a broad, leaf like portion or 'lamina'" (Chapman & Chapman 1980:1). Some seaweeds are simply a flat plate of tissue, while others have a plant body or 'thallus' with branch-like structures diverging from it (Chapman & Chapman 1980). Very few seaweeds are found in all regions, and so geographical areas are characterised by their own distinct algal flora (Chapman & Chapman 1980). In Europe and the North Atlantic region, the brown seaweeds or Phaeophyceae are most common. *Pelvetia canaliculata*, *Fucus spiralis*, *Ascophyllum nodosum*, and *Fucus vesiculosus* are the most common species growing high on the shore. Both of the latter two species have vesicles which are filled with gas, enabling the plant to float near the surface when the tide comes in. Other species of seaweed grow further down the shore as they cannot tolerate long periods of exposure to the air (Chapman & Chapman 1980), so the four types of seaweed listed above are those most likely to be harvested.

Results

Charcoal Analysis

Table 3 shows the results of the analysis of the wood charcoal from the floors, hearths and middens of Structures 1 and 3 at Vatnsfjörður. It is clear from the table that the vast majority of the samples of charcoal can be identified as *Betula nana/pubescens*, which cannot be distinguished on the basis of wood anatomy. Considering the latitude of Vatnsfjörður, and the size of the charcoal fragments found in the samples, most of the charcoal fragments are likely to be *Betula pubescens* (Downy Birch). Two of the samples provided an exception to this, being identified as *Salix* species. The species of *Salix* found in Iceland cannot be

distinguished from one another by wood anatomy alone, but they are often found growing as individual specimens in birch woodlands. These two types of wood are native to Iceland and are found growing in the Vatnsfjörður area. Figure 2 below shows examples of charcoal fragments recovered from the samples from Vatnsfjörður.

Figure 2. *Two examples of archaeological charcoal from Vatnsfjörður.*

Seaweed Analysis

Table 4 shows the results of the analysis of seaweed from Structures 1 and 3 at Vatnsfjörður. Overall, there is virtually no difference between the amount of burnt seaweed compared to wood charcoal in the two structures, with the values from Structure 1 averaging at 1.52, while the average from Structure 3 was 1.53. There was much more variation between context types. The hearth contexts had the lowest amount of seaweed present, with contexts [233] and [245] from Structure 1 and context [6126] from Structure 3 all having a seaweed value of 1, indicating virtually no seaweed present in the samples. The floor of structure 1, context [48], yielded an average seaweed value of 1.08, while that of context [6020], the floor of structure 3, was higher at 1.59. The two middens, contexts [209] and [6129], present a marked difference in the amount of seaweed relative to wood charcoal. The midden of structure 1, context [209], had a seaweed value of 3, and that of the Structure 3 midden, context [6020], was 2, representing a dominance of wood charcoal. Figure 3 below shows examples of seaweed remains from Vatnsfjörður.

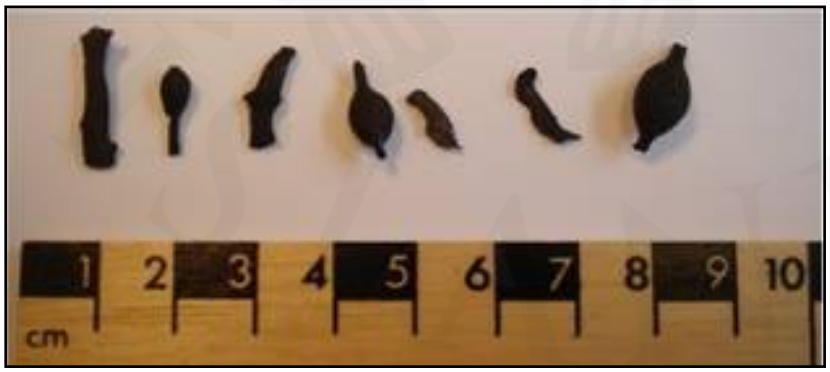

Figure 3. *Examples of archaeological remains of Ascophyllum nodosum seaweed from Vatnsfjörður.*

Table 3. *Results of charcoal analysis.*

Year	Unit No	Sample No	Structure	Context	Sub-sample No	Species
2004	[48]	<19>	1	Floor	1	*Betula nana/pubescens*
2004	[48]	<19>	1	Floor	2	*Betula nana/pubescens*
2004	[48]	<19>	1	Floor	3	*Betula nana/pubescens*
2004	[48]	<19>	1	Floor	4	*Betula nana/pubescens*
2004	[48]	<19>	1	Floor	5	*Betula nana/pubescens*
2004	[48]	<21>	1	Floor	1	*Betula nana/pubescens*
2004	[48]	<21>	1	Floor	2	*Betula nana/pubescens*
2004	[48]	<21>	1	Floor	3	*Betula nana/pubescens*
2004	[48]	<21>	1	Floor	4	*Betula nana/pubescens*
2004	[48]	<21>	1	Floor	5	*Betula nana/pubescens*
2004	[48]	<22>	1	Floor	1	*Betula nana/pubescens*
2004	[48]	<22>	1	Floor	2	*Betula nana/pubescens*
2004	[48]	<22>	1	Floor	3	*Betula nana/pubescens*
2004	[48]	<22>	1	Floor	4	*Betula nana/pubescens*
2004	[48]	<23>	1	Floor	1	*Betula nana/pubescens*
2004	[48]	<23>	1	Floor	2	*Betula nana/pubescens*
2004	[48]	<23>	1	Floor	3	*Betula nana/pubescens*
2004	[48]	<23>	1	Floor	4	*Betula nana/pubescens*
2004	[48]	<23>	1	Floor	5	*Betula nana/pubescens*
2004	[48]	<25>	1	Floor	1	*Betula nana/pubescens*
2004	[48]	<25>	1	Floor	2	*Betula nana/pubescens*
2004	[48]	<25>	1	Floor	3	*Betula nana/pubescens*
2004	[48]	<25>	1	Floor	4	*Betula nana/pubescens*
2004	[48]	<25>	1	Floor	5	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	1	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	2	*Salix sp.*
2005	[209]	<11>	1	Midden	3	*Salix sp.*
2005	[209]	<11>	1	Midden	4	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	5	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	6	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	7	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	8	*Betula nana/pubescens*
2005	[209]	<11>	1	Midden	9	*Betula nana/pubescens*
2005	[233]	<14>	1	Hearth	1	*Betula nana/pubescens*
2005	[233]	<14>	1	Hearth	2	*Betula nana/pubescens*
2005	[245]	<20>	1	Ember Pit	1	*Betula nana/pubescens*
2005	[245]	<20>	1	Ember Pit	2	*Betula nana/pubescens*
2006	[6020]	<115>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<115>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<115>	3	Floor	3	*Betula nana/pubescens*
2006	[6020]	<117>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<117>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<117>	3	Floor	3	*Betula nana/pubescens*
2006	[6020]	<130>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<130>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<130>	3	Floor	3	*Betula nana/pubescens*
2006	[6020]	<131>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<131>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<131>	3	Floor	3	*Betula nana/pubescens*

Year	Unit No	Sample No	Structure	Context	Sub-sample No	Species
2006	[6020]	<131>	3	Floor	4	*Betula nana/pubescens*
2006	[6020]	<154>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<154>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<154>	3	Floor	3	*Betula nana/pubescens*
2006	[6020]	<167>	3	Floor	1	*Betula nana/pubescens*
2006	[6020]	<167>	3	Floor	2	*Betula nana/pubescens*
2006	[6020]	<167>	3	Floor	3	*Betula nana/pubescens*
2006	[6020]	<167>	3	Floor	4	*Betula nana/pubescens*
2007	[6126]	<8>	3	Hearth	1	*Betula nana/pubescens*
2007	[6126]	<8>	3	Hearth	2	*Betula nana/pubescens*
2007	[6126]	<8>	3	Hearth	3	*Betula nana/pubescens*
2007	[6126]	<8>	3	Hearth	4	*Betula nana/pubescens*
2007	[6126]	<8>	3	Hearth	5	*Betula nana/pubescens*

Table 4. *Results of seaweed analysis.*

Year	Sample No	Context No	Structure	Context	Seaweed
2004	<16>	[48]	1	Floor	1
2004	<17>	[48]	1	Floor	1
2004	<18>	[48]	1	Floor	1
2004	<19>	[48]	1	Floor	1
2004	<20>	[48]	1	Floor	1
2004	<20>	[48]	1	Floor	1
2004	<21>	[48]	1	Floor	2
2004	<22>	[48]	1	Floor	1
2004	<22>	[48]	1	Floor	1
2004	<23>	[48]	1	Floor	1
2004	<24>	[48]	1	Floor	1
2004	<25>	[48]	1	Floor	1
2005	<11>	[209]	1	Midden	3
2005	<14>	[233]	1	Hearth	1
2005	<20>	[245]	1	Ember Pit	1
2006	<114>	[6020]	3	Floor	2
2006	<115>	[6020]	3	Floor	2
2006	<116>	[6020]	3	Floor	2
2006	<117>	[6020]	3	Floor	1
2006	<119>	[6020]	3	Floor	1
2006	<120>	[6020]	3	Floor	2
2006	<120>	[6020]	3	Floor	2
2006	<123>	[6020]	3	Floor	2
2006	<124>	[6020]	3	Floor	2
2006	<125>	[6020]	3	Floor	1
2006	<126>	[6020]	3	Floor	2
2006	<127>	[6020]	3	Floor	1
2006	<128>	[6020]	3	Floor	2
2006	<131>	[6020]	3	Floor	1
2006	<132>	[6020]	3	Floor	2
2006	<133>	[6020]	3	Floor	3
2006	<134>	[6020]	3	Floor	2
2006	<135>	[6020]	3	Floor	1
2006	<154>	[6020]	3	Floor	1
2006	<157>	[6020]	3	Floor	1
2006	<158>	[6020]	3	Floor	1
2006	<159>	[6020]	3	Floor	1
2006	<160>	[6020]	3	Floor	2
2006	<161>	[6020]	3	Floor	1
2006	<162>	[6020]	3	Floor	3
2006	<165>	[6020]	3	Floor	2
2006	<167>	[6020]	3	Floor	2
2006	<168>	[6020]	3	Floor	1
2006	<178>	[6020]	3	Floor	2
2007	<48>	[6129]	3	Midden	2
2007	<8>	[6126]	3	Hearth	1

Discussion

Charcoal Analysis

It is perhaps surprising that all the charcoal found in these samples came from local Icelandic wood resources, considering the paucity of modern Icelandic woodlands and the wide variety of non-wood resources used as fuel at other Icelandic sites from the settlement era (Zutter 1992, Vésteinsson & Simpson 2004, Sveinbjarnadóttir 2004, Milek 2007). The fact that the majority of the wood identified was from *Betula* rather than *Salix* species can be explained in two ways: firstly, that birch is more common than willow in Iceland, and that the woodlands are generally primarily birch interspersed with occasional willow trees (Kristinsson 1998), and secondly that willow is commonly known to be a poor fuel, as the wood is very wet (Ballantyne pers. comm.). It is clear that the inhabitants of Vatnsfjörður had access to substantial amounts of locally available wood from the earliest phase of the site.

Considering the large amount of driftwood available in the Westfjords (Eggertsson 1993, Edvardsson 2004), one might expect the inhabitants of the region to have used this abundant resource as fuel. If this was the case, the samples would have contained conifer woods such as Pine, Spruce and Larch. However, it seems that not only was driftwood too valuable for building material and for making objects, but also there was a large amount of local wood available to burn which made the burning of driftwood an unnecessary waste. It is known that Vatnsfjörður had rights to driftwood collection on several beaches all over the Westfjords, from Bolungarvík in the west to the far north of the Hornstrandir coast (Diplomatarium Islandicum VIII, p. 288), so clearly driftwood was available to the inhabitants of the farm.

However, the farmstead also had rights over several areas of woodland in the local area. The 1509 *máldagi* (deed) of Vatnsfjörður lists all the land rights of the farm, and here we can see that the occupants had the right to as much wood as they wished from several nearby areas of forest (Diplomatarium Islandicum VIII, pp. 287-288) even as late as the 16th century. Therefore, although these formalised ownership rights may not have existed in the 10th century, it is clear that there would have been no shortage of local birch forest in which to gather fuel during the Viking Age. We can therefore conclude that the wood used as fuel at Vatnsfjörður originated from local birch forest owned or controlled by the farm.

Seaweed Analysis

One might be inclined to think that in order to discuss material burnt as fuel, the first place to look would be the hearth of a building, and both hearths studied here contained only very small amounts of seaweed. However, the material present in the hearths only represents the last burning event. Ethnographic evidence from Þverá in Laxárdalur has suggested that hearth material would be spread out over the floors of buildings in the Viking Age when floors became too wet or worn, in order to improve sanitation and provide a more stable floor layer (Milek 2007). Therefore, in order to understand what was being burnt in the hearths we must also study the floor samples. The floor of Structure 1 yielded a lower seaweed value than that of Structure 3, however some seaweed was found in both. This suggests that a small amount of seaweed was being burnt in the hearths of both structures, slightly more in the smithy. It seems that seaweed was being used as a supplementary fuel in some cases, but that wood charcoal was preferred as a fuel in both domestic and industrial contexts. Cooking pits were discovered close to Structures 1 and 3 in 2005 and 2008 (Milek 2005, Daxböck this volume) and analysis of archaeobotanical samples from these contexts may reveal whether or not seaweed was used in cooking fires. It had been thought that the presence of seaweed in the floor samples from Structure 3 could be due to storage of fresh seaweed in the building, which then became charred when the building burnt down. However, the archaeoentomological remains from Structure 3 do not indicate the presence of fresh seaweed (Forbes 2008), so this

hypothesis seems unlikely.

The two middens, contexts [209] and [6129], present a marked difference in the amount of seaweed relative to wood charcoal. The midden of Structure 1, context [209], had a seaweed value of 3, and that of the Structure 3 midden, context [6020], was 2. This is higher than in the hearths and floors, which suggests that perhaps seaweed was being burnt elsewhere on site, for a purpose other than as fuel. Burnt seaweed can be used for non-fuel purposes such as in metalworking and in dyeing wool. Both of these purposes are relevant to Vatnsfjörður, where metalworking was occurring in the smithy and it is very likely that the Viking Age inhabitants of the site were processing and dyeing wool for clothing. Seaweed has also been found in soil micromorphology samples from the floor layers of other structures of unidentified function at the site (Milek, pers. comm.), so analysis of archaeobotanical samples from these structures and their associated middens may shed further light on the use of seaweed at Vatnsfjörður. Considering the ubiquitous nature of seaweed in samples from across the site, it is likely that seaweed was being used as a complementary fuel in both domestic and industrial fires. Seaweed of all types has a high mineral content, particularly of salts such as sodium, potassium, calcium and magnesium (Norrie & Hiltz 1999), meaning that the organic, combustible content of seaweed is lower than that of wood. Therefore, seaweed would be a less efficient fuel then wood, although it was almost certainly used as a fuel source at Vatnsfjörður. Further research in this area will include loss-on-ignition analysis of fresh seaweed samples taken from the beach at Vatnsfjörður during the 2008 season, and the creation of soil micromorphology thin sections of seaweed ash, to facilitate the identification of activity areas related to the processing of seaweed ash.

Conclusion

From the analysis of the wood charcoal and seaweed found in the archaeobotanical samples from the hearths, floors and middens of Structures 1 and 3 at Vatnsfjörður, we can begin to build up a picture of life at the site in the 10th century.

The community at Vatnsfjörður during the Viking Age had a wide variety of resources available to them, and due to the high status gained by the site as a regional chiefdom seat these resources were not only available to the farm, but also owned by it by the 12th century. It is interesting that no driftwood was found at the site from the 10th century samples. We know from the 1509 *máldagi* that Vatnsfjörður's driftwood rights stretched across the Westfjords (Diplomatarium Islandicum VIII p. 288) in the medieval period. While the inhabitants of Vatnsfjörður must have had access to driftwood, as mentioned previously there is very little driftwood in Ísafjarðardjúp compared to the Strandir coast. Perhaps the fact that driftwood does not seem to have been used as a fuel relates not so much to the scarcity of the resource, but to the distance which had to be travelled to procure it. For example Rekavík ('Drift Bay') in Hornstrandir, where Vatnsfjörður had driftwood and whaling rights, is 50 miles from Vatnsfjörður by sea. Considering the many areas of local woodland which were available to the inhabitants of the site, it is understandable that driftwood would have been used for artefacts and possibly for building, while local wood, which could be obtained more easily, was burnt as fuel.

The presence of charred seaweed at the site represents the exploitation of local resources by the community for various purposes. Large amounts of seaweed collect on the beach at Vatnsfjörður, and considering this it was likely that seaweed was used in a number of ways. Some of these are not visible in the archaeological record. We know from ethnohistorical sources that seaweed was used as manure and as fodder for animals (Chapman & Chapman 1980, Donaldson 1986, Towrie 1996, Dickson 1999), but as these practices involved the decomposition or consumption of the seaweed rather than its burning, it is only possible to make an informed speculation that seaweed was used for these purposes at Vatnsfjörður during the Viking Age. The prevalence of burnt seaweed in various contexts across the site suggests that seaweed was being used as a supplementary fuel, as well as for

industrial purposes to produce potash and lye.

Overall, from the earliest settlement at Vatnsfjörður, a wide range of resources were being used at the site, reflecting what was locally available rather than any particular cultural traditions. While at other sites, peat or turf or dung was the main fuel, the woodland available to the inhabitants of Vatnsfjörður was abundant and easily accessible, so birch wood became the main fuel, supplemented by seaweed. This breaks with the common assumption that wood was a scarce resource in Viking Age Iceland. This was certainly not the case at Vatnsfjörður, the large amounts of birch charcoal recovered from the hearths of the *skáli* and smithy and from the pits excavated in 2008 disprove this argument, at least for this site in this period. Driftwood was clearly seen as a higher value resource, saved for artefacts and possibly building material, not due to its scarcity but to the effort involved in obtaining it.

This study reinforces the view that it is impossible to create a generalised picture of an issue as complex as resource and fuel use over any large area. One cannot say that birch wood was the preferred fuel in Iceland in the 10th century, as in another part of the country and in a different environment, this will not be the case. Rather, a synthesis of resource use studies from across the region will highlight local variations depending on the local environment, while other aspects of the culture such as architecture and art styles are perhaps less varied. Vatnsfjörður is by no means a typical Viking Age Icelandic farmstead: its extensive land rights and importance in historic sources mark it as a place of high status and social significance. The ownership and rights held by the property of Vatnsfjörður over local resources led to and reinforced this status. However, if the site were situated elsewhere, rights over turf or peat cutting might have contributed to a similar social status. Resource use cannot be generalised, as variation between sites is inevitable due to a combination of social, economic and environmental factors, and Vatnsfjörður is one piece of the bigger picture of resource use across Iceland.

Further Work

There is much work still to be done on the subject of fuel and resource use at the site of Vatnsfjörður, and during subsequent field seasons much more material of interest is likely to be discovered. In the 10th century part of the site, new outbuildings are being excavated every year, and contour surveys of the homefield indicate that many more are yet to be investigated (Milek pers. comm.). On the farm mound, occupation layers have been dated to as early as the 10th century in the lowest levels of the mound, yet excavations of the uppermost level, dating to the 19th century, are still being undertaken.

Excavations in the 10th century settlement require further analysis. The floor of Structure 5, a small horseshoe-shaped building of unidentified purpose, contains large amounts of charred seaweed in soil micromorphological samples from the floor layers. It is possible that this building was a specialised area where seaweed ash was used for some purpose. Archaeoentomological analyses do not suggest that this area was used for wool processing, but the preservation of insect remains at the site is poor, and absence of evidence is not evidence of absence (Forbes 2008). Archaeobotanical and geoarchaeological investigations of the outbuildings at Vatnsfjörður have the potential to shed further light on the uses of seaweed at the site. The first step in this process would be to conduct loss-on-ignition analysis of seaweed, in order to gauge its mineral and organic content. The ash from this could be used to create reference slides of seaweed ash for soil micromorphological analysis, which would facilitate the identification of activity areas particularly associated with the use of burnt seaweed. Samples of local seaweed for this purpose were collected during the 2008 field season.

Excavations on the farm mound will give a different insight into resource use at Vatnsfjörður. As the excavation progresses through the lower levels of the mound, through careful sampling it will be possible to build up a picture of how resource use at the site has changed over time. This will, however, be a slow process, and complete results from this

cannot be expected for as much as 10 years, due to the short field seasons and the complexity of the site stratigraphy. However, when excavations are complete, this will present a coherent view of how life at Vatnsfjörður has changed from the Viking Age to the modern period. Also, the preservation of organic remains from the farm mound is far superior to that of the 10th century area, and several wooden artefacts have been recovered from excavations there (Gisladóttir, pers. comm.). An analysis of these would indicate whether driftwood was being used to make household artefacts, or whether wood or completed objects were being imported from mainland Scandinavia. This would add another dimension to the discussion of resource use and procurement at Vatnsfjörður.

Further to this, there is very little work being conducted on the uses of local wood and driftwood across Iceland. Sites such as Hofstaðir and Sveigakot have large bodies of archaeobotanical material awaiting analysis (Garðar Guðmundsson, pers. comm.). If the material from these sites was subjected to a similar analysis as the Vatnsfjörður material, it would be a step towards building up a picture of how wood resources were managed in the Viking Age across Iceland, and their relative importance at different sites. This study has given an insight into fuel and resource use during the Viking Age at the site of Vatnsfjörður, and carefully-considered future investigations have great potential to expand this insight across both space and time.

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PRELIMINARY GEOARCHAEOLOGICAL REPORT ON FUEL RESOURCE UTILISATION AT VATNSFJÖRÐUR BASED ON THIN SECTION MICROMORPHOLOGY OF FARM MOUND SEDIMENTS

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Introduction

The foundations of this report were laid in fieldwork undertaken in June 2008 at Vatnsfjörður, with the farm mound area chosen for specific inspection. The decision to target the farm mound was based on its layered composition, with the accumulated waste material of which the mound is constituted representing phases of occupation on the site since its inception. Following the completion of fieldwork, micromorphological analysis of thin sections produced from undisturbed sediment from the farm mound area was undertaken, with the results revealing some intriguing insights into fuel resource availability and utilisation at Vatnsfjörður and changes to these over time. By taking this Icelandic site as a base model for fuel resource utilisation and exploitation amongst Norse colonisers, a primary source 'archive' has been created relevant to the farm mound at Vatnsfjörður, applicable to making pertinent comparisons with settlements elsewhere in the Norse North Atlantic.

A brief account of the fieldwork

A square hole (with dimensions of roughly 1m x 1m x 1.5m) was dug out of the western edge of the farm mound so as to avoid any structural remains. Each layer of activity in the soil was removed from the exposed profile in sequence, with all relevant materials unearthed being recorded in line with archaeological protocol and passed onto FSI. Amongst the findings were fish and domestic mammal bones, chunks of nineteenth-century coal and iron nails, with the number of finds falling significantly below the upper part of the hole. Whilst this process was not necessarily of great significance to the specific objectives of this undertaking it has provided an idea of the type of occupational debris associated with the farm mound. Once the bottom of the occupational sequence in the soil had been reached (as indicated by the presence of the stream bed gravels and subsequently confirmed by radiocarbon dating), the eastern face of the hole was cleaned to reveal a distinct stratigraphy comprised of the numerous layers (or horizons) of accumulated sediment within the farm mound section (see Fig. 1). In total the stratigraphy included 27 designated horizons (see Fig. 2), from the gravelled stream bed to the topsoil. From the stratigraphy soil samples were taken using Kubiëna tins, ensuring that each layer within the sequence between horizons 1 to 24 (from *landnám* to Medieval), was represented. This meant that all aspects of relevant human activity within the profile were captured and could be analysed through thin section micromorphology. Since the completion of the fieldwork radiocarbon dating of three fragments of Betula charcoal[15] from within the profile has been carried out and thus provided a relative chronological framework for thin sections '1a' to '6'. Once calibrated, the three dates provided were AD 825±35, AD 1035±35 and AD 1220±35 (see Fig. 1), correlating with the main time period under investigation in this dissertation. The accounts of fuel resources available at Vatnsfjörður and its satellite settlements that can be found in Jarðabók for the early eighteenth century also serve to add to the chronological picture and help to contextualise thin sections '7' and '8' and the changes that took place beyond the thirteenth century.

[15] Identified by GUARD, University of Glasgow.

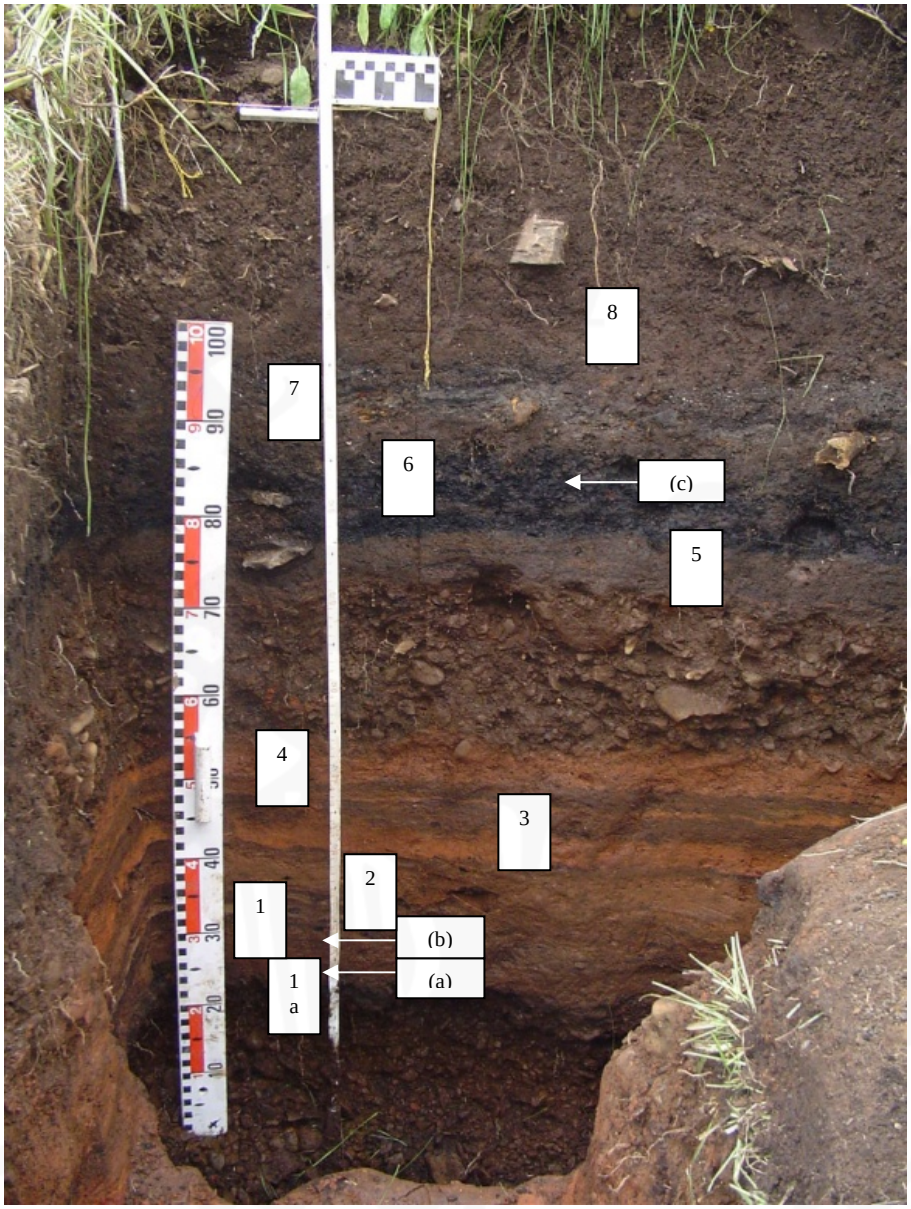

Figure 1. *Finished profile of the eastern side of the hole dug into the farm mound. Numbered boxes roughly represent the locations where Kubiëna tins were inserted into the profile and soil samples were removed to create thin sections '1a' to '8'. Letters (a), (b) and (c) represent the points from where Betula charcoal was extracted and used to provide specific dates within the stratigraphy via radiocarbon dating. Letter (a) represents Cal AD 825±35, (b) Cal AD 1035±35 and (c) Cal AD 1220±35.*

Context for the observations

A precedent for looking at Icelandic fuel residues through the application of thin section micromorphology was set by Simpson et al.'s 2003 paper 'Fuel resource utilisation in landscapes of settlement'. This paper offered a model for the various characteristics that can be sought within soil stratigraphies so as to prove past use of a range of fuels (peat, wood, turf and animal manures) at both high (800˚C) and low (400˚C) temperature. Focusing on two north Icelandic settlements dating from *landnám*, the high and low status sites of Hofstaðir and Sveigakot, Simpson et al. utilised Árni Magnússon and Páll Vídalín's *Jarðabók*, or Land Register, compiled between 1702 and 1714. This document provides information regarding resources held by every farm in Iceland, including fuel supplies, which therefore allowed the investigators to identify relevant fuels to experimentally combust in order to provide themselves with a model for observation. Taking a similar approach here, the inclusion in *Jarðabók* for Vatnsfjörður (Magnússonar and Vidalíns 1940: 214-216), recorded on 22 July 1710, indicates that the settlement was by then suffering from its marginality:

"The homefields are hard and grow slowly. Outfields are waterlogged, boggy and the bogs

> contain little roots. The hay in the outfields is very meagre for use. Fishing from the farm has not been for many years, because fish do not migrate so far into the fjord, which does not make it feasible to row from the farm."

The value of land in the vicinity was steadily decreasing, as made clear by the situation at Vatnsfjörður's outlying farm of Sveinhús, where rent payments in 1710 were half that of twenty years previously. Marginality is also reflected in the range and supplies of fuels mentioned for Vatnsfjörður, Sveinhús and the dependent island of Borgarey, with a clear dependence upon a deteriorating supply of birch. *Jarðabók* indicates for the primary settlement that "There is little turf-cutting and it is bad. Birch has been used for fuel, but is being used up and is of little use now. Roots for fuel supplement are now used... The farm has driftwood rights". At Sveinhús it was recorded that "Turf-cutting is bad and of little use. Birch can be used for fuel", whilst on Borgarey (Magnússonar and Vidalíns 1940: 214-216):

> "There is enough turf cutting. No wood for fuel is [present] on the island and the occupant has to cut birch on the main farm's land, which he does for free... There is little seaweed to be had and not worth mentioning. The occupant uses... birch for fuel as much as he needs."

Therefore, *Jarðabók* indicates that in the early eighteenth-century Vatnsfjörður and its satellites were overly reliant on birch wood for fuel, which was presumably in greater stocks prior to 1710, with precious little else to burn. Worthy of note in relation to this is the evidence for woodland management in Medieval Iceland, which contradicts traditional viewpoints that any birch wood surviving in the country following widespread deforestation that accompanied *landnám* was economically insignificant. Vésteinsson and Simpson have demonstrated that the thirteenth-century laws laid down in *Grágás* limited the extent to which woodland may have been legally used for fuel by tenants. Such laws promoting the conservation of woodland were maintained in *Jónsbók* from 1281 following Iceland's incorporation into the Norwegian kingdom (Vésteinsson and Simpson 2004: 183. Therefore, the opportunity for adding to this picture of woodland management in Norse Iceland through the results of thin section micromorphological analysis of the Vatnsfjörður farm mound is an important addition to scholarly knowledge of fuel resource exploitation in the country.

The use of roots as a supplementary fuel source gives a striking impression of Vatnsfjörður's decline, whilst there appears to have been a conspicuous lack of viable alternatives to a clearly dwindling birch wood resource. As has been previously stated, however, Vatnsfjörður was a high status settlement from early on and into Medieval times, so there must be a level of expectation that a wider range of fuels with various uses were present prior to the sorry situation of 1710. Therefore, along with the evidence gleaned from Hofstaðir, a similarly high status settlement, for the presence in the Viking and Norse periods of fuels not mentioned in the *Jarðabók* entry for Vatnsfjörður, most significantly peat burnt at industrial temperatures, was considered during thin section analysis. Other historical evidence for fuel types in Iceland includes cattle dung, scrub and heather (Vésteinsson and Simpson 2004).

Methodology of thin section production and microscope usage

Thin section production and microscope analyses was undertaken ay the Micromorphology laboratory, University of Stirling, following standard procedures outlined at http://www.thin.stir.ac.uk/category/methods/.

Critical notes

Before discussing the results and implications of the micromorphology of the thin sections, certain drawbacks to the study must be identified in the interest of scientific and observational validity. It must be held in mind that only one small area from within the Vatnsfjörður farm mound was subject to micromorphological analysis. Therefore the results are essentially only applicable to activity on the farm mound, specifically the edge from where soil samples were taken. If soil from elsewhere in the mound had been analysed it is entirely possible that significant differences would have existed between the areas due to the different use of space within the farm mound. The decision of where to place Kubiëna tins and withdraw soil samples was made based on observations of a two-dimensional stratigraphy. As a result, any aspects of interest behind the surface could have been easily missed without even realising it. Furthermore, the Kubiëna tins used have a surface area much smaller than the stratigraphy and its various horizons as a whole, meaning that there could have been significant exclusions running along the surface despite the efforts made to represent all horizons in the profile. Nevertheless, the samples are considered to be representative of the major stratigraphic units observed in the field.

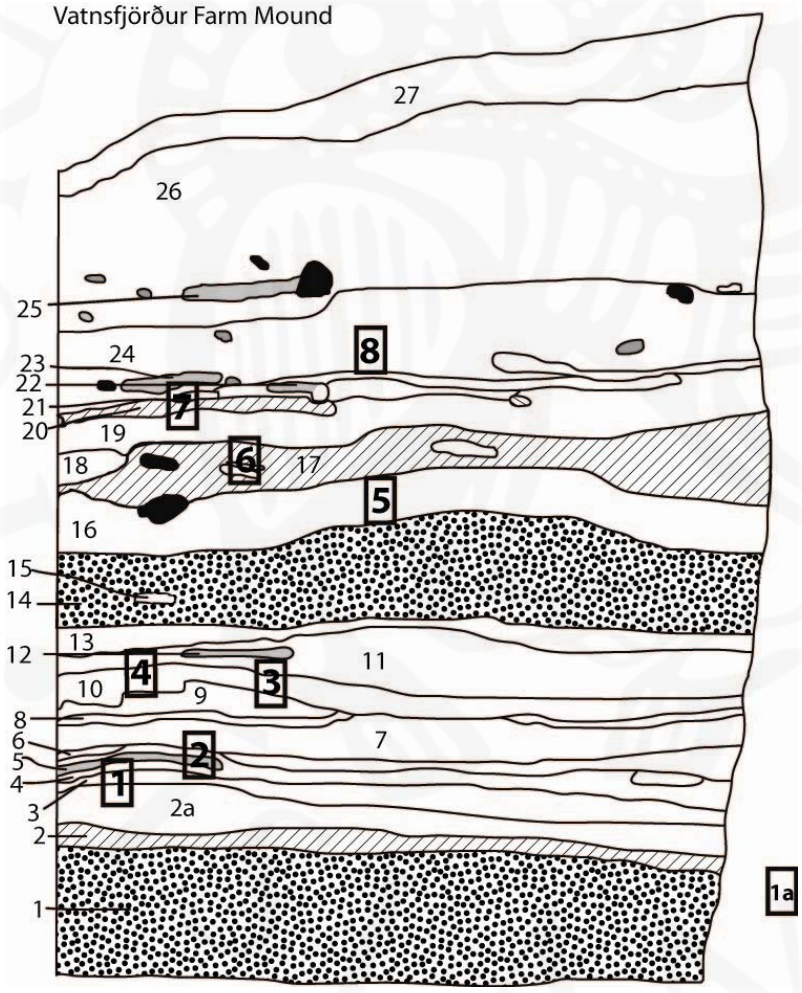

Figure 2. *Stratigraphic drawing of the farm mound profile, with horizons 1-27 and the location and numbers of Kubiëna tins '1a'-'8'.*

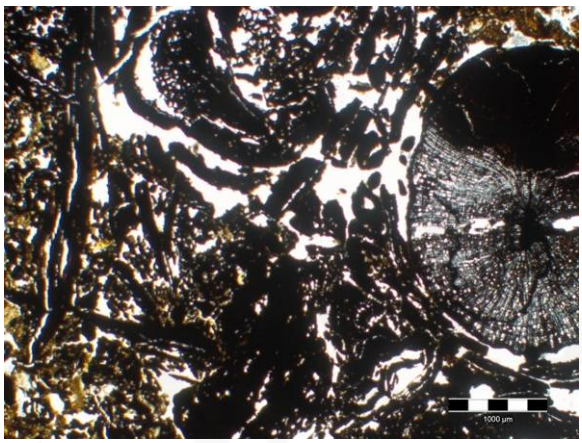

Figure 3. *Wood charcoal and tree ring cross section in thin section '1a'. (PPL)*

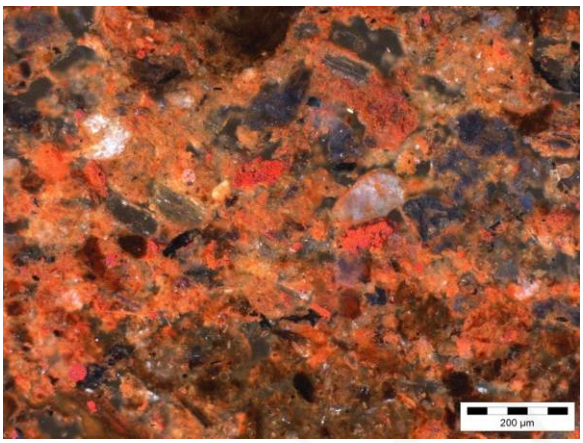

Figure 4. *Orange and coarse mineral incidences reflect combusted turf in thin section '1'. (OIL)*

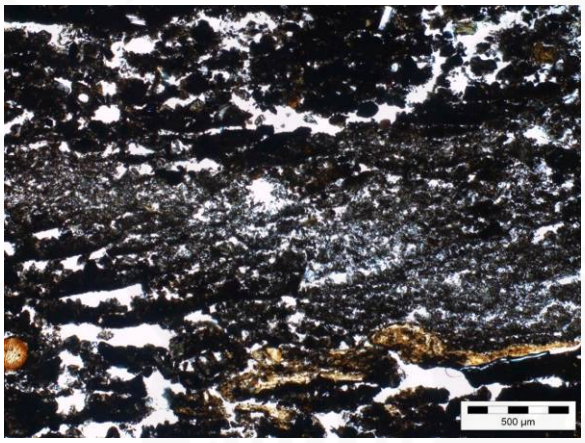

Figure 5. *Calcitic material across the centre of thin section '2' reflects evidence for wood ash. (PPL)*

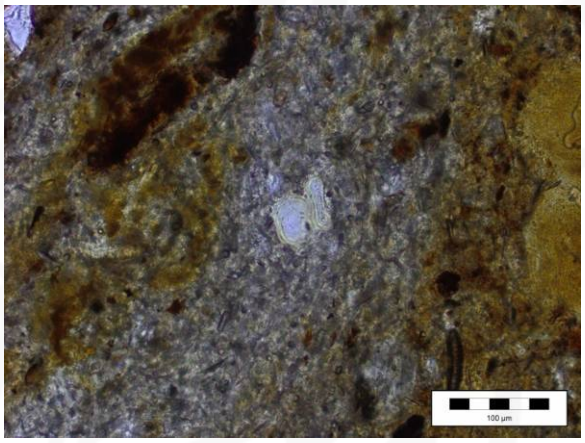

Figure 6. *Fused siliceous material in thin section '4' indicating high temperature peat burning. (PPL)*

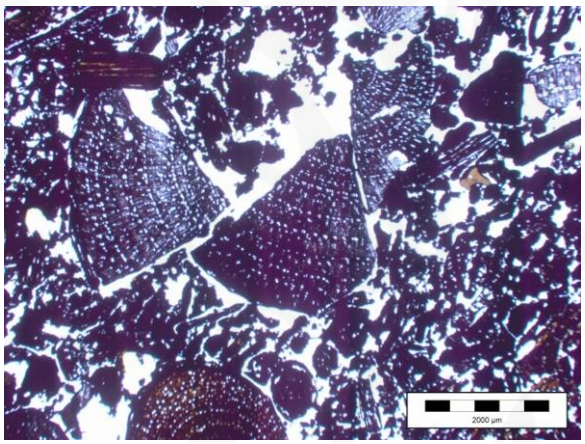

Figure 7. *Charcoal and tree ring specimens in thin section '6'. (PPL)*

Table 1. *Summary micromorphological descriptions of thin sections from the Vatnsfjörður farm mound.*

Section	Micro-horizon	Coarse mineral material									Fine mineral material		Groundmass b-fabric		Organic material							Pedofeatures		
		Igneous	Iron-stained Igneous	Calcite	Bone	Tephra and silts	Diatoms	Phytoliths	Clusters?	Heated material	Colour under plain polarised light	Colour under oblique incident light	Stipple/ Organo-mineral content	Clusters?	Cellular Charcoal	Non-cellular charcoal	Tree ring age	Amorphous (black)	Amorphous (brown)	Mineral inclusions?	Parenchymatic matter	Excremental	Textural	Iron concentrations
1a	i	**	*	**	*	*	**	**	Y		Brown	Red/orange, pale lenses	Stippled		**	*		***	**	Y				
	ii	*		*	*	*	*	**	Y		Brown	Pale, reddish lenses	Stippled		***	*	3	**	*					
	iii			*		*	*	**			Dark brown	Red/orange, pale lenses	Stippled		***			*						
	iv			*		*	*	*	Y		Brown	Pale, orange	Stippled			*		*	*					
1	i			*		*	*	*		*	Brown	Orange/red	Organic/Stippled		*	*		*	*					
	ii			*		*	*	*			Brown	Light orange	Organic/Stippled		*	*								
	iii			*		*	**	*	Y	*	Dark brown	Light/grey	Organic/Stippled	*	*	*			*					
	iv	*	*	*	****	*	*	*		*	Brown	Orange	Organic/Stippled	*	*	*		*						
	v			*			*	*	Y		Brown	Light brown	Organic/Stippled		*	*		*	*					
2	i			*	**	*	*	**	Y		Brown	Orange/dark brown	Organic/Stippled		*	*		**	*	Y	*			
	ii	*		*	*		*	*	Y		Brown	Orange	Organic/Stippled		*		4	***	*					
	iii			*			***	***	Y		Light brown	Yellow/grey	Organic/Stippled		*			*	**					
	iv	*		*	*						Dark brown	Orange	Stippled		**	*		**	*					
	v	*	*	***			***	***	Y		Light brown	Yellow/grey/light brown	Stippled		*	*		**	*	Y				
	vi			*			**	*			Brown	Grey/orange	Stippled		*	**		**	*					
3	i	*		**	*		*	**	Y		Dark brown	Orange, dark patches	Organic/Stippled		**	*		***	**					
	ii	*					***	****	Y		Brown	Red, yellow/grey	Organic/Stippled		*	*		**	**					
	iii	*					***	***	Y		Light brown	Red, grey	Organic/Stippled					*	*					

											brown													
	v						***	****	Y		Brown	Red	Organic/Stippled	**				**	*					
	vi	**					***	****	Y		Light brown	Light/grey	Organic/Stippled	*				*	*					
	vii						***	***	Y		Brown	Grey	Organic/Stippled	*	*	*		**	*		*			
4	i						***	**	Y		Brown	Brown, orange	Stippled			*		*	**					
	ii	*	*				*	**	Y		Dark brown	Orange	Stippled					***	**	Y		*		
	iii	**	*				***	**	Y		Brown	Red, brown	Stippled			*		**	*					
	iv	****	**	**		**	*	*			Reddish brown	Dark, red/orange	Stippled			*		*	**						**
	v						**	***	Y		Brown, grey	Pale, red	Stippled			*		**	*		*			
	vi				**		*	*			Dark brown	Orange	Organic/Stippled		**	*	19	***	**					
	vii	*	*	*				*	Y		Brown	Orange	Stippled		**	*					*			
5	i	*	*		*		*	**			Brown	Pale/brown, orange	Stippled			*		**	**			*		
	ii	*			*					*	Brown, orange lenses	Brown	Stippled		*	*		***	*					
	iii	*									Dark brown	Brown	Stippled		*	**		**	*					
	iv	*	*					*	Y		Dark brown/red	Brown, yellow	Stippled		*	*		**	*					
	v	**			*						Dark brown	Orange	Stippled		*	**		***						
	vi	*			*			*			Brown	Pale, orange	Stippled	*	***	*		**	*					
	vii	*			**					*	Black	Grey	Organic	*					*					
	i	**			*		*	*			Black	Grey, orange	Organic		***	*		****	*					
	ii	*					*		Y		Light/reddish brown	Orange	Stippled		****	*	12, 3	**	**					
	iii	*			*						Black	Grey	Organic		***	*	1, 1	*	*					
6	iv	*	*				*	*			Light brown	Pale/grey	Stippled		***	**	12, 14	**						
	i	*	*		*		***	***	Y		Light brown	Grey/pale, orange	Stippled		*	*		**	*	Y				
	ii	*	*		*		**	**	Y		Light brown	Grey/pale; orange	Stippled		*	*	1	***	*					
	iii	*					*	*			Dark brown	Brown	Organic		*	****	1	**		Y				
	iv	**			*		**	**			Light brown	Pale/grey	Stippled		*	*		**	*					
	v	*			*		*	*			Dark brown	Brown	Organic					*		Y				
7	vi	*			*		***	***	Y	*	Very light	Pale/grey	Stippled		*	*		**	*	Y				
	i	*			*		***	**	Y		Light brown	Brown	Stippled		*	*		**	*					
8	ii	*			*		**	***	Y		Light brown	Red/brown	Stippled	*	*	*		**	*					

Frequency class refers to area of micro-horizon. *Very few; **few; ***frequent/common; ****dominant/very dominant.

Results and discussion

A vital starting point for the micromorphological observations was to prove (or disprove) the integrity of the stratigraphic chronology of the soil through its sedimentary environment. Disturbance to the soil in the farm mound through natural or human initiated activity could have rendered any results from the laboratory work unreliable. Superficially, the stratigraphy in the field appeared to be consistent with regards to having distinct horizons, mostly complete, and therefore building up in chronological order. This observation had to be confirmed on the micro-level, however, so as to validate the micromorphological findings and their interpretation. By considering pedofeatures such as excremental deposits and accumulation of fine material in pore spaces in the farm mound sediments it was clear that there had been little significant disturbance to the stratigraphy; any micromorphological features associated with fuel residues were likely to be located where they were deposited. Such pedofeatures as those mentioned here are indicative of surface soil activity and therefore if found further down the stratigraphy can demonstrate soil dislocation as well as possible biological disturbance. Excremental deposits in pore-space were very few, with only small isolated deposits apparently present in micro-horizons '4ii' and '5i'. Textural pedofeatures, whereby fine material builds up in pore space or around grains in the soil, were not found to any significant extent anywhere in the profile. If they were present there would have been a suggestion of surface processes and disturbance on the farm mound and the lack of evidence for this would suggest a more constant accumulation of sedimentary material. Iron concentrations are identified through reddening in the soil caused by repeated wetting and drying as soil is serially exposed and protected from surface dampness. Again a dearth of significant evidence for this, save for micro-horizon '4iv', serves to demonstrate the sequential integrity of the record. Furthermore, much like the distinctive horizons of the larger stratigraphy from which samples were taken, the consistency of the micro-horizons within the slides serves to corroborate the notion that disruption to the soil in the farm mound has been minimal over time.

The evidence for a variety of fuel resources and changes to the relative dependency or desirability of their utilisation is clearly evidenced in the sections taken from the Vatnsfjörður farm mound. It would seem from the results of the micromorphology that a mixed fuel economy was in operation at Vatnsfjörður, although there are clear indications that greater emphasis was placed on certain resources at different periods. For clarification's sake, it must be reiterated that only sections '1a' to '6' relate specifically to the time frame that this dissertation is focused upon. However, this is not to dismiss the relevance of sections '7' and'8' as the effects of the fuel management policies employed in the Viking and Norse periods bore direct consequences later on. The primary fuel types that have been identified in the sections are peat, turf and wood charcoal with suggestions of wood being used as a supplementary domestic fuel in certain instances.

There is evidence for at least some degree of peat being employed as a versatile fuel source used at high and low temperature throughout most of the stratigraphy. High temperature peat burning is demonstrated by the presence of pale or yellow lenses of fine mineral colours (under OIL) associated with clusters of both phytoliths and diatoms (siliceous features of plant stems and algae that remain after combustion) which are found in the majority of micro-horizons in the slides, particularly between '1a' and '4'. There is consistent evidence for peat burned at high temperature from micro-horizons '1ai' to '4v', with increased incidence of associated phytolith and diatom clusters alongside pale or yellow patches between '2iii' and '4v' indicating a peak phase of activity (see Fig. 6). Low temperature peat burning is evidenced by red or orange lenses of fine mineral colours where there is a lack of associated coarse mineral content. Peat burning clearly reaches a hiatus from micro-horizon '4vi', before re-emerging as the prevailing choice or option for high temperature combustion in slides '7' and '8'. Evidence for the inclusion of peat burned at low temperature is at a premium but can be found at micro-horizons '3v' and '4i' and 'v'. There

can be little surprise that these examples fall within the section with most intensive peat utilisation. Low temperature turf burning also has the appearance of red or orange lenses, but conversely to peat tends to have a significant coarse mineral content, often with the inclusion of heated particles. As a result there would seem sufficient evidence that combusted turf is present in slides '1a' to '4' and particularly noticeable in micro-horizons '1ai-ii', '1i' and 'iii-iv' (see Fig. 4), '2i-ii' and 'iv', '3i' and '4ii-iv'. There is also the issue of there being negligible evidence for making a judgement between the presence of either peat or turf in certain other micro-horizons where the obvious occurrence of peat combusted at high temperature is sometimes accompanied by ambiguous red or orange material.

Charcoal has at least some occurrence in the majority of micro-horizons examined, with a significant level of incidence in slide '1a' probably reflective of the burning of woodland as part of the *landnám* clearances, or possibly fuel at the very start of occupation. It is worth bearing in mind that the tenth-century smithy found in the Viking Age area exhibits evidence for charcoal utilisation and therefore corroborates the notion of its use from at least a short time after the settlement's inception (Daxböck and Milek 2007). The association with charcoal of burnt wood of decipherable age (based on tree ring counts) also gives an insight into the levels of woodland at the site and its possible management. Slide '1a' for example includes one piece of wood indicating three years worth of growth (see Fig. 3.) and slide '2' one of four years. However, these are two very much isolated instances which are not repeated until one reaches slides '4', '6' and '7', the second of which provides particularly interesting evidence. Charcoal retains a perceptible level of usage between slides '1' and '3i/ii', before a conspicuous decline in its prevalence occurs between '3iii' and '4v'. Interestingly, this decline coincides with the apparent rise in high temperature peat utilisation, with possibilities that this cessation of charcoal was either enforced through utter exhaustion of woodland resources or part of a wider plan for conservation so as to prevent aforementioned exhaustion. Adding credence to the notion of conservation is the inclusion of wood with nineteen years worth of growth exactly at the point where charcoal incidences begin rising once more ('4vi'). This return of charcoal is found leading up to a re-emergence of the material as a prevalent inclusion in slide '6', where there is also considerable evidence for wood aged into double figures (see Fig. 7.). Also worth noting is the definite correlation between a dropping of high temperature peat combustion beyond '4v' and the re-emergence of charcoal from '4vi', with peak levels of prevalence between '5v' and '6iv'. As one moves down through slide '7' a clear drop in the incidence of charcoal is noticed, once again with a remarkable correlation to the increased frequency of high temperature combusted peat. Coinciding with the highest levels of charcoal (between micro-horizons '6i' and 'iv') is the presence of wood aged 12, 3, 1, 1, 12 and 14 years. Micro-horizon '4vi' also includes, somewhat anomalously through its isolation, a 19 year old fragment which adds to the picture of wood with a level of maturity at the site. With wood aged into double figures it may be suggested that the kind of woodland management discussed by Vésteinsson and Simpson was in place at Vatnsfjörður. This suggests that inhabitants of the settlement showed the discipline to refrain from utilising wood until it had reached a level of maturity – a practice surely aided by the settlement's status and capacity to rely upon alternative sources – and thus promoting careful conservation despite the traditional supposition that deforestation post-*landnám* rendered woodland economically unviable. This theory remains, however, a working hypothesis and one must entertain the possibility that wood was imported from outside the settlement's territory.

Analysis of the groundmass b-fabric of the thin sections demonstrated some evidence for limited wood ash residue, associated with low temperature burning. Clusters of calcitic speckled birefringence fabric in the thin sections when viewed under crossed polars exhibits the occurrence of wood ash and was noticeable in micro-horizons '1iii' and 'iv', 2, '3v-vii' and '5vi-vii' (Fig 5). However, such observations were of limited scale and frequency, which suggests that while there was some wood burnt on the site at 'domestic' temperatures it was

very much of marginal importance. Evidence for the combustion of animal dung was not evident and thus has not been included in the table of results.

The occupational debris included in the thin sections provides an indication of the level and range of activity that occurred on the farm mound, helping to build a picture of the general practices of the mound and the specific relationship of these to fuel usage over time. Mammal bone was identified throughout the thin sections but is noticeable through its absence from much of slides '1', '3' and '4', although it is worth noting that micro-horizon '1iv' had a very high frequency of bone inclusions. The fact that bone inclusions appeared to be of mammal origin and were unburnt would suggest that they indicate the remains of butchered domestic livestock. Further occupational debris is reflected in the organic material of the thin sections. Charcoal and wood aside, the primary organic content to be analysed was black and brown amorphous matter and parenchymatic matter. Amorphous material was present throughout the slides with a general preponderance of black over brown. This would most likely represent the presence of turf once used for construction. The broader micromorphological features observed are indicative of a farm site, rather than a specialised fishing settlement, for example, which have a different set of indicators (Simpson et al. 2000).

When related to the radiocarbon dates clear patterns for the choices made regarding fuel resource utilisation can be seen. There was a very much mixed fuel economy in place in the years following settlement, a situation that remained throughout the occupational sequence but was accompanied by more pronounced dependence upon either peat or charcoal for industrial temperature activities as time went on. The initial period after settlement is characterised by the combined presence in thin section '1a' of evidence for turf burning, high temperature peat combustion and also that of charcoal, without any of these resources holding particular dominance. This is a situation that was maintained down to the first part of thin section '2', which, along with the top part of thin section '1', is closely associated with the Cal AD 1035±35 radiocarbon date. From part way up thin section '2' to the upper part of thin section '4' there emerges a clear dependence upon peat at both high and low temperature where it is of mixed prevalence along with turf. With the hiatus in activity in the stratigraphy provided by the thick gravel layer comes a change whereby peat and turf frequencies drop dramatically in thin sections '5' and '6', giving way to extensive use of charcoal which is particularly correlated with the Cal AD 1220±35 radiocarbon date. Beyond thin section '6' and throughout the remaining thin sections the dominant fuel used returns to peat, which appears to have been burned at high temperature for the most part. How far beyond the mid-thirteenth century thin sections '7' and '8' represent is impossible to say. However, the close proximity in the stratigraphy of thin section '7' to the location from where the Betula charcoal was removed for dating as well as the continued presence of significant amount of fuel residues in thin sections '7' and '8' suggests that the marginal situation described in *Jarðabók* is not represented.

Conclusions

It is difficult to make exact chronological references for changes in fuel practice, as soil accumulation is not directly correlated to the amount of time that passes. However, conclusions can be made with regards to changes between Cal AD 825±35 and Cal AD 1035±35 and those between Cal AD 1035±35 and Cal AD 1220±35. Beyond that it is impossible to make accurate judgements related to chronology, although attempts can be made to relate the upper thin sections to changes between Cal AD 1220±35 and the *Jarðabók* entry for 1710. There appears to have been a consistent mix of a range of fuel resources utilised from *landnám* into the early Norse period, before high temperature peat burning became the most prevalent type of combustion on the farm mound. This situation remained the same for a considerable length of time until, sometime prior to the mid-thirteenth century, wood charcoal made a noticeable return to prominence. This culminated in its highest levels of use appearing to be at almost exactly Cal AD 1220±35. There is a clear suggestion that the

kind of woodland preservation stipulated by *Grágás* and *Jónsbók* for the thirteenth century was employed at Vatnsfjörður concurrently to their coming into effect and quite possibly earlier. After all, there would have to have been a certain level of woodland preserved prior to such laws becoming established, otherwise they would have had no consequence at the site.

The ability of the inhabitants of Vatnsfjörður to respond to the changing availability and expediency of fuel resources, most notably peat and charcoal, is made clear by the recurring presence of such resources in the thin sections. By avoiding over-reliance on one specific fuel source throughout the settlement's history the inhabitants were clearly capable of utilising one resource when it was prevalent, allowing it to then recover before it was totally exhausted and returning to it when it became viable once more. Such patterns of use are decipherable for charcoal and most particularly peat. The use of subsidiary fuels such as turf and wood for low temperature burning most often characterised by domestic activities was an important part of the fuel economy on the farm mound at Vatnsfjörður, especially in the earliest phases of stratigraphic accumulation. It is perhaps unsurprising that the most successful sites of Icelandic Norse settlement, such as Vatnsfjörður and Hofstaðir, display evidence of such considered fuel resource utilisation as the carefully judged choices made by their chieftains and leaders were surely central to their positions of superiority. By making sensible decisions about what and when to burn resources, the inhabitants of Vatnsfjörður were able to help develop the success of the settlement despite environmental marginality. Over four hundred years' worth of industrial and domestic temperature burning of a range of natural fuel resources on the farm mound alone surely took a toll on the marginal landscape around Vatnsfjörður. That the farm maintained its high status in spite of this into the Medieval period is testament to the strategies of fuel resource management employed at the site, whether this relates to the conservation of resources at a local level or importation from elsewhere, a possibility that must be entertained for such a pre-eminent holding.

From here comparisons can now be made with the findings from the other sites under examination, using the micromorphological evidence presented here for Vatnsfjörður as a base model for fuel resource practices in areas of Norse Viking settlement. The data available from the excavations at Pool, Sanday has proved the most applicable for comparison and has been used most thoroughly in relation to that from Vatnsfjörður. Evidence from Bornais will be used to develop the wider picture of fuel exploitation in the Northern and Western Isles, giving an idea of some general expectations for fuel resource utilisation in the Norse Viking colonies. As a result, pertinent inferences for fuel procedures at Ribblehead have been made. At all the sites concerned, such inferences have been re-applied to the developing environmental and political situations so as to set the general conclusions into their local contexts.

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APPENDIX 1: REGISTER OF EXCAVATED UNITS

Units excavated in the Viking Age Area

Unit No	Area	Group No	Unit Type	Description
7157	14		Deposit	Red and black turf and gravel wall of Structure 7
7164	14		Deposit	Dark brown, organic floor layer in Structure 7
7172	14		Deposit	Paving stones in Structure 7
7181	14		Deposit	Paving stones in Structure 7
8000	23		Deposit	Reddish brown topsoil and aeolian silt
8001	23	8075	Deposit	Small spread of charcoal and burnt bone in [8000]
8002	23	8075	Deposit	Reddish/blackish brown turf collapse
8003	23	8075	Deposit	Stone deposit under [8000] in pit of NW corner
8004	23		Deposit	Small spread of turf, near test-trench 23
8005	23	8074	Deposit	Charcoal rich midden material (modern)
8006	23	8074	Deposit	Light brownish turf deposit (modern)
8007	23	8074	Deposit	Reddish brown aelion silt
8008	23	8074	Deposit	Stone dump in pit with ash, peat and charcoal
8009	14		Deposit	Stone, gravel and light brown silt spread on Structure 7
8010	23		Deposit	Equal to [8000] = extension of Area 23
8011	14		Deposit	Turf collapse at north of Structure 7
8012	23	8074	Deposit	Stone dump in pit
8013	23	8075	Deposit	Stone deposit in the pit of NW corner
8014	14		Deposit	Turf collapse on northwest corner of Structure 7
8015	23		Deposit	Spread of collapse with stones, on top of western wall?
8016	23		Deposit	Turf collapse (wall?)
8017	23	8074	Deposit	Charcoal deposit under [8012], possibly at bottom of pit
8018	14		Deposit	Red and black turf collapse in north of Structure 7
8019	23	8074	Cut	Cut of possible cooking pit, west side of Area 23
8020	14		Deposit	Gravel from collapse of south wall of Structure 7
8021	23	8075	Deposit	Charcoal layer under [8013], probably at the bottom of (cooking?) pit in western corner of Area 23
8022	23		Deposit	Dark brown turf collapse under [8016]
8023	14		Deposit	Dark red and black turf collapse on south side of Structure 7
8024	23		Deposit	Yellow brown turf collapse under [8022]
8025	23	8075	Cut	Cut for [8021], charcoal pit
8026	23		Deposit	Reddish brown turf collapse spread
8027	23		Deposit	Dark brown mixed spread in northern centre of Structure 8 under [8084]
8028	14		Deposit	Dark brown floor, under stone 1, Structure 7
8029	23		Deposit	Turf collapse layer in north of Structure 7
8030	14		Deposit	Turf collapse of south-wall, Structure 7
8031	14		Deposit	Flat stone, Structure 7
8032	23		Deposit	Turf collapse from eastern (?) wall
8033	14		Deposit	Turf collapse, Structure 7
8034	14		Deposit	Flag stone on floor of Structure 7

Unit No	Area	Group No	Unit Type	Description
8035	23		Deposit	Turf collapse - eastern wall?
8036	14		Deposit	Small charcoal spread under stone [8034], Structure 7
8037	23		Deposit	Charcoal spread, sheet midden, equal to [252]
8038	14		Deposit	Organic floor layer between stone pavement, Structure 7
8039	14		Deposit	Stone pavement of Structure 7
8040	23		Deposit	Turf collapse, eastern part of wall in Structure 8 [8035]
8041	14		Deposit	Clayey silt spread
8042	14		Deposit	Compact orange-brown silt
8043	14		Deposit	Stone pavement in the middle of Structure 7
8044	14		Deposit	Later phase of stone pavement in southwestern entrance of Structure 7
8045	14		Deposit	Silt spread, leveling layer between two paving phases
8046	23		Deposit	Turf collapse in centre of Structure 8
8047	14		Deposit	Spread of dark brown organic silt on south side of Structure 7
8048	26		Deposit	Turf deposit - possible turf wall?
8049	14		Deposit	Clayey silt accumulation against southwest entrance of Structure 7
8050	23		Cut	Cut in Structure 8
8051	23		Deposit	Wall - intact in Structure 8
8052	23		Deposit	Turf debris in northeast of Structure 8
8053	23		Deposit	Old land surface (A-Horizon?)
8054	30		Deposit	Very patchy and thin turf, peat ash and charcoal spread
8055	14		Deposit	White turf wall of Structure 7, below [7157]
8056	14		Deposit	Compact, organic, dark brown floor in Structure 7
8057	14		Deposit	Pale brown organic silt spread
8058	14		Deposit	Mixed red and white turf collapse outside south wall of Structure 7
8059	14		Deposit	Mixed red and white turf collapse inside south wall of Structure 7
8060	14		Deposit	Very compact medium brown floor in southwest corner of Structure 7
8061	14		Deposit	White turf, possible turf wall (?) in Structure 7
8062	14		Deposit	Soft red and pale brown silt
8063	14		Deposit	Stone pavement in southwestern entrance of Structure 7
8064	14		Deposit	Small charcoal patch, Structure 7
8065	14		Deposit	Grey ash layer under [7159], Structure 7
8066	14		Deposit	Mottled brown red and yellow silt spread on south-wall of Structure 7
8067	14		Deposit	Pale brown organic silt
8068	14		Deposit	White turf, probable wall
8069	14		Deposit	Charcoal spread
8070	14		Deposit	Medium brown silt and charcoal under [7157]
8071	31		Deposit	Charcoal spread, sheet midden?
8072	31		Deposit	Orangish-brownish red turf - collapse?
8073	23	8075	Deposit	Aelion silt with *in situ* H-1693 tephra
8074	23		Group	Fully excavated pit - Pit 1: cut and associated fills
8075	23		Group	Partly excavated pit - Pit 2: cut and associated fills

Units Excavated in the Farm Mound Area

Unit No	Area	Group	Structure	Type	Description/Information
8500	21			D	Topsoil
8501	21			D	Black cultural deposit
8502	21			D	Ash, charcoal, wood, with metallurgic slag, burnt and unburnt material
8503	21			D	Gravel layer
8504	21			D	Very dark brown deposit. Contemporary kitchen waste
8505	21			D	Mixed dark brown silty clay. Grey reddish ash with charcoal and chunks of coal.
8506	21			D	Charcoal layer with coal fragments
8507	21			D	Organic layer. Platy structure
8508	21			D	Dark grey tephra
8509	21			D	Dark reddish brown layer
8510	21			D	Very dark brown deposit. Contemporary kitchen waste
8511	21			D	Black charcoal deposit
8512	21			D	Very dark brown layer. (10y R 2/2)
8513	21			D	Very dark brown deposit. (7.5y R)
8514	21			D	Brown layer. (10y R 2/2)
8515	21			D	Red and pale brown turf collapse
8516	21			D	Dark brown gravel
8517	21			D	Pebbles, charcoal, very pale brown lenses
8518	21			D	Dark brown layer with charcoal flakes.
8519	21			D	Very mixed layer with charcoal, turf and stone inclusions < 1%)
8520	21			D	Dark brown layer (7.5y R 2.5/3)
8521	21			D	Brown layer (7.5y R 4/4) with peat ash
8522	21			D	Peat ash deposit with bone fragments and charcoal
8523	21			D	Dark brown layer with charcoal fragments
8524	21			D	Very pale brown peat and gravel (ca. 30%) deposit
8525	21			D	Peat ash and charcoal above stream level
8526	21			D	Stream level - gravel.
8527	FM	8560	7500	D	Brown/orange fill/dump
8528	FM	8590	7500	D	Rooty greyish brown deposit - collapse or levelling layer?
8529	FM		7500	D	Mixed fill layer overlying midden in 890/220 and 885/220
8530	FM		7500	D	Paving? Flat stones concentrated
8531	FM	8590	7500	D	Bioturbated, brown silty layer on top of cleaner turf
8532	FM		7500	D	Midden layer with charcoal patches - fish bone dump. 885/220
8533	FM		7500	D	Mottled turf debris
8534	FM	8590	7500	D	Gravel mixed layer in northwest middle area
8535	FM		7500	C	Created by bioturbation?
8536	FM		7500	D	Turf layer. Collapse? Inside room? On top on paving stones?
8537	FM	8590	7500	D	Sandy deposit with charcoal. S-E corner of middle area,
8538	FM	8574	7500	D	Mottled turfy collapse
8539	FM	8574	7500	D	Red turf deposit on top of burnt layer
8540	FM		7500	D	Turf layer, collapse? On top of and including stone corridor?
8541	FM	8590	7500	D	Dark turfy deposit with orange patches
8542	FM		7500	D	Mottled layer with turf debris

Unit No	Area	Group	Structure	Type	Description/Information
8543	FM	8590	7500	C	Irregular oval cut (see fill [8534])
8544	FM	8563	7500	D	Turf debris
8545	FM	8574	7500	D	Mottled turf lump
8546	FM	8574	7500	D	Silty patch
8547	FM	8574	7500	D	Mottled dark turfy deposit
8548	FM		7500	D	Turf collapse with stones
8549	FM	8563	7500	D	Mixed layer of mixed material
8550	FM	8562	7500	D	Turf surrounding a pit which is filled with rubbish
8551	FM		7500	D	Rock structure supported (?) by turf block
8552	FM	8562	7500	D	Turf collapse west of rubbish dump
8553	FM		7500	D	Stone paving. Room/corridor?
8554	FM	8562	7500	D	Mixed turf and silt with charcoal deposit on top of dump
8555	FM		7500	D	Turf collapse and stones. In room/corridor?
8556	FM	8560	7500	D	Stone collapse
8557	FM	8563/ 8590	7500	D	Turf layer, probably collapse
8558	FM		7500	D	Turf collapse
8559	FM	8560	7500	D	Stone collapse
8560	FM	8560	7500	G	Group of stone collapse in west of ´middle´area
8561					DISCARDED
8562	FM	8562	7500	G	Group number for "midden-room"
8563	FM	8563	7500	G	Group number for "SW-house" and corridor
8564	FM	8563	7500	D	Turf patch similar to [8549]
8565	FM	8563	7500	D	Turf patch similar to [8549]
8566	FM	8562	7500	D	Turf, bones and wood ash midden deposit
8567	FM	8563	7500	D	Turf patch similar to [8549]
8568	FM	8563	7500	D	Turf patch similar to [8549]
8569	FM	8563/ 8590	7500	D	Mottled turf deposit between [8563] and middle area
8570	FM	8563/ 8590	7500	D	Reddish turf layer in [8563] and strectches into [8590]
8571	FM	8563	7500	D	Light brown deposit turf (patches)
8572	FM		7500	D	Twig layer
8573	FM	8563	7500	D	Light brown deposit
8574	FM	8574	7500	G	Possible Test-trench
8575	FM	8574	7500	D	Stones - possibly a structure
8576	FM	8574	7500	D	Concentration of birch twigs
8577	FM	8574	7500	D	Inside stones [8575] light and dry turf debris
8578	FM	8574	7500	D	West row of stones in Group [8574]
8579	FM		7500	D	Collapse and disturbed mottled layer with turf
8580	FM	8563	7500	D	Brown/orange organic layer
8581	FM	8574	7500	D	Brownish grey turf - yellowish light, quite organic
8582	FM	8563	7500	D	Brown turf collapse. Partly in room/corridor?
8583	FM	8562	7500	D	Mixed peat ash, turf and charcoal deposit
8584	FM		7500	D	Dark brown turf collapse. In room/corridor?
8585	FM		7500	D	Collapse and disturbed mottled layer with turf
8586	FM	8563/8 590	7500	D	Mottled turf layer. Sretches into [8590]
8587	FM		7500	D	Mottled disturbance layer and collapse
8588	FM	8562	7500	D	Turf collapse SW of midden room
8589	FM		7500	C	Cut after stone deposit/collapse removal
8590	FM	8590	7500	G	Group number for ´middle´area
8591	FM			F	Fill from 1906 house

Unit No	Area	Group	Structure	Type	Description/Information
8592	FM			C	Cut for 1906 house
8593	FM	8574	7500	C	Subrectangular cut

APPENDIX 2: REGISTER OF FINDS

Finds from the Viking Age Area

Find No	Unit No	Area	Object	Material	Dimensions (mm)	Qty Weight	Qty Count	Notes
1	8000	23	Pottery	Ceramic	L:25 ; W:10 ; Th: 4	0,81	1	19th/20th c
2	8000	23	Window	Glass		2,03	2	19th/20th c
3	8000	23	Vessel	Glass		9,05	5	19th/20th c
4	8000	23	Horse shoe	Iron	L:76 ; W:17-25 ; Th:10	31,74	1	1/3 fragment of horse shoe. Side fragment, two perforation.
5	8000	23	Handle?	Iron	L:78 ; W:8-18 ; Th.6	17,73	1	Handle? Broken in two conjoining pieces. Needs x-ray.
6	8000	23	Nail	Iron	Max.L:74 ; min.L:18	20,38	4	One machine made, 19th century. Other badly corroded.
7	8000	23	Rivet/rove	Iron	L:26 ; W:24 ; Th:5	4,25	1	Roughly trapezoid shaped rove. Badly corroded.
8	8001	23	Nail	Iron	L: 65	4,18	1	Complete wire nail, post 1880.
9	8001	23	Vessel	Glass		0,16	2	19th/20th c
10	8005	23		Iron	L:22 ; W: 21 ; Th:4	1,47	1	Small piece, bent in half circle. Sub-rectangular in cross-section (flat) tapering towards on end, the other broken.
11	8000	23	Bead	Glass	L:13 ; W:7 ; Th:5	0,78	1	A simple, blown bead of dark blue colour. The bead is well made with even surface and has clear, tortated ends. The bead is in good condition. It is of Callmer type E060. b) A simple, blown bead of dark blue colour
12	8073	23	Vessel	Glass	L:17 ; W:6 ; Th:3	0,53	1	19th/20th c
13	8005	23	Vessel	Glass		7,93	2	19th/20th c.
14	8005	23	Nail?	Iron	L: 28	0,63	1	Nail shank? Badly corroded.
15	8005	23	Fish hook	Iron	L: 45	1,17	1	Complete fish hook with a barb and possibly loop eye terminal. X-ray needed. 18mm across the bow.
16	8005	23	Wire	Iron	L: 81	2,04	1	Corroded snippet.
17	8005	23	Wire	Iron	L: 84	3,91	2	Folded wire. Badly corroded.
18	8005	23	Nail	Iron	L of both:39	5,7	2	Very corroded and misshapened nails.
19	8005	23	Stick	Plastic		105	1	Sun bleached orange/red plastic stick/' hair' . From a broom.
20	8005	23	Slag	Slag		11,03		Five pieces.
21	8007	23	Buckle?	Copper alloy	L:37 ; W:30 ; Th:2	3,26	1	Roughly D-shaped object, partly open on the straighter side. Subrectangular in cross-section (4x2mm). Very worn on one side. Possibly buckle or strap.
22	8006	23	Vessel	Glass	L:17 ; W:7 ; Th:3	0,73	1	19th/20th c
23	8006	23	Foil	Aluminium	L:13 ; W:8 ; Th:1	0,01	1	Fragment of crumbled alumium paper/foil. Candy paper.
24	8006	23	Discard	Discard	Discard			Shell skin. Discarded.
25	8016	23	Fitting?	Iron		17,07	2	Three conjoining pieces of a bar. Probably fitting of some sort. Needs x-ray. Rectangular in cross-section. Max.: 38x15x8mm, min.: 27x18x5mm
26	8020	14	Indet	Iron	L: 22	0,85	1	Small oblong fragment with one end flattened. Unidentifiable.
27	8006	23		Wood		6,31	10	Unidentifiable wood fragments. Max.: 32x30x12mm; min.: 13x10x9mm
28	8006	23	String	Textile	Max.L: 225 ; min.L:106	0,91	3	Nylon string/rope

Find No	Unit No	Area	Object	Material	Dimensions (mm)	Qty Weight	Qty Count	Notes
29	8006	23	String	Textile	Length:162	0,15	1	Nylon string/rope.
30	7157	14	Nail	Iron	L:19	0,61	1	Bent shank.
31	8038	14	Indet	Iron		0,82	3	Corroded and very small fragments. Max.: 13x9x2mm; min.: 9x7x5mm
32	8000	26	Vessel	Glass	L:26 ; W:26 ; Th:2	1,05	1	19th/20th c
33	8035	23	Bead	Glass	Dia:7 ; Th: 6	0,69	2	a) A simple, blown bead of dark blue colour. Well made with even surface and has clear, tortated endsþ Good condition, of Callmer type E060. b) A simple, blown bead of dark blue colour, Like that bead it is well made and has tortated ends that are slightly oblong. The bead is in good condition but on the surface there are fine lines and holes that have been filled up with earth. It is of Callmers type E060.
34	8071	31	Punch?	Iron	L:138 ; W:15 ; Th:12	28,42	1	a) Three cojoining pieces, total 97mm long. The object is broken at both ends and tapering. The cross section is roughly rounded at the broader end but oval at the other. Punch? Very corroded. b) Irregularly shaped, folded and broken iron fragment.
35	8001	23	Slag	Slag		8,25		Burnt bone attached. One piece.

Finds from the Farm Mound Area

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
001	8500	FM	Food waste	Bone			5 bags
002	8500	21	Food waste	Bone			1 bag
003	8502	21	Food waste	Bone			1bag
004	8503	21	Food waste	Bone			1bag
005	8504	21	Food waste	Bone			1 bag
006	8505	21	Food waste	Bone			1bag
007	8512	21	Food waste	Bone			1 sm bag
008	8513	21	Food waste	Bone			1 sm bag
009	8514	21	Food waste	Bone			1 sm bag
010	8517	21	Food waste	Bone			1 bone
011	8518	21	Food waste	Bone			1 bone
012	8519	21	Food waste	Bone			1 sm bag
013	8520	21	Food waste	Bone			1 sm bag
014	8522	21	Food waste	Bone			1 sm bag
015	8523	21	Food waste	Bone			1 bone
016	8528	FM	Food waste	Bone			2 sm bags
017	8529	FM	Food waste	Bone			2 sm bags
018	8530	FM	Food waste	Bone			1 sm bag
019	8532	FM	Food waste	Bone			1 bag
020	8534	FM	Food waste	Bone			1 bag
021	8500	FM	Object	Bone	Whalebone	148	1
022	8500	FM	Horse shoe	Metal	Iron	169	2
023	8500	FM	Drain fastener	Metal		241	1
024	8500	FM	Object	Metal	Iron	318	1
025	8500	FM	Nail	Metal	Iron	468	67
026	8500	FM	Rivet	Metal	Iron	25	2
027	8500	FM	Fish hook	Metal	Iron	15	5
028	8500	FM	Object	Metal	Iron	15	1
029	8500	FM	Slag	Slag		29	
030	8500	FM	Buckle	Metal	Iron	35	2
031	8500	FM	Vessel	Metal	Iron	82	1
032	8500	FM	Pottery	Ceramic		592	80
033	8500	FM	Clay pipe	Ceramic		34	12
034	8500	FM	Rivet	Metal		22	2
035	8500	FM	Lamp	Metal	Copper alloy	75	1
036	8500	FM	Knife	Composite	Iron, Wood	32	1
037	8500	FM	Rove	Metal	Copper alloy	1	1
038	8500	FM	Sheeting	Metal	Copper alloy	1	1
039	8500	FM	Object	Metal	Copper alloy	11	1
040	8500	FM	Thimble	Metal	Copper alloy	3	1
041	8500	FM	Stopper?	Composite	Cu-alloy, wood	8	1
042	8500	FM	Object	Bone	Whalebone	4	1
043	8500	FM	Hammer	Stone		1258	1
044	8500	FM	Roof tile	Stone	Slate	7	1
045	8500	FM	Whetstone	Carborundum		67	4
046	8500	FM	Whetstone	Stone	Schist	36	3
047	8500	FM	Belt	Leather		9	1
048	8500	FM	Tar paper	Tar paper		10	2
049	8500	FM	Drain	Ceramic		131	1
050	8500	FM	Window glass	Glass		185	45

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
051	8500	FM	Bottle	Glass		477	30
052	8500	FM	Vessel	Glass		23	2
053	8510	21	Nail	Metal	Iron	3	1
054	8519	21	Nail?	Metal	Iron	0	2
055	8527	FM	Pottery	Ceramic		6	1
056	8527	FM	Nail	Metal	Iron	15	1
057	8528	FM	Nail	Metal	Iron	148	15
058	8528	FM	Object	Metal	Iron	42	2
059	8528	FM	Staple	Metal	Iron	26	1
060	8528	FM	Vessel	Metal	Iron	443	1
061	8528	FM	Window glass	Glass		73	28
062	8528	FM	Vessel	Glass		7	5
063	8528	FM	Pottery	Ceramic		45	7
064	8528	FM	Clay pipe	Ceramic		4	1
065	8528	FM	Belt	Leather		53	4
066	8531	FM	Fish hook	Metal	Iron	3	1
067	8531	FM	Wire	Metal	Iron	9	3
068	8531	FM	Fitting	Metal	Iron	25	1
069	8531	FM	Nail	Metal	Iron	218	34
070	8531	FM	Window glass	Glass		54	17
071	8531	FM	Vessel	Glass		77	3
072	8531	FM	Pottery	Ceramic		124	37
073	8531	FM	Clay pipe	Ceramic		0	1
074	8531	FM	Coin	Metal	Copper alloy	5	1
075	8529	FM	Nail	Metal	Iron	75	19
076	8529	FM	Fish hook	Metal	Iron	3	1
077	8529	FM	Slag	Slag		4	
078	8529	FM	Window glass	Glass		18	13
079	8529	FM	Vessel	Glass		9	4
080	8529	FM	Pottery	Ceramic		35	7
081	8529	FM	Clay pipe	Ceramic		3	2
082	8529	FM	Button	Glass		0	1
083	8529	FM	Whetstone	Stone	Schist	13	2
084	8530	FM	Hammer	Stone	Basalt	1861	1
085	8534	FM	Stove rign	Metal	Iron	503	1
086	8534	FM	Nail	Metal	Iron	448	66
087	8534	FM	Stove lid	Metal	Iron	239	1
088	8534	FM	Object	Metal	Iron	101	1
089	8534	FM	Handle	Metal	Iron	87	1
090	8534	FM	Lid	Metal	Iron	623	2
091	8534	FM	Horse shoe	Metal	Iron	566	5
092	8534	FM	Object	Metal	Iron	189	1
093	8534	FM	Object	Metal	Iron	156	1
094	8534	FM	Object	Metal	Copper alloy	19	1
095	8534	FM	Window glass	Glass		222	45
096	8534	FM	Vessel	Glass		1362	104
097	8534	FM	Grinding stone	Stone		326	1
098	8534	FM	Drain pipe	Ceramic		1693	6
099	8534	FM	Object	Stone		239	1
100	8534	FM	Pottery	Ceramic		10	4
101	8534	FM	Harness	Composite	Leather, iron	16	1
102	8534	FM	Fragment	Leather		10	3
103	8534	FM	Belt/Strap	Leather		95	2

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
104	8534	FM	Textile	Textile		7	1
105	8534	FM	Stopper	Cork		2	1
106	8534	FM	Paint brush	Composite	Wood, hair	351	2
107	8536	FM	Manuport	Stone		1	8
108	8536	FM	Whetstone	Stone	Schist	1	17
109	8536	FM	Pottery	Ceramic		1	3
110	8536	FM	Clay pipe	Ceramic		0	1
111	8536	FM	Vessel	Glass		26	1
112	8536	FM	Window glass	Glass		4	1
113	8536	FM	Button	Metal	Copper alloy	0	1
114	8537	FM	Window glass	Glass		3	4
115	8537	FM	Pottery	Ceramic		0	5
116	8537	FM	Vessel	Glass		5	6
117	8537	FM	Clay pipe	Ceramic		6	2
118	8540	FM	Window glass	Glass		0	2
119	8540	FM	Vessel	Glass		10	2
120	8540	FM	Pottery	Ceramic		20	2
121	8540	FM	Manuport	Stone		0	1
122	8540	FM	Textile	Textile		59	5
123	8541	FM	Sheeting	Metal	Copper alloy	0	1
124	8541	FM	Lamp ring	Metal	Copper alloy	4	1
125	8541	FM	Slag	Slag		10	1
126	8541	FM	Object	Metal	Lead	24	3
127	8541	FM	Object	Metal	Lead	8	1
128	8541	FM	Fitting	Metal	Lead	14	1
129	8541	FM	Nail	Metal	Iron	385	40
130	8541	FM	Lid	Metal	Iron	111	1
131	8541	FM	Fish hook	Metal	Iron	5	2
132	8541	FM	Spigot handle	Metal	Iron	77	1
133	8541	FM	Object	Metal	Iron	75	4
134	8541	FM	Fitting	Metal	Iron	24	1
135	8541	FM	Object	Metal	Iron	34	1
136	8541	FM	Button	Metal		21	4
137	8541	FM	Object	Metal		4	1
138	8541	FM	Buckle	Composite		30	1
139	8541	FM	Knife	Metal		80	2
140	8541	FM	Window glass	Glass		342	54
141	8541	FM	Vessel	Glass		158	24
142	8541	FM	Object	Leather		111	6
143	8541	FM	Textile	Textile		3	13
144	8541	FM	Fish hammer	Stone		2521	3
145	Deleted	FM	Deleted	Deleted			
146	8541	FM	Brick	Ceramic		1416	1
147	Deleted	FM	Deleted	Deleted			
148	8541	FM	Whetstone	Stone		194	2
149	8541	FM	Manuport	Stone		4	2
150	8541	FM	Pottery	Ceramic		211	45
151	8541	FM	Clay pipe	Ceramic		50	12
152	8541	FM	Object	Wood		17	1
153	8541	FM	Object	Wood		12	1
154	8538	FM	Object	Wood		0	1
155	8541	FM	Cork	Cork		0	1
156	8544	FM	Nail	Metal	Iron	32	3

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
157	8544	FM	Rivet	Metal	Iron	2	2
158	8554	FM	Nail	Metal	Iron	54	4
159	8544	FM	Object	Metal	Iron	21	3
160	8544	FM	Knife	Metal	Iron	36	1
161	8544	FM	Brick	Ceramic		688	5
162	8544	FM	Pottery	Ceramic		20	2
163	8554	FM	Window glass	Glass		7	6
164	8554	FM	Vessel	Glass		17	8
165	8544	FM	Textile	Textile		51	4
166	8545	FM	Object	Leather		18	1
167	8545	FM	Stopper	Cork		4	1
168	8547	FM	Indterminate	Metal	Iron	4	2
169	8547	FM	Manuport	Stone	Jasper	4	1
170	8547	FM	Cork	Cork		30	1
171	8547	FM	Window glass	Glass		5	2
172	8547	FM	Wessel Glass	Glass		7	2
173	8547	FM	Clay figure	Stone	Red sandstone	13	1
174	8547	FM	Pottery	Ceramic		62	5
175	8548	FM	Clay pipe	Ceramic		7	6
176	8548	FM	Pottery	Ceramic		0	2
177	8548	FM	Window glass	Glass		10	7
178	8548	FM	Vessel	Glass		64	10
179	8548	FM	Nail	Metal	Iron	51	5
180	8548	FM	Object	Metal	Iron	7	2
181	8548	FM	Hinge	Metal	Copper alloy	3	1
182	8548	FM	Ornament	Metal		3	1
183	8548	FM	Shoe	Leather		159	1
184	8549	FM	Slag	Slag		7	1
185	8549	FM	Textile	Textile		22	4
186	8549	FM	Nail	Metal	Iron	20	2
187	8550	FM	Saddle	Metal	Iron	125	1
188	8552	FM	Window glass	Glass		0	1
189	8552	FM	Pottery	Ceramic		0	2
190	8553	FM	Pottery	Ceramic		0	2
191	8553	FM	Nail	Metal	Iron	4	1
192	8553	FM	Vessel	Glass		0	1
193	8553	FM	Window glass	Glass		0	1
194	8554	FM	Wire	Metal	Iron	0	1
195	8554	FM	Textile	Textile		2	1
196	8555	FM	Nail	Metal	Iron	30	10
197	8555	FM	Coin	Metal	Copper alloy	0	1
198	8555	FM	Button	Metal	Copper alloy	0	1
199	8555	FM	Fitting	Metal	Iron	0	1
200	8555	FM	Vessel	Glass		0	3
201	8555	FM	Window glass	Glass		19	16
202	8555	FM	Pottery	Ceramic		4	9
203	8556	FM	Pottery	Ceramic		8	3
204	8556	FM	Vessel	Glass		2	3
205	8556	FM	Window glass	Glass		2	2
206	8566	FM	Knife	Metal	Iron	74	1
207	8567	FM	Pottery	Ceramic		0	2
208	8569	FM	Nail	Metal	Iron	5	1

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
209	8571	FM	Brick	Ceramic		689	10
210	8573	FM	Nail	Metal	Iron	29	5
211	8537	FM	Food waste	Bone			2 bags
212	8548	FM	Food waste	Bone			1 bag
213	8544	FM	Food waste	Bone			1 bag
214	8532	FM	Food waste	Bone			3 bags
215	8554	FM	Food waste	Bone			3 bags
216	8541	FM	Food waste	Bone			1 bag
217	8549	FM	Food waste	Bone			1 bag
218	8552	FM	Food waste	Bone			1 bag
219	Unstratified	FM	Food waste	Bone			2 bags
220	8566	FM	Food waste	Bone			18 bags
221	8583	FM	Food waste	Bone			7 bags
222	8556	FM	Food waste	Bone			1 bag
223	8559	FM	Food waste	Bone			1bag
224	8567	FM	Food waste	Bone			1 bag
225	8573	FM	Food waste	Bone			1 bag
226	8579	FM	Food waste	Bone			1sm bag
227	8582?	FM	Food waste	Bone			1 sm bag
228	8585	FM	Food waste	Bone			1 bag
229	8588	FM	Food waste	Bone			1 bag
230	8579	FM	Strip	Metal	Copper alloy	1	1
231	8581	FM	Shoe	Leather		211	1
232	8582	FM	Textile	Textile		17	2
233	8585	FM	Textile	Textile		72	1
234	8559	FM	Textile	Textile		16	3
235	8534	FM	Brick	Ceramic		2495	4
236	8534	FM	Object	Metal	Iron	491	1
237	8534	FM	Object	Metal	Iron	166	1
238	8534	FM	Object	Metal	Iron	598	1
239	8535	FM	Hammer	Stone		xxxx	1
240	8534	FM	Object	Metal	Iron	843	1
241	8534	FM	Socket	Metal	Iron	331	1
242	8534	FM	Screw	Metal	Copper alloy	31	2
243	8537	FM	Knife	Metal	Iron	7	1
244	8537	FM	Object	Metal	Iron	858	1
245	8537	FM	Nail	Metal	Iron	601	124
246	8537	FM	Object	Metal	Iron	291	1
247	8537	FM	Rove	Metal	Iron	10	1
248	8537	FM	Pot	Metal	Iron	51	1
249	8537	FM	Object	Metal	Iron	63	1
250	8537	FM	Horse shoe	Metal	Iron	150	1
251	8537	FM	Slag	Slag		804	
252	8537	FM	Object	Metal	Iron	16	4
253	8538	FM	Fitting	Metal	Iron	49	1
254	8550	FM	Fitting	Composite		1	1
255	8550	FM	Nail	Metal	Iron	20	1
256	8550	FM	Nail	Metal	Iron	78	6
257	8541	FM	Stove	Metal	Iron	628	1
258	8530	FM	Nail	Metal	Iron	5	1
259	8530	FM	Bead	Amber		0	1
260	8530	FM	Vessel	Glass		12	4
261	8530	FM	Clay pipe	Ceramic		0	1

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
262	8530	FM	Pottery	Ceramic		37	6
263	8530	FM	Window glass	Glass		0	1
264	8530	FM	Object	Stone	Flint	8	2
265	8540	FM	Nail	Metal	Iron	10	1
266	8540	FM	Whetstone	Stone	Schist	18	1
267	8540	FM	Button	Metal	Copper alloy	0	1
268	8573	FM	Hammer	Stone	Basalt	xxxx	1
269	8576	FM	Clay pipe	Ceramic		9	3
270	8576	FM	Object	Ceramic		24	2
271	8576	FM	Window glass	Glass		0	1
272	8576	FM	Lamp?	Stone	Red sandstone	4	3
273	8581	FM	Object	Wood		23	1
274	8500	FM	Manuport	Stone	Jasper	0	1
275	8532	FM	Pottery	Ceramic		0	1
276	8532	FM	Nail	Metal	Iron	47	10
277	8532	FM	Hinge?	Metal	Iron	24	1
278	8532	FM	Window glass	Glass		4	2
279	8532	FM	Vessel	Glass		3	1
280	8532	FM	Object	Metal	Copper alloy	0	1
281	8556	FM	Nail	Metal	Iron	25	4
282	8556	FM	Slag	Slag		23	X
283	8556	FM	Fish hook	Metal	Iron	8	1
284	8556	FM	Whetstone	Stone	Schist	12	2
285	8556	FM	Wire	Metal	Iron	142	6
286	8548	FM	Lump	Metal	Iron	106	1
287	8548	FM	Lid	Metal	Iron	228	1
288	8558	FM	Window glass	Glass		13	12
289	8558	FM	Clay pipe	Ceramic		4	1
290	8558	FM	Pottery	Ceramic		10	4
291	8566	FM	Nail	Metal	Iron	33	6
292	8566	FM	Lump	Metal	Iron	101	1
293	8566	FM	Lamp?	Stone	Red sandstone	77	1
294	8566	FM	Vessel	Glass		40	3
295	8577	FM	Vessel	Glass		11	1
296	8581	FM	Vessel	Glass		1	1
297	8581	FM	Window glass	Glass		11	5
298	8581	FM	Clay pipe	Ceramic		8	3
299	8581	FM	Pottery	Ceramic		9	2
300	8582	FM	Nail	Metal	Iron	19	1
301	8582	FM	Lump	Metal	Iron	124	1
302	8583	FM	Button	Metal	Lead	4	1
303	8583	FM	Nail	Metal	Iron	53	10
304	8583	FM	Rivet	Metal	Iron	21	3
305	8583	FM	Vessel	Glass		99	19
306	8584	FM	Vessel	Glass		23	5
307	8584	FM	Pottery	Ceramic		0	1
308	8584	FM	Window glass	Glass		0	2
309	8586	FM	Pottery	Ceramic		40	2
310	8586	FM	Vessel	Glass		68	3
311	8586	FM	Window glass	Glass		0	1
312	8587	FM	Vessel	Glass		27	1

Find No	Unit	Area	Object	Material	Submaterial	Qty Weight (g)	Qty Count
313	8587	FM	Window glass	Glass		6	2
314	8587	FM	Pottery	Ceramic		18	3
315	8585	FM	Button	Metal	Iron	0	1
316	8585	FM	Button	Wood		0	1
317	8585	FM	Fish hook	Metal	Iron	4	1
318	8585	FM	Nail	Metal	Iron	53	5
319	8585	FM	Clay pipe	Ceramic		60	18
320	8585	FM	Pottery	Ceramic		135	31
321	8585	FM	Vessel	Glass		151	25
322	8585	FM	Window glass	Glass		34	13
323	8585	FM	Vessel	Metal	Iron	103	1
324	8585	FM	Whetstone	Stone	Schist	47	1
325	8585	FM	Slag	Slag		33	x
326	8585	FM	Fragment	Metal	Iron	0	1
327	8585	FM	Object	Wood		0	1
328	8585	FM	Textile	Textile		12	5
329	8585	FM	Textile	Textile		12	1
330	8585	FM	Object	Leather		5	1
331	8588	FM	Clay pipe	Ceramic		8	1
332	8588	FM	Linoleum	Linoleum		0	1
333	8588	FM	Button	Glass		0	1
334	8588	FM	Window glass	Glass		25	6
335	8588	FM	Vessel	Glass		19	2
336	8588	FM	Rivet	Metal	Iron	32	1
337	8588	FM	Pottery	Ceramic		10	5
338	8588	FM	Fish hook	Metal	Iron	4	1
339	8588	FM	Nail	Metal	Iron	28	5
340	Unstratified	FM	Shoe	Rubber		60	1
341	8582	FM	Food waste	Bone			1

APPENDIX 3: REGISTER OF BONES

Bones from the Viking Age Area

Bone No	Area No	Unit No	Quantity of Bags	Description
1	23	8001	1	Bone fragments
2	23	8002	1	Bone fragments, medium preservation
3	23	8000	1	Burnt bone fragments
4	23	8005	1	Medium to poor preserved burnt bone fragments
5	23	8005	1	Bone fragments from sieving
6	14	8009	1	Bone and tooth fragments
7	23	8006	1	Bone fragments
8	23	8000	1	Bone fragments from cleaning
9	23	8013	1	Burnt bone fragments
10	23	8012	1	Teeth
11	23	8012	1	Burnt bone fragments
12	23	8017	1	Burnt bone fragments
13	23	8016	1	Piece of animal teeth
14	23	8053	1	Tooth fragment, sheep?
15	23	8046	1	Tooth fragment, pig?
16	14	8030	1	Burnt bone fragments
17	23	6129	1	Teeth fragments
18	14	8038	1	Fish bone inclusive vertebra
19	14	8038	1	Tooth enemel
20	14	8041	1	Bone fragment - vertebra
21	14	8042	1	Bone fragments
22	23	8037	1	Burnt bone fragments
23	14	8047	1	Bone fragments
24	14	8056	1	Bone fragments
25	14	8056	1	Burnt bone fragments

NB. Bones from the Farm Mound Area have been registered as finds, and can be found in Appendix 2.

APPENDIX 4: REGISTER OF SAMPLES

Samples from the Viking Age Area

Sample No	Area No	Unit No	Grid	Sample Type	No of Bags/ Buckets	Description
1	23	8001			1	Charcoal for identification
2	23	8002			1	Seed for identification
3	23	8004			1	Wood for identification
4	23	8012	930/315	Bulk	1	Archaeoentomological sample
5	23	8012	930/315	Bulk	1	Flotation
6	23	8017	930/315	Bulk	1	Flotation
7	14	8018	890/310		1	Large piece of charcoal
8	14	8018			1	Large piece of charcoal
9	23	8013	930/330	Bulk	1	Flotation
10	23	8021	930/330	Bulk	9	Flotation
11	23	8021	930/330		1	Large charcoal twig for identification and possible dating?
12	23	8021	930/330		1	Charcoal chunks for identification
13	23	8027	940/325	Bulk	1	Very organic deposit - collapse or occupation layer?
14	14	7164	894,14/309,72	Block	1	Micromorphological sample - for storage
15	14	7164	894,04/309,80	Block	1	Micromorphological sample - for thin sectioning
16	14	7164	890/305	Bulk	1	Archaeoentomological sample
17	14	7164	893,20/307,92	Bulk	1	Archaeoentomological sample
18	14	7164	892,88/308,30	Block	1	Micromorphological sample - for storage
19	14	7164	892,8/309	Bulk	1	Archaeoentomological sample
20	14	7164	893,05/308,35	Block	1	Micromorphological sample - for thin sectioning
21	14	7164	892,76/309,20	Block	1	Micromorphological sample - for thin sectioning
22	14	7164	892,10/309,22	Block	1	Micromorphological sample - for storage
23	14	7164	894,50/307,90	Block	1	Micromorphological sample - to section
24	14	7164	894,40/307,80	Bulk	1	Archaeoentomological sample, close to S-23
25	14	7008		Bulk	1	Tephra sample for chemical investigations
26	14	7164	894,04/309,30	Bulk	1	Chemical sample, close to S-15
27	14	7164	894,50/307,90	Bulk	1	Chemical sample, close to S-23
28	14	7164	892,88/308,30	Bulk	1	Chemical sample, close to S-18
29	14	7164	892,26/309,20	Bulk	1	Chemical sample, close to S-21
30	14	7157		Bulk	1	Geochemical sample - east corner of Structure 7-wall

Sample No	Area No	Unit No	Grid	Sample Type	No of Bags/ Buckets	Description
31	14	7157		Bulk	1	Geochemical sample - north corner of Structure 7-wall
32	14	7157		Bulk	1	Geochemical sample - west corner of Structure 7-wall
33	14	7157		Bulk	1	Geochemical sample - south corner of Structure 7-wall
34	14	7001		Bulk	1	Geochemical sample - aeolian below [7008], 46 cm below surface
35	14	7001		Bulk	1	Geochemical sample - aeolian below [7008], 45 cm below surface
36	14	7001		Bulk	1	Geochemical sample - aeolian below [7008], 41 cm below surface
37	14	7164		Bulk	2	Flotation - floor under eastern most paving stone 1
38	23	6129		Bulk	12	Flotation - sheet midden north of Structure 2 (Area 2)
40	23	0			1	Tephra ~1693, for identification
41	14	8036		Bulk	1	Flotation
42	14	8038			1	Charcoal for identification
43	23	8037		Bulk	15	Flotation - sheet midden/charcoal spread equal to [252]
44	25	0		Block	1	Micromorphological sample of peat
45	25	0		Block	1	Micromorphological sample of wall
46	25	0		Block	1	Micromorphological sample of soil east of wall
47	14	8041			1	Charcoal for identification
48	14	8047			1	Charcoal for identification
49	23	8037			1	Charcoal for identification
50	23	8016			1	Charcoal for identification
51	23	8046			1	Charcoal for identification
52	23	8016			1	Chemical sample
53	14	8065			1	Charred oyster and shell fragments
54	27	0		Block	1	Micromorphological sample - grey silt for soil test pit
55	27	0		Bulk	1	Soil - 15 cm below surface
56	27	0		Bulk	1	Soil - 31 cm below surface
57	27	0		Bulk	1	Soil - 47 cm below surface
58	27	0		Bulk	1	Soil - 55 cm below surface
59	25	0			1	Below peat - west of wall, to extract charcoal for C14-dating
60	25	0			1	Below turf wall - to extract charcoal for C14-dating

Samples from the Farm Mound Area

Sample No	Area	Unit No	Grid	Volume (L)	No of bags/ buckets	Description
1	21	8505		100 ml	1 small bag	Grey ash layer
2	21	8505		100 ml	1 small bag	Reddish ash layer
3	21	8506		10	1 bucket	Charcoal layer
4	21	8508		10-20 ml	1 small bag	Dark grey tephra
5	21	8511		6,5	1 bucket	Black charcoal
6	21	8513			1 bucket	Black charcoal
7	21	8518			1 bucket	Dark brown deposit
8	21	8521		9	1 bucket	Brown peat ash
9	21	8522		6	1 bucket	Dark brown peat ash with coal and charcoal
10	21	8525			2 medium bags	Dark peat and ash above stream level
11	FM	Under 8500 in turf wall			1 small bag	Archaeobotany
12	FM	Under 8500 in turf wall			1 small bag	Archaeobotany
13	FM	8554		4	1 bag	Insects
14	FM	8566		4	1 bag	Insects
15	FM	8566		10	1 bucket	Archaeobotany
16	FM	8576		0,5	1 big bag	Birch twigs. For ID
17	FM	8583			1 bag	Insects
18	FM	8587			1 bag	Seeds. For ID