Hegranes Settlement Survey. Interim Report on Fieldwork at Vatnskot, Beingarður, Hamar and Rein in the summer 2017

Douglas J. Bolender
John M. Steinberg
Brian Damiata
Guðný Zoëga

6/16/2018

Picture on front page – Drone photo over Svanavatn, looking southwest (Photo credit: John Schoenfelder).

Douglas J Bolender, John Steinberg, Brian Damiata, and Guðný Zoëga
Byggðasafn Skagfirðinga/Fiske Center for Archaeological Research, UMass Boston
BSK-2018-207 / SCASS-2018-21
2018

Acknowledgements

We are greatly indebted to the farmers in Hegranes who allowed us to core and excavate on their farms, and were incredibly kind and helpful throughout. Specifically, we thank the farmers at Keflavík (Jóhann Már Jóhannsson and Þórey Jóndóttir), at Garður (Jón Sigurjónsson), at Ás 1 (Guðriður Valtýsdóttir and Jón Gunnar Magnússon), at Ás 2 (Einar Valur Valgarðsson and Bjarney Anna Björnsdóttir), at Ríp (Birgir Þórðarson and Ragnheiður Hrefna), at Hamar (Sævar Einarsson), at Keta (Ingibjörg Jóhannesdóttir and Símon Traustason), at Keldudalur (Þórarinn Leifsson and Guðrún Lárusdóttir), at Egg and Rein (Embla Dóra Björnsdóttir and Davíð Logi Jónsson), at Helluland and Ásgrímsstaðir (Sigurbjörg Rögnvaldsdóttir and Ólafur Jónsson), at Utanverðunes (Heiðbjört Pálsdóttir and Mikael Leo Brennan), and the kind families who own Hróarsdalur who all allowed us to excavate test pits on their land,. We thank all our collaborators and those who supported us in any way.

A team of 24 archaeologists and other specialists worked on the various dimensions of the survey: coring, geophysical survey, and excavation. The principal investigators are John Steinberg, Douglas Bolender, Guðný Zoëga and Brian Damiata, and; the senior specialists include Maarten Blaauw, Kathryn Catlin, Lísabet Guðmundsdóttir, Margrét Hrönn Hallmundsdóttir, Kimmarie Murphy, Stephen Albert Mrozowski, Rita Shepard, John Schoenfelder, Josiah Wagener, Bryndís Zoëga; and, of course, we are very grateful to the team of student archaeologists without which this work could not be achieved: Aileen Balasalle, Grace Cesario, Eric Johnson, Annie Greco, Leigh Koszarsky, Laura Marques-Jackson, Jared Muehlbauer, Lauren Welch O'Connor, Alicia Sawyer, Katherine Wagner, and Nicholas Zeitlin,.

General permits for the survey of Hegranes and associated excavations were granted by The Cultural Heritage Agency of Iceland (MÍ201306-0030, MÍ201306-0040, MÍ201606-0051, & MÍ201606-0065). The National Museum of Iceland granted artifact catalogue number 2016-41. The work was supported by the US National Science Foundation (PLR # 1242829, 1345066, 1417772 & 1523025) in a joint project of the Skagafjörður Heritage Museum (Byggðasafn Skagfirðinga) and UMass Boston. The Icelandic Archaeology Fund (Fornminjasjóður) also supplied significant support for the project. We are grateful to the Skagafjörður Commune for their ongoing and invaluable support. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the individuals and institutions who support this work.

Skagafjörður Heritage Museum

The Skagafjörður Heritage Museum is a center for research on local history and cultural heritage in the Skagafjörður region, North Iceland. It is affiliated with the National Museum of Iceland and its main exhibition at the old turf farm of Glaumbær is one of the most visited national heritage tourist attractions. The Archaeological Department of the museum was established in 2003 and engages in contract and research driven archaeology both within and outside the region. The core long-term research programs center on fundamental issues surrounding the settlement and early medieval church history of Skagafjörður and the North-Atlantic region with a focus on developing methodological and theoretical approaches to the geography of early Christian cemeteries. The department is involved in multifaceted interdisciplinary collaboration with Icelandic and international institutions and specialists. Its research portfolio includes bioarchaeology, early metal production, settlement studies, as well as the methodological aspects of archaeological surveying.

Fiske Center for Archaeological Research

The Andrew Fiske Memorial Center for Archaeological Research at the University of Massachusetts Boston was established in 1999 through the generosity of the late Alice Fiske and her family as a living memorial to her late husband Andrew. As an international leader in interdisciplinary research, the Fiske Center promotes a

vision of archaeology as a multi-faceted, theoretically rigorous field that integrates a variety of analytical perspectives into its studies of the cultural and biological dimensions of colonization, urbanization, and industrialization that have occurred over the past one thousand years in the Americas and the Atlantic World. As part of a public university, the Fiske Center maintains a program of local archaeology with a special emphasis on research that meets the needs of cities, towns, and Tribal Nations in New England and the greater Northeast. The Fiske Center also seeks to understand the local as part of a broader Atlantic World.

Skagafjörður Church and Settlement Survey (SCASS)

The Skagafjörður Church and Settlement Survey (SCASS) seeks to determine if the settlement pattern of the 9th-century colonization of Iceland affected the development of the religious and economic institutions that dominated the 14th century. The research builds on the combined methods of two projects, the Skagafjörður Archaeological Settlement Survey and the Skagafjörður Church Project. One has focused on Viking Age settlement patterns. The other has been investigating the changing geography of early Christian cemeteries. Together, the research seeks to understand the connections between the Viking settlement hierarchy and the Christian consolidation.

Fornbýli Landscape and Archaeological Survey on Hegranes (FLASH)

The *Fornbýli* Landscape and Archaeological Survey on Hegranes (FLASH) project investigates ruined structures and sites (*fornbýli*) located on the environmental and social margins of the modern farm properties. This research complements the work of SCASS by seeking to understand the role of smaller, marginal settlements in the political economy of the region, especially the effects of anthropogenic environmental and landscape change on the establishment, abandonment, and reuse of these sites. The project is led by Kathryn Catlin as part of her doctoral dissertation in Anthropology at Northwestern University.

Contents

Figures

Summary

On Hegranes, in Skagafjörður, Northwest Iceland, four farms were investigated in 2017 with a program of cores and test excavations in order to estimate farmstead size and establishment date. This project is part of the larger Skagafjörður Church and Settlement Survey (SCASS) and over 3 years all the farms on Hegranes will be surveyed. The four farms were Vatnskot, Beingarður, Hamar, and Rein. Using the H1 tephra (AD 1104), as a horizon marker, the largest farmstead was Hamar (4,400 m^2), followed by Vatnskot (3,500 m^2), Beingarður (1,100 m^2), and Rein (900 m^2), which is the smallest farmstead associated with a known farm site that we have measured in either Hegranes or in Langholt. Vatnskot was the oldest farm, likely established in the mid-10th century whereas the other farms – Rein, Beingarður, and Hamar – all appear to have been established close to A.D. 1000.

Útdráttur

Sumarið 2017 fóru fram fornleifarannsóknir á fjorgur jörðum í Hegranesi í Skagafirði. Rannsóknirnar voru í formi ítarlegrar könnunar með töku kjarnabora og könnunarskurða og var ætlunin að kanna aldur jarða og stærð þeirra í upphafi. Rannsóknirnar voru hluti af stærra rannsóknarverkefni, Skagfirsku kirkju- og byggðasögurannsókninni þar sem allar jarðir í Hegranesi verða kannaðar með tilliti til aldurs og byggðaþróunar. Jarðirnar fjorgur voru Vatnskot (Svanavatn), Beingarður, Hamar, or Rein. Gjóska úr Heklu sem féll 1104 e.Kr. var notað sem leiðarlag varðandi skilgreiningu á elstu byggð. Hamar reyndist stærsta jörðin fyrir gjóskufallið (alls 4.400 m^2), næsta var Vatnskot (3.500 m^2), Beingarður (1,100 m^2), og Rein (900 m^2), sem var minnsti býli í Hegranesi og Langholti. Vatnskot var elsta jörðin, jafnframt byggð um miðjan 10. Aldar en hin bæir – Rein, Beingarður, og Hamar – var byggð um A.D. 1000.

Introduction

In 2014 a joint project of the Skagafjörður Heritage Museum and the University of Massachusetts Boston, called the Skagafjörður Church and Settlement Survey (SCASS) received a grant from the Division of Polar Programs (PLR) of the National Science Foundation (NSF). The aim of the project is to systematically survey for the oldest settlement and church history in the area of Hegranes, a rocky promontory in the middle of the Skagafjörður valley in North Iceland. The area is well suited for study as it is geographically distinct and there is evidence for possible cemeteries at nine of the dozen original settlement farms. The primary objectives of the settlement survey are to identify all farmsteads in the Hegranes region, establish their earliest date of occupation, and to measure their extent at different periods in history.

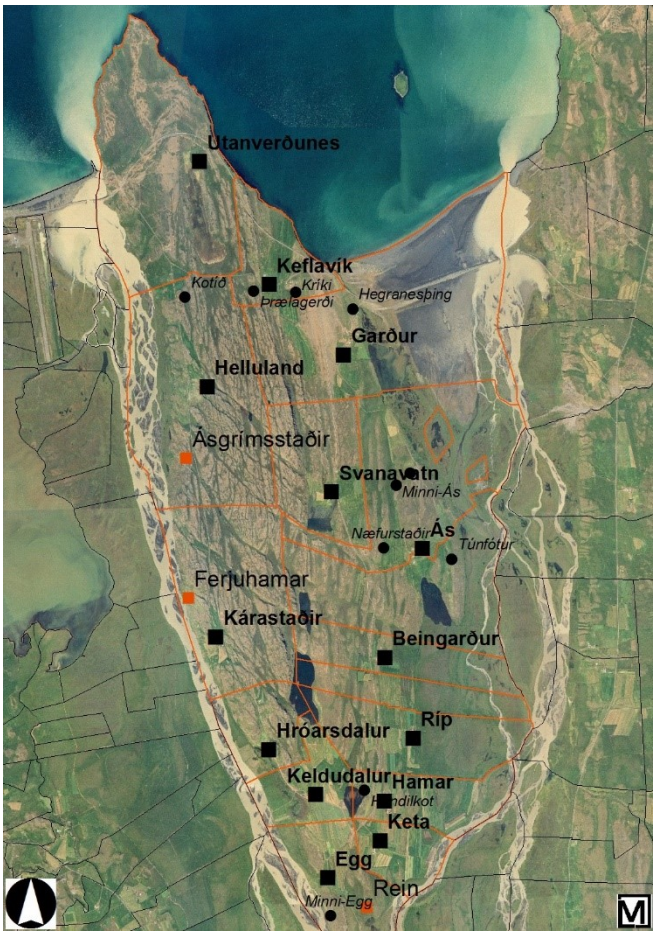

Figure 1. Hegranes overview and location of survey farms with modern property boundaries.

The summer of 2017 was the last of three planned years of intensive survey of farmsteads in the Hegranes region. In 2015, five farms were investigated: Ás, Garður, Hróarsdalur, Keflavík, and Keldudalur. In 2016, nine additional farms were surveyed: Egg, Rein, Keta, Hamar, Ríp, Hegranesþing (Litla-Garður), Utanverðunes, Helluland, and Ásgrímsstaðir (*Figure 1*). In 2017, Vatnskot and Beingarður were surveyed. Additional coring and excavation was conducted at Hamar, which we were unable to complete during the 2016 field season due to a barley crop on the field immediately east of the main farm buildings. Additonal coring was conducted at 7 farms to systematically cover the region within 350 m of the main farmstead: Ásgrímsstaðir, Helluland, Utanverðunes, Keflavík, Vatnskot, Ás, and Rein. At Rein coring also defined the area of the early modern reoccupation of the site. The survey field season started on the 5th of July and finished on the 13th of August, 2017.

Primary objectives for 2017 field season were:

1. Identify buried or abandoned areas of past domestic occupation and farm activity.
2. Estimate the extent of farmstead deposits at each farm during three periods of occupation: pre-1104 A.D., 1104-1300 A.D., and post-1300 A.D.
3. Identify and date the earliest occupational deposits at each farmstead.
4. Identify early Christian household cemeteries associated with the farms.
5. Investigate the history of changing patterns of farm and cemetery distribution in relationship to the institutionalization of secular power and the Catholic Church in Iceland.

Icelandic farmsteads and settlement survey

Icelandic farms are dispersed throughout the habitable coastal and lowland areas and interior valleys of the island. Historically, farms consisted of a central concentration of turf structures, the immediately surrounding infields, the outfields, pastures, and other resource locations that were owned by a specific farmer (Amorosi, et al. 1998; Urbańczyk 1999). Most farms also

relied on extensive grazing lands that were communally owned and managed. During the summer, livestock were moved to the communal pastures while grass was grown in intensified homefields and outfield areas to produce winter fodder (Friðriksson 1972).

There were also productive activities that took place well away from the main farmstead, for example summertime dairy production at shielings, turf cutting, charcoal production, bog iron ore collection, and fishing (Brown, et al. 2012; Lucas 2008; Sveinbjarnardóttir 1991; Vickers and Sveinbjarnardottir 2013).

Comprised of dispersed infrastructure, lands, and resource rights, the farm is difficult to identify archaeologically and for this reason the survey is primarily focused on the **farmstead** rather than the **farm** as a whole. The farmstead is the central concentration of farm buildings, including the central domestic buildings, barns, and other ancillary structures (Lucas 2009; Milek 2006; Ólafsson and Ágústsson 2004; Vésteinsson 2004). The location of Icelandic farmsteads could be stable and often results in significant concentrations of built up turf and midden material (primarily ash) referred to as farm mounds (Vésteinsson 2010). Many farm mounds have been occupied since the initial settlement of Iceland over a millennium ago. While these are readily identifiable in the landscape (most are still occupied today), the earlier horizons are usually covered by later occupations making them difficult to access. Farmsteads that were occupied for shorter periods, either because the farm was abandoned or because the farmstead was relocated to a new spot on the same farm (Bolender, et al. 2011), are often visible on the surface but in areas with significant soil accumulation can be buried and difficult to identify using traditional surface survey methods.

Hegranes

Hegranes is a low, rocky region situated in the middle of the Skagafjörður valley bottom. It is currently separated from the rest of the valley by the glacial rivers of Héraðsvötn which flow on both its west and east sides. The northern end projects as a low headland in to the fjord. Today, much of the region is exposed rock and heathland. Although it is clear that the environment was impacted by human settlement and subsequent land use the nature and extent of the alternations is currently unclear. There is evidence of localized patterns of soil erosion and deposition as well as wetland formation. According to the Jarðabók Árna Magnússonar (Magnússon and Vídalín 1930), Hegranes had 12 principal farms: Keflavík, Garður, Ás, Ríp, Hamar, Keta, Egg, Keldudalur, Hróarsdalur, Kárastaðir, Helluland, and Utanverðunes, and many smaller subfarms and cottages. It also records two abandoned farms, Ferjuhamar, Ásgrímsstaðir, which are mentioned in other earlier sources. All but two of the large farms (Ásgrímsstaðir and Ferjuhamar) continue to be occupied today. Hegranes is unusual for its historical and archaeological evidence for a large number of household churches and cemeteries. Nine of the farms have some evidence pointing to the presence of an early church or cemetery including, Ríp, Keldudalur, Ferjuhamar, Ásgrímsstaðir, Helluland, Utanverðunes, Keflavík, Garður (Hegranesþing), and Ás (Sigurðardóttir 2012). The discovery of the previously undocumented early Christian cemeteries at Keldudalur in 2002 (Zoëga 2015) and at Keflavík (Zoëga, et al. 2015) has raised the question of how many of the other farms may have had cemeteries.

Survey Methodology

The survey utilizes cores to identify buried farmsteads and to map the extent of known and newly discovered farmsteads over time. Small test excavations, usually 1x1 meter or 1x2 meters, are carefully placed in the oldest, well-preserved sections of middens to collect soil samples for flotation and tephra identification. Tephrochronology and radiocarbon dates from preserved organics (preferably barley seeds) in the stratigraphically oldest layers in the midden are used to refine the farmstead establishment date. These survey methods are augmented with geophysical survey where appropriate to gain a better understanding of the farmstead layout and structure.

Two core types were used in the survey: a JMC Backsaver soil sampler push probe with an 18-inch long 1.25-inch wide sampling tube which fully extended can reach a depth of 120 centimeters, and an Eijkelkamp

meter-long single-gouge auger with a 6 cm diameter, which with multiple extensions can reach a depth of up to 5 meters. Wherever possible, cores probed to the prehistoric tephra layers (e.g., H3 or H4) ensuring that the entire potential period of occupation was sampled. All tephra layers, soil horizons, and inclusions (cultural and otherwise) were recorded. When cultural material was identified (e.g., charcoal, ash, midden, floor, or turf not belonging to natural in situ bog deposits) additional cores were taken, filling in the intermediate areas in the survey grid to more precisely determine the nature, extent, and dates of the deposit. In the combined survey programs of SCASS and FLASH over 2600 cores were taken in 2016; 910 of these were at the five farms reported here: Rein, Keta, Hamar, Utanverðunes, and Ásgrímsstaðir.

Excavation utilized a single context methodology following protocols modified from the Museum of London Archaeology Service (Westman (ed.) 1994). Excavation data, including context descriptions as well as sample, find, and photographic registries, were entered into a FileMaker relational database. In the combined survey programs of SCASS and FLASH over 21 small test pits were excavated in 2016; 7 of these were at the five farms reported here: Rein, Keta, Hamar, Utanverðunes, and Ásgrímsstaðir

Reconnaissance for buried farmsteads and other farm activity areas

In areas with sufficient soil accumulation to completely bury abandoned farmsteads, coring densities varied from 10 to 100 meter intervals depending on the geological conditions. Cores were generally taken every 40 m.

Farmstead coring and site size estimation

Known farmstead sites, including buried activity areas identified in the reconnaissance coring, were systematically cored to estimate the extent of the farmstead at various periods in history and to target the oldest preserved layers of midden for small text excavations. Coring generally concentrated at the edge of farmstead areas to better define their changing boundaries.

´Farmstead´ deposits

Small and infrequent anthropogenic inclusions in soils – such as ash, charcoal, and bone – are common near farmsteads and other activity areas. These are good indicators that an activity area or domestic site may be near but we do not count infrequent inclusions as contributing to the areal extent of the farmstead. Higher concentrations of anthropogenic inclusions, midden deposits, turf, dense cultural layers, and activity surfaces are included. For the purposes of the survey, farmstead deposits include:

Low density cultural layers – defined by anthropogenic inclusions amounting to 2-50% of the soil matrix (*Figure 2*). These are assumed to result from indistinct and extensive deposition events that suggest regular activity typical of farmsteads or other farm production areas.

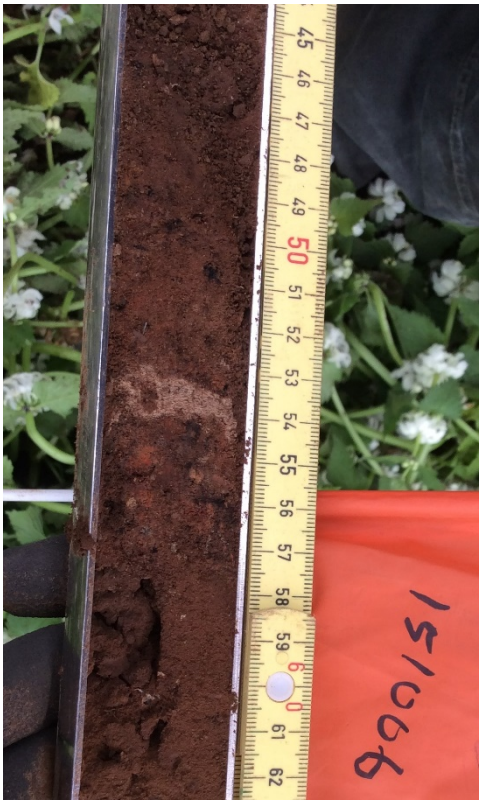

Figure 2. Core 151006 from Ás showing low density cultural deposit (LDC).

Middens – defined by anthropogenic inclusions amounting to more than 50% of the soil matrix that suggest the regular deposition of household or

production area waste (*Figure 3*). Middens are the result of distinct and intensive deposition events associated with purposeful disposal.

Turf deposits – any evidence for a turf structure, including collapsed or levelled turf, are considered evidence of farm buildings (*Figure 4*). The organic content and percentage of soil in turf deposits is variable.

Figure 3. Core 150604 from Keflavík showing a midden deposit.

Figure 4. Core 150033 from Keflavík showing a turf deposit.

Dense cultural layers and floors – characterized by dense, compacted, and/or greasy cultural layers indicative of floors, extramural activity areas, or areas of intense deposition of organic materials. These deposits are often thin but are very distinct.

Geology and tephra

The geology of the region is characterized by Upper Tertiary basic and intermediate extrusive basalts (Feuillet, et al. 2012) overlain by morainic glacial till. The area was deglaciated by 6100 yr cal. BP and then subject to uplift (Cossart, et al. 2014). The natural stratigraphy of the surface of the region consists of a rapidly formed sediment and soil with intermixed tephra layers, along with gravel layers and lenses of glacial origin. The soil is a brown andosol that derives from aeolian sediments of volcanic origin, but is not the direct product of eruptions (O. Arnalds, et al. 1995; Ãrnalds 2004). The andosol is non-cohesive but has an extremely high water-retention capacity (Ó. Arnalds 2008).

Survey chronology and the Skagafjörður tephra sequence

The survey relies heavily on datable tephra layers preserved in the soil stratigraphy. Skagafjörður has an early tephra sequence that allows for a fine-grained chronology of the changes in early settlement patterns (Larsen, et al. 2002). While tephra deposition can vary over small distances (Davies, et al. 2010) the basic tephra sequence is found throughout Skagafjörður and allows for a common dating system among farms and farmsteads, including sheet middens and relict field systems (Þórarinsson 1977). The dates of the historic eruptions roughly coincide with several major historical events including the original settlement of the island about A.D. 870, the end of mass migration to the island in 930, the conversion to Christianity in 1000, the establishment of the tithe law in 1097, the incorporation of Iceland into the Norwegian state in 1262, and the beginnings of the Little Ice Age in 1300. Specific tephras are described below.

Historic tephras:

- Hekla A.D. 1766. A black tephra usually found in turf or in the upper 10 cm of the soil sequence.
- Hekla A.D. 1300. A gray-blue to dark black tephra (Larsen 1984; Larsen, et al. 1999; Larsen, et al. 2002; Larsen, et al. 2001; Sveinbjarnardóttir 1992).
- Hekla A.D. 1104 (H1). This white or yellowish-white tephra is the most consistent in Skagafjörður (Eiriksson, et al. 2000; Thórarinsson 1967) and is readily identifiable in both natural and cultural stratigraphic sequences.

Landnám sequence tephras:

- Vj~1000 tephra. A blue to bluish-black layer whose source has not been determined but is likely to be either from Grímsvötn or Veiðivötn eruption dated to approximately A.D. 1000 (Boygle 1999; Ólafsson 1985; Sigurgeirsson 1998; Wastegard, et al. 2003).
- The mid-10th century layer (~950). This blue-green layer is currently an un-sourced and undated layer that is found between the LNL and Vj~1000. There are several potential candidates for this layer, including the large A.D. 934 ±2 eruption of Eldgjá. (Fei and Zhou 2006; Hammer, et al. 1980; Thordarson, et al. 2001) or an A.D. 933 ±6 green tephra layer identified in the Lake Mývatn area from Veiðivötn, termed V-Sv~950 (Sigurgeirsson, et al. 2013). Because this layer has not yet been dated it is referred to as the ~950 layer throughout the text.
- "Landnám" or "settlement" layer (LNL). The layer is so-named for its association with the earliest settlements in Iceland (Andrew J Dugmore and Newton 2012) and has been dated to A.D. 871±2 (Grönvold, et al. 1995) and A.D. 877±4 (Zielinski, et al. 1997). Recent reanalysis has refined the date for the Landnám layer to A.D. 877±1 (Schmid, et al. 2017). The tephra originates from the Vatnaöldur fissure swarm associated with the Torfajökull and Bárðarbunga volcanos (Andrew J Dugmore and Newton 2012; Larsen 1984). In general, this layer consists of two distinct tephras–an olive-green tephra overlying a white tephra. However, in Skagafjörður, only the green portion is present (cf. Hallsdóttir 1987).
- Black tephra before the LNL (K800). The earliest tephra in this sequence is a dark black layer probably from the Katla volcano, but is not well dated (Wastegard, et al. 2003). It is usually labeled K800 in profiles.

Prehistoric tephras:

- Hekla 3 (H3). A thick (generally 2-3 cm) white or whitish-yellow tephra dating to about 950 B.C. (Andrew J. Dugmore, et al. 1995).
- Hekla 4 (H4). A thick (generally 1-3 cm) white or yellowish-white tephra dating to about 2300 B.C. (Eiriksson, et al. 2000).

Farmstead stratigraphy and estimates of farmstead size at different periods

Chronological phasing of farmstead sizes primarily relies on two tephra layers: the white Hekla A.D. 1104 and the dark Hekla A.D. 1300. These layers are the most common in coring stratigraphy and often the easiest of the historical tephras to identify. Using these tephra layers to date cultural deposits allows for the chronological phasing of farmstead sizes and for farmstead sizes to be compared across contemporary temporal horizons. It also allows for the identification of changes in the size of individual farmsteads. Other tephras are used to help identify the overall stratigraphic sequence in the soil cores and to associate specific layers with historical periods. The resulting chronology allows for the estimation of farmstead size for three primary periods:

- *Pre-A.D. 1104,*
- *A.D. 1104-1300, and*
- *Post-A.D. 1300*

Deposits were also identified as belong to two, more inclusive, categories:

- *Post-A.D. 1104, this is especially useful where the Hekla A.D. 1300 tephra is not present or difficult to identify, and*
- *'Anytime', which simply denotes the presence of a farmstead deposit from any time period.*

Deposits were categorized by these temporal phases based on whether or not they contained "farmstead" material.

Estimates of Farmstead extent

Cores that contained a ´farmstead´ deposits are coded in three simple categories for each chronological period: "yes," "no," and "maybe" based on the presence of any of the above discussed cultural deposits identified in any of the temporal phases. Deposits classified as "yes" for each temporal period were stratigraphically bound by the appropriate tephra layer(s). "Maybe" was used to classify farmstead deposits that could not be restricted to a particular temporal period but for which a particular chronological could not be ruled out. For example, a core with layers of midden and turf layers but without any tephra would be classified as "yes" for 'all time' but "maybe" for all other periods as the cultural deposits could date from anytime. Similarly, a core with midden below and turf above the H1 tephra but with no other tephras would be categorized as "yes" for pre-1104 and "yes" for post-1104 but "maybe" for both the 1104-1300 and post-1300 periods as it is unclear when, post-1104, the turf was deposited. "No" classifications indicate the absence of any farmstead deposits for the designated time period or for the core as a whole.

The distribution of "yes", "maybe", and "no" deposits for each time period are plotted in GIS and an outline representing the furthest extent of contiguous farmstead deposits is drawn resulting in an estimation of the areal extent of each farmstead for each period. "Yes" deposits are used to define the basic shape of the farmstead outline. Then "maybe" deposits for each period are used to refine the basic outline based on the distribution of "yeses". In general, "no" deposits were ignored if they were contained within an area surrounded by "yes" and "maybe" deposits. Boundaries to the areal extent were placed approximately halfway between the last "yes" deposit and the first "no" deposit at the edge of the contiguous farmstead deposits. Where a "maybe" deposit was between the last "yes" and the first "no" deposit, the boundary was drawn passing through the "maybe" location.

The process of modeling farmstead boundaries in GIS produces an estimated farmstead footprint and area calculation for each time period based on the material recovered in cores and test excavations. To not imply an inappropriate level of accuracy to these estimates, all farmstead sizes are reported rounded to the nearest 100 m^2.

Most cores with farmstead deposits are clustered together allowing for the definition of a single contiguous farmstead area. However, isolated areas with multiple cores containing farmstead deposits that are some distance removed from the main farmstead area are often identified in the coring. A 30-meter, multiple core rule was applied to these areas to determine whether these islands should be included in the main farmstead boundary, generate an additional measured area of the same farmstead, or were ignored. First, islands were only identified based on multiple neighboring cores that had farmstead deposits. Single isolated cores with farmstead deposits were not considered islands. Second, islands had to have a midden deposit present in at least one of the cores. Isolated areas of turf or LCD, without nearby midden, floor, or distinct cultural deposits, were not defined as farmstead islands. If the islands had a sterile interstitial area that separated the island from the main farmstead area by less than 30 m, the main farmstead boundary was extended to include the island. Separate enclosing boundaries were generated for islands that had sterile interstitial areas of more than 30 m from the main farmstead area. The area of these isolated islands was then added to the area of the main farmstead. Isolated farmstead deposits beyond 100 meters from the main farmstead are counted as separate named farmstead areas.

The estimations of farmstead extent presented in this survey report should be considered preliminary. Final estimations of farmstead extent will involve the careful

review of all coring data and stratigraphic sequences to further refine the estimated farmstead extent.

Farmstead establishment date

The establishment date of a farmstead is the final critical metric for the settlement pattern study. The establishment dates were determined from tephra dates, sometimes in combination with AMS radiocarbon dates, obtained from carefully targeted excavations in the oldest part of a farmstead's midden.

Household middens are ideal targets for obtaining the establishment date of a farmstead. Substantial concentrations of ash and bone are indicative of domestic occupation and their presence can distinguish farmsteads from isolated outbuildings and other non-domestic site types. Ash and other household garbage was not universally spread on fields, but often built up into a mound (e.g., Davidson, et al. 1986) and a small portion of the ash spread over living floors (Milek 2006). Middens were often concentrated adjacent to a side entrance or kitchen door (Buckland, et al. 1994; Snæsdóttir 1991; Vésteinsson 2010). In other regions, Viking Age middens frequently were dispersed like a sheet around the farmstead. In all of these midden formations, the ash tends to build up rapidly due to the tremendous volume of waste from the burning of peat, dung, and wood (Simpson, et al. 2003; Vésteinsson and Simpson 2004). Midden deposition seems to be relatively continuous and thus provides an excellent environment for the rapid burial and preservation of tephra layers. Middens can be sampled without unduly damaging the complex stratigraphic relationships in structures.

The estimations of farmstead establishment date presented in this survey report should be considered preliminary and are likely to be refined by more extensive radiocarbon samples in combination with tephra layers. In some cases, chemical analysis may redefine tephra layers entirely changing a farmstead's date range.

Survey results

The survey produces three main datasets related to the farmsteads in Hegranes: the identification of occupational areas on the farm, an estimation of changing farmstead size based on coring data, and an estimate of the earliest occupation at the farm based on test trenches strategically placed in the farmstead midden deposits to expose the oldest cultural deposits identified in the coring. Results from each farm are presented below.

Hamar

Hamar is located immediately north of Keta and south of Ríp. Keta and Hamar are quite close compared to other farms on Hegranes; the contemporary farm buildings are separated by less than 400 meters and a low barren ridge. Like its southern neighbor, Hamar is first mentioned in the historical record in A.D. 1446 where it appears as one of the properties owned by the cloister at Reynistaður (Diplomatarium Islandicum, vol. 4:701). A number of farms on Hegranes were owned by the cloister. Ferjuhamar, Karastaðir, Hróarsdalur, and Keldudalur are all listed in the original endowment of the cloister by the Hólar bishop in A.D. 1295 (Diplomatarium Islandicum, vol. 2:301-302). The absence of Hamar and Keta, its immediate neighbor to the south, from the earlier inventory suggests that this represents a transition in the status of the properties sometime in the 14th or early 15th century. It is unclear if the properties were previously independent or how they became properties of the cloister. The geographical pairing of the two farms might indicate that they were transferred at the same time and that their ownership may have been related before coming under the control of the cloister. Hamar remained a property of the cloister, and the state following the reformation, until A.D. 1908 (Pálsson 2010). The Jarðabók Árni Magnússonar lists its value at 20 hundreds and includes a past subfarm, now barn area, at Hendilkot (Magnússon and Vídalín 1930, vol. 9:66). Coring and test excavations at Hendilkot confirm that it was probably a functioning *hjáleiga* in the past and was established sometime before A.D. 1104 (Catlin 2016).

Site overview

The farmstead at Hamar is situated on the east side of Hegranes on land sloping down toward wetlands and the floodplain of Héraðsvötn. The farmstead has probably always been located in approximately this location as excavations in 2014 revealed a sequence of domestic structures dating back to the 11th century just north of the current farmhouse (Sigurðsson 2014). About 80 meters east of the current farmhouse the land flattens into a now drained bog. Coring in the boggy area revealed deep layers of damp peaty soils dating back thousands of years. Further to the east a few north-south running rocky ridges punctuate the boggy land. The primary early modern homefield covers the area between the house and the bog.

The historical farm mound is located on the site of the contemporary farmhouse. The farmstead midden extends to the east of the farmhouse and covers much of the eastward facing slope between the contemporary house and drained marshlands. There is little evidence of farmstead deposits in the field to the west of the house beyond a small area of turf that is likely from a small outbuilding.

Farmstead coring

The farmstead was initially cored during the 2016 season but the field just to the east of the contemporary farmhouse was covered with mature barley when Hamar was surveyed and it was decided not to disturb the crop. This left areas immediately to the north, west, and south of the farmhouse open for coring and a thin strip along the edge of the barley field that could be accessed without disturbing the crop. Coring at the edge of the barley field closest to the farmhouse revealed a deep stratified midden which likely extended some distance into the field. Cores with farmstead deposits to the east and south of the barley field were also securely dated to the pre-1104 and 1104-1300 phases allowing for a reasonable estimation of the total farmstead size for these period. No farmstead excavation was conducted in 2016 as the barley field likely contained the oldest midden deposits associated with the farmstead (Bolender, et al. 2017).

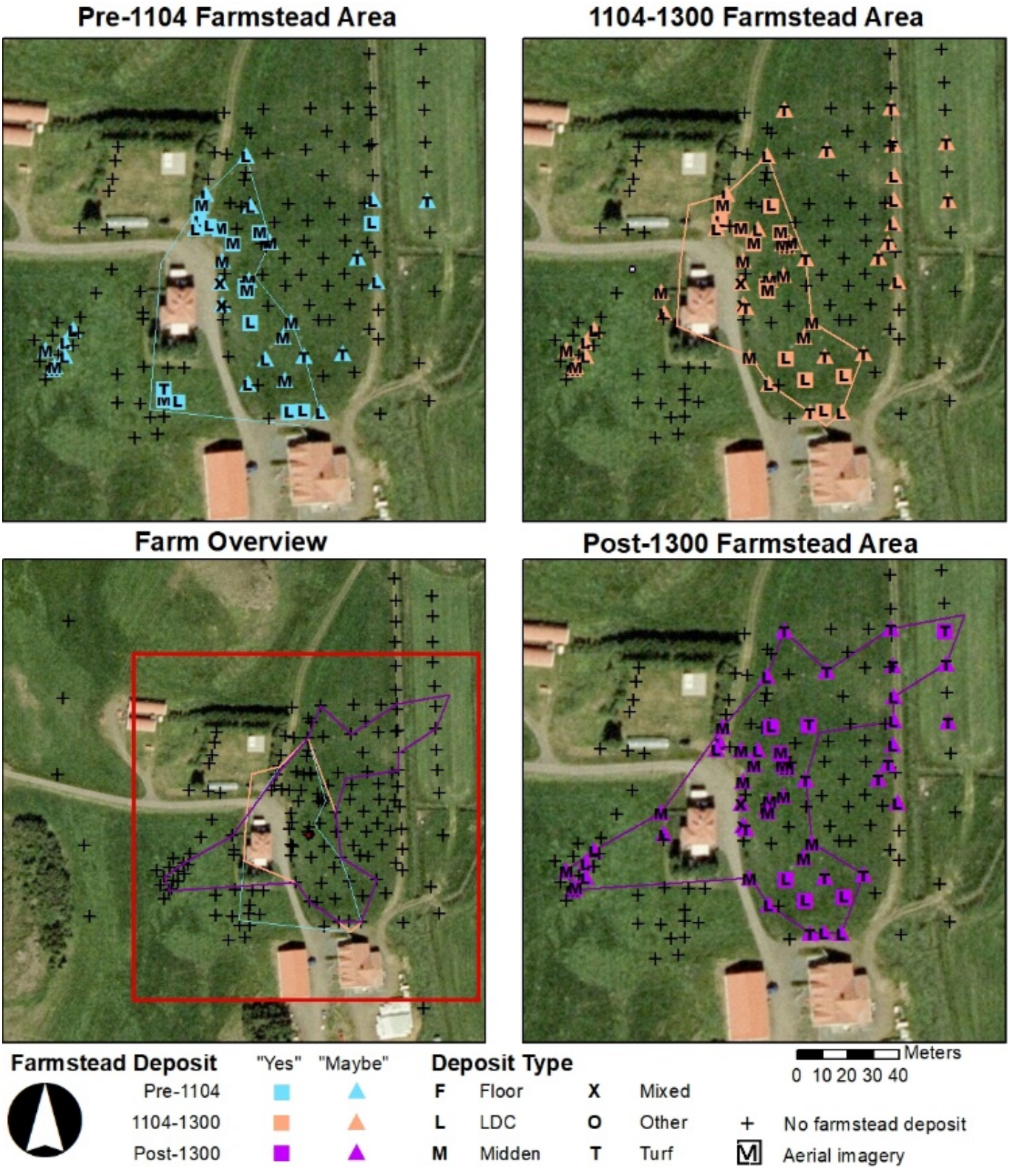

Figure 5. Hamar farmstead coring and estimated farmstead extents.

In 2017 the field east of the contemporary farmhouse was systematically cored allowing for a revision of the farmstead area estimates based on the 2016 data. Over the two field seasons, 196 cores were taken at Hamar (130 in 2016 and 66 in 2017). Of the 196 cores, 63 had farmstead deposits. Most of these were concentrated around the contemporary farmstead. The new farmstead area estimates decreased the size of the

Figure 6. Hamar 2014 and 2017 excavation locations.

farmstead for the pre-1104 and 1104-1300 periods but increased it for the post-1300 period. Based on the combined 2016 and 2017 coring data, Hamar was moderately sized in the pre-1104 phase at 4400 m^2. It appears to have retracted slightly in the 1104-1300 period to 3900 m^2. In the post-1300 period the farmstead increased to its largest measured area at 6900 m^2 (*Figure 5*).

Excavation

A 2014 excavation conducted by the Skagafjörður Heritage Museum revealed early domestic structures associated with the main farm mound (Sigurðsson 2014). The 122 m^2 excavation was located on the north side of the contemporary farmhouse where the drive from the main road turns south. The earliest deposits lay under the Hekla 1104 layer and appeared to be mixed with the Vj~1000 layer. These were interpreted to represent occupation between A.D. 1000 and 1104. In 2017, a small 1x1 meter unit was excavated in the midden to the east of the contemporary farmhouse to collect samples and clarify the site stratigraphy and establishment date. The unit was placed based on a cluster of cores with deep midden deposits under the Hekla 1104 tephra (southwest corner: east 479161.74, north: 573770.97, elevation 20.67) (*Figure 6*).

The results of the new excavation largely confirm the basic sequence and establishment date based on the 2014 excavation. An establishment date around A.D. 1000 would be consistent with the coring which identified a number of farmstead deposits under the

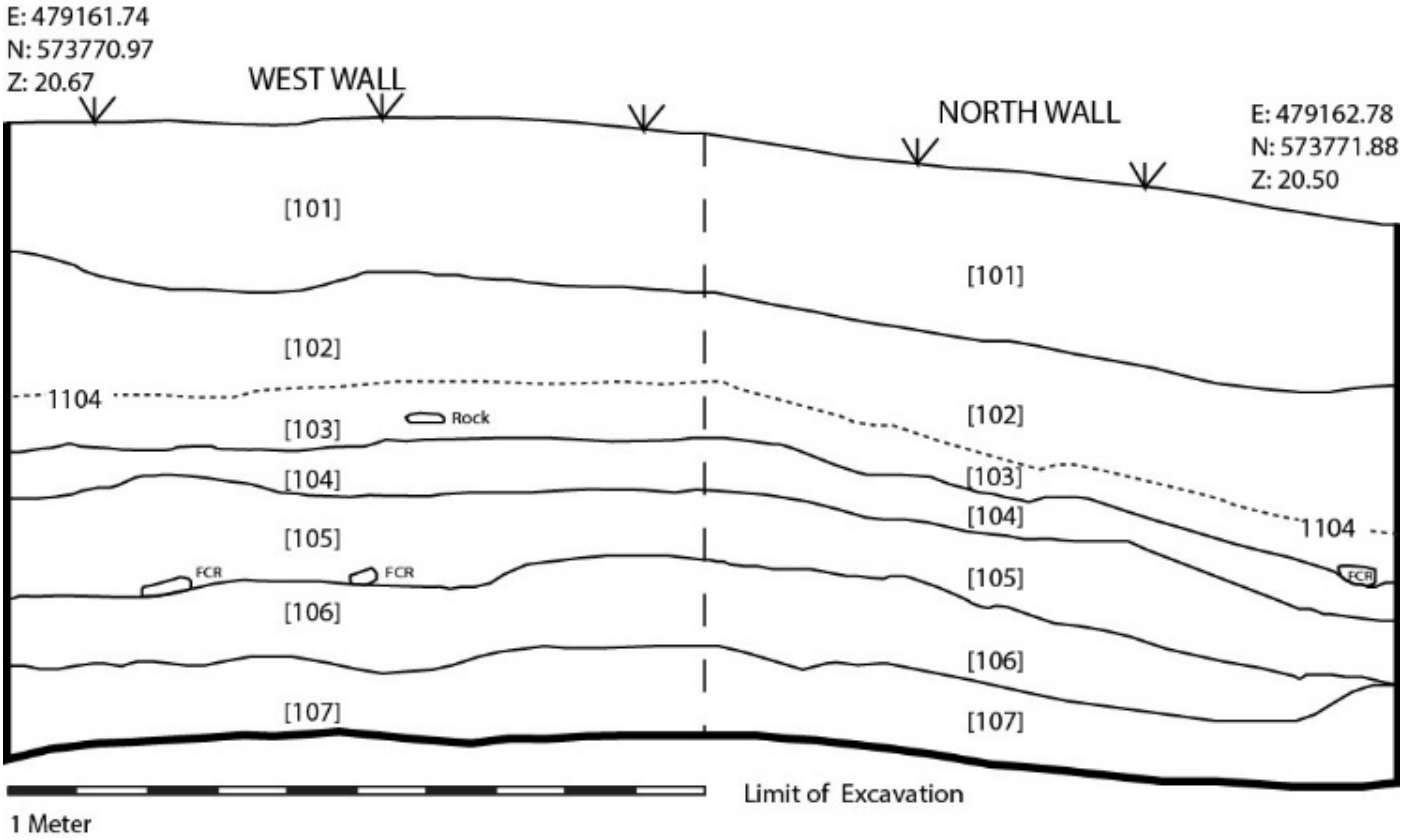

Figure 7. Hamar 1x1 meter excavation unit #1, profile.

Hekla 1104 tephra but none under the Vj~1000. However, a radiocarbon date from the lowest level suggests a possible 10th century date for the earliest activity at the site.

The upper layer [101] of the 2017 excavation unit consisted of plowed soil with gravel inclusions. This is not surprising as the field had been plowed the previous year in preparation for a barley crop. Unfortunately, the plowing – and probably previous a farm-related activity in the field – appears to have truncated the most of the late medieval and early modern deposition in this location. This disruption of later deposits largely coincided with areas with early deposits and as a result there are few locations where a full midden sequence is preserved.

Below the plow zone the stratigraphy appeared largely intact (*Figure 7*). There was no evidence of a preserved Hekla 1300 tephra in the stratigraphic sequence nor was it identified in any of the nearby cores, although it was present in cores 20 m to the north and 30 m south and southeast of the excavation unit. The first undisturbed layer [102] consisted of mid-orangish brown ashy soil with bone, fire-cracked stones, and frequent charcoal inclusions. The layer probably dates to ca. 1104 to pre-1300.

The midden deposit [103] continues under the Hekla 1104 tephra. It has some minor lensing and a concentration of fire-cracked stone at the top of the layer. In addition to white and pink ash, bones, and charcoal found in [102], the midden also included turf fragments. [104] was largely the same as [103] above. The contexts were broken on a thin (<1-2 cm) layer of roughly continuous turf debris approximately 10 cm below the start of [103] above. Other than the layer of turf debris, the main difference between [103] and [104] was the inclusion of some slag in [104] and patches of a greenish-gray tephra (possibly the ~950). The tephra did not appear to be in situ.

Below [104] the was a dark reddish-pink domestic midden [105]. The context was broken on a thin (<1-2 cm) strata of roughly continuous mixed peat ash and charcoal approximately 10 cm below the start of [104].

Other than the compositional and pattern change in the peat ash and charcoal distribution there is nothing particularly different about the material in [104] and [105]. Below the mixed strata, the midden is a fairly uniform peat ash matrix with fire-cracked rock, but not as concentrated as in [104]. There are also a few charcoal lenses in the stratum. Turf inclusions contained a greenish-gray tephra, possibly the LNL or ~950.

Below [105] is a firmly compacted surface of mid-orangish pink ash and charcoal that covers the northern and middle parts of the unit 1-2 cm thick [106]. The deposit tapers to a greenish brown at edges of the unit (*Figure 8.*) and transitions to peat ash and turf debris below the compacted surface, which is similar to [105] above.

Figure 8. Hamar [106] compacted layer of peat ash and charcoal.

The compacted surface has trampled/flat smears of charcoal (1-8 cm) and turf (2-8 cm); however, there is limited lamination and no evidence that the deposit is within the interior of a structure. The trampled surface was not broken in to a distinct context from the midden below but it was sampled for flotation separately (sample #9) from the midden layer below (sample #11).

A number of degraded and butter bones were seen in the peat ash matrix suggesting poor bone preservation. Some animal teeth were found. Below the midden is a layer of natural turf [107] with no anthropogenic inclusions that then gave way to glacial sand. The interface with the bottom of the midden [106] above is abrupt and shows a clear truncation of natural stratigraphy/soil before the initiation of midden deposition (*Figure 9*).

Figure 9. Hamar 1x1 meter excavation unit #1, Harris matrix.

In general, the 2017 excavation unit and coring agree with the basic site chronology established by the 2014 excavation at farmhouse indicating an earliest domestic occupation in the early 11th century sometime after the Vj~1000 tephra. This is based on the assumption that the absence of the tephra is due to the truncation of the underlying stratigraphy at the initiation of the depositional sequence. Otherwise the tephra layer would be expected to be preserved in the sequence of midden deposition. A piece of charred barley produced a 1095±15 BP radiocarbon date (calibrated AD 895-929 [37.8%], 939-990 [57.6%]). This could be consonant with a post Vj~1000 establishment date for the farm depending on the date for the Vj~1000 tephra, which is current only a loose designation. Combining the stratigraphy and radiocarbon allows for a refinement of the establishment date for the farm to the late 10th century. Such a dating must, of course, remain tentative

as it relies on the absence of the critical Vj~1000 tephra. This is further complicated by the compacted layer [105], which could represent an interior deposit unlikely to retain the Vj~1000 tephra in situ.

Vatn/Vatnskot

The historically known farm of Vatnskot is located on the contemporary farms of Svanavatn and Hegrabjarg, which were created in the first half of the 20th century when the farm of Vatnskot was divided into two properties. The farm name, Vatnskot, dates to the mid-16th century. Historical sources indicate the existence of an earlier farm, Vatn, near or on the property of Vatnskot. It is likely that Vatnskot is the same farm under a different name. There are no obvious early farm ruins on the property but the farmstead could be situated in the same location and the 2017 archaeological work at the site appears to confirm this.

Vatn is listed in the A.D. 1388 inventory of properties belonging to the Bishopric at Hólar where it is listed as owing 3 marks of *vadmal* in rent and 2 cows and 12 ewes in cow rent (Diplomatarium Islandicum, 3:408, 413). It appears again in the Hólar registries in A.D. 1449 where it is listed along with the neighboring Beingarður at 40 alnar, a relatively small amount for a single farm and particularly low for the paired farms. There is no indication in the record that the low valuation is based on a partial ownership of the properties. It is likely that the farm was abandoned sometime in the second half of the 15th or early in the 16th century. Vatn is not listed in the A.D. 1525 register of Hólar properties for Hegranes (Diplomatarium Islandicum, 9:301). It reappears in the A.D. 1550 register under the name Vatnskot, presuming that this designates either the same farm under a different name or a newly established farm on or near the old site of Vatn (Diplomatarium Islandicum, 11:861). The main issue with the sequence of abandonment and possible name change is whether or not the farmstead shifted location and if the status or property associated with the farm changed during this transition. It is once again absent in the Hólar register of properties in A.D. 1569 (Diplomatarium Islandicum, 15:223). Hjalti Pálsson (Pálsson 2010:64) suggests that this absence from the Hólar register could indicate either abandonment or that the farm had become a *hjáleiga* of Ás. One way or the another, the 16th century was a volatile time for the farm with periods of possible abandonment and a fundamental transformation in the nature or status of the property.

It is not clear when the farm was reoccupied or re-established. Vatnskot is not listed in the A.D. 1686 or 1695 land registers (Lárusson 1967) but this may reflect its changed status. In 1713, the Jarðabók Árnamágnussonar lists Vatnskot as a subfarm amounting to ¼ the value of Ás, or 15 of a total 60 hundreds in value (Magnússon and Vídalín 1930, vol. 9:64-65). The farm appears to have been occupied throughout the early modern period until it was partitioned in A.D. 1937 into two new farms: Svanavatn and Hegrabjarg (Pálsson 2010:64).

Farmstead coring

A total of 326 cores were taken at Vatnskot (excluding those at Hegrastaðir taken as part of the FLASH project and reported separately). Of the 326 cores, 95 had farmstead deposits. Most of these were concentrated around the contemporary farmstead, which was almost certainly the location of the Viking Age and Late Medieval farm of Vatn and the later Vatnskot.

Vatnskot was moderately sized in the pre-1104 phase at 3500 m^2. It appears to have increased slightly in the 1104-1300 period to 4000 m^2. In the post-1300 period the farmstead increased to its largest measured area at 7400 m^2 (*Figure 10*). The size and progression of these farmsteads measurements are very similar to Hamar further to the south. Although Vatnskot appears to be established earlier than Hamar (see below), they seem to occupy similar positions within the overall settlement pattern of Hegranes. During the pre-1300 phases, the farmstead was located on the south side of the contemporary farm mound, around the current residence on the farm. The post-1300 period saw a

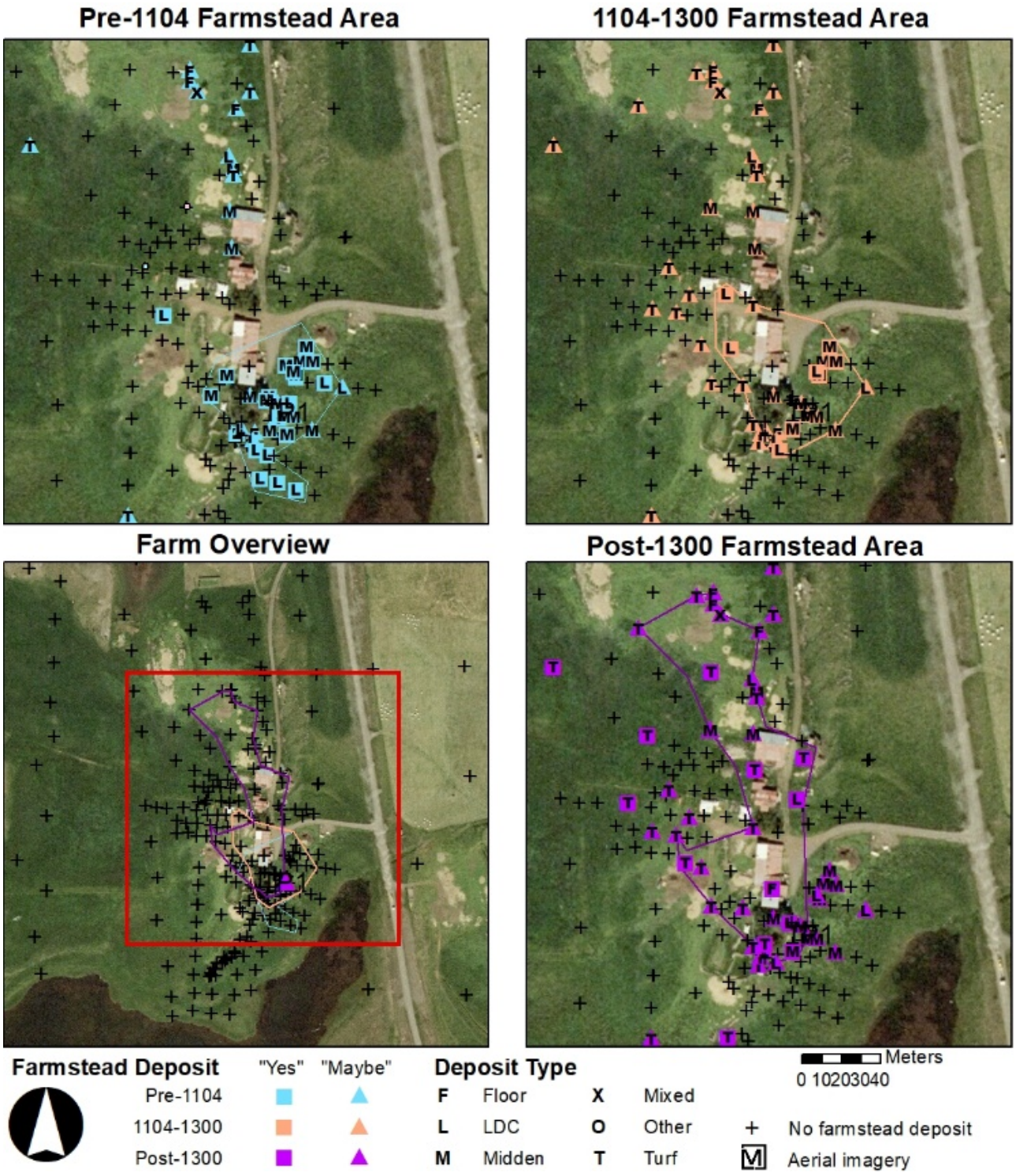

Figure 10. Vatnskot farmstead coring and estimated farmstead extents.

significant expansion to the north where the early modern/early 20th-century residence was situated. Although the chronology in the coring is not precise enough to determine when the domestic center of the farmstead moved, the overall pattern is consistent with the possible abandonment and reoccupation of the site ca. A.D. 1500 suggested in the historical inventories and may be related to the shift in the name of the farm from Vatn to Vatnskot.

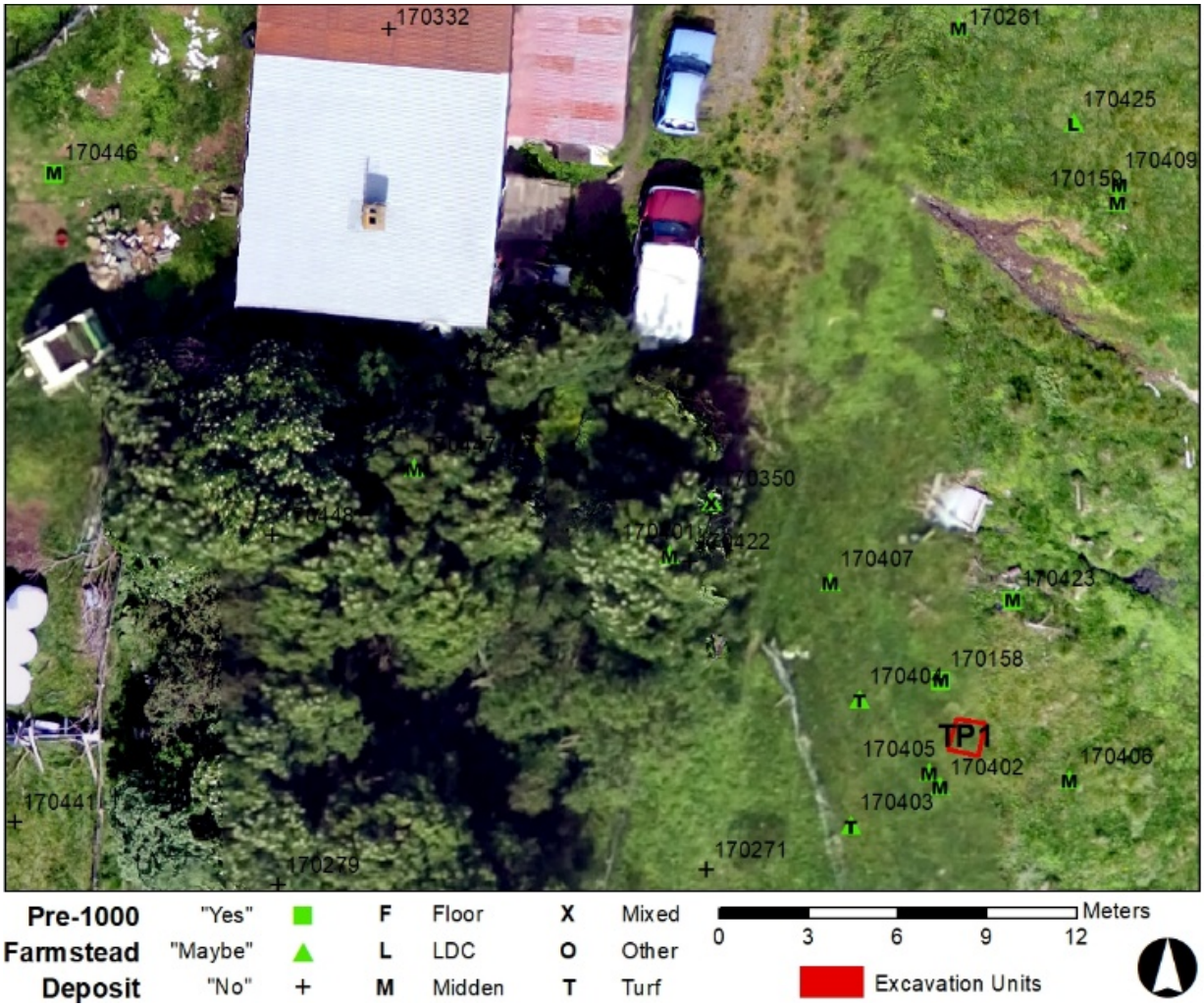

Figure 11. Vatnskot excavation location.

Test Excavation

Based on the results of the coring, a small excavation was placed southeast of the current residence and just east of the small enclosed copse on the south side of the farm mound. The unit was originally excavated as 1x1 m unit (southwest corner: east 478294.39, north: 578525.49, elevation 63.25) and later expanded 1 m to the south (southwest corner: east 478294.16, north: 578524.53, elevation 63.17) to collect additional archaeofauna samples from the midden (*Figure 11*). Because the units were excavated separately, context numbers were assigned sequentially, initially to the first 1x1 m unit and then continuing in the 1x2 m expansion to the south. For the most part, the context assignments align between the north and south sections of the unit (see correspondence in Harris matrix for matching contexts *Figure 12*).

In both halves of the unit, the disturbed and bioturbated root mat and top soil was designated [101]. The upper part of the deposit appears to have been flattened at some point. The northern half of the unit is additionally disturbed by a recent cut/fill event [102] that measures about 50 cm square in the middle of the unit. Although disturbed, the upper layer shows little evidence of anthropogenic inclusions, despite the unit's proximity to the farmhouse. This may provide some marginal support for the idea that the main locus of farmstead activity shifted to the north in the Late Middle Ages.

In the north half of the unit, the disturbed layers [101] and [102] comprise all the material above the Hekla 1104 tephra. The Hekla 1300 tephra was not identified in the northern half of the unit during excavation, in part due to the large truncation from [102], but it was

later identified in the profile. Based on the Hekla 1300 tephra in the profile, the deposit between 1300 and 1104 was collected and sampled as a distinct layer [110] in the southern half of the unit. The layer is largely mid-brown aeolian soil with bone and heavily bioturbated.

Below the Hekla 1104 tephra is a layer of orangish-brown low density cultural material [N103/S111]. The upper part of the north unit is partially truncated by [102], which penetrates through the Hekla 1104 tephra. With the exception of a cluster of articulated fish bones in southwest corner of the southern unit (vertebrae and spines), there are few anthropogenic inclusions in the layer.

The layer of low density cultural material [N103/S111) transitions to a mid-orangish brown midden deposit [N104/S112] after about 20 cm (*Figure 13*). The midden includes pink ash, charcoal, bone, shell, and turf debris. The inclusion of fire-cracked stone is suggestive of domestic activity. Below [N104/S112] is a grayish-black tephra identified as the Vj~1000 tephra. The tephra layer is discontinuous but present in both the northern and southern halves of the unit and appears to be in situ.

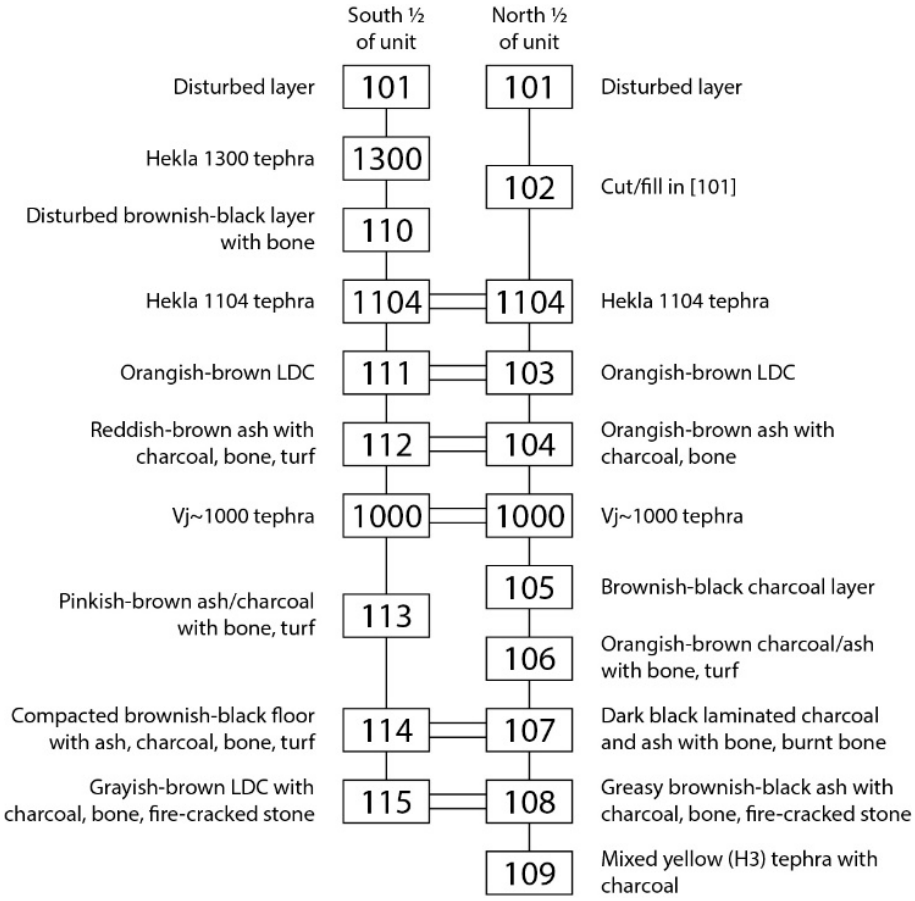

Figure 12. Vatnskot 1x1 meter excavation unit #1, Harris matrix.

Under the Vj~1000 tephra a brownish-black charcoal rich layer [N105] was identified in the northern half of the unit. The upper charcoal layer is fairly continuous throughout unit (ca. 1 cm thick) but rapidly gave way to a mixed midden deposit with peat ash and charcoal. Fire-cracked stone and animal bones indicates domestic cooking dumping. A bronze ring pin (field registry find #5) was found in the charcoal layer (*Figure 14*).

Under the charcoal layer and midden in the northern half of the unit is another layer of charcoal and peat ash [N106] that gives way to turf debris in the bottom 2-3 cm of the layer that may represent mixed building collapse. The midden deposit contains ash, charcoal, bone, turf, and fire-cracked stone.

The charcoal layer [N105] is not present in the southern half of the unit and the layered midden contexts [N105] and [N106] identified in the northern half of the unit were collected as a single context in the south [S113]. The overall composition of [S113] is similar to the two northern units but lacks in the distinctive charcoal and ash lensing.

Under the midden deposits is a dark-black, compact and flaky floor layer of mixed charcoal and ash [N107/S114]. In the northwest of the unit distinct alternating laminations of charcoal, peat ash, and then charcoal could be identified. Burnt and fragmented bone and shell are compressed in the floor matrix. Unburnt bone was found immediately above and below the layer although no clear unburnt bone unequivocally associated with the floor layer was identified. The floor

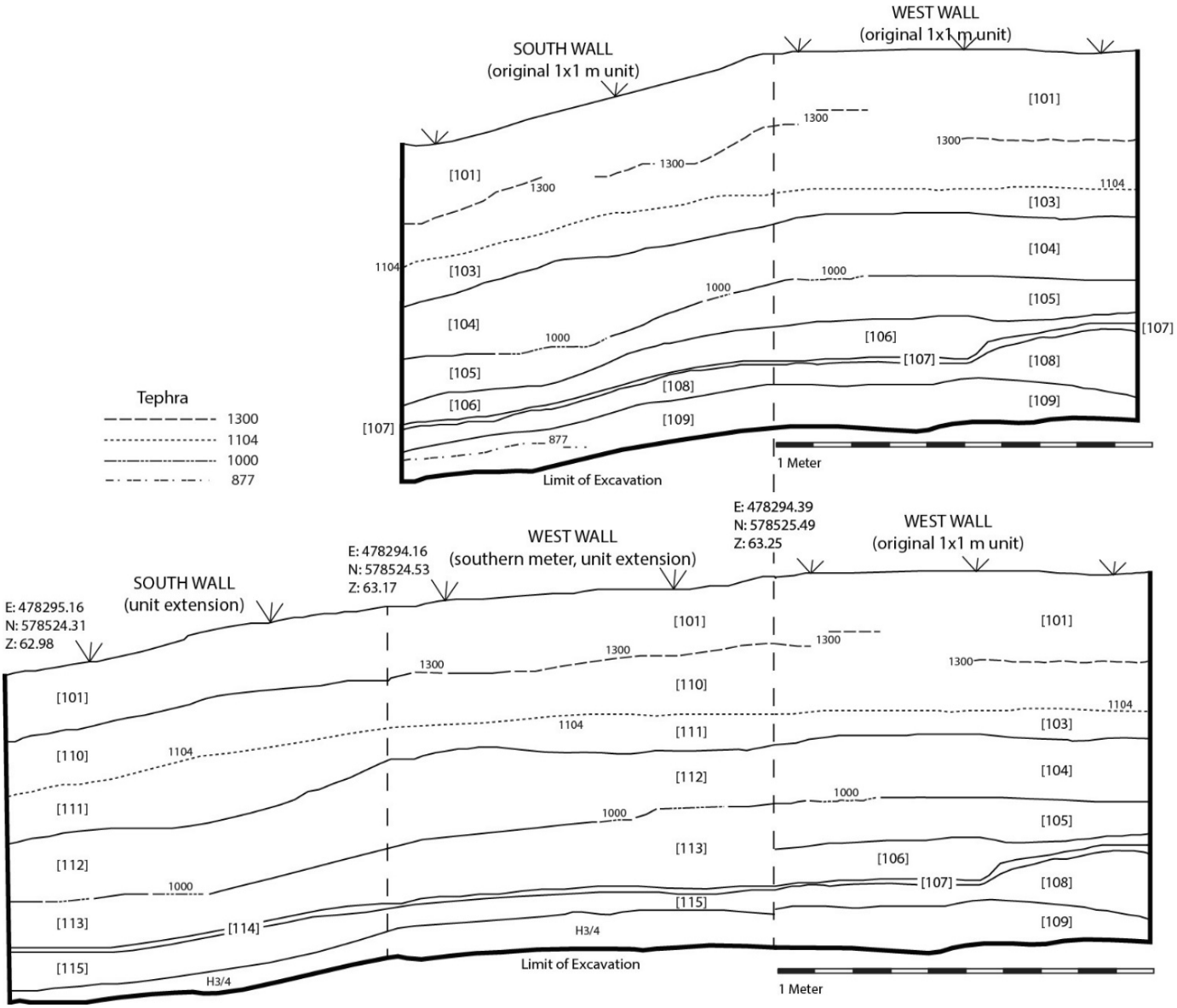

Figure 13. Vatnskot 1x2 meter excavation unit #1, profile.

appears to be truncated by later activity, especially in the eastern half of the unit.

Below the compacted floor layer is a dark brown and greasy midden layer [N108/S115]. Fire-cracked stone and animal bones and shell indicate primary deposition of cooking garbage. The animal bones are predominately unburnt. Articulated animal bones in the northwest corner of the northern half of the unit were sampled together (possibly infant sheep). A cluster of articulated fish vertebrae just of south of sheep bones were partially embedded in west profile wall and were not remove. These bones seem to be lying on a sterile context below. The superposition of a compacted floor layer [N107/S114] on what looks like primary domestic midden leaves some uncertainty about the interpretation of the floor layer. It was clearly subjected to repeated compaction but there is no evidence for a break in the stratigraphy that would be associated with the construction of a building on top of a midden. It is possible that the "floor" layer represents a heavily trampled extramural midden deposit and not the interior of domestic structure.

Below the midden is a partially truncated natural soil sequence [108]. The Landnám tephra was identified in

Figure 14. Vatnskot F#5, ring pin.

the southeast corner of the unit and profile but appeared to be inconsistently preserved or truncated throughout the rest of the unit (*Figure 15*). The light yellow deposit above the Landnám tephra indicates remobilized Hekla 3 tephra and localized surface disruption possibly associated with the establishment of the farmstead. The sterile layer was not excavated in the southern expansion of the unit.

The excavation unit shows a rich midden sequence before the Hekla 1104 layer with limited deposition between 1104 and 1300. The midden layers contain a wide range of domestic inclusions: ash, charcoal, burnt and unburnt bones, shell, turf debris, and fire-cracked stones. Under the Vj~1000 tephra, a compacted floor layer with high concentrations of burnt bone may indicate a structural floor or heavily trampled extramural surface. The underlying sediment sequence has been partially truncated, possibly as a result of the initial land clearance of the farmstead. The occupation starts before the Vj~1000 tephra. The absence of the ~950 layer in the preserved stratigraphy may indicate that it was truncated as part of the land clearance suggesting an overall establishment date for the site between ca. 950 and 1000. This date fits well with the single radiocarbon date obtained from a charred piece of barley in the deepest midden layer [113] at 1120±15 BP (calibrated AD 890-975 [95.4%]). However, the possible presence of a building or highly traffic area visible in the earliest layers may simply indicate that the ~950 layer did not collect or was not preserved in the unit stratigraphy.

Figure 15. Vatnskot excavation unit, south profile of the northern ½ of the unit with context labels for both the northern and southern halves of the unit. The intrusive pit [102] was not visible in any of the profiles.

Beingarður

Beingarður is listed in the A.D. 1388 inventory of properties belonging to the Bishopric at Hólar where it is listed as owing 3 marks of *vadmal* in rent and 5 cows and 12 ewes in cow rent (Diplomatarium Islandicum, 3:408, 413). It appears again in the Hólar registries in A.D. 1449 where it is listed along with the neighboring Vatn at 40 alnar, a relatively small amount for a single farm and particularly low for the paired farms. There is no indication in the record that the low valuation is based on a partial ownership of the properties. Also like its neighbor, Vatn, it is not listed in the A.D. 1525 register of Hólar properties for Hegranes (Diplomatarium Islandicum, 9:301) but where Vatn appears to be reoccupied under the name Vatnskot in the A.D. 1550 register, Beingarður continues to be absent in the Hólar registry (Diplomatarium Islandicum, 11:861). It is also not listed in A.D. 1569 inventory (Diplomatarium Islandicum, 15:223).

Beingarður does not appear again until the A.D. 1686 or 1695 land registers where it is designated as a property of Hólar (Lárusson 1967:248). In 1713, the Jarðabók

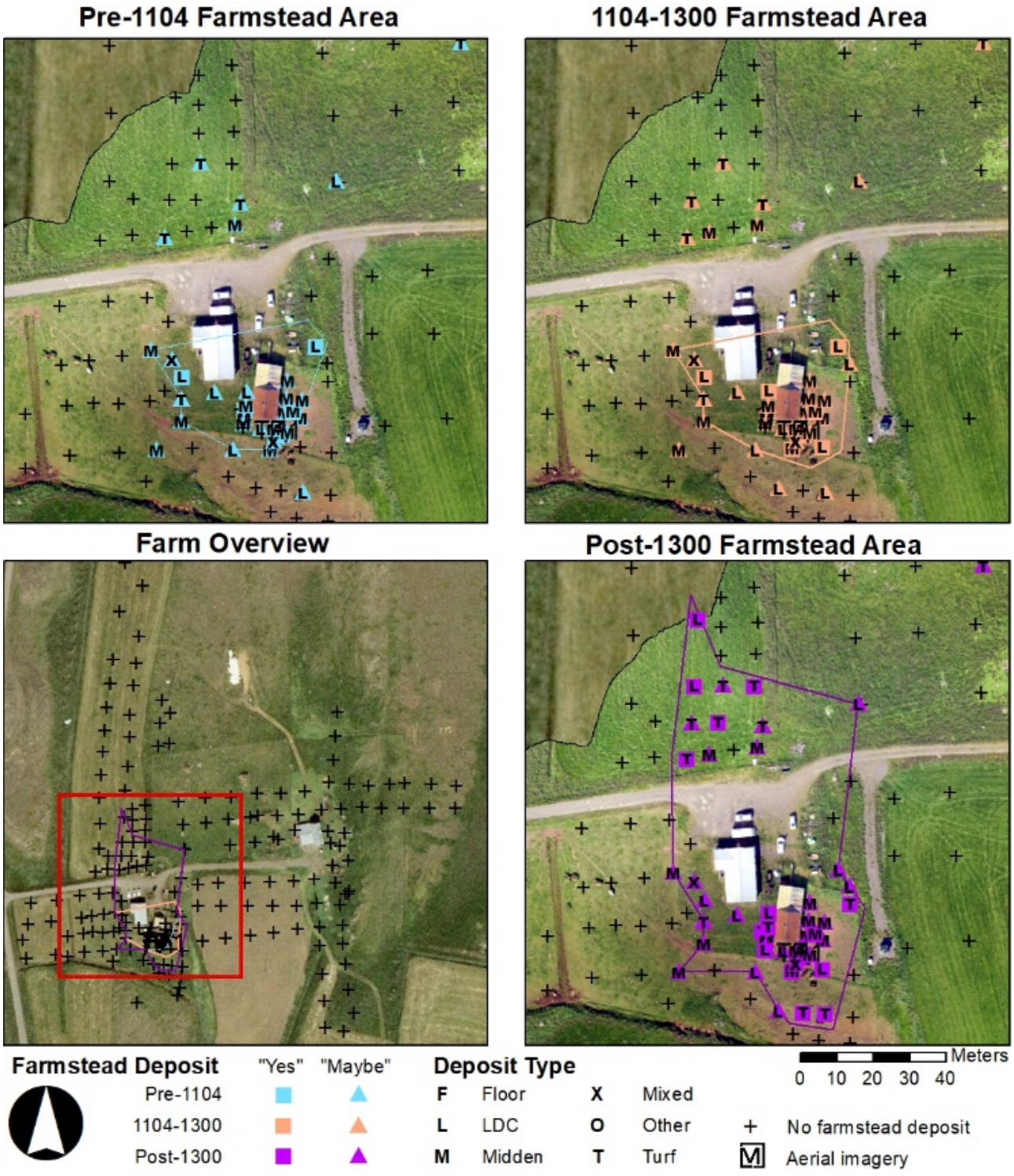

Figure 16. Beingarður farmstead coring and estimated farmstead extents.

Árnamágnussonar lists it as a subfarm (*eyðikot* or abandoned cottage) in the main entry for Ás but notes that it continues to be owned by the bishopric at Hólar (Magnússon and Vídalín 1930, vol. 9:65). According the Jarðabók, it had been abandoned for nine years, although it also was abandoned at the time of the 1703 national census, ten years prior to the Jarðabók survey. It appears to have been abandoned throughout most of the 18th century although it appears to have been occupied in 1753. It was reoccupied again sometime after 1762 only to be abandoned again from 1784-1809 and 1812-1813 (Pálsson 2010:74-75). It was sold along

with many other farms owned by the bishopric at Hólar in 1802 (Pálsson 2010:72).

Farmstead coring

A total of 200 cores were taken at Beingarður in 2017. Of the 200 cores, 60 had farmstead deposits. Most of these were concentrated around the contemporary farmstead, which appears to have been the site of continuous domestic activity throughout the history of the farm. The area around the contemporary barn, located on a ridge east of the dwelling structures just above the wetlands around Heraðvötn East, had some evidence of older activity but the deposits were too restricted to suggest an alternative or second domestic habitation on the farm. Coring revealed that the area between the contemporary farmstead and barn historically had the driest soils on the farm. There were wetlands immediately north of the current driveway and west and south of the house. Beingarður was relatively small compared to other farmsteads on Hegranes. In the pre-1104 phase in measured a total of 1100 m^2. It appears expanded slightly in the 1104-1300 period to 1300 m^2. In the post-1300 period the farmstead increased to its largest measured area at 4200 m^2 (*Figure 16*).

Excavation

The largest area of midden on the farm was located around the 1935 house, located to the southeast of the contemporary dwelling structure. The midden was deepest and most extensive to the east and south of the structure where ash and bone were clearly visible on

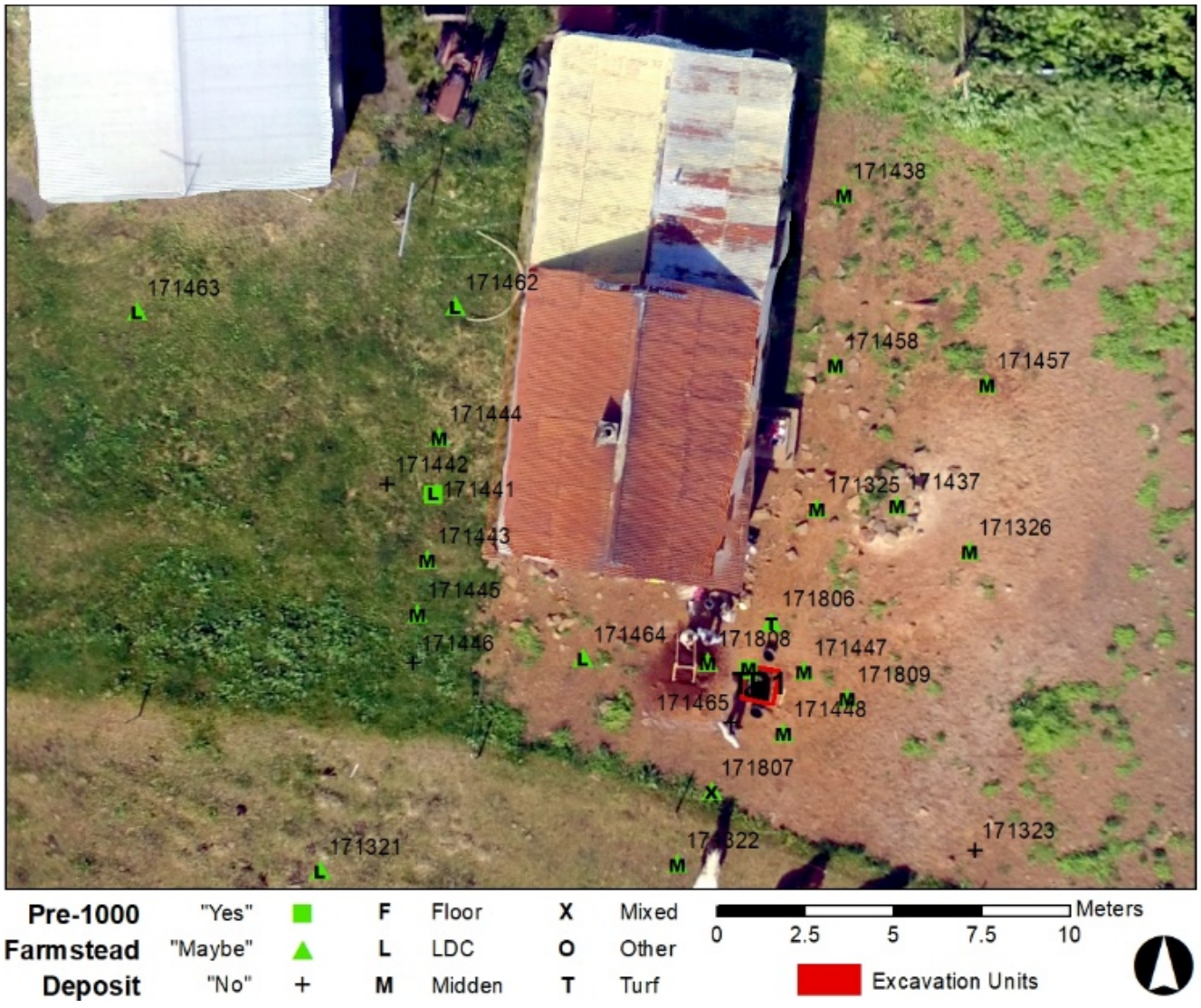

Figure 17. Beingarður excavation location.

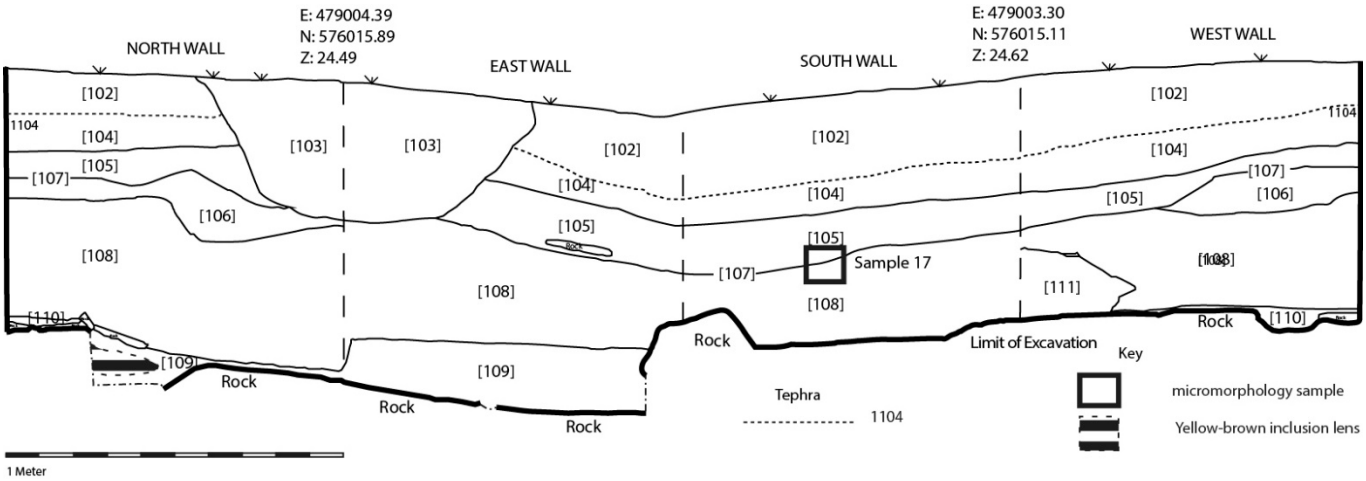

Figure 18. Beingarður, 1x1 meter excavation unit #1, profile.

the eroded ground surface. Three cores identified a dark tephra, either the Vj~1000 or the ~950, in farmstead deposits under the Hekla 1104 near the 1935 house, one on the west side of the structure and the other two to the southeast. As discussed below, the tephra appears not to be in situ but rather an inclusion in a layer of mixed turf collapse. A single 1x1 meter test unit was placed to the southeast of the 1935 house (southwest corner: east 479003.30, north: 576015.11, elevation 24.62) (*Figure 17*).

Late medieval and early modern accumulation layers in the area of the excavation unit have clearly been truncated by modern erosion. The present ground surface is about 50 cm below the foundation of the 1935 farmhouse. No tephra layers above the Hekla 1104 were preserved in the excavation unit stratigraphy indicating that the erosion likely removed about 700-800 years of deposition. The truncation was designated as [101].

An intrusive pit in the northeast corner of the unit [103] cuts through [102], [104], and [105] (*Figure 18*). The pit is filled with similar material to the truncated deposits consisting primarily of ash with charcoal, bone, small fragments of degraded wood, and fire-cracked stone. The upper interface of the cut was clear against the background midden fill [102] as soon as the contemporary surface was cleared indicating that the top of the cut and fill had also been eroded. It is unclear when the cut and fill occurred other than that it postdates [102] and the Hekla 1104 layer. No traces of later tephra where identified in the fill.

The first non-intrusive deposit in the unit is [102], a pinkish-brown firmly compacted layer of ash with charcoal, bone, turf fragments and fire-cracked stone. The deposit includes small patches of a mid-bluish gray tephra. The tephra was tentatively identified in the field as the Hekla 1300 but could also be the VJ~1000 redeposited from smashed pieces of older turf.

Under [102] is the in situ white Hekla 1104 tephra layer. Under the tephra is a lensed midden deposit [104] made up of many individual dumping events. A lens of smoldering in the middle-north of the unit indicates one of the dumping events was of hot ash. Layers [104] and [105] initially appeared to be similar. The new layer [105] was designated based on a thin (~1 cm thick) lens of ash and charcoal that covered most of the unit. However, under the ash lens the layer transitions to include more turf with fine charcoal and ash inclusions (<1 cm) that then gives way to a very fibrous and dense hay midden, likely dumping from a paddock or barn floor with waste and bedding from animals. The bottom of the unit follows an undulating surface sloping down to the southeast of unit, which was cutout and filled with evidence of in situ burning (*Figure 19*). The bottom of the cutout area is lensed with approximately 2 cm of black embers and ash that lap up the edges of the cut and then taper to a thin spread at the interface [107] of [105] and [106]/[108]. The slag recovered from the

Figure 20. Beingarður, 1x1 meter excavation unit #1, bottom of [105] with cutout section with in situ burning in southeast part of the unit.

Figure 19. Beingarður, 1x1 meter excavation unit #1, bottom of unit, domestic structure: floor [109], turf wall [111], and wall, bench, or possible entrance [110]. The north section of the floor was truncated in the past.

layer was concentrated in the southeast corner associated with the burn event. While the section in the southeast of the unit is the area most obviously truncated, the entire interface [107] between [105] and [106]/[108] appears to have been truncated.

A turfy-collapse layer [106] is only preserved in the northwest corner of the unit. The deposit has a fibrous texture with charcoal, unburnt wood, and what appears to be hay that looks like the floor of a barn. The turf collapse includes patches of greenish-blue tephra that could be either LNL or ~950. It was this tephra that was originally identified as in situ in core 171466 and resulted in the placement of the excavation unit. Layer [106] has been truncated by some later leveling event [107], which removed most of the deposit within the excavation unit.

The collapsed barn deposit [106] lays on a thick deposit of brownish turf collapse [108], which also contains greenish-blue tephra that could be either the LNL or ~950 tephras or both. The turf collapse is likely associated with the underlying domestic floor and structure.

Below the layer of collapsed turf [108] is a corner of a domestic structure (*Figure 20*). These deposits were left largely intact. A firm layer of peat ash with small charcoal inclusions (<0.5 cm) [109] covers most of the unit and was interpreted as a domestic floor although it is not heavily compacted or striated. A bulk soil sample (#16) was taken for flotation from the southeast corner of the floor. The exposed section revealed multiple layers of peat ash, turf and compacted floor lenses with a total depth ranging between 8 and 14 cm. The northern section of the floor was truncated before the building fully collapsed as the turf layer above the truncated section of floor [108] filled the gap in the floor. The truncated section of the floor and sampling location revealed a number of large flattish rocks under the floor. It is apparent in the section that the floor had been excavated about 10 cm into the subsoil. Floor accumulation began immediately on top of the rocks but it is unclear if these were deliberately placed for the floor or if the structure was initially excavated down to a natural rocky surface. The rocks were embedded in a natural-looking clayey and very hard yellowish-gray sediment. The sediment did not appear to contain any

of the yellow H3 tephra (the sediment was too fine and concreted).

The south side of the unit revealed the edge of an east-west running turf wall [111] indicating that the exposed floor is in the corner of a building. Making up the west side of the corner was a foundation of flat stones [110]. This may have been the base of another turf wall but the turf above the stones looks like collapse and not in situ wall blocks (as were clear in [111]). Also, there is a thin layer (<0.2 cm) or pinkish ash and fine charcoal covering parts of the flat stones in [110] that are difficult to account for under an in situ wall deposit. Small pieces of unburnt wood were found along the interface between [110] and [109]. The stone foundation may be the edge of an elevated platform inside the structure such as a bench or possibly an entrance to the building.

The excavation unit revealed an overall sequence beginning with a domestic building ([108][109][110][111]) followed by an animal structure that [106], that was levelled and partially truncated [107] before the regular accumulation of midden ([102][103][104][105]) (*Figure 21*). The domestic sequence at the farm clearly began significantly before the Hekla 1104 tephra as there are multiple layers of midden accumulation on top of what appears to be a domestic building under the tephra layer. Turf in the building had what appeared to be two distinct greenish tephra layers, in all likelihood the LNL and ~950 tephras. This makes it likely that the farmstead was established sometime after the ~950 layer. This leaves the question of the relationship to the Vj~1000 tephra, which is missing in the sequence, unclear. Absence of the tephra layer in the midden layers would suggest that the layer was truncated at the beginning of the sequence and therefore that Beingarður was established after the Vj~1000 tephra. However, the fact that the earliest layers of the excavation unit relate to the interior of a domestic building raises the possibility that the tephra fell when the building was standing and therefore was not incorporated into the surviving stratigraphic sequence. In the latter case, the farm was likely established in the second half of the 10th century.

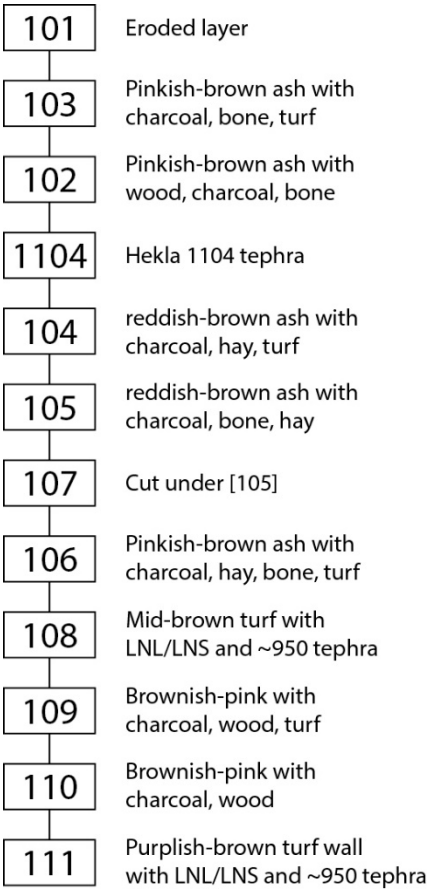

Figure 21. Beingarður, 1x1 meter excavation unit #1, Harris matrix.

Rein

Rein is currently an abandoned farm on the property of Egg. It is located at the southern end of Hegranes on the western side of a sloped piece of land that projects into an area of wetlands at the valley bottom (*Figure 1*). The eastern side of the farmstead is delineated by a low but precipitous escarpment. The area to the west of the farmstead has recently been drained. The drainage ditch profiles show that the area has been boggy for the past several thousand years. The land to the northeast of the farmstead, in the direction of Keta, is dry but heavily eroded.

Rein had two major periods of occupation. The first beginning with the Viking Age settlement of Hegranes and lasting into the late Middle Ages and a later reoccupation sometime in the 18th century and lasting into the first half of the 20th century (Pálsson 2010). The

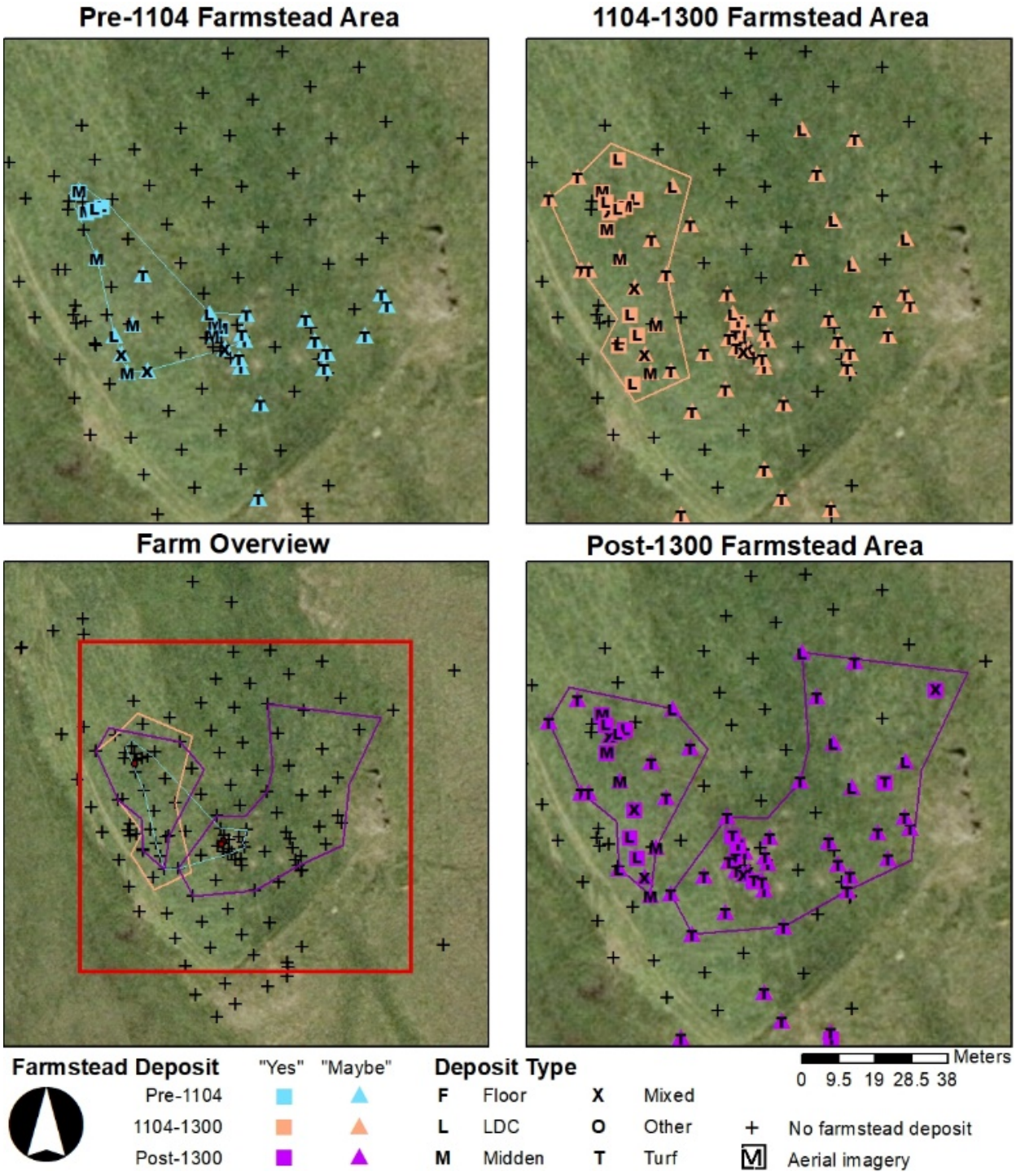

Figure 22. Rein farmstead coring and estimated farmstead extents. The boundary for the early modern farmstead is to the east.

end of the first occupation is unrecorded but probably occurred sometime in the 15th century. The tephra sequence in the midden clearly shows continued accumulation after A.D. 1300 (Bolender, et al. 2017). The farm is listed in the A.D. 1388 inventory of properties belonging to the Bishopric at Hólar (Diplomatarium Islandicum, 3:408, 413). The specification of rent payments suggests the farm was occupied at the time but was likely abandoned sometime before A.D. 1449 as it was not then listed in the Hólar inventory from that year.

In 1713, the Jarðabók Árnamágnussonar lists Rein as an abandoned farm on the property of Egg, which was

owned by the Hólar bishopric (Magnússon and Vídalín 1930). At that time the homefield fence and turfhouse ruins were visible but there was no knowledge of when it had last been occupied. In 1802 Hólar sold Egg, including Rein. It is unclear if Rein was occupied at the time. The first recorded reoccupation is in 1831. The farm continued to be occupied until 1931 with short period of abandonment from 1887-1889 and 1921-1923 (Pálsson 2010).

Farmstead coring

The primary survey work at Rein was conducted during the 2016 field season. Additional coring was done in 2017 as part of the extensive coring program and to define the area of the early modern reoccupied farmstead at the site.

Over the two field seasons, 206 cores were taken at Rein (147 in 2016 and 59 in 2017). Of the 206 cores, 83 had farmstead deposits. Most of these were concentrated in the area of the Viking Age/Late Medieval farm mound and the nearby early modern farmstead. The newly defined early modern farmstead measured 2800 m^2 (*Figure 22*).

As part of the final project assessment, all preliminary farmstead area sizes were re-evaluated (see below). The identification of the early modern farmstead at Rein resulted in a minor alteration of the preliminary 2016 post-1300 farmstead boundary as a small separate patch of farmstead deposition that had originally been assigned to the post-1300 Late Medieval farmstead was subsequently assigned to the early modern farmstead. However, after the re-evaluation of the original farmstead boundaries was completed, the post-1300 Late Medieval farmstead had the same area as originally estimated in 2016: 1100 m^2.

Excavation

No additional excavation was conducted at Rein in 2017.

Outcomes of the 2017 survey and future work

In the 2017 field season the survey dated the establishment and measured the area of the last three farmsteads to be surveyed in Hegranes. The early modern farmstead boundary at Rein was also defined and two possible farmstead areas at Hegranesþing (separately reported) were also identified. With the seven farmsteads surveyed in 2015 and nine farmstead surveyed in 2016, this year completed the survey of all known farmsteads in Hegranes plus the abandoned places that have been investigated as part of the Fornbýli Landscape and Archaeological Survey on Hegranes (FLASH) project (not counting Kárastaðir and Ferjuhamar, for which access has not been granted). The farmstead areas range from very small (<1000 m^2) to large (>19,000 m^2). The distribution shows a distinct discontinuity between the smaller farmsteads (ca. <5000 m^2) and larger farmstead (ca. <10,000 m^2) in the pre-1104 period. This discontinuity is not explained entirely by the order of establishment but all of the largest farmsteads were likely established before ca. 950.

Farmstead establishment dates currently are based on the presence of midden deposits below the oldest tephra layer identified in the test excavations. These dates may change based on the chemical identification of tephra and the addition of radiocarbon dating to help refine the sequence. Based on these preliminary data, there is a general relationship between farm establishment date and farmstead size in which early establishment correlates with larger farmstead size as measured for the pre-1104 phase (*Table 1*). This relationship, however, appears to be much weaker than that identified in the neighboring region of Langholt, which showed a very high inverse correlation between establishment date and pre-1104 farmstead size (Steinberg, et al. 2016). In Hegranes, there appears to be much greater variation in farmstead sizes with similar establishment dates. Adding in the small farms or activity areas from the FLASH project would further weaken this relationship in Hegranes, as many of these places are both very small and early. These result are

highly preliminary but they do suggest a difference in the overall settlement pattern and process when comparing Hegranes and the neighboring region of Langholt.

Another finding is that the range of farmstead sizes in Hegranes is broader than the range in Langholt. In Langholt, farms ranged from just under 1000 m2 to about 10,000 m2 for the pre-1104 period. In Hegranes the current range is from 400 m2 to 15,300 m2 for the pre-1104 period.

Future work:

- The main fieldwork planned for the three-year SCASS project was completed in 2017.
- In 2017, a possible early Christian cemetery was identified by geophysical surveying at Utanverðunes. Follow up excavation is necessary to confirm (or deny) the presence of a church and cemetery at the site.
- Additional geophysical survey could be done around other farmsteads to identify additional possible early Christian cemetery sites.
- Some sites, in particular Ás, would benefit from additional test excavations to refine the original establishment date and sequence at the farm.
- Farmstead establishment dates will be refined with radiocarbon dating and tephra analysis. These analyses are ongong.

Table 1. Hegranes farmstead establishment dates and areas.

Farmstead	Establishment Date	Farmstead Areal Extent (m^2) Pre-1104	1104-1300	Post-1300
Rein	<1000	908	1440	1144
Rein, 1831-1931				2794
Beingarður	<1104	1139	1339	4162
Ríp 2	<1104	1400		
Hegranesþing South	<1104	2083	3230	
Keta	<1104	2306	4738	4350
Hegranesþing North	<950	2413		
Vatnskot	<1000	3539	3965	7427
Lower Keflavík	<1000	3752		
Hamar	1000-1104	4362	3901	6876
Utanverðunes	<1000	4376	9267	11448
Garður	<1104	4682	10216	8978
Ásgrímsstaðir	<950	4823	2944	1355
Keflavík	<950	4866	5297	4993
Hróarsdalur	<950	5887	4985	4986
Helluland	<950	12020	19945	17861
Ás	<950	12167	10471	13367
Keldudalur	<950	13041	13511	13145
Ríp	<950	15152	13592	11673
Egg	<950	15265	14725	13931

Appendix A: Spatial Controls: Coring, test excavations, geophysical survey grids, and ground control points for low-altitude aerial photography and photogrammetry

All spatial measurements collected in the survey utilize the ISNET 93 coordinate system.

Core locations

Core locations were measured using three methods: 1) location capture using the internal assisted GPS in the Apple iPads used for in-field data recording; 2) secondary measurement of core locations using a Topcon Hiper SR GNSS with RTK correction; 3) post processed core locations using Trimble GeoXH with Zepher antenna. The internal iPad location capture is only accurate to within approximately ±5 meters, which was generally sufficient for broad reconnaissance survey. The Hiper SR utilized a RTK correction from the local Sauðárkrókur base station via ÍSMAR and has an estimated accuracy of ±1 centimeter in the horizontal and ±2 centimeters in vertical location. The post processed Trimble GeoXH data has an estimated accuracy of ±30 centimeters.

Test trench locations

The corners of all test excavations were measured using the Hiper SR. All measurements and excavation geometries are stored in an ESRI-formatted geodatabase.

Spatial measurements: total station, kite- and pole-based low altitude aerial photography, photogrammetry

Spatial measurements were made using a Topcon total station or based on kite- and pole-based orthorectified images generated from multiple camera positions using Agisoft Photoscan photogrammetry software. All measurements use the ISNET93 coordinate system. For each photographic run, ground control points (GCPs) were placed in the subject area and measured with the total station for input into Photoscan to generate orthorectified composite images and corners of the excavation area and pinned in place to use as GCPs for the kite photos. Blue poker chips were used for the pole photos.

Ricoh GR was used with the kite and a Nikon Coolpix A was used with the pole. Both cameras have a fixed 18.33mm f/2.8 lens (28mm equivalent in a 35mm camera) and built in intervalometer, which was set to take photographs every 5 seconds. Both cameras were set to record data in RAW format. RAW photos were converted to TIFF using Adobe Photoshop for photogrammetry modeling in Photoscan.

For kite photos, the Ricoh GR camera was enclosed in layers of closed-cell polyethylene foam inside a Ziploc brand plastic box, which was hung from the kite line via a “Picavet” string suspension. For kite photos, the photo rig was suspended from an Air Affairs Sutton Flow Form 16. This design proved effective in protecting the camera during “hard landings” and in keeping the camera pointed downward at near-vertical angles during flight. Our standard photograph collecting procedure was for the kite operator to walk a loose grid pattern, walking a set number of strides, stopping long enough for the camera to take 2-3 shots, and repeating. When available, a second person stood either directly under the camera or to the side in order to keep the operator appraised of the area being photographed. Kite photos were collected at the beginning of fieldwork before site opening, at two occasions as excavation proceeded, and again at the end of the excavation prior to site closure.

Pole photos were collected of various contexts, structures, and of graves. The Nikon Coolpix A was suspended from a 4-meter extension pole topped by a mount that allows the camera to self-balance pointing down. For some features, such as the bottom of graves, the camera was simply held by hand and oblique shots were collected in addition to the top-down shots to

better aid in 3d modelling of complex features in Photoscan.

The resulting photographs can be georeferenced and used to establish a visual overview of site and surface conditions including the location of visible ruins, vegetation and other surface features to aid in the interpretation of geophysical anomalies. Agisoft's Photoscan photogrammetry software was used to produce 3d models of features. These models can be output as georeferenced orthophotos and digital elevation models (DEMs) for incorporation in GIS.

Kite-based and pole-based photography datasets include:

1) Unprocessed RAW images. Full collection of digital photos from each kite flight and pole run.
2) Selected TIFF converted images.
3) 3d models in Photoscan format.
4) Orthorectified composite images generated from 3d models in Photoscan.
5) Digital elevation models generated from 3d models in Photoscan.

Appendix B: Excavations, Contexts, Samples, Finds, and Photos

Hamar (Jarðatal Johnsen farm number 455; Place number 0)

Excavation type: Test Pit 1, 1x1 meter

Opening date: 14 July 2017; Closing date: 14 July 2017

Southwest corner, east: 479161.74; north: 573770.97

Contexts

CONTEXT	TYPE	DESCRIPTION	ID	DATE
101	Deposit	Plowed, root mat, gravel	DJB	07/14/2017
102	Deposit	Just below plow zone; lots of charcoal	DJB	07/14/2017
1104	Deposit	Tephra from 1104 eruption of Hekla	DJB	07/14/2017
103	Deposit	Midden, peat ash and charcoal mixed with some minor lensing	DJB	07/14/2017
104	Deposit	Household midden, similar to [103] above	DJB	07/14/2017
105	Deposit	Midden continues. Fairly uniform peat ash matrix. Fire cracked rock, but not as concentrated as in [104]. There are also a few charcoal lenses in the stratum.	DJB	07/14/2017
106	Deposit	Trampled surface and underlying deposit in midden.	DJB	07/14/2017
107	Deposit	Natural turf - sterile, ends on glacial sand. No samples taken. Profiled north and west walls.	DJB	07/14/2017

Samples

SAMPLE	CONTEXT	TYPE	DESCRIPTION	ID	DATE
1	102	Flotation	Bulk soil for flotation	GMC	07/14/2017
2	102	Bone, Animal	Animal bones, screen collection	GMC	07/14/2017
3	103	Flotation	Bulk soil for flotation	GMC	07/14/2017
4	103	Bone, Animal	Animal bones, screen collection	GMC	07/14/2017
5	104	Flotation	Bulk soil for flotation	GMC	07/14/2017
6	104	Bone, Animal	Animal bones, screen collection	GMC	07/14/2017
7	105	Flotation	Bulk soil for flotation	GMC	07/14/2017
8	105	Bone, Animal	Animal bones, screen collection	GMC	07/14/2017
9	106	Flotation	Bulk soil for flotation, compact layer top of unit	GMC	07/14/2017
10	106	Bone, Animal	Animal bones, screen collection	GMC	07/14/2017
11	103	Flotation	Bulk soil for flotation, bottom of unit	GMC	07/14/2017
12	107	Flotation	Bulk soil for flotation	GMC	07/14/2017

Finds

FIND	CONTEXT	RETRIEVAL	COUNT	MATERIAL	DESCRIPTION	ID	DATE
1	102	Screen	1	Metal	Unidentified object with small round hook. 26.3mm in length; round hole 4.9mm diameter	GMC	07/14/2017
2	102	Screen	1	Bone	Bone or ivory pin: thin pointed object	GMC	07/14/2017
3	104	Hand	1	Metal	Metal object	NZ	07/14/2017
4	105	Hand	1	Glass	Thin fragment of glass	DJB	07/14/2017

5	102	Sample #2	1	Bone	Possibly shaped fragment of a small animal long bone, 24.1 mm in length	GMC	07/27/2017
6	102	Sample #2	1	Bone	Fragment of bone with incised transverse grooves, 25.3 mm in length	GMC	07/27/2017

Photos

IMAGE	CAMERA	CONTEXT	DIRECTION	DESCRIPTION	ID	DATE
4685	Sao Paulo	1104	North	H1 tephra in situ	RSS	07/14/2017
4686	Sao Paulo	103	North	Opening 103, midden	RSS	07/14/2017
4687	Sao Paulo	103	North	Opening 103, midden	RSS	07/14/2017
4688	Sao Paulo	103	North	Opening 103, midden	RSS	07/14/2017
4689	Sao Paulo	104	North	Opening 104, midden	RSS	07/14/2017
4690	Sao Paulo	104	North	Opening 104, midden	RSS	07/14/2017
4691	Sao Paulo	104	North	Opening 104, midden	RSS	07/14/2017
4692	Sao Paulo	105	North	Opening 105, midden	RSS	07/14/2017
4693	Sao Paulo	105	North	Opening 105, midden	RSS	07/14/2017
4694	Sao Paulo	105	North	Opening 105, midden	RSS	07/14/2017
4695	Sao Paulo	105	North	Opening 105, midden	RSS	07/14/2017
4696	Sao Paulo	106	North	Opening 106, midden	RSS	07/14/2017
4697	Sao Paulo	106	North	Opening 106, midden	RSS	07/14/2017
4698	Sao Paulo	106	North	Opening 106, midden	RSS	07/14/2017
4699	Sao Paulo	107	North	Opening 107, midden	RSS	07/14/2017
4700	Sao Paulo	107	North	Opening 107, midden	RSS	07/14/2017
4701	Sao Paulo	107	North	Opening 107, midden	RSS	07/14/2017
4702	Sao Paulo	-	West	Profile	RSS	07/14/2017
4703	Sao Paulo	-	West	Profile	RSS	07/14/2017
4704	Sao Paulo	-	West	Profile	RSS	07/14/2017
4705	Sao Paulo	-	North	Profile	RSS	07/14/2017
4706	Sao Paulo	-	North	Profile	RSS	07/14/2017
4707	Sao Paulo	-	North	Profile	RSS	07/14/2017
4708	Sao Paulo	-	North	Profile	RSS	07/14/2017
4709	Sao Paulo	-	North	Profile	RSS	07/14/2017
4710	Sao Paulo	-	North	Profile	RSS	07/14/2017
4711	Sao Paulo	-	North	Profile	RSS	07/14/2017

Beingarður (Jarðatal Johnsen farm number 440; Place number 0)

Excavation type: Test Pit 1, 1x1 meter

Opening date: 19 July 2017; Closing date: 21 July 2017

Southwest corner, east: 479003.30; north: 576015.107

Contexts

CONTEXT	TYPE	DESCRIPTION	ID	DATE
101	Cut	Eroded surface layer, absent	DJB	July 19, 2017
102	Deposit	Midden	DJB	July 19, 2017
1104	Deposit	1104 tephra	DJB	July 19, 2017
103	Deposit	Intrusive midden filled pit.	DJB	July 19, 2017
104	Deposit	Lensed midden deposit with multiple dumiping events.	DJB	July 19, 2017
105	Deposit	Lensed midden deposit with multiple dumiping events. Broke on a lense of peat ash and charcoal	DJB	July 19, 2017
106	Deposit	Hay filled turfy midden	DJB	July 20, 2017
107	Cut	Cut associated with in situ burn event at bottom of 105 in SE corner of unit	DJB	July 20, 2017
108	Deposit	Yellow and rust red mottled	DJB	July 20, 2017
109	Deposit	Brownish-pink firm floor	DJB	July 20, 2017
110	Deposit	Bench/wall; west side of unit	DJB	July 21, 2017
111	Deposit	Turf wall; southern end of unit	DJB	July 21, 2017

Samples

SAMPLE	CONTEXT	TYPE	DESCRIPTION	ID	DATE
1	102	Flotation	Bulk soil for flotation	DJB	07/19/2017
2	102	Bone, Animal	Animal bones, screen collection	DJB	07/19/2017
3	1104	Bone, Animal	Animal bones, screen collection	DJB	07/19/2017
4	103	Bone, Animal	Animal bones, screen collection	DJB	07/19/2017
5	104	Flotation	Bulk soil for flotation	LWO	07/19/2017
6	104	Bone, Animal	Animal bones, screen collection	LWO	07/19/2017
7	105	Flotation	Bulk soil for flotation	MMR	07/20/2017
8	105	Bone, Animal	Animal bones, screen collection	MMR	07/20/2017
9	105	Slag	Pieces of slag	MMR	07/20/2017
10	106	Flotation	Bulk soil for flotation	MMR	07/20/2017
11	106	Flotation	Organic material	MMR	07/20/2017
13	106	Bone, Animal	Animal bones, screen collection	MMR	07/20/2017
15	109	Flotation	Bulk soil for flotation	DJB	07/20/2017
16	109	Flotation	Bulk soil for flotation	DJB	07/21/2017
17	105	Micromorph	Soil block, south profile [105] [107] [108]	AHS	07/21/2017

Finds

FIND	CONTEXT	RETRIEVAL	COUNT	MATERIAL	DESCRIPTION	ID	DATE
1	108	Hand	3	Lithic	3 stones including: 1 roundish and semi-transparent 16.3mm; 1 semi-transparent, irregular with extensive conchoidal or subconchoidal fracturing, 17.9mm x 13.6mm; 1 small irregular	LW	07/20/2017

					rounded whitish with beginnings of crystalline formation. 15.6mm		
2	106	Hand	3	Lithic	3 stones including: 1 irregular and semi-transparent 29.7mm; 1 opaque whitish with fibrous crystalline formations. 22.3mm; 1 small rounded whitish with beginnings of crystalline formations. 15.2mm	MES	07/20/2017

Photos

IMAGE	CAMERA	CONTEXT	DIRECTION	DESCRIPTION	ID	DATE
38	Delhi	102	North	Open 102	LWO	July 19, 2017
39	Delhi	102	North	Open 102	LWO	July 19, 2017
40	Delhi	1104	North	In situ Hekla 1104 tephra	LWO	July 19, 2017
41	Delhi	1104	North	In situ Hekla 1104 tephra	LWO	July 19, 2017
42	Delhi	104	North	Open 104, 103 mid-excavation	LWO	July 19, 2017
43	Delhi	104	North	Open 104, 103 mid-excavation	LWO	July 19, 2017
44	Delhi	105	North	Open 105, 103 mid-excavation	LWO	July 20, 2017
45	Delhi	105	North	Open 105, 103 mid-excavation	LWO	July 20, 2017
46	Delhi	105	North	Fibrous material in 105, possible animal floor/bedding or sweep out	LWO	July 20, 2017
47	Delhi	105	North	Compact ash lens in 105	LWO	July 20, 2017
48	Delhi	105	North	Compact ash lens in 105	LWO	July 20, 2017
49	Delhi	105	North	Charcoal lens bottom of 105, cut in SE corner of unit	LWO	July 20, 2017
50	Delhi	105	North	Charcoal lens bottom of 105, cut in SE corner of unit	LWO	July 20, 2017
51	Delhi	106	North	Open 106, cut in SE corner of unit 107	LWO	July 20, 2017
52	Delhi	106	North	Mid-excavation, turf blocks	LWO	July 20, 2017
53	Delhi	106	North	Mid-excavation, turf blocks	LWO	July 20, 2017
54	Delhi	108	North	Turf collapse	LWO	July 20, 2017
55	Delhi	108	North	Turf collapse	LWO	July 20, 2017
56	Delhi	109	North	Open 109	LWO	July 20, 2017
57	Delhi	109	North	Open 109	LWO	July 20, 2017
59	Delhi	109	North	Open 109	LWO	July 20, 2017
60	Delhi	109	North	Open 109	LWO	July 20, 2017
61	Delhi	109	North	Open 109	LWO	July 20, 2017
62	Delhi	109	North	Open 109	LWO	July 20, 2017
63	Delhi	-	North	Profile	DJB	July 21, 2017
64	Delhi	-	North	Profile	DJB	July 21, 2017
65	Delhi	-	East	Profile	DJB	July 21, 2017
66	Delhi	-	East	Profile	DJB	July 21, 2017
67	Delhi	-	South	Profile	DJB	July 21, 2017
68	Delhi	-	South	Profile	DJB	July 21, 2017
69	Delhi	-	West	Profile	DJB	July 21, 2017
70	Delhi	-	West	Profile	DJB	July 21, 2017

71	Delhi	109	North	Close of excavation [109][110][111]	DJB	July 21, 2017
72	Delhi	109	North	Close of excavation [109][110][111]	DJB	July 21, 2017
73	Delhi	109	North	Close of excavation [109][110][111]	DJB	July 21, 2017
74	Delhi	-	North	Profile	DJB	July 21, 2017
75	Delhi	-	East	Profile	DJB	July 21, 2017
76	Delhi	-	North	Profile	DJB	July 21, 2017
77	Delhi	-	East	Profile	DJB	July 21, 2017
78	Delhi	-	East	Profile	DJB	July 21, 2017
79	Delhi	-	East	Profile	DJB	July 21, 2017
80	Delhi	-	South	Profile	DJB	July 21, 2017
81	Delhi	-	South	Profile	DJB	July 21, 2017
82	Delhi	-	South	Profile	DJB	July 21, 2017
83	Delhi	-	West	Profile	DJB	July 21, 2017
84	Delhi	-	West	Profile	DJB	July 21, 2017
85	Delhi	-	West	Profile	DJB	July 21, 2017
87	Delhi	-	North	Profile	DJB	July 21, 2017
88	Delhi	-	North	Profile	DJB	July 21, 2017

Vatnskot (Jarðatal Johnsen farm number 443; Place number 0)

Excavation type: Test Pit 1, 1x2 meter (north-south orientation)

Opening date: 11 July 2017; Closing date: 18 July 2017

Southwest corner, east: 478294.39; north: 578525.49

Contexts

CONTEXT	TYPE	DESCRIPTION	ID	DATE
101	Deposit	Northern unit begun 11 July 17. Disturbed/bioturbated root mat and topsoil. Southern extension begun 17 July 17 - not screened or floated -,also disturbed/bioturbated root Mat.	AHS	July 11, 2017
102	Cut	Cut and fill through 1104. Similar to [101]	AHS	July 11, 2017
103	Deposit	Below H1 - low density cultural layer	AHS	July 11, 2017
1104	Deposit		AHS	July 11, 2017
104	Deposit	Midden	AHS	July 11, 2017
105	Deposit	Dark charcoal layer with metal ring pin	AHS	July 11, 2017
1000	Deposit	1000 tephra, discontinuous throughout unit	AHS	July 11, 2017
106	Deposit	Dark charcoal layer at top, then peat ash layer directly beneath; bottom 2-3 cm looks like turf collapse.	AHS	July 12, 2017
107	Deposit	Laminated charcoal and peat ash. A lot of bone and burned bone. Truncated in NE,NW, SE corners.	AHS	July 12, 2017
108	Deposit	Greasy midden under floor, significantly less burned bone, but a lot of unburned bone and shell fragments.	AHS	July 12, 2017
109	Deposit	Below midden - mixed cultural and H3 - screened, but no bones or finds. Flotation sample taken.	AHS	July 12, 2017
1300	Deposit	Southern pit. [101] removed down to 1300 tephra	GMC	July 17, 2017
110	Deposit	Context just below 1300 tephra. N photos, but very friable and disturbed deposit just below root Mat.	GMC	July 17, 2017
1104	Deposit	H1 tephra	GMC	July 17, 2017
111	Deposit	Low density cultural. Opening context picture taken taken on RSS Canon 102; number 8434. Largest amount of bones in SW corner; at least one articulated fish in SW corner.	GMC	July 17, 2017
112	Deposit	True midden that includes, peat ash, turf, bone, charcoal, shell	GMC	July 17, 2017
114	Deposit	Compacted peaty/ashy layer, mainly fragmented burned bone	AHS	July 17, 2017
113	Deposit	Midden under 1000. Images on RSS's Canon 102 and on iPad camera.	GMC	July 17, 2017
1000	Deposit	Tephra	AHS	July 17, 2017
115	Deposit	Under floor, lower density	AHS	July 17, 2017

Samples

SAMPLE	CONTEXT	TYPE	DESCRIPTION	ID	DATE
1	103	Flotation	Bulk soil for flotation, SW corner of unit, top	AHS	July 11, 2017
2	103	Bone, Animal	Animal bones, screen collection	GMC	July 11, 2017
3	104	Bone, Animal	Animal bones, screen collection	RSS	July 11, 2017
4	104	Flotation	Bulk soil for flotation	RSS	July 11, 2017
5	105	Flotation	Bulk soil for flotation, top of 105	GMC	July 11, 2017
6	105	Bone, Animal	Animal bones, screen collection	GMC	July 11, 2017

7	105	Flotation	Bulk soil for flotation, bottom of 105	AHS	July 12, 2017
7	106	Flotation	Bulk soil for flotation	AHS	July 12, 2017
9	107	Flotation	Bulk soil for flotation	DJB	July 12, 2017
10	108	Flotation	Bulk soil for flotation	AHS	July 12, 2017
13	109	Flotation	Bulk soil for flotation	AHS	July 12, 2017
8	106	Bone, Animal	Animal bones, screen collection	AHS	July 12, 2017
11	107	Bone, Animal	Animal bones, screen collection	AHS	July 12, 2017
12	108	Bone, Animal	Animal bones, screen collection	AHS	July 12, 2017
14	109	Tephra	Tephra in context	AHS	July 13, 2017
15	110	Flotation	Bulk soil for flotation	GMC	July 17, 2017
16	110	Bone, Animal	Animal bones, screen collection	GMC	July 17, 2017
17	111	Flotation	Bulk soil for flotation	AHS	July 17, 2017
18	111	Bone, Animal	Animal bones, screen collection	GMC	July 17, 2017
19	112	Flotation	top of context	AHS	July 17, 2017
20	112	Bone, Animal	Animal bones, screen collection	GMC	July 17, 2017
21	112	Flotation	Lower level of context	RSS	July 17, 2017
22	113	Flotation	Bulk soil for flotation	AHS	July 17, 2017
23	113	Bone, Animal	Animal bones, screen collection	GMC	July 17, 2017
24	114	Flotation	Bulk soil for flotation, floor	AHS	July 17, 2017
25	115	Flotation	Bulk soil for flotation	AHS	July 17, 2017
26	115	Bone, Animal	Animal bones, screen collection	GMC	July 17, 2017

Finds

FIND	CONTEXT	RETRIEVAL	COUNT	MATERIAL	DESCRIPTION	ID	DATE
1	104	Point	1	Bone	Whale bone?	DJB	July 11, 2017
2	104	Hand	2	Stone	White stone, not pretty pebble	DJB	July 11, 2017
3	104	Screen	3	Metal		DJB	July 11, 2017
5	105	Hand	4	Metal	Decorated bronze ring with iron pin shaft	DJB	July 11, 2017
4	105	Hand	5	Stone	White stone	DJB	July 11, 2017
6	106	Hand	6	Ceramic	White ceramic, maybe wall fall	DJB	July 12, 2017
7	107	Hand	7	Wood	Flat fragment of cut wood.	DJB	July 12, 2017
8	108	Screen	8	Metal		DJB	July 12, 2017
9	108	Screen	9	Bone	Worked bone toggle or pendant or pin head	DJB	July 12, 2017
10	111	Hand	10	Metal		DJB	July 17, 2017
11	111	Screen	11	Stone	Turquoise in color, maybe worked	DJB	July 17, 2017
12	111	Screen	12	Bone	maybe worked/drilled	DJB	July 17, 2017
13	111	Hand	13	Metal	Bolt? Horse tack?	DJB	July 17, 2017
14	111	Hand	14	Stone	Fragment	DJB	July 17, 2017
15	112	Hand	15	Metal	Fragment of bolt/fastener?	DJB	July 17, 2017
16	112	Hand	16	Stone	Manuport - white , worked? Rock	DJB	July 17, 2017
17	112	Screen	17	Metal	Rusted bolt/nail?	DJB	July 17, 2017

18	113	Screen	18	Stone	White stone	DJB	July 17, 2017
19	113	Screen	19	Metal	Nail?	DJB	July 17, 2017
20	115	Screen	20	Bone	Pin? Whale bone?	DJB	July 17, 2017
21	115	Screen	21	Stone	White stone	DJB	July 17, 2017

References

1857-1972 *Diplomatarium Islandicum, Íslenzkt fornbréfasafn 834-1600, I-XVI*, Copenhagen and Reykjavík.

Amorosi, Thomas, Paul Buckland, K. Edwards, I. Mainland, Thomas McGovern, J. Sadler and P. Skidmore

1998 They did not live by grass alone: the politics and paleoecology of animal fodder in the North Atlantic region. *Environmental Archaeology* 1:41-54.

Arnalds, O., C. T. Hallmark and L. P. Wilding

1995 Andisols from Four Different Regions of Iceland. *Soil Science Society of America journal* 59(1):161.

Arnalds, Ólafur

2008 Soils of Iceland. *Jökull* 58:409-421.

Ãrnalds, Ólafur

2004 Volcanic soils of Iceland. *Catena* 56(1):18.

Bolender, Douglas J., John M. Steinberg, Brian N Damiata and Guðný Zoëga

2017 *Hegranes Settlement Survey: Rein, Keta, Hamar, Utanverðunes, Ásgrímsstaðir. Interim Report 2016*. University of Massachusetts Boston. Byggðasafn Skagfirðinga.

Bolender, Douglas J., John M. Steinberg and Brian N. Damiata

2011 Farmstead Relocation at the End of the Viking Age. Results of the Skagafjörður Archaeological Settlement Survey. *Archaeologia Islandica* 9:77-101.

Boygle, J.

1999 Variability of tephra in lake and catchment sediments, Svinavatn, Iceland. *Global and Planetary Change* 21(1-3):129-149.

Brown, Jennifer L., Ian A. Simpson, Stuart J. L. Morrison, W. Paul Adderley, Eileen Tisdall and Orri Vesteinsson

2012 Shieling Areas: Historical Grazing Pressures and Landscape Responses in Northern Iceland. *Human Ecology* 40(1):81-99.

Buckland, Paul C. , A. John Gerrard, Jon P. Sadler and Guðrún Sveinbjarnardóttir

1994 Farmers, farm mounds and environmental change. In *Environmental Change in Iceland*, edited by J. Stötter and F. Wilhelm, pp. 7-29. vol. B12. Institut für Geographie der Universität München, München.

Catlin, Kathryn A.

2016 *Fornbýli Landscape and Archaeological Survey on Hegranes (FLASH), Interim Report 2016*. Byggðasafn Skagfirðinga.

Cossart, Etienne, Denis Mercier, Armelle Decaulne, Thierry Feuillet, Helgi Páll Jónsson and Þorsteinn Sæmundsson

2014 Impacts of post-glacial rebound on landslide spatial distribution at a regional scale in northern Iceland (Skagafjörður). *Earth Surface Processes and Landforms* 39(3):336-350.

Davidson, Donald. A., Douglas D. Harkness and Ian A. Simpson

1986 The formation of farm mounds on the Island of Sanday, Orkney. *Geoarchaeology* 1:36-48.

Davies, S. M., G. Larsen, S. Wastegard, C. S. M. Turney, V. A. Hall, L. Coyle and T. Thordarson

2010 Widespread dispersal of Icelandic tephra: how does the Eyjafjoll eruption of 2010 compare to past Icelandic events? *Journal of Quaternary Science* 25(5):605-611.

Dugmore, Andrew J and Anthony J Newton

2012 Isochrons and beyond: maximising the use of tephrochronology in geomorphology. *Jökull* 62:39-52.

Dugmore, Andrew J., G. T. Cook, J. S. Shore, A. J. Newton, K. J. Edwards and Gudrún Larsen

1995 Radiocarbon Dating Tephra Layers in Britain and Iceland. *Radiocarbon* 37(2):10.

Eiriksson, J., K. L. Knudsen, H. Haflidason and J. Heinemeier

2000 Chronology of late Holocene climatic events in the northern North Atlantic based on AMS C-14 dates and tephra markers from the volcano Hekla, Iceland. *Journal of Quaternary Science* 15(6):573-580.

Fei, J. and J. Zhou

2006 The possible climatic impact in China of Iceland's Eldgja eruption inferred from historical sources. *Climatic Change* 76(3-4):443-457.

Feuillet, Thierry, Denis Mercier, Armelle Decaulne and Etienne Cossart

2012 Classification of sorted patterned ground areas based on their environmental characteristics (Skagafjörður, Northern Iceland). *Geomorphology* 139–140:577-587.

Friðriksson, Sturla

1972 Grass and grass utilization in Iceland. *Ecology* 53:785-796.

Grönvold, K., N. Óskarsson, S. J. Johnsen, H. B. Clausen, C. U. Hammer, G. Bond and E. Bard

1995 Ash layers from Iceland in the Greenland GRIP ice core correlated with oceanic and land sediments. *Earth and Planetary Science Letters* 135:149-155.

Hallsdóttir, M.

1987 Pollen analytical studies of human influence on vegetation in relation to the Landnám tephra layer in Southwest Iceland. Ph.D., Department of Quarternary Geology, Lund University, Lund.

Hammer, Claus U, Henrik B Clausen and Willi Dansgaard

1980 Greenland ice sheet evidence of post-glacial volcanism and its climatic impact. *Nature* 288:230-235.

Larsen, Gudrún

1984 Recent volcanic history of the Veidivotn fissure swarm, southern Iceland -- an approach to volcanic risk assessment. *Journal of Volcanology and Geothermal Research* 22(1-2):33-58.

Larsen, Gudrún, Andrew J. Dugmore and Anthony Newton

1999 Geochemistry of historical-age silicic tephras in Iceland. *The Holocene* 9(4):9.

Larsen, Gudrún, Jón Eiríksson, Karen Louise Knudsen and Jan Heinemeier

2002 Correlation of late Holocene terrestrial and marine tephra markers, north Iceland: implications for reservoir age changes. *Polar research* 21(2):283-290.

Larsen, Gudrún, Anthony J. Newton, Andrew J. Dugmore and E. G. Vilmundardottir

2001 Geochemistry, dispersal, volumes and chronology of Holocene silicic tephra layers from the Katla volcanic system, Iceland. *Journal of Quaternary Science* 16:119-132.

Lárusson, Björn

1967 *The Old Icelandic Land Registers*. C. W. K. Gleerup, Lund.

Lucas, Gavin

2008 Pálstóftir: A Viking Age Shieling in Iceland. *Norwegian Archaeological Review* 41(1):85-100.

2009 *Hofstaðir : excavations of a Viking age feasting hall in north-eastern Iceland*. Monograph. Institute of Archaeology, Reykjavik.

Magnússon, Árni and Páll Vídalín

1930 *Járðabók Árna Magnússonar og Páls Vídalíns I-XIII*. Hið íslenska fræðafélag, Copenhagen.

Milek, Karen

2006 Houses and Households in Early Icelandic Society: Geoarchaeology and the Interpretation of Social Space. Ph.D., Department of Archaeology, University of Cambridge, Cambridge.

Ólafsson, Guðmundur

1985 Gjóskulög í Austurdal og Vesturdal, Skagafirdi. , Námsritgerd við Háskóla Íslands, Reykjavík.

Ólafsson, Guðmundur and Hörður Ágústsson

2004 *The Reconstructed Medieval Farm in Þjósárdalur and the development of the Icelandic turf house*. National Museum of Iceland and Landsvirkjun, Reykjavík.

Pálsson, Hjalti

2010 *Byggðasaga Skagafjarðar: V. Bindi Rípurhreppur - Viðvíkurhreppur*. Sögufélag Skagafirðinga, Sauðárkróki (Iceland).

Schmid, Magdalena M. E., Andrew J. Dugmore, Orri Vésteinsson and Anthony J. Newton

2017 Tephra isochrons and chronologies of colonisation. *Quaternary Geochronology* 40:56-66.

Service, Museum of London Archaeology

1994 *Archaeological Site Manual, Third edition*. Museum of London, London.

Sigurðardóttir, Sigríður

2012 *Skagfirska kirkjuránnsóknin. Miðaldakirkjur 1000-1318*. Rit Byggðasafn Skagfirðinga I. Ásprent, Akureyri.

Sigurðsson, Guðmundur St.

2014 *Hamar í Hegranesi - Neyðarrannsókn 2014*. Byggðasafn Skagfirðinga.

Sigurgeirsson, Magnús Á.

1998 Gjóskulagarannsóknir á Hofstoðum 1992–1997. *Archaeologia Islandica* 1:110-118.

Sigurgeirsson, Magnús Á., Ulf Hauptfleisch, Anthony Newton and Árni Einarsson

2013 Dating of the Viking Age Landnám Tephra Sequence in Lake Mývatn Sediment, North Iceland. *Journal of the North Atlantic* 21:1-11.

Simpson, Ian, Orri Vésteinsson, W. Paul Adderly and Thomas McGovern

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

Snæsdóttir, Mjöll

1991 Stóraborg - An Icelandic Farm Mound. *Acta Archaeologica* 61:116-120.

Steinberg, John M., Douglas J. Bolender and Brian N. Damiata

2016 Viking Age Settlement Patterns in Northern Iceland: Initial Results of The Skagafjörður Archaeological Settlement Survey. *Journal of Field Archaeology*.

Sveinbjarnardóttir, Guðrún

1991 Shielings in Iceland - an archaeological and historical survey. *Acta Archaeologica* 61:73-96.

1992 *Farm Abandonment in Medieval and Post-Medieval Iceland: an Interdisciplinary Study*. Oxbow Monograph 17. Oxbow Press, Oxford.

Thórarinsson, S.

1967 The eruptions of Hekla in historical times. In *The Eruption of Hekla, 1947-1948. Vol. 1 of The Eruptions of Hekla in Historical Times: A*

Tephrochronological Study, edited by S. Thórarinsson, pp. 5-183. Leiftur, Reykjavik.

Þórarinsson, Sigurður

1977 Gjóskulög og gamlar rústir. *Árbók* 1976:5-38.

Thordarson, T., D. J. Miller, G. Larsen, S. Self and H. Sigurdsson

2001 New estimates of sulfur degassing and atmospheric mass-loading by the 934 AD Eldgja eruption, Iceland. *Journal of Volcanology and Geothermal Research* 108(1-4):33-54.

Urbańczyk, Przemyslaw

1999 North Atlantic turf architecture as an example of environmental adaptation. *Archaeologia Polona* 37:119-133.

Vésteinsson, Orri

2004 Icelandic farmhouse excavations: field methods and site choices. *Archaeological Islandica* 3:71-100.

2010 On Farm-Mounds. *Archaeologia Islandica* 8:13-39.

Vésteinsson, Orri and Ian Simpson

2004 Fuel utilization in pre-industrial Iceland. A micromorphological and historical analysis. In *Current Issues in Nordic Archaeology. Proceedings of the 21st Conference of Nordic Archaeologists 6-9 September 2001 Akureyri, Iceland*, edited by G. Guðmundsson. Society of Icelandic Archaeologists, Reykjavík.

Vickers, Kim and Guorun Sveinbjarnardottir

2013 Insect invaders, seasonality and transhumant pastoralism in the Icelandic shieling economy. *Environmental Archaeology* 18(2):165-177.

Wastegard, S., V. A. Hall, G. E. Hannon, C. van den Bogaard, J. R. Pilcher, M. A. Sigurgeirsson and M. Hermanns-Audardottir

2003 Rhyolitic tephra horizons in northwestern Europe and Iceland from the AD 700s-800s: a potential alternative for dating first human impact. *Holocene* 13(2):277-283.

Zielinski, Gregory A., Paul A. Mayewski, L. David Meeker, Karl Grönvold, Mark S. Germani, Sallie Whitlow, Mark S. Twickler and Kendrick Taylor

1997 Volcanic aerosol records and tephrochronology of the Summit, Greenland, ice cores. *Journal of Geophysical Research* 102(12):26625-26640.

Zoëga, Guðný

2015 A Family Revisited: The Medieval Household Cemetery of Keldudalur, North Iceland. *Norwegian Archaeological Review* 48(2):105-128.

Zoëga, Guðný, Douglas J. Bolender, Brian N. Damiata and John Steinberg

2015 *Keflavík on Hegranes: Cemetery Excavation, Interim Report 2015*. Fiske Center for Archaeological Research.