SKAGAFJÖRÐUR CHURCH AND SETTLEMENT SURVEY

Lower Keflavík: Excavation, Geophysical Prospection and Coring Interim Report 2017

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Photo on front page – Lower Keflavík Test Pit 6, excavated down to sterile soil, showing outline of post hole.

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The Keflavík work is part of a larger survey of Hegranes. General permits for the survey of Hegranes and associated excavations were granted by The Cultural Heritage Agency of Iceland (MÍ201506-0056, MÍ201506-0058, MÍ201506-0059, MÍ201606-0051, & MÍ201606-0030). The National Museum Research Number for this work (and for most of Hegranes for the 2017 year) is 2017-19. The work was supported by the US National Science Foundation (PLR # 1242829, 1345066, 1417772 & 1523025) in a joint project of the Skagafjörður Heritage Museum and UMass Boston. The Icelandic Archaeology Fund 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. Products or instruments mentioned should not be construed as an endorsement.

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

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 and results of two projects. 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.

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1.0 ABSTRACT

This report updates the earlier Lower Keflavík Report (Damiata, et al. 2017). It covers the additional 2017 coring and a test pit (TP6) placed in the midden of the Lower Keflavík farmstead.

In this updated Lower Keflavík report, the 2017 additional coring and excavated test pit are reported on. This additional work confirms the existence of a Viking Age farmstead that was constructed and occupied very soon after the settlement started. The primary occupation of this farmstead seems to have been between the settlement tephra layer (~ 871 AD) and the falling of a dark tephra at the end of the 10th century (Vj~1000). The farmstead appears to be abandoned before the Hekla 1104 AD tephra layer fell, although there is a suggestion of later outbuildings, probably associated with the visible farm mound at Keflavík.

The methodological results at Lower Keflavík are also significant. In this field, several of the major modern conductivity meters were employed, including the DualEM, the CMD Explorer, and the CMD Mini (Damiata, et al. 2017). The results of the additional coring and test pit suggest that at Lower Keflavík, the CMD Mini, using a transect spacing of 0.25 m with an effective sampling rate of 0.06 m and relying on the in-phase component (IP) of the longest dipole (1 m) is the most efficacious for highlighting the structure of the shallowly buried Viking-Age farmstead.

2.0 INTRODUCTION

Keflavík is one of the most northern farms on Hegranes. "Keflavík" means driftwood bay. The name of the island is probably derived from the nickname of the supposed first settler of the region, Havardr hegri, translated into English as Havard the heron, (Pálsson and Edwards 1972:90). To the north of Keflavík are the waters of Skagafjörður. The northeastern border is a beach (probably the actual keflavík) and the rest of the northern border of the farm consists of sea cliffs. To the northwest of Keflavík is the farm of Utanverdunes and to the southeast is Helluland. The farm south of Keflavík is Garður (Figure 1). Keflavík has been assigned number 445 based on its Jarðatal number (Johnsen 1847:277). SCASS has currently defined four places at Keflavík (1 Keflavík Cemetery; 2 Þrælagerði; 3 Grænakot / Vík; 4 Kríki: and 6: Lower Keflavík)[1] with the main farm mound defined as place #0. For

[1] Vík was originally assigned #5, but that location has been merged with Grænakot.

summative assessment purposes, the main farm mound is also labeled "Keflavík 1" and Lower Keflavík labeled "Keflavík 2" (e.g., Figure 2 & Figure 28)

The central part of Keflavík farm's fields is in a 300 m wide north-south running valley that drains to the north. Today the farm buildings are high on a ridge on the east side of the valley, but the main farm mound, barn, and other activity areas are directly opposite, on a terrace just below the west side ridge. The eastern part of the main farmmound contains a Viking Age and medieval churchyard and is currently being investigated (Zoëga and Bolender 2016, 2017; Zoëga, et al. 2015). The results presented here cover the 2017 investigation of the area in the center of Keflavík's fields, between the modern houses and the main farmmound, termed Lower Keflavík. The defining feature of Lower Keflavík is a visible tún wall that runs for about 200 m (Figure 2). This visible tún wall should enclose a farmsted. For coring purposes, the area defined as Lower Keflavík is about 14,950 m^2 (starting at N 581790 and going 115 m north to E 581905 and starting at E 477290 and going 130 m east to E 477420). This area, either defined by the tun wall, or the strict dimensions above, does not appear to be associated either with the main farmmound or the medieval churchyard. The natural stratigraphy of the Lower Keflavík region consists of soil with intermixed tephra layers, along with gravel layers and lenses of glacial origin. The main gravel layer seems to start between 40 and 80 cm bgs and seems to be continuous across the Lower Keflavík area. At Lower Keflavík, the ground surface was smoothed at the end of the last century by the current owners with modern equipment, but has never been plowed. Thus, the surface is relatively smooth. However, there are a frost hummocks or frost heaves—called þufur or thufur (Grab 2005)—as well as some ruins of a sheep house and a few drainage ditches that create some topographical relief.

Keflavík first appears in the historical record in 1374 as a property belonging to the Bishop's see at Hólar. A medieval cartulary dating to 1394 recounts that a priest was paid for his service at Keflavík, which suggests that there might have been a chapel (Sigurðardóttir 2012). The existence of an early Christian cemetery at Keflavík was confirmed in 2013 and is currently under investigation (Zoëga and Bolender 2016, 2017; Zoëga, et al. 2015). This church was abandoned long before the 1394 mention, hinting that this site may be complex and potentially contain other churches. In 1713 the farm was worth 20 hundreds (Magnússon and Vídalín 1930:64) and the same again 130 years later (Johnsen 1847:277) and neither land survey source mentions a church. Magnússon and Vídalín (1930) do mention other potential

farms at Keflavík: Vík, Grønagerði or Grottakot, Þrægerði, Litla-Keflavík, and an unnamed old farm. The western border of Lower Keflavík is about 40 m from the cemetery excavations, which are at the eastern base of the main farm mound. Thus, it is unlikely that Lower Keflavík is associated with any of the specific places mentioned by Magnússon and Vídalín (Zoëga and Sigurðarson 2009) although they mention several abandoned enclosures on small hayfields. Recent work on the outlying farmsteads at Keflavík (Catlin and Steinberg 2016; Catlin, et al. 2017, 2018) suggest that most of these mentioned farms are elsewhere and thus not associated with the Lower Keflavík area.

Figure 1. Air photo of Hegranes showing modern farm boundaries in yellow.

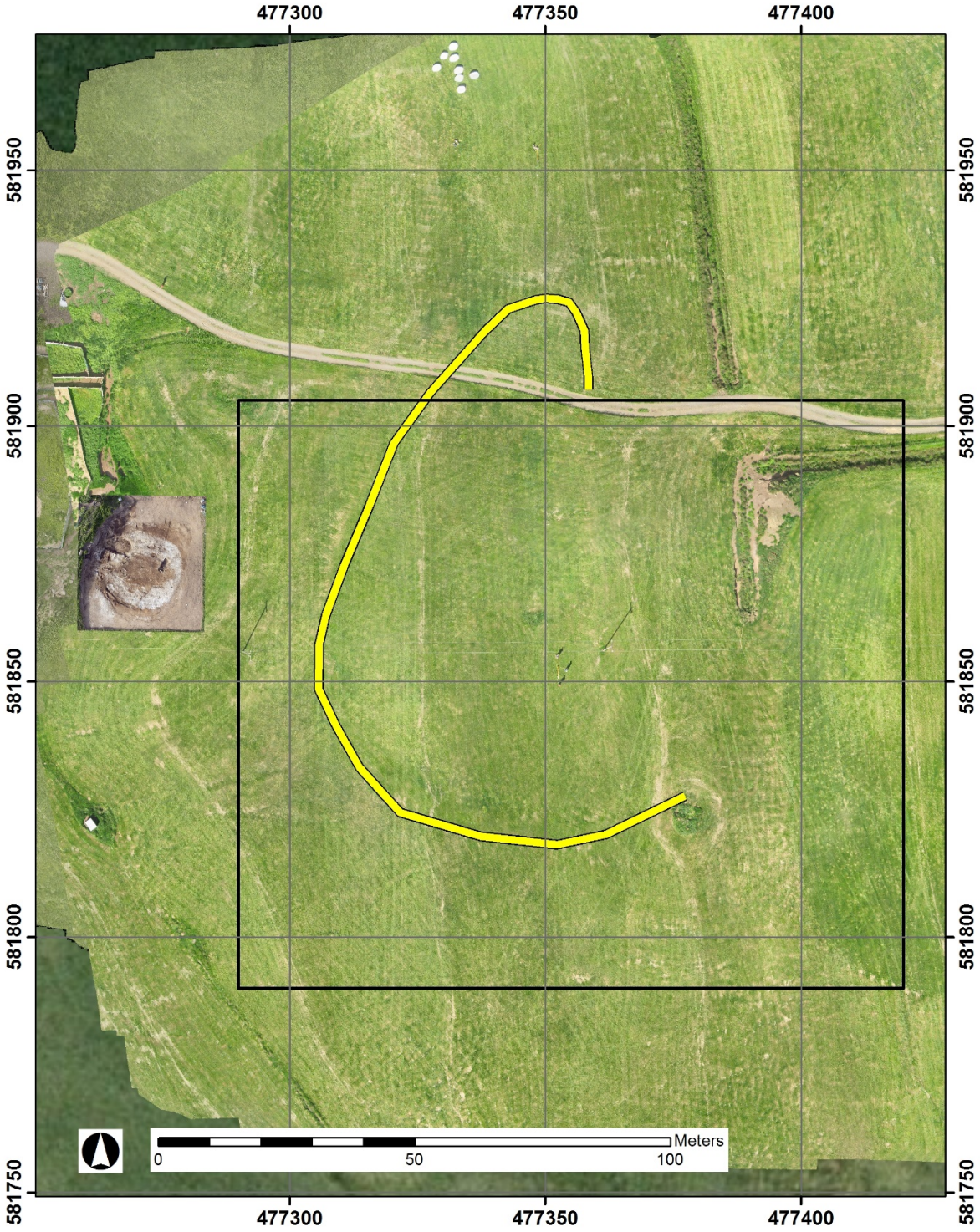

Figure 2. Kite photograph of Lower Keflavík with tun boundary wall from (Zoëga and Sigurðarson 2009) in yellow and defined Lower Keflavík area in black. The churchyard associated with the western farm mound (Keflavík 1) is also shown.

2.1 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 (Decaulne, et al. 2016). The area was deglaciated by 6100 yr cal.BP and then subject to uplift (Cossart, et al. 2014). Hegranes is probably a large rock drumlin, flyggberg, or rôche moutonnée formation (e.g., Neil 2002), with a long gradual south-side slope and a more sudden fall off on the north with many areas of plucked bedrock on that side of the island. The natural stratigraphy of the near 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 (Arnalds 2004, 2008; Arnalds, et al. 1995). The andosol is non-cohesive but has an extremely high water-retention capacity (Arnalds 2008).

The settlement and church survey relies heavily on tephra layers preserved in the soil. 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 (Þórarinsson 1977).

- Historic:
  - Hekla A.D. 1766. A black tephra usually found in turf or in the upper 10 cm of the soil sequence (Kirkbride and Dugmore 2006; Thórarinsson 1967).
  - 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) and is readily identifiable in both natural and cultural stratigraphic sequences.
- Landnám sequence (LNS):
  - Vj~1000 tephra. A blue to bluish-black layer whose source has not been determined but is likely to be either from a Grímsvötn and/or Veiðivötn eruption dated to

approximately A.D. 1000 (Sigurgeirsson 2001). The layer was first suggested in two undergraduate theses (Jónsson 2005; Ólafsson 1985) and it has been proposed that this layer may be found in other areas (Aldred and Sigurgeirsson 2005; Lárusdóttir, et al. 2012). Preliminary analysis of the composition of volcanic glass shards by scanning electron microprobe (SEM) has identified a mixture of shards from both volcanic sources.

- The mid-10th century layer (~950). This blue-green layer that is sporadically found is currently an un-sourced and undated layer that lies between the LNL and Vj~1000. There are several potential candidates for this layer, including the large eruption of Eldgjá dated to A.D. 934 ±2 (Fei and Zhou 2006; Hammer, et al. 1980; Thordarson, et al. 2001) or perhaps a few years later (Oppenheimer, et al. 2018). It could also be an A.D. 933 ±6 green tephra layer identified in the Lake Mývatn area from Veiðivötn, termed V-Sv ~950 (Sigurgeirsson, et al. 2013). Preliminary analysis by SEM has identified shards primarily from the Grímsvötn source.

- "Landnám" or "settlement" layer (LNL, LTL, also designated as 871). The layer is so-named for its association with the earliest settlements in Iceland (Dugmore and Newton 2012)) and is dated to A.D. 871 ±2, (Grönvold, et al. 1995), but could be dated to A.D. 877±4 (Schmid, et al. 2017; Zielinski, et al. 1997). The tephra originates from the Vatnaöldur fissure swarm associated with the Torfajökull and Bárðarbunga volcanos (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). In many cases this layer and surrounding layers of the LNS are tightly spaced in a brown organic rich soil matrix associated with the environmental changes of colonization.

- Black tephra below 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:

- Hekla 3 (H3). A thick (generally 2-3 cm) white or whitish-yellow tephra dating to about 950 B.C. (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).

2.2 Farmstead stratigraphy

Chronological phasing of farmstead sizes primarily relies on two tephra layers: the white Hekla A.D. 1104 (H1) and the dark Hekla A.D. 1300. These layers are the most commonly found in cores and often the easiest to identify of the historical tephras. H1 is presented twice as often as Hekla A.D. 1300. 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. Their presence also allows for the identification of changes in the size of individual farmsteads. Other tephra layers are used to help identify the overall stratigraphic sequence in the soil cores and to associate specific layers with historical periods. Deposits categorized by these temporal phases are based on whether or not they contained "farmstead" material. The resulting chronology allows for the estimation of farmstead size for three primary periods:

- Pre-A.D. 1104
- A.D. 1104-1300
- Post-A.D. 1300

2.3 Farmstead deposits identified in coring

To determine the location and area of farmstead deposits, the results of cores were divided into three simple categories: "yes," "no," and "maybe" based on the presence of cultural material above or below specific tephra layers (Steinberg, et al. 2016). 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 nearby but we do not count infrequent inclusions as contributing to the areal extent of the farmstead. Higher concentrations of anthropogenic inclusions, midden deposits, turf, and floors are included in farm mound deposits.

For the "Pre-A.D. 1104" period a "Yes" cores presented cultural deposits below the H1 (or an earlier) tephra. "Maybe" cores indicated early cultural deposits, as determined by depth or association with another tephra such as the 1766 or 1300 tephra, but without the presence of a

clearly defined H1 tephra layer. The absence of the H1 in a context of a cultural deposit is mostly because it was not preserved or the core did not penetrate deeply enough to encounter it (i.e., refusal within more recent deposits). A "no" core resulted when no cultural layers were present in the core or where there was no cultural layer below the H1. Almost all "no" cores had the H1, or some other tephra that allowed for the assessment of this important negative evidence. The same logic was used for the "A.D. 1104-1300" and the "Post-A.D. 1300" farmstead distributions based on coring.

For the purposes of the coring survey, farmstead or farm mound deposits include:

- Turf deposits: any evidence for a turf structure, including collapsed or levelled turf, are considered evidence of farm buildings. The organic content and percentage of soil in turf deposits is variable. Sometimes tephra layers are present in turf, which can provide a terminus post quem (TPQ) date for the deposit. Dating turf deposits is not without difficulties. As a rule, a turf farmstead deposit containing a tephra layer is a positive farm mound location (yes) for the period(s) after the latest identified tephra. In the absence of in situ tephra, the rest of the deposit is characterized as a potential farm mound (maybe). For example, in a core with turf including what was identified as the H 1300 tephra as the only "farmstead deposit" would be coded as "Yes" for post-1300 but also "Maybe" for the pre-1104 and 1104-1300 phases because of the inherently uncertainty of a field identification of a single dark tephra.

- Low density cultural layers (LDC): defined by anthropogenic inclusions amounting to 10-50% of the soil matrix. These are assumed to result from indistinct and extensive depositional events that suggest regular activity typical of farmsteads or other farm production areas. Sometimes this deposit has a "mixed" character.

- 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. Middens are the result of distinct and intensive depositional events associated with purposeful disposal. In both LDC and Midden layers that are punctuated by tephra layers, for purposes of farm mound dating, the deposits are assumed to be continuous, occurring immediately before and after the date of the tephra deposition. For example, in a midden deposit with only H1 present, surrounded on either side by

midden, both "Pre 1104, and "1104-1300" would be positive ("yes") while "Post-A.D. 1300" would be "maybe."

- Floor: characterized by dense, compacted, and/or greasy cultural layers indicative of floors, extramural activity areas, or areas of intense deposition of organic materials. Sometimes floors are distinct fine-grained black ash. These floor deposits are often thin but are very distinct.

For a farmstead to be defined, at least one core had to have some evidence of human burning or other unambiguous evidence of human occupation that would be distinct from an animal only outbuilding. A farmstead's perimeter for a given time period was determined by the results of the plotted cores taken around a farmstead site. The perimeter was plotted half way between a "yes" and "no" core, or on a "maybe" core between a "yes" and "no" core. The continuous area within the perimeter was calculated to produce the maximum possible area of a farmstead.

2.4 Previous archaeological work

In 2008 the visible surface features within the tún wall of Lower Keflavík were mapped and tested as part of the Skagafjörður Church Project (Zoëga and Sigurðarson 2009). In 2012 there was some preliminary geophysics at Lower Keflavík (Bolender, et al. 2013). Trench 2015-6 is part of Ramona Steel's Master's thesis work, and will not be reported on here. In 2016 additional geophysics and intensive coring along with the previous work, allowed for the identification of the location of a potential long house and associated farmstead structures (Damiata, et al. 2017).

3.0 LAND SURVEYING AND ESTABLISHMENT OF GRIDS

All land-survey data were collected based on the ISN93 coordinate system. Core locations were determined in several ways. For only a few cores that were taken well away from ruins, the internal GPS receiver in the iPhones or iPads that were used to record the coring data was used. Within Lower Keflavík, most cores were collected on 10 x 10 m grid that were located with the Topcon GPT 9005A total station. Judgmentally placed cores were originally located with an iPad and then refined by either a Topcon Hiper SR DGPS or a Trimble Geo XH which was equipped with a Zepher antenna in order to improve upon the accuracy of the locational data.

The geophysical grid was initially established using a Topcon Hiper SR DGPS using the ISMAR differential station at Stoð ehf in Sauðárkrókur, which yields about 1 cm horizontal accuracy and 2 cm vertical accuracy. The original GPS points were re-measured with the Topcon GPT 9005A auto tracking pulse total station to ensure consistency across different total-station set ups. The corner points of the survey area and internal grids at intervals of 50 × 50 meters were flagged using the total station. Additional flags were laid out at intervals of 10 × 10 m using fiberglass measuring tapes that were stretched between the stations established by the DGPS. The eastern and western baselines of the entire grid were flagged at 1-m intervals using alternating colors. Additional lines of alternating flags running east to west were laid out 10 m apart to help guide the surveying.

4.0 CORING

At Lower Keflavík, 207 cores were taken during the 2013, 2015, and 2016 field seasons (Figure 3). An additional 72 specifically targeted cores were taken in 2017 (which will be reported on here) and used for interpretation of the site along with earlier cores. These 2017 cores are primarily in three transects: a north south line and two east west lines. The north-south transect is east of the potential long house, across the long axis of the midden, and intercepts a potential out building. The northern east-west line, connects a probable east door of the long house, identified in 2016 (Damiata, et al. 2017) through the midden area. The southern east-west core transect, located just south of the long house cross cuts the midden, intercepts a second potential out building, and puts the 2008 test trench (Zoëga and Sigurðarson 2009) in better context with the currently identified structure. Cultural material in these new 2017 cores, along with earlier cores, suggest a discrete pre-1104 occupation in the center of a distinct tún boundary wall (Figure 4).

The 2017 cores taken in Lower Keflavík bottom out at an average of 64.4 cm (SD=13.7) below the ground surface onto gravel (Table 1). The pre-2017 cores had an average depth of just 56.1 cm suggesting that the cultural deposits targeted in 2017 are substantially deeper than the surrounding area. For context, the overall average for cores for the SCASS survey is 62.6 cm (SD=94). Of these 72 highly targeted cores, only 12 did not have any cultural remains at all (Table 3). Eight cores had both distinct floor and midden deposits in the same core, and 17 of the cores presented with a floor, and 23 with midden deposits (Figure 5).

Of these 72 new cores, there were no instances of the 1766 or the1300 tephras. Conversely, 40 presented the H1 (56%) and 33 (45%) presented the H3/H4 tephra (Table 2). Nine encountered an in situ dark tephra from between the H1 and the time of settlement, all of them identified in the field as the "1000" layer, while no ~950 tephra was identified in any of the cores. One core (171413) revealed a distinct LTL and 17 others the LNS, which appeared as a dark distinct mixed layer. For the long house (Structure #1) described in Damiata, et al. (2017) or any of the structures described below, there was no cores that suggested anything other than a pre-1104 occupation.

Most of the 2017 cores were placed to explore and define the midden area (Figure 5). The data from the cores, combined with the in-phase 1 m dipole (IP3) CMD Mini readings allow for an assessment of the area, depth and type of midden deposits that could be expected at Lower Keflavík. The IP3 CMD Mini readings are related to magnetic susceptibly (cf. Benech and Marmet 1999) and relatively higher magnetic susceptibility is associated with burning and hearths at Viking Age long houses (Milek and Roberts 2013), thus it makes sense that floors and midden areas should be detectable with the in-phase component of the CMD Mini (Damiata, et al. 2017).

The northern end is defined by the area between cores 171319 (Which has some LDC) and 171390 (which is absent cultural material). This area between the cores corresponds with a substantial drop in the IP3 readings. The eastern end is defied by the 171412 (LDC) and 171411 (absent cultural material) cores along with the 173941 (thin floor) and 174353 (absent cultural material). Core 173941 (Figure 15) is interesting, as it appears to be at the thin edge of the midden, but may have some sort of floor deposit associated with structure #3, described below. Again, the area between these two sets of cores corresponds to a relative drop in the IP3 readings moving out from the center of the midden. South of the proposed long house, between cores 173936 (LDC) and 173934 (absent cultural material), there is again a substantial drop in IP3 readings. These four documented edge-of-midden interfaces suggest that using substantial changes in the IP3 at Lower Keflavík is a very good guide for defining the midden area. Thus, the IP3 fall off has been used to define the midden edges at Lower Keflavik, in areas without coring (Figure 5). The midden area is about 28 m x 12 m and has a volume of about 100 m^3 of ash and turf.

For the area defined as Structure #2 (Figure 6), the 11 cores average 72.6 cm before hitting the gravel, about 8 cm deeper than the rest of the 2017 cores at Lower Keflavík, suggesting

that this feature is probably a sunken deposit and the size is largely consistent with pit-houses excavated elsewhere in Iceland (cf. Milek 2012). The low IP areas immediately around the high IP regions, suggest a turf (Figure 9) or upcast wall surrounding a sunken structure filled with magnetically susceptible material. Of the 11 cores, 7 presented dark black sooty deposits, potentially floors (Figure 6, Figure 8, Figure 10, Figure 11, & Figure 12).

For the 4 cores associated with Structure #3 (Figure 7), the average total core depth is 65.5 cm, similar to the rest of the 2017 cores. The deepest cultural deposit was identified in core 174349 (5 cm thick sooty floor, lying on top of a 27 cm thick cultural layer with gravel at 81 cm bgs, Figure 16) and core 173937 (10 cm of sooty floor) with Gravel at 80 cm bgs. Thinner floors were also identified (e.g., Figure 14). Core 173937, also seemed to have burnt turf (Figure 13). Finally, core 173936, in a well-defined semicircle of lower IP3 readings, has 30 cm of turf deposits on top of an 8 cm black ashy floor. If structure #3 is a sunken, it is smaller than structure #2.

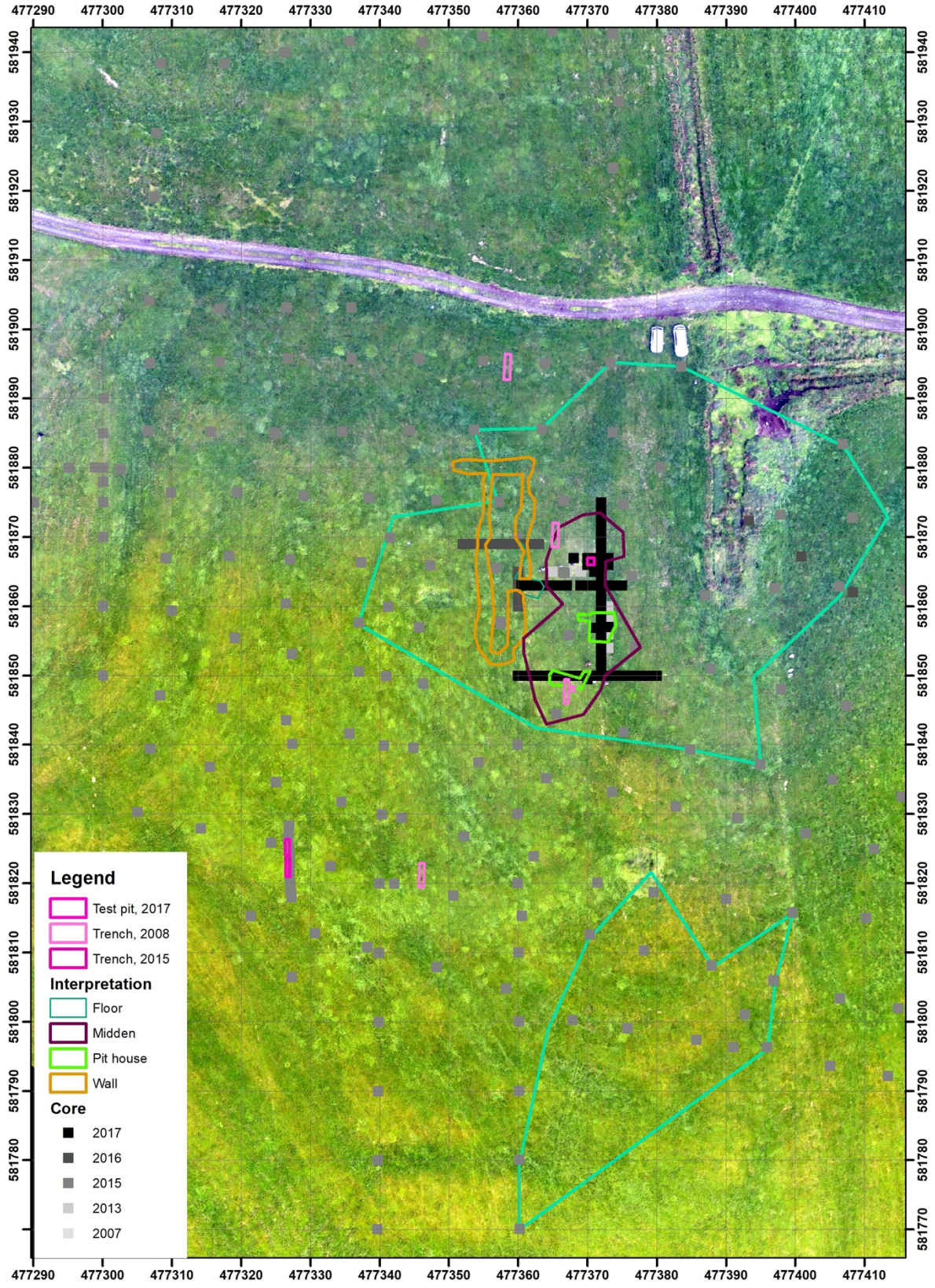

Figure 3. Core locations with archaeological feature interpretation superimposed on an orthorectified drone image. Farm mound area is outlined in teal.

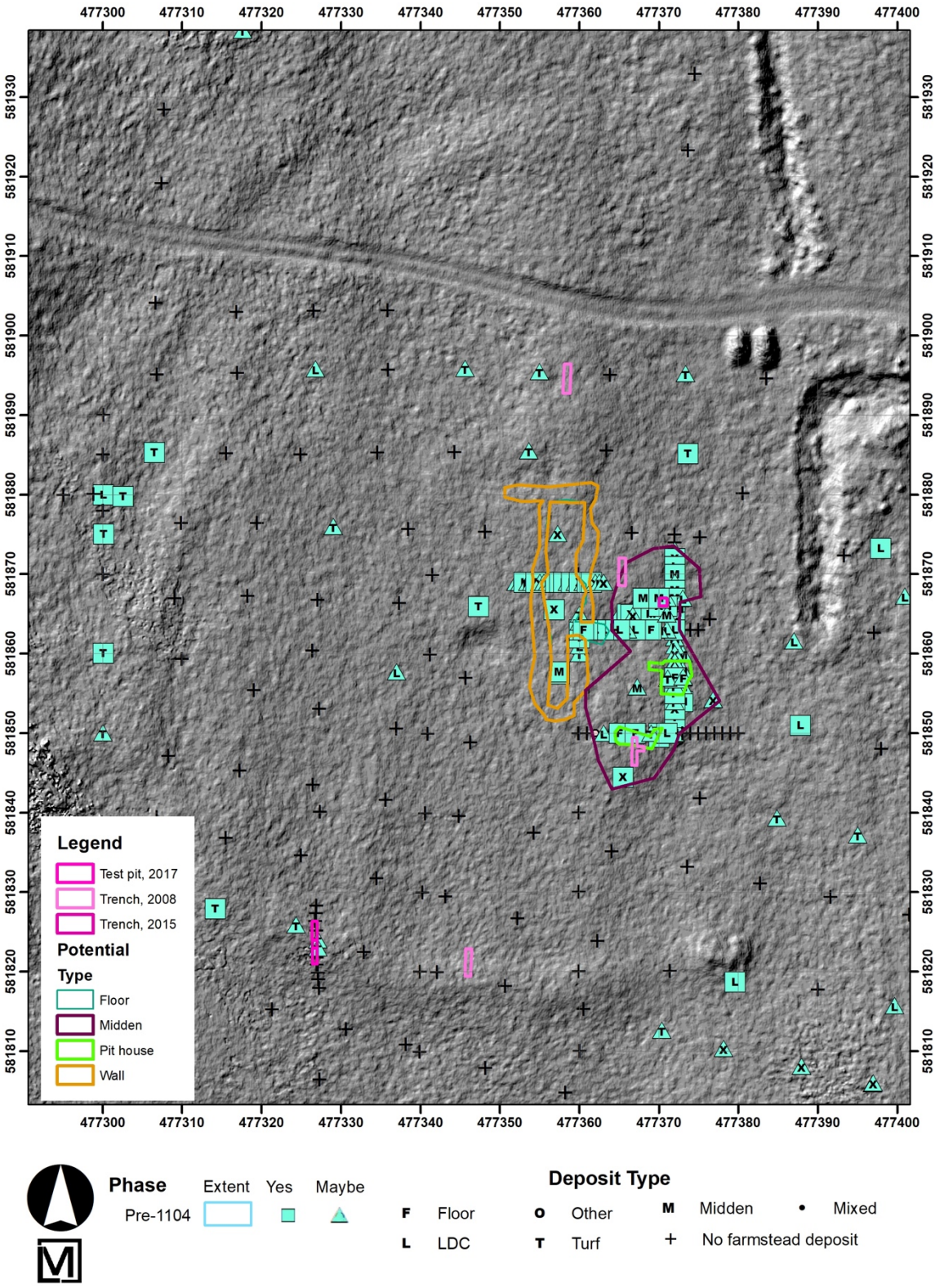

Figure 4. Core locations with archaeological feature interpretation superimposed on a Digital elevation model of Lower Keflavík with hillshade function.

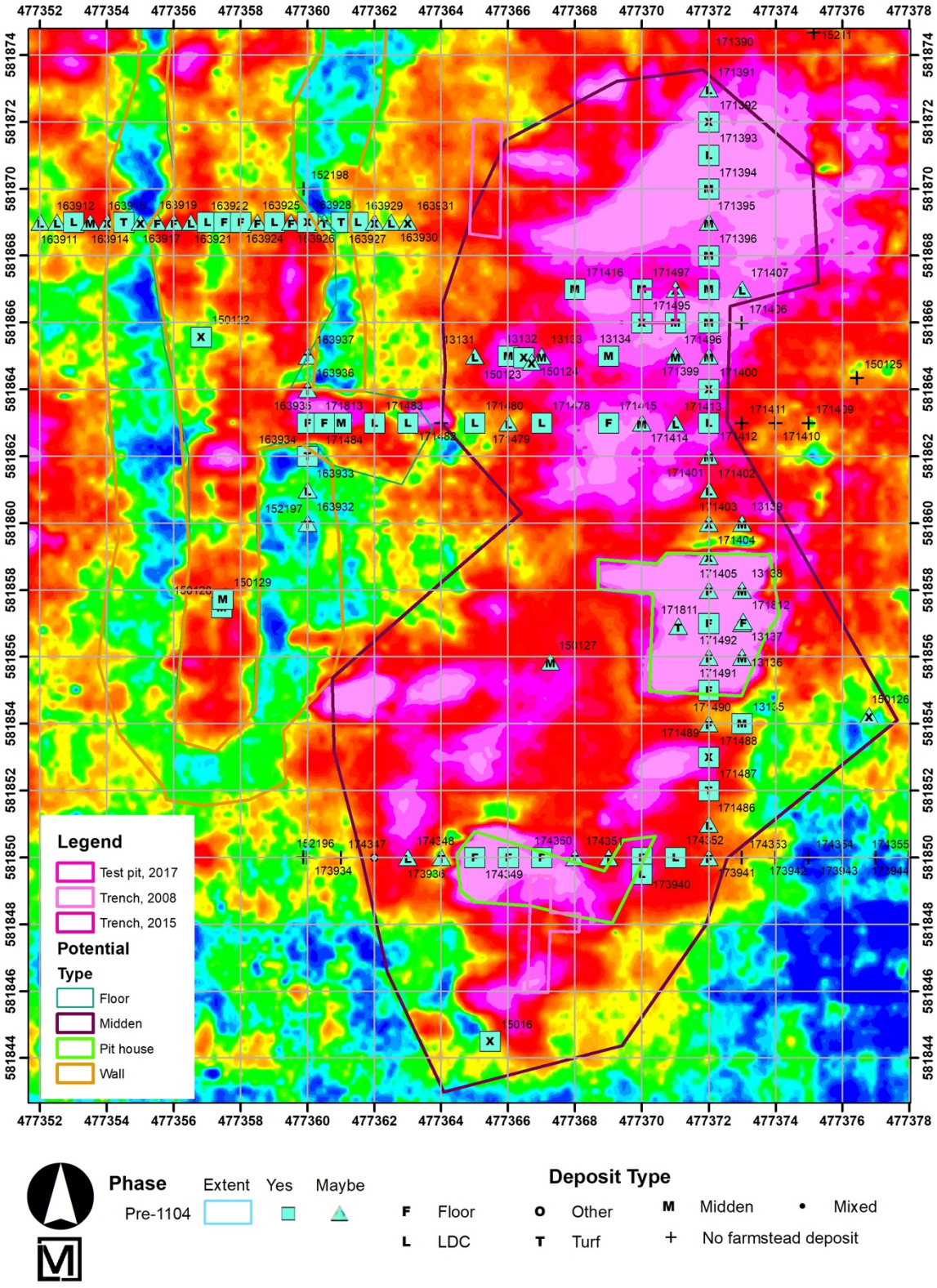

Figure 5. Lower Keflavík midden area with core locations and numbers. Excavations are superimposed on CMD Mini IP3. The IP3 scale (ppt) is from 0.8 (blue) to 1.8. (green) to 2.0 (orange to 8.0 (purple). The probable extent of the midden is outlined in burgundy, to the west of the proposed longhouse (structure #1).

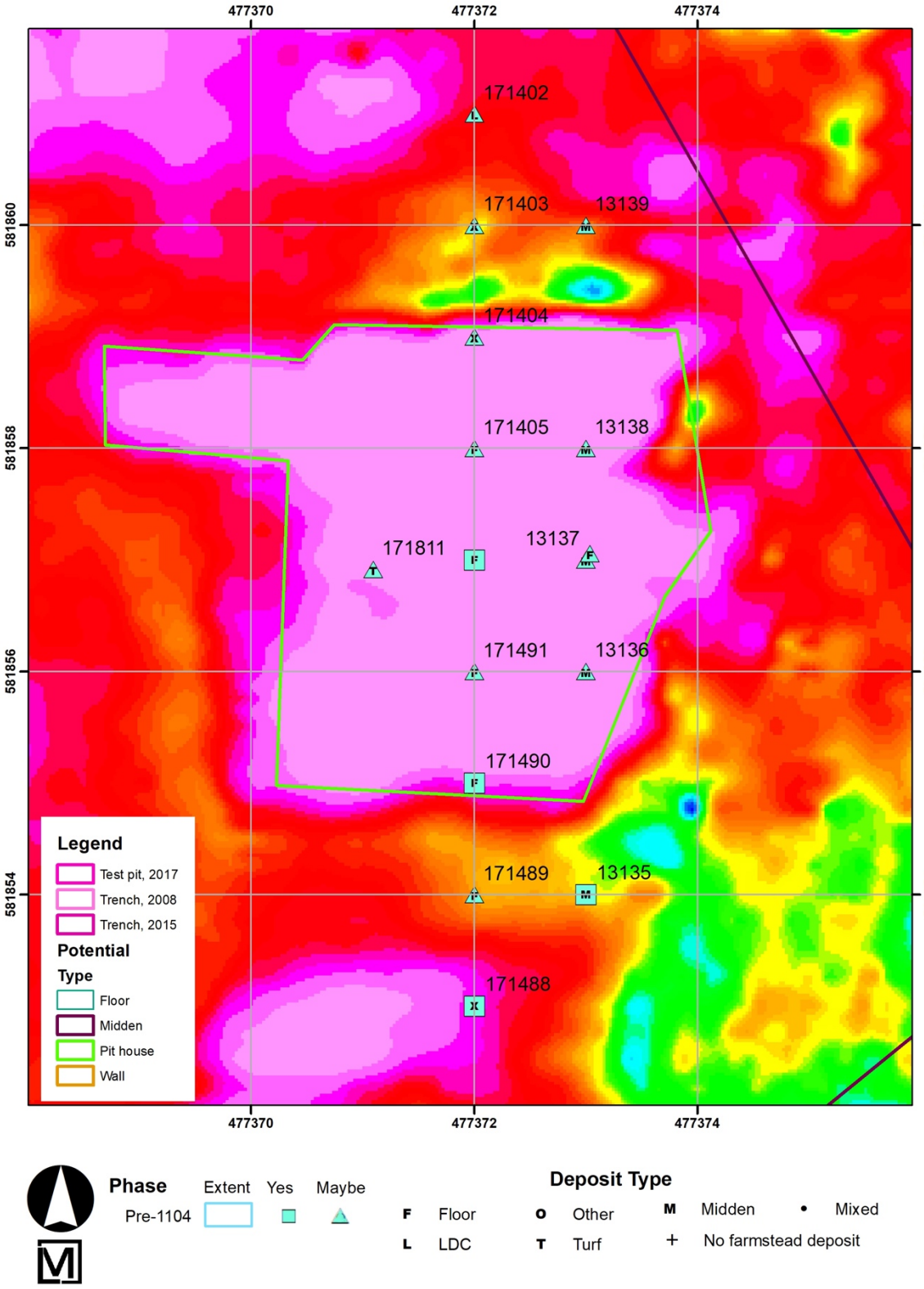

Figure 6. Lower Keflavík potential structure #2 with cores and excavations superimposed on CMD Mini IP3.

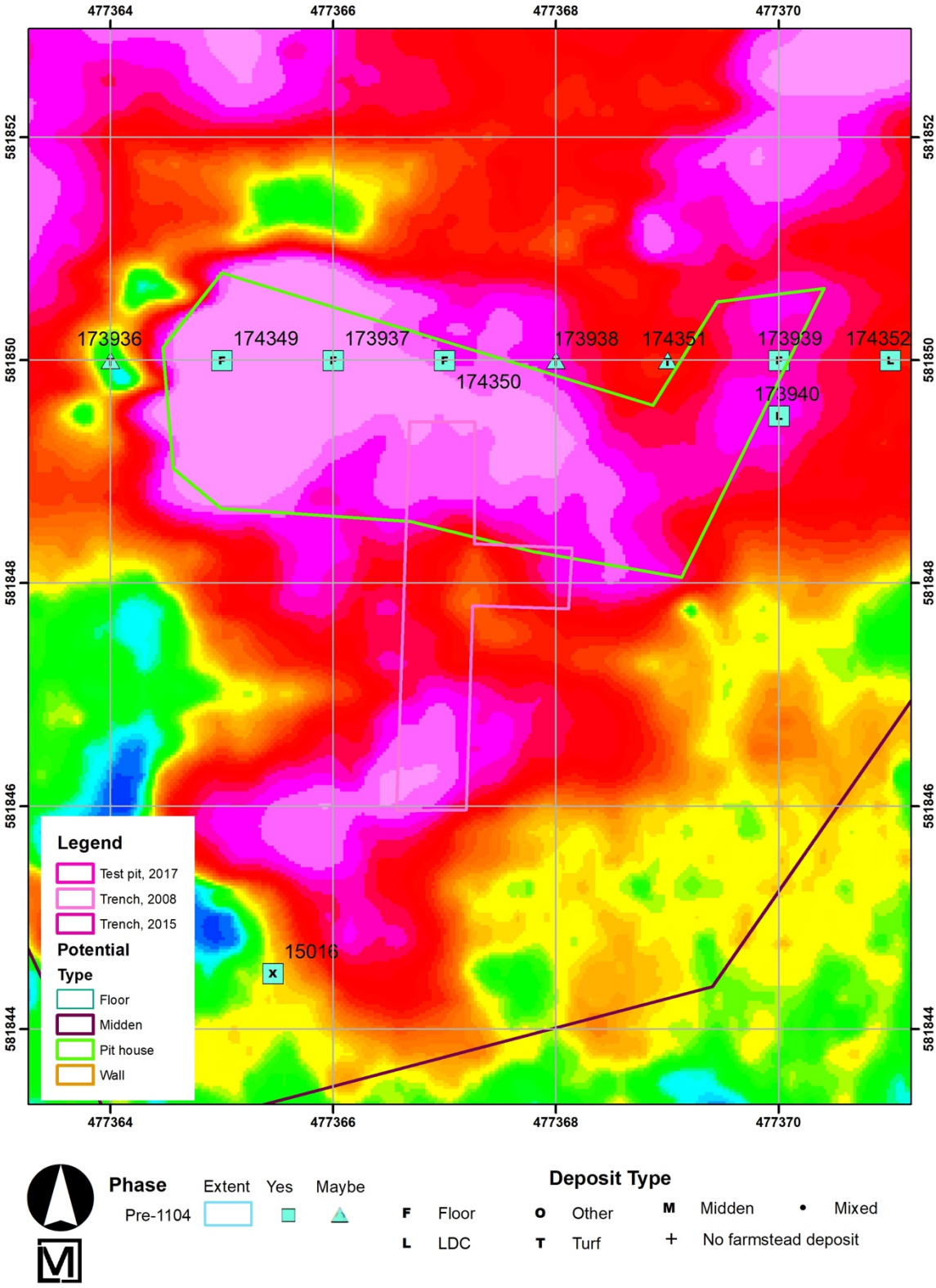

Figure 7. Lower Keflavík out structure #3 with cores and excavations superimposed on CMD Mini IP3.

Figure 8. Core 171404 showing floor from 18-23 cm bgs.

Figure 9. Second barrel of core 171488 showing distinct turf deposit form 35-67 cm bgs

Figure 10. Core 171490 showing floor from 26-30 cm bgs.

Figure 11. Core 171492 showing floor from 33 cm bgs with turf above it.

Figure 12. Core 171812 showing thin floor from 30 to 32 cm bgs with turf above and below it.

Figure 13. Second barrel of core 173937 showing burnt turf deposit from 65 to 80 cm bgs

Figure 14. Core 173939 showing thin floor from 31 to 33 cm bgs with turf above and LDC below it.

Figure 15. Core 173941 showing thin floor from 30 to 32 cm bgs with aeolian soils above and LDC below it.

Figure 16. Second barrel of core 174349 showing distinct turf deposit form 49-54 cm bgs

5.0 EXCAVATIONS

The results of the 2017 test pit in Lower Keflavík (TP6) confirm the long-standing hypothesis that a long house, separate and district from the main farm mound is present at Lower Keflavík.

Test pit 6 (TP6) was placed on the basis of cores 171493 and 171497 (Figure 17). Both of these cores suggested a substantial, well-preserved midden with good tephra presentation. Core 171493 was one of the few that presented a clear 1000 tephra layer about 1 cm below the start of the midden which extended for 25 cm. Core 171497 presented both the H1 and the LNS with 27 cm of midden as well as a sterile aeolian deposit above the H1. While other areas of the midden seemed to have deeper midden deposits (Figure 18) this area seemed to have the best tephra preservation and adequate midden with charcoal inclusions suggesting good preservation.

In general, the top 20 cm of TP6 was difficult to interpret, probably due to mechanical field flattening in the recent past. While the current farmers have never plowed the field, the field seems to have had substantial thufurs. Conversely, the bottom 60 cm presented a distinct well preserved midden deposit that seems to contain wood charcoal, gray hay and dung ash, and pink peat ash in a series of distinct deposits.

Context [101] was a thick root mat of almost 20 cm (Figure 19). Immediately below the root mat was [125] which was a transitional layer between layers with good integrity and the disturbed [101]. On the west wall (Figure 20), two distinct overlapping H1 tephras were presented, which is entirely consistent with the excavation of that unit, which had a very patchy H1 widely distributed over the unit (Figure 22) but not in distinct well-preserved layers. That is, context [125] does not appear to be a turf wall with multiple H1 tephra layers, but rather a thufurized flattened layer with H1 in it (Figure 21). Also present in [125] is a Vj~1000, distinct in the plan during excavation and visible in the west side wall. The Vj~1000 appeared to be a single, distinct, somewhat patchy tephra layer. This suggests that, unlike the Vj~1000, which was deposited on a flat surface, the H1 tephra fell on a thuverized landscape, and that the occupation of lower Keflavik had probably already ended when that white tephra fell.

Test pit 6 produced 2 finds: a worked piece of bone and a piece of whiteware ceramic. Find 2 from context [125], just below the root mat (Figure 22) was a fragment of a small

whiteware ceramic, most likely a handle (Figure 23). This find, along with the patchy and repeating H1, reinforce the interpretation of a disturbed surface, rather than a turf wall. This observation also suggests that cores, interpreted as turf with multiple H1 terphas around Lower Keflavík should be disregarded.

Contexts [126] through [129] were a series of well-defined striated pink and gray ash deposits with substantial charcoal and some bone. Context [126] was a mixed ash deposit with distinct bone inclusions, while [127] seemed to be mostly peat ash. Contexts [126] and [127] also had a second dark patchy tephra layer that is potentially the mid-10th century tephra layer. From [127], associated with the black tephra, a small cut bone with a drilled hole was recovered in the screen. Context [128] had potential hay deposits as well as various types of ash. Context [129] a brown ash layer rested immediately on a distinct LNS, suggesting some antiquity to this layer.

If this interpretation of this difficult sequence is correct, it implies that contexts [128], [129], and [130] were all laid down before this 10th century tephra layer tephra layer (Figure 24). Context [130] would appear to be posthole, the outline of which was not given a context number, that punched through the LNS (see cover photo). The posthole was later filled with mixed yellowish-brown ash that also rested on top of the LNS, suggesting that the posthole itself was also created after the LNS was laid down. While a post hole is the most likely explanation, this hole could also be a tree mold from a tree that was in place during the later phases of the LNS and disturbed its earlier phases.

Palioeethnobotanical analysis from floatation samples is still ongoing for TP6. However, an initial scan for barley produced 2 charred *Hordeum vulgare* grains from [127] sample 7 (15 l floated) and 2 charred *Hordeum vulgare* grains from [128] sample 9 (24 l floated). One of the grains form [128] (Figure 25). was sent for AMS dating and returned a date of 1085 ± 15 radiocarbon years before present. This date calibrates to A.D. 896-927 (29%), 941-997 (65%), and 1007-1012 (1.2%). If the tephras are interpreted correctly in TP6, then the constrained two sigma range is approximately AD 896-950. A mid-point for this sequence would be about A.D. 923, which is probably a good proxy for an establishment date. This sequence is consistent with the interpretation that TP6 is somewhat well centered in a midden deposit just east and a little downhill from a long house. We suggest that this midden is contemporaneous with the longhouse and was formed when its occupants exited an eastern door and deposited ash and other waste in the area of TP6.

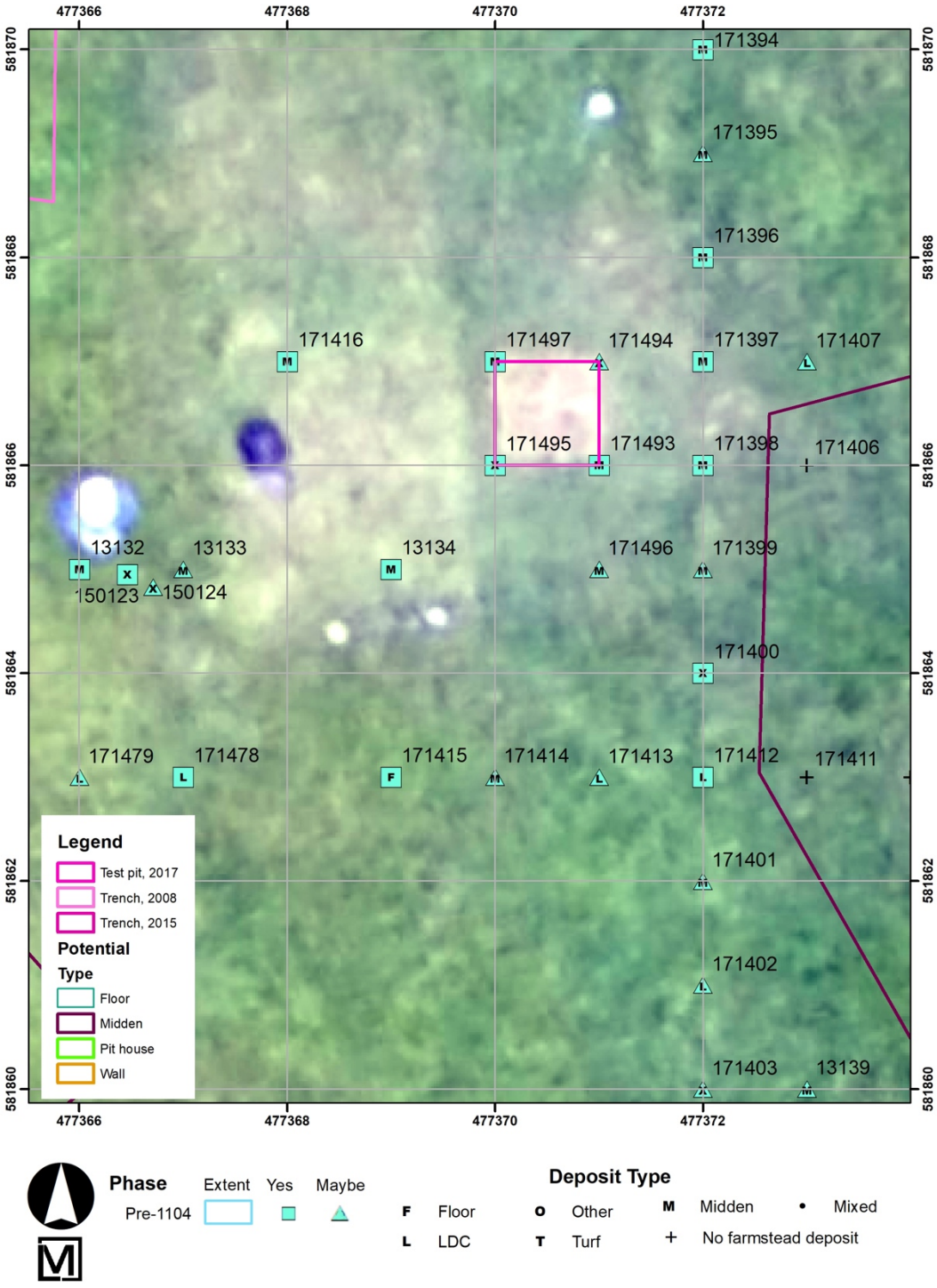

Figure 17. Map showing core and test pit locations in pink at Lower Keflavik.

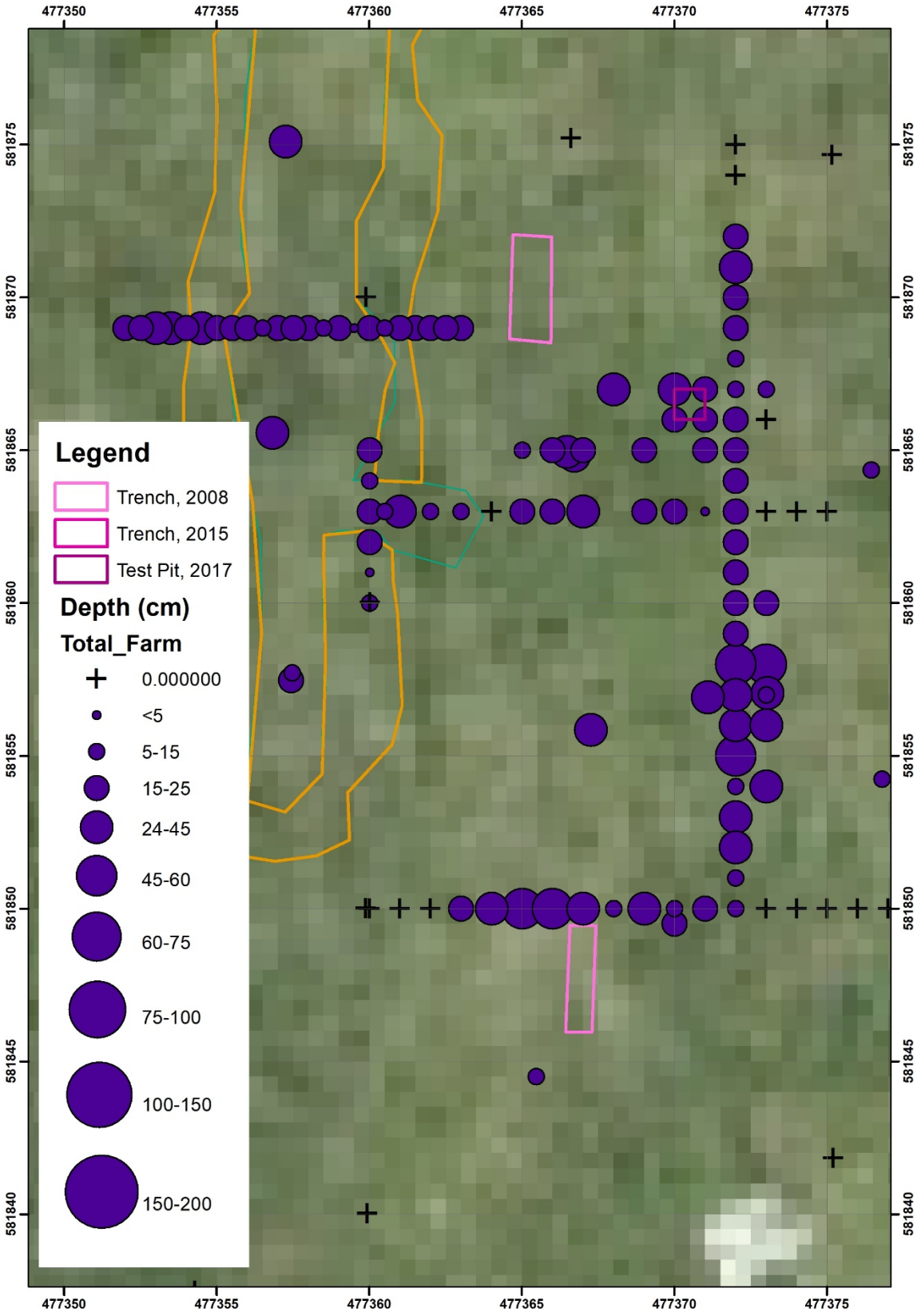

Figure 18. Map showing the distribution and size of general farmstead deposits in all cores, along with excavation locations. The proposed longhouse is outlined in orange.

Keflavik 445-6
TP 6

E: 477370.00
N: 581866.01
Z: 35.84

Context	Description
101	Root mat
125	Brown ash with bone and charcoal inclusions
126	Orangish-brown ash with bone and charcoal inclusions
127	Peat ash with bone inclusions
128	Yellowish-brown ash with bone and charcoal inclusions
129	Brown ash with bone, charcoal, and wood inclusions
130	Yellowish-brown ash with bone and charcoal inclusions

Tephra

1104
~ 950
LNS

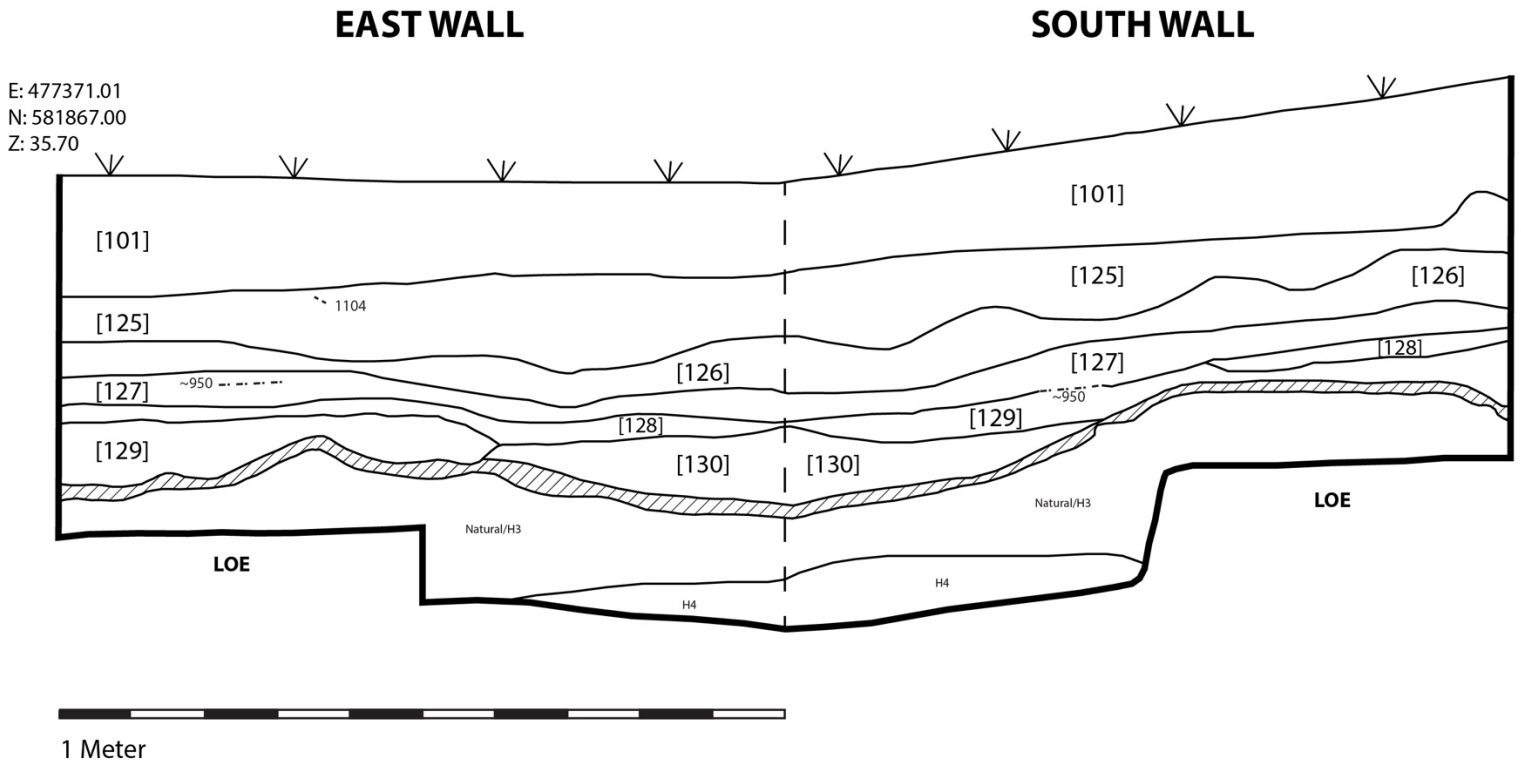

Figure 19. Drawn profiles of South and east walls of test pit 6.

Keflavik 445-6
TP 6

E: 477370.00
N: 581866.01
Z: 35.84

Context	Description
101	Root mat
125	Brown ash with bone and charcoal inclusions
126	Orangish-brown ash with bone and charcoal inclusions
127	Peat ash with bone inclusions
128	Yellowish-brown ash with bone and charcoal inclusions
129	Brown ash with bone, charcoal, and wood inclusions
130	Yellowish-brown ash with bone and charcoal inclusions

Tephra

1104
1000
~ 950
LNS
Tephra sample

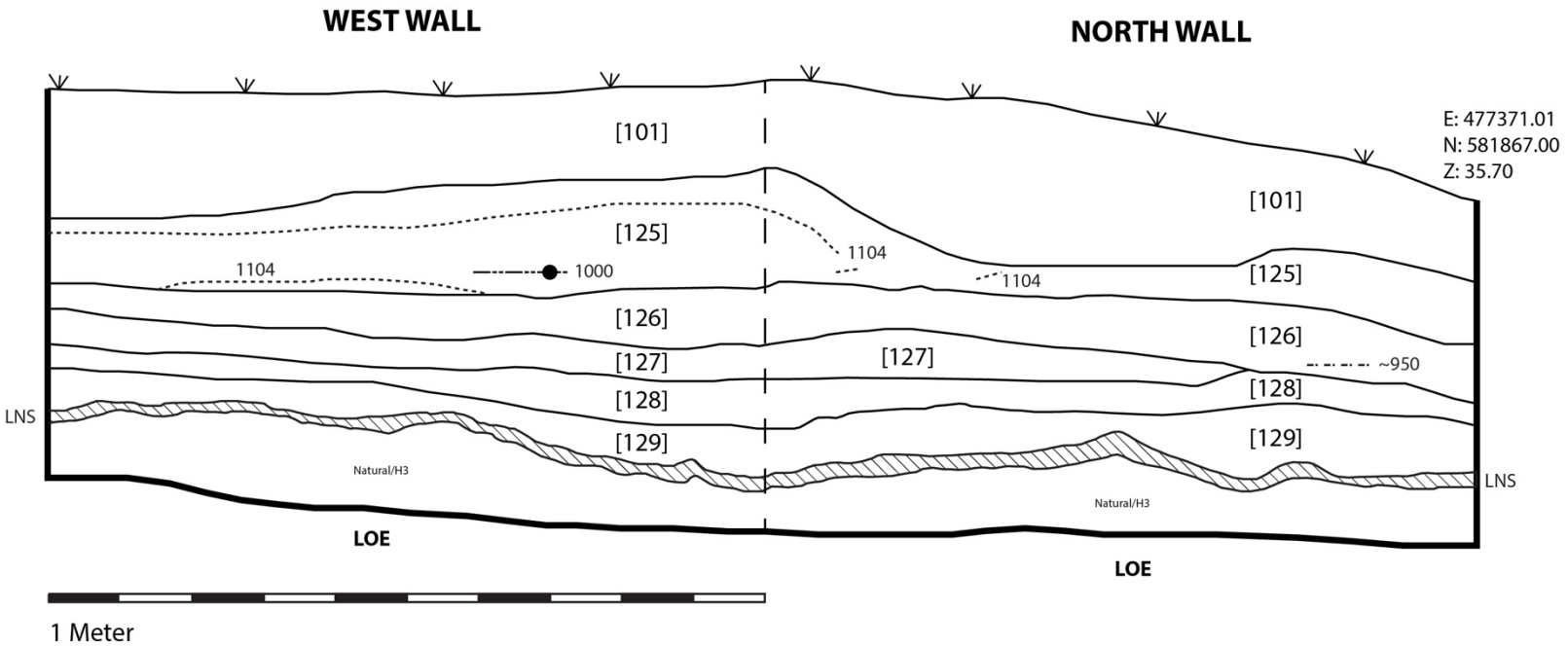

Figure 20. North and West drawn profiles of test pit 6.

Figure 21. Photo of west wall of TP6 showing thuriverized H1 tephra

Figure 22. Photo, looking north, of the top of context [125]

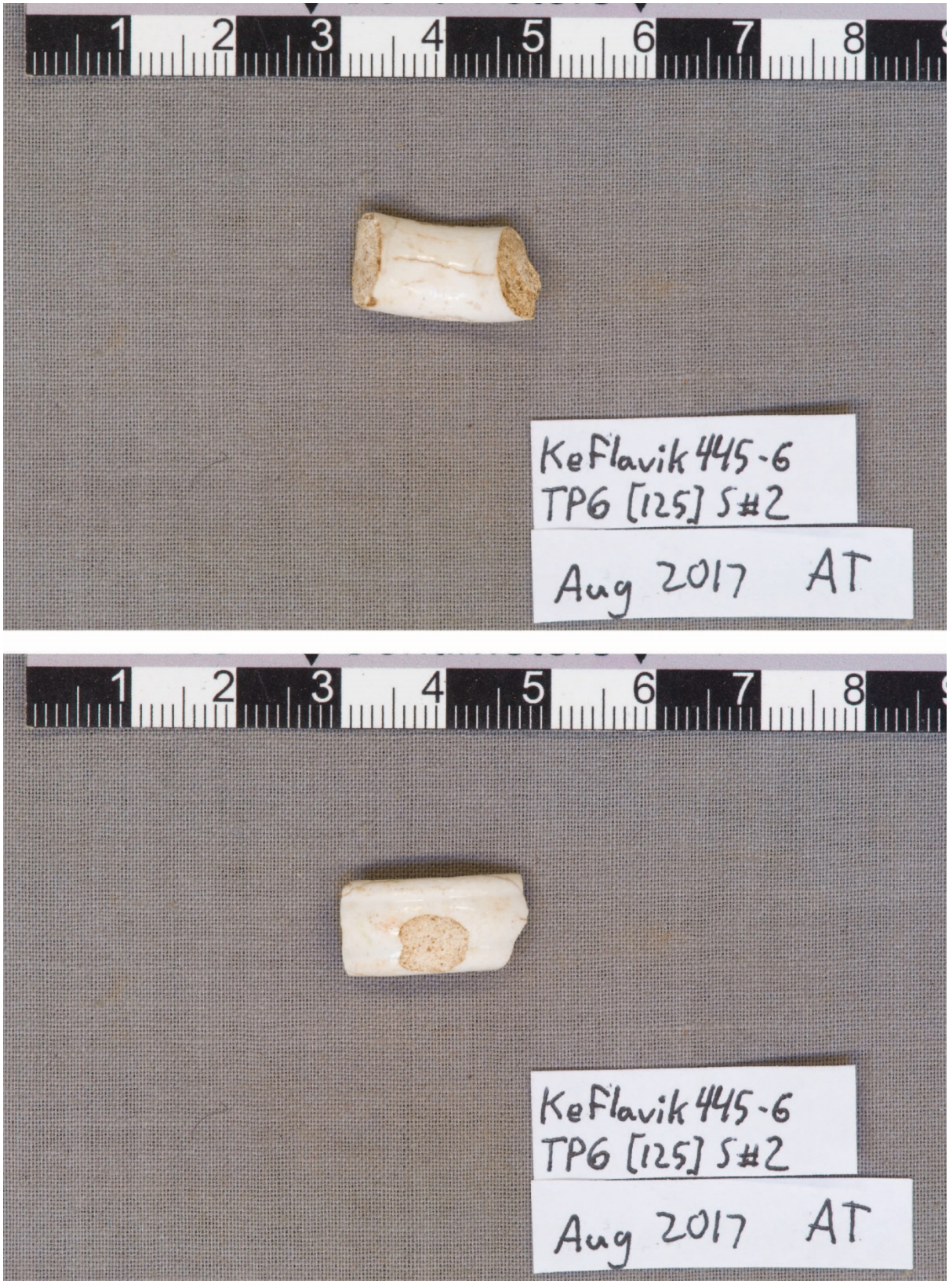

Figure 23. Photo of whiteware handle from TP6, context [125].

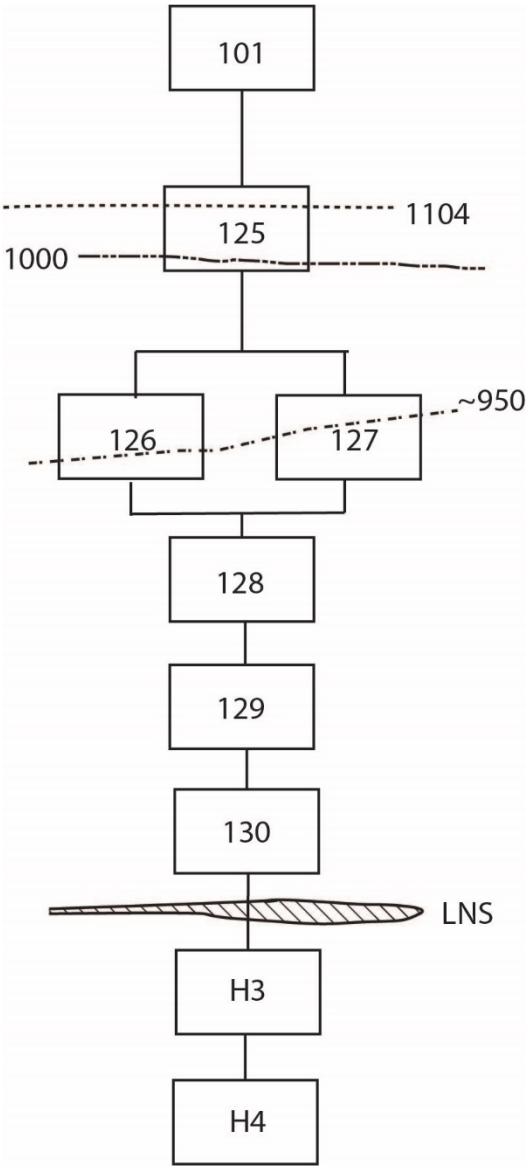

Figure 24. Harris Matrix of Test Pit 6.

Figure 25. Photo of *Hordeum vulgare* grain from TP6, context [128], sample 9.

6.0 CONCLUSIONS

The results presented here are the outcome of a minimally invasive SCASS protocol developed over the last decade. Most of the assessment of Lower Keflavík is derived from a CMD Mini geophysical survey, 276 cores, two test trenches, and one test pit. Placing a small 1x1 test pit in the oldest part of the midden associated with the potential Lower Keflavík long house was the main goal of the 2017 field season. Using the results of the coring along with the IP3 readings from the CMD Mini allowed for an estimation of the broad dimensions of the midden—about 28 m north-south and 12 m east-west. This would indicate that the midden is roughly the same size as the main section of the proposed longhouse with its center about 12 m northwest of the longhouse center (Figure 26). Within the midden area, which is over 300 m2, are potentially two sunken features with surrounding turf walls. The main door from the longhouse appears to allow exit to the east, and is just a little over 5 meters to the east-southeast of structure #2. The geophysics suggests an extension to the east of structure #2, implying that structure #1 and structure #2 could be related. In fact, the dating that we currently have suggests that all three identified structures and the midden are all part of the same complex.

While the 2017 field season explored the midden deposit southeast of the proposed longhouse, there are still other potential deposits that should be explored. First, suggested in the geophysics immediately to the north of the longhouse, is an east-west running low IP3 linear anomaly, that would be consistent with the turf wall of an animal barn of some sort (Figure 26). There are some cores in the area that have identified turf in the deposits, reinforcing this suggestion. No burning or ash deposits were identified north of the longhouse, again consistent with buildings for animal remains. Second, about 20 m south of the midden area and immediately south of the semicircular tún wall is another, thin deposit of turf and midden, about half the size of the spread that surrounds the longhouse and midden (Figure 27). Only two of the 14 cores that define this secondary pre-1104 area give definitive dates, but several of the cores had distinct midden deposits. While this southern midden and turf deposits may be the result of the redeposition of midden material that was carried by the prevailing and often strong winds from the north, this area should also be further explored.

The two Lower Keflavík farmstead areas (Figure 27) combine to total about 3750 m^2. This is about 77% as large as the pre-1104 farmstead area of the main Keflavik 1 farmstead (Figure 28) which is on the order of 4860 m^2. The two farmsteads are separated by about 125 m of

interstitial area (except for a few cores with turf that are clearly associated with the semicircular tún wall).

While the establishment date for the main Keflavík 1 farm mound has not been confirmed by AMS, it almost certainly has pre Vj~1000 cultural deposition and appears likely to have pre~950 activity (Bolender, et al. 2016). This would suggest that Lower Keflavík is probably contemporaneous with the main farm mound, but for how long and to what extent, it is difficult to ascertain at this stage. That being said, excavations up to now suggest there is substantially more occupation deposits below a probable ~950 tephra layer at Lower Keflavik – about 20 cm - than the 3 cm of cultural material below a probable Vj~1000 at Keflavík 1 (Bolender, et al. 2016:17).

While the main Keflavík 1 farm mound is occupied up to the modern period, the abandonment date of Lower Keflavík is difficult to establish. Lower Keflavík is almost certainly abandoned by 1104, as only a few cores present post 1104 deposits, and those are all consistent with nearby animal structures, the ruins of one of which still stands nearby. The Vj~1000 is generally ephemeral at Lower Keflavík (only 16 cores) and there seems to be cultural material on both sides of the tephra layer, but generally more cultural material below the Vj~1000 than above it. Conversely, the sequence of TP6 indicates that there is little cultural deposit between the Vj~1000 and the 1104 tephra layers suggesting an abandonment about A.D. 1000. If the mid-point of the constrained AMS date is used for an establishment date, it would imply a 77-year occupation range for Lower Kefllivik from about A.D. 923 to about A.D. 1000. That would mean a midden accumulation rate of about 1.6 m^3 per year at Lower Keflavík. If these sequences are born out buy further research, it would imply that sometime between about 950 and 1000, and maybe longer, both Lower Keflavík and the main Keflavík 1 farm mound were occupied at the same time.

While the two main farmsteads may be contemporaneous, the more substantial early activity indicated at Lower Keflavík hints that it may be the first farmstead established at Keflavík. This suggest that like nearby farmsteads explored in Skagafjörður, the main locus of activity shifts uphill before the 1104 tephra falls (Bolender, et al. 2011; Steinberg, et al. 2016), consistent with a very dynamic Viking Age settlement pattern.

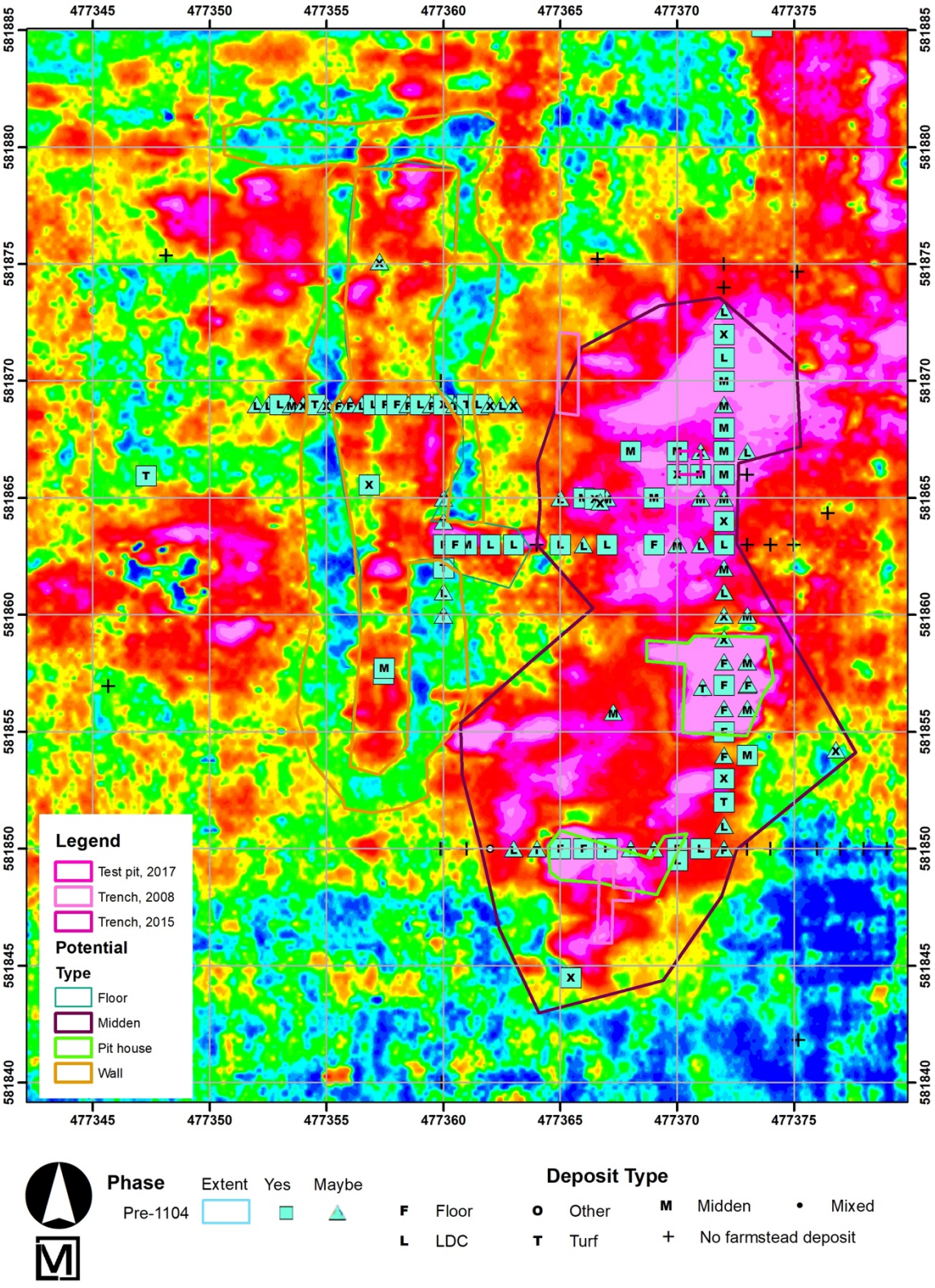

Figure 26. Lower Keflavík farmstead area with cores and excavations superimposed on CMD Mini IP3.

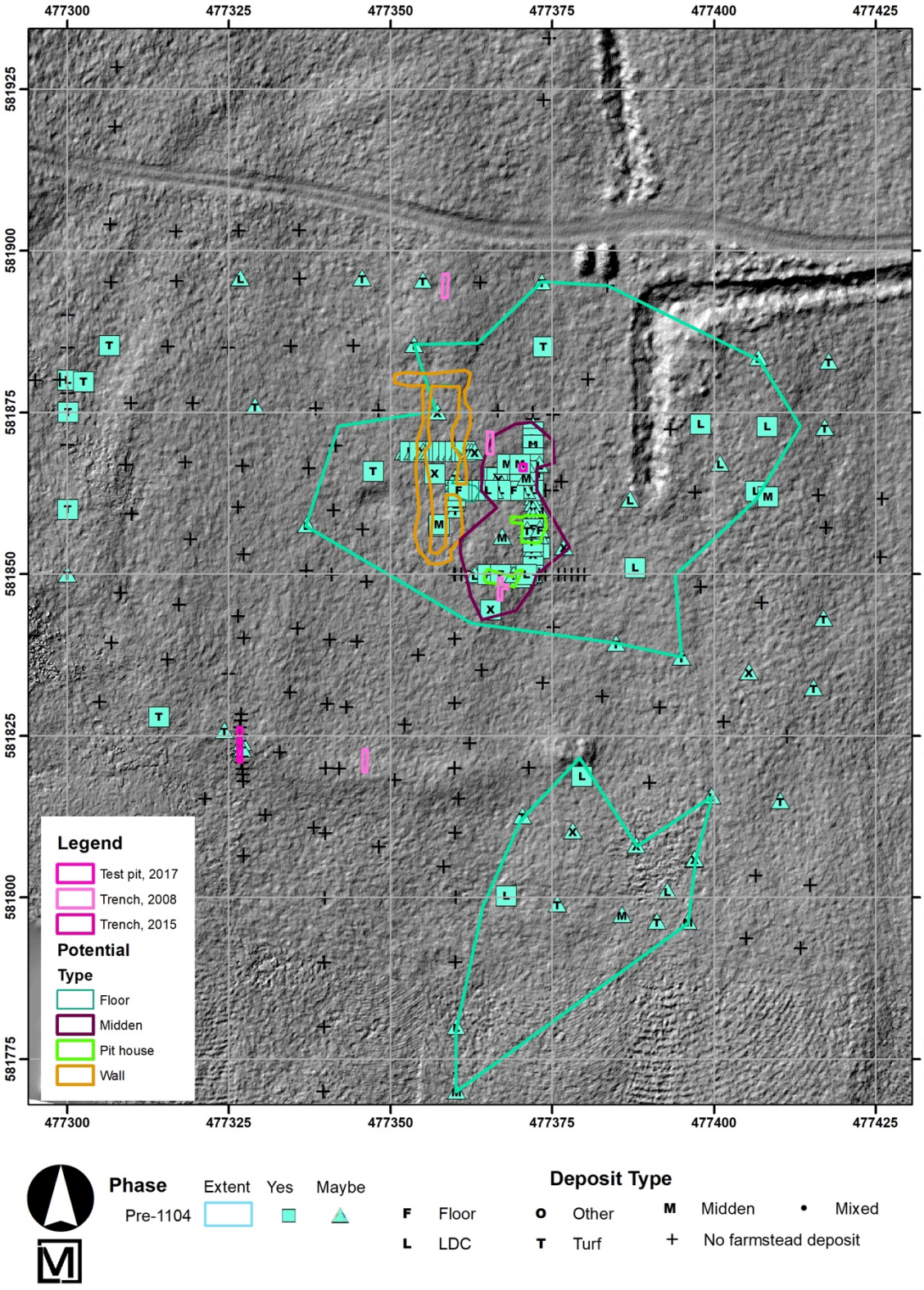

Figure 27. Lower Keflavík farmstead area with cores and excavations superimposed on digital elevation model with hillshade function. Farmstead area is in teal.

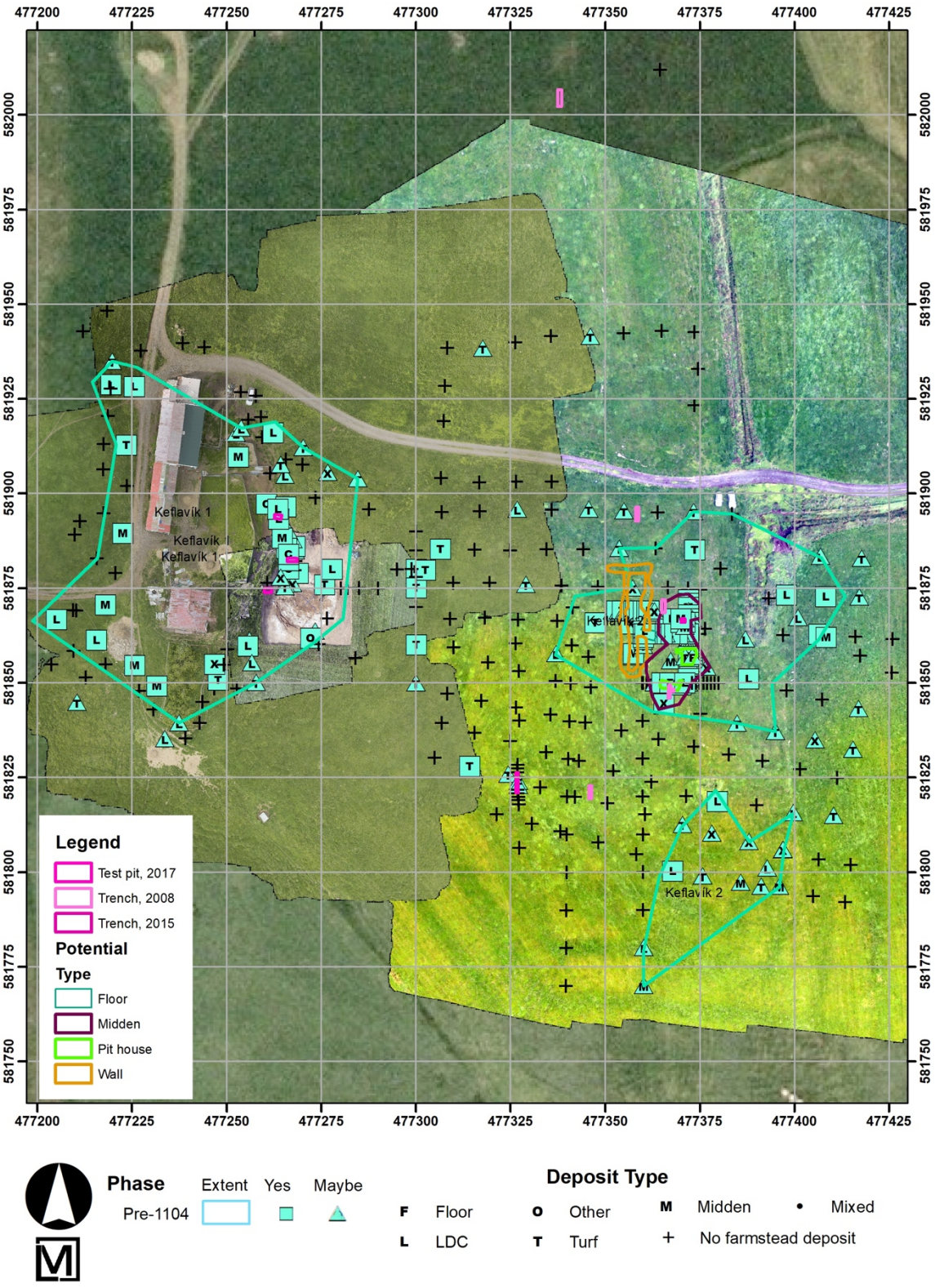

Figure 28. Mosaic of orthophotos of Keflavík, with cores, test excavtions, and Pre-1104 farmstead size superimposed. Lower Keflavík (Keflivik 2), is on the right, the main farmmound (Keflivk, 1), on the left

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APPENDIX – 2017 CORING DATA

Table 1. Coring locations

Core number	End Depth	ISNET East	ISNet North
171389	58	477372	581875
171390	67	477372	581874
171391	56	477342	581873
171392	58	477372	581872
171393	54	477372	581871
171394	58	477372	581870
171395	40	477372	581869
171396	70	477372	581868
171397	69	477372	581867
171398	69	477372	581866
171399	77	477372	581865
171400	55	477372	581864
171401	64	477372	581862
171402	62	477372	581861
171403	80	477372	581860
171404	58	477372	581859
171405	70	477372	581858
171406	62	477373	581866
171407	40	477373	581867
171409	47	477375	581863
171410	55	477374	581863
171411	61	477373	581863
171412	68	477372	581863
171413	73	477371	581863
171414	80	477370	581863
171415	81	477369	581863
171416	79	477368	581867
171478	66	477367	581863
171479	65	477366	581863
171480	65	477365	581863
171481	75	477364	581863
171482	55	477363	581863
171483	51	477362	581863
171484	48	477361	581863
171485	70	477372	581850
171486	78	477372	581851
171487	84	477372	581852
171488	115	477372	581853
171489	80	477372	581854
171490	80	477372	581855
171491	72	477372	581856
171492	74	477372	581857
171493	64	477371	581866
171494	60	477371	581867
171495	65	477370	581866

Core number	End Depth	ISNET East	ISNet North
171496	65	477371	581865
171497	72	477370	581867
171811	50	477371.092	581856.914
171812	75	477373.036	581857.056
171813	41	477360.5	581863
173934	45	477360	581850
173935	65	477362	581850
173936	80	477364	581850
173937	80	477366	581850
173938	85	477368	581850
173939	40	477370	581850
173940	80	477370	581849.5
173941	55	477372	581850
173942	55	477374	581850
173943	60	477376	581850
173944	50	477378	581850
173945	45	477380	581850
174347	48	477361	581850
174348	65	477363	581850
174349	81	477365	581850
174350	61	477367	581850
174351	71	477369	581850
174352	75	477371	581850
174353	70	477373	581850
174354	61	477375	581850
174355	42	477377	581850
174356	45	477379	581850

Table 2. Tephra layers in cores

Core Number	Depth	Tephra	Description
171389	24	H1	
171389	32	H4	Truncated
171390	19	H1	
171390	23.5	1000	
171390	36	H3	
171390	41	H4	
171391	45	H3	
171392	19.5	H1	Diffuse
171393	25	H1	
171394	19	H1	
171394	51	H3	
171396	28	H1	

Core Number	Depth	Tephra	Description
171396	40	LNS	
171397	23	H1	
171397	45	H3	
171398	25	H1	Speck
171398	32	1000	
171398	40	H3	
171399	38	H3	
171400	19	H1	
171400	48	LNS	
171401	46	H3	
171402	45	H3	
171403	54	H3	
171404	43	H3	
171404	53	H4	
171406	22	H1	
171407	33	LNS	
171409	36	H4	
171410	19	H1	
171411	19	H1	
171411	39	H3	
171411	50	H4	
171412	37	1000	
171412	43	H3	
171412	50	H4	
171413	40	LNL	
171413	53	H3	
171413	63	H4	
171414	65	LNS	
171415	26	H1	
171415	27	1000	
171415	60	H3	
171415	63	H4	
171416	22	H1	
171416	59	1000	
171416	67	H3	
171416	71	H4	
171478	21	H1	
171478	36	1000	
171480	20	H1	
171480	53	H3	
171481	30	H1	
171481	39	H3	

Core Number	Depth	Tephra	Description
171482	31	H1	
171482	41	H3	
171483	32	H1	
171484	20	H1	
171485	68	H4	
171486	37	LNS	
171486	65	H3	
171486	70	H4	
171487	20	H1	
171487	39	H3	
171488	16	H1	
171489	67	H3	
171489	72	H4	
171490	24	H1	
171491	61	H3	
171491	66	H4	
171492	18	H1	
171492	54	H3	
171492	61	H4	
171493	19	H1	
171493	28	1000	
171493	50	LNS	
171494	45	H3	
171495	22	H1	
171495	29	1000	
171495	49	H3	
171495	50	H4	
171496	50	LNS	
171497	17	H1	
171497	56	LNS	
171813	18	H1	Blob
171813	25.5	1000	
173934	36	H1	
173935	28	H1	
173937	25	H1	
173939	20	H1	
173940	21	H1	
173940	65	H3	
173940	70	H4	
173943	25	H3	
173944	25	H1	
173944	35	H3	

Core Number	Depth	Tephra	Description
173945	25	H1	
173945	30	H3	
173945	35	H4	
174347	30	H1	
174349	16	H1	
174350	21	H1	
174352	38	H1	
174352	47	LNS	
174352	57	H3	
174353	34	H3	
174354	17.5	H1	
174354	31	H3	
174356	27	H3	

Table 3. Stratigraphic layers in cores.

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171389	0	9	Root Mat		
171389	9	20	Disturbed		
171389	20	32	Aeolian Deposit		
171389	32	58	Subsoil		
171389	58	58	Gravel		
171390	0	11	Root Mat		
171390	11	20	Disturbed		
171390	20	45	Aeolian Deposit		
171390	45	67	Subsoil		
171390	67	67	Gravel		
171391	0	7	Root Mat		
171391	7	22	Disturbed		
171391	22	30	Aeolian Deposit		
171391	30	36	Low Density Cultural		
171391	36	56	Aeolian Deposit		
171391	56	56	Gravel		
171392	0	9	Root Mat		
171392	9	20	Disturbed		
171392	20	37	Low Density Cultural		
171392	37	40	Aeolian Deposit		
171392	40	42	Turf		None
171392	42	58	Aeolian Deposit		
171392	58	58	Gravel		
171393	0	12	Root Mat		
171393	10	40	Low Density Cultural		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171393	40	54	Aeolian Deposit		
171393	54	54	Gravel		
171394	0	8	Root Mat		
171394	8	24	Disturbed		
171394	24	31	Low Density Cultural		
171394	31	36	Midden		
171394	36	44	Low Density Cultural		
171394	44	58	Subsoil		
171394	58	58	Rock		
171395	0	12	Root Mat		
171395	12	22	Disturbed		
171395	22	38	Midden		
171395	38	40	Aeolian Deposit		
171395	40	40	Rock		
171396	0	8	Root Mat		
171396	8	28	Disturbed		
171396	28	36	Midden		
171396	36	70	Aeolian Deposit		
171396	70	70	Gravel		
171397	0	8	Root Mat		
171397	8	24	Grave Fill		
171397	24	29	Low Density Cultural		
171397	29	38	Midden		
171397	38	69	Aeolian Deposit		
171398	0	8	Root Mat		
171398	8	19	Disturbed		
171398	19	30	Midden		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171398	30	40	Low Density Cultural		
171398	40	69	Aeolian Deposit		
171399	0	6	Root Mat		
171399	8	15	Disturbed		
171399	15	35	Midden		
171399	35	40	Aeolian Deposit		
171399	40	77	Subsoil		
171399	77	77	Gravel		
171400	0	9	Root Mat		
171400	9	19	Disturbed		
171400	19	27	Turf		None
171400	27	37	Low Density Cultural		
171400	37	55	Aeolian Deposit		
171400	55	55	Rock		
171401	0	6	Root Mat		
171401	6	27	Disturbed		
171401	27	46	Midden		
171401	46	64	Aeolian Deposit		
171401	64	64	Gravel		
171402	0	10	Root Mat		
171402	10	25	Disturbed		
171402	25	42	Low Density Cultural		
171402	42	62	Aeolian Deposit		
171402	62	62	Gravel		
171403	0	10	Root Mat		
171403	10	20	Disturbed		
171403	20	29	Turf		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171403	29	43	Midden		
171403	43	80	Aeolian Deposit		
171403	80	80	Gravel		
171404	0	10	Root Mat		
171404	10	18	Disturbed		
171404	18	23	Floor		
171404	23	33	Turf		LNL/LNS
171404	33	43	Midden		
171404	43	58	Aeolian Deposit		
171404	58	58	Gravel		
171405	0	4	Root Mat		
171405	4	19	Low Density Cultural		
171405	19	26	Midden		
171405	26	30	Floor		
171405	30	32	Midden		
171405	32	35	Floor		
171405	35	39	Midden		
171405	39	50	Turf		H3/H4
171405	50	70	Subsoil		
171405	70	70	Gravel		
171406	0	8	Root Mat		
171406	8	20	Disturbed		
171406	20	62	Aeolian Deposit		
171406	62	62	Gravel		
171407	0	7	Root Mat		
171407	7	19	Disturbed		
171407	19	34	Low Density Cultural		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171407	34	40	Aeolian Deposit		
171407	40	40	Gravel		
171409	0	10	Root Mat		
171409	10	22	Disturbed		
171409	22	36	Aeolian Deposit		
171409	36	47	Subsoil		
171409	47	47	Gravel		
171410	0	12	Root Mat		
171410	12	18	Disturbed		
171410	18	33	Aeolian Deposit		
171410	33	55	Subsoil		
171410	55	55	Gravel		
171411	0	10	Root Mat		
171411	10	21	Disturbed		
171411	21	32	Aeolian Deposit		
171411	32	33	Diatoms		
171411	33	61	Subsoil		
171411	61	61	Gravel		
171412	0	10	Root Mat		
171412	10	22	Disturbed		
171412	22	39	Low Density Cultural		
171412	39	68	Subsoil		
171412	68	68	Gravel		
171413	0	11	Root Mat		
171413	11	22	Disturbed		
171413	22	25	Low Density Cultural		
171413	25	41	Aeolian Deposit		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171413	41	73	Subsoil		
171413	73	73	Gravel		
171414	0	10	Root Mat		
171414	10	18	Disturbed		
171414	18	26	Low Density Cultural		
171414	26	33	Midden		
171414	33	39	Low Density Cultural		
171414	39	75	Aeolian Deposit		
171414	75	80	Subsoil		
171414	80	80	Gravel		
171415	0	11	Root Mat		
171415	11	22	Disturbed		
171415	22	31	Aeolian Deposit		
171415	31	41	Midden		
171415	41	48	Floor		
171415	48	53	Aeolian Deposit		
171415	53	81	Subsoil		
171415	81	81	Gravel		
171416	0	11	Root Mat		
171416	11	20	Disturbed		
171416	20	26	Aeolian Deposit		
171416	26	36	Low Density Cultural		
171416	36	61	Midden		
171416	61	79	Subsoil		
171416	79	79	Gravel		
171478	0	15	Root Mat		
171478	15	25	Disturbed		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171478	25	62	Low Density Cultural		
171478	62	66	Subsoil		
171478	66	66	Gravel		
171479	0	10	Root Mat		
171479	10	26	Disturbed		
171479	26	50	Low Density Cultural		
171479	50	65	Subsoil		
171479	65	65	Gravel		
171480	0	10	Root Mat		
171480	10	20	Disturbed		
171480	20	27	Aeolian Deposit		
171480	27	50	Low Density Cultural		
171480	50	65	Subsoil		
171480	65	65	Gravel		
171481	0	15	Root Mat		
171481	15	25	Disturbed		
171481	25	38	Aeolian Deposit		
171481	38	75	Subsoil		
171481	75	75	Gravel		
171482	0	15	Root Mat		
171482	15	30	Disturbed		
171482	30	40	Low Density Cultural		
171482	40	55	Subsoil		
171482	55	55	Gravel		
171483	0	10	Root Mat		
171483	10	30	Disturbed		
171483	30	41	Low Density Cultural		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171483	41	51	Subsoil		
171483	51	51	Gravel		
171484	0	15	Root Mat		
171484	15	20	Disturbed		
171484	20	29	Low Density Cultural		
171484	29	37	Midden		
171484	37	46	Floor		
171484	46	48	Subsoil		
171485	0	11	Root Mat		
171485	11	22	Disturbed		
171485	22	29	Aeolian Deposit		
171485	29	35	Floor		
171485	35	41	Low Density Cultural		
171485	41	60	Aeolian Deposit		
171485	60	70	Subsoil		
171485	70	70	Gravel		
171486	0	10	Root Mat		
171486	10	20	Disturbed		
171486	20	35	Low Density Cultural		
171486	35	70	Aeolian Deposit		
171486	70	78	Subsoil		
171486	78	78	Gravel		
171487	0	12	Root Mat		
171487	12	20	Disturbed		
171487	20	38	Aeolian Deposit		
171487	38	68	Turf		LNL/LNS
171487	68	84	Subsoil		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf	
171487	84	84	Gravel			
171488	0	12	Root Mat			
171488	12	22	Disturbed			
171488	22	35	Low Density Cultural			
171488	35	67	Turf		LNL/LNS H3/H4	
171488	67	115	Subsoil			
171488	115	115	Gravel			
171489	0	11	Root Mat			
171489	11	25	Disturbed			
171489	25	32	Aeolian Deposit			
171489	32	36	Floor			
171489	36	41	Turf		LNL/LNS	
171489	41	80	Subsoil			
171489	80	80	Gravel			
171490	0	14	Root Mat			
171490	14	26	Disturbed			
171490	26	30	Floor			
171490	30	80	Turf			934
171490	80	80	Rock			
171491	0	13	Root Mat			
171491	13	21	Disturbed		934	
171491	21	34	Turf		LNL/LNS	
171491	34	37	Floor			
171491	37	39	Aeolian Deposit			
171491	39	47	Floor			
171491	47	53	Midden			

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171491	53	59	Turf		934
171491	59	72	Subsoil		
171491	72	72	Gravel		
171492	0	15	Root Mat		
171492	15	20	Disturbed		
					934
171492	20	33	Turf		LNL/LNS
171492	33	44	Floor		
171492	44	51	Turf		
171492	51	74	Subsoil		
171492	74	74	Gravel		
171493	0	12	Root Mat		
171493	12	18	Disturbed		
171493	18	27	Aeolian Deposit		
171493	27	52	Midden		
171493	52	64	Subsoil		
171493	64	64	Gravel		
171494	0	10	Root Mat		
171494	10	24	Disturbed		
171494	24	31	Midden		
171494	31	35	Aeolian Deposit		
171494	35	45	Turf		
171494	45	60	Subsoil		
171494	60	60	Gravel		
171495	0	11	Root Mat		
171495	11	21	Disturbed		
171495	21	33	Midden		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf	
171495	33	42	Turf			
171495	42	65	Subsoil			
171495	65	65	Gravel			
171496	0	11	Root Mat			
171496	11	21	Disturbed			
171496	21	42	Midden			
171496	42	52	Aeolian Deposit			
171496	52	65	Subsoil			
171496	65	65	Gravel			
171497	0	10	Root Mat			
171497	10	17	Disturbed			
171497	17	21	Aeolian Deposit			
171497	21	48	Midden			
171497	48	60	Aeolian Deposit			
171497	60	72	Subsoil			
171497	72	72	Gravel			
171811	0	12	Root Mat			
171811	12	22	Disturbed			
171811	22	50	Turf			934
171811	50	50	Rock			
171812	0	12	Root Mat			
					934	
171812	12	30	Turf	Burnt	1000	
171812	30	32	Floor	Sooty		
171812	32	48	Turf			
171812	48	75	Subsoil			
171812	75	75	Gravel			

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
171813	0	16	Root Mat		
171813	16	18	Disturbed		
171813	18	25	Aeolian Deposit		
171813	25	35	Midden		
171813	35	39	Floor		
171813	39	41	Aeolian Deposit		
171813	41	41	Gravel		
173934	0	10	Root Mat		
173934	10	39	Aeolian Deposit		
173934	39	45	Subsoil		
173934	45	45	Gravel		
173935	0	15	Root Mat		
173935	15	45	Aeolian Deposit		
173935	45	60	Grave Fill		
173935	60	65	Subsoil		
173935	65	65	Gravel		
173936	0	10	Root Mat		
173936	10	32	Disturbed		
173936	32	42	Subsoil		
173936	42	72	Turf		
173936	72	80	Floor		
173936	80	80	Gravel		
173937	0	10	Root Mat		
173937	10	30	Aeolian Deposit		
173937	30	43	Low Density Cultural		
173937	43	50	Turf	Burnt	
173937	50	60	Floor	Sooty	

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
173937	60	65	Midden		
173937	65	80	Turf		
173937	80	80	Gravel		
173938	0	10	Root Mat		
173938	10	42	Disturbed		
173938	42	57	Turf		
173938	57	78	Grave Fill		
173938	78	85	Subsoil		
173938	85	85	Gravel		
173939	0	15	Root Mat		
173939	15	25	Disturbed		
173939	25	31	Turf	Burnt	
173939	31	33	Floor		
173939	33	40	Low Density Cultural		
173939	40	40	Rock		
173940	0	12	Root Mat		
173940	12	22	Disturbed		
173940	22	42	Low Density Cultural		
173940	42	80	Aeolian Deposit		
173940	80	80	Gravel		
173941	0	15	Root Mat		
173941	15	23	Disturbed		
173941	23	30	Aeolian Deposit		
173941	30	32	Floor		
173941	32	45	Low Density Cultural		
173941	45	55	Subsoil		
173941	55	55	Gravel		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
173942	0	10	Root Mat		
173942	10	25	Disturbed		
173942	25	55	Aeolian Deposit		
173942	55	55	Gravel		
173943	0	10	Root Mat		
173943	10	20	Disturbed		
173943	20	60	Aeolian Deposit		
173943	60	60	Gravel		
173944	0	10	Root Mat		
173944	10	25	Disturbed		
173944	25	50	Aeolian Deposit		
173944	50	50	Gravel		
173945	0	12	Root Mat		
173945	12	20	Disturbed		
173945	20	45	Aeolian Deposit		
173945	45	45	Gravel		
174347	0	9	Root Mat		
174347	9	29	Disturbed		
174347	29	48	Aeolian Deposit		
174347	48	48	Gravel		
174348	0	8	Root Mat		
174348	8	24	Aeolian Deposit		
174348	24	27	Low Density Cultural		
174348	27	29	Aeolian Deposit		
174348	29	32	Low Density Cultural		
174348	32	37	Aeolian Deposit		
174348	37	45	Low Density Cultural		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
174348	45	50	Turf		
174348	50	60	Grave Fill		
174348	60	65	Subsoil		
174348	65	65	Gravel		
174349	0	7	Root Mat		
174349	7	26	Aeolian Deposit		
174349	26	49	Turf	Burnt	
174349	49	54	Floor	Sooty	
174349	54	81	Cultural Layer		
174349	81	81	Gravel		
174350	0	7	Root Mat		
174350	7	27	Aeolian Deposit		
174350	27	36	Turf	Burnt	
174350	36	38	Floor		
174350	38	52	Low Density Cultural		
174350	52	55	Midden		
174350	55	61	Low Density Cultural		
174350	61	61	Gravel		
174351	0	7	Root Mat		
174351	7	22	Aeolian Deposit		
174351	22	62	Turf		H3/H4
174351	62	71	Aeolian Deposit		
174351	71	71	Gravel		
174352	0	6	Root Mat		
174352	6	28	Aeolian Deposit		
174352	28	38	Turf		
174352	38	44	Low Density Cultural		

Core number	Top depth	Bottom depth	Category	Description	Tephra in turf
174352	44.5	45	Clay		
174352	45	47	Low Density Cultural		
174352	47	63	Aeolian Deposit		
174352	63	75	Subsoil		
174352	75	75	Gravel		
174353	0	7	Root Mat		
174353	7	35	Aeolian Deposit		
174353	35	70	Subsoil		
174353	70	70	Gravel		
174354	0	6	Root Mat		
174354	6	38	Aeolian Deposit		
174354	38	61	Subsoil		
174354	61	61	Gravel		
174355	0	7	Root Mat		
174355	7	42	Aeolian Deposit		
174355	42	42	Gravel		
174356	0	6	Root Mat		
174356	6	30	Aeolian Deposit		
174356	30	45	Subsoil		
174356	45	45	Gravel		