SKAGAFJÖRÐUR CHURCH AND SETTLEMENT SURVEY

# Hegranesþing: Geophysical Prospection and Coring Interim Report 2016

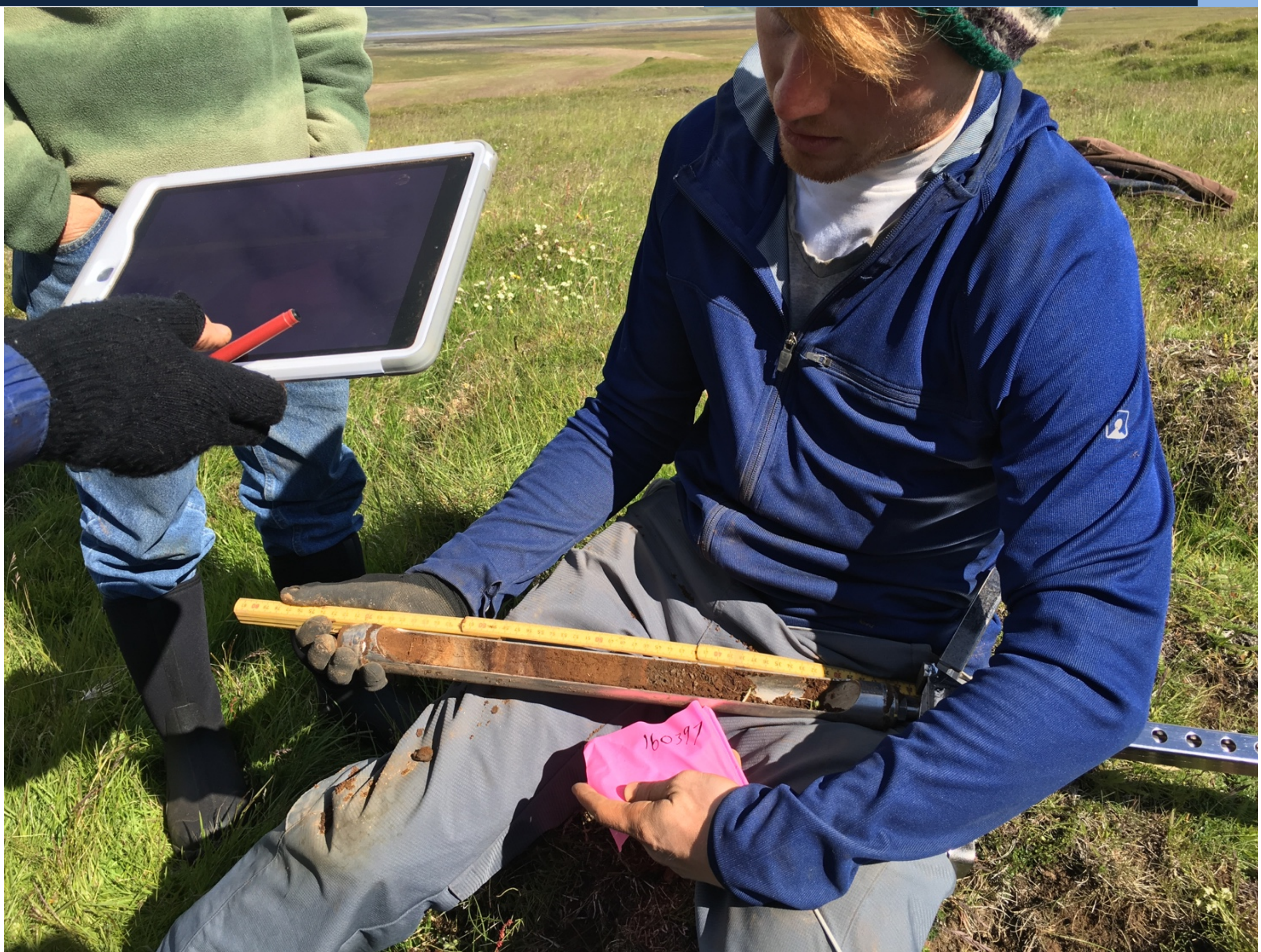

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*Photo on front page – Eric Johnson coring at Hegranesþing.*



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The Hegranesþing geophysical and coring survey 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. 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 SUMMARY

Hegranesþing is an area on the farm of Garður associated with a Viking and medieval assembly site as well as the farmstead of Litli-Garður. The geophysical survey and extensive coring results presented here, as well as previous work, suggest that, in addition to the booths associated with the probable assembly site, there are also typical farmstead deposits associated with permanent Viking Age occupation. There are three areas that may contain domestic remains (Figure 1). The high-confidence area of these farmstead deposits is just north of the farmstead boundary wall, while lower confidence areas for domestic occupation are located just south of the north farmstead boundary wall and just north of the churchyard wall.

## 2.0 ÚTDÁTTUR (ICELANDIC SUMMARY)

Leifar hins forna Hegranesþingstaðar liggja í landi jarðarinnar Garðs í Hegranesi. Hegranesþing var vorþingstaður Skagfirðinga á Víkingaöld og fram á miðaldir. Á síðari öldum var þar býli sem kallaðist Litli-Garður en engar ritheimildir finnast um búsetu þar. Sumarið 2016 voru gerðar jarðsjármælingar á þingstaðnum auk þess sem teknir voru borkjarnar til að greina aldur og eðli minja. Rannsóknin leiddi í ljós að auk leifa búða frá þinghaldinu eru líkleg ummerki um fasta búsetu á þremur stöðum innan tóftasvæðisins (Figure 1). Elstu og gleggstu byggðaleifarnar liggja norðarlega á svæðinu og kunna að vera frá landnámsöld. Annar bær kann að hafa verið sunnarlega á þingstaðnum skammt frá 11. – 12. aldar kirkjugarði sem þar er. Þriðju mögulegu bæjarleifarnar eru svo norðarlega innan túngarðs sem umlukti fornbýlið Litla-Garð.

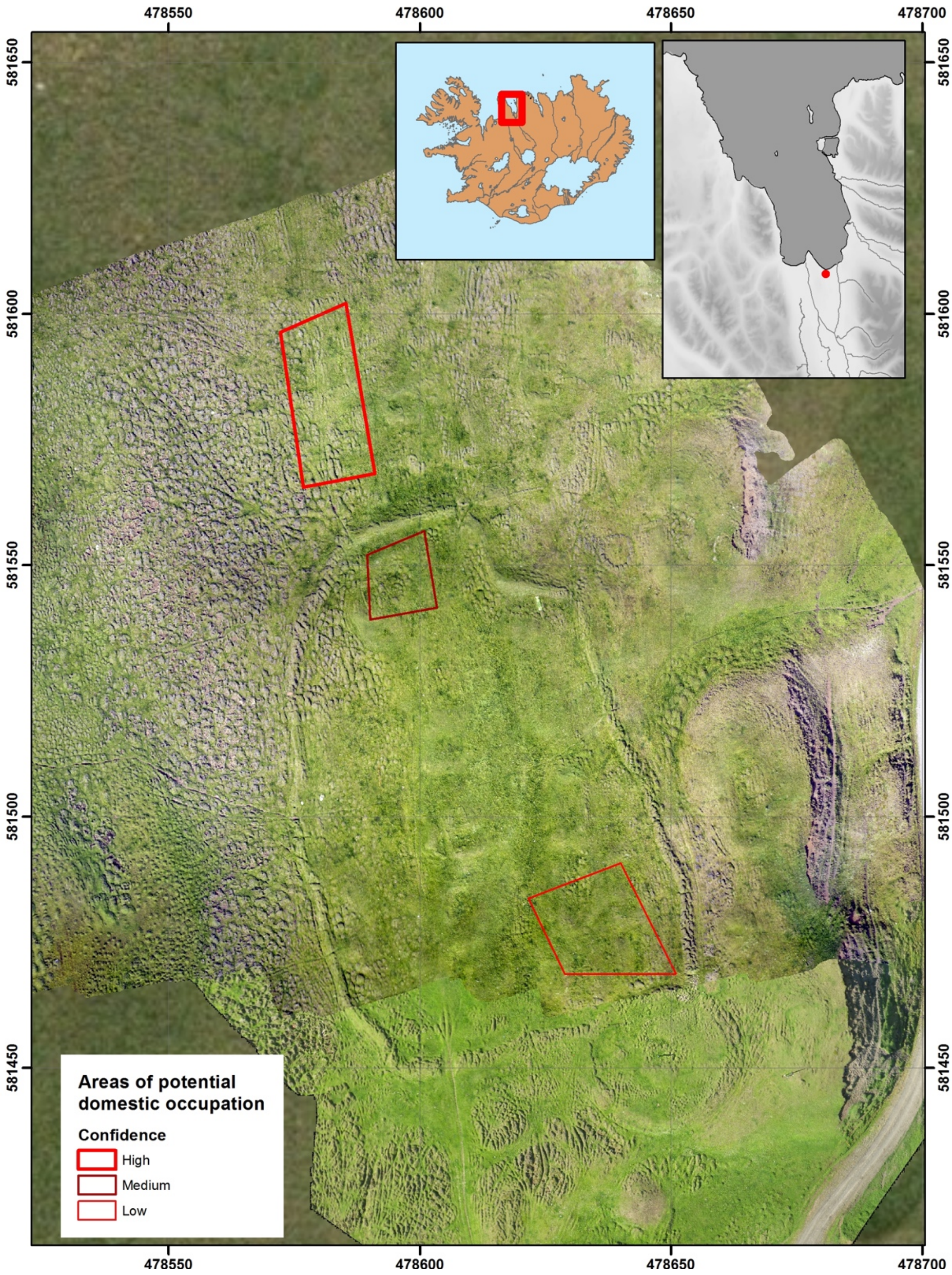


Figure 1. Air photo of Hegranesþing showing three areas of potential domestic occupation. The top center insert shows Iceland with Skagafjörður outlined, and the top right insert shows the location of Hegranesþing.

## 3.0 INTRODUCTION

Hegranesþing, a Viking and medieval assembly site (sometimes spelled Hegranesthing) is on the northern part of the island of Hegranes, in central Skagafjörður (Figure 2). The name of the island, and in turn the assembly site, 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). The Hegranesþing takes up part of the northern area of the farm of Garður, but its boundaries are unclear. Hegranesþing presents itself as a collection of booths, in the style typical of Icelandic assembly sites (Vésteinsson 2013; Vésteinsson, et al. 2004). Surrounding some of the southernmost booths is a tún boundary wall that encloses about 5550 $m^2$. A circular church wall intercepts the southeastern portion of the tún wall and encloses an additional 550 $m^2$. These walls appear to define the outer boundary of Hegranesþing, although many surface features, consistent with booths, can be identified well outside these walls.

The modern farm buildings of Garður are about 400 m to the south of the Hegranesþing's tún boundary wall. To the west of Hegranesþing is the delta of Austari-Héraðsvötn, that includes Garðssandur & Flæðar. To the east is the farm of Keflavík, to the northeast is the farm of Utanverðunes, and to the north are the waters of Skagafjörður. The rivers that currently surround Hegranes, Austari-Héraðsvötn and Eystri Héraðsvötn are constantly shifting and Hegranes may have been connected to one side or another in the past, rather than being an island, as it is today (Zoëga 2015).

### 3.1 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).


Figure 2. Air photo of Hegranes showing modern farm boundaries in yellow.

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.
    - 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 (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 (Boygle 1999; Ólafsson 1985; Sigurgeirsson 1998; Wastegard, et al. 2003). 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 is lies 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). 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; Zielinski, et al. 1997, [A.D. 877 ±4]). 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 are tightly spaced in a brown organic rich soil matric 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).

### 3.2 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

## 3.3 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. These deposits are often thin but are very distinct.

A farmstead's perimeter for a given time period was determined by the results of the plotted cores taken around a 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.

## 3.4 Written sources

The Earliest mention of Hegranesþing is in The *Saga of Grettir the Strong* where it was described having booths separated from some of the more public areas:

> . . . [T]he Hegranes Assembly came around in the spring. A great gathering from all the districts that the assembly covered attended. They spent much of the spring engaged in both

> legal cases and festivities, because at that time there were many men in the districts who liked celebrating.
>
> [Grettir] arrived at the assembly as people were living the Law council on their way back to their booths…
>
> Some young men said that the weather was fine and pleasant and that it would do them good to arrange wrestling matches and entertainment. Everyone agreed that this was a good idea and went to sit down near their booths. . . (Scudder 1997:160)

Hegranesþing is also mentioned in the *Saga of Hacon* where the attempted swearing of an oath seems to be adjourned from Hegranesþing to a later date at the Althing (Þórðarson 1894).

Between 1271 and 1281 law books divide the Hólar bishopric into four assembly regions, specifically specifying Hegranesþing as one of them (Sigurðsson 2012). Hegranesþing is also mentioned in the *Lárentíus Saga* (Hafliðason 1890), a saga written down about 1530 and describing the events of AD 1301. Hegranes "moot" is described as the location where Berg the Wren thought he killed Krók-Álfur, a Norwegian official, who was presenting writs from the King of Norway to the assembled people. According to the story, Krók-Álfur was appointed to two quarters of Iceland and at both Oddeyri and Hegranes assemblies, the people accosted him.

> At Hegranesþing:" he was so scared that he hardly knew where to turn for refuge: the vagabond beggars whooping and hollering, smote their shields against him; he was only saved from slaughter at their hands by Lord Thórd from Mödruvellir and other lords having him covered by their shields. (Hafliðason 1890:27)

In 1374 Garður is listed in the Hólar land inventory as belonging to that bishopric (Pálsson 2010:39) but Hegranesþing is not specifically mentioned in that document. Along the same lines, medieval documents from about that time mention churches and chapels on nearby farms (including Ás, Keflavík and Utanverðunes), but not at Garður (Sigurðardóttir 2012:31). In 1713 Garður was worth 20 hundreds (Magnússon and Vídalín 1930:64) and no sub-farms are mentioned in the listing. However, there is a reference to an abandoned weaning fold (stekkur) with field walls around it. Magnússon and Vídalín (1930) suggest that it might have been a small subsidiary farm occupied by freed slaves (þrælagerði). Oddly enough, they are told that the site of the meeting place is lost, but that it might be north of "Garðar" (Friðriksson, et al. 2004:39). In the second decade of the 19th century, Finnur Magnússon mentions that ruins of the assembly site are visible on Hegranes but no specific location is given (Rafnsson 1983). According to the later Jarðatal, Garður was worth 20 hundreds (Johnsen 1847) and there is no mention of outbuildings or subfarms, let alone an assembly site.

## 3.5 Previous archaeological work

The earliest known scientific investigations at Hegranesþing is that of the philologist and cultural historian Kristian Kålund between 1872 and 1874 (Kålund 1892:78) who identifies the spot on Garður as being the assembly place. In 1886 Sigurður Vigfússon describes 48 different structures at Hegranesþing (Vigfússon 1892). Of those structures, he associates 17 with the weaning fold, the specific location as that of the Hegranesþing of Grettir the Strong, and with the place name Litli-Garður. In 1896 Daniel Bruun noted even more structures (Bruun 1897:226) and he produced a map in 1898 (Bruun 1899). In 1974, the National Museum investigated a booth impacted by road construction (Ólafsson and Snæsdóttir 1975). The stone-footed building did not have a floor and only a few stains of charcoal, burnt bones, and peat ash in the deposit. Six postholes filled with sand in the center of the building were identified.

In 2003 as part of the Assembly Project, a surface survey and two test excavations were conducted at the site of Hegranesþing (Friðriksson, et al. 2004). Excavation 1 revealed the presence of a supposed early Christian cemetery from about the time of deposition of the 1104 (H1) tephra layer. In particular, the visible circular enclosure wall of the cemetery was mostly from the time after the H1 tephra fell. In addition, the cultural layers identified were not associated with the cemetery but from a much later smaller farmstead, that was abandoned well before the 1766 tephra fell. Excavation 2, into a booth, revealed turf foundation walls constructed between 1104 and 1766, but closer to 1104. Although there were animal bones and bits of charcoal, no cultural layer was encountered.

In 2009, three test trenches were dug as part of the Skagafjörður Church Project. Excavation 1 of the prior Assembly project was expanded and deepened, revealing four graves. The two graves that had been identified in 2003 were fully excavated and the skeletons removed for further analysis. Another test trench was placed about 8 m to the south of test trench 1, just east of a presumed church ruin. The trench revealed the cut of a fifth grave (Zoëga 2009). While the two graves excavated were clearly dug through the 1104 tephra, two other burials were overlain by that tephra, suggesting that the cemetery was in use before and after the tephra layer fell. The third test trench confirmed that the cemetery's wall that is visible on the surface post-dates 1104 and most likely represents a 12th century enlargement of the cemetery. The cemetery had been landscaped and leveled with turf, both before and after the 1104 tephra fall, the later landscaping episode probably associated with the building of the cemetery wall. The cemetery remains are consistent with a large number of early Christian farmstead cemeteries that are found in the Skagafjörður region (Zoëga 2014, 2015). Thus, the functional, temporal, and spatial relationship between the cemetery and the assembly is unclear, but the cemetery is potentially associated with a nearby farmstead.

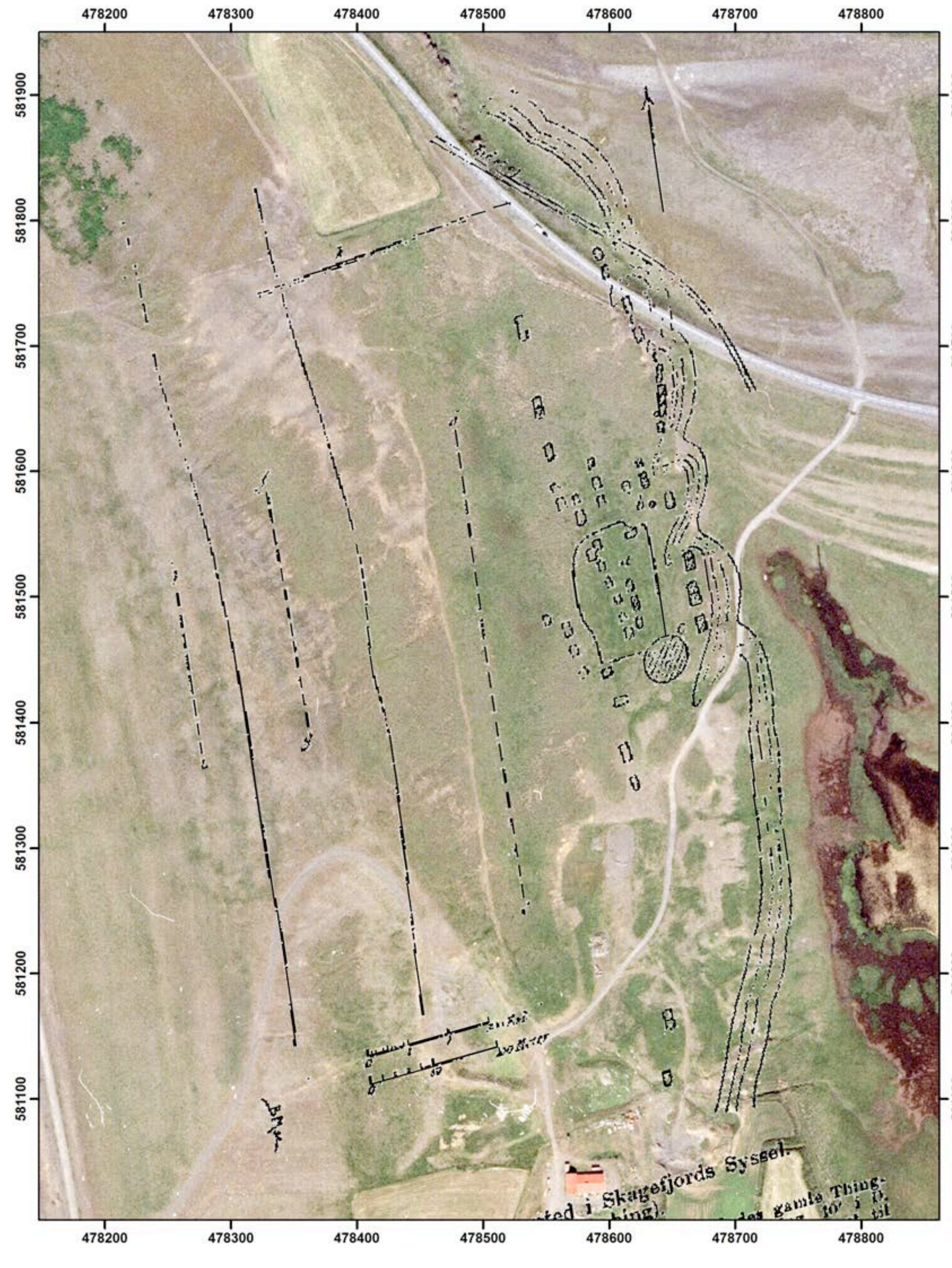


Figure 3. Bruun’s 1898 map superimposed on landscape. Georeferencing is based on tún walls.

In 2013 and 2015, as part of this project, a series of geophysical surveys were conducted at Hegranesþing (Figure 4). The work in 2013 was a preliminary part of the SCASS project to investigate and analyze the use of geophysical methods to locate and image early Christian cemeteries in Iceland, while the work in 2015 was part of the basic SCASS work described in the front matter. This work indicated that the northern part of the cemetery at least was densely packed with burials. High ground conductivity readings in the center of the visible tún enclosure (478610E 581500N) suggests the possible presence of a long-term domestic occupation (Damiata, et al. 2016). The broad anomaly of elevated readings is qualitatively different from the well-defined smaller "booth" anomalies as seen in other parts of the site. The geophysical survey described below is an expansion to the north of this earlier survey, and the coring survey was guided by the results of both the previous survey in 2015 and the FDEM survey in 2016.

## 4.0 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 the Hegranesþing ruins, the internal GPS receiver in the iPhones or iPads that were used to record the coring data was used. Within Hegranesþing, most cores were collected on 20 x 20m grid spacings that were located with the total station. Judgmentally placed cores were originally located with an iPad and then 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.

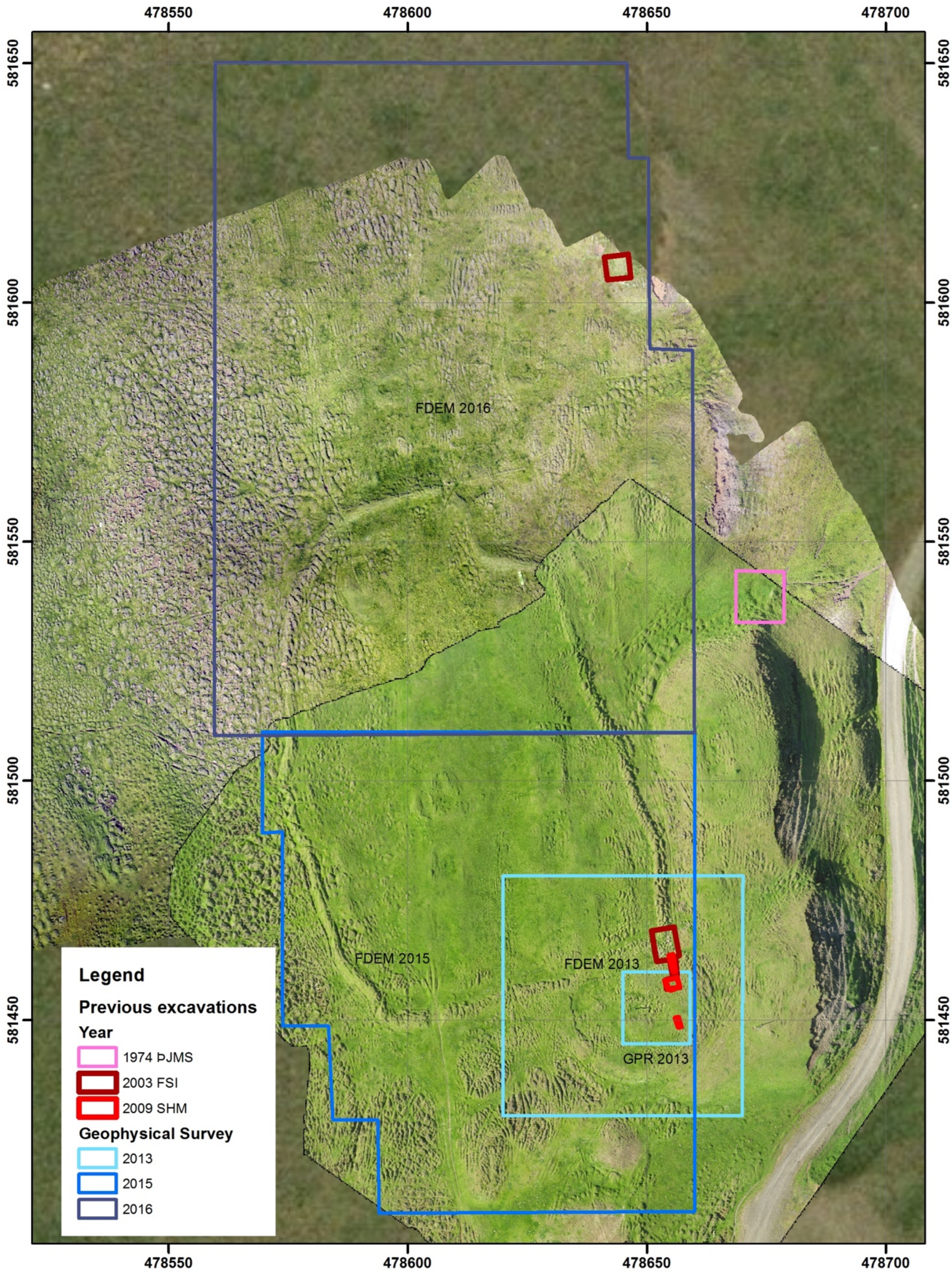


Figure 4.  Location of archaeological excavations from 1974 (approximate), 2003 and 2009 as well as geophysical surveys conducted in 2013, 2015 and 2016, superimposed on kite-based photo-mosaic of Hegranesþing.

## 5.0 GEOPHYSICAL METHODOLOGIES

The use of geophysical methods in support of archaeological investigations is widely established (e.g., Gaffney and Gater 2003; Linford 2006). For the 2016 study, frequency-domain electromagnetics (FDEM) was applied over northern portions of the assembly site. Summarized below are the geophysical methodologies that were used. Appendix A provides a general overview of FDEM operations.

### 5.1 Site Conditions and Geophysical Targets

The natural stratigraphy of the region consists of soil with intermixed tephra layers, along with gravel layers and lenses of glacial origin. At Hegranesþing, the ground surface is hummocky due to a combination of thufurs or frost heaves (e.g., Grab 2005) and the remnants of archaeological remains. A limited excavation within the cemetery proper yielded fill layers overlying a gravel deposit below which two well-preserved skeletons were revealed (Zoëga 2009).

There are several potential geophysical targets associated with the Viking Age archaeological remains at Hegranesþing. For this survey, the most important targets are usually found in a central farmstead. The most common include: longhouses, middens, barns, pit houses, outbuildings, and churches. Other features, that are not necessarily buildings, include animal pens and boundary walls, that can, less frequently, be identified using maps of geophysical readings. Geophysical techniques are most effective for predicting the location of buried archaeological structures and deposits without surface sign where the deposits are substantial and are of a single component. Furthermore, the archaeological remains must have physical properties that make them distinct from the surrounding environment. Finally, the geophysical techniques work best where the remains have a will-defined interface with an original surface. Generally, geophysical techniques are contraindicated when the remains are ephemeral, or in disturbed contexts, or part of a complex palimpsest-like deposit.

The two main targets for the geophysical survey are long houses and churchyards. Long houses are distinguishable by their geometry, with two slightly bowed 2 m thick turf walls that are between 4 and 8 m apart. Thus far, we have not identified a central fireplace or hearth with geophysical techniques, but these fire features are a key part of longhouse structures.

Other archaeological remains (e.g., booths, walls) are expected to consist of compacted turf blocks overlying a stone foundation. In some cases, the turf will be placed directly on the ground or on a prepared surface. From a geophysical perspective, measureable contrasts between stones and soil and between compacted turf and soil are anticipated (i.e., contrast in apparent ground conductivity and in-phase for FDEM).

In general, churchyards consist of a small central church that is surrounded by a cemetery, which is enclosed by a circular wall. The churches are often only 3 × 4 m in size and constructed of wood with stone foundation. The wall is typically between 15 to 30 m in diameter and composed of compacted turf overlying a stone foundation or gravel base. Graves may be found throughout the enclosed cemetery including under the church.

Graves can be a difficult geophysical target to detect but differential fill, breaks in soil stratigraphy, and the interfaces along the sides and bottom of grave shafts might be detectable (Bevan 1991; Conyers 2005, 2006; Doolittle and Bellantoni 2010; Jones 2008; King, et al. 1993). In some instances, the direct detection of skeletal remains is possible (Damiata, et al. 2013; Damiata, et al. 2017; Schultz 2008; Schultz and Martin 2011).

## 5.2 Frequency-Domain Electromagnetic Surveying

In 2013, an FDEM survey was conducted over a 50 × 50 m grid, which was primarily intended to investigate the churchyard (Figure 4). In 2015, an expanded reconnaissance survey was conducted over areas to the south, north and west of the churchyard—including most of the homefield. One objective of this work was to directly compare geophysical results (Damiata, et al. 2016) to the exposed archaeological remains (e.g., Figure 3). In 2016, a third FDEM survey was conducted, which covered a portion directly to the north of the expanded reconnaissance survey that was conducted in the previous year. The data from the two surveys were combined to create maps of the entire areas that were surveyed. (Figure 6 and Figure 7)

### 5.2.1 Equipment and Field Procedures

The FDEM surveys were conducted using a GF Instruments' CMD Explorer (Figure 5), which operates at 30 kHz over three separate dipole lengths (i.e., a single transmitter [TX] located at one end of the unit and three separate receivers [RX] located at varying distances along the boom). By increasing dipole length, a greater volume and depth of soil can be sensed. When operated in the vertical dipole mode, the dipole lengths of 1.48, 2.82 and 4.49 m provide depths of interrogation of approximately 2.2, 4.2 and 6.7 m (i.e., ~1.5X the dipole length), respectively, relative to the level of the sensors. Both quadrature phase (bulk ground conductivity - C) and in-phase (related to bulk ground magnetic susceptibility - IP) components were recorded for each of the three dipole lengths (i.e., six simultaneous readings were recorded for each "measurement"). Maps and figures of FDEM readings are labeled with the component and dipole length. Thus, C1 and IP1 present quadrature phase and in-phase data from the shortest dipole length, and shallowest depth of interrogation while C3 and IP3 present quadrature phase and in-phase data from the longest dipole length, and greatest depth of interrogation.

Figure 5. Using the CMD Explorer with the boom oriented parallel to the direction of transects.

For the reconnaissance FDEM surveys, the instrument was operated in the vertical dipole mode with the boom carried at hip level. For the survey in 2013, the boom was oriented perpendicularly to the direction of transects, whereas in 2015 and 2016 it was parallel. Both surveys were conducted uni-directionally in that all data for a given survey were collected by traversing from south to north. Data were collected along contiguous transects that were separated by 0.5 m. The sampling rate was set to 10 Hz (i.e., 10 samples per second), which yielded a spacing between measurements of ~0.06 m while walking at a normal pace. Note that surveying was guided by color-coded PVC flags that were placed every 10 meters along transects separated by 1 m. The true location of a measurement was determined by fiducial markers that were placed into the data stream by the operator and assuming linear interpolation between markers.

### 5.2.2 Data Processing

The raw data were initially corrected to properly adjust for the starting and ending locations of each transect. As a check on quality control, the average spacing of measurements for each fiducial segment along a given transect (i.e., every 10 m) was calculated to ensure the spacing between measurements was approximately 0.07 m or less. The data were then processed using Oasis Montaj mapping software to produce color-contoured maps. The 2015 and 2016 datasets required slight color adjustments to create single images with minimal mismatch at the seams. The processed data were also archived into a database for future use.

### 5.2.3 Results

Figure 6 and Figure 7 present the composite results for apparent ground conductivity and in-phase component, respectively. The FDEM data provide detailed maps that reflect changes in both surficial topography and subsurface material properties. The results for C3 and IP2 provide the best correspondence to the partially visible remains, which include enclosure wall of the churchyard, boundary wall of the homefield, and booths within and outside of the homefield.

With respect to apparent ground conductivity and sensor 3, archaeological features that have relatively pronounced topographic variations (e.g., tún wall) present themselves as a high-low-high (i.e., red-blue-red) responses. This is attributed to elevational variations of the RX and TX as the feature is approached and crossed over, and to a lesser extent to the distances to buried stone or bedrock. However, features with little or no topographic expression (e.g., many of the booths) have responses that are more influenced by buried rock and appear as mainly low apparent ground conductivity (i.e., blue). This is the case for some of the booths to the northeast in the vicinity of the earliest excavations at Hegranesþing. All of those excavations suggest that the structures and walls have a substantial stone component (Friðriksson, et al. 2004; Ólafsson and Snæsdóttir 1975; Zoëga 2009). In addition, for the surveys that were conducted at this site, IP2 appears particularly sensitive to the presence of rocks, which are noted as high values (Damiata, et al. 2016).

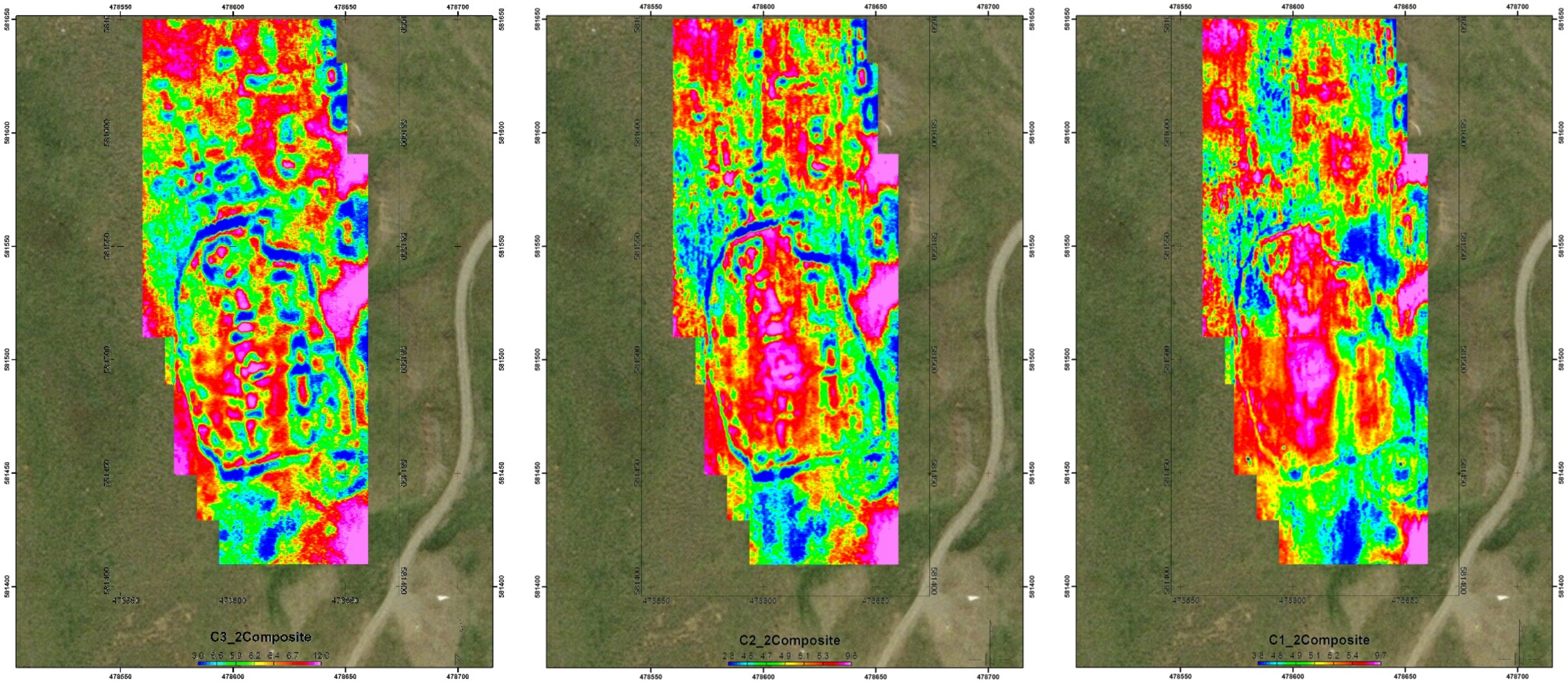


Figure 6. Apparent ground conductivity maps (mS/m). Left: C3 composite image. Middle: C2 composite image. Right: C1 composite image3.

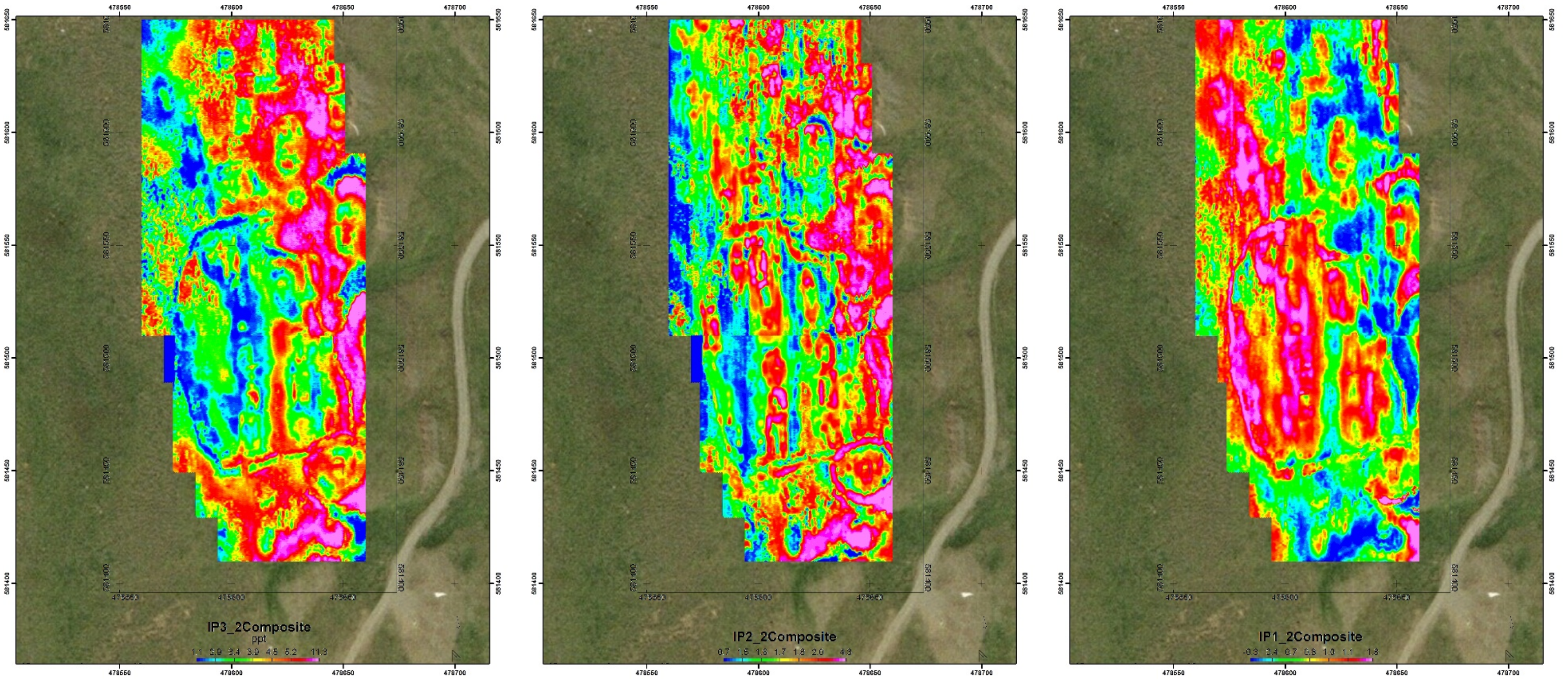


Figure 7. In-phase component maps (ppt). Left: IP3 composite image. Middle: IP2 composite image. Right: IP1 composite image.

## 6.0 CORING

At Hegranesþing, 144 cores were taken during the 2016 field season (Figure 8). The coring continued the work at Garður that was initiated in 2015 (Figure 9). There were 44 cores that revealed turf deposits which could be associated with either booth or long-term domestic occupations. At four coring locations (6 cores), distinct floor deposits were encountered. Overall, 64 cores contained some sort of cultural deposit (44%) while 76 had none. Most of the cores (84) were taken on a 20 × 20 m grid (57%) while the rest were judgmentally placed based on previous coring, geophysical results or surface topography.

As for tephra layers, 14 cores encountered an in situ 1766 tephra (9%), which is normally very difficult to identify in cores (e.g., of the 8962 cores taken in Skagafjörður by the SCASS and SCAS teams, about 641 (7%) contained this tephra). Along the same lines, 33 cores encountered the 1300 tephra (22%, exactly the average that are presented in Skagafjörður as a whole). In situ H1 tephra layer was the most common identified. It appeared in 61 different cores (42%), while H3/H4 was in 54. Twenty-six cores encountered an in situ dark tephra from between the H1 and the time of settlement. Fourteen cores contained the mid 10$^{th}$ century tephra layer, while 14 had the 1000 tephra. Only two cores presented them together. Four cores revealed a distinct LTL and 5 others the LNS, which appeared as a dark distinct mixed layer.

In general, coring in an assembly sites does not yield “notable concentrations of cultural refuse” (Friðriksson, et al. 2004:36). For example, at Thingvellir where 70 cores were taken, only two contained small cultural deposits (3%). Conversely, at Hegranesþing, where 145 cores were taken, 21 had distinct midden deposits (14%), suggesting the possibility of substantial long-term domestic occupations at Hegranesþing.

Two areas of coring suggested substantial domestic occupation. The first, just north of the northern tún wall (Figure 10 & Figure 11) suggests an extensive early occupation at about 478580E, 581580N. Floor deposits were encountered in cores 160407 (Figure 14) and 160408, at about 50 cm bgs. Both cores were taken with the JMC and in both cases, the floor was encountered in the second barrel. In both of these cores, the floor was below an in situ H1 tephra layer. Core 160408 had turf and a H1 immediately above the 9-cm thick floor, while core160407 had an H1 at 15 cm bgs, just below the root mat and above a 24-cm thick turf layer which rested on the 25-cm thick floor. These cores were just a few meters apart. In the same region, several other cores (e.g., core 160443) revealed midden layers as evident by substantial peat ash and charcoal deposits at about 55 cm bgs. Just south of the northern tún wall, several cores presented midden layers also under the H1 (Figure 15 and Figure 16) which might be associated with this structure, but broken by the later construction of the tún wall.

The second area of potential domestic occupation is in the center of the tún enclosure. Only one core encountered the occupational layers. Originally started with the JMC as Core 160392 and retaken as core 160393 with the 6 cm Eijkekamp auger, the location (478584.78E, 581580.10N) yielded suggestions of a domestic occupation (Figure 12). The first 50 cm of the core encountered a crumbly aeolian deposit and the 1300 tephra layer at 40 cm bgs. Below were two sets of alternating layers of midden and turf for 21 cm, followed by another aeolian deposit from 71 to 89 cm bgs. From 89 to 99 cm bgs, a substantial black greasy floor was encountered. This floor appears over the mid 10th century tephra at the very bottom of the first core (100 cm bgs). The floor was on top of yet another aeolian deposit that extended from 99 to 120 cm bgs, which was followed by a 6 cm turf deposit that rested on an in situ H3 tephra layer at 120 cm bgs. The H4 layer was also well preserved at 144 cm bgs and the core experienced refusal at 160 cm bgs. There are smaller, less distinct areas of midden nearby, just north of the church, in the tún (cores 160404 & 160403 at 478640E, 581485N) and these cultural deposits seem to be above the H1 tephra layer.

Figure 8. Two of the authors coring at Hegranesþing.

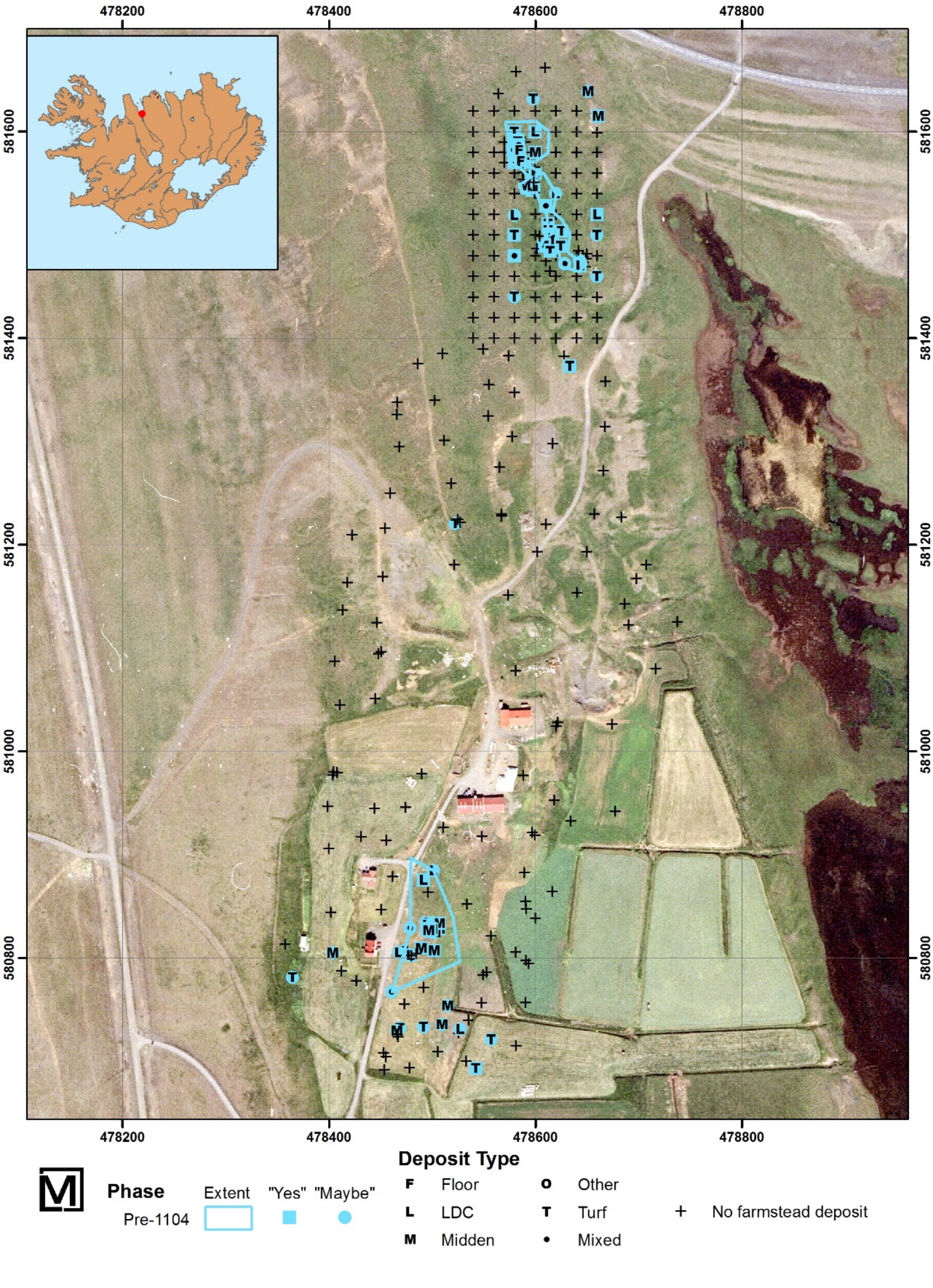


Figure 9. Distribution of cores at Garður (south), including Hegranesþing (north) taken during the 2015 (Garður) and 2016 (Hegranesþing) field seasons.


Figure 10. Core distribution (x) over Hegranesþing labeled with core numbers, superimposed on air and kite photos.

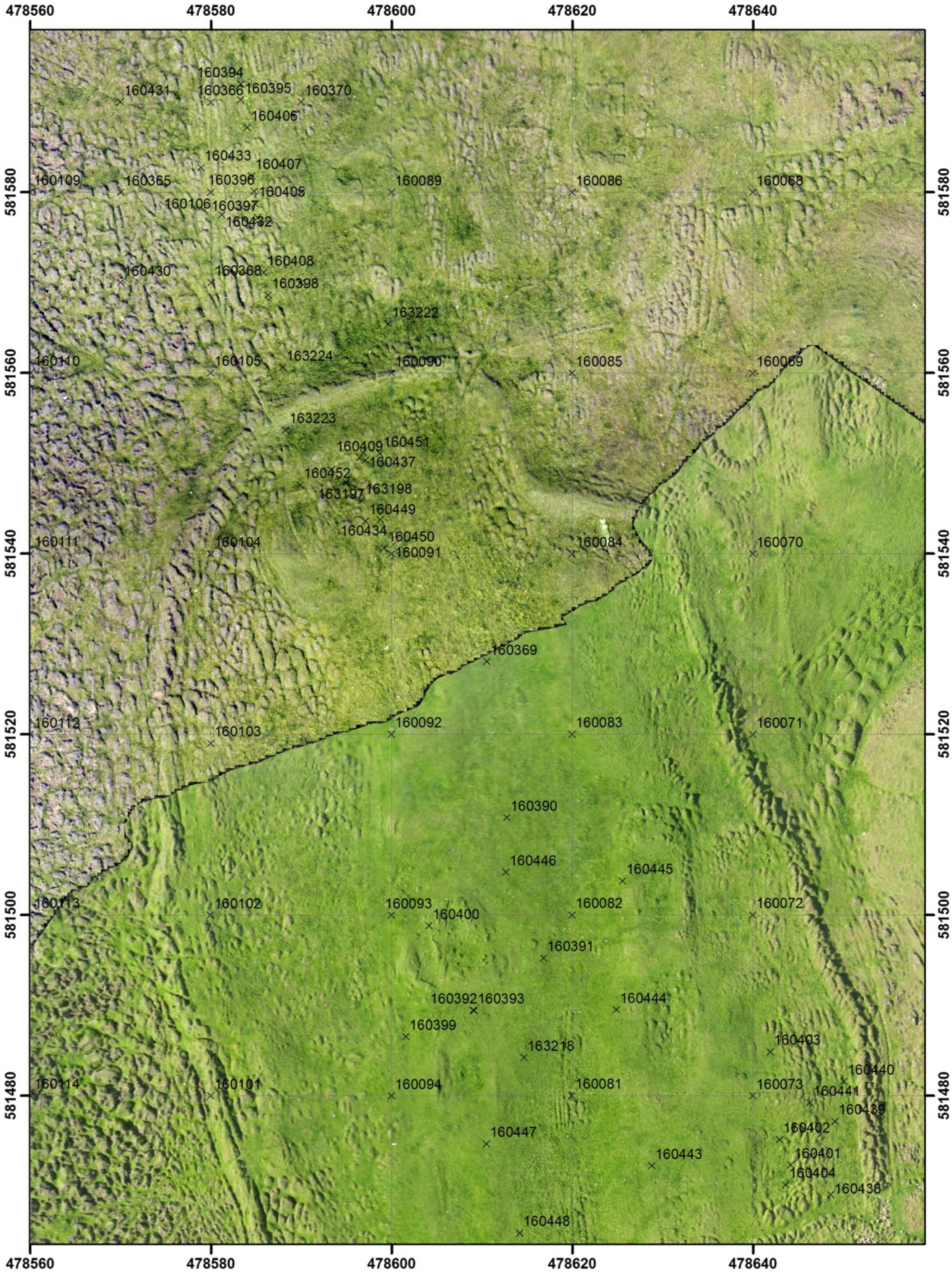


Figure 11. Core distribution (x) over tún area labeled with core numbers, superimposed on air and kite photos.

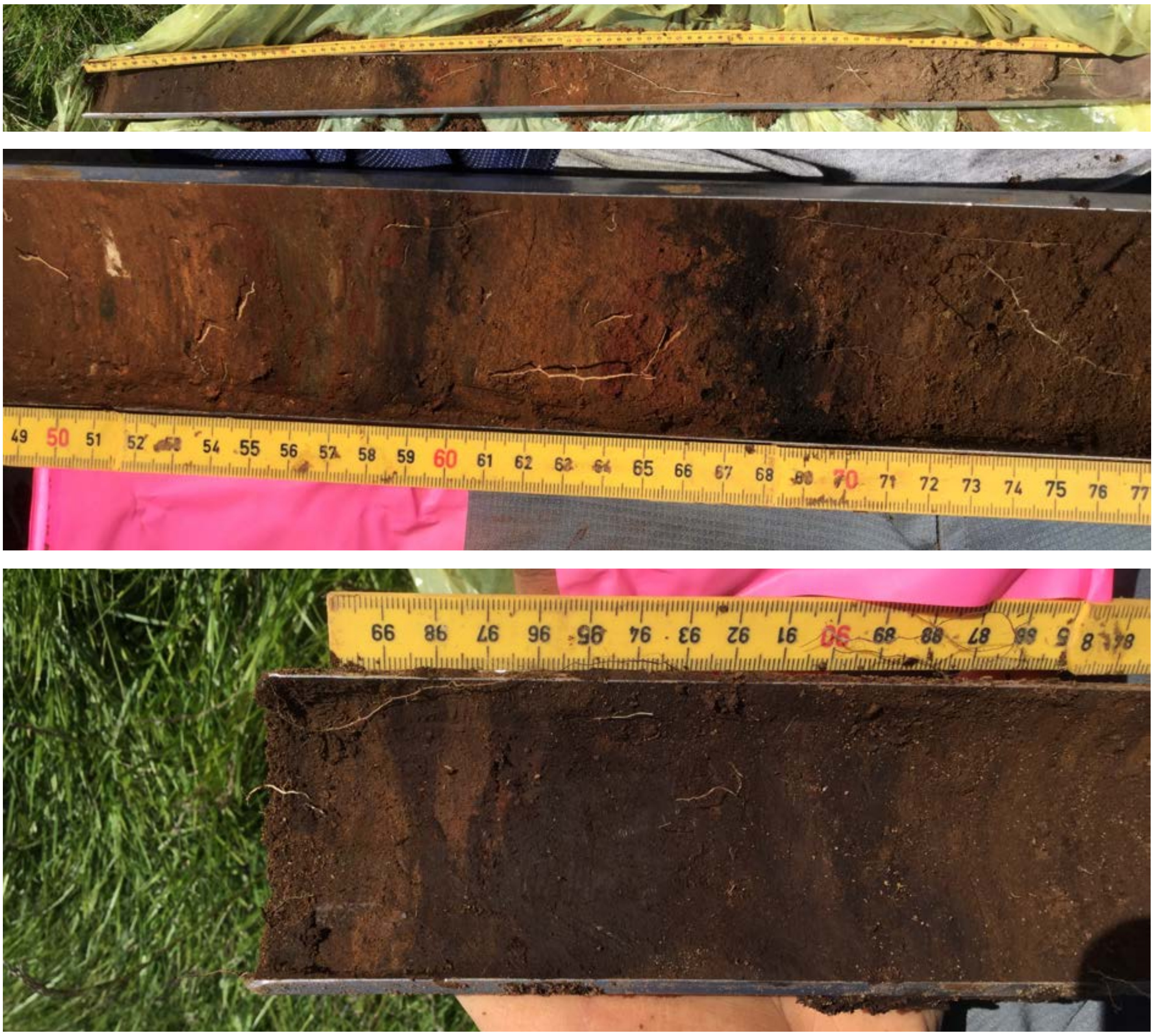

Figure 12. Core 1600393, taken with the 6 CM Eijkelkamp auger. Top shows the first 100 cm of the core with the first 50 cm of aeolian deposit and the 1300 tephra layer at 40 cm bgs. Middle shows alternating layers of midden and turf. Bottom shows floor from 89 to 99 cm bgs and the mid 10th century tephra at the very bottom of the core.

Figure 13.  Core 160397 showing floor from 54 to 58 cm bgs then an aeolian deposit with a thick LNS at 59 followed by a combined H3/H4 tephra layer that ends at about 64 cm bgs. Taken at 478585.20E, 581577.21N, just north of the tún wall.

Figure 14.  Core 160407 showing the floor section from 40-65 cm bgs. Taken at 478584.54E, 581581.81N just north of the tún wall.

Figure 15. Core 160449 Showing the 1300 tephra at about 20 cm bgs and the midden starting at 25 cm bgs. The midden surrounds the white H1 at 30 cm bgs. Taken just south of the northern tún wall at 478597.12E, 581543.59N.

Figure 16. Core 163198 showing 0-35 cm bgs. On either side of the H1 at 30 cm bgs, a midden deposit stretched all the way down to 50 cm bgs where it rested on an iron pan (not shown). Taken just south of the northern tún wall at 478596.68E, 581545.89N.

## 7.0 SUMMARY AND CONCLUSIONS

Geophysical surveys were conducted at Hegranesþing in 2013, 2015 and 2016 and cores were taken in 2016. Earlier work suggests that the FDEM data from sensor 2 provided the best correspondence to the visible remains, which included the enclosure wall of the churchyard, the boundary wall of the homefield, a central structure within the churchyard and structures (e.g., booths) within the homefield (Damiata, et al. 2016). These features are characterized by relatively low and high values of apparent ground conductivity and in-phase, respectively. These responses are most likely due to rocks.

Most of the well-dated extensive deposits that can be associated with specific structures occur below the 1104 tephra layer (Figure 17 and Figure 18). A substantial area to the north of the tún wall is potentially very early and well preserved, and includes floor layers. Surface topography and geophysical results suggest a possible north-south oriented longhouse of the order of 25 m long, as well as potential outbuildings in this area. Ideally test pits should be placed in the well-defined midden to refine the chronology and obtain paleoethnobotanical samples. The area just to the south of the northern tún wall is not as well dated, but still could be early and associated with the deposits to the north of the tún wall. In the center of the tún is another well-defined floor layer that dates before 1104. Midden deposits have not been identified that are associated with this floor. More coring is recommended in this area to identify the midden deposits for a future test pit.

For the period of 1104 to 1300 there is well-defined midden deposit just south of the northern tún wall (Figure 19 and Figure 20). This deposit clearly straddles the 1104 tephra layer, but unlike the neighboring northern deposit that probably does not have a post-1104 component, this deposit clearly does. Five different cores show 1104-1300 deposits in this area. Only one of these 5 cores encountered post 1300 midden. In fact, that core, 160449, is the only one at Hegranesþing with good evidence for post 1300 midden, as the midden straddles the tephra layer. That being said, this one core should not be relied upon and should be confirmed with additional work. A test pit into this midden deposit is recommended to refine the chronology and obtain paleoethnobotanical samples. The 1104-1300 time period provides the best temporal description of the deposit just north of the church, which is suggested by several cores. It is recommended that more cores be placed to determine the limits of this deposit. This is probably the best candidate for the Litli-Garður referent (Zoëga 2009).

There does not seem to be much domestic activity at post 1300 Hegranesþing. This negative evidence, and the substantial size of Garður in the post 1300 period (8200 $m^2$) suggest that domestic activities, by this time, may have entirely shifted to Garður.

The pre-1104 Hegranesþing farm mound area (if that is a correct description of the deposits) is probably contiguous, but could be divided either at the northern tún wall or in the center of the tún (top right in Figure 23). Currently, the coring distribution is not dense enough to determine if there are breaks, so the area has been put together into a single area of 3366 $m^2$ which is still smaller than the 4500 $m^2$ of Garður for the same time period. Between 1104 and 1300 the distribution of midden, LDC, and turf has two distinct areas, the smaller northern one is 544 $m^2$ and the larger southern one is 1231 $m^2$ for a total of 1775$m^2$. This total is about 1/6 the size of Garður during this period which was about 11,400 $m^2$. Well dated deposits from the post 1300 farm mound are few, and the 197 $m^2$ suggested in Figure 23 is probably not a viable domestic occupation.

The results of the work so far suggest that, in addition to the booths and other aspects of an assembly site, Hegranesþing also contains a substantial and early occupation, potentially at multiple locations.

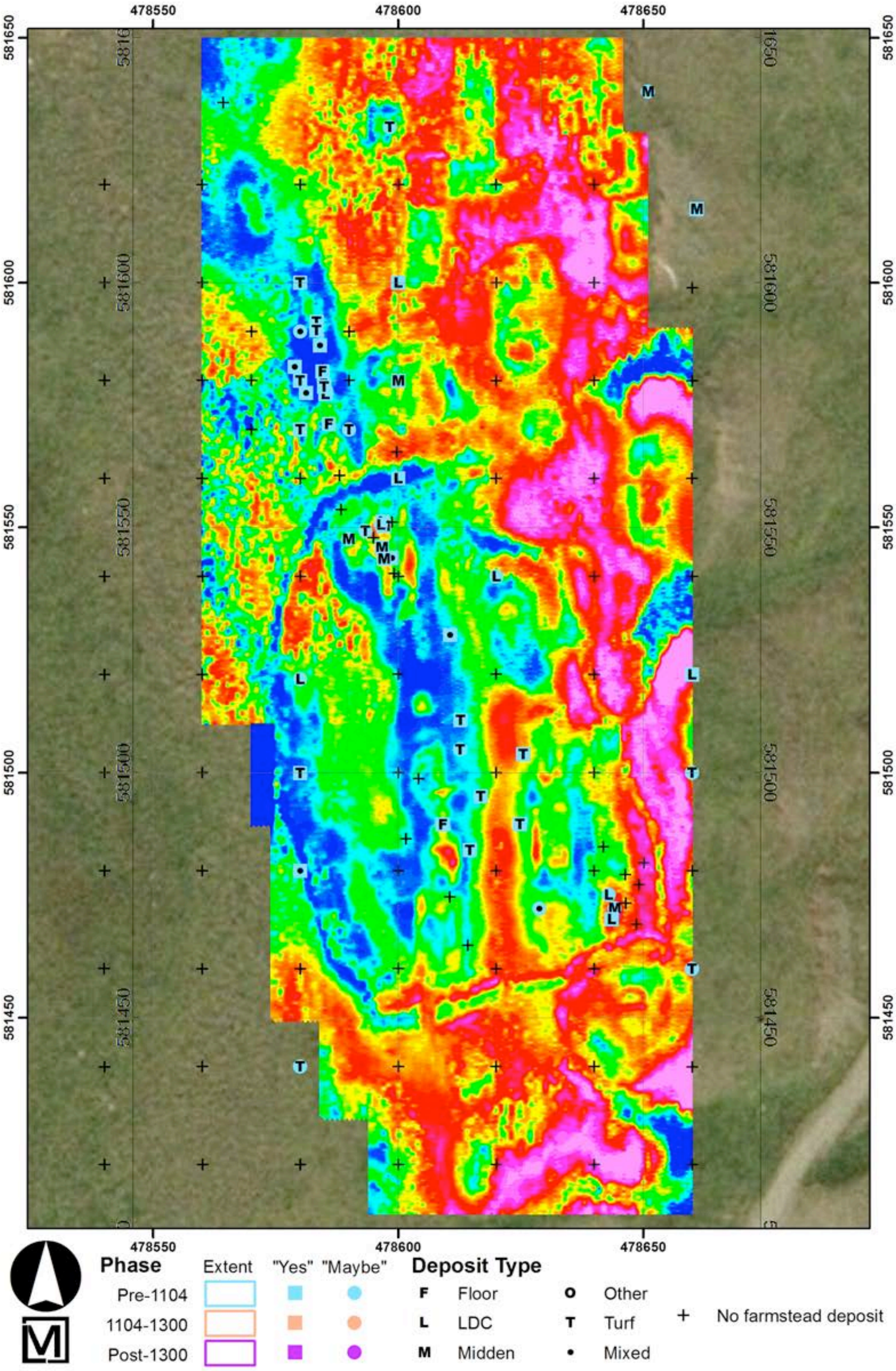


Figure 17. IP3 with pre-1104 coring results.

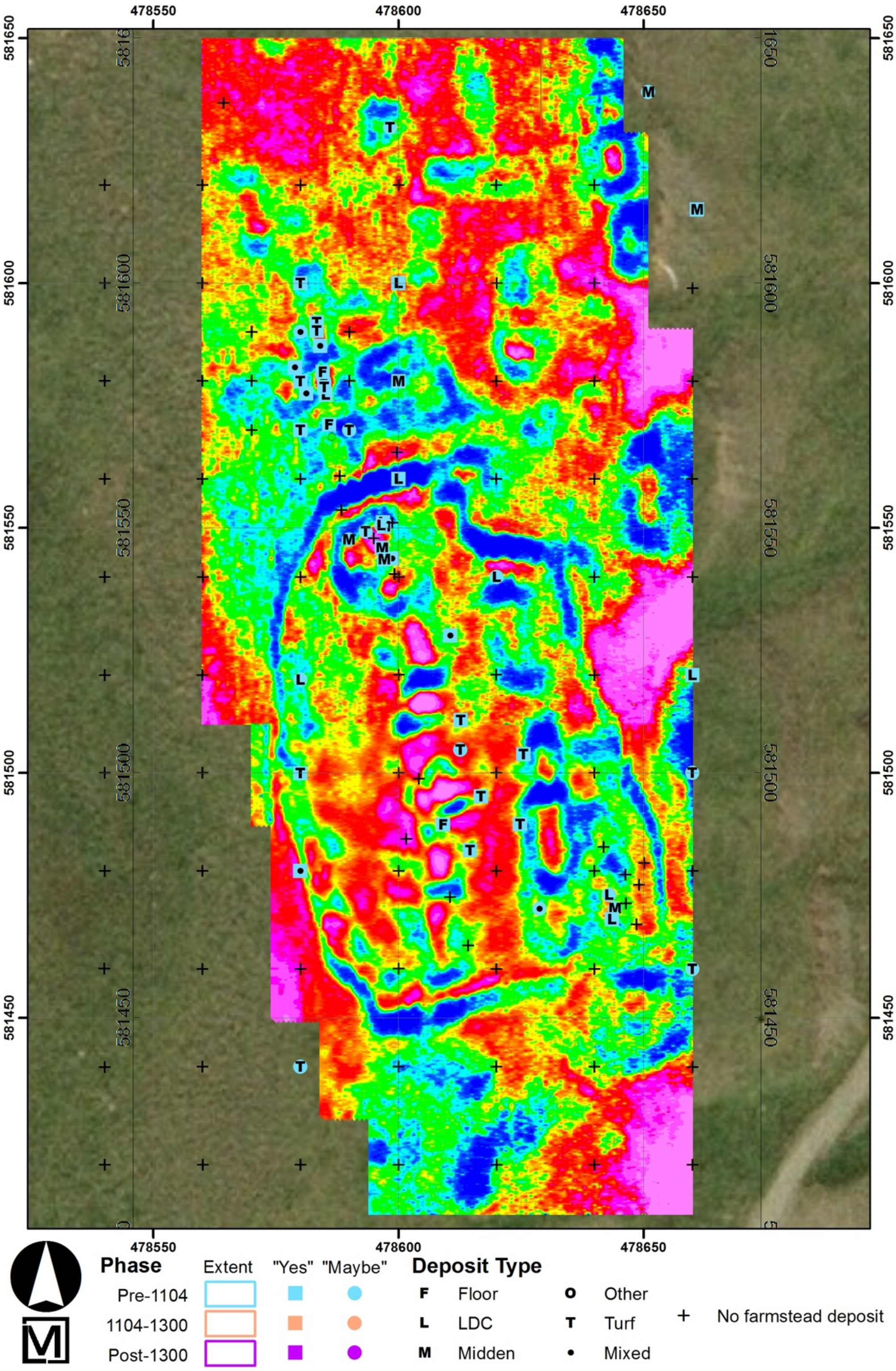


Figure 18. C3 with pre-1104 coring results.

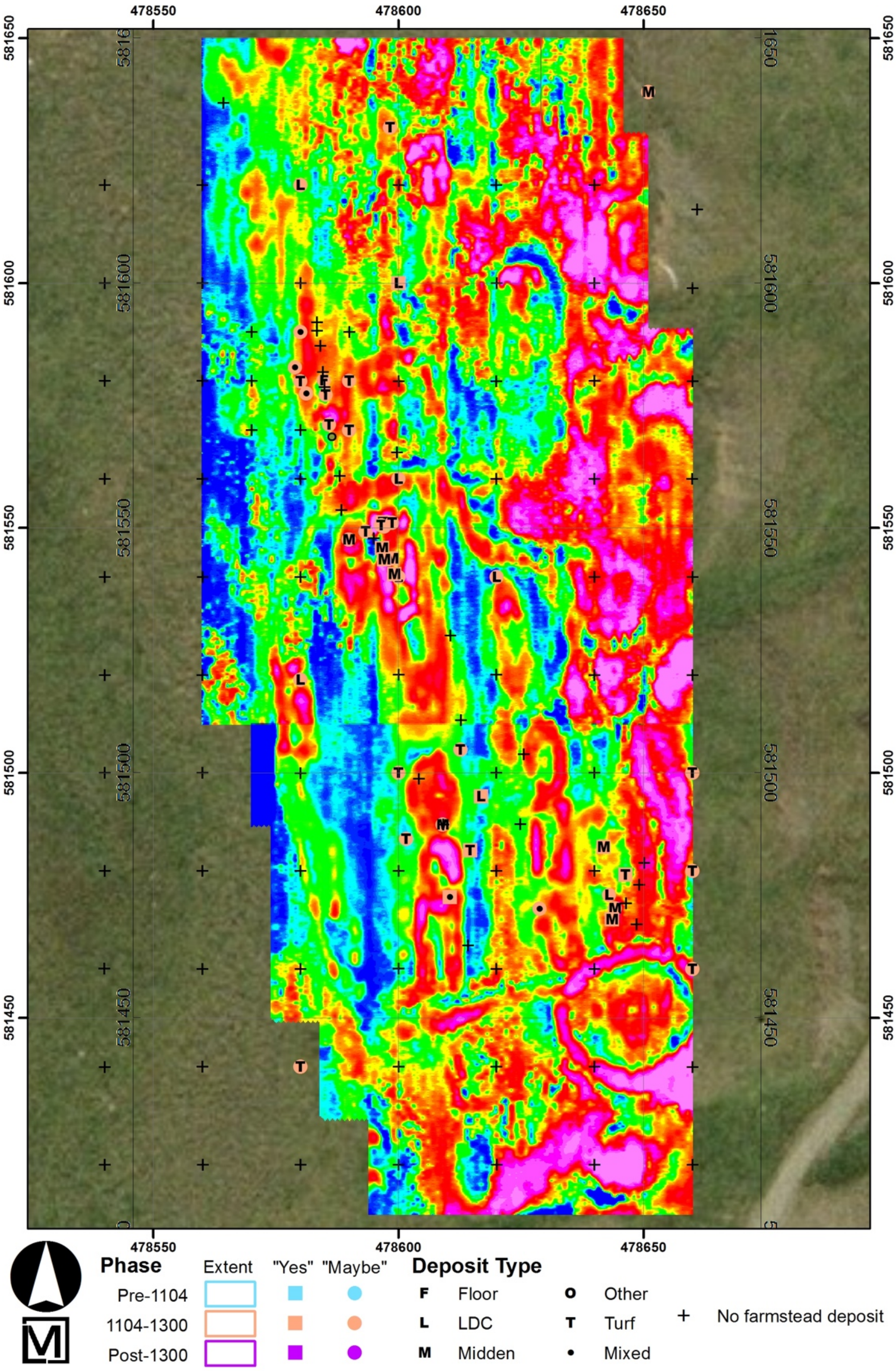


Figure 19. IP2 with 1104-1300 coring results.

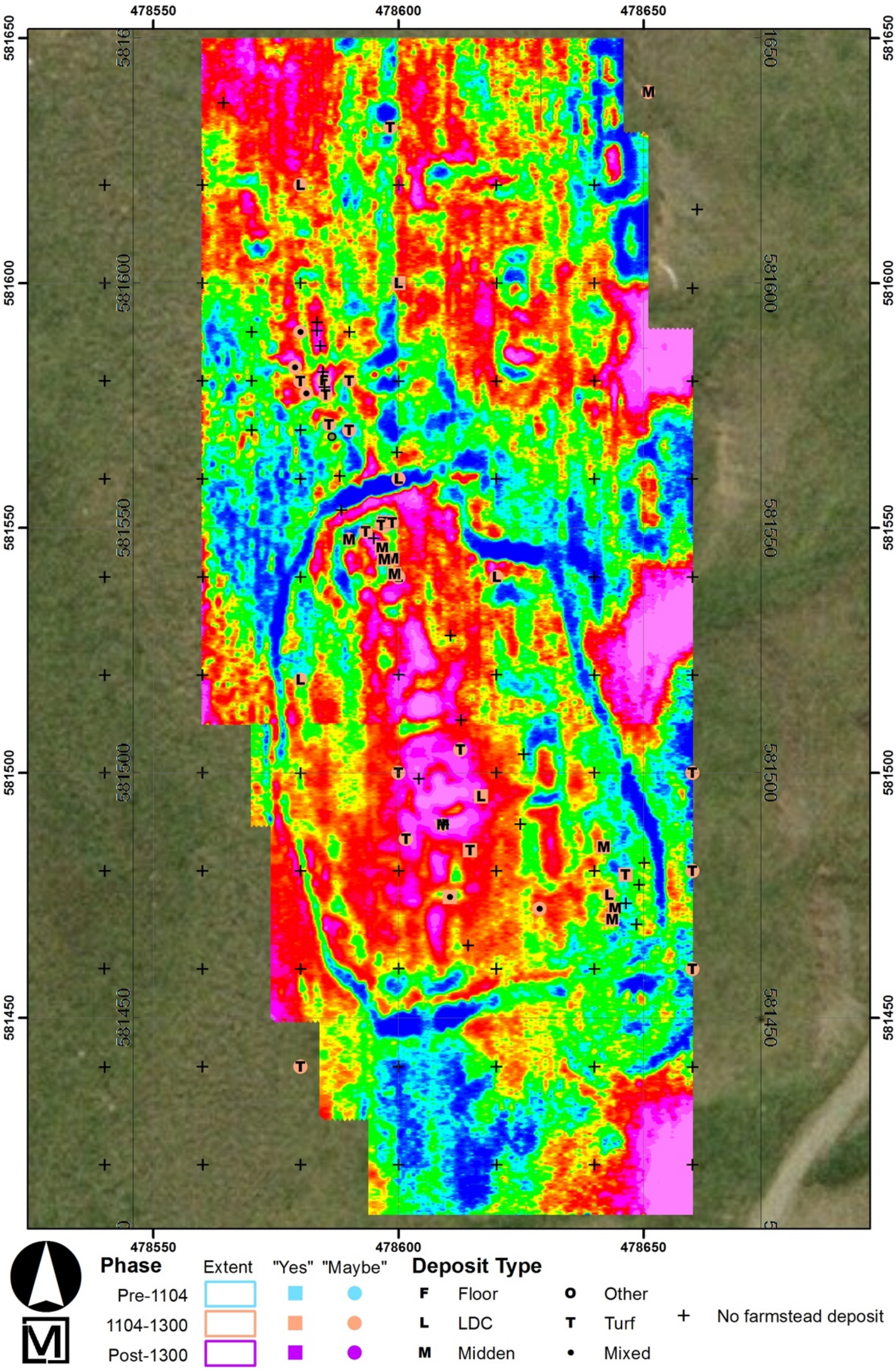


Figure 20. C2 with 1104-1300 coring results.

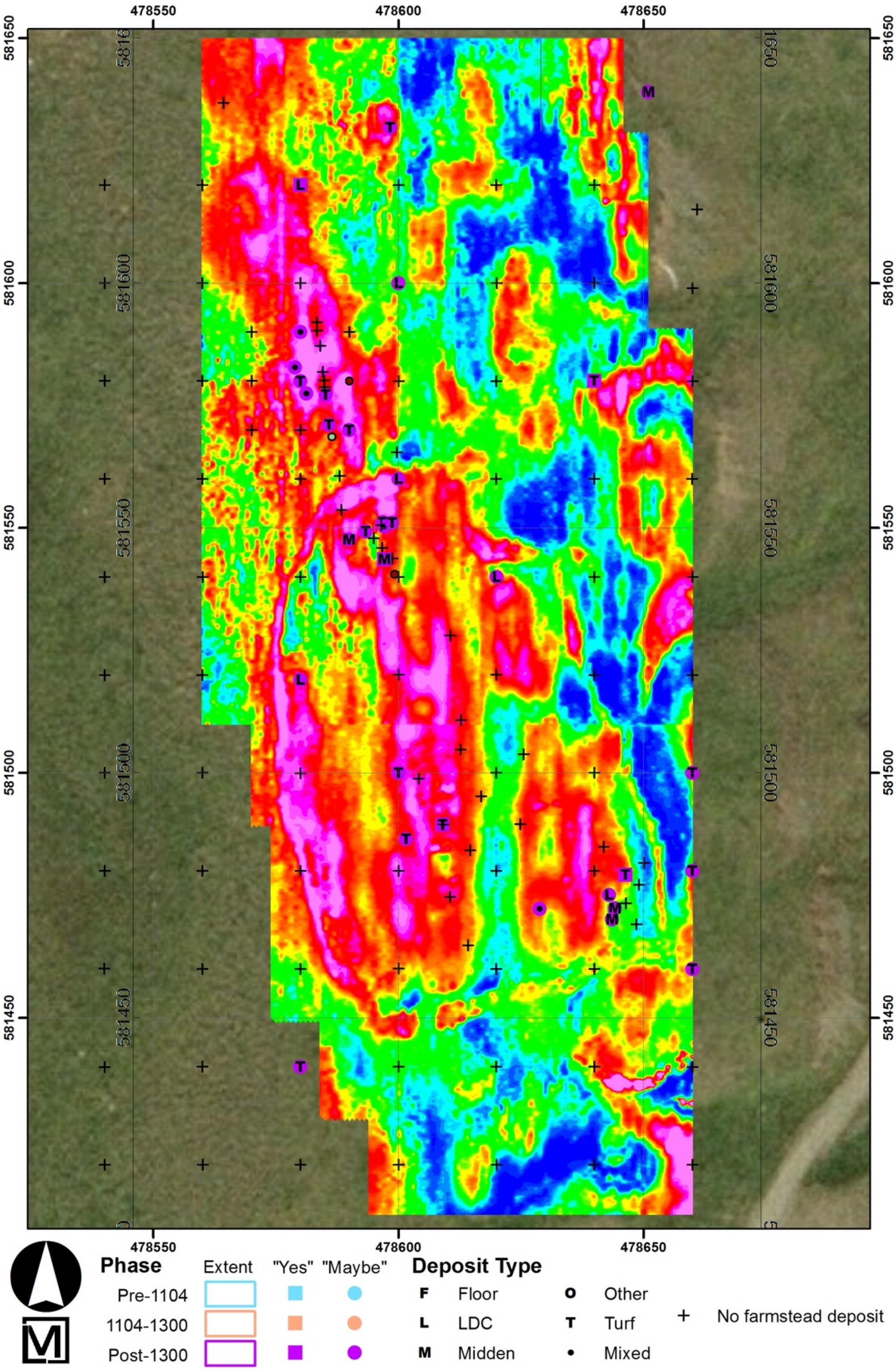


Figure 21.IP1 with Post-1300 coring results.

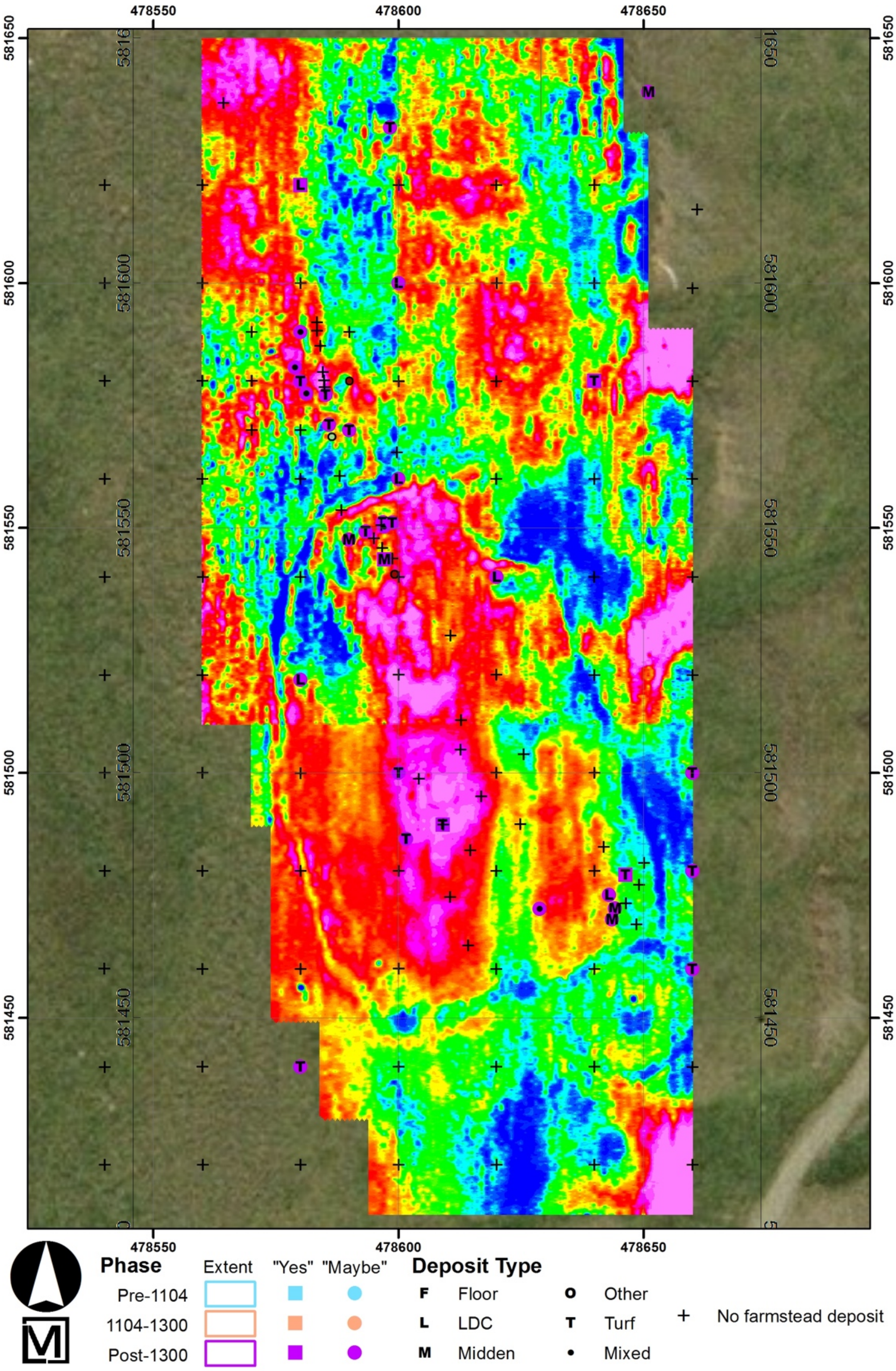


Figure 22. C1 with Post-1300 coring results.

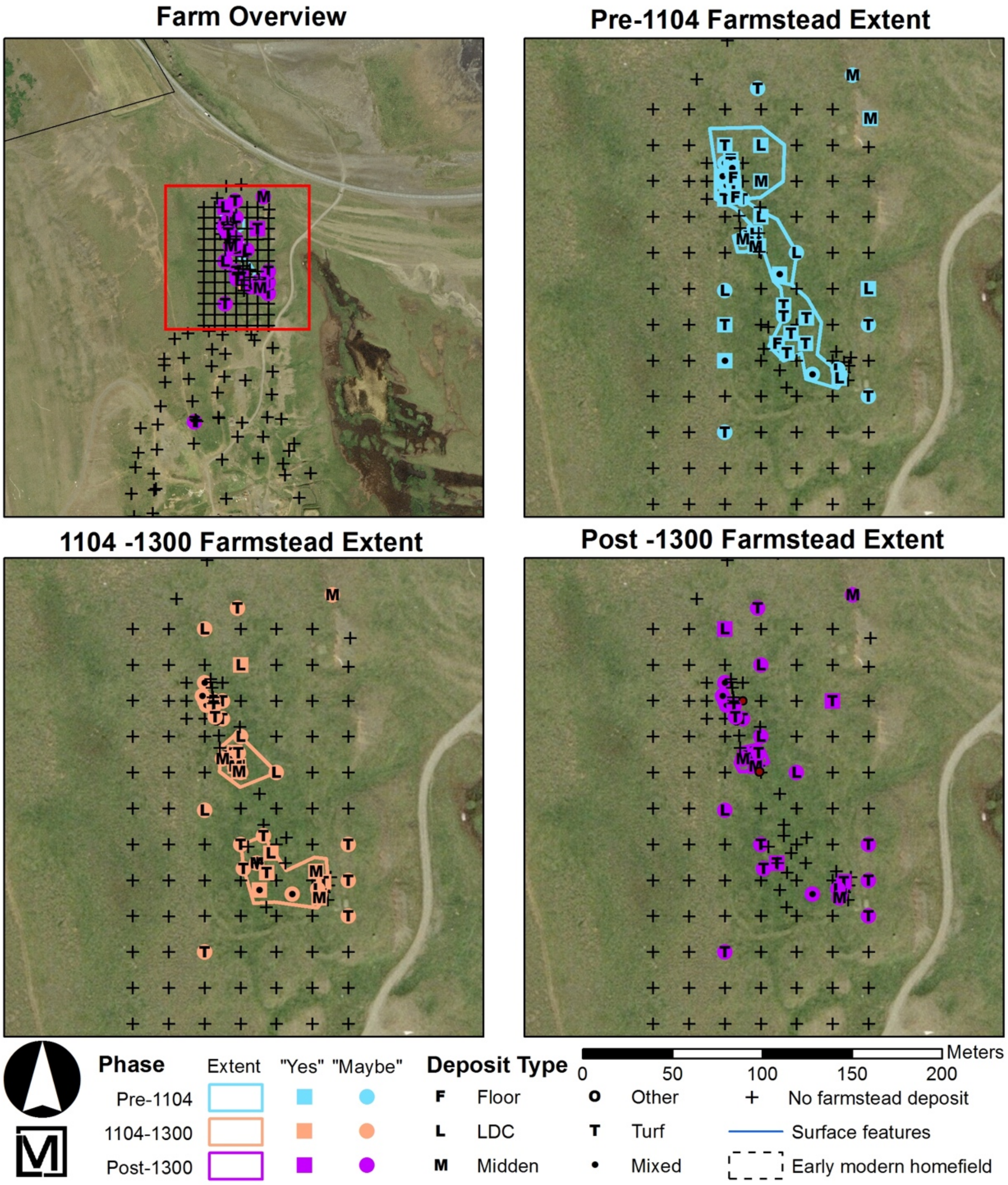


Figure 23. Farm mound sizes for different time periods based on coring at Hegranesþing.

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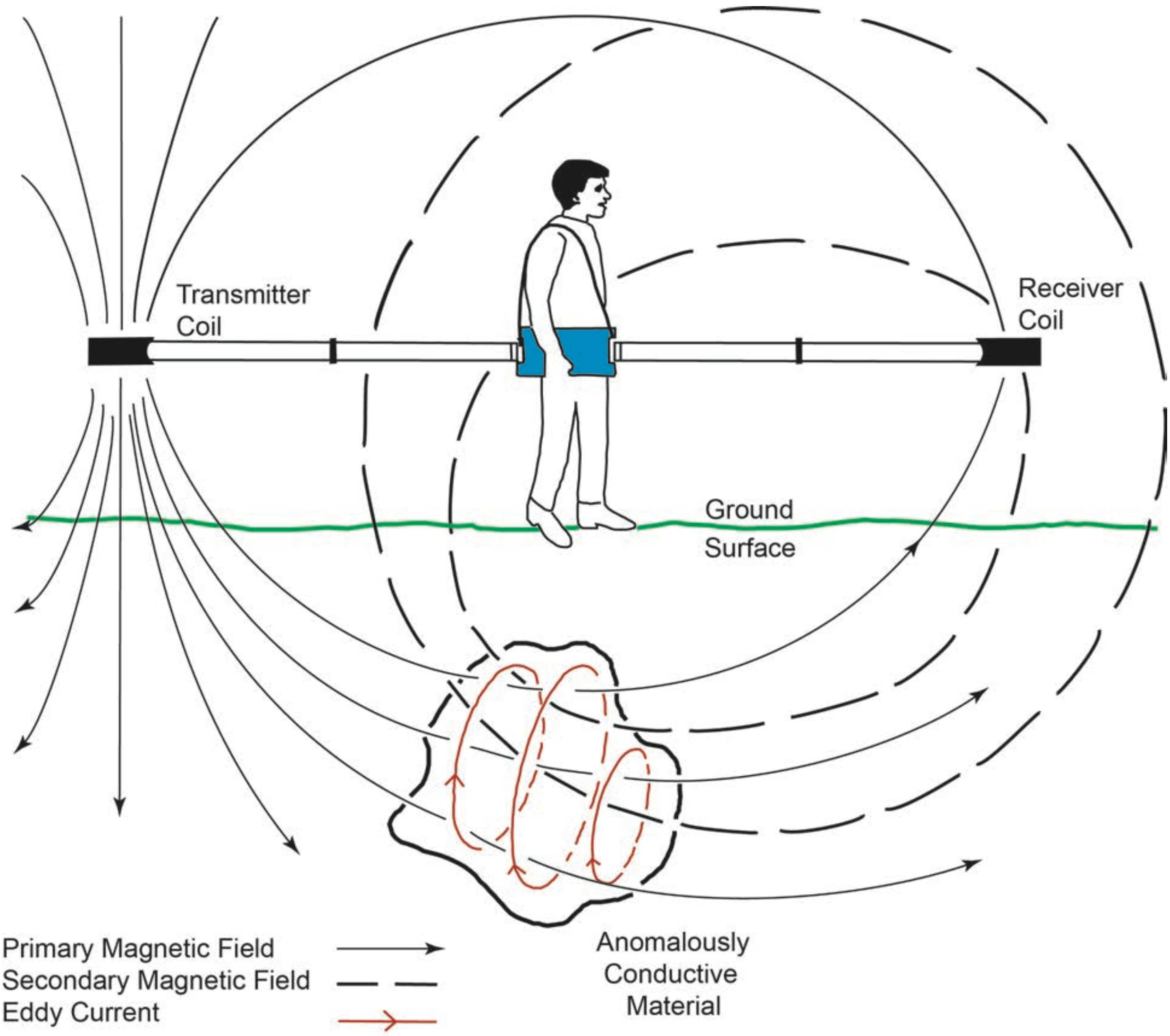
## APPENDIX A – BASIC PRINCIPLES OF FREQUENCY-DOMAIN ELECTROMAGNETICS

The frequency-domain electromagnetic (FDEM) method is an active non-destructive geophysical method that is used to obtain shallow subsurface information. In the EM method, a time-varying magnetic field is generated by driving an alternating current through either a loop of wire or a straight wire that is grounded at both ends. Induced or eddy currents with flow within any conductive solid or fluid material that is present beneath the area of investigation. The eddy currents, in turn, generate their own magnetic fields such that at any point in space, the total magnetic field is the superposition of the primary field due to the source current and secondary fields due to the eddy currents, as schematically illustrated in Figure B1. By discriminating between primary and secondary fields, variations in the EM properties of the ground can be discerned.

EM instruments measure both out-of-phase (quadrature) and in-phase components of the induced magnetic fields. The former is a measure of the bulk apparent ground conductivity; the latter is related to magnetic susceptibility and is particularly sensitive to the presence of metallic objects. Bulk apparent ground conductivity reflects true conductivity when the subsurface is homogeneous and isotropic, which is rarely the case in practice. For heterogeneous conditions, it represents an integrated effect of the all the conductivity within the volume of ground being sensed. It does not, however, represent an average conductivity and in fact can be lower or higher than the lowest or highest subsurface conductivities, respectively. A lateral variation in the components is indicative of lateral changes in properties. The conductivity is particularly sensitive to fluid content and dissolved salts or ions. Accordingly, wet sands, clays and materials with high ion content generally have high bulk apparent ground conductivity; dry sands and crystalline rocks have low bulk apparent ground conductivity.

Ideally, EM surveys are conducted in archaeological investigations to find conductive targets in resistive environments such as middens and rammed-earthed walls. Although more subtle and difficult to detect, resistive targets such as buried stone walls and foundations can also be detected through EM surveying.




$$\sigma_a = \frac{2}{\pi f \mu l^2} \frac{H_s}{H_p}$$

(McNeill, 1980)

$\sigma_a$ = Apparent Ground Conductivity (mS/m)
$f$ = Frequency
$\mu$ = Magnetic Permeability of Free Space
$l$ = Intercoil Spacing
$H_s$ = Secondary Magnetic Field
$H_p$ = Primary Magnetic Field

Figure A1. Schematic diagram illustrating the principles of FDEM.

# APPENDIX B – CORING DATA

| Jonsbók | Place Number | Farm | Place Name | Core Number | ISNet East | ISNet North | Profile Context | Pre 1000 Farm Mound | Pre 1104 Farm Mound | Post 1104 Farm Mound | 1104 to 1300 Farm Mound | Post 1300 Farm Mound | Date Collected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 444 | 1 | Garður | Hegranesþing | 160058 | 478660.01 | 581439.98 | | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160059 | 478659.99 | 581460.01 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160060 | 478660.02 | 581479.99 | JMC | No | No | Yes | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160061 | 478660.02 | 581500.00 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160062 | 478660.01 | 581519.99 | JMC | Yes | Yes | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160063 | 478660.01 | 581540.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160064 | 478659.98 | 581560.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160065 | 478660.02 | 581580.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160066 | 478659.99 | 581598.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160067 | 478640.00 | 581600.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160068 | 478640.02 | 581580.00 | JMC | No | No | Yes | No | Yes | 07/11/2016 |
| | | Garður | Hegranesþing | 160069 | 478640.02 | 581559.98 | JMC | | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160070 | 478639.99 | 581540.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160071 | 478640.00 | 581520.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160072 | 478640.00 | 581500.00 | JMC | | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160073 | 478640.02 | 581480.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160074 | 478640.03 | 581460.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160075 | 478640.02 | 581440.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160076 | 478640.03 | 581420.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160077 | 478660.02 | 581420.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160078 | 478620.02 | 581419.98 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160079 | 478619.98 | 581440.04 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160080 | 478620.00 | 581460.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160081 | 478619.97 | 581480.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160082 | 478619.99 | 581500.01 | JMC | | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160083 | 478620.01 | 581520.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160084 | 478620.02 | 581539.98 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160085 | 478620.01 | 581559.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160086 | 478620.01 | 581580.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160087 | 478620.03 | 581600.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160088 | 478600.00 | 581600.01 | JMC | Maybe | Yes | Yes | Yes | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160089 | 478600.01 | 581579.99 | JMC | Maybe | Yes | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160090 | 478599.99 | 581560.00 | JMC | Maybe | Yes | Yes | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160091 | 478600.01 | 581540.00 | JMC | No | No | Yes | Maybe | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160092 | 478600.01 | 581520.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160093 | 478600.00 | 581500.00 | JMC | No | No | Yes | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160094 | 478600.01 | 581479.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160095 | 478600.02 | 581460.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160096 | 478600.00 | 581439.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160097 | 478600.00 | 581419.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160098 | 478580.03 | 581420.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160099 | 478580.00 | 581440.01 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160100 | 478580.02 | 581460.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160101 | 478580.01 | 581479.99 | JMC | Maybe | Yes | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160102 | 478579.97 | 581499.98 | JMC | Maybe | Yes | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160103 | 478579.98 | 581519.02 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160104 | 478580.00 | 581539.98 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160105 | 478579.99 | 581560.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160106 | 478580.01 | 581580.00 | JMC | Maybe | Yes | Yes | Maybe | Maybe | 07/11/2016 |
| | | Garður | Hegranesþing | 160107 | 478580.02 | 581600.01 | JMC | Maybe | Yes | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160108 | 478560.01 | 581600.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160109 | 478560.00 | 581580.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160110 | 478560.02 | 581560.01 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160111 | 478560.04 | 581540.02 | JMC | No | No | No | No | No | 07/11/2016 |

| Jonsbók | Place Number | Farm | Place Name | Core Number | ISNet East | ISNet North | Profile Context | Pre 1000 Farm Mound | Pre 1104 Farm Mound | Post 1104 Farm Mound | 1104 to 1300 Farm Mound | Post 1300 Farm Mound | Date Collected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Garður | Hegranesþing | 160112 | 478560.01 | 581519.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160113 | 478560.01 | 581500.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160114 | 478559.98 | 581480.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160115 | 478559.98 | 581459.98 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160116 | 478560.02 | 581440.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160117 | 478560.04 | 581420.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160118 | 478540.02 | 581420.04 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160119 | 478540.02 | 581439.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160152 | 478540.00 | 581460.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160153 | 478540.01 | 581480.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160154 | 478540.02 | 581500.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160155 | 478540.02 | 581520.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160156 | 478540.00 | 581540.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160157 | 478540.02 | 581560.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160158 | 478540.02 | 581580.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160159 | 478540.01 | 581600.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160160 | 478539.98 | 581400.03 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160161 | 478559.99 | 581400.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160162 | 478580.00 | 581400.02 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160163 | 478600.01 | 581399.98 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160164 | 478620.02 | 581399.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160165 | 478640.01 | 581400.00 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160166 | 478660.00 | 581399.99 | JMC | No | No | No | No | No | 07/11/2016 |
| | | Garður | Hegranesþing | 160206 | 478639.99 | 581619.98 | JMC | No | No | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160207 | 478620.02 | 581619.99 | JMC | No | No | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160208 | 478600.01 | 581620.03 | JMC | No | No | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160209 | 478580.02 | 581620.00 | JMC | No | No | No | Maybe | Yes | 07/12/2016 |
| | | Garður | Hegranesþing | 160210 | 478560.02 | 581619.99 | JMC | No | No | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160230 | 478661.00 | 581615.00 | Profile | Maybe | Yes | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160231 | 478651.00 | 581639.00 | Profile | Maybe | Maybe | Maybe | Maybe | Maybe | 07/12/2016 |
| | | Garður | Hegranesþing | 160232 | 478540.00 | 581620.00 | JMC | No | No | No | No | No | 07/12/2016 |
| | | Garður | Hegranesþing | 160364 | 478598.34 | 581631.75 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160365 | 478570.02 | 581580.00 | JMC | No | No | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160366 | 478579.98 | 581589.98 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160367 | 478589.98 | 581580.01 | JMC | No | No | Yes | Maybe | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160368 | 478580.03 | 581570.02 | JMC | Maybe | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160369 | 478610.57 | 581528.05 | JMC | Maybe | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160370 | 478590.00 | 581590.00 | JMC | No | No | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160371 | 478590.00 | 581570.00 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160390 | 478612.79 | 581510.80 | JMC | Maybe | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160391 | 478616.85 | 581495.25 | JMC | Maybe | Yes | Yes | Yes | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160392 | 478609.04 | 581489.47 | JMC | Yes | Yes | Maybe | Maybe | Yes | 07/14/2016 |
| | | Garður | Hegranesþing | 160393 | 478609.16 | 581489.44 | JMC | Yes | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160394 | 478583.33 | 581591.97 | JMC | Maybe | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160395 | 478583.32 | 581590.23 | JMC | Yes | Yes | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160396 | 478584.79 | 581580.10 | JMC | No | Maybe | Maybe | Maybe | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160397 | 478585.20 | 581577.21 | JMC | Maybe | Yes | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160398 | 478586.38 | 581568.63 | JMC | Maybe | | | | | 07/14/2016 |
| | | Garður | Hegranesþing | 160399 | 478601.61 | 581486.55 | JMC | No | No | Yes | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160400 | 478604.14 | 581498.81 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160401 | 478644.20 | 581472.35 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160402 | 478642.99 | 581475.14 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160403 | 478641.93 | 581484.87 | JMC | No | No | Yes | Yes | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160404 | 478643.63 | 581470.16 | JMC | Maybe | Yes | Yes | Yes | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160405 | 478584.92 | 581578.74 | JMC | Maybe | Yes | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160406 | 478584.04 | 581587.16 | JMC | Maybe | Yes | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160407 | 478584.54 | 581581.81 | JMC | Maybe | Yes | No | No | No | 08/04/2016 |

| Jonsbók | Place Number | Farm | Place Name | Core Number | ISNet East | ISNet North | Profile Context | Pre 1000 Farm Mound | Pre 1104 Farm Mound | Post 1104 Farm Mound | 1104 to 1300 Farm Mound | Post 1300 Farm Mound | Date Collected |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Garður | Hegranesþing | 160408 | 478585.83 | 581571.13 | JMC | Maybe | Yes | Yes | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160409 | 478596.51 | 581550.61 | JMC | No | Maybe | Yes | Maybe | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160430 | 478570.00 | 581570.00 | JMC | No | No | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160431 | 478570.00 | 581590.00 | JMC | No | No | No | No | No | 07/14/2016 |
| | | Garður | Hegranesþing | 160432 | 478581.20 | 581577.49 | JMC | Yes | Yes | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160433 | 478578.89 | 581582.76 | JMC | Yes | Yes | Maybe | Maybe | Maybe | 07/14/2016 |
| | | Garður | Hegranesþing | 160434 | 478598.77 | 581543.80 | JMC | Yes | Yes | Yes | Yes | No | 07/20/2016 |
| | | Garður | Hegranesþing | 160435 | 478593.35 | 581549.30 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 07/20/2016 |
| | | Garður | Hegranesþing | 160436 | 478596.87 | 581551.20 | JMC | Maybe | Yes | Yes | Yes | Maybe | 07/20/2016 |
| | | Garður | Hegranesþing | 160437 | 478597.12 | 581550.33 | JMC | Yes | Yes | Yes | Maybe | Maybe | 07/20/2016 |
| | | Garður | Hegranesþing | 160438 | 478648.63 | 581469.07 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160439 | 478649.09 | 581477.18 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160440 | 478650.10 | 581481.60 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160441 | 478646.33 | 581479.24 | JMC | No | No | Yes | Yes | Yes | 08/04/2016 |
| | | Garður | Hegranesþing | 160442 | 478646.46 | 581473.36 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160443 | 478628.80 | 581472.25 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160444 | 478624.90 | 581489.51 | JMC | Maybe | Yes | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160445 | 478625.59 | 581503.79 | JMC | Maybe | Yes | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160446 | 478612.67 | 581504.75 | JMC | Maybe | Maybe | Maybe | Maybe | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160447 | 478610.50 | 581474.68 | JMC | No | No | Yes | Yes | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160448 | 478614.20 | 581464.82 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160449 | 478597.12 | 581543.59 | JMC | Maybe | Yes | Yes | Yes | Yes | 08/04/2016 |
| | | Garður | Hegranesþing | 160450 | 478599.19 | 581540.61 | JMC | No | No | Yes | Yes | No | 08/04/2016 |
| | | Garður | Hegranesþing | 160451 | 478598.72 | 581551.08 | JMC | No | No | Yes | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 160452 | 478589.92 | 581547.62 | JMC | Maybe | Maybe | Maybe | Maybe | Maybe | 08/04/2016 |
| | | Garður | Hegranesþing | 163197 | 478595.00 | 581547.88 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163198 | 478596.68 | 581545.90 | JMC | Maybe | Yes | Yes | Yes | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163218 | 478614.65 | 581484.23 | JMC | Maybe | Yes | Yes | Yes | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163219 | 478609.56 | 581662.03 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163220 | 478581.29 | 581658.29 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163221 | 478564.31 | 581636.76 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163222 | 478599.68 | 581565.43 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163223 | 478588.31 | 581553.70 | JMC | No | No | No | No | No | 08/04/2016 |
| | | Garður | Hegranesþing | 163224 | 478587.98 | 581560.61 | JMC | No | No | No | No | No | 08/04/2016 |