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An Archaeological Exploration of Agriculture, Trade, and Indigenous Relationships at a Seventeenth-Century New England Site

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AN ARCHAEOLOGICAL EXPLORATION OF AGRICULTURE, TRADE, AND INDIGENOUS RELATIONSHIPS AT A SEVENTEENTH-CENTURY NEW ENGLAND SITE

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Jasmine C. Saxon

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ABSTRACT

A multimethod approach including ground-penetrating radar, magnetometry, historical research, excavations, and artifact analyses was used to gather data at a 17th century archaeological site in South Glastonbury, Connecticut. Interpretation of these data provided evidence that the Europeans who occupied this site were involved in a variety of activities such as agriculture, trade, and developing Indigenous relationships. These activities included cultivating an agricultural surplus instead of relying on subsistence farming, access to trading networks that extended throughout the Colonies and into Europe, and cohabitation with the Indigenous peoples in the area. This research led to an examination of various historical narratives on early Colonial Connecticut and shows that English colonists were interacting with their environment in ways that are much more nuanced and complex than previously suggested.

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There were many others who were invaluable to my research at the Hollister site. Thank you so much to the family who allowed me to conduct research on their property. I would also like to express my deep gratitude to Dr. Brian Jones, the Connecticut State Archaeologist, for allowing me to conduct research with him at the Hollister site. Dr. Jones contributed numerous hours outside of his own responsibilities to assist me in my research. I will forever be most grateful for his time. I must also thank the Jones-O'Keefe family for opening their home to me while I conducted my research. Many others were present at the Hollister site that contributed significantly to my research, especially Scott Brady who joined us in the field during the early morning hours to assist us with collecting data. Your help contributed greatly to the success of this research. I would also like to express my deepest gratitude for my research partner, Maeve Herrick, who spent countless hours in the field and in the lab assisting me in my research. Finally, I want to say thank you to all my friends and family who have supported me. Your encouragement contributed greatly to my success.

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CHAPTER ONE: INTRODUCTION

Understanding the past within an archaeological framework has often relied on the combination of historical records and archaeological data. However, many times, historical accounts do not provide enough information about the past and can often be bias, inaccurate, or simply nonexistent (Deetz 1977, Hawley 2015). Archaeology addresses this issue by using artifacts to tell stories of culture and daily life that may not be recorded in written records. This is especially true when studying farm sites during the 17th century in New England (Deetz 1977, Groover 2008). We know more about religious convictions and what happened on the Sabbath in meetinghouses than how farmers conducted their daily routines (Anderson 2008, 496). Farmsteads were the main avenue of settlement in the colonial period. If we do not know what was happening in these communities, then it is nearly impossible to understand the life and culture of these English colonists.

The John Hollister archaeological site located in South Glastonbury, Connecticut, offers a perspective of what farm life may have been like in mid-17th century New England (Figure 1.1). My thesis topic focuses on this archaeological site and uses multiple research methods to tell the story of the Hollister family and three particular aspects of their worldview in 17th century Connecticut. "Worldview" is defined as a particular philosophy of life or conception of the world (English Oxford Living Dictionaries, 2018). This definition is too broad and comprehensive for my research but

there are certain aspects of worldview that I discuss. These aspects are: (1) the production of agricultural surplus, (2) the presence of trade networks that extended into the Colonies and throughout Europe, and (3) the development of beneficial relationships between the Indigenous community and the Hollister family. Throughout this thesis, the term worldview is used to reference these specific aspects altogether.

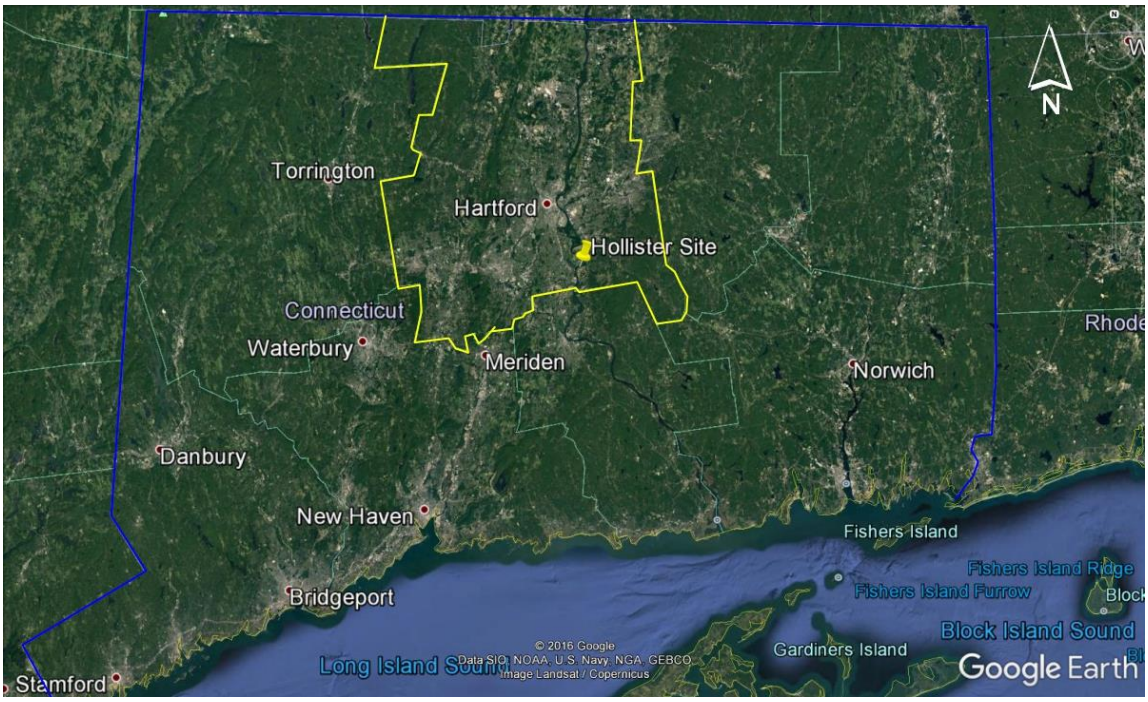


Figure 1.1: Google Earth Map (2016). The John Hollister archaeological site is located in South Glastonbury, Connecticut, by the bank of the Connecticut River. Connecticut state lines are shown in blue, with Hartford County outlined in yellow. Long Island Sound is located to the south of the State of Connecticut.

Exploring these three aspects of the Hollister's 17th century agrarian worldview shows that not all commonly accepted narratives of this time period in Connecticut are accurate (Taylor 1979, Trumbull 1818). Some historians depict colonists with an almost obsessive intent to exert dominion over the wilderness and the Native people in order to construct a "civilized" society that assigned market value to all types of natural resources including furs, timber, and land (Anderson 2008, 497, Groover 2008, Scoville 1953,

Taylor 1979, Trumbull 1818). Other scholars are not as zealous in their descriptions and portray 17th century settlers as self-sufficient economic entrepreneurs. It is true that colonists were determined to be independent and that many atrocities did occur between the colonists and the Native Americans during the tumultuous time of colonization in North America. However, partially reconstructing the Hollisters' agrarian worldview during the 17th century in Connecticut can modify misinformation concerning agricultural practices, the development of trade networks, and how Indigenous relationships contributed to successful settlement in Connecticut (Anderson 2008, 496-497, Daniels 1980, Hawley 2015, Taylor 1979).

The differences in scholarly perspectives communicate to us that the activities of 17th century farmers and how they thought about their environment is not well understood. This is due to the lack of archaeological and historic records for the 17th century in Connecticut. The lack of documentation does not mean that these farmsteads are unimportant. Groover (2008, 66-67) states that all types of farming operations, from small farms to large plantations, encouraged colonization and supported the developing economy in the New World. Taking Groover's research into consideration, it becomes absolutely necessary to research these communities in order to construct a meaningful story about European colonists and their experiences that may have been excluded from historical accounts (Coghlan and Brydon-Miller 2014, Hawley 2015).

To explore the aspects of agriculture, trade, and Indigenous relationships at the Hollister site, I used ground-penetrating radar (GPR), magnetometry, archaeology, and historical and current literature. Ground-penetrating radar and magnetometry are both geophysical methods used to survey the archaeological site before any excavation took

place. These technologies differ in their ability to provide information and are used to develop a broad understanding of the landscape and the features that lay under its surface. Archaeology is complimentary to these technologies and allows further exploration of artifacts and features left behind by past peoples. Historical documents, such as the diary of Thomas Minor from Stonington, Connecticut, provide another layer of information that is also important in understanding the Hollister site. These accounts provide personal or abstract details that might not be available in the archaeological record such as the types of farming techniques that were practiced. Reconstructing these details from historical records can be challenging because little is recorded about the day-to-day activities that occurred at the farmstead (Deetz 1077, Groover 2008). It is uncommon to find written accounts that tell us what the 17th century colonial farmer was physically doing, let alone what he thought about his world and experiences (Anderson 2008, 497, Deetz 1977, Groover 2008, Harper 2012).

One historical account in particular greatly assists in understanding 17th century farmers in Connecticut and how they may have conducted their daily routines on the farm. The diary of Thomas Minor from Stonington, Connecticut, 1653 to 1684, is the only document of its kind for Connecticut (Anderson 2008, Minor 1899). Anderson (2008) analyzes this "diary," which is more comparable to a farmer's almanac with some personal details mentioned throughout. She proposes that farming was just as important as religion in molding the experiences of Minor's life. Agriculture not only contributed to Minor's financial prosperity but his worldview was also shaped through the physical demands of farming and the seasonal patterns of nature (Anderson 2008, 512-513). Therefore, it is necessary to incorporate both archaeological evidence and historical

literature to reconstruct aspects of agriculture, trade, and Indigenous relationships at the Hollister site, which then assist in developing more complete historical narratives for 17th century Connecticut.

Archaeological farm sites dating to the 17th century in Connecticut are not routinely found and most have been disturbed by modern development (Groover 2008, Harper and Clouette 2010, Harper, Harper, and Clouette 2013, Jones 2016). The Hollister site is a unique archaeological farmstead because it is well-preserved and provides a snapshot of about 70 years (ca. 1640 to 1711) during the time when the first Europeans settled in Connecticut. This site presents a special opportunity to dig deeper into the life and experiences of a colonial farmer in the 17th century when much of early colonial history in Connecticut is unknown or contains narratives that may not be historically accurate (Anderson 2008, 496-500, Deetz 1982, Groover 2008). The diary of Thomas Minor provides a key component to understanding and interpreting the Hollister site because Minor's experience is similar to Lt. Hollister's. They lived in the same time period and region, were about the same age, and were both highly successful individuals at farming and influential within their communities. My research shows that first-generation settlers in Connecticut, such as Hollister and Minor, lived in an agriculturally based society that developed a surplus of agricultural goods, were involved in trading networks that connected throughout the Colonies and into Europe, and maintained beneficial relationships with Native Americans. This experience varies from typical historical narratives about this time period that describe subsistence farming as a primary way of life with limited trading options and conflicting relationships with the Indigenous community (Daniels 1980, 434-436, Taylor 1979, Wright 1957).

The Importance of Colonial Farmsteads

Colonial farmsteads are important because they represent the beginning of rural life within the United States. During the 17th century, the Colonies were considered to be on the margins or periphery of the growing world economy (Groover 2008, 66). However, all colonial households were involved in some form of commercial agriculture and worked to provide these products to local, regional, and international markets. These economic activities encouraged farm families to change both materially and culturally (Deetz 1977, Groover 2008, 67). A good example of this change is the introduction of tobacco into colonial farms and households. Major aspects of society became centered on the production and trade of tobacco starting in the mid-17th century (Middleton 1953, 112). This obsession with tobacco brought enormous amounts of wealth to the Colonies. As a result, cash crops like tobacco allowed rural farmsteads to connect to the world beyond their local community (Groover 2008, 67).

Agriculture was the root of success within the Colonies (Taylor 1979, Wright 1957). Farming activities required farmers to connect to communities, marketplaces, and different cultures that provided them with necessary resources and materials. Understanding the role of agriculture for the Hollister family is important because other types of professions were mostly unavailable. Farming was the primary method of gaining wealth and independence in the 17th century. The exchange of goods and ideas through the activity of farming makes colonial farmsteads important to study as they are a direct connection to the culture and way of life that early colonists experienced.

The Popularity of Tobacco

Tobacco was one of the major cash crops produced in the colonial economy. It was often used as currency because of the scarcity of gold and silver in the New World. Unfortunately, agriculture was not always reliable and sometimes crops would succumb to disease, drought, or destruction. Problems like these created cyclical patterns of boom and bust in the colonial economy. Even though there were times of serious depression, this did not stop tobacco or other products from being traded all over the world. Because of its popularity and high demand, tobacco quickly became associated with wealth and affluence (Agbe-Davies 2014, Burns 2007).

The popularity of smoking tobacco meant that pipes became an affordable and common possession for people of all socioeconomic classes. Eventually these clay pipes were used up, broken, and discarded, becoming part of the archaeological record. As a result, tobacco pipe fragments are fairly common at colonial sites (Burns 2006, Noël Hume 1969). This is beneficial because tobacco pipes can be dated to specific periods of time and some of them can be traced to specific manufacturers (Harrington 1954, Binford 1978, McMillan 2016, Noël Hume 1969). An example of this is at the Hollister site. A kaolin clay pipe was excavated from the south cellar (S1W14 NW, bag 14) with a maker's mark of "WE" inscribed on it. This maker's mark stands for "William Evans," dates to the mid-17th century and was manufactured in England (Fox 1998, "Kaolin Clay Trade Pipes" 2017) (Figure 5.6). Through studying these artifacts, it is apparent that colonial farmers were involved in cash crop industries and that their cultural and material values were influenced by both local and global markets. Clay tobacco pipes and other

artifacts at the Hollister site are an important data set because they connect the archeologist to colonial households who are largely unrepresented in the historical record.

The Mid-17th Century Connecticut Farmer

It is difficult to determine the involvement of colonial farmers in the commercial economy and how they interacted with daily challenges during the 17th century. Minor's diary and the Hollister site are examples of farmsteads that were connected to larger economic systems outside of their local community. Minor wrote about his experience taking goods to markets in New London and Saybrook, 10 to 20 miles away (Anderson 2008, 505). These trips show that he was not limited to trade within his own community. The Hollister site also shows that farmers were involved in multiple markets by the presence of local artifacts and those imported from England (Figure 1.2). In my research, I use archaeological evidence along with the diary of Thomas Minor and other historical sources to support the idea that the Hollister family was interacting with their environment in nuanced ways that are mostly undocumented in historical accounts (Daniels 1980, Deetz 1977, Groover 2008, Taylor 1979, Trumbull 1818, Wright 1957).

Figure 1.2: An abundance of clay tobacco pipe fragments was excavated from the three cellars at the Hollister site. Two types of pipes were discovered, local red clay and kaolin imported from England. These fragments can also be dated to range of time by measuring the bore stem diameters with drill bits measuring in 64th of inch increments (Binford 1978, Noël Hume 1969). This particular kaolin pipe stem dates to from 1620 to 1650.

Analyzing the Hollister site with multiple methods creates a more complete approach to both the cultural and physical environment of the site during the 17th century. The GPR and magnetometry images show that there were two unique groups of people, the Europeans and the Native Americans, that used the same landscape. The settlement is medium-sized and may have contained multiple families or generations. European cellars seen in the GPR images were large enough to store excess materials or resources beyond the immediate family needs. This indicates that the people living here were most likely involved in trading agricultural products with the surrounding community. The GPR and magnetometry images also show that during the early 18th century a flood occurred

(Conyers 2018, 68). This flood was likely large enough to destroy crops and cause damage to dwellings. The devastation may have forced the people living here to relocate and abandon this site in 1711 (Figures 4.7 and 4.10). Using these geophysical methods gives us a short history of what these past peoples may have experienced throughout the lifetime of this site. To further develop this story, it was necessary to use archaeological methods and historical research.

Excavations at the Hollister site uncovered many artifacts that complement the geophysical data and confirm the presence of both Europeans and Native Americans at this site. During excavations, several red clay and kaolin tobacco pipes were discovered along with a variety of 17th century European ceramics and Native American pottery. The materials left behind show that the Hollister's imported many fancy eating utensils but also chose to acquire local materials. Even though there are many interesting conclusions that can be drawn from these artifacts, to analyze and include them all in this report is beyond the scope of this research. Instead, I focus on how these artifacts, especially the clay tobacco pipes and the Native American pottery, can be used to confirm the occupation period of the site and represent different economic connections that the Hollisters maintained with their local community and international markets.

The presence of kaolin tobacco pipes at the Hollister site indicate that the Hollister family had overseas connections and the financial ability to acquire pipes manufactured in England. Kaolin is a material that is native to England and was not available in New England for pipe making ("Kaolin" 2015). Likewise, red clay is found within various areas in Connecticut and not available in England (Alter 1995, Deane 1967, 40, Zeilinga de Boer, 2011, 75-76). Even though the material differs for these clay

pipes, the red clay pipes found at the Hollister site are made in the same exact form of the kaolin pipes, which were imported from England. Despite the similarity in material, the red clay pipes also differ from the Native American terra-cotta style (Baker 1985, 24-25, Henry 1979, 18, Kincaid 2012, 88-89). The different origins of the clay from these tobacco pipes show that the Hollister family was connected to both local and European markets.

Not only do the Hollister tobacco pipes tell us about the presence of trade networks in mid-17th century Connecticut but they also provide the ability to date the occupation of the site. Lewis Binford (1962) expounded upon J.C. Harrington's (1954) formula for calculating the date range of an assemblage of British pipe stems and created a linear regression formula that can be used to calculate a mean date of occupation or a single year. In 1972, Heighton and Deagan presented a new regression formula that has proven to be more accurate for producing a mean occupation date (McMillan 2016). Using Heighton and Deagan's (1972) formula on the pipe stems excavated from the Hollister site, the mean date of occupation is 1676 (Appendix II and III). This date complements the known dates of occupation from about 1640 to 1711 according to historical records and archaeological evidence. Identifying the time period of the Hollister site is important because it allows for historical context and more accurate interpretation of the site regarding activities such as agriculture, trade, and Indigenous relationships.

European farmers who settled in 17th century Connecticut are not well represented in the historical literature. However, Thomas Minor's diary (1653-1684) is a rarity that provides an invaluable source of knowledge about the 17th century Connecticut farmer

and how he navigated the colonial landscape. Even though farmers were involved in activities that directly impacted the colonial economy, large-scale commercial farming was not as prevalent during the mid-17th century as it was in the early 18th century (Groover 2008). Looking at archaeological evidence and using historical documentation for context, it is apparent that Hollister operated a farm that produced an agricultural surplus long before agricultural specialization developed in the 18th century, which varies from many historical narratives that limit colonial farmers to only subsistence farming techniques (Daniels 1980, Lambert n.d., Scoville 1953, Taylor 1979).

The Hollister family also maintained connections to markets outside of the farm through an exchange of goods. Tobacco and other similar cash crops, such as apples for cider or molasses for rum, is a good example of this exchange. Hollister mentions his apple orchard in his will and Minor writes in his diary about traveling into nearby towns with butter and other such products specifically for trade purposes (Anderson 2008, 500, 505, "Estate of John Hollister, Town of Wethersfield" 1665). There is also evidence of farmers trading with the local Indigenous community for pottery, maize, and other resources (Groover 2008, 56, Oliver 2005). These same materials, like maize and Native American pottery, are present at the Hollister site and show that Hollister was intent on creating a life for himself that was not focused solely on subsistence or survival, but also supported independence and the ability to create wealth. The desire to be successful is evident at the Hollister site by Hollister's perseverance to build and maintain a profitable farmstead. The Colonies' desire for wealthy independence continued to magnify into the 18th century and eventually manifested itself in the form of social and political issues such as civil war and slavery. The industrial 18th century was different than the agrarian

17th century when first generation settlers, such as Hollister, were required to take advantage of all types of resources to survive, regardless of discrimination.

The presence of Native Americans on the landscape assists in understanding how the Hollister family interacted with other cultures when they established the farm. Historical documents and archaeological evidence show us that farmers in Connecticut during the 17th century were much more amiable with their local neighbors than in later centuries ("Amix" n.d., Case 1886, 24, Chapin 1853, 13, McNulty 1970, 12-13). During this time, it was not uncommon for Native Americans to live on the same land as European settlers (Adams 1904, 43-44, Handsman and Lamb Richmond 1995, 101). Historical records show that the Hollister family cultivated a positive relationship with the surrounding Indigenous community, became friendly with them, hired them as paid laborers and entrusted them to fortify their house in 1675 ("Amix" n.d., Case 1886, 24, Chapin 1853, 13, McNulty 1970, 12-13). Hollister and Minor both learned Indian languages and became a key part in negotiations and agreements, showing that their relationships must have been positive in order to hold these positions ("Amix" n.d., Anderson 2008, 501). The presence of Native American pottery within the remains of the European cellars at the Hollister site further supports the historical documentation and archaeological evidence that the Hollisters' had positive relations with the local Indigenous people and most likely traded with them for both pottery and other goods. These interactions support the idea that Hollister actively maintained different connections with the Native Americans than what is present in the 18th century Connecticut when Indigenous communities were discriminated against, stripped of their freedom to trade, and were denied their right to ancient traditions such as tribal hunting

and fishing grounds (Coghlan and Brydon-Miller 2014, Hawley 2015, Lavin 2013, 324-326).

Conclusion

Using the methods of geophysics, excavation, and historical and current literature, a story is told about who occupied the Hollister farmstead, how they may have interacted with each other, and their connections to entities outside of the local farm. When first generation settlers were coming to Connecticut in the early to mid-17th century, the cultural landscape was much different than in the 18th century. This research helps to fill gaps within the current literature, as there are not many historic records for 17th century Connecticut when compared to the 18th and 19th centuries. This is an important issue as many of our historical narratives are often presented from a Western perspective that excludes other cultures (Coghlan and Brydon-Miller 2014).

In my thesis, I use the theory of Post-colonialism to discuss the gaps of knowledge in many of our historical narratives. Post-colonial theory is a body of knowledge that questions the key ways through which the "world" is known (Coghlan and Brydon-Miller 2015, Hawley 2015). This theory is fundamentally based on the critique of Western knowledge with its discourse and thought formations accepted as mainstream. Many of North America's historical narratives are rooted in colonial perspectives and advance the Western world view to the detriment of the "other" or non-western view. Rejecting the accustomed ways of seeing or the established knowledge and agendas of historical narratives is the objective of Post-colonial theory. Analyzing the data from the Hollister site through the lens of Post-colonialism provides the opportunity

to modify many of these incomplete or bias historical narratives and gives a voice to many of those that have been underrepresented in our North American history.

The advanced agricultural techniques used at the Hollister farm, Hollister's involvement in trade both regionally and internationally, and his positive relationships with the Native Americans show that the Western perspective in many of our historical narratives is incomplete. In my thesis, I discuss the evidence of these activities at the Hollister site by the presence of features like European cellars and Native American pit houses and artifacts such as fancy European ceramics and Native American pottery. All of these elements come together to show that life in 17th century Connecticut for English settlers was much more complex and advanced than many historical narratives represent (Taylor 1979, Trumbull 1818).

Scholarly narratives often deliberate between the aggressive, greedy, and determined colonist that subdues nature and mankind and the entrepreneur colonist who is essentially self-sustaining (Anderson 2008, 496-497). The Hollister site and Minor's diary show a different perspective of colonialism with Minor and Hollister more concerned with supporting their families than with subduing the local population (Anderson 2008, 513, Case 1886, 19, 22, 24). This mindset explains why early colonists were open to local Indigenous help. Colonists were forced to reach out to other entities in order to establish their households successfully. In the 18th century when more colonists settled in New England, technology advanced and it became possible to make considerable amounts of wealth through large agricultural plantations and specialized trades without assistance from the local Natives (Daniels 1980, 433, Lambert, n.d.). As a result, the relationships between European settlers and Indigenous communities quickly

deteriorated as they became exploited for labor. The tension between the Colonies and the King of England also worsened and led to violence and war. Exploring Hollister's experiences show a stark contrast between society in the 17th century and that of the 18th century, most of which is not documented in historical narratives. All of these elements come together to create a vastly different worldview that helps bridge gaps of knowledge when studying 17th century colonists in Connecticut (Hinks 2017).

CHAPTER TWO: BACKGROUND

In the 17th century, most Europeans were landless and oppressed both religiously and financially (Trumbull 1818, 1, Van Dusen 1961, 11-12). The discovery of the New World provided the opportunity for English settlers to take advantage of inexpensive land and greater social freedom that was not available in England (Groover 2008, 33, Van Dusen 1961, 11, 18, Wright 1957, 3-4). Although land was relatively easy to obtain in the New World, settling here was a difficult transition. English colonists arriving in Connecticut were introduced to a completely different environment than they were familiar with and this created many challenges. Colonization required first-generation colonists to be strong and resourceful in order to be prosperous (Anderson 2008, 509, Wright 1957, 4).

To endure the harsh conditions of an undeveloped land, first-generation settlers turned to farming for their livelihood (Wright 1957, 1-3). Because of this, farming households became the primary unit of colonization during the 1600s and they continued to increase in number along the Atlantic coast throughout the 1700s (Groover 2008, 33). The John Hollister archaeological site in Connecticut provides an excellent example of a colonial farmstead that was established by a first-generation colonist who migrated to Connecticut in the mid-1600s and built his wealth and success through farming (Case 1886, 19, McNulty 1970, 12). Locating intact 17th century archaeological farmsteads is extremely rare in Connecticut because of continued development since colonization. The

Hollister site has been preserved with no disturbance except for agricultural activities and is the only known site of its kind in Connecticut (Dr. Brian Jones, personal communication, 2018). Analysis of this undisturbed 17th century archaeological farmstead provides information about how colonial farmsteads may have operated and the type of experiences that molded the activities of first-generation colonists in Connecticut.

Archaeological information combined with historical documentation is necessary to explore the activities of agriculture, trade, and Indigenous relationships at the Hollister site. In turn, this information is analyzed to present a brief summary of experiences that Hollister and farmers like him may have had when they first came to the New World. Hollister's world was based on surplus farming, local and international trade and mostly cooperative relationships with the Indigenous community (Anderson 2008, 505, Daniels 1980, 429-431, Oliver 2005, Taylor 1979, Wright 1957, 1-2). These activities are supported by particular entries in Minor's diary that reference agricultural practices, the presence of Native American features and artifacts showing the interaction between Hollister and the Indigenous community, and artifacts that provide evidence of trade networks connected throughout the hinterlands and into Europe.

Connecticut

Colonial farmers in Connecticut worked hard cultivating the land to provide food and resources for themselves and their family (Daniels 1980, 429-430). However, even the hardest working farmer was impacted by climate. Minor's diary has numerous entries recording weather patterns like the first snow or frost, bad storms, and when rain

interfered with haying, planting, or harvesting (Anderson 2008, 507). Since climate plays an important part in the success of a farmer, it is helpful to provide a brief overview of the Connecticut region.

Geographically, Connecticut is located along the coast of the Atlantic Ocean in North America. It is bordered by New York to the west, Massachusetts to the north, and Rhode Island to the east. Even though Connecticut is located on the coast, direct access to the ocean is blocked by Long Island Sound to the south (Figure 2.1). Connecticut climate is most known for its changeability and can range from good weather to storms, cold waves and heat waves, all in short periods of time (Stolborg and Hoyt 2017). Connecticut has a typical January temperature of 16˚F and the summer is usually between 80˚ and 84˚F. Precipitation averages about three to four inches per month with most of the state receiving 35 to 45 inches of snow each year ("Climate Hartford - Connecticut" 2018). Heat, cold, and precipitation are all factors that greatly influenced the success or failure of Colonial farmsteads in Connecticut.

Figure 2.1: Google Earth map (2016). Connecticut Colony was originally located in what is now the State of Connecticut. Connecticut is surrounded by land on all sides except for the south. Even though Long Island Sound blocks ocean access in the south, this did not prevent Connecticut from having a strong maritime presence.

Even though weather patterns could be erratic, Connecticut's farming industry thrived during the 17th and 18th centuries partly because of access to abundant water. The Connecticut River watershed covers 11,260 miles, connects 148 tributaries, and 38 major rivers and lakes ("About the River" 2017). Waterways such as the Connecticut River and the Thames River provided farmers a steady and ample supply of water for fields and animals. Some of the first crops grown in Connecticut were maize, wheat, rye, peas, hemp, flax, and tobacco (Daniels 1980, 430). These crops were used for local trade and eventually exported internationally to the West Indies and to other colonies for profit (Anderson 2008, 505, Taylor 1917, 92-93). The presence of multiple waterways was an important influence in establishing communities, developing agriculture, and promoting

trade in 17th century Connecticut (Figure 2.2) (Daniels 1980, Glastonbury Town Hall 2016, Taylor 1979).

Figure 2.2: Partie de la Novvelle Angleterre contenant les villes, les bourgs, et le commerce des habitans (Foster and Hubbard c. 1720). Excerpt from a historic map dating to the 18th century showing the lakes and rivers in Connecticut. Connecticut is referred to as "New London" on the map. Waterways were important for transportation, trade, and agriculture during the 17th century and continue to be utilized to this day.

The climate of the Connecticut region dictated the success of colonial farms in the 17th century. All crops depended on favorable weather to grow successfully no matter how hard the farmer worked. Despite unpredictable weather conditions, waterways like the Connecticut River provided a means of nourishment for both crops and livestock. These waterways also furnished a method of transportation to help overcome the major challenge of undeveloped or inadequate roadways and encouraged international trade (Taylor 1917, 92-93, Wright 1957, 2-3). All of these elements formed the climate of 17th century agrarian Connecticut and are important to take into consideration because farmers were reliant on agriculture to survive. This agriculturally based society is an

important aspect of Hollister's worldview because it influenced his ability to become an independent and successful farmer.

Indigenous Settlements

The Hollister archaeological site is located along the shore of the Connecticut River where many different Indian tribes were living (Taylor 1979, 10-11). Primary historical documents and archaeological evidence from the Hollister site help to clarify the interactions between Native Americans and English colonists when they began to settle in the Connecticut Valley. Understanding how these relationships develop and evolve is an important part of explaining the 17th century worldview of Connecticut farmers like Hollister and Minor.

Before Europeans discovered the New World, the Connecticut River Valley was home to many different Indian tribes that were loosely affiliated with the Algonkin confederation (Figure 2.3) (Taylor 1979, 10-11). The name "Connecticut" is derived from an Algonkin word that means "on the long-tidal river" (Van Dusen 1961, 31). These tribes are sometimes referred to as the river Indians because of the major role that the Connecticut River had in supporting their livelihood. The river Indians did not always cooperate with one another and sometimes fought bitterly (Van Dusen 1961, 31). Tensions among different Indian tribes were common and often influenced how these groups interacted with English settlers through trade or other agreements (Trumbull 1818, 29-30).

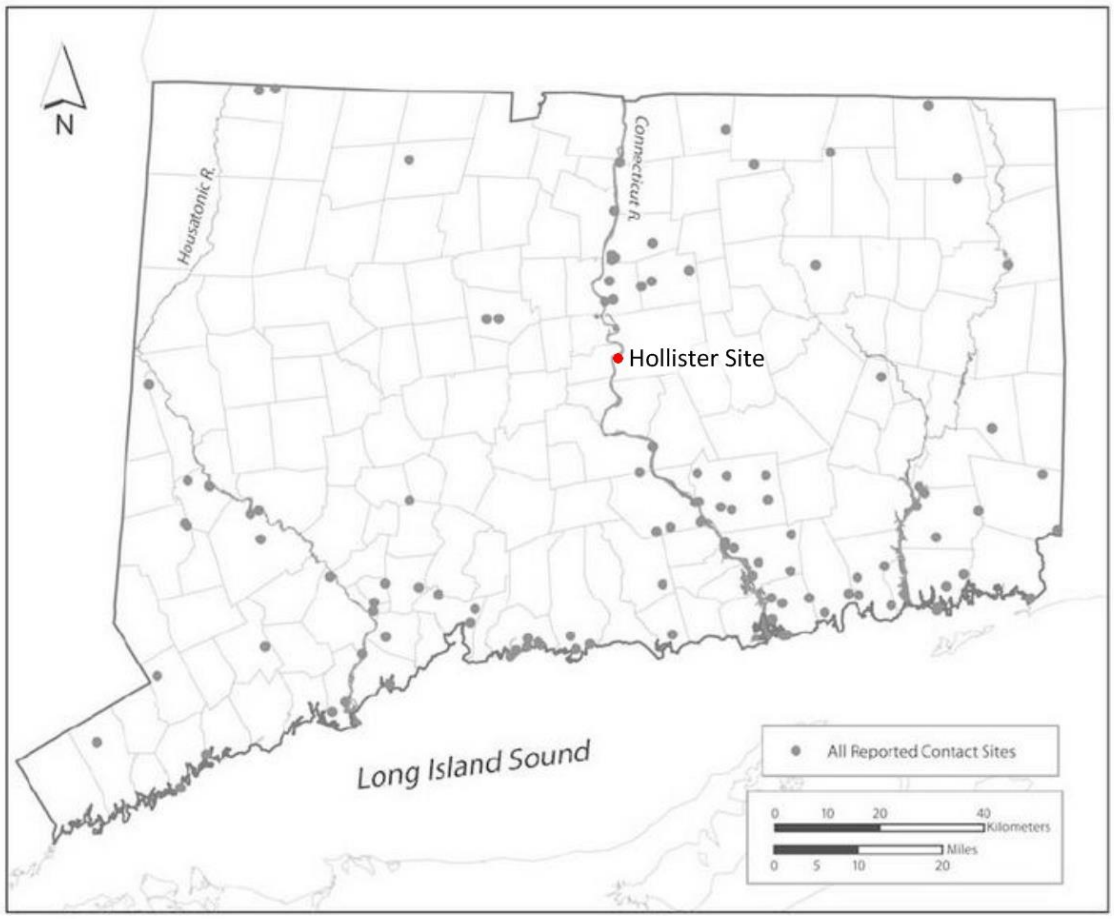


Figure 2.3: The black dots on this map mark the location of known Indian sites where contact occurred with European groups during the Post-Contact period in Connecticut. The majority of Indian settlements were located along the coast and by the shore of the Connecticut River. The approximate location of the Hollister Site is shown in relation to the other contact sites. Original map on file in the Connecticut Office of State Archaeology (Lavin 2013, 320).

When European merchants started to appear along the Connecticut River, the river Indians readily welcomed them and encouraged trade in hopes of securing allies against the Mohawks and Pequots (Van Dusen 1961, 31). Both the Mohawks and the Pequots were enemies of the river Indians and they regularly harassed and threatened them (Taylor 1979, 10-11). The Pequots took advantage of the rivalry among the river Indians and attacked them, taking their property and land. The arrival of European traders

stimulated the production of both agricultural and material commodities and marked the beginning of a successful trade enterprise between the river Indians and the Europeans (Taylor 1979, 10-11, Trumbull 1818, 29-30).

Native American pottery in the Shantok tradition (Herrick 2017, 135) excavated from the Hollister site supports the hypothesis that English colonists interacted with the local Indigenous community. Geophysical survey and archaeological excavations at the Hollister site also show the remains of European cellars and Native American pit houses within walking distance of each other (Conyers 2018, 78-79). This demonstrates that the local Indigenous community not only exchanged goods with the Hollister's but also shared their land and must have had a mutually beneficial relationship with the English settlers at the Hollister site (Dr. Brian Jones, personal communication 2018).

Historical documents also provide at least two accounts, "Amix" (n.d.) and the story of Hollister wrestling the Indian (Case 1886, 24), that show local Native Americans and Hollister exchanging knowledge and fostering relationships. Hollister and Minor both hired Native Americans to help with tasks around the farm such as hunting wolves, building structures, and other activities (Adams 1904, 205, Anderson 2008, 501, Trumbull 1852, 375). Colonists also learned farming techniques from the Native Americans and adopted the use of maize as their principle cereal because it was much more suited for the Connecticut climate and soil ("Colonial Economies – Mercantilist Tradition," Daniels 1980, 430). Maize is present in the botanicals at the Hollister site (Farley 2018) and is also mentioned in Minor's diary (Anderson 2008, 499). This is important because these accounts are in contrast to many recorded narratives of

discrimination against the Native Americans and the cruelty that is attributed to English settlers during colonization (Lavin 2013, 324-326).

The Connecticut River Valley has been home to various tribes of Indians for generations (Van Dusen 1961, 31). When European traders starting moving into Connecticut many Native Americans saw an opportunity for trade and power (Taylor 1979, 10-11, Trumbull 1818, 29-30). Even though this is quite a significant event in our history, these relationships are often challenging to understand because of bias or lack of documentation. This research shows that positive interactions between the English and Native Americans did exist in early Colonial Connecticut and were much more frequent than the commonly accepted narratives of escalated violence ("Amix" n.d., Anderson 2008, 497, 499, Case 1886, 24, Taylor 1979).

An example of these cooperative relationships is the Native American pottery excavated from the Hollister site (Herrick 2017, 135) and the use of land by both European settlers and Native Americans (Conyers 2018, 78-79). These beneficial interactions differ from the 18th and 19th centuries when much more serious issues such as slavery and racism developed (Daniels 1980, 430, Taylor 1979, Wright 1957, 5). Considering the evidence from primary historical documentation and archaeology, our perspective shifts to a much more nuanced and complicated relationship between English settlements and Indigenous communities than normally presented during the colonial period (Lavin 2013, 323-325). Acknowledging these slight changes in perspective are important in understanding the types of interactions that may have occurred between the Indigenous community and first-generation colonial settlers, such as Hollister and Minor.

European Exploration and Settlement in Connecticut

A brief overview of European exploration, the settlement of Connecticut Colony, and Hollister's migration to Wethersfield provides context for the physical, social and political environment that the Hollister site operated within. The area that became known as Connecticut was first discovered by Europeans in 1614 through a Dutch tradesman named Adriaen Block. Block made many sea voyages as a merchant and sailed from Amsterdam to the Americas four times (Varekamp and Varekamp 2006). His most notable journey took place in 1613 when he and a fellow merchant sailed two boats from Holland to the New York Bight. Through a series of events, Block lost his boat and his crew mutinied. This forced Block to stay through the winter near Manhattan Island.

With the help of Native Americans, Block acquired a new boat and, in the spring, crossed the East River and entered Western Long Island Sound. Block sailed up the Connecticut River and stopped at the present northern line of the city of Hartford. He may have explored further north but the river eventually became too shallow (Figure 2.4) (Van Dusen 1961, 19, Varekamp and Varekamp 2006). Block's exploration of the Connecticut River allowed the Dutch to establish a trading post at the mouth of the river and eventually construct a fortified trading post in Hartford named the House of Good Hope (Van Dusen 1961, 19). The increased immigration of English settlers and Native Americans limited Dutch interests and eventually forced them out of Connecticut (Ciment 2006, Taylor 1979, Varekamp and Varekamp 2006). In spite of this outcome, the establishment of Dutch trading posts opened the way for English settlements to develop along the Connecticut River.

Figure 2.4: Map of "New Netherland" (1614). Adriaen Block created one of the earliest maps of Long Island Sound and the colonies. Block's map also labels the colonies as "New Netherland." Block was the first to show the estuary and Long Island as a true island. Earlier maps connected the tip of Long Island with Rhode Island but did not show the Sound (Varekamp and Varekamp 2006) (Image courtesy of Public Domain, https://commons.wikimedia.org/w/index.php?curid=344646).

English settlers from the Massachusetts Bay Colony founded the three original towns of Connecticut Colony: Windsor, Wethersfield, and Hartford (Figure 2.5). The first English explorer in Connecticut was Edward Winslow, governor of the Plymouth Colony in Massachusetts. Motivated by a land shortage in the Massachusetts Colony, Winslow began exploration of Connecticut in 1632. By 1633, Winslow established a trading post at Windsor (Ciment 2006, Daniels 1979, Taylor 1979). Reports of rich fertile land and abundant natural resources encouraged John Oldham and other colonists to build a settlement at Wethersfield in 1634 and officially established a township in 1636. The town of Wethersfield would eventually divide into two separate townships, Wethersfield and Glastonbury (Ciment 2006, Daniels 1979, Taylor 1979, Glastonbury Town Hall 2016). Hollister was one the first English settlers in Wethersfield and eventually purchased a farmstead in Glastonbury. These two towns are important for historical context because they form the setting in which the Hollister family chose to build a successful farming operation. Although exact reasons for this location are unclear, the abundance of natural resources, the availability of trading partners and access to the Connecticut river for transportation and irrigation must have all been factors that influenced Hollister's decision to settle in this area.

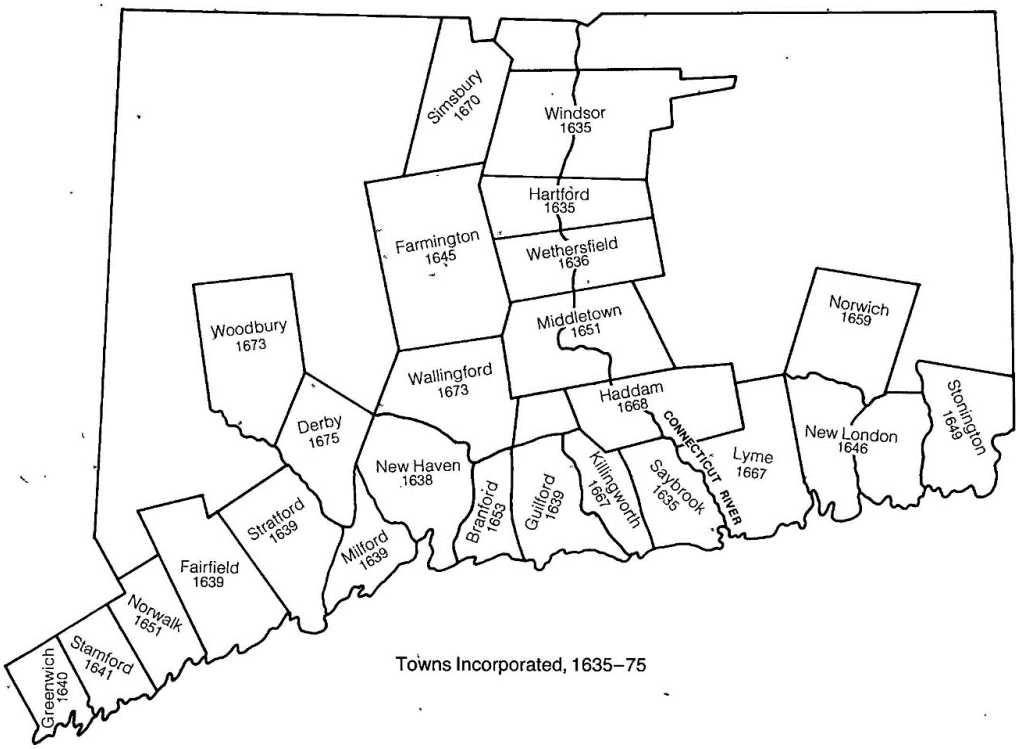


Figure 2.5: The original colonies of Connecticut were located in Windsor, Hartford, and Wethersfield (Daniels 1979, 16).

Wethersfield and Glastonbury, Connecticut

To understand the culture and society that the Hollister family lived and worked in, it is necessary to explain the historical background of Wethersfield and Glastonbury, Connecticut. The area of Wethersfield was originally located on both sides of the Connecticut river and was known by its indigenous name Pyquag (Adams and Stiles 1904, Glastonbury Town Hall 2016). By 1636, thirty families from Pyquag (Wethersfield) were settled in Naubuc Farms, which was a tract of land located on the eastern side of the Connecticut River and purchased from the Native American Chief Sowheag (Figure 2.6). Around 1640, Hollister settled in this area and established his farmstead near to the Connecticut River to take advantage of the abundant resources for farming

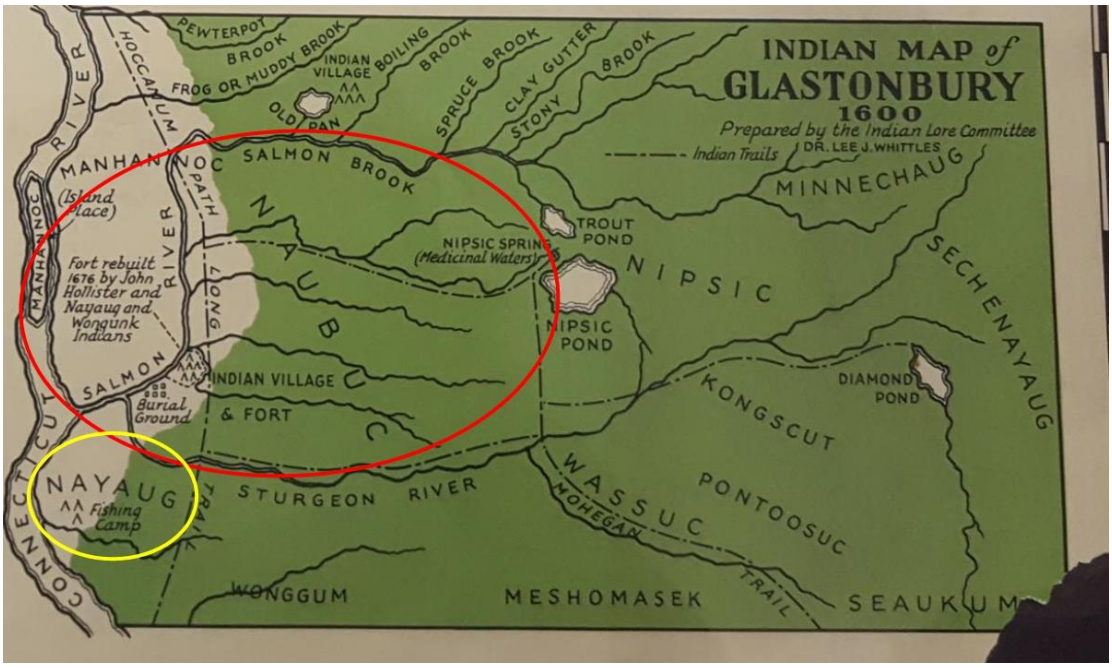


Figure 2.6: Glastonbury, Conn. (1869) (Historical Reference Map Case, Connecticut State Library, Hartford, Connecticut.). Excerpt from the map, Glastonbury, Conn. (1869), shows the "Indian Map of Glastonbury 1600." This historic map shows the area of Naubuc on the east side of the Connecticut River. This area was originally part of the township of Wethersfield but became the town of Glastonbury in 1692. Nayaug is located off the bank of the Connecticut River and is the location where the Hollister farmstead, along with other farms, was built during the mid-17th century. The approximate area of Naubuc is marked in red on the map and Nayaug is marked in yellow.

In 1672, the General Court granted permission to extend the boundary lines of Naubuc Farms five miles to the east. This additional land was purchased from the Native Americans and formed Eastbury. In 1689, residents of Naubuc Farms petitioned Wethersfield and the General Court to become a separate township. Permission was granted from these entities in 1690 and this area formed the town of "Glassenbury" in 1692 (Figure 2.7) (Historical Society of Glastonbury 2015, Glastonbury Town Hall 2016, Taylor 1979). Glastonbury is the town where the Hollister archaeological site is located. Hollister also maintained a home in Wethersfield throughout his lifetime, but this residence has been lost over the course of history ("Estate of John Hollister, Town of

Wethersfield" 1665). It is important to know the history of how Wethersfield and Glastonbury formed because these two English settlements shape the cultural environment in which Hollister and the Native Americans interacted on a regular basis.

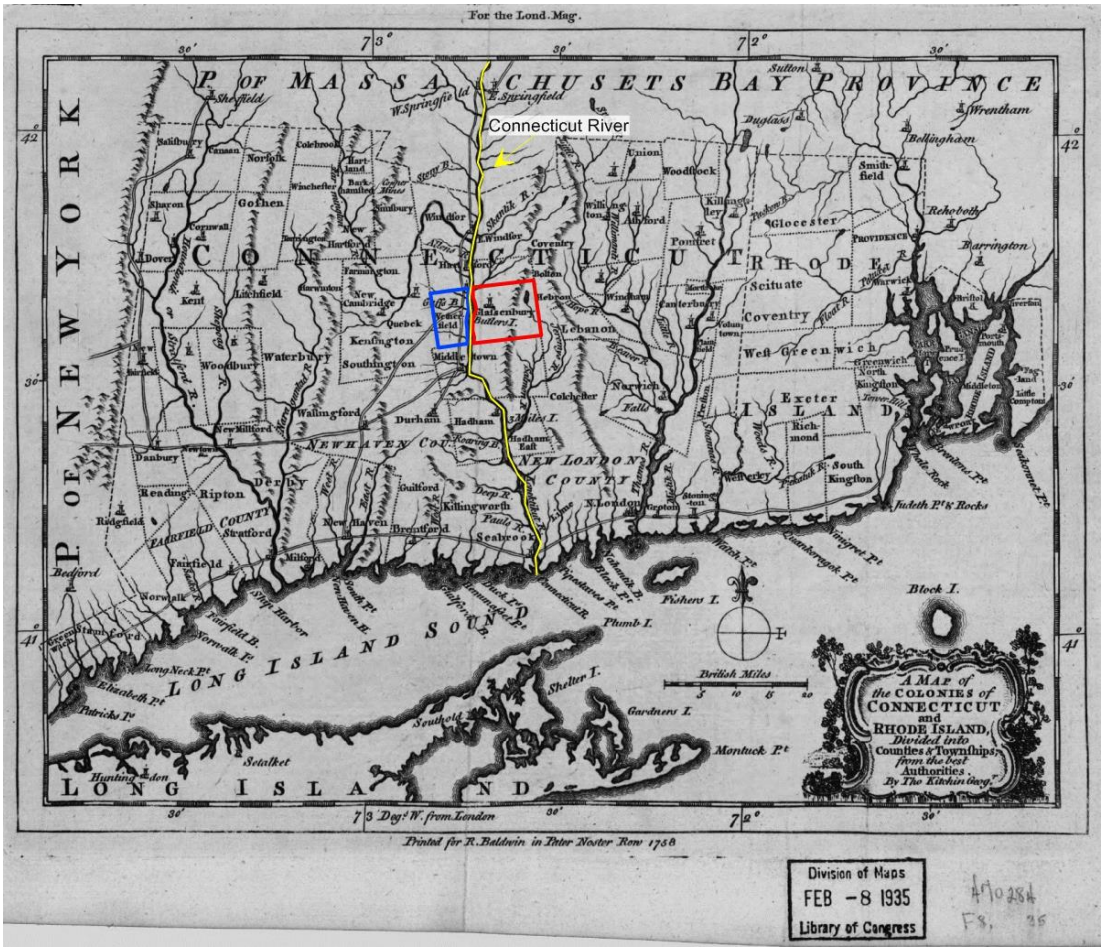


Figure 2.7: A historic map of Connecticut showing the separate townships of Wethersfield and Glastonbury (Glaisenbury), Connecticut, located across the Connecticut River from each other (Kitchin 1758). The Connecticut River is marked in yellow. Wethersfield is marked in blue and Glastonbury in red.

Hollister Archaeological Site

The Hollister archaeological site is located on the eastern bank of the Connecticut River, south of the townships of Wethersfield and Glastonbury (Figure 2.8). The original Hollister house was built by Lieutenant John Hollister (Sr.) ca. 1640, near where the Old

Dock Road approached the river bank. The Hollister family was not the only family living along the Connecticut River. Neighbors were present on either side of the Hollister property ("John Hollister and his House"). Another European family, the Gilbert brothers, were tenants of Hollister and paid rent for the property from 1651-1663 (Glastonbury Records 1680, 126). Geophysical survey and archaeological excavations also show the remains of Native American pit houses indicating that they cohabited with the Gilbert's and Hollister's (Conyers 2018, 78-79). Recognizing that this landscape was home to different groups of people is an important component to consider when researching the activities of Hollister and his family as they could be influential factors in decision-making processes and the life experiences of the family.

Figure 2.8: Google Earth Map (2016). The Hollister archaeological site is located on the eastern bank of the Connecticut River south of the townships of Wethersfield and Glastonbury, Connecticut.

Historic records have several different accounts of the location of the Hollister house and its later relocation to Tryon Street in Glastonbury sometime in the early 1700s (Case 1886, "John Hollister and his House," McNulty 1970). It is unclear when and how the Hollister house was moved. Historic records have conflicting descriptions of its relocation, but it is certain that the home was moved from its original site near the Connecticut River to somewhere in Glastonbury. The relocation of the Hollister house is an important part of the history of the site because it left behind numerous anthropogenic features such as cellars and wells that were backfilled and preserved. European cellars and Indigenous pit houses are present on the landscape and contain an abundance of artifacts including Native American pottery and fine European ceramics that allow us to understand the activities and culture of the English settlers and how they may have interacted with their Native American neighbors. This shows that even though English settlers had moved into this area, the Native American community still lived here and that these two groups most likely interacted on a regular basis.

Thomas Minor's Diary

Archaeological evidence does allow preliminary conclusions about the activities and culture of the Hollister site, but analyzing historical records provides another element of detail that cannot be overlooked. The diary of Thomas Minor is one such historical document that deserves special recognition because it is a personal account of farming activities from 1653 to 1685 while Minor lived in Stonington, Connecticut (Anderson 2008, Minor 1899). This document is the only one of its kind for the Connecticut region

and has aided tremendously in creating historical context for the 17th century Connecticut farmer and especially for the Hollister farm.

Throughout Minor's diary, he describes the labor required to subdue the land for farming and the amount of work it took to build a home and other structures that were necessary for farming (Anderson 2008, 502). Even though Minor does not go into much detail on his thoughts and feelings, the information that he does record gives amazing insight into the different types of activities that were performed on the farm, the variety of crops that were cultivated, and the relationships that he maintained though trade and employing Native American laborers. These types of activities are referenced in some historical documents and can be seen in the archaeological record at the Hollister site by the remains of both European and Native American features on the landscape and the presence of botanical remains, such as maize (Anderson 2008, Conyers 2018, 78-79, Farley 2018). This diary shows that Minor was not unlike many farmers that came over from Europe to establish a new beginning in hopes of providing a better life for this family (Anderson 2008, 504).

The dates of Minor's diary overlap with the lifetime of Lt. Hollister's son, John Hollister (Jr.) who was born in 1644 and died in 1711. This means that Minor was living and working in the same region, only a few hours away, and most likely performing similar activities on his farm as the Hollister family. Minor's account of farm life in 17th century Connecticut is unique because documents such as this are extremely rare for New England (Deetz 1977, Groover 2008). This diary provides a historically accurate

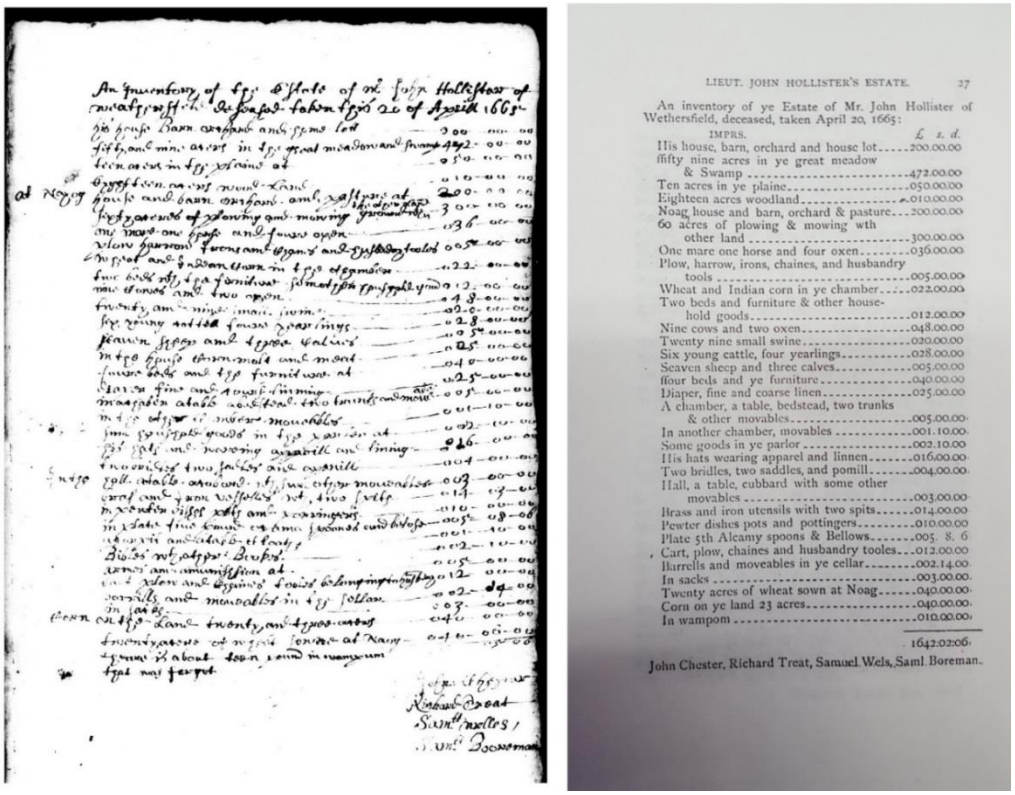
background that assists in recreating the 17th century Connecticut agrarian worldview that Hollister and his family likely experienced.

The Hollister Family

The historical background for Hollister and his family is important because it further defines and clarifies how first-generation settlers in Connecticut interacted with their environment. The Hollister Family was a well-known family in the Wethersfield and Glastonbury communities (Case 1886, 19, 22). Lieutenant John Hollister established his primary residence in Wethersfield and married Joanna Treat. Together, they had eight children. Their oldest son, John Hollister (Jr.), was born ca. 1644. After Hollister (Sr.) passed away in 1665, his wife, Joanna Hollister, inherited the residence in Wethersfield and John Hollister (Jr.) and his children inherited all of his father's farmland in Glastonbury (Case 1886, 25-26, "Estate of John Hollister, Town of Wethersfield" 1665). Lt. Hollister's will states that Hollister (Jr.) was required to give his mother, Joanna, twenty bushels of apples and two barrels of cider so long as she lived and the orchard prospered ("Estate of John Hollister, Town of Wethersfield" 1665). For Lt. Hollister to require this in his will highlights his success as a farmer and shows that this farmstead was more than just a subsistence operation.

In addition to having two homesteads, one in Wethersfield and one in Glastonbury, Lt. Hollister's probate inventory also lists an abundance of valuable property: many acres of land, farming equipment, a house, barn, and orchard in Wethersfield and in Nayaug (Glastonbury), livestock, linen fabrics, numerous pieces of furniture, produce such as wheat and corn, and currency, including wampum (Figure 2.9)

(Case 1886, 27, "Estate of John Hollister, Town of Wethersfield" 1665). These entries in Lt. Hollister's probate support the assertion that he was an influential and wealthy man during his lifetime. Probate records and historic documents show the farmstead in Glastonbury as a profitable operation, not only during Lt. Hollister's lifetime but also throughout his son's ("Estate of John Hollister, Town of Wethersfield" 1665, "Estate of John Hollister, Town of Glastonbury" 1711). These seemingly unimportant details are quite necessary in understanding Hollister family's social status, their success as farmers, and how these elements influenced their daily life in 17th century Connecticut.



LIEUT. JOHN HOLLISTER'S ESTATE. 27

An inventory of ye Estate of Mr. John Hollister of Wethersfield, deceased, taken April 20, 1665:

IMPRS.	£ s. d.
His house, barn, orchard and house lot	200.00.00
fifty nine acres in ye great meadow & Swamp	472.00.00
Ten acres in ye plaine	050.00.00
Eighteen acres woodland	010.00.00
Noag house and barn, orchard & pasture	200.00.00
60 acres of plowing & mowing wth other land	300.00.00
One mare one horse and four oxen	036.00.00
Plow, harrow, irons, chaines, and husbandry tools	005.00.00
Wheat and Indian corn in ye chamber	022.00.00
Two beds and furniture & other household goods	012.00.00
Nine cows and two oxen	048.00.00
Twenty nine small swine	020.00.00
Six young cattle, four yearlings	028.00.00
Seaven sheep and three calves	005.00.00
ffour beds and ye furniture	040.00.00
Diaper, fine and coarse linen	025.00.00
A chamber, a table, bedstead, two trunks & other movables	005.00.00
In another chamber, movables	001.10.00
Some goods in ye parlor	002.10.00
His hats wearing apparel and linnen	016.00.00
Two bridles, two saddles, and pomill	004.00.00
Hall, a table, cubbard with some other movables	003.00.00
Brass and iron utensils with two spits	014.00.00
Pewter dishes pots and pottingers	010.00.00
Plate 5th Alcamy spoons & Bellows	005. 8. 6
Cart, plow, chaines and husbandry tooles	012.00.00
Barrells and moveables in ye cellar	002.14.00
In sacks	003.00.00
Twenty acres of wheat sown at Noag	040.00.00
Corn on ye land 23 acres	040.00.00
In wampom	010.00.00
	1642:02:06

John Chester, Richard Treat, Samuel Wels, Saml. Boreman.

Figure 2.9: Lieutenant John Hollister's inventory from his probate in 1665. On the left is the original historic document ("Estate of John Hollister, Town of Wethersfield" 1665). The image on the right shows the transcription of the original inventory (Case 1886, 27). Hollister was a wealthy and an influential man in both Wethersfield and the Connecticut Colony (Case 1886). The possessions listed in his estate attest to the wealth that he acquired throughout his lifetime.

Lieutenant John Hollister

Lieutenant John Hollister provides an example of a first-generation settler who came to the Colony of Connecticut, established a farming operation and became quite successful (Case 1886, 19). He owned 149 acres of land according to his will ("Estate of John Hollister, Town of Wethersfield" 1665) and was involved in many different matters of state including service as a juror and a deputy, represented the town of Wethersfield many times until 1656, and was appointed tax collector in Wethersfield in 1660 (Case 1886, 19, 22). Lieutenant John Hollister was also selected along with two other men from Wethersfield on October 3rd, 1654, to accompany the deputy-governor in convincing men to join an expedition that was most likely against the Indians (Case 1886, 19). In February of 1656, Hollister was appointed to give "the best and safe advice to Indians, if they agreed to meet and should crave their advice" (Case 1886, 19). These positions of authority show that Hollister had a good reputation and was an influential figure in the English community.

Historic documents also state that Hollister had a friendly relationship with local Native Americans ("Amix" n.d., Case 1886, 24). One historic document located in the Hollister family archive at Glastonbury Historical Society, describes in detail how the Hollister family helped Amix, a Native American girl, learn to use a sharp knife to skin animals instead of a stone scraper, to make red clay pots, how to cook and preserve European foods, and how to sew with metal needles and thread instead of using bone needles and animal sinews. The Hollister's also taught Amix their language and learned Indian words from her ("Amix" n.d.). This story shows that the Hollister family went

beyond using the Indigenous community just as trading partners but they also exchanged knowledge and ideas that assisted both groups in their survival.

There is also a well-known story about Lt. John Hollister wrestling with an Indian that has been mentioned in several historic writings and shows that Hollister interacted with the Indigenous community outside of economic activities (Case 1886, 24, Chapin 1853, 13, McNulty 1970, 12-13). While Hollister was visiting his farmland at Nayaug (Glastonbury), a strong Indian man, claiming to be the most powerful man in his tribe, confronted Hollister and said he heard that Hollister was the "stoutest pale-face in the settlement" and suggested a fight to see who was stronger (Chapin 1853, 13). Hollister and the Indian fought until they were both exhausted and then after resting resumed fighting until the sun set. Neither of them won the fight. Instead, they exchanged tokens of friendship and lived in peace with each other ever after (Case 1886, 24, Chapin 1853, 13). Although there is uncertainty regarding the validity of this story, it is helpful to understand how Hollister may have gained his reputation for being friendly with the Native Americans.

Lieutenant Hollister's involvement with political affairs and the Native Americans shows that he had some type of relationship with the Indigenous groups in the area. The archaeological evidence of Native American pottery and cohabitation at the Hollister site and the accounts from historic documents allude to a positive interaction between the Hollister Family and the Native Americans (Dr. Brian Jones, personal communication, 2016, Herrick 2017). This is important because the Indians were highly involved in the trade and exchange of goods, including tobacco, which contributed to the

wealth of the Connecticut Colony. Through these interactions, Hollister shows himself as a savvy businessman and who took advantage of all types of trading partners and their resources without racial discrimination, which differed from settlers in the 18th century who refused Native Americans their right to trade (Lavin 2013, 497).

Conclusion

Connecticut Colony found its beginning in the hard-working farmers of the early 17th century. The Hollister site provides a unique look into the mid-17th century when agriculture was the only means of survival in the New World and relationships with Indigenous peoples were still being negotiated and established. Minor's experiences recorded in his diary and the archaeological evidence from the Hollister site shows how early settlers worked hard to establish a residence, took advantage of abundant local resources in order to survive, utilized the local Indians for labor and trade, and eventually became prosperous through diligence.

Hollister's 17th century Connecticut was much different than the early 18th century when first-generation settlers were mostly involved in farming as there was not a developed infrastructure that catered to other professions. In order to succeed, colonial farmers were required to work incredibly hard and partner with Indigenous communities to survive. Farmsteads like Minor's and Hollister's provided the infrastructure necessary to support a small industry that produced materials for trade both locally and regionally (Anderson 2008, 509). The Indigenous community provided trading partners and resources that contributed to these successful farmsteads, for example, the agriculture of maize (Daniels 1980, 430). In turn, the Connecticut River supported both the English

settlers and the Native Americans by providing fertile land, natural resources, and transportation (Wright 1957, 2). Even though colonial farmers had to overcome great difficulties, this did not stop them from creating prosperous farms and maintaining positive relationships with local Indians.

In 17th century Connecticut, Hollister was committed to farming because it was the only viable way to ensure survival (Taylor 1979). Hollister and Minor's relationships with Native Americans revolved around trade, labor, and knowledge. These experiences differed from 18th century settlers when agricultural specialization developed, issues like civil war, racism, and slavery escalated, and increased regulations from England created tension among colonists and Native Americans throughout New England (Anderson 2008, Case 1886 19-20, Daniels 1980, Taylor 1979). These are important concepts to consider because historic records that provide personal details of 17th century Connecticut farmers are rare and mostly nonexistent (Deetz 1977, Groover 2008). Scholars often depict colonists as either aggressive forces of violence and change or as hardworking entrepreneurial farmers that are somewhat complacent when interacting with the Indigenous community (Anderson 2008, 496-497). This gap in knowledge is critical because the majority of settlers in the 17th century were farmers and the amount that we know about this large section of population is at best, minimal (Anderson 2008, 497). Analyzing the Hollister site through geophysical surveys, archaeological excavations, and historic documents can assist in bridging these gaps of knowledge and provides a more informed worldview of 17th century agrarian Connecticut when agriculture was the

primary method of survival, global trade networks were not yet fully developed, and positive relationships with the Indigenous community were maintained.

CHAPTER THREE: FIELD METHODS

Combining the methods of geophysical survey, including ground-penetrating radar (GPR) and magnetometry, archaeological excavation, and historical research, provide the ability to perform a detailed analysis of the Hollister site. This analysis includes locating specific archaeological features on the landscape, using historical documents for context, and interpreting artifacts from excavations. These data were then examined to explore three key aspects of the Hollister site. These aspects are the development of an agricultural surplus, the presence of trade networks throughout the Colonies and into Europe, and how relationships evolved between the English settlers and the Indigenous communities.

A limited amount of research was completed on the Hollister site when I initially started my project. Historical research performed by the landowner indicated that a farmstead was built by the Hollister family in the mid-17th century. However, the exact location of the Hollister house was unclear. The landowner initiated this project through contacting the Glastonbury Historical Society for more information on the Hollister family. In turn, the Historical Society contacted Dr. Brian Jones, the Connecticut state archaeologist. In order to quickly determine if there were archaeological features below the surface of the ground, Dr. Jones asked Peter Leach, a doctoral student from the University of Connecticut, to conduct a GPR survey over the middle part of the pasture where the Hollister farmstead was supposed to be located.

In the summer of 2015, Peter Leach performed a GPR survey that was followed by excavations over a limited area of the site (Figure 3.1). Ground-penetrating radar is a geophysical method that uses electromagnetic waves to detect features below the surface of the ground (Conyers 2013). The GPR survey was collected in three grids measuring 100x30 meters. Peter Leach interpreted these data and produced an image through *RADAN* (Geophysical Survey Systems, Inc 2015), GPR processing software, which shows various rectangular and circular features (Figure 3.1). This GPR image was then used to perform limited excavations in the summer of 2015 during a public field day that involved members of the community (Dr. Brian Jones, personal communication, 2016). Eight 1x1 meter excavation units were placed around one of the rectangular features identified through GPR survey (Figure 3.1). The amateur nature of the excavations led to minimal data collection regarding stratigraphy, depth, and artifacts at the site. However, excavations in the plowzone did uncover material dating to the 17th century that included a number of pipe stems (Dr. Brian Jones, personal communication, January 21, 2016). This is important because the presence of this material, especially the pipe stems, indicates European occupation of the site during the 17th century.

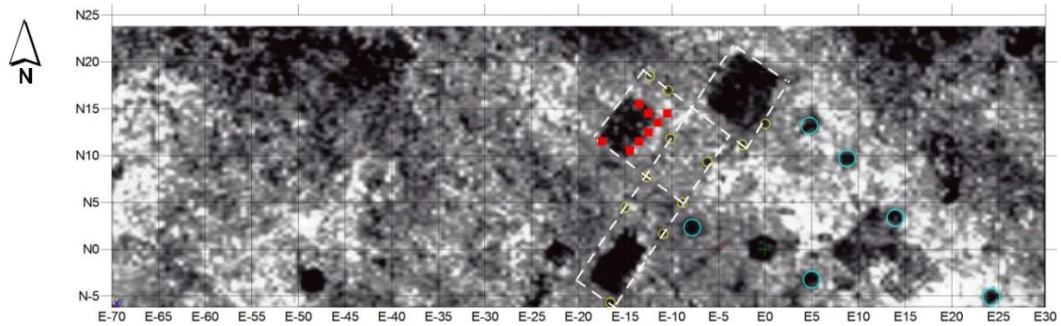


Figure 3.1: Image courtesy of Peter Leach and Dr. Brian Jones, generated by the GPR data processing software, *RADAN* (Geophysical Survey Systems, Inc 2015). This slice map shows red squares where the summer 2015 excavations were located. The yellow and blue circles are distinct curvilinear features.

In November and December of 2015, detailed analysis of the site began by examining and interpreting Leach's GPR data. Herrick and I received the raw GPR data from Leach and produced amplitude slice maps using the software programs *GPR Process* (Conyers et al. 2010) and *Surfer* (Golden Software, LLC 2015) (Figure 3.2). This analysis focused on questions concerning the extent of the site and the types of features located there. These data were used to create maps that revealed over a dozen buried features dating to the 17th century (Dr. Brian Jones, personal communication, 2016) and show that this land was heavily occupied for a length of time.

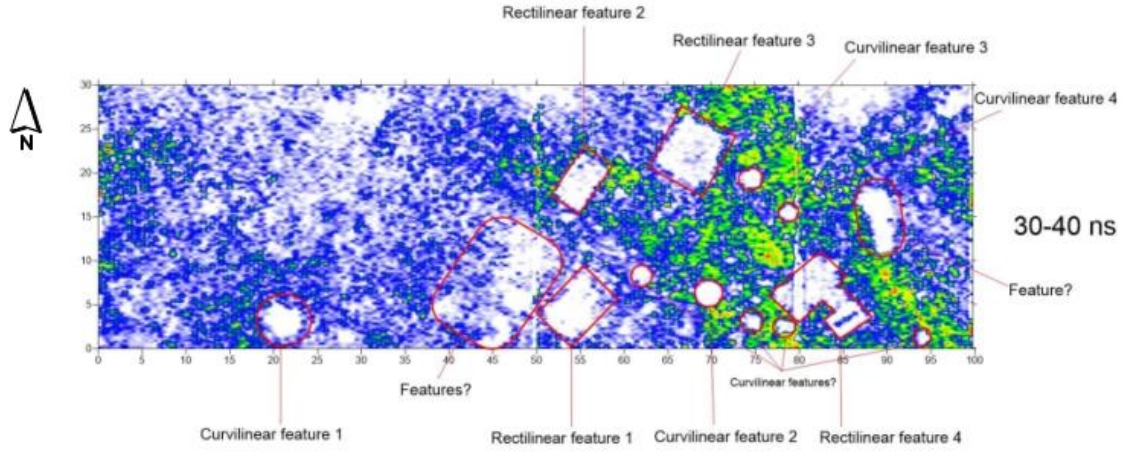


Figure 3.2: Image courtesy of Maeve Herrick. Amplitude slice map showing a depth of 30-40 nanoseconds. Map created from raw GPR data collected by Peter Leach using *GPR Process* (Conyers et al. 2010) and *Surfer* (Golden Software, LLC 2015). Anthropogenic features are highlighted in red on the image. The rectangular features are cellars (Conyers 2018:78).

The GPR slice map shows areas of low amplitude that appear white indicating minimal radar reflections due to fine grained sediment from the river flooding in the early 18th century (Figure 3.2) (Conyers 2018, 78-79). The blue areas are places of high amplitude reflections that show undisturbed sections of the earth where bedrock or other natural stratigraphy is present. During the initial interpretation of these data, the

rectangular features appeared to be cellars beneath a 17th century farm home (Conyers 2018,75-77, Dr. Brian Jones, personal communication, 2016). The other curvilinear features were hypothesized in our initial interpretation as constructed by Native Americans, Europeans, or both and could be pit houses, wells, or storage facilities. The shapes of these features are clearly anthropogenic and attest to the land being occupied.

The variety and number of features present in the amplitude slice maps are intriguing because they indicate a medium-sized settlement that most likely involved both Europeans and Native Americans. The areas of low amplitude are rectangular, square, and circular (Figure 3.2). These shapes are usually associated with human activity that has modified the landscape (Conyers 2012). The GPR image also shows areas of low amplitude that have been truncated by the survey (Figure 3.2). These areas could be part of a complex of structures that is not visible in this grid, suggesting a larger area of settlement. These observations led to additional GPR survey for a broader analysis of the site that could confirm the boundaries of the site, the extent of occupation, and the activities that may have occurred there.

Herrick and I implemented magnetometry as our first geophysical survey method to gain further information on how the landscape was used (Figure 3.3). After performing the magnetic survey and analyzing the data, our next step was to survey as much of the site as possible with GPR (Figure 3.4). Excavations during the summer of 2016 were centered on the cellars found in the GPR data and included two other interesting features that Herrick and I chose to investigate. These series of steps in our research methods were

carefully planned to produce data that could be used to create an integrated view of the landscape that included geologic and anthropogenic features.

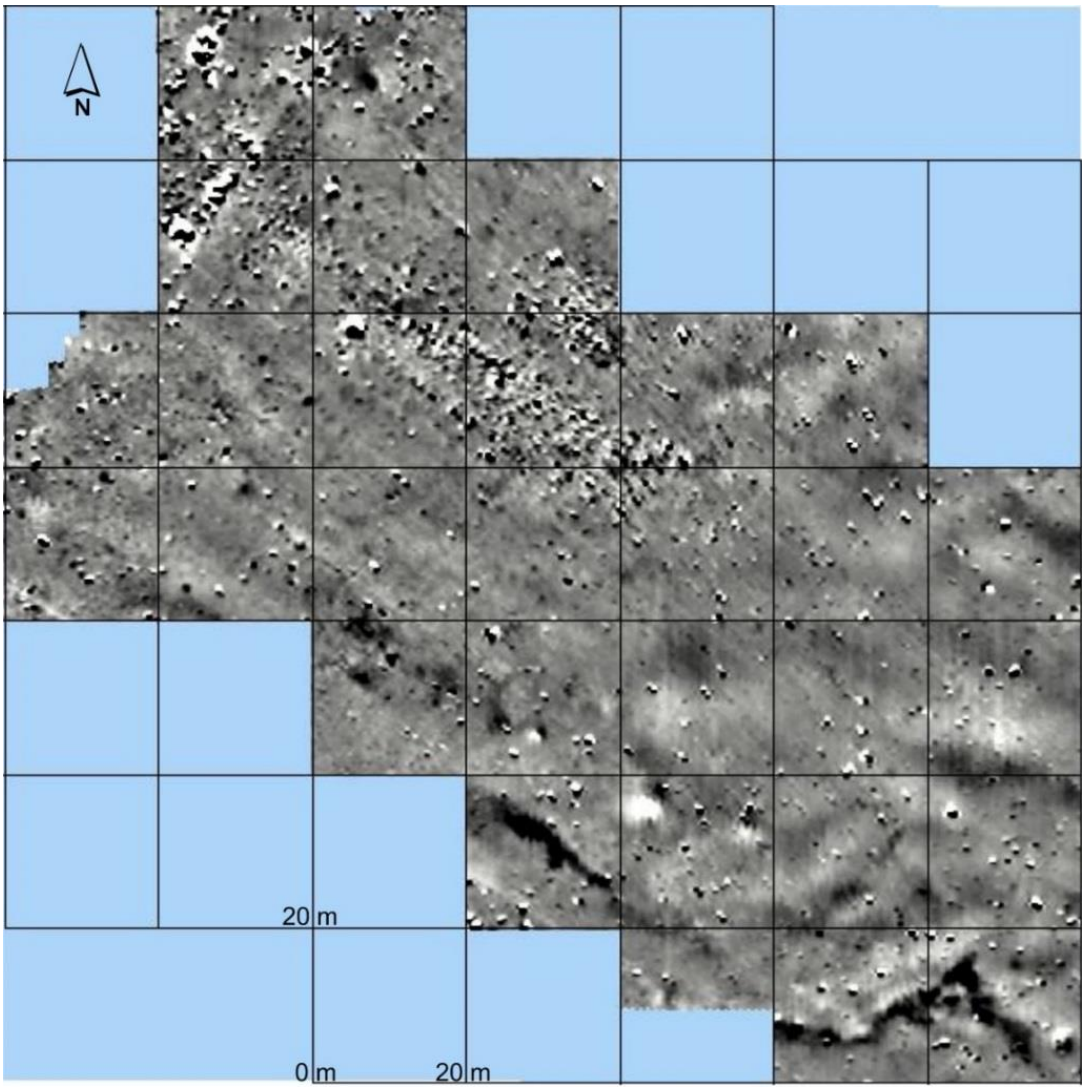


Figure 3.3: Hollister Site (March 2016), Magnetometry Survey with Bartington Grad601 Single Axis Magnetic Field Gradiometer, data collected in 20x20 meter grids by Maeve Herrick and Jasmine Saxon, Masters Students in Anthropology at the University of Denver. Image produced using *TerraSurveyor* (DW Consulting, 2016).

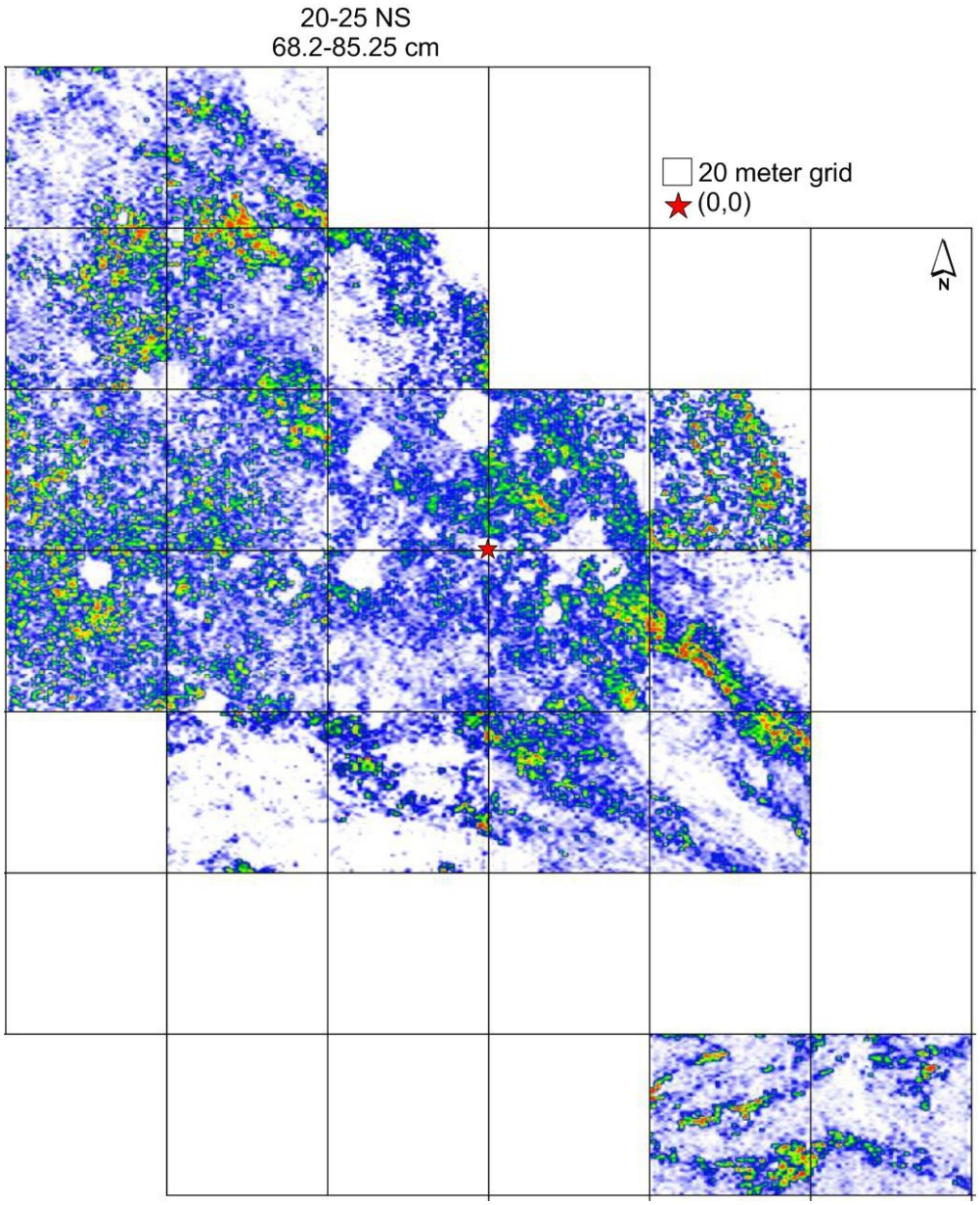


Figure 3.4: Hollister Site (July 2016), GPR survey, data collected in 20x20 meter grids by Maeve Herrick and Jasmine Saxon, Masters Students in Anthropology at the University of Denver. Image produced using *Surfer* (Golden Software, LLC 2015).

Archival research was performed at a number of libraries and historical societies in Hartford, Wethersfield and Glastonbury, Connecticut, to provide historical context for the Hollister site during the 17th century. Any specific documents that pertained to the

Hollister family, their tenants (the Gilbert family), the property, and interactions between the Hollister's and the Native Americans, were collected and analyzed. These documents included land deeds, probate records, town records, family histories and genealogies. These types of resources provide small details that can be used to develop a larger picture of what life may have been like in 17th century Connecticut. Some of these accounts provide personal details such as the possessions listed in Hollister's will. All of these factors are important when analyzing the Hollister site in 17th century Connecticut because they provide information on socioeconomic status, relations between family members and other groups, and the types of activities that occurred on the farm.

Establishing a Local Grid

When performing geophysical survey and excavation at an archaeological site, it is very important to establish a coordinate system or a local grid that will accurately locate features within the site. Total stations are generally used as a mapping tool to establish points within a grid. The state archaeologist, Dr. Brian Jones, established a local coordinate system within our site by using a total station to record points in the site map.

A total station is an electronic theodolite that uses an electronic distance meter (EDM) to measure many different aspects of the landscape including distance, slope, angles, height, three dimensional coordinates and a variety of other functions helpful in archaeology (Figure 3.5) (Darvill 2008). These data are logged into a computer system by the surveyor and then used to create a map that shows x and y-coordinates as well as the elevation (z) within the grid. Using a Topcon GTS201D total station, Dr. Jones surveyed

the Hollister site and established a grid with the 0,0 point located in the middle of the historic well feature, closest to the three rectangular cellars. We utilized this grid for the magnetometry and GPR surveys and to place the excavation units and test pits (Figure 3.6).

Figure 3.5: A total station is an electronic theodolite that uses an electronic distance meter (EDM) to measure many different aspects of the landscape including distance, slope, angles, height, three dimensional coordinates and a variety of other functions helpful in archaeology (Darvill 2008). Pictured is a Topcon GTS201D, which is the instrument we used to create a local grid for the Hollister Site. Image available from terapeak.com, accessed August 29, 2017 (https://www.terapeak.com/worth/topcon-gts-201d-total-station-sokkia-trimble-leica-nikon/322305346448/).

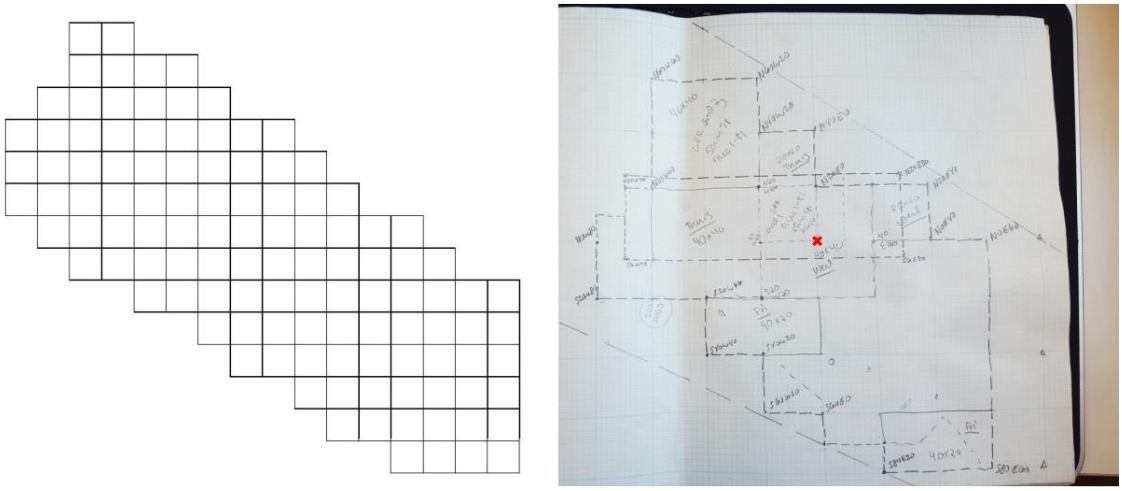


Figure 3.6: Left: Coordinates from the total station were imported into ArcGIS to create a base map that could be used as a layer for creating additional maps. Right: Map drawn using the coordinates from the total station. The historic well feature closest to the three cellars marks the 0,0 point (in red) established for the coordinate system within the site. This coordinate system was used to establish the grids for the magnetometry and GPR survey and to plot excavations.

Magnetometry

Magnetometry is a remote sensing method that records subtle variations of Earth's magnetic field, which are the product of changes in magnetic materials in the shallow subsurface (Kvamme 2006, 206). These subtle changes in the ground are the product of thermal and chemical differences in artifacts, natural objects, organic layers and other magnetic features such as bacteria found in topsoil. These materials retain minor magnetism and influence the earth's magnetic field (Kvamme 2006, 206). The magnetic field is measured in nanoteslas (nT) with most archaeological features within ±5 nT of the natural background. Results from magnetic surveys show contrasts between Earth's magnetic field and the magnetic properties of anthropogenic or geological features. These contrasts are labeled as anomalies until they are further identified.

There are three types of anomalies that are present within the magnetic data: positive, negative, and dipolar (Figure 3.3). The positive anomalies appear as black features in the map and come from soils that are magnetically enriched or changed in some way. An example of this would be a pit or ditch that is dug and then refilled with top soil. A negative anomaly appears when topsoil is removed for construction. Features like underground storage pits, cellars or ditches will show as negative anomalies within the magnetic map. Finally, dipolar anomalies are result of metal artifacts on or below the surface of the ground. These three types of anomalies are shown in the magnetometry image and are used to interpret features under the surface of the earth.

In March 2016, Maeve Herrick and I performed a magnetometry survey over a two-day period with a Bartington Grad601 Single Axis Magnetic Field Gradiometer (Figure 3.7 and 3.8). We surveyed thirty 20x20 m grids with two grids slightly shortened in order to accommodate for the landscape. Spatial resolution in the magnetic survey is governed by "the separation between transects, the number of samples taken per meter, and the sampling capabilities of the instrument" (Kvamme 2006, 214). Survey parameters were set to acquire greater detail and quality of magnetic anomaly definition with 8 samples for every meter in the y direction and with two traverses for every meter in the x direction (Kvamme 2006, 215). The data was collected in a zig-zag traverse mode with the nanotesla range set to ±100 of the calibrated "zero" point of earth's magnetic field. This range ensured that the instrument would record any anomalies that alter Earth's magnetic field with a resolution of 0.01 nT. This level of sensitivity is important to find smaller anomalies. The magnetometer was calibrated using specific steps to set the range

of nTs recorded and by facing the cardinal directions ("Bartington Grad601 Setup," 2012).

Figure 3.7: Jasmine Saxon, master's student at the University of Denver, performs the magnetometry survey within a 20x20 m grid. Dr. Brian Jones, state archaeologist, and Maeve Herrick, master's student at University of Denver, use ropes to keep the measurement of transects that are surveyed.

Figure 3.8: The magnetometer survey was performed with a Bartington Grad601 Single Axis Magnetic Field Gradiometer.

TerraSurveyor (DW Consulting, 2016) was used to create the magnetic image that allowed us to compare and contrast the features in the magnetic map to the map produced from Leach's GPR data (Figure 3.3). This comparative method highlighted many features that enabled Herrick and me to interpret the magnetic data more accurately throughout the rest of the site. The positive, negative, and dipolar anomalies appear as black and white features in the image (Figure 3.3). Black areas within the image represent positive anomalies. Negative anomalies appear as white areas and the dipolar anomalies are represented by black and white areas.

Analyzing the map, I found an abundance of dipolar anomalies located in the same areas that the GPR revealed anthropogenic features, indicating human disturbance in those areas. An example of this disturbance is the number of dipolar anomalies present in the northwest of the map. This area is where the remains of a 1934 tobacco barn are located. Metal artifacts left behind from the barn's deconstruction appear as dipolar anomalies in the shape of a rectangle (Figure 3.9). Positive and negative anomalies are present throughout the magnetic data indicating different features within the landscape, which are specifically discussed in Chapter 4, *Data Analysis*. Some of these anomalies are difficult to interpret due to the abundance of metal artifacts left in this pasture during 20th and 21st century, which is why I used the GPR data and the magnetic data together to identify features that are present in the subsurface of the earth.

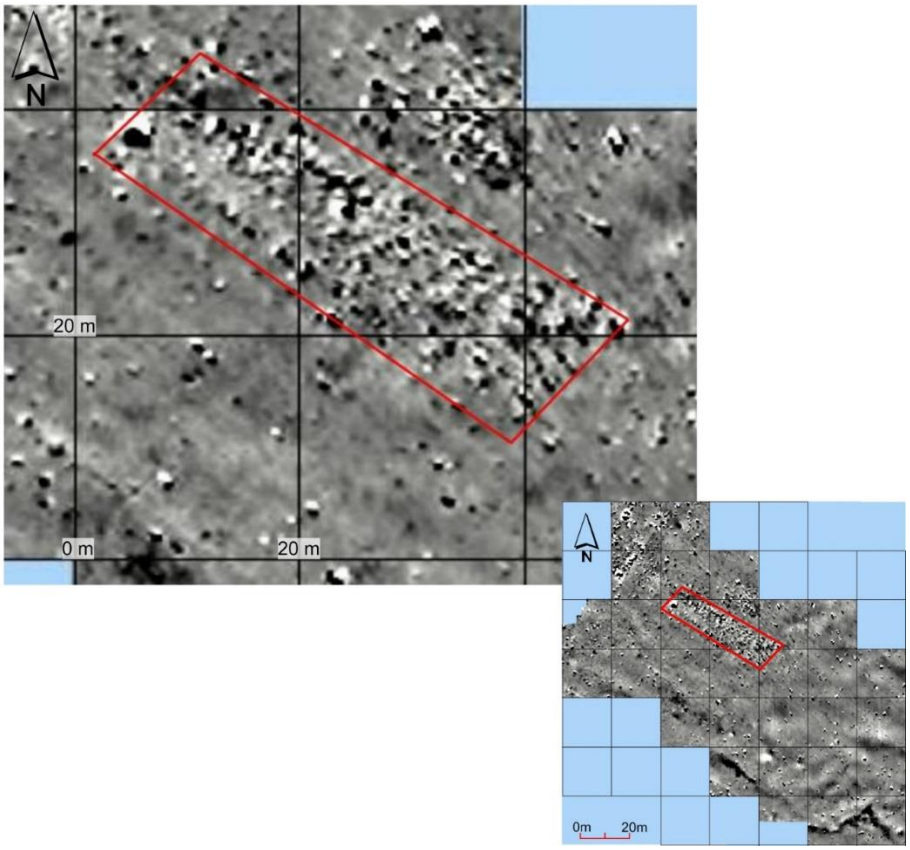


Figure 3.9: This magnetic image was created using *TerraSurveyor* (DW Consulting, 2016). Herrick and I wanted to cover as much of the landscape as possible in order to delineate the boundaries of the archaeological site. This image shows positive anomalies as black. Negative anomalies are shown as white and dipolar anomalies as black and white. The red rectangle shows where the 1934 tobacco barn used to sit. These dipolar anomalies represent numerous metal artifacts left behind by the tobacco barn, such as nails and metal hinges.

Even though magnetometry provides a broad data set in a relatively short amount of time, only a limited amount of information can be obtained from the magnetic data. Sometimes it is difficult to discern between geological and anthropogenic features and to locate small features or artifacts that do not have magnetic properties (Aspinall, Gaffney, and Schmidt 2008, Kvamme 2006). An illustration of this is the positive anomalies that are located in the southeast part of the grid (Figure 3.10). When looking at the map, it is unclear whether these features are a result of human activity or a natural occurrence.

Without GPR, it is difficult to analyze these features and understand their true nature. In order to obtain a more detailed analysis of the subsurface, an additional GPR survey was planned for the summer of 2016. Studying the profiles and the amplitude maps allowed us to analyze these features in greater detail, which led to our understanding of their geological character as glacial moraines (Conyers 2018, 63-64, Herrick 2017).

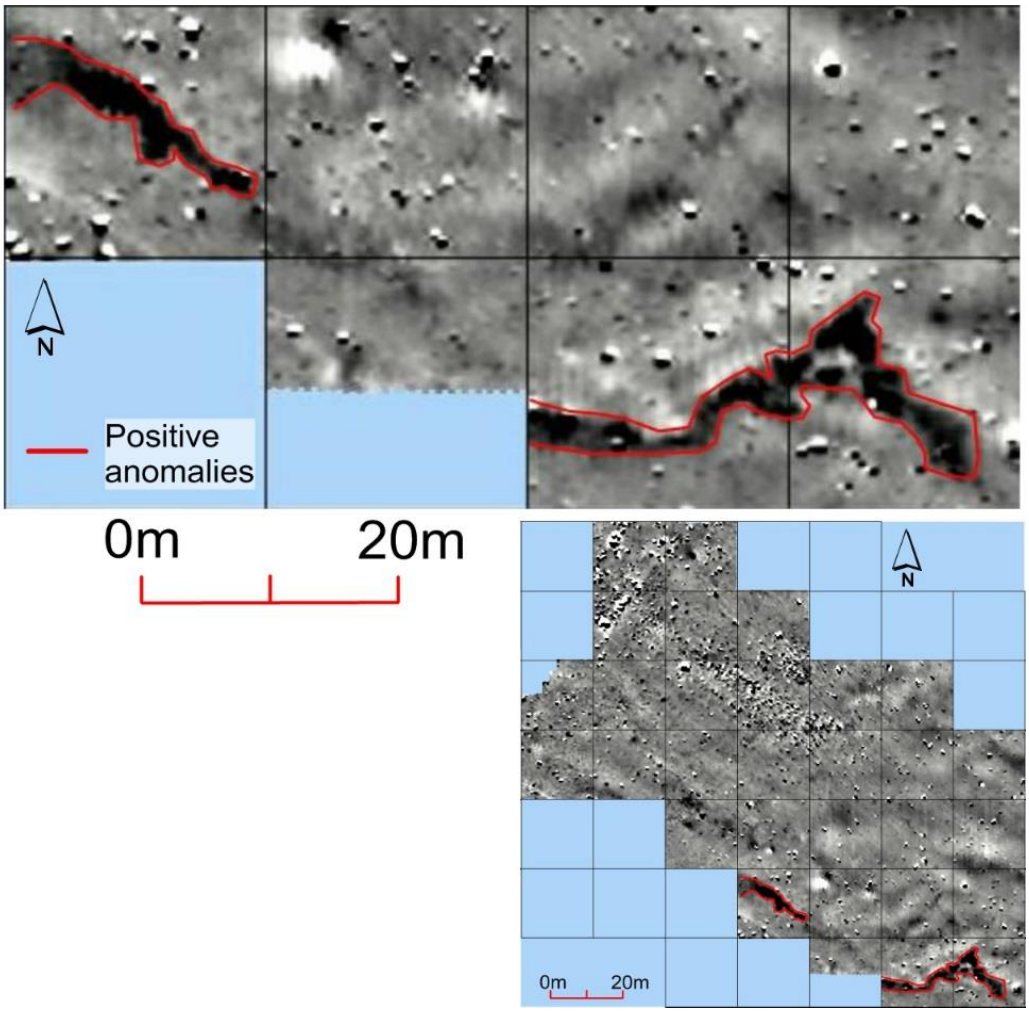


Figure 3.10: The red outlines show the positive anomalies in the southern part of the grid. When only looking at the magnetic data, these features are confusing and could be classified as anthropological or geological. Studying the GPR profiles and the amplitude map allowed me to analyze these features in greater detail, which led to my understanding of their geological character (Conyers 2018, 63-74, Herrick 2017).

Ground-penetrating Radar

Ground-penetrating radar (GPR) is a geophysical survey method that uses electromagnetic waves, or radar, to detect features below the surface of the ground. This is the only geophysical method that provides accurate depth of both geological and anthropogenic features (Conyers 2012, 17, Conyers 2013, 19-21). The GPR contains a control system and display monitor that is connected to two antennas, a transmitting antenna and receiving antenna. These two antennas are housed within a fiberglass box and collectively referred to as the "antenna." This remote sensing system transmits electromagnetic pulses from the surface antenna that spread out as waves into the ground, reflect off buried discontinuities, and return back to the surface radar antenna. The system measures the elapsed time and amplitude of the reflected waves as they are received back at the surface (Conyers 2016, 2). Nanoseconds are used to measure the time that elapses between the reflections, which are then used to calculate depth. The velocity of the wave will change depending upon the type of material it passes through and the water saturation of buried features (Conyers 2013, 24-37). This change in velocity produces reflections that can be viewed as images created from the GPR data (Conyers 2013, 25).

A GPR survey is conducted within a grid by pulling an antenna along the ground in transects located at a certain interval (Figure 3.11). As the antenna moves along the surface of the ground thousands of reflected waves are collected along the survey transects. Buried features produce reflection profiles that are much like profiles seen in excavation trenches (Conyers 2016, 2). Collecting numerous reflection profiles in a grid allowed us to create two- and three-dimensional images of buried features. Two-

dimensional images show the survey transects in profile, whereas three-dimensional amplitude maps show the grid with all transects put together, sliced by time measurement (usually in nanoseconds or in centimeters) (Figure 3.12). Ground-penetrating radar is a unique geophysical method that not only allows images of geological and anthropogenic features to be produced but is also presents this information in three-dimensions (Conyers 2016, 2).

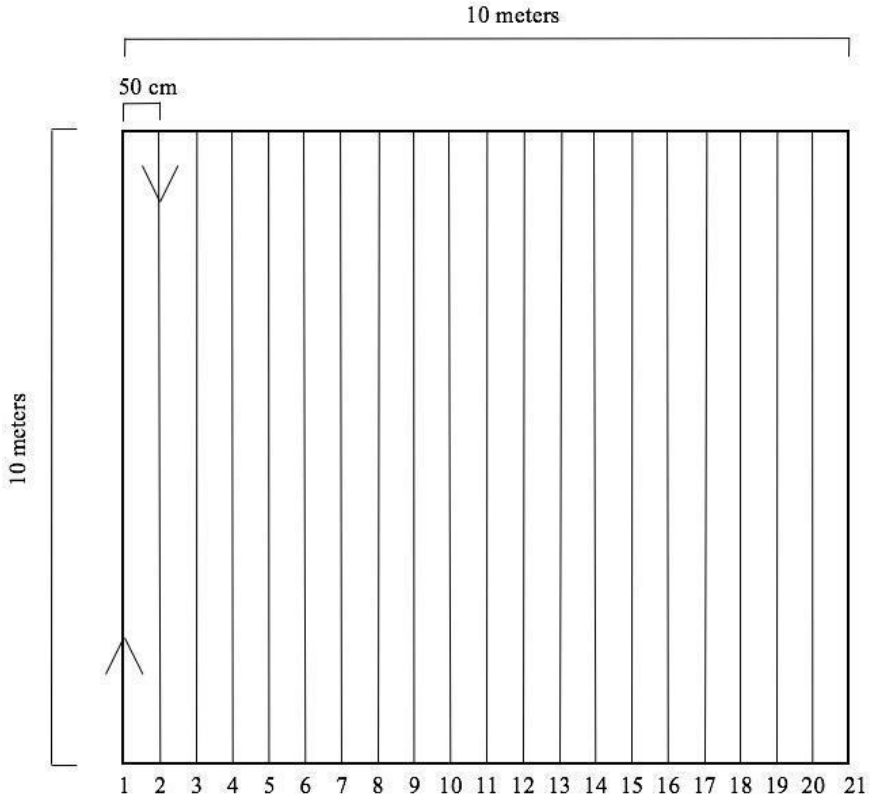


Figure 3.11: Image courtesy of Maeve Herrick. A 10x10 meter grid with 50 centimeter spacing between transects. This is an example of how to perform a ground-penetrating radar survey within a grid. The radar antenna is moved along the surface of the ground in a zigzag fashion with 50 centimeter spacing between each profile that is collected.

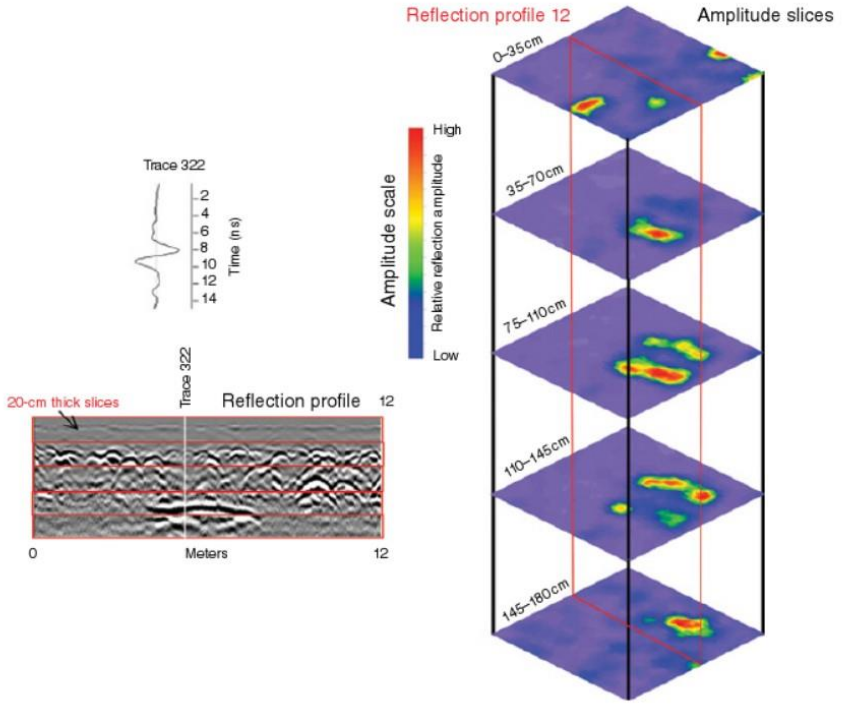


Figure 3.12: Image showing a transect viewed in profile. Amplitude slice maps are a result of resampling reflection traces at certain depths in the ground (Conyers 2016:13).

In contrast to magnetometry, GPR allows for identification of non-magnetic features such as clay floors, limestone foundations, and post holes, which contain important anthropological information that cannot be obtained from magnetic data (Kvamme 2006, 205-206; Conyers 2012). Ground-penetrating radar is also useful for detailed analysis of cultural features within the site. An example of this is the ability to differentiate between an earthen cellar and a rock lined cellar or if there are any contents within the wells or pits located at the site (Conyers 2012, 109).

Another benefit of using GPR is the noninvasive nature of the survey. Features below the surface can be preserved and still analyzed using the images created from GPR

data (Conyers 2013, 129-131). The GPR images allow me to analyze the spatial layout of the site, identify anthropogenic activities, and to preserve as much of the site as possible.

Maeve Herrick and I conducted a GPR survey with a 400 MHz antenna and a GSSI 3000 control system (Figure 3.13). We surveyed ten grids in total. These grids varied in size to cover the features analyzed in the magnetic data and to include the GPR grids collected by Peter Leach (Figure 3.14). Our first priority was to survey the area of the three cellars in greater detail by decreasing the survey transects from 50 centimeter to 25 centimeter spacing using a 400 MHz antenna. Transects spaced 25 centimeters apart increases the amount of profiles collected within the grid. A higher number of profiles increases the accuracy of data processing and may result in higher resolution slice maps than transects collected at 50 centimeters apart. Grid 1 is located over all three cellars and measures 20x20 meters with 25 centimeter transect spacing. All other grids were collected with survey transects placed 50 centimeters apart. Grids were laid out in 20x20, 40x20, and 40x40 meters (Figure 3.14).

Figure 3.13: Ground-penetrating radar survey conducted by Maeve Herrick and Jasmine Saxon (top) with a 400 MHz antenna and a GSSI 3000 control system (bottom).

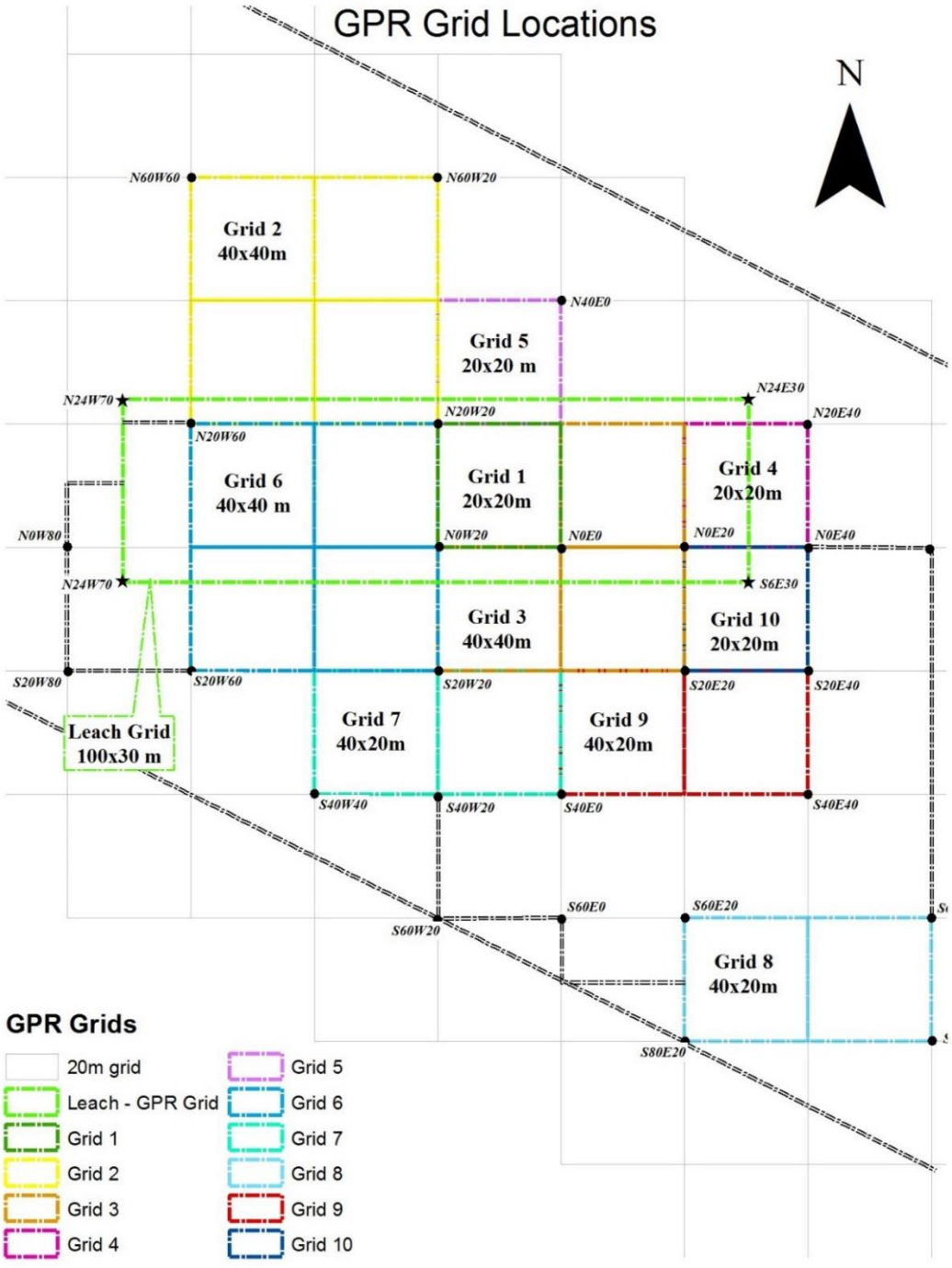


Figure 3.14: Location and size of each GPR grid collected at the Hollister site (2016) by Maeve Herrick and Jasmine Saxon, masters' students in anthropology at the University of Denver.

The goal of the GPR survey was to cover as much of the site as possible in order to establish the boundaries of the Hollister farmstead. This was achieved by surveying two grids each day with processing and interpretation performed at the end of each day's collection. The process of locating anthropogenic and geological features within the images created from the GPR data was necessary to plan the locations for the additional grids the following day. I produced images from the GPR data in two-dimensional profiles or in three-dimensional amplitude slice maps (Figure 3.15) (Appendix II). The images produced from the GPR data also allowed us to strategically plan excavation units and test pits located within the site by providing the location and depth of anthropogenic features (Figure 3.15). This method of processing, interpreting, and comparing GPR data to the magnetic data assisted in locating areas of anthropogenic activity and defining the boundaries of certain features, such as the historic cellars and wells located at the site.

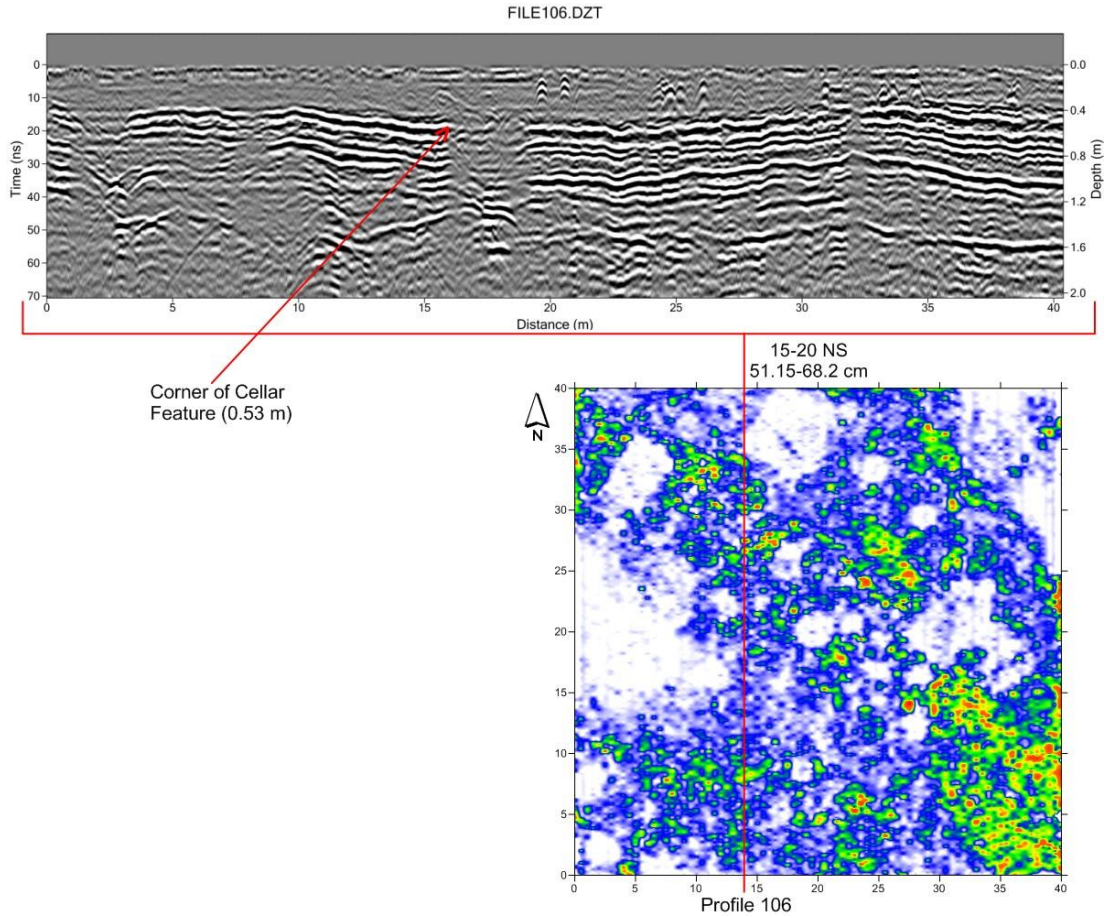


Figure 3.15: Hollister site (2016) GPR grid 3, collected by Maeve Herrick and Jasmine Saxon, masters' students in anthropology at the University of Denver. The reflection profile (top) shows the top of a cellar feature at about 53 centimeters below the surface or roughly 15 to 20 nanoseconds. The amplitude slice map (bottom) shows where the reflection profile is located within the 40x40 meter grid. These images produced from the GPR data provided the location and depth of cultural features that allowed us to strategically plan excavation units and test pits.

Excavation

Excavations at the Hollister site were planned by analyzing features located in the GPR and magnetic maps. Contributions from Peter Leach, Maeve Herrick, and me on the interpretation of the GPR data assisted in locating areas to place excavation units and test pits (Figure 3.16). Dr. Brian Jones, Connecticut State Archaeologist, planned and organized all major aspects of the excavation. Through Dr. Jones' experience in

excavating colonial archaeological sites, he knew that excavating the cellars would provide information concerning the homestead and the activities that may have occurred there (Dr. Brian Jones, personal communication, 2016). Cellars are also most likely to contain artifacts and refuse that provide important information concerning the date of the site and how the occupants utilized the area. Due to these reasons, the three cellars identified in the GPR amplitude slice maps became the focus of our excavations (Figure 3.17).

Figure 3.16: Hollister site (2016). White tents cover the three excavation trenches located within the European cellars. Dr. Brian Jones planned and executed all aspects of the 2016 season.

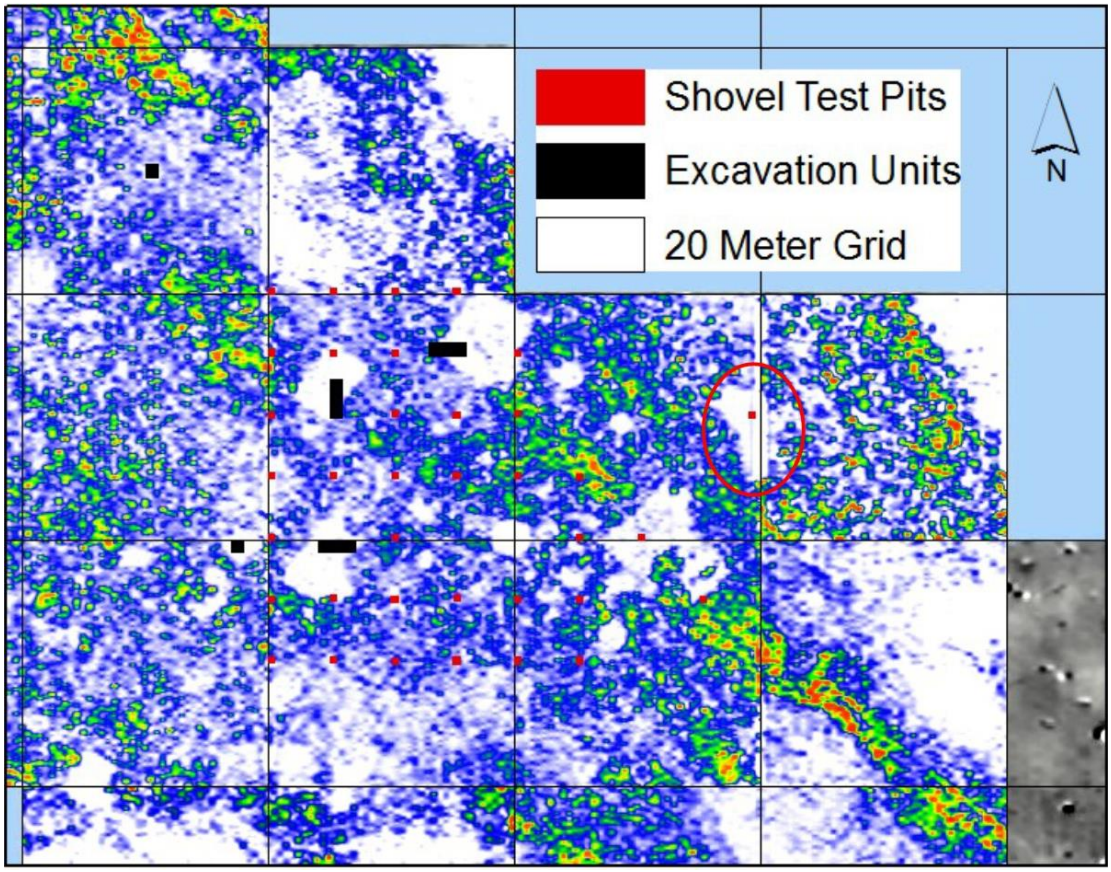


Figure 3.17: Hollister site (2016) GPR data collected by Maeve Herrick and Jasmine Saxon, masters' students in anthropology at the University of Denver. The amplitude slice map shows where the shovel test pits and the excavation units were placed within the site. These areas were strategically planned using the analysis and interpretation of the GPR maps and profiles. The shovel test pits (STPs) measured 50x50 centimeters. The excavation units measured 1x1 meter. The circled STP located in the northwest of grid is shaped unlike any other feature present within the image with rounded edges enclosing a distinct low amplitude area. This shape is intriguing and could represent a large midden or refuse dump.

Trenches measuring 3x1 meters were placed on the edge of each cellar. The trench was divided into three units, each measuring 1x1 meter (Appendix I). Each unit was tied into the local grid and labeled according to its southwest corner within the grid. Each unit was excavated in quadrants with artifact bags labeled according to the unit they were located in. Excavation was primarily done in 10-centimeter levels until reaching the floor of each cellar at about 155 centimeters. Soil from each excavation unit was screened

with 1/8-mesh. Detailed profile drawings and photographs were taken to carefully document each feature found within the trenches.

In addition to excavating the cellars, 36 shovel test pits (STPs) were located around the perimeter of the cellars. Dr. Jones placed these test pits between the cellars and to the north and south of the cellars (Figure 3.17). The test pits measured 50x50 centimeters and were excavated to the subsoil, which was about 30-40 centimeters below the surface. Volunteers from the community were involved in excavating the STPs. Maeve and I helped supervise the test units and assisted the volunteers with proper techniques in excavating and screening for artifacts. The strategy in placing these test pits was to see if there were any artifacts or outlying structures in addition to the cellars. Many of the STPs contained an abundance of the same types of artifacts found in the cellars, whereas some STPs contained very few artifacts. Distinguishing between the STPs that contained a high concentration of artifacts and those that did not could be helpful in analyzing the use and layout of the site. These STPs also allowed us to explore features located in the GPR without opening up an entire excavation unit. The method of using test pits enabled us to quickly decide if the area was impacted by anthropogenic activity and allowed us to plan excavation units strategically.

Artifacts from Excavation

The majority of the artifacts were excavated from the cellar units with some items found in the test pits. These artifacts were found in fragments and included many different household goods such as glass beads, bits of lead piping, window glass, utensils, iron nails, tools, and pottery sherds. Some of the ceramic types present at the site include

black and yellow glazed earthenware, Bellarmine and Westerwald German stoneware, Persian bleu delftware, and one large fragment of North Italian slip-decorated earthenware (Dr. Brian Jones, personal communication, 2017). Red clay and kaolin tobacco pipes were also found in large quantities. All of these artifacts say something about the Hollister family, whether they attest to wealth, everyday activities, or the types of building materials they used. To analyze all of the artifacts and incorporate them into my research is beyond the scope of this thesis. However, the pottery sherds and clay tobacco pipes confirm Hollister's socioeconomic status as a wealthy farmer and is a testament to how household materials were acquired. This is evidenced by the high-quality European ceramics like the North Italian slip-decorated earthenware and the German stoneware that Hollister possessed. Vessels like these were difficult to obtain in the New World unless you had money or connections (Noël Hume 1969, 102-111). In addition to the ceramics, the presence of both local and English clay tobacco pipes indicates that the Hollister family maintained trade connections outside of their small community and utilized these connections to acquire items that were not always available to less wealthy farmers.

Earthenware was the easiest and cheapest type of pottery to make in the 17th century. These vessels were imported from southeastern England or West Country and were one of the most common types of pottery found at the Hollister site (Noël Hume 169, 102). Earthenware is common at mid-17th century sites and was probably used for everyday cooking and household chores at the Hollister site (Noël Hume 1969, 102-111). Delftware was also a type of pottery that was developed in England and is known for its

tin enamel that was painted before firing. Many different fragments of blue delftware were present at the Hollister site along with other high-quality European ceramics like the German stoneware and the North Italian slip-decorated earthenware (Noël Hume 1969, 276-277, Straube 1999).

In addition to these European ceramics, Native American pottery is also present at the site and shows that Hollister acquired vessels from local potters, not just from England. These different types of pottery sherds attest to Hollister's wealth, social status, and the trade connections that were in place during early Colonization in Connecticut (Harper 2010, Harper and Clouette 2010, Harper, Harper, and Clouette 2013). This is important because it shows that Hollister was actively exchanging goods and fostering relationships with entities outside of the local farm including European merchants and Native American trading partners. This shows that Hollister actively maintained connections to local and regional merchants in a time when the global market was just developing (Taylor 1979, 94-96, "The Colonial Economies – The Mercantilist Tradition").

Another example of Hollister's success as a farmer is seen in the archaeobotanical assemblage of the Hollister site. Maize and cherry were the primary plants grown in this area with lower numbers of beans, grapes, and wheat (Appendix V). By investing in the agriculture of maize, Hollister was capitalizing on the ability of Connecticut's soil to produce maize much better than English grains and it did not require as much labor to produce a good yield (Daniels 1980, 430). Just from this one example, there is evidence that Hollister was utilizing Native American agriculture to his benefit and with the

presence of Native Americans on the landscape, it is logical to assume that Hollister developed relationships with the community in some sort of capacity, either as trading partners or as laborers. This is an important detail that contributes to understanding the type of relationships that Hollister fostered with Native Americans and how this relationship influenced both entities by providing them the ability to exchange knowledge and resources.

All artifacts from the excavation were collected and catalogued by unit and depth during the excavation. The artifacts were then transferred to the lab at University of Connecticut. Dr. Jones procured a student's assistance to inventory all the artifacts found in the 2016 season. In January 2017, Herrick and I visited the lab at University of Connecticut to personally catalogue, photograph, and inventory the artifacts for our research. With the help of Dr. Brian Jones and Scott Brady (member of Friends of the State Archaeologist), I pulled all of the clay tobacco pipes from the collection and inventoried them. I recorded the unit, quad, depth, bore stem measurement, decoration, color, and any other details about that pipe that were relevant (Appendix II). The bore stems were measured using 64^{th} of an inch drill bit (4/64", 5/64", 6/64", 7/64", and 8/64") in order to calculate an approximate date of occupation for the Hollister site using Heighton and Deagan's formula (Heighton and Deagan 1972, McMillan 2016).

Lewis Binford (1962) devised a mathematical formula to date a site's occupation using the 64-inch diameter measurements of English clay tobacco pipes. This formula is based upon Harrington's method of dating clay pipes at Jamestown and other colonial Virginia sites and only applies to English manufactured pipes dating from 1590 to 1800

(Agbie-Davies 2014, 39-40, Noël Hume 1969, 296-298). In 1972, Heighton and Deagan created a new regression formula that has proven to be more accurate in finding a mean date of occupation (McMillan 2016). To determine when the archaeological site was most likely occupied, I measured the diameter of the pipe stems from the excavation and used Heighton and Deagan's formula to calculate the mean date for occupation for the Hollister site at 1676 (Appendix III). This is important because this date aligns perfectly with historical records and confirms that this farmstead operated during the mid-17th century. This confirmation establishes a concrete time period that provides an important foundation when discussing Hollister's activities in 17th century Connecticut.

All of the artifacts present at the Hollister site communicate important details about the farmstead that may not be available in historical records. In particular, this is shown by the variety of household and luxury ceramics, the local red clay tobacco pipes, and the kaolin tobacco pipes. These artifacts show that the Hollister farmstead was successful because of the wealth required to obtain these materials. They also show that Hollister maintained trade connections with different groups of people from all over the region, including Native American and European traders. In turn, the presence of Native American pottery at the Hollister site further underlines the relationship between English settlers at the site and the Indigenous community. Bringing all of these details together supports the idea that certain aspects of Hollister's 17th century agrarian worldview revolved around agriculture, trade connections, and his relationship with the Indigenous community.

Excavating Features

Using the images we produced from the GPR data, Herrick and I identified several areas outside of the cellars that appeared to contain anthropogenic remains based upon the geometric shapes in the amplitude slice maps and the different types of reflections in the radar profiles. Some of these were high-amplitude reflections indicative of floors or walls. Other profiles showed truncated planar reflections suggesting pits or wells. Abundant point-source hyperbolas were also identified as areas with possible concentrations of artifacts or rubble. One of these was nicknamed the "kidney pool" due to its oblong shape in the amplitude slice maps (Figure 3.17). This feature in the slice map, with rounded edges enclosing a distinct low amplitude area, was not shaped like any other features present within the image. To gain some insight into what the purpose of this feature may have been, we dug a test pit in the middle of it. This shape intrigued us and we thought that it may be a large midden or refuse dump, which would provide further detail about the site and the activities of its occupants (Figure 3.17).

Oblong Feature

For the shovel test pit, Herrick and I dug in a 50x50 centimeter square removing 10 centimeters of dirt for each level of excavation. For every 10 centimeters, we recorded all of the artifacts we found and the soil changes on a shovel test pit form. The test pit was dug to a total of 110 centimeters beneath the surface. There were hardly any artifacts associated with this STP except for pieces of quartz. The most interesting artifact was a large piece of quartz that looked like it had been worked on at one time and then discarded due to imperfections in the material. This feature could easily be the remains of

a Native American pit house and assists in understanding how both Native Americans and Europeans may have been using this area.

Circular Features

Using reflection profiles and slice maps from the GPR data, Herrick and I identified a group of circular features located to the northwest of the cellars (Figure 3.18). This is interesting because historical documentation states that Hollister was given permission in 1676 to build fortification around his farmstead (Case 1886, 24, Chapin 1853, 13, McNulty 1970, 12-13). Using historical documentation as a basis, we analyzed the magnetometry and the GPR data for a palisade feature built around the farmstead. The circular features in the amplitude slice maps resemble postholes that may have been evenly spaced across the landscape. If a palisade or another type of fortification was built here, there should be remains of large postholes in the archaeological record. These remains would validate the historical references and provide a better understanding of how the farm was organized.

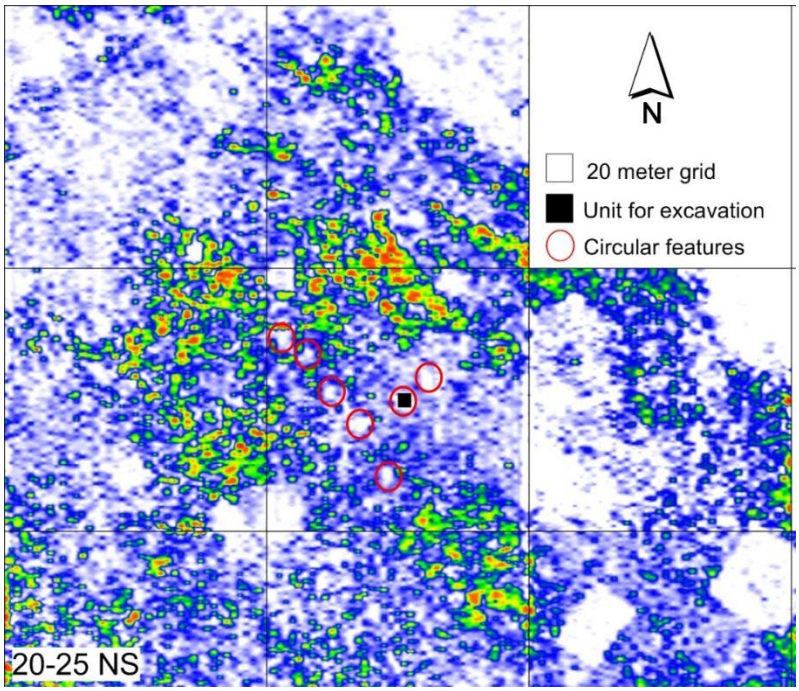


Figure 3.18: Hollister site (2016) GPR collection by Maeve Herrick and Jasmine Saxon, masters' students in anthropology at the University of Denver. The red circles in the amplitude slice map (20-25 nanoseconds) represent areas in grid 2 that resemble posthole features. These circular features are also visible in the reflection profiles. The excavation unit is located in the N½ of N29W30 and the S½ N30W30 and represented in this image by the black square.

To test our hypothesis that the circular features were postholes, we chose one of the circular features to excavate (Figure 3.18). Our dimensions for the excavation unit were 1x1 meter. We excavated the unit in 10 centimeter levels until we reached soil changes. Once we identified differences in the soil, we excavated carefully in accordance with observing and recording soil horizons. The remains of a fence post would have been represented as dark organic soil in a circular shape, eventually tapering off to a point at a certain depth below the surface.

We excavated to a depth of about 125 centimeters beneath the surface but did not locate the remains of a fence post. However, we were able to use this excavation unit to understand and define the stratigraphy that is most likely present throughout the site

(Figure 3.19). The lack of archaeological remains in this excavation unit is important as it allows us to identify how the electromagnetic waves interact with different types of sediments and how changes within the stratigraphy are represented in the images produced by the GPR data. These stratigraphic layers can be used to correlate sediment layers present within the GPR profiles, represent how the landscape has changed over time, and assist in identifying certain geological features within the GPR profiles and amplitude slice maps.

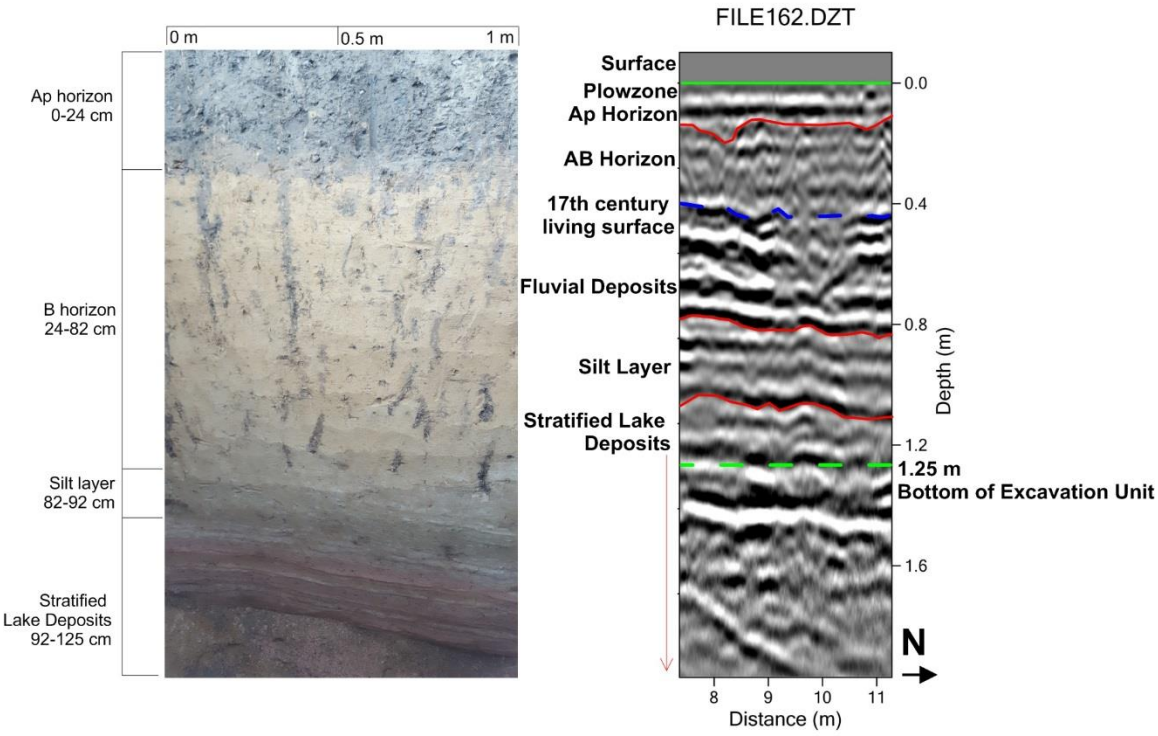


Figure 3.19: On the right is the excavation unit N29W30 and N30W30 excavated by Maeve Herrick and Jasmine Saxon, masters' students in anthropology at the University of Denver. On the left show an image of the GPR profile 162 located in grid 2. These two images are annotated to show how the sediment layers correlate, the stratigraphy, and the different horizons that exist within the unit. Note: these profiles show West at the top of the image with North to the right.

At the bottom of profile 162 in grid 2, there are stratified lake deposits from glacial Lake Hitchcock's fluvial sediments and silt deposits (Figure 3.19). The stratified lake deposit is composed of laminated pink sand and starts at about 92 centimeters beneath the surface and extends to the end of the unit (125 centimeters). Above the stratified lake deposit there is a yellow mottled silt layer with remnant laminations of silt. This silt layer or fluvial sediment was deposited from previous flooding. Horizon B (24-82 centimeters) is located above the silt layer and differs in color but is still composed of very fine sandy loam (10 YR 5/6). At the very top of the profile is a darker layer that represents the A horizon (0-24 centimeters) and is composed of very fine sandy loam with abundant coal fragments (10 YR 3/2). Worm burrows were present throughout all the sediment horizons until about 92 centimeters beneath the surface (Dr. Brian Jones, Personal Communication, 2016). These layers were identified in order to understand the stratigraphy and what the landscape may have looked over time (Herrick 2017, 91-93). For example, the presence of flood sediments near the top of the unit show that a flood occurred in this area and most likely destroyed many of the structures on this landscape. Details like this help create a timeline of events for the landscape and form a geographical context for the Hollister site. The geological context of the site is discussed in Chapter 4: *Data Analysis*.

Another important distinction in the unit stratigraphy is between the Ap horizon or plowzone layer and the B horizon at 24 centimeters. The GPR profile shows this same distinction as high amplitude reflections starting at the surface and extending to about 24 centimeters. Using this comparison, the GPR profile and the unit stratigraphy can be

correlated accurately. It is interesting to note that although the 17th century living surface is hard to discern in the unit stratigraphy, it clearly shows itself in the GPR profile as distinct planar reflections starting at 24 centimeters and extending to about 50 centimeters. This is a good example of how sensitive the GPR is to detecting sedimentary layers and differences within the stratigraphy. Identifying the 17th century living surface is important because at the Hollister site, there were two groups of people, the Native Americans and the English, which settled in different areas of the landscape. Understanding what the landscape may have looked like allows us to ask questions like why people settled in particular areas and what types of natural resources might have been available.

Glacial sediments and fluvial deposits created a landscape with varying topology. The English settled on higher areas of land so that they could dig deep cellars without hitting the water table. The Indigenous community preferred the low marshy areas where more natural resources like berries were available. This information can then be used to support aspects of Hollister's 17th century agrarian worldview like the concentration of agriculture and cohabitating with the nearby Indigenous community.

Site Forms

Each excavation unit or test pit was documented through specific site forms. These forms were titled "Excavation Level Form." The form is double-sided with the one side outlining the details of the project and the methods used in excavation. This includes fields such as project name, excavator(s), crew chief, date, depth, and the methods used in excavating (such as shovel shaved or troweled), the excavation levels (10 centimeter

levels, 20 centimeter levels, and so on) and the measurement of the screen mesh. There is also a unit map in the center of the form for recording the unit drawing and a place at the bottom of the form for notes (Figure 3.20).

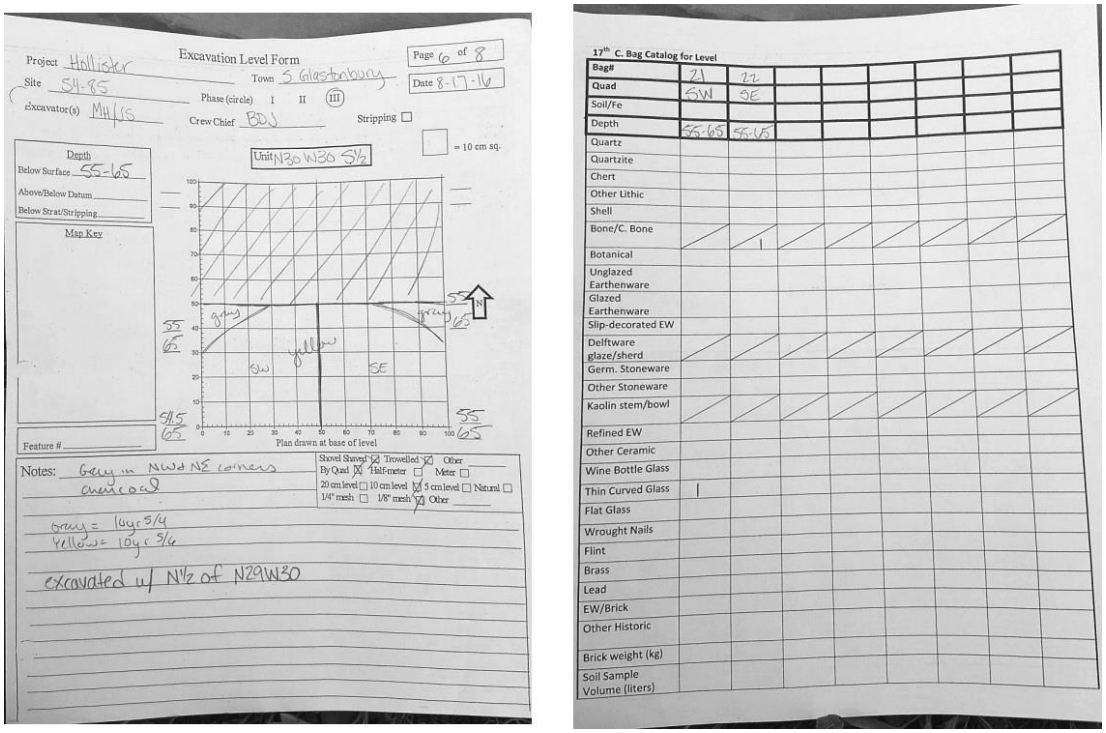


Figure 3.20: Hollister site (2016) excavation form. This form is double-sided. This first image shows one side of the form, outlining the details of the project and the methods used in excavation. There is a grid located in the center of the page for recording the unit drawing and a place at the bottom of the form for notes. The other side of the excavation form contains a table for listing all of the potential artifacts found at a 17th century site. Artifacts were collected for each level of excavation, organized by artifact bags numbered in sequential order, and identified and counted according to the categories listed on the form.

The other side of the "Excavation Level Form" contains a table listing the potential artifacts found at a 17th century site. There are four rows listed before the artifact categories. These rows describe the bag numbers, quadrants, soil type, and depth at which the artifacts were located. Artifacts were collected for each level of excavation and organized by artifact bags numbered in sequential order. Artifacts were identified

according to the categories listed on the form. Each artifact was counted and the appropriate column marked for it (Figure 3.20). This meticulous note-taking is extremely important to document all of the work performed during excavation as it cannot be recreated. Analyzing the archaeological record and drawing conclusions as to the nature of the site rely on excellent documentation.

Historical Documentation

Researching the Hollister site also included collecting historical documentation on the residents that occupied the land and their activities. In order to obtain as much historical context as possible, Herrick and I visited many locations that contained historical documentation on the Hollister family. Research was conducted at the Wethersfield Public Library, Wethersfield Historical Society, Connecticut State Library, Connecticut Historical Society and the Glastonbury Historical Society. Some of these sources were in print and some of them were on microfilm or microfiche. Any specific documents pertaining to the Hollister family were photographed or scanned to an external hard drive. This was necessary because we were not allowed to remove these sources from their location but needed to further analyze the historic documents in accordance with the archaeological evidence.

The documents we collected included tax records, deeds, probate records, public court records, land records, town records, historic accounts, and maps. In addition to these documents, family histories and genealogies were critical in learning about the residents of the site. Any information about the Hollister family or their tenants, the Gilbert family, was collected. We also collected any documents that contained evidence

of interactions between the Hollister family and the Native Americans in the area. We specifically focused on the mid-17th century to the early 18th century when looking for documentation because this is the time period that the homestead was occupied.

One of the most important historical documents that I located was the dairy of Thomas Minor from Stonington, Connecticut, 1653 to 1684 (Anderson 2008, Miner and Stanton Jr. 1899). This historic document contains daily entries from Minor who was a farmer during the mid-17th century in Connecticut. This document is an extremely rare resource and the only one of its kind (Anderson 2008). Entries mostly record the labor that it took to build a farm from raw materials and the activities that Minor and his sons did around the farm to maintain it. Not many personal details are included in these entries. The "diary" reads more like an almanac for farmers and includes details about the weather and seasons. Even though Minor's personal feelings are not communicated through his entries, the reader does get a sense of how the farm operated, the activities that revolved around the farm, and the types of relationships that Minor maintained through trade and labor. This document greatly helps in defining some of the more abstract activities that farmers in 17th century Connecticut were involved in that may not appear in the archaeological record.

Conclusion

Anthropologists and archaeologists agree that artifacts represent a cultural history that includes traditional values and beliefs (Deetz 1977). By using the methods of magnetometry, GPR, excavation, and analyzing historical documentation along with current literature, I gained insight as to how the Hollister farm operated within the 17th

century agrarian landscape in Connecticut. Starting with the GPR data provided by Peter Leach, Herrick and I were able to identify many different anthropogenic features in the landscape (Figure 3.1). We then used magnetometry to provide an overview of the site and to help us identify potential features that we could explore using GPR (Figure 3.7). Surveys for GPR were planned across areas of the site that contained interesting features analyzed through the magnetic data. We performed additional comparisons between the magnetic data and the GPR data by conducting profile analysis and creating amplitude slice maps. This process resulted in identifying interesting features within the site and allowed us to strategically plan STPs and excavation units (Figure 3.17).

Excavations were primarily centered on the three cellars identified in the GPR data, but Herrick and I were also able to excavate a couple of other features outside the area of the cellars (Figure 3.17). These excavations contributed to uncovering a number of artifacts that helped provide context to the cultural landscape that residents at the Hollister farm lived and worked in. Excavations were performed systematically with detailed records of the stratigraphy and artifacts (Figure 3.20).

Magnetometry, GPR, excavations, historical documentation and current literature all provide different types of information concerning the Hollister site. Each one of these methods is necessary in order to fully explore and document the cultural resources present at the Hollister site. This information is then combined with historic documentation to reconstruct a picture of Hollister's 17th century agrarian worldview in Connecticut. Not all aspects of his worldview can be chronicled but there are certain details that can be deduced from the evidence we do have. Using my research methods, I

have narrowed down three specific aspects that Hollister experienced while living as a colonial farmer in 17th century Connecticut. These are the ability to produce an agricultural surplus, trade networks that extended throughout the Colonies and into Europe, and the development of beneficial relationships with the local Indigenous community. These factors are much different than the 18th century when issues such as trade regulations, slavery, racism, and civil war were at the forefront of society. These issues created a much different experience for later settlers and shows that some of the commonly accepted narratives about the aggressive nature of first-generation colonialists might not be as accurate as previously assumed (Anderson 2008, Taylor 1979, Trumbull 1818). The lack of historic records and archaeological materials from the 17th century does create a challenge. However, combining various research methods like geophysical survey, archaeology, and historic documentation provides insight into Hollister's life as a first-generation settler and modifies historical narratives to reveal a part of obscure history in 17th century Connecticut.

CHAPTER FOUR: DATA ANALYSES

Many different lines of data were compared and contrasted during the data analyses process. The magnetic data were collected in the spring of 2016 and used to plan GPR surveys. By examining the different types of anomalies present within these magnetic data, preliminary conclusions were drawn about the features present on the landscape. These hypotheses were then investigated through GPR survey, which allowed for more detailed information about the Hollister site. Combining these two geophysical methods allowed a better understanding of what types of features were present such as their shape and orientation. The images made from the GPR data were also used to plan the excavation units and shovel test pits. Features, artifacts and the botanical materials that were uncovered in these excavations are discussed in this chapter.

Magnetometry

Magnetometry is a geophysical method that records variations of the Earth's magnetic field in the shallow subsurface of the ground. This is a passive method of remote sensing because it uses Earth's magnetic field instead of generating its own. The geomagnetic field that is used to measure the magnetic contrasts between archaeological features and the surrounding materials is caused by currents deep within Earth's molten liquid core. Materials become magnetized through the rotation and spin of the negatively charged electrons that orbit around atomic nuclei (Figure 4.1). The magnetic field strength is measured in nanoteslas (nT) and ranges from about 30,000 nT at the magnetic

equator to about 60,000 nT at the magnetic poles (Clark 2003, Kvamme 2006). This is important to take into consideration because magnetic anomalies of archaeological interest are often within the ±5 nT of the natural background. Differences can also be as subtle as 0.5 nT and less. These small subtleties are called anomalies and require the magnetic survey instrument to be extremely sensitive (Kvamme 2006, 210, 211). Herrick and I used magnetometry to survey a large area of the Hollister site and to collect as much preliminary data as possible before performing GPR and excavations (Figure 3.3).

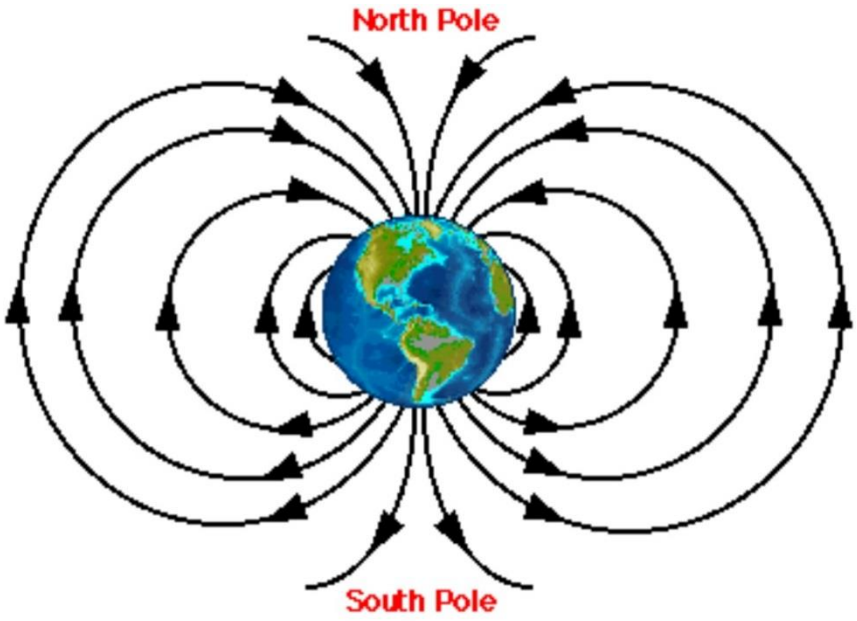


Figure 4.1: Photo courtesy of University of North Carolina Chapel Hill (http://www.unc.edu/depts/oceanweb/turtles/geomag.html). Earth's magnetic field is shown in this image as currents emerging from the southern half of the Earth and come together again in the northern half. The magnetic field varies in strength over the surface of the earth. It is most intense at the poles and weakest at the equator (Kvamme 2006).

A magnetometer records nanoteslas (nT), which are used to measure Earth's magnetic field. The type of magnetometer used for the magnetic data collection at the Hollister site was a Bartington Grad601 Single Axis Magnetic Field Gradiometer. A fluxgate gradiometer records the difference in measured nanoteslas (nT) between two vertically separated sensors in the instrument (Kvamme 2006, 210) (Figure 3.8). This is important because the strength of the magnetic field decreases by the third power of distance from a target. For example, if a sensor at 1 meter from the target yields a measurement of 1 nT, then a second sensor at 2 meters will record a value of $1/2^3 = 1/8$ nT (Kvamme 2006, 2010). The gradiometer uses simultaneous measurements from these sensors to eliminate temporal variations that can occur when the sensor moves farther away from the target. This type of magnetometer is a popular choice for archaeologists because it is generally more affordable and eliminates the need for two sensors, one fixed sensor for measuring the temporal variations and a second roaming sensor for measuring spatial and temporal magnetic changes (Kvamme 2006, 210).

There are a number of things to keep in mind when using a fluxgate gradiometer. First, it is directionally sensitive and must be calibrated according to the cardinal directions for efficient application (Kvamme 2006, 212). It is also important to set the magnetometer to record data that is within ±100 nT of the calibrated "zero" point of Earth's magnetic field. In other words, anomalies that alter Earth's magnetic field within a resolution of 0.01 nT are recorded (Bartington Instruments). Kvamme (2006, 210, 211) recommends this level of sensitivity to find smaller, subtler anomalies. Even though the magnetic survey can reveal multiple archaeological features, it is important to keep in

mind that magnetometry does not provide exact depth and can only detect 1-2 meters below the surface of the Earth (Kvamme 2006, 222). However, this range of depth is sufficient to identify archaeological remains and for reconstructing the geological landscape. Once the magnetometer is calibrated, surveys are performed within a gridded parameter. The survey at the Hollister site was completed in thirty 20x20 meter grids with two grids slightly shortened in order to accommodate for the landscape (Figure 3.3).

Materials and Processes Affecting Magnetism

There are different types of materials and processes that affect the magnetism of elements within Earth's surface. Induced magnetism is present in all soils, sediments, and rocks. This is because they exist within earth's magnetic field. Induced magnetism is a result of the magnetic susceptibility of the material and the presence of magnetizable minerals (Kvamme 2006, 208). These ferromagnetic minerals produce magnetic anomalies and are found in features such as ditches, pits, postholes, or palisades (Fassbinder 2015, 85-86). Enrichment and separation of these minerals are a result of various processes such as mechanical, pedogenic, and heating during fires (Fassbinder 2015, 86).

Remnant magnetism is present in almost every rock, sediment, or soil (Fassbinder 2015, 87). Thermoremenant magnetism occurs when materials are heated above the Curie point. When this happens, the domains line up according to the orientation of Earth's magnetic field at the time of the firing. When the material is cooled, the domains remain "frozen" in this pattern and can be recognized and detected by magnetometry (Fassbinder

2015, 87, Kvamme 2006, 207-208). Together, induced, remnant, and thermoremenant, magnetism are the processes that allow the magnetometer to locate anomalies.

Types of Magnetic Anomalies

There are three types of magnetic anomalies: dipolar, negative, and positive (Figure 4.2). Dipolar anomalies are a result of iron artifacts beneath the surface. These iron materials may be a result of construction or dumping areas (Kvamme 2006, 220-221). Negative anomalies occur for a number of different reasons: (1) the material of the archaeological feature has a lower magnetic susceptibility than the surrounding matrix, (2) when an excavated pit is immediately refilled with the same material, (3) or through a geochemical process involving the precipitation of iron oxides into the soil or the dissolution of ferromagnetic particles (Fassbinder 2015, 88-89). Lastly, positive anomalies come from soils that have enhanced or magnetically enriched topsoil. Any pit, ditch, or wooden posthole that is refilled with top soil will produce a positive magnetic anomaly (Fassbinder 2015, 88).

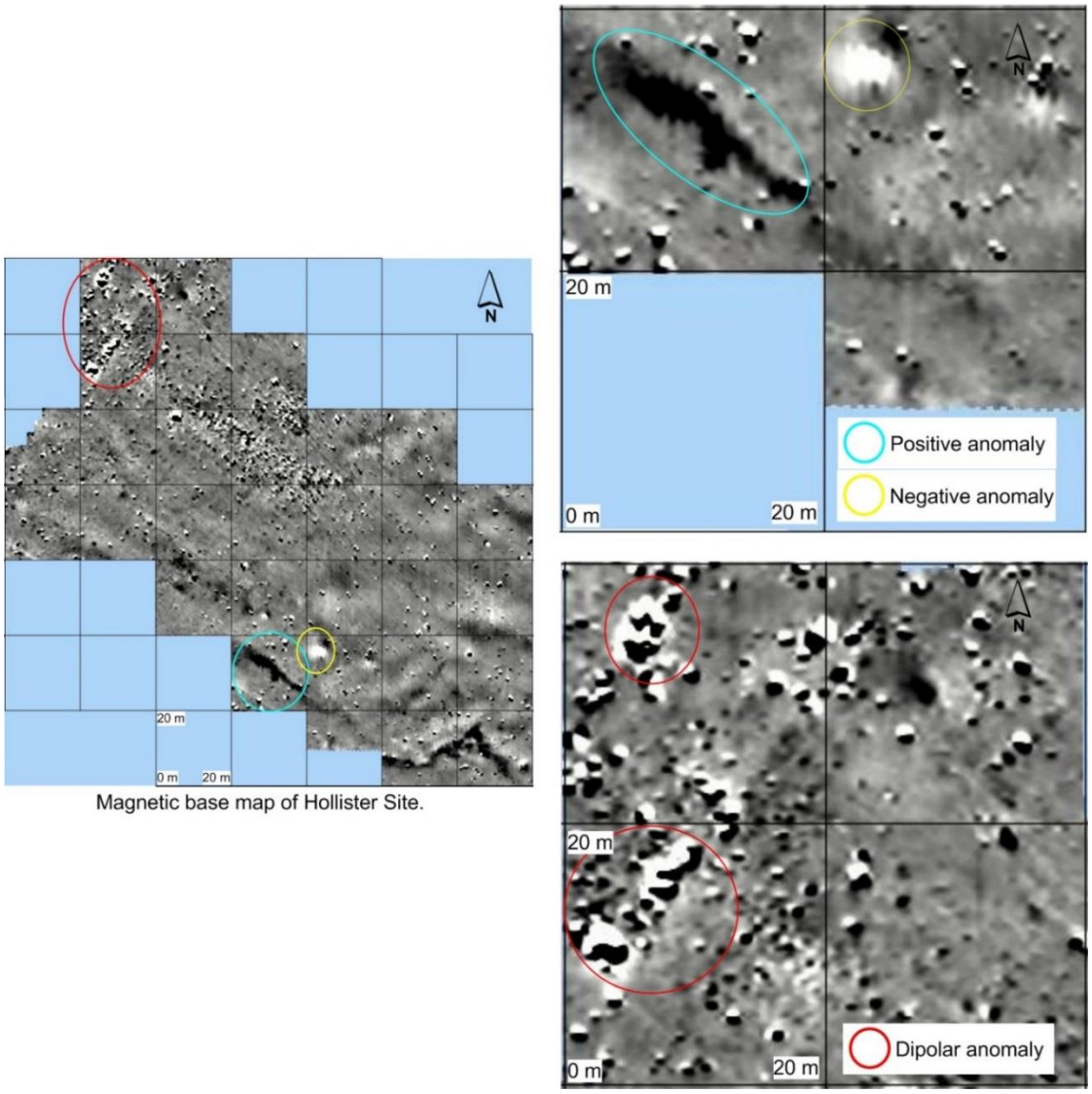


Figure 4.2: Magnetic map of the Hollister site in South Glastonbury, Connecticut, in March 2016 created by Maeve Herrick and Jasmine Saxon using *TerraSurveyor* (DW Consulting 2016). These images use a black and white color scheme to depict three different anomalies. The positive anomalies will appear black in color, the negative anomalies appear white, and the dipolar anomalies as black and white. The magnetic map is shown on the left with examples of anomalies on the right. Top right: image shows a positive anomaly circled in blue and a negative anomaly circled in yellow. Bottom right: image shows dipolar anomalies circled in red.

Dipolar Magnetic Anomalies

The map from the magnetic survey at the Hollister site shows many different anomalies that reveal anthropogenic activity (Figure 4.3). Dipolar anomalies are highly

prevalent in the magnetic map because of the agricultural and pastoral activities that occurred on the land. The dipolar anomalies scattered across the survey area are concentrated in the northwest part of the grid. This is the area where the Hollister residence was located in the 17th century as well as a tobacco barn during the 1930s (Figure 4.4). The land was eventually turned into a horse pasture and remains so to this day. These types of activities left numerous iron and steel artifacts from building materials, broken horse shoes, and farm equipment. All of these artifacts show up as dipolar anomalies in the magnetometry survey. Since magnetometry does not produce data that can identify depth, it is difficult to differentiate between remains from the 20th and 21st centuries and those from the 17th century. This is important to keep in mind when looking at the dipolar anomalies in the magnetic map as these anomalies could lead to misinterpreting features within the archaeological site. However, these dipolar anomalies provide evidence that a particular area on the landscape was heavily used by past peoples for a variety of activities such as agriculture.

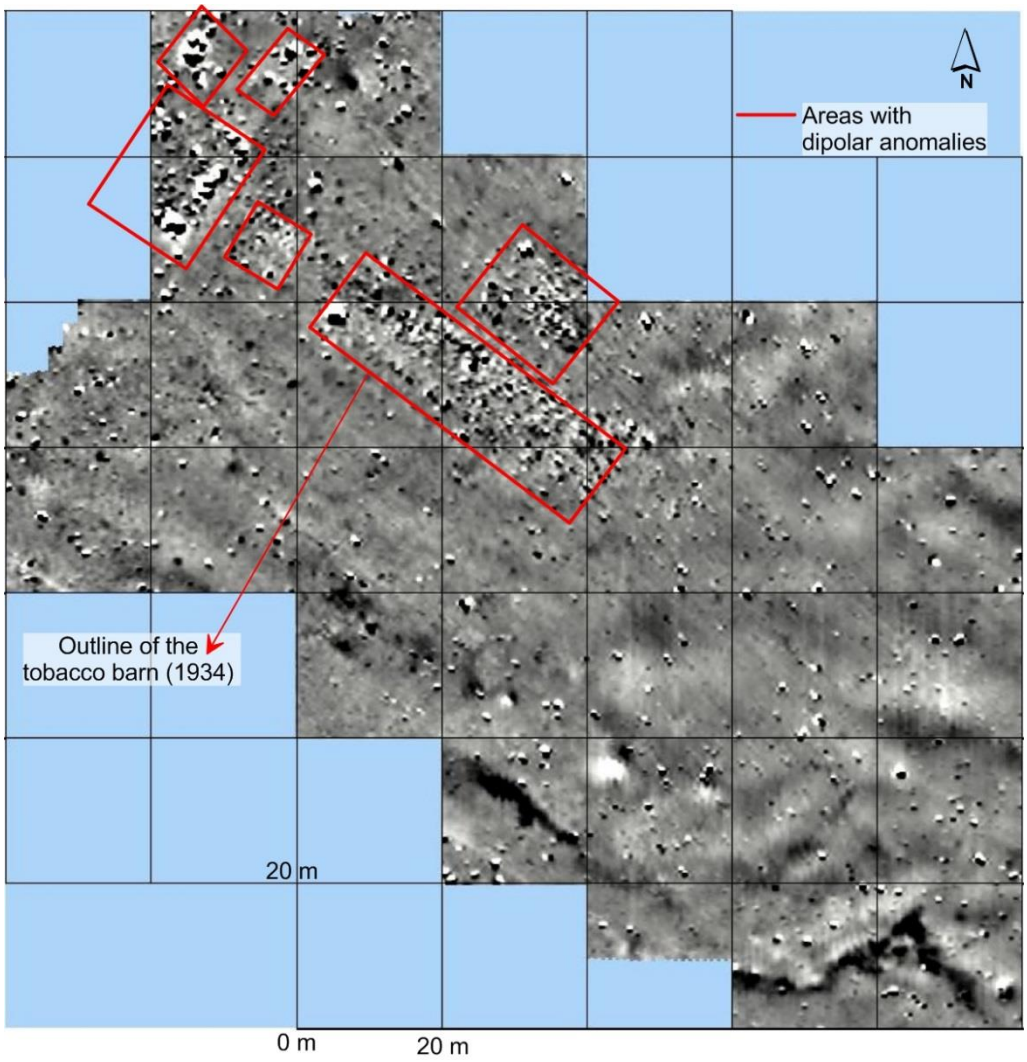


Figure 4.3: Hollister site (2016). Image made from magnetic data using *TerraSurveyor* (DW Consulting 2016). A black and white color scheme is used to represent the magnetic data. The red rectangles highlight areas that contain a concentrated number of dipolar anomalies, shown in black and white. These areas are filled with metal artifacts from the Hollister residence, farming activities, and the remains of a 1934 tobacco barn. Most of the human activity on this site occurred in the area where the tobacco barn was located and towards the shore of the Connecticut River northwest of the survey area, where a coal dock was located during the 18th century.

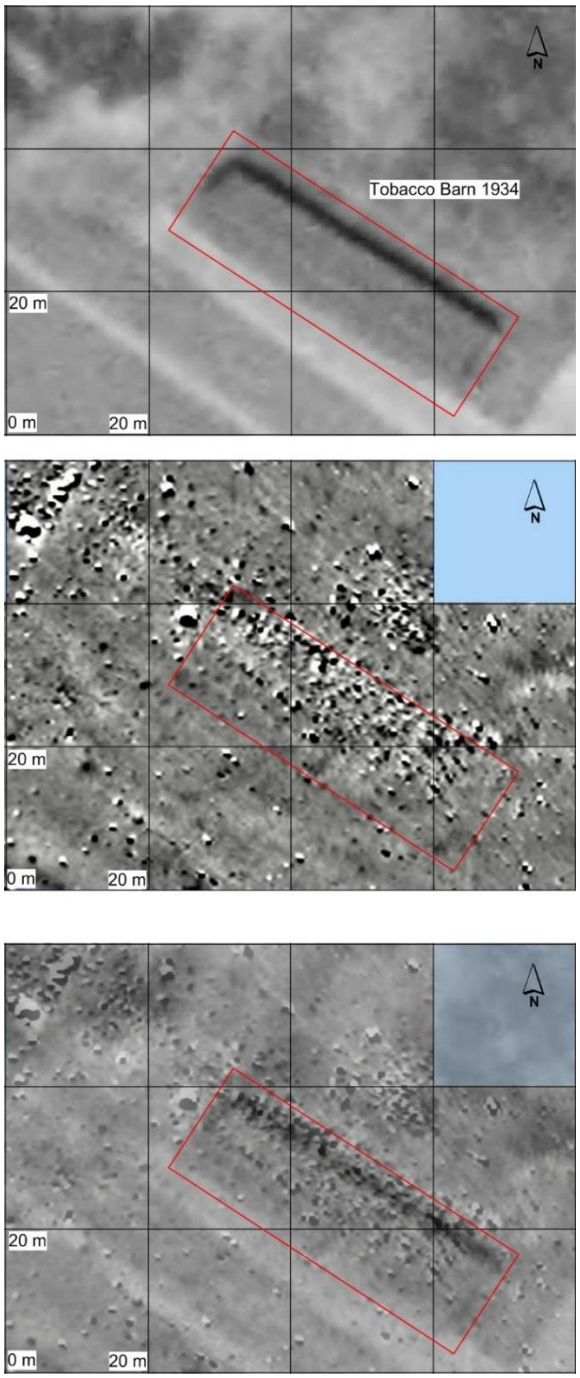


Figure 4.4: The magnetic map created of the Hollister site (2016) shows dipolar magnetic anomalies in the shape of the 1934 tobacco barn, represented by the red rectangle. The top image shows the aerial photo of the barn. The middle image shows the magnetic map with the dipolar anomalies and the bottom image shows the aerial photo overlain with the magnetic map. Anomalies showing distinct patterns for direct interpretation, such as a rectangle for a house cellar, were identified through the "pattern-recognition" approach (Kvamme 2006, 206).

Negative Magnetic Anomalies

Physical and chemical process such as weathering and biogenic activity magnetically enrich Earth's topsoil. Removing topsoil results in altering the magnetic field intensity for that area because the amount of magnetic material that was on the surface of the earth has been disturbed and is now smaller than that in nearby areas (Kvamme 2006, 219). The contrast between the area with the topsoil removed and adjacent areas is represented by a negative anomaly (Figure 4.2) (Kvamme 2006, 219, Fassbinder 2015, 88-89).

Features such as recessed house floors, subterranean storage pits, cellars, ditches, or looters' holes, extract small to large areas of topsoil during their construction. This ground disturbance is represented in the magnetic map as negative anomalies due to the contrast in magnetism between these features and the surrounding material. Negative anomalies can also occur from grooves in the ground made by vehicles or foot traffic. This is useful for understanding the commonly used pathways for transportation and how this may have influenced the placement of other features on the landscape. When sediments and soils are not replaced in their original manner within a pit or grave negative anomalies can also occur. This is because the more magnetic topsoil might become buried causing a contrast between these pits and the surrounding undisturbed ground with its topsoil in place (Kvamme 2006, 219-220). The presence of negative anomalies on the magnetic map assists in locating all kinds of different anthropogenic features that communicate that this landscape was utilized for various activities including building structures and depositing materials.

An example of negative anomalies occurring from foot traffic or vehicles is seen in the magnetic map of the Hollister site. These negative anomalies show the outline of a road crossing the survey area. This is more obvious when you compare the magnetic image to an aerial view of the site (Figure 4.5). Since this location was used as a horse pasture for a number of years, there are also horse burials located on the eastern side of the property according to the land owner (land owner, personal communication, 2016). Some of the negative anomalies that appear in the survey area may be the burials of horses, wells or other historically constructed features. Without the use of an additional geophysical method, such as GPR, or excavations, it is difficult to understand the true nature of these anomalies. However, the presence of dipolar anomalies in the magnetic map show that different types of activity occurred on this landscape such as agriculture and that humans modified this area by constructing buildings, roads, wells, and burials. This provides evidence that past humans, such as the Hollister family, were living and working on this landscape. These conclusions were only preliminary at the time and led to exploring this landscape with GPR survey to gain more detail on the nature of the Hollister site.

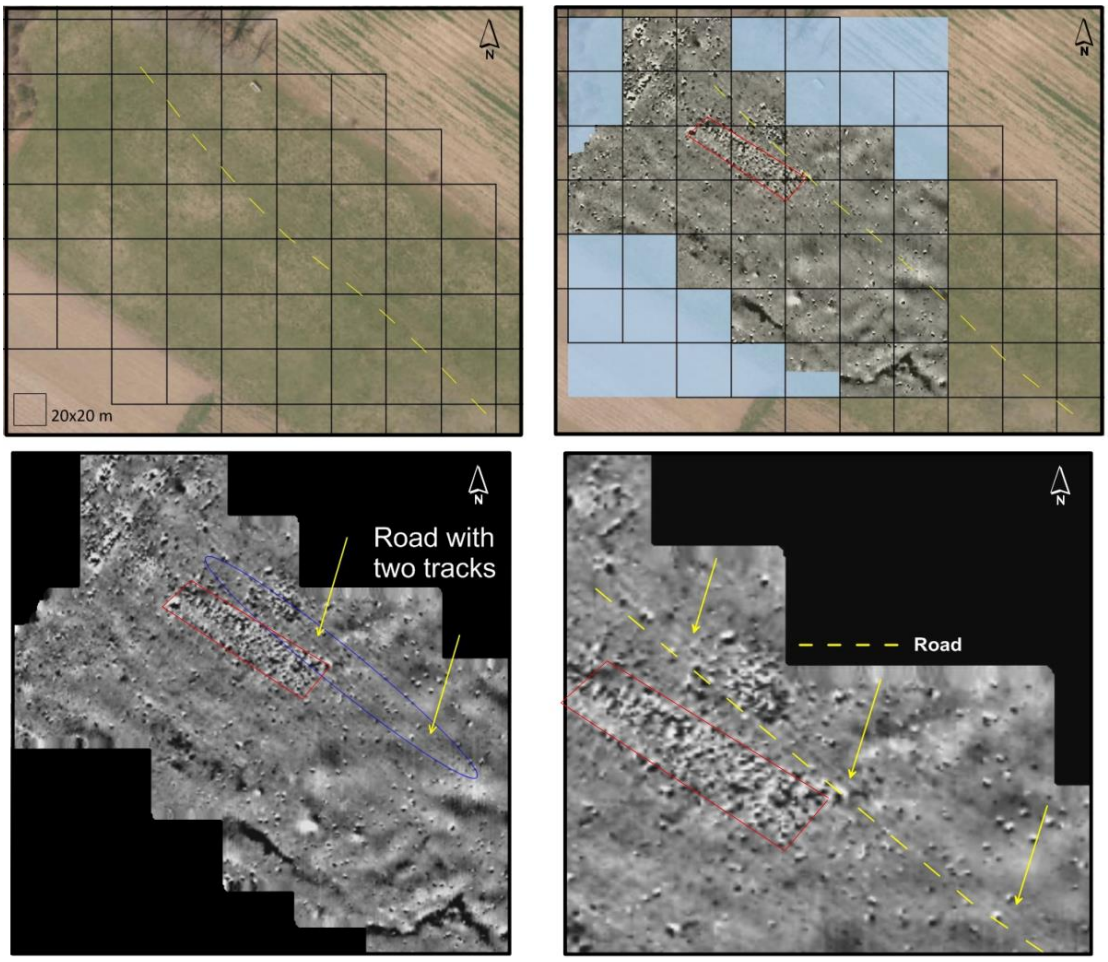


Figure 4.5: These four images show the dirt road that is present on the landscape of the Hollister Site through comparing the aerial photography and the magnetic map (2016). Top left: Image shows an aerial photograph of the Hollister Site (ESRI 2018). The yellow dotted line sits right below the dirt road. The tracks are faint as this aerial shot was taken in winter of March 2018. Top right: This aerial image has the magnetic map overlain to show where the remains of the barn are in real space, marked in red. Bottom: These two images show the magnetic map without the 20x20m grid. The grid was removed so that the dirt road would be more visible to the viewer. Negative anomalies, represented in white, show the outline of a road crossing the survey area.

Positive Magnetic Anomalies

Positive anomalies appear as black features in the magnetic map (Figure 4.2). These anomalies can be caused by multiple processes. Stone and other materials used in construction will cause positive anomalies due to the magnetism of the rock. The stone

may be more or less magnetic than the surrounding soil, which causes magnetic contrasts (Kvamme 2006, 218). This means that cellar features constructed from stone or other magnetized materials will show as positive anomalies in the magnetic map. Positive anomalies are also caused by a concentration of burned material, as well as pits, ditches, or wooden postholes that have been refilled by topsoil (Fassbinder 2015, 88). These features continue to provide evidence that this landscape has changed over time through various anthropogenic and natural processes. In the magnetic map, the positive anomalies (shown in black) are scattered throughout the survey area (Figure 4.6).

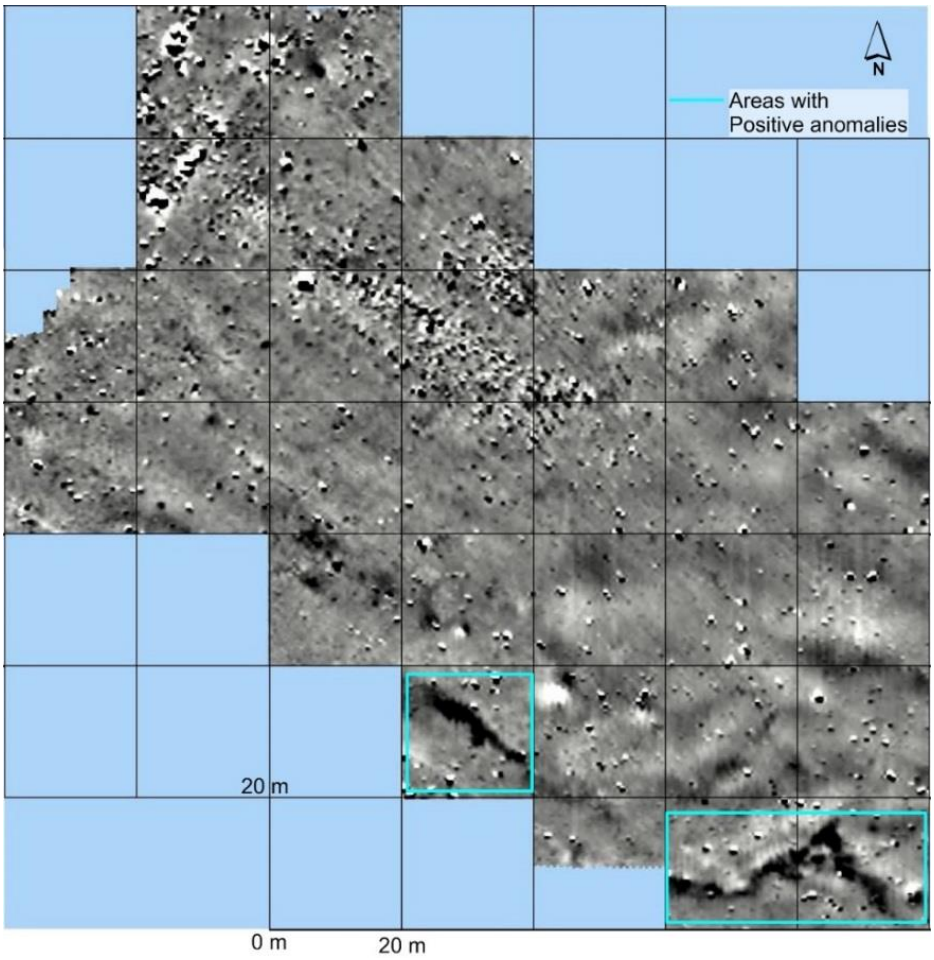


Figure 4.6: Image created from magnetic data using *TerraSurveyor* (DW Consulting 2016) (Hollister site 2016). The positive anomalies (shown in black) are scattered across the entire survey area. The most prevalent of these areas is located to the southeast of grid. These positive magnetic features are a result of glacial activity that occurred thousands of years before the colonial settlers occupied the land and most likely created a different landscape than what is present today (Conyers 2018, 68-69, Herrick 2017, 160-161).

The most prevalent of these anomalies are likely a result of glacial activity that shaped the landscape 16,000 years before present (Zeilinga de Boer 2009, 74). When glaciers at the end of the last ice age began melting, glacial till was deposited here in a moraine. The glacial till here is composed of gravel, sand, and cobbles eroded from the Canadian Shield. These sediments are iron rich and give the glacial tills a high remnant magnetism which results in positive anomalies in this area (Conyers 2018, 18). Once the

glacier retreated northward, sedimentary beds filled in the lower areas of the landscape resulting in a formation that looks much like a river channel (Conyers 2018, 15) (Figures 3.10 and 4.6).

Further analyses of these geological features are not the focus of my research but they are important to note because these features communicate to us that this was a much different landscape over time (Figure 4.7). Low marshy areas would have been present at one time with flat, dry areas located between the rocky moraines. This landscape would have changed quite extensively while the Native Americans were living here and before the Europeans arrived (Conyers 2018, 78-79, Dr. Brian Jones, personal communication, 2017, Herrick 2017, 84-85). This is important to take into consideration when understanding how structures on the landscape were organized. People built their homes in areas that would provide the resources they needed to survive. The Hollister's built their structures on the flat, dry areas of the landscape so they could dig cellars without hitting the water table. The Indigenous community relied on hunting and gathering for their livelihood and chose the low, marshy areas that provided more abundant natural resources (Conyers 2018, 78, Herrick 2017, 142-147, 160-161). Recognizing factors like these helps provide context for interactions that occurred between these two groups and how they used the landscape in different ways, whether for agriculture or to gather natural resources.

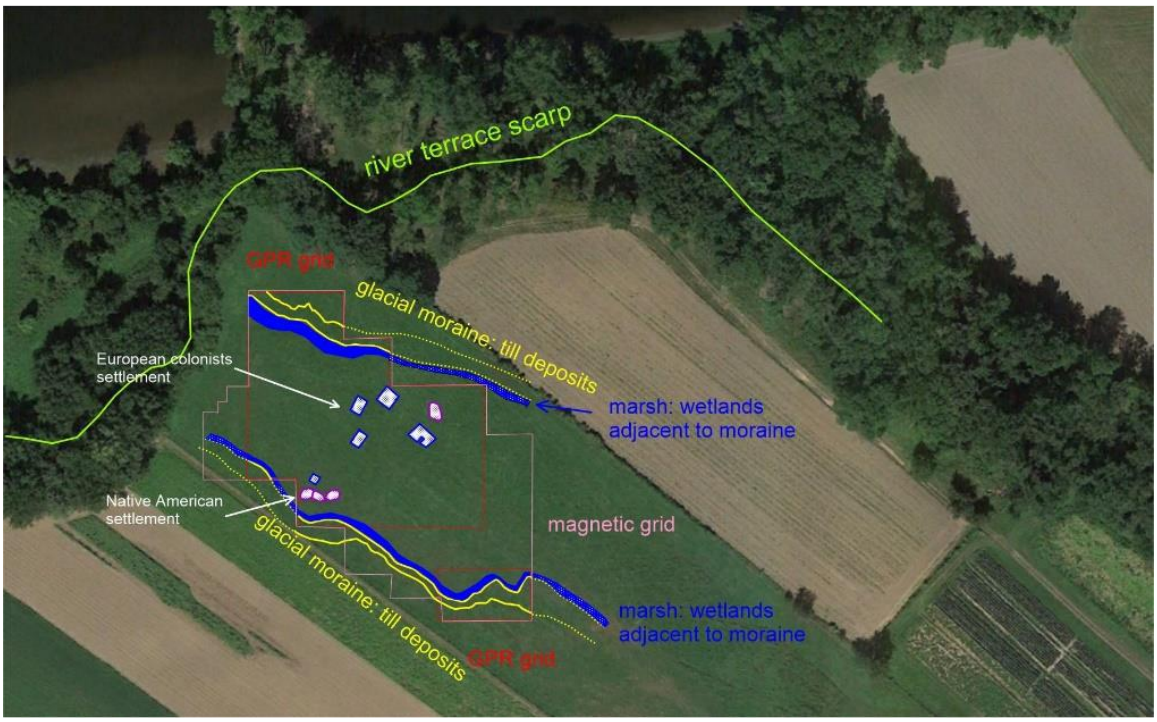


Figure 4.7: This is an aerial photo of the Hollister site showing the Connecticut River to the north. This image shows how the landscape changed over time. The Europeans chose to live in the relatively flat, dry area with well-drained soils away from the marsh. The Native Americans chose to live closer to the marshy area where they could gather additional resources such as game and berries (Image courtesy of Conyers 2018, 79) (Conyers 2018, 78-79, Herrick 2017, 84-85).

Conclusion

The magnetic survey was the first geophysical survey performed to gain an understanding of the landscape and its subsurface features. If these subsurface features have different magnetic qualities from the surrounding earth, a difference may be noticed between them. The contrast between Earth's natural magnetic field and the magnetic charge of materials within the Earth are measured according to the range of recorded nanoteslas. These contrasts are referred to as anomalies until they are properly identified as geological or archaeological features. Analyzing the anomalies present in the magnetic

map provide information about anthropogenic remains and the geological landscape for the Hollister site.

Anomalies showing distinct patterns for direct interpretation were identified through the "pattern-recognition" approach, such as a rectangle for a house cellar (Kvamme 2006, 206). Geometric patterns are usually derived from human interaction and not natural processes. Herrick and I used this approach to identify certain features in the magnetic map like the remains of a 20th century tobacco barn (Figure 4.4). The ability for the magnetometer to show contrasting materials that can identify archaeological remains designates magnetometry as a convenient prospection method to find and map buried features over large areas.

Even though it is difficult to distinguish between the 20th and 21st century artifacts on the landscape and the 17th century artifacts, the presence of these items reveals that this area was heavily occupied at one time. The metal debris left behind from agricultural activities (Figure 4.3) and the presence of the dirt road (Figure 4.5) provides evidence that this was once a central area of occupation on the landscape. Identifying features like these are important to understand how this landscape was used by its inhabitants.

The physical environment also influenced where different groups of people settled and the types of activities that they performed. Conyers (2018) and Herrick (2017) compared data sets from the magnetic and GPR surveys to provide further insight into the changes that occurred on the landscape over time (Figure 4.7). They both explain that the landscape was much different before the Europeans arrived. Native Americans who inhabited this area for thousands of years would have witnessed rocky moraines and

lower, marshy areas to the north and south of the site after the glacial activity ceased in this area. The area that the Europeans chose to occupy was relatively flat and dry with well-drained soils suited for digging cellars and practicing agriculture (Conyers 2018, 78, Dr. Brian Jones, personal communication, 2017, Herrick 2017, 101).

Even though detailed information on geological and archaeological features cannot be obtained without combining the magnetic data with GPR, the magnetic map does provide evidence of human activity on the landscape and how it has changed over time. This is important because these features provide insight into how the land was used and the different groups of people that occupied it. Part of Hollister's experience in 17th Connecticut revolved around the hard labor of farming and the nearby community of Native Americans, which created a resource for knowledge, labor, and the exchange of materials. To further determine the types of structures that existed on the landscape and how these features represent the people that once occupied this area, GPR was implemented as the next geophysical survey for the Hollister site.

Ground-penetrating Radar

Ground-penetrating radar is one of the most efficient and comprehensive geophysical methods that is currently available to the archaeologist. This is because GPR allows for depth and identification of archaeological features and the radar data can be analyzed in both 2D and 3D images. Ground-penetrating radar works by transmitting electromagnetic waves into the ground with shielded antennae (Conyers 2012, 25). These electromagnetic waves then reflect off of buried discontinuities and return to the surface

to be recorded by the computer. This data is then processed using software programs to create images and maps of features found underground.

Herrick and I surveyed ten grids with a 400 MHz antenna and a GSSI 3000 control system. The grids varied in size to accommodate features of the landscape and the timeframe of the survey (Figure 4.8). These areas measured 20x20, 40x40, and 40x20 meters. We surveyed the area where the three cellars were originally found by Peter Leach (Figure 3.1) with 25 cm transects to produce higher resolution slice maps. This area of the landscape contains a concentrated number of artifacts and we thought that by surveying this grid with smaller transects, we would be able to see more detail within the cellars and possibly uncover additional information about these underground features. When these data were collected, interpreted, and mapped, the difference in detail was minimal and did not provide any new information from the data collected at 50 cm transects. We continued to incorporate adjoining grids with 50 cm transects to cover as much of the archaeological site as possible.

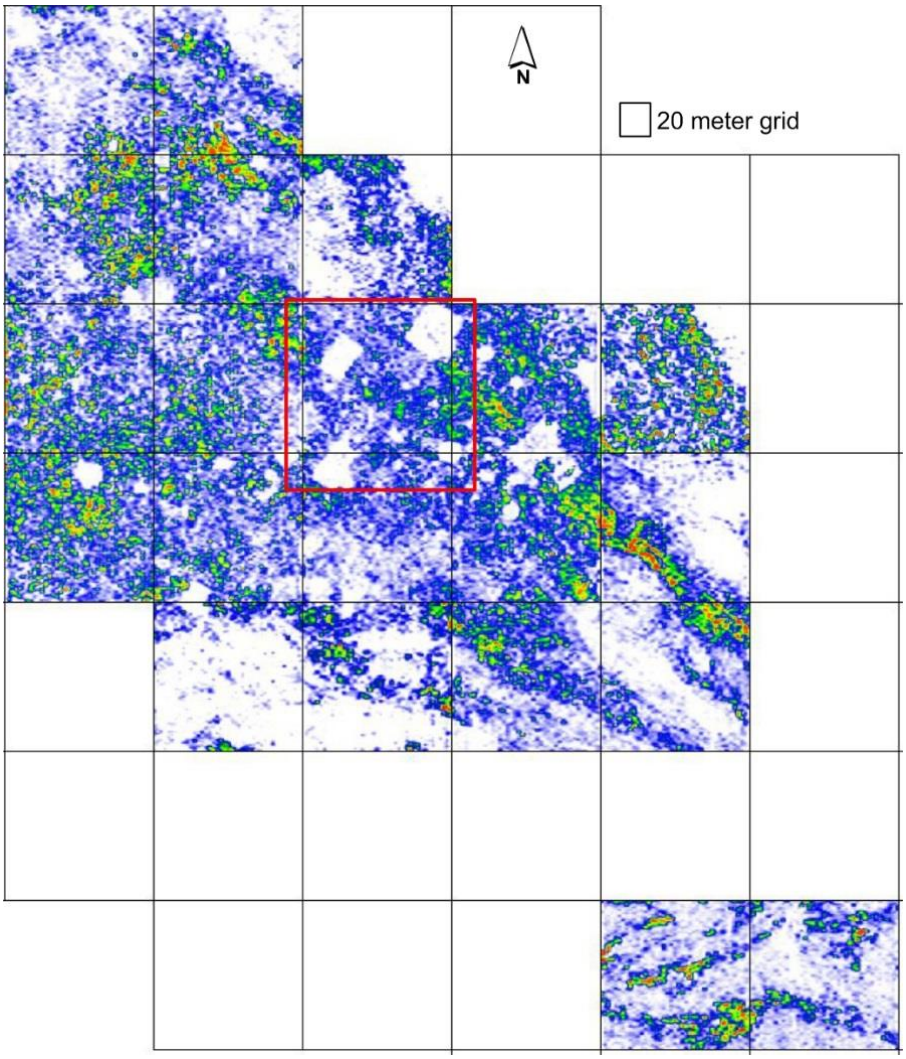


Figure 4.8: Leach's original GPR survey included the cellars in the central part of the grid, marked by the red square in the image. These cellars appear as white rectangular outlines. Herrick and I continued to incorporate adjoining grids to survey as much of the area as possible. The area to the southeast was surveyed because of the interesting features that the magnetic map provided. Upon closer inspection, using the GPR profiles and maps, this area does not contain anthropogenic features. Although, this does represent how the geological landscape has changed over time (Conyers 2018, 78-79, Herrick 2017, 85-85).

Once we completed the GPR survey, these data were processed with *GPR Process* (Conyers and Lucius 2010), *GPR Viewer* (Conyers and Lucius 2016), and *Surfer* (Golden Software, LLC 2015) to create images of profiles and amplitude maps. These images showed many different archaeological and geological features in the subsurface

of the earth. The focus of my analysis was to identify the archaeological or geological nature of the feature, its location, depth and any other materials that might be present such as stone, burned surfaces, or artifacts.

The GPR amplitude slice map uses a color scheme to display areas of high and low amplitudes in the landscape (Figure 4.8). The darker the color on the map, the higher the amplitude is. White areas on the map represent low amplitudes. One of the most important characteristics of the amplitude map is the distinct anthropogenic features that appear as white areas. These areas are where fluvial sediment was deposited from past flooding. This material is fine-grained and produces minimal reflections that appear as low amplitude areas in the amplitude map. When these structures were built on this landscape, the original earth was removed in construction. Sediment was then deposited into this area as a result of flooding that occurred sometime in the early 18th century (Figure 3.17). Even though this disaster may have forced the occupants of the Hollister site to abandon this area ("John Hollister and his House"), the fine-grained sediment deposited here preserved the remains of these structures and provided a medium that allowed the GPR to easily distinguish between this material and the natural stratigraphy.

The distinction between the fluvial sediment and the surrounding materials made it easier to identify subsurface features (Figure 4.9). Some features were identified as geological (Figures 4.6 and 4.7) (Conyers 2018, 78-79). Others were clearly archaeological in the shape of circles, rectangles, and squares (Figures 4.8 and 4.9) (Conyers 2018, 72-74). The geological features revealed that this landscape has gone through multiple changes over the last few thousand years, from rocky, visible moraines

and low marshy areas to the relatively flat and stable agricultural landscape it is now (Conyers 2018, 78, Herrick 2017, 86-87).

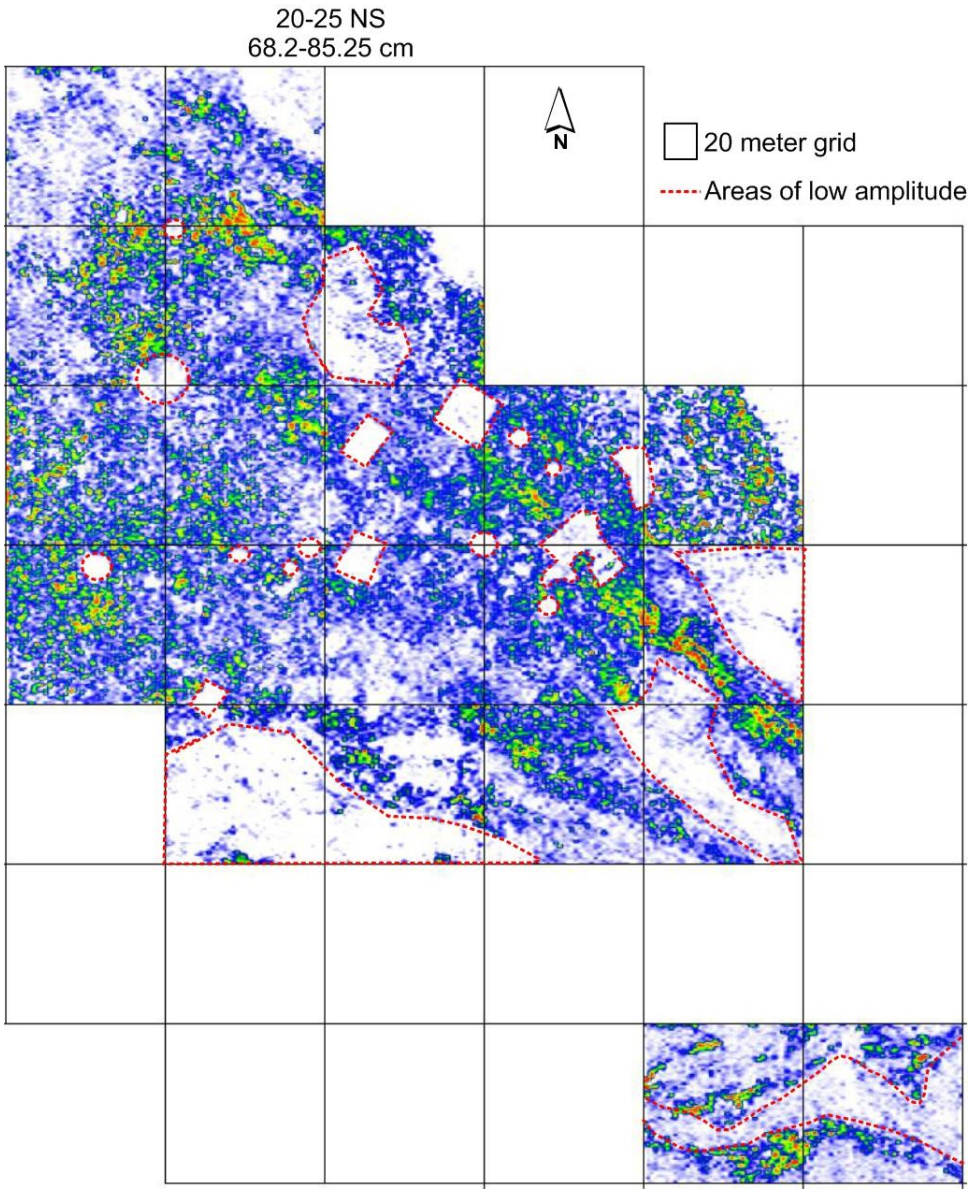


Figure 4.9: Ground-penetrating radar amplitude slice map of the Hollister site (2016). Fluvial sediment has filled many of the anthropogenic features indicating that flooding occurred in this area. Fine-grained sediment produced minimal reflections, represented as white features in the map with red dotted lines enclosing them. These low amplitude reflections create highly visible subsurface features.

The distinction between the fluvial sediment and the surrounding materials made it easier to identify subsurface features (Figure 4.10). Once the anthropological features were identified, detailed analyses of both the GPR profiles and slice maps showed that they were most likely cellars, wells, and pits filled with debris. Using information from both the slice maps and the profiles, I identified the location of the feature in space, the depth and size, if possible, the material used for construction such as stone in the middle cellar (N10-12W15), and the presence of artifacts. This information was then used to strategically plan the excavation trenches at one corner of each cellar and to calculate the depth at which the cellar feature would appear (approximately 55 centimeters) (Figure 3.17).

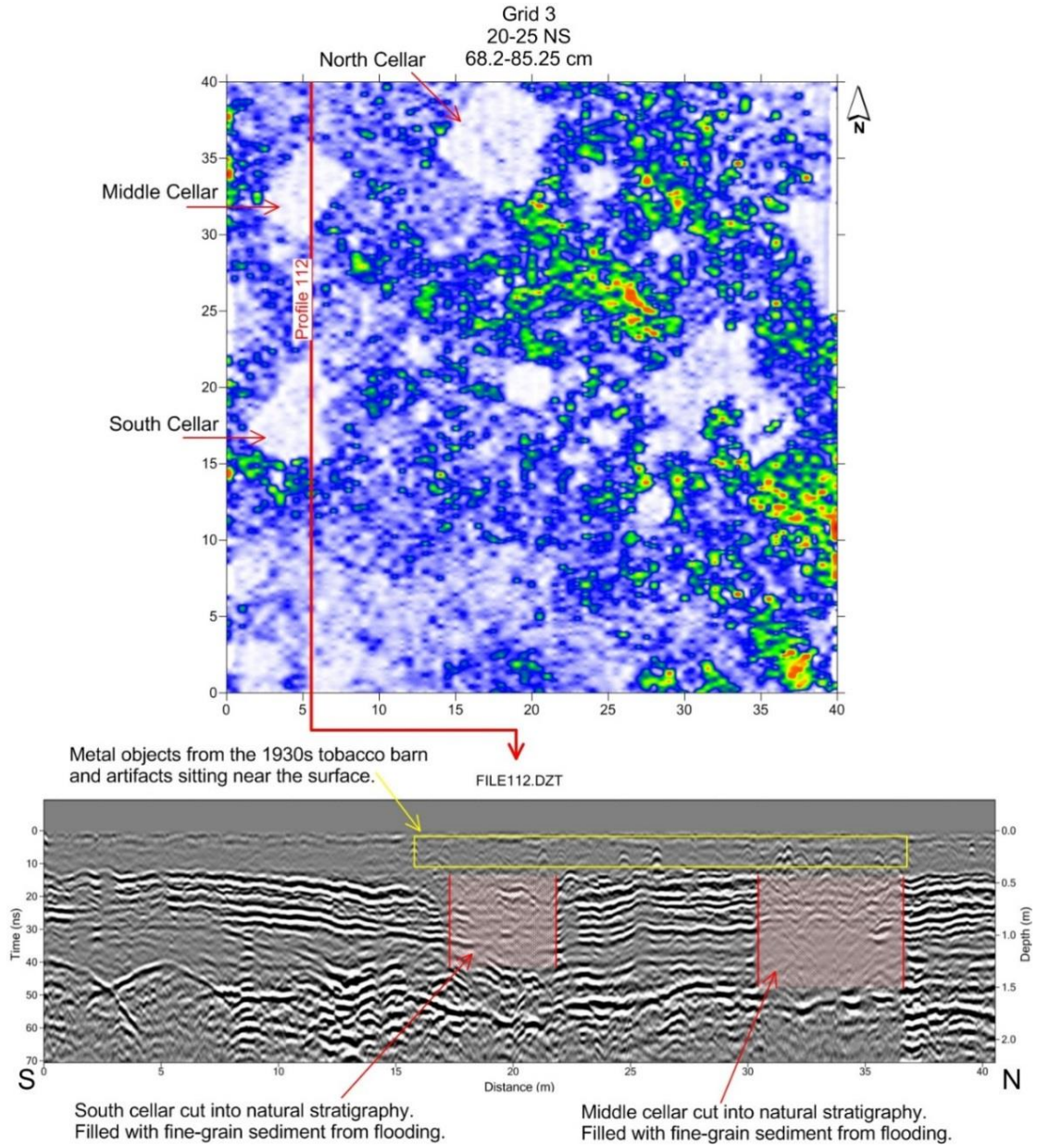


Figure 4.10: An amplitude slice map shows grid 3 above with the profile 112 below. Low amplitude areas are shown in white in the amplitude slice map and are in geometric shapes. This is a result of fluvial sediment from past flooding. Profile 112 shows the south cellar (S1W14-16) and the middle cellar (N10-12W15) truncating the natural stratigraphy with fine-grain sediment as its fill. The middle cellar shows high amplitude reflections along its parameter, indicating large objects, such as rocks, lining the cellar wall. Artifacts including metal objects from the 1930s tobacco barn show in the GPR profile as multiple point source hyperbolas sitting right above the cellars.

The GPR profiles in conjunction with the slice maps provide information as to how the settlement at the Hollister site was spatially organized. There are four distinct rectangular cellars clustered on the landscape with circular features dotted throughout. The circular feature located at the 0, 0 point of the map was confirmed as a well in the 2016 excavations. The remaining circular features are most likely additional wells or refuse pits. The central area of occupation appears to be where the cellars and the well (0, 0) are located (Figure 4.11). This area has the most concentrated number of features and artifacts with a few other features located towards the edge of the site. Buried cultural features within settlements usually contain some sort of spatial pattern, which makes GPR extremely helpful to map out these features. Characteristics such as structure size, orientation, construction and architectural techniques are just some of the information that can be discerned from the GPR images (Conyers 2012, 184). The spatial layout at the Hollister site can then be compared to other archaeological farm sites to learn more about human behavior, such as where the trash pits may have been located, how the buildings were oriented within the farmstead and for what purpose (Groover 2008, 32, 37-38).

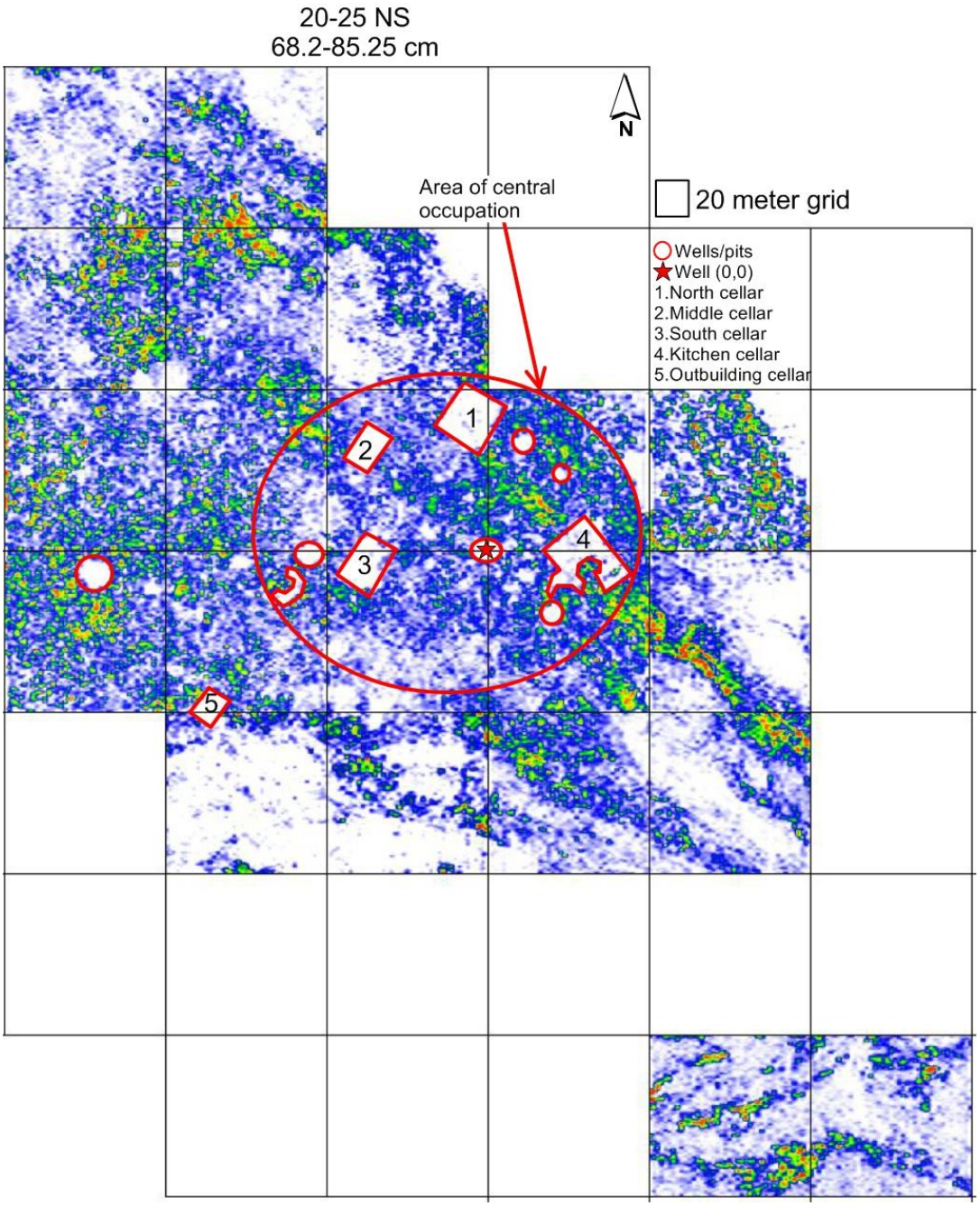


Figure 4.11: Amplitude slice map of the Hollister site (2016) showing the English area of central occupation, indicated by the red outline. This area has the most concentrated number of artifacts and structures on the landscape. There are four distinct rectangular cellars clustered on the landscape (#1-4) with circular features dotted throughout. The circular feature located at the 0, 0 point of the map was confirmed as a well in the 2016 excavations. The remaining circular features are most likely additional wells or refuse pits. It also appears that a structure was built on the edge of the settlement (#5) and may be an outbuilding.

Since many of the farmsteads that date to the 17th century in Connecticut have been destroyed or lost (Dr. Brian Jones, personal communication, 2016, Groover 2008, 6), comparing the layout of the Hollister site to other farm sites is difficult. One farmstead site that mimics a comparable layout is the William Strickland site dating from the late 1600s to the late 1700s in Delaware (Groover 2008 32, 37-38). Even though the William Strickland site is not exactly cotemporaneous with the Hollister site, it was established not too long after Hollister built his farm around 1640. Even though architectural styles and spatial organization evolved over time, a period of about 50 years would not drastically alter traditional building techniques. This is why it is appropriate to use the layout of the William Strickland site as a rough template for how the Hollister site may have been organized.

The William Strickland site is shaped in a semi-circle that incorporates separate buildings for the kitchen, house, and smoke house (Figure 4.12). There are also two outbuildings that are on the parameter of the household. Trash pits are located at a distance from the house along with an animal pen that is in a convenient location but not close enough to dwelling to be a nuisance. There are also two wells located close to the main household (Groover 2008, 38). Mapping out the layout of the Hollister site, it appears to be quite similar to the William Strickland site (Figure 4.11). There are four cellars at the Hollister site that form a semi-circle close to the well located at 0, 0 in the grid. A number of circular features are scattered throughout these structures and could indicate additional wells, storage or refuse pits. It is hard to distinguish the presence of a fence or animal pen as these structures are not as permanent, but there is a European

cellar located to the southwest of the central cellars that could indicate an outbuilding of some type.

Adams (1990) states that spatial layouts tend to reflect the efficiency of the settlement. The activities that took higher energy, such as retrieving water from the well, cooking, preparing produce, and repairing farm equipment occurred closest to the house whenever possible. Less intensive activities occurred farther away, such as tending pastures and animal pens, since these tasks usually did not require large amounts of energy on a daily basis (Adams 1990, 94). The GPR amplitude slice map of the Hollister site shows that the main household buildings were situated close to each other with wells nearby. At least one outbuilding appears to be located towards the edge of the property for pastoral activities. The intentional placement of buildings on this landscape show that Hollister had long term goals and intended to capitalize on agriculture for many years to come.

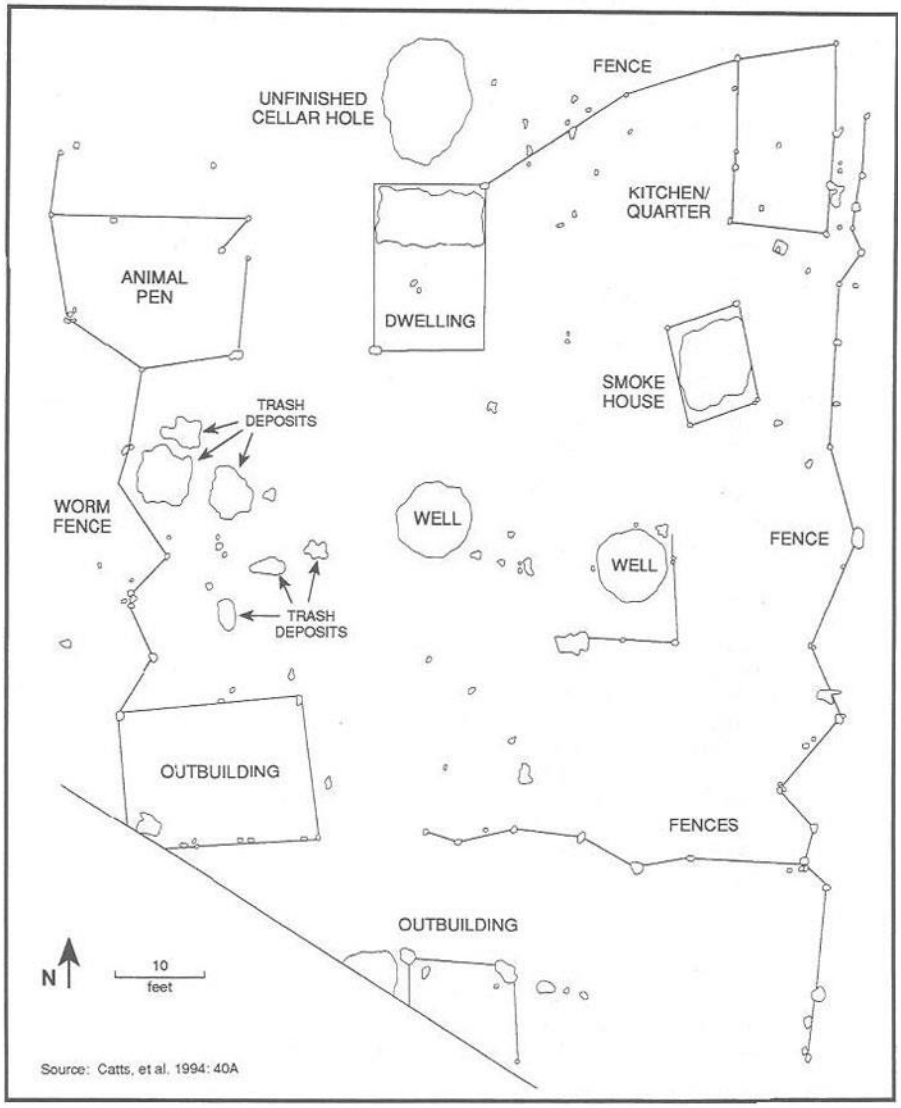


Figure 4.12: The layout of the William Strickland site is shaped in a sort of semi-circle that incorporates separate buildings for the kitchen, house, and smoke house accompanied by two wells. There are also two outbuildings, trash pits, an animal pen, and fencing. The placement of these structures shows that these buildings were intentionally arranged for efficiency, with more energy-intensive activities closer to the household and less energy-intensive activities located away from the household (Adams 1990) This site mimics the Hollister site layout and shows that Hollister intentionally arranged his farm to maximize his success ((Image courtesy of https://www.deldot.gov/archaeology/delaware_kitchens/index.shtml?dc=william_strickland, accessed September 4, 2018).

Once the spatial organization of the English farmstead was known, other features that differed from the strict geometric shapes of English construction were defined. Herrick (2017, 95-100) identified several features that appear to be Native American structures in her 2017 thesis research. One of these oval features is situated relatively close to the central area of occupation (Figure 4.13). The other oval feature is located towards the southwest of the site with a European cellar close by. Herrick also discovered that these oval areas cut into one another and represent separate periods of occupation, which indicate that this landscape was used for an extensive amount of time by Indigenous peoples (Conyers 2018, 75, Herrick 2017, 97-99). This discovery has led to the hypothesis that these two groups of people were cohabitating on the landscape and probably interacted on a regular basis (Conyers 2018, 75-76, Dr. Brian Jones, personal communication, 2018, Herrick 2017, 141-142). This is a critical detail that supports historical documentation and shows that Hollister developed beneficial relationships with the Native American community ("Amix" n.d., Anderson 2008, 496-497, 501, Case 1886, 24, Taylor 1979, 160-166).

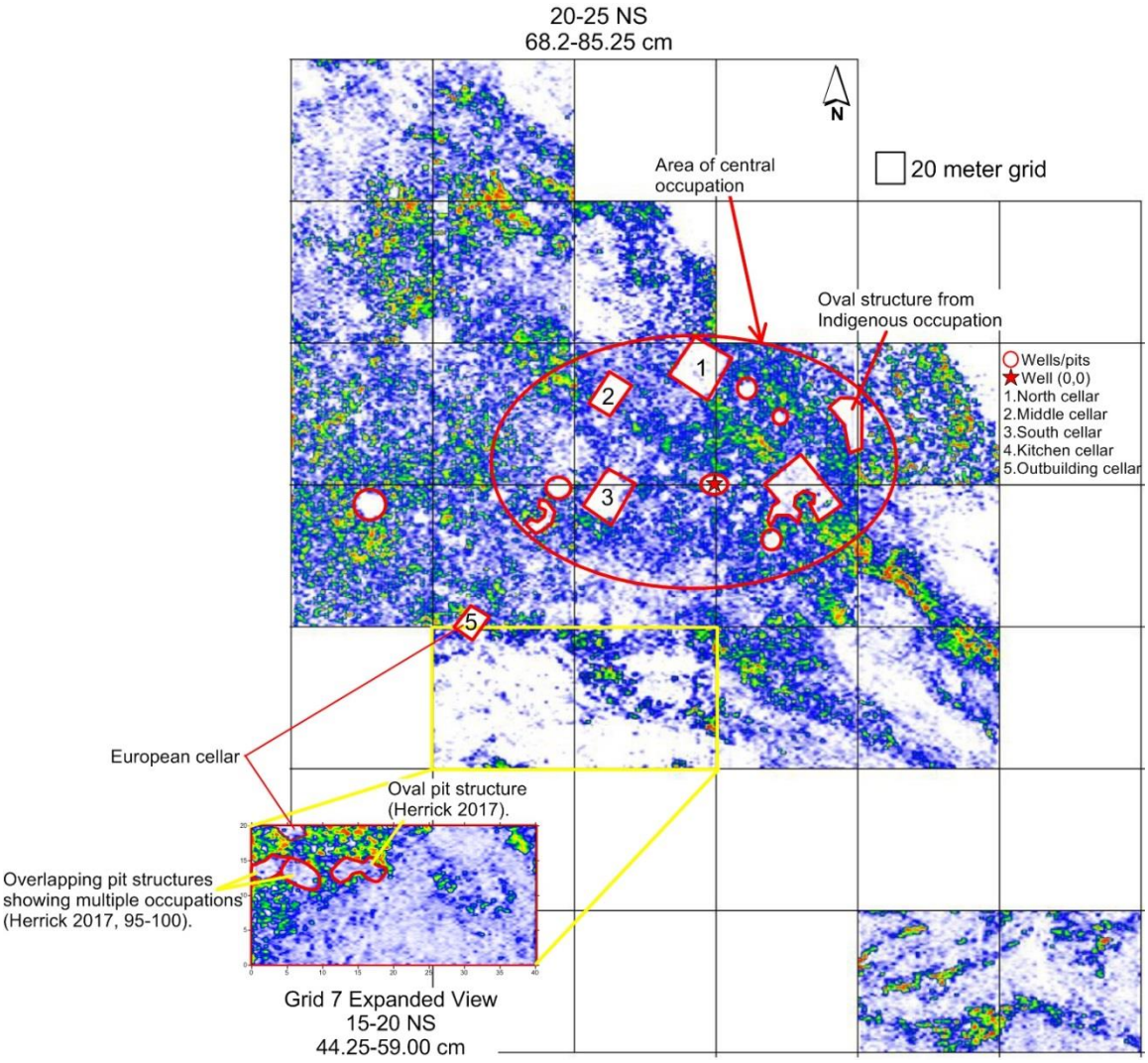


Figure 4.13: This amplitude map of the Hollister site (2016) shows the English area of central occupation, highlighted by the red circle. Native Americans preferred oval structures to the square cellars that the English built. These structures appear throughout the landscape but are especially evident in the southwest section of the grid in the expanded view of Grid 7. These oval structures are located near European structures and suggest that these features could be cotemporaneous with one another or that these two groups both utilized this landscape around the same time (Conyers 2018, 75-77, Dr. Brian Jones, personal communication, 2018).

The placement of the European and Indigenous structures is quite intriguing because there is very little historical documentation that shows the cohabitation of European settlers and Indigenous groups except for land deeds that could include the right for Indigenous peoples to maintain access to their land (Handsman and Lamb

Richmond 1995, 101). In historical records, Hollister maintains a favorable relationship with the Native Americans in the area and was appointed as a type of mediator between the Council of War and the Wangunk people during wartime (Trumbull 1852). There is also a historical document that mentions a Native American girl by the name of Amix who worked for the Hollister Family ("Amix" n.d.). The relationship between Hollister and the Native Americans could have been mutually beneficial for both parties and most likely contributed to the success of the farm through the exchange of knowledge and materials (Herrick 2017, 160-163).

Conclusion

It is commonplace in archaeology to use GPR to guide excavations but it also provides an abundant and invaluable set of data that can be used to map the landscape without having to disturb any of the subsurface features (Conyers 2013, 1-2). The advantage of GPR is that it provides the ability to understand the landscape both archaeologically and geologically. The GPR profiles and maps were used in conjunction with each other (Conyers 2012, 29) to reveal details about the landscape such as location of features, their size and depth underground, and the presence of materials such as sediment, stone, and artifacts. These characteristics show that the landscape has gone through multiple changes over the last few thousand years, from rocky, visible moraines and low marshy areas to the relatively flat and stable landscape it is now (Conyers 2018, 78, Herrick 2017, 86-87). Europeans preferred the well-drained soils for agriculture and digging deep cellars, whereas the Indigenous peoples preferred the low marshy areas where natural resources such as berries and game were more abundant. This information

helps us understand the placement of structures on the landscape according to certain cultural behaviors (Figures 4.7 and 4.13).

Ground-penetrating radar can also be used to recognize spatial patterns within the landscape. Some of these patterns are house size, orientation, construction and architecture (Conyers 2012, 183-184) (Figures 4.10 and 4.11). Archaeological features show that Hollister intentionally organized his farm for success by orientating the household buildings closer together with high-energy activities located further away in order to be most efficient. Using this method to examine the Hollister site provides insight into the agricultural nature of this site and the groups of people that once lived here.

Different groups of people are evidenced through the European construction of square or rectangular cellars and the Native Americans preference of oval shapes for their homes (Figure 4.13). These structures are also at the same depth within the ground, which tells us that they could be cotemporaneous or that Native Americans were living on this landscape right until the Hollisters built their farm in the mid-17th century (Potter and Waselkov 1994). The proximity of the English farmstead to the Native American structures is shown in the GPR images and implies that Hollister was probably interacting with this community on a regular basis. This is an important detail to consider when explaining the type of social environment that Hollister was a part of in 17th century Connecticut. Many historical documents provide discriminating accounts against the Indians by the English and this research can help modify some of these narratives

showing that not all relationships between these two groups were strained or violent (Lavin 2013, 324-326, Taylor 1979, 160-166).

Excavation

After the GPR survey, excavations were planned over a period of two weeks in the summer of 2016. The first week of excavation took place at the beginning of August with a volunteer group from the Friends of the State Archaeologist (FOSA) as well as visiting local archaeologists. The second week took place in the middle of August with both FOSA and community members volunteering. Using the maps that we created from the GPR data, Herrick and I assisted in placing three trenches within all three cellars, measuring 3x1 meters (Figure 3.17). Thirty-six shovel test pits, measuring 50x50 centimeters, were also placed throughout the cluster of cellars. Units were placed within the local grid and labeled by its southwest corner (Figure 4.14). We also set up equipment, supplies, screening stations, and assisted volunteers with excavations.

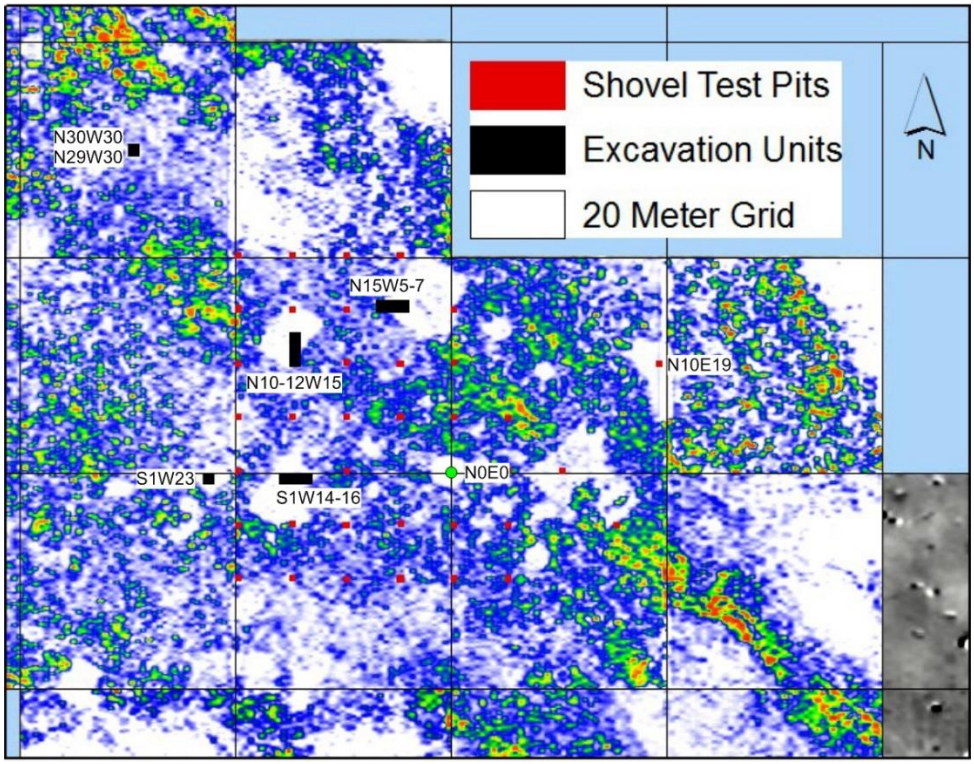


Figure 4.14: This image shows the GPR map with the excavation units and shovel test pits labeled. Units were placed within the local grid and labeled by its southwest corner within the grid. Excavation trenches measuring 3x1 meters were placed within all three central cellars.

Herrick and I worked together for most of the excavation. We were primarily responsible for excavating units within the southern cellar (S1W14-16) (Figure 4.14). We also picked two other areas that we wanted to excavate within the site. In the first area we placed a 1x1 meter unit in a pit feature that we thought might be a posthole for a palisade, which Hollister asked permission to build around his farm in 1675 (Adams 1904, 205) (Figure 3.16). For the second area, we chose the large oblong-shaped feature that we identified in the GPR map (N10E19) (Figure 4.14). Before we knew the Indigenous nature of this feature, we placed a STP (50x50 cm) in the center of it as we thought it might be a midden due to its size and irregular shape. The last unit (S1W23) was

excavated by members of FOSA just to the west of the south cellar that was thought to be a chimney fall (Figure 4.14).

Units were divided into quadrants (NW, NE, SW, and SE). Each quadrant was excavated with a shovel and then a trowel was used to smooth the edges and the bottom of the unit. We excavated the units at roughly 10 centimeter levels. The artifacts were stored together in artifact bags according to the depth that it was found, the quadrant, and the unit. Numerous artifacts were found during excavation and are presently stored at the University of Connecticut for future research, some of which are discussed below.

Cellar Excavations

There are four cellars that are located in the GPR maps (Figures 4.14 and 4.15). The cellars are shown in the map as areas of low-amplitude that truncate the natural stratigraphy (Figure 4.10). A number of point-source hyperbolas can be seen in the profiles near the top of the historical cellars, indicating that they are filled with artifacts and sediment that differs from the surrounding material (Conyers 2012, 110). The GPR profiles and slice-maps were used to place three trenches along the edge and interior of the north, middle, and south cellars. The fourth cellar was not excavated but did have a 50x50 centimeter test unit placed within it (Figure 4.14). The units were excavated primarily by FOSA and members of the community with assistance from Dr. Brian Jones, Herrick, and me. Numerous artifacts were recovered from the excavations, including uncommon European pottery sherds, Native American pottery sherds, metal and iron debris, glass, faunal and botanical material (Appendix IV and V). The presence of these household artifacts provides important details on trade connections, socioeconomic

status, and relations between Native Americans and the Hollister's. These materials are also discussed in further detail below.

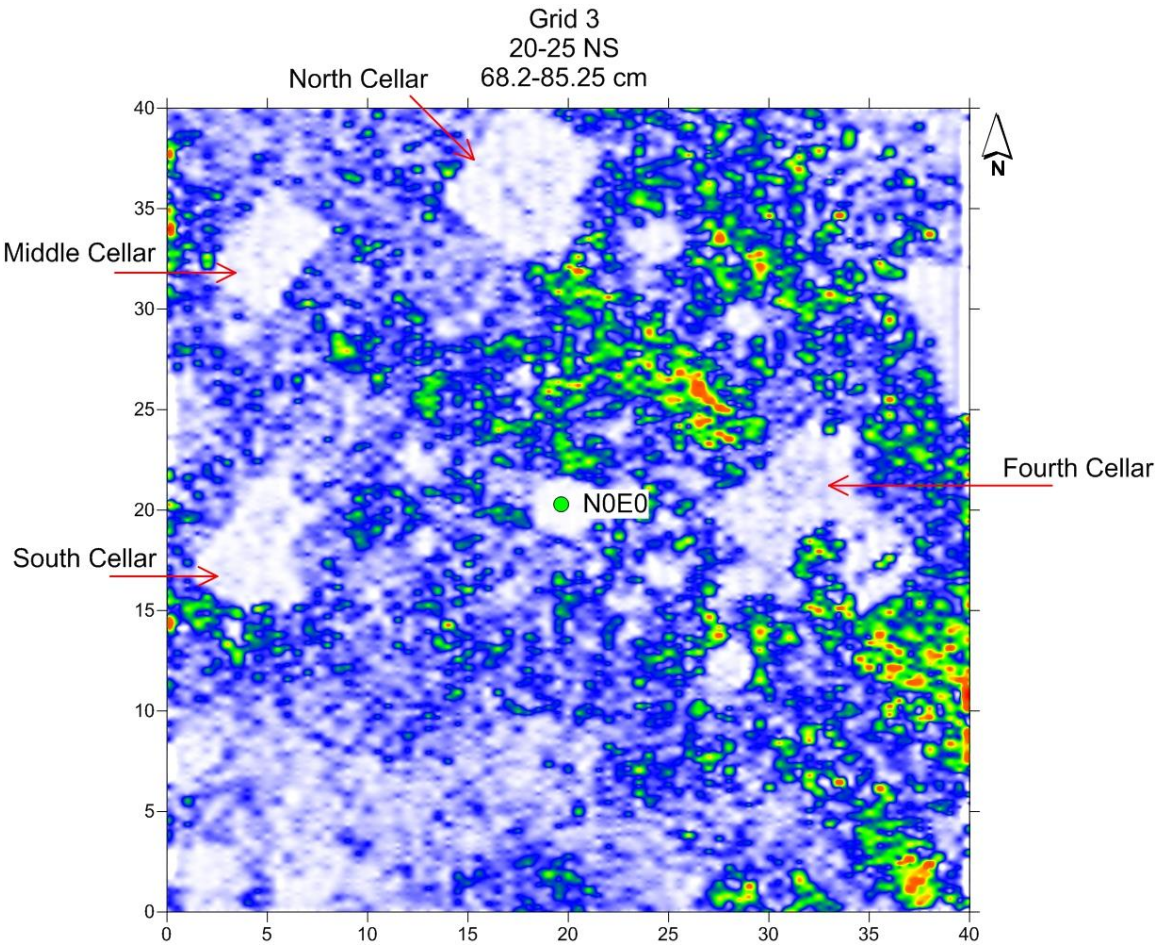


Figure 4.15: Image of GPR amplitude slice map showing the four cellars located at the Hollister site. The north, middle, and south cellars were excavated in 3x1 meter trenchs. The fourth cellar did not have an excavation unit but a 50x50 centimeter shovel test pit was dug by members of FOSA.

Shovel Test Pits

Dr. Jones plotted 36 shovel tests pits (STPs) around the cluster of cellars (Figure 4.14). These STPs were dug by Natural Resources Conservation (NRCS), members of a local Boy Scout troop, members of FOSA, and local families from the community. Herrick and I helped with monitoring the digging and answered any questions that the

participants had. The test pits were excavated in 10-centimeter levels to at least 25 centimeters below the surface of the earth. Any of the STPs that were not completed during the day were finished by Dr. Jones, FOSA members, Herrick, and me. These test pits were placed to see if any archaeological material was uncovered that could tell us about the occupants of the site and where structures may have been placed on the landscape. The results of the STPs did not tell us anything new about the features, but they did confirm the placement of the cellars and the well shown in the GPR images (Figure 4.13).

Pit Features

There are a number of pit features visible in the GPR images (Figure 3.16). We hypothesized that these features might be part of a palisade that was constructed at the site in 1675 (Adams 1904, 205). Herrick and I chose to excavate one of these pit features that appears in both the GPR amplitude slice-maps and the profiles (Figure 4.16). The feature looks like a round area of distinct low-amplitude within the GPR map. Using the GPR images, we determined the exact depth and location of this feature to excavate it. Within the GPR profile, the pit feature truncates the natural stratigraphy at a depth of about 50 centimeters. The unit was 1x1 meter and labeled as N30W30/N29W30.

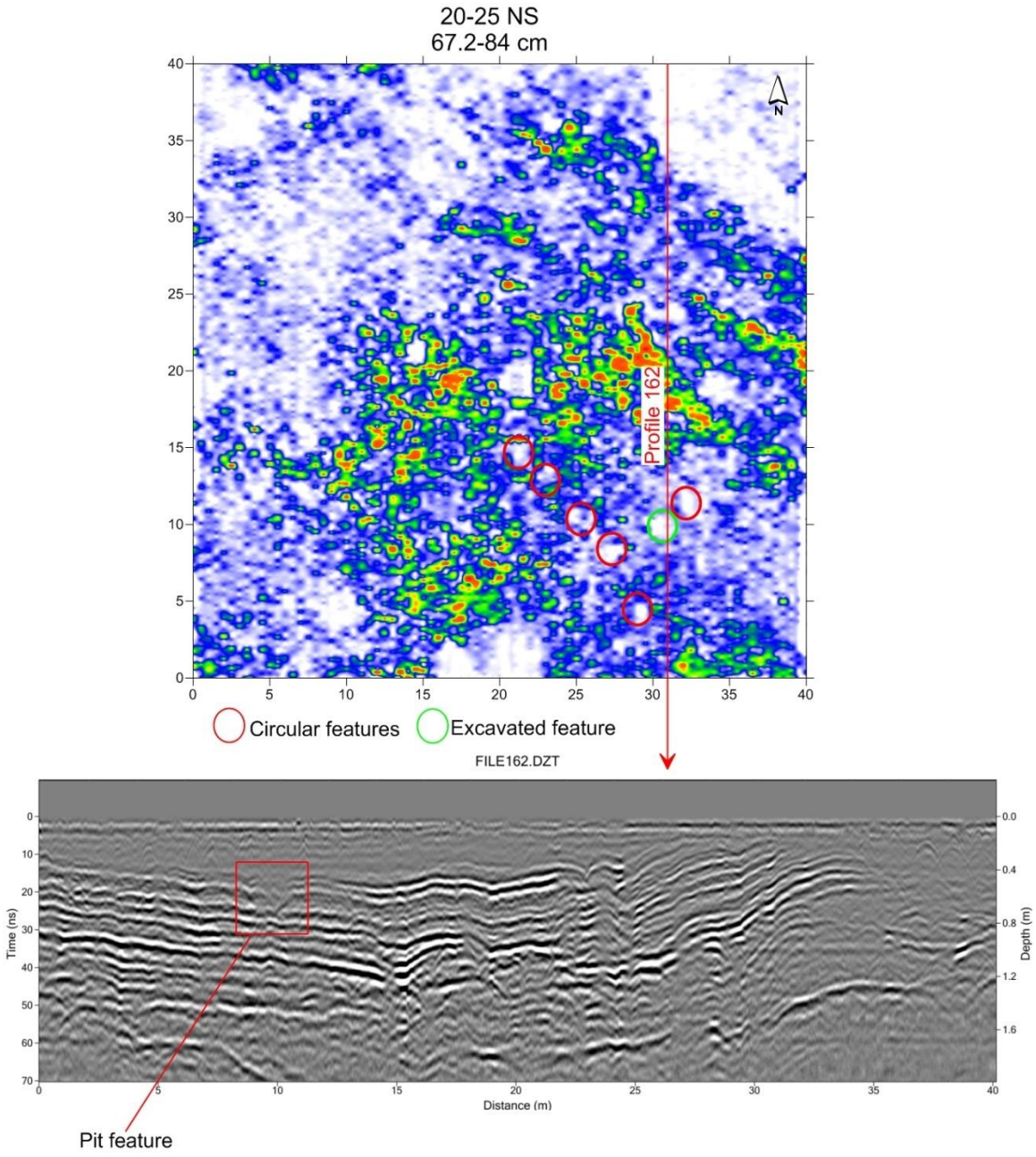


Figure 4.16: Top: Ground-penetrating radar slice map of grid 2 at 20-25 ns. This image shows the location of the pit features that we recognized in the slice maps and hypothesized that they may be part of a palisade built by Hollister at his farm. Bottom: Profile of the same pit feature. The red square shows where we located the feature, its depth, and location within the grid.

Herrick and I thought that this feature would produce a stain in the soil at about

50 centimeters, indicating a posthole. We started by excavating the first 20 centimeters to

get through the plowzone, which contained dark soil. Below the plowzone, the soil turned to a more yellow color (Figures 4.17 and 4.18). We continued to excavate but did not see any soil changes until about 55 centimeters below the surface of the ground. At this level, there were distinct differences in the texture of the soil between the north and south parts of the unit. We also found a lot of charcoal at this level. We continued to excavate in 10-centimeter levels until we reached 73 centimeters. At this level, we saw a black, linear feature in the SW quadrant of the unit (N29W30 NW). We leveled the entire unit to 73 centimeters and then continued to 85 centimeters. There was a thick black stain in the northern quadrants (N30W30 SW and SE) but we did not find any soil changes that indicated a posthole feature. Instead, it is hypothesized that this feature may have been an old tree throw, a bowl-shaped depression that is often created when a stump is pulled out of the ground (Dr. Brian Jones, personal communication, 2016). Even though this feature was not the posthole that we hoped for, it is still interesting to note that the GPR was able to distinguish the disturbance of the soil with the surrounding materials. The sensitivity of the GPR is one of the primary reasons why it is beneficial to survey the landscape before any excavations take place.

Figure 4.17: This unit (N29W30 N½, N30W30 S½) was identified in the GPR images as a pit feature. Herrick and I hypothesized that this could be post hole from the fortification of the Hollister farm in 1675 (Adams 1904, 205). We started by excavating the first 20 centimeters to get through the plowzone, which contained dark soil. Below the plowzone, the soil turned to a more yellow color (28 cm below surface). We continued to excavate but did not see any soil changes until about 55 centimeters below the surface of the ground.

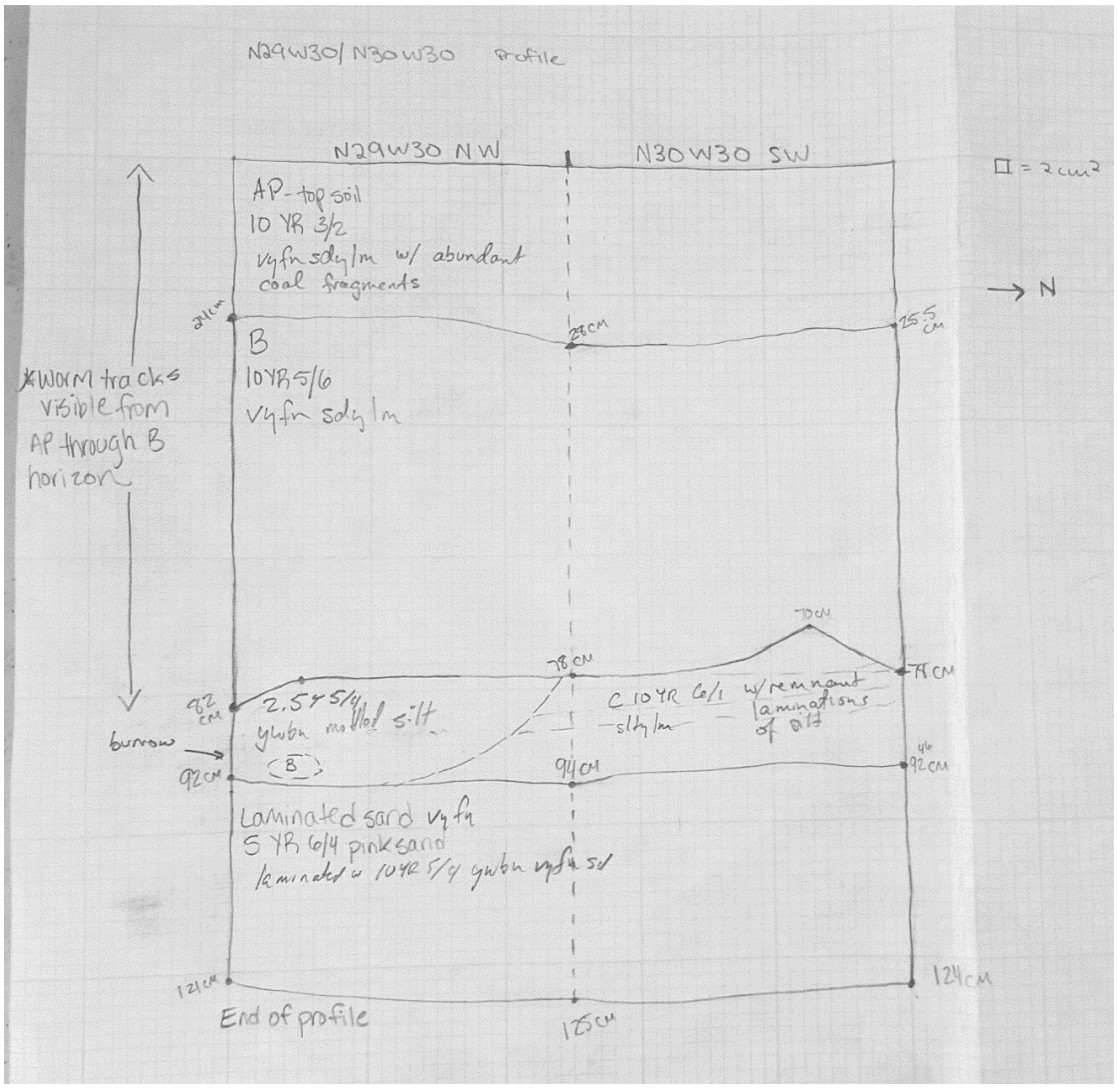


Figure 4.18: This is a profile drawing of the unit (N29W30 N½, N30W30 S½) identified in the GPR images as a possible posthole. Herrick and I excavated in 10-centimeter levels until we reached 73 centimeters. At this level, we saw a black, linear feature in the SW quadrant of the unit (N29W30 NW). We leveled the entire unit to 73 centimeters and then continued to 85 centimeters. There was a thick black stain in the northern quadrants (N30W30 SW and SE) but we did not find any soil changes that indicated a posthole feature. Instead, it is hypothesized that this feature may have been an old tree throw (Dr. Brian Jones, personal communication, 2016).

Oblong Feature

Another interesting feature in the GPR images is an oblong-shaped feature, located to the west of the cluster of cellars (Figures 4.19). This feature is located in GPR

grid 3 and partly in grid 4. It is shown as a low amplitude area within the slice-maps and the profile shows this feature truncating the natural stratigraphy (Figure 4.19). Because of its size and irregular shape, Herrick and I thought that this might be a midden or a trash dump of some kind. We excavated a 50x50 centimeter test pit with the southwest corner at N10E19 (Figures 4.14, 4.19 and 4.20). We dug in 10-centimeter levels to about 110 centimeters beneath the surface of the ground. We reached pinkish granular glacial sediment at about 110 centimeters. Only a few fragments of European pottery and a piece of quartz were found in this test pit.

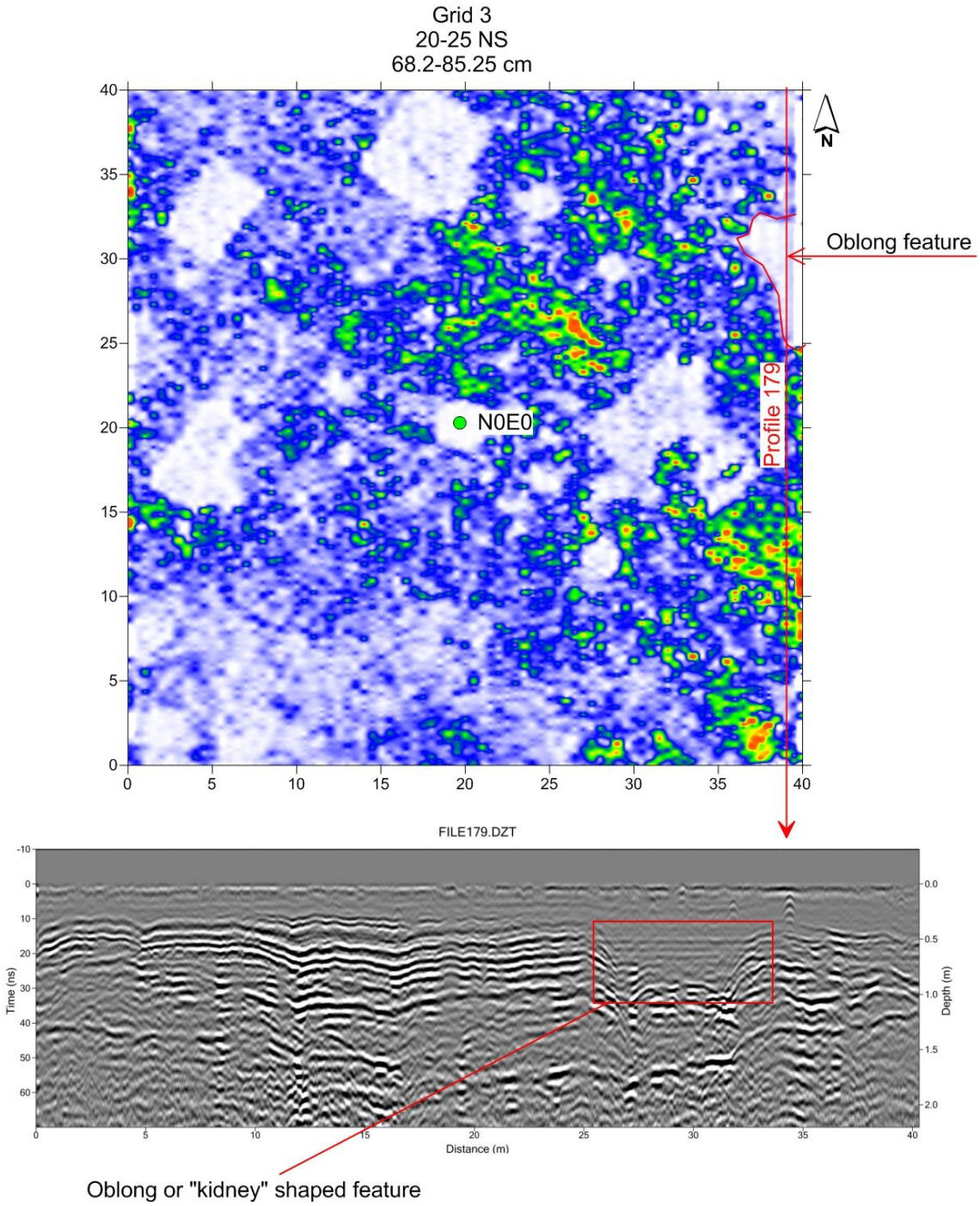


Figure 4.19: Top: Ground-penetrating radar slice map shows where the oblong or "kidney" shaped feature sits within the grid. Bottom: Profile 179 from the GPR images shows this feature as a large pit that truncates the natural stratigraphy within the ground.

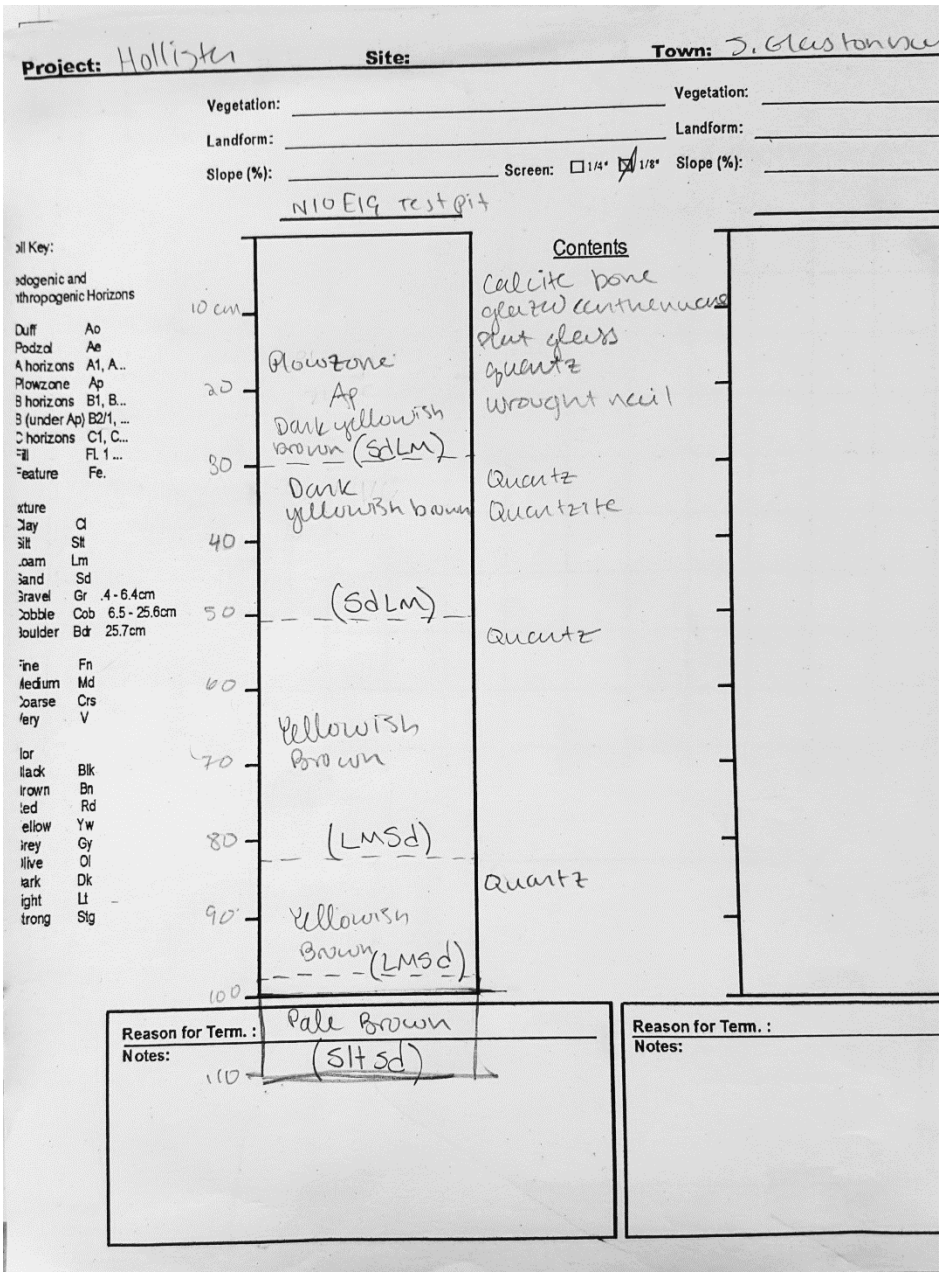


Figure 4.20: Profile drawing of the 50x50 centimeter test pit with the southwest corner at N10E19. Herrick and I dug in 10-centimeter levels to about 110 centimeters beneath the surface of the ground. We reached pinkish granular glacial sediment at about 110 centimeters. Only a few fragments of European pottery and a piece of quartz were found in this test pit.

Due to the lack of artifacts in this test pit, we were quite sure that it was not a midden or trash dump as these features contain a large quantity of discarded materials.

Since this feature is somewhat similar to the other oval features in the GPR images (Figure 4.13), this could be the remains of an Indigenous household located close to the European settlement. The small amount of pottery sherds collected from this feature were mostly European with pieces of quartz found throughout. However, we did uncover a partially knapped quartz artifact as well (Figure 4.21). The oval or oblong shape of the feature, the small amount of European pottery sherds, and the quartz artifact support the idea that this may have been an Indigenous household at one time. Further excavations are needed to confirm the nature of this feature and if it is cotemporaneous with the Hollister farmstead.

Figure 4.21: This piece of quartz was found partially knapped within the test pit that Herrick and I excavated (N10E19 SW). The small amount of European pottery sherds, and the quartz artifact support the idea that this may have been an Indigenous household that most likely traded materials with the Europeans.

Artifacts from the Hollister Site

University of Connecticut graduate students under the supervision of Dr. Brian Jones catalogued all of the artifacts from the 2016 excavations. Although many different types of artifacts were uncovered, I chose to focus on the European and Native American pottery, the clay tobacco pipes, and the botanicals recovered from the Hollister site. The

European ceramics present at the Hollister site consist of fine luxury items as well as utilitarian vessels for every day household activities. Some of the more uncommon ceramics excavated from the Hollister site were Ballarmine and German stoneware, Persian bleu delftware, and a large fragment of North Italian slip-decorated earthenware (Figures 4.22-4.24). Some of these items may have been brought over with Hollister when he migrated from Europe, such as the piece of North Italian slip-decorated earthenware as it dates to an earlier time period than the occupation of the site (Dr. Brian Jones, personal communication, 2016). However, other ceramic sherds like the German stoneware and delftware were luxury items during the mid-17th century that wealthier members of society were able to obtain from European merchants (Noël Hume 1969, 102, 105, 109, 111-112, 276-279). The presence of these fine ceramic sherds show that Hollister was successful enough to afford luxury items and that he maintained connections outside of his farm. These artifacts are evidence of local and regional trade networks that were an important part of the Hollister's survival and his success.

Figure 4.22: Fragments of German Rhenish stoneware from the 2016 excavations at the Hollister site.

Figure 4.23: Fragment of Persian bleu delftware from the 2016 excavations at the Hollister site (middle cellar, N10-12W15).

Figure 4.24: Fragment of north Italian marbleized slipware from the 2016 excavations at the Hollister site. Right: interior of vessel. Left: exterior of vessel.

Even though Hollister did possess fancy pottery, earthenware and Native American pottery were also uncovered from the 2016 excavations (Figure 4.25 and 4.26). These types of ceramics were not as finely made and were probably used for utilitarian purposes rather than entertaining as they appear to be large storage vessels (Herrick 2017, 138). Earthenware was the easiest and cheapest to make and therefore became one of the most common types of pottery during the 17th century (Noël Hume 1969, 102). This can be seen in the abundance of earthenware fragments found throughout the excavations. Native American pottery was also a prevalent material, especially in the middle cellar trench (N11W15 and N12W15). It was probably used for similar purposes as the earthenware due to its durability and its local availability (Herrick 2017, 135, Noël Hume, 1968, 98-99). The presence of Native American pottery shows that Hollister did

not discriminate against using Indian made products and supports the idea that he was on friendly terms with the nearby Indigenous community.

Figure 4.25: Earthenware jar rim (courtesy of Dr. Brian Jones, summer 2018 excavations).

Figure 4.26: Native American pottery fragments from the 2016 excavations at the Hollister site. This vessel has a rim diameter measuring 35-40 centimeters, or 9.84-15.75 inches, making it a very large vessel (Herrick 2017, 138). Top: Two sherds refitted. Bottom: Six sherds refitted.

In addition to the ceramic vessels excavated at the Hollister site, there was also a large quantity of clay tobacco pipes. With the help of Dr. Brian Jones and Scott Brady (FOSA member), I inventoried all of the red clay and kaolin tobacco pipe fragments from each unit and test pit (Appendix II). I recorded information to keep track of the count, the unit location, type of material, bore diameter measurement (4/64", 5/64", 6/64", 7/64", and 8/64"), decorations, and any other details about the pipe that may be important. Since I was unable to attend the 2017 excavations, Dr. Jones shared the tobacco pipe data with me for that season. Altogether, 887 fragments of red clay and kaolin tobacco pipes were recovered from the site during the 2016 and 2017 excavations.

In the 1950s, J.C. Harrington studied thousands of clay pipes that were excavated from Jamestown and other colonial Virginia sites. He noticed that there was a relationship between the diameter of the pipe stem bore and the period from which the pipe belonged. Harrington found that the earliest pipes dating to 1600 had stem bore diameters measuring to 9/64-inch and by 1800 this diameter decreased to 4/64 of an inch (Agbie-Davies 2014, 39-40, Noël Hume 1969).

Lewis Binford later devised a mathematical regression formula, based on Harrington's histogram of time period for calculating the mean date of occupation for an archaeological site by using the 64-inch diameter measurement of the tobacco pipe stem bores (Agbe-Davies 2014, Barca 2012, McMillian 2010, Noël Hume 1969). A few years later in 1972, Robert F. Heighton and Kathleen A. Deagan presented a new regression formula that is much more accurate than Binford's linear regression formula. They

suggested that the bore diameters should be applied to a curvilinear line and formulated a two-part equation, a logarithmic formula and a point of origin formula:

$$X=(-\log Y+1.04435)/\ 0.05324),$$

$$\text{date}=1600+22X$$

To solve for the curve and calculate the mean date, there are three steps to follow (Appendix III): (1) determine *Y*, the mean bore diameter. The *Y* value or mean bore diameter is then converted to its logarithmic form, (2) solve the first equation using the logarithmic form of *Y*, and (3) The last step is to use *X*, which is calculated by the first equation, to solve the second equation. In this formula, 1600 is the date of the point of origin or the theoretical start date of the stem-bore size. Twenty-two is the estimated number of years between each decrease in size of the bore diameter (Heighton and Deagan 1972, McMillan 2016). To determine when the Hollister site was most likely occupied, I measured the diameter of the pipe stems from the excavation and used Heighton and Deagan's formula to calculate the mean date for occupation for the Hollister site at 1676 (Appendix III). This date aligns perfectly with the historical records and confirms that this farmstead operated from about 1640 to 1711.

The majority of the pipes were made from kaolin, which is a hard, white clay imported from England. Others are made out of local red clay (Agbe-Davies 2014, Groover 2008, Harper, Harper and Clouette 2010, Dr. Brian Jones, personal communication, 2106, Noël Hume, 1969) (Figure 4.27). Out of all the pipe fragments from the 2016 and 2017 seasons, 61 or 9% are red clay (Figure 4.28). The red clay material is native to this region and not found in England (Henry 1979, Zeilinga de Boer,

2011, 75-76). The difference in pipe material is intriguing as it points to a difference in how they may have been acquired and their manufacture. This also indicates that these red clay pipes were probably locally produced, bought, and used. However, because there is such a small amount of red clay pipes, a local manufacturer was probably not the normal avenue of acquiring tobacco pipes. Typically, tobacco pipes were made in England and imported to the colonies through European merchants. Either way, the presence of both types of pipes further supports the idea that Hollister was involved in both local and international trade networks, an important industry that supplied both materials and knowledge.

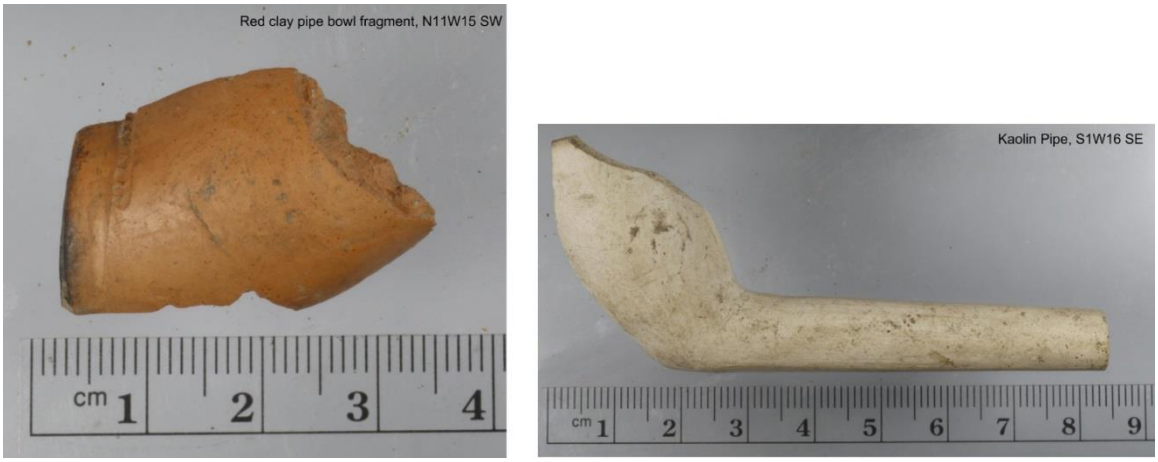


Figure 4.27: These two images are clay pipes from the Hollister site (2017). Top picture shows a white kaolin pipe with a partly intact bowl and stem. Bottom picture shows the bowl of a red clay pipe.

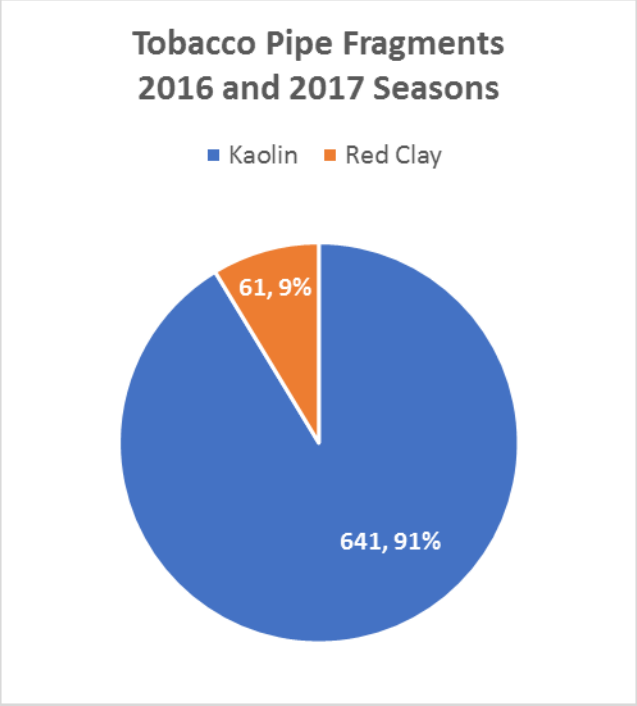


Figure 4.28: Pie chart showing the number of red clay and kaolin tobacco pipe fragments at the Hollister site. Seven hundred and two fragments were found altogether during the 2016 and 2017 summer excavations.

The location of the Hollister farmstead was outside of the main town of Wethersfield and relied on other entities to obtain the resources they needed. In this regard, the activity of exchange was extremely important for Hollister's livelihood. This experience shows that even though the Hollister farmstead was not directly linked to a city center, a strong enough network was in place to provide materials from both England and local merchants.

The last set of data that I discuss from the 2016 and 2017 excavations at the Hollister site are the botanical and faunal remains (Appendices IV and V). Maize was the primary crop grown at the Hollister site and is directly linked to Indigenous agricultural practices and was the first crop planted at colonial farms that produced a good yield without the plowing, hoeing, and fertilizing that other crops required (Daniels 1980, 430).

The botanicals at the site show that Hollister mainly grew beans and maize. Beans were commonly planted within the hill of the corn so that the beans could climb along its stalks. Hollister most likely utilized this practice as it was a common method of agriculture in the 17th century. The abundance of maize botanicals shows that Hollister was not afraid to foster relationships with the Native Americans and exchange agricultural knowledge with them. Cherries, grapes, and wheat were some of the other crops grown at the Hollister farm and were probably used to make specialty products that could be sold for profit such as cider, brandy, and flour (Taylor 1979, 93-94). The presence of these crops show that Hollister was a savvy businessman who did not grow produce just for survival but capitalized on specialty crops that could be exchanged for other goods. This shows that the industry of trade was intense and widespread even into remote areas of the hinterlands before transportation was reliable and global trade became prominent.

The faunal materials at the Hollister site also support the idea that Hollister was a wealthy farmer and utilized all different types of resources to be successful. Shells from oysters, deer, sheep, cow, pig, turtle and fish bones were all part of the faunal collection and communicate to us that the occupants at the Hollister site ate quite well with a mixture of both wild game and domesticated animals. Hunting and taking care of livestock can be time consuming. Historical documentation suggests that Native Americans were hired as laborers for tasks around the farm such as hunting and watching cattle (Anderson 2008, 501). With the nearby community of Indians, it is likely that Hollister hired them as workers around the farm for miscellaneous labor. This interaction

between the Indigenous community and the English settlers is an important aspect of Hollister's experience in the 17th century Connecticut and supports the idea that beneficial relationships developed between these two groups. This directly conflicts with some of the historical narratives that describe the interactions between English and Native Americans as being violent, discriminatory, and filled with tension (Taylor 1979, Lavin 2013, 324-236).

Evidence of Hollister's socioeconomic status and his trade connections are evidenced by the fine ceramic materials he possessed, the clay tobacco pipes, and the presence of Native American pottery in the European cellars. Luxury ceramics give evidence to Hollister's wealth and show that he was a successful farmer involved in local and regional trade networks.

The red clay and kaolin tobacco pipes also support this assertion as the red clay is a local material in Connecticut and kaolin is directly linked to English manufacture (Agbe-Davies 2014, Barca 2012, McMillian 2010, Noël Hume 1969). Native American pottery at the site provides evidence that Hollister did trade with the Indigenous community in some sort of capacity. This connection likely played a part in the success of the farmstead as transportation was an ongoing challenge in early colonial Connecticut and could sometimes hinder the ability to trade with other English settlements (Taylor 1979, 90).

The botanical and faunal materials further support these assertions by showing the agricultural nature of the site by the types of crops grown (maize, wheat, cherries, grapes, and beans) and reveal that the Hollister's diet was rich and varied, mainly composed of

natural game and some domesticated animals like sheep, cow, and pig. These particular artifacts show that the Hollister site focused on agriculture and produced a surplus of specific crops that were used for in-demand products. This practice contrasts from accounts of 17th century Connecticut farmers only practicing subsistence farming for survival and shows that many of our historical narratives are incomplete in their descriptions of early agricultural practices in colonial Connecticut (Anderson 2008, Daniels 1980, 432, Taylor 1979).

Conclusion

It is apparent from the magnetic and GPR images that there are a number of anthropological and geological features present at the Hollister site (Figures 4.2-4.6, and 4.13). These images provide a better understanding of the different types of features present, their construction, and location. The GPR images were then used to guide excavation units and shovel test pits (Figure 4.14). Many different artifacts and botanical materials were recovered from excavations (Appendix IV and V) and provide more data from which to draw conclusions about the people that lived on this landscape such as how they interacted with each other, how they used the land, and the types of activities they were involved in.

One aspect that these data show is that this land was specifically used for agricultural purposes. The spatial organization of the farmstead shows that Hollister intentionally placed household dwellings close together with a well located nearby (Figures 4.12 and 4.13). This created an energy efficient environment to complete tasks around the farm showing that Hollister was deliberate in creating a successful farming

operation (Adams 1990). The remains of both faunal and botanical materials also show that Hollister was involved in agriculture (Appendix IV and V). Bones from livestock such as cows and pigs were present in the faunal remains and the types of crops Hollister grew, such as maize, grapes, beans, and cherries show in the botanical report (Farley 2018). All of this information shows that Hollister maintained an agrarian lifestyle but also produced a surplus of agricultural products that was beyond what the family needed to survive. In the 18th century, specialization became the dominant mode of agriculture in Connecticut (Daniels 1980, 432, Taylor 1979, 90-92) with entire regions and towns devoted to producing specific types of products like meat and dairy. Hollister's agricultural methods are an important aspect of his experience as a first-generation colonist. They show the development of agricultural practices over time and that many of the preconceived ideas about colonial famers only practicing subsistence farming is incorrect (Taylor 1979, Trumbull 1818).

Not only was Hollister involved heavily in agriculture for his livelihood but artifacts like European ceramics, red clay and kaolin tobacco pipes, and Native American pottery communicate that the Hollister farm was not completely secluded from resources provided by the nearby English and Indigenous communities (Figures 4.22-4.26). Although these items could have been manufactured on the farmstead, the probability is not likely due to the range of different types of materials that originated from other areas and cultures. Examples of this are the local earthenware, tobacco pipes, German stoneware, North Italian slipware, and kaolin tobacco pipes that were uncovered from the Hollister site.

Global exports were not as prevalent in Connecticut during the 17th century due to the lack of transportation and the inability to specialize in certain products because of the fledgling colonial economy (Taylor 1979). This encouraged England to export goods to the Colonies for profit and since many of the Colonies were struggling to survive, materials from England were critical. The abundance of European ceramics and kaolin tobacco pipes at the Hollister site attests to this occurrence (Appendix IV). Even though it is unlikely Hollister was exporting items internationally, the tobacco pipes, and the European and Native American pottery show that Hollister was involved in trade networks that provided these materials. The presence of maize, grapes, and cherries also supports this assertion as these crops were in high demand for products like corn meal, brandy, and cider (Taylor 1979). The presence of these artifacts give testament to the trade connections that Hollister maintained, which assist in understanding how remote farmsteads like the Hollister site were connected to trade networks in 17th century agrarian Connecticut.

The final aspect of my data analysis focuses on the relationships between the English settlers at the Hollister site and the Indigenous community. The GPR images were a key element in understanding how this landscape was utilized by these two groups of people and show that they may have been sharing this landscape at one time. This close proximity indicates that there was some sort of interaction between these groups (Figure 4.13). Excavations and artifacts further support this hypothesis by identifying the oval structures found in GPR images as Native American and by the presence of Native American artifacts scattered throughout the site, especially the pottery located in the

excavation trenches of the middle cellar (N11W15 and N12W15) (Figures 4.25 and 4.36). Interpretation of these data support the idea that Hollister fostered positive relationships with the nearby Indians. This connection may have allowed Hollister to obtain both materials and knowledge, such as pottery and the cultivation of maize (Daniels 1980, Taylor 1979). These interactions are different than what has previously been thought based on the historical narratives of violence and discrimination between these disparate groups (Daniels 1980, 431, 449-450, Taylor 1979).

The Hollister site provides an opportunity to further define the interactions between first-generation settlers and Native Americans in the 17th century before issues such as slavery, bigotry, and civil war became serious issues of society. These data analyses reveal that part of Hollister's worldview revolved around agriculture, trade, and his relationships with the Indigenous community. Using multiple research methods is imperative for this research because it provides multiple facets of data that are combined to communicate the experience of Hollister as a first-generation settler in 17th century Connecticut. This is important because this period of time is largely undocumented in our North American history and the information we have received through historical narratives is not always accurate. Most of what we do know about early settlers comes from court records, probates and other official documentation. Researching the Hollister site provides more personal information about the Hollister family and the people who lived there. This information can then be used to show changes over time in the subjects of agriculture, trade and relations with Indigenous peoples. The industrial 18th century introduced specialized farming, global trade networks, racism, slavery, and civil war

(Daniels 1980, 431, 449-450, Taylor 1979). Through the influence of historical literature, these characteristics are often associated with all colonial experiences (Anderson 2008, 496-497, Taylor 1979, Lavin 2013, 324-326). The Hollister site is an example of how this line of thinking is often in error and shows that the experiences of early colonial life in Connecticut was quite different than many historians suggest.

CHAPTER FIVE: INTERPRETATION

Multiple methods were used to collect data about the features and artifacts at the Hollister site. Analyses of these data provide insight into various aspects of agriculture, trade, and interactions between the English and the Indigenous people. Interpretation of features and artifacts at the Hollister site connected to these activities revealed that many historical narratives for 17th century Connecticut misrepresent the experiences of early colonial settlers (Taylor 1979, Trumbull 1818). These historical accounts are written from a European viewpoint that is often bias and offers little credence to other perspectives, like the Native Americans. This European viewpoint often describes colonists as unrelenting, privileged, and oftentimes a victim when injurious events occurred between the Native Americans and the English (Taylor 1979, Trumbull 1818). This description has influenced many narratives on early colonial farmers, introducing the idea that they were obsessed with civilizing the wilderness and that they were self-sufficient entrepreneurs who primarily lived in remote areas, kept to themselves and had limited access to trade networks (Anderson 2008, 496-497, Taylor 1979, Trumbull 1818, Wright 1957). Archaeological evidence presented here from the Hollister site suggests that at least in this farmstead, early English colonists in Connecticut were involved in a variety of different interactions including responsible farming techniques, extensive trade networks, and fostering relationships with the local Indigenous community, which is in many ways contrary to the prevailing historical narratives.

One way to interpret the issue of differing scholarly perspectives is by drawing on the theory of Post-colonialism (Hawley 2015), which critiques Western discourse that advances a Western world view to the extent of excluding the "other" or non-Western views. That is, these Western perspectives are fundamentally ethnocentric and do not recognize the values and practices of non-Western cultures (Coghlan and Brydon-Miller 2014). Even though primary historical documents such as probate records, court records and other such official documentation do exist for the Hollister site, many of these documents lack personal details and are written by the English. This is why it is important to use archaeological evidence and historical documentation together to help modify some of these narratives to present a more well-rounded view of the experience of some of the early settlers in Connecticut (Deetz 1977, 7). The activities of agriculture, trade, and the beneficial relationships that developed between the English and the Native Americans at the Hollister site are discussed below to illustrate a different perspective of early colonialism that varies from the intent to dominate or control the local environment as many narratives have suggested (Anderson 2008, 496-497, Scoville 1953, Trumbull 1818).

Agriculture at the Hollister Site

In the early 1630s, English colonists migrated from Massachusetts to the Connecticut River Valley for religious freedom and to take advantage of the abundant natural resources such as rivers, lakes, rich soil, wood, fruits, nuts, berries, and wild animals (Trumbull 1818, 1, 37-39, Taylor 1979, 10, Van Dusen 1961, 11-12). These natural resources and the practice of agriculture played a fundamental role in supporting

the livelihood of English settlers. The importance of agriculture is shown in the layout of the first towns in Connecticut. Towns were usually centered on a main road with secondary roads providing access to outlying farms (Taylor 1979, 67-69, 91). Planting fields were often separated into narrow strips with allotments scattered across individuals so that the best and poorest lands were divided evenly (Figure 5.1). Farmers who had these strips of land were required to travel between their land holdings and their home lot in order to attend their crops and livestock. An example of this is at the Hollister site where research suggests that Lt. John Hollister lived in the town of Wethersfield but regularly traveled from his home to tend other properties such as his farm in Glastonbury (Case 1886, 27, "Estate of John Hollister, Town of Wethersfield" 1665). According to his will, Lt. Hollister owned a barn, orchard, and house in Wethersfield, 59 acres in "ye great meadow & Swamp," 10 acres in "ye plaine," 18 acres "woodland," 60 acres of "plowing & mowing with other land," and the "Noag [Glastonbury] house and barn, orchard & pasture" ("Estate of John Hollister, Town of Wethersfield" 1665). Land was a valuable commodity for the English settlers because it provided the ability to grow crops, raise livestock, and establish a home (Wright 1957, 29-30). The amount of farmland that Hollister owned shows that he, his family, and dependents did more than just grow crops for survival, as many historic narratives suggest (Daniels 1980, Taylor 1979, Wright 1957). Evidence derived from the botanical remains at the Hollister site also indicate that Hollister grew a variety of crops that were intended for profit, such as cherries and grapes that could be made into brandy and wine.

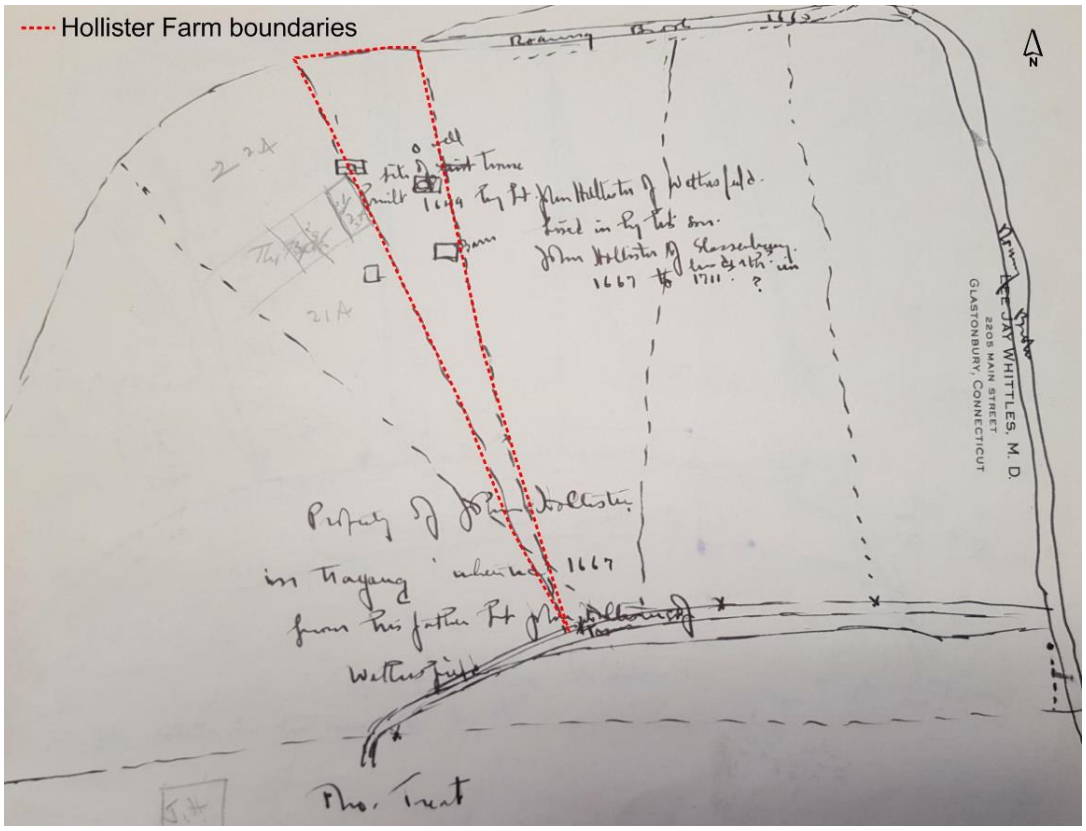


Figure 5.1: This document is located in the archives at Glastonbury Historical Society in Glastonbury, Connecticut. Dr. Wittles was a local historian who was interested in the history of the Hollister family. During his research, he identified where some of the historic land boundaries were located. The red dotted lines show the possible boundary of the Hollister farm. Even though this drawing may not be completely accurate, Dr. Wittles does show how farming land in Colonial Connecticut was divided into narrow strips providing equal land quality to all farmers.

Land was more abundant when settlers first arrived to Connecticut, so instead of investing time into intensive cultivation of existing fields, they cleared new lands (Anderson 2008, 503). Much criticism has been placed on the farming techniques of 17th century Connecticut, claiming that colonists were primarily subsistence farmers who were careless with their livestock and wasteful with their farmland by not manuring and rotating fields instead of crops (Daniels 1980, 430-431, Scoville 1953, Taylor 1979, 94). However, data collected from the Hollister site and entries from the diary of Thomas

Minor who lived in Stonington, Connecticut (1653-1685) show that despite these criticisms, not all English colonists in 17th century Connecticut were subsistence farmers or wasteful. Instead, we see that Hollister was intentional in how structures were placed on the landscape and that he specifically grew certain crops to make a profit in the market place. This is seen in the way that the farm was arranged, the types of crops that were grown, and the farming techniques that were used.

At the Hollister site, structures on the landscape were intentionally arranged for the farm to be efficient (Adams 1990, Groover 2008 32, 37-38). The GPR and magnetic images show that the home, kitchen, and wells were all centered closely together on the landscape (Figure 4.13). This indicates that activities such as cooking, tending the kitchen garden, gathering water, or repairing equipment all took place close to together so that less time and energy was used for these tasks. Tending fields and livestock were regularly occurring activities as well but did not necessarily take place each day. There are a few structures at the Hollister site that have been placed farther away from the home, like the European cellar located directly southwest of the main household (Figure 4.13). This feature probably indicates an outbuilding, such as a barn or shed, that was placed closer to the animal pens or pastures and used for farming activities and storage. Outlining these structures on the landscape shows that this farm was intentionally built for efficiency and long-term investment (Adams 1990). If this was not the case, structures on the landscape would have been placed more haphazardly without intentionally arranging buildings according to their function.

Sometimes it can be difficult to determine the exact activities that took place on the landscape by past peoples. Fortunately, the Hollister family left behind subsurface features that can provide some insight to the activities that they performed. Comparing the layout at the Hollister site with the William Strickland site in Delaware from the mid-1700s shows that arranging structures on the landscape by how intensely they were used was a common practice for colonial farmsteads (Groover 2008, 37, 38) (Figure 4.12). The organization of the Hollister farm shows the dwelling, kitchen, and wells were all grouped close together. These buildings allude to energy intensive activities that took place daily like cooking, repairing farm equipment, and gathering water from the well. Tending animal pens and pastures did not require large amounts of energy on a daily basis and were usually located farther away, which is implied by the placement of outbuildings farther away from the main household (Adams 1990) (Figure 4.12). This layout is quite similar to the William Strickland site, which dates to the mid-1700s and is quite a few years older than the Hollister site (ca. 1640-177). This is interesting because although the William Strickland site dates to a later time period, the layout of the structures at the Hollister site are similar and support the hypothesis that the buildings were intentionally arranged for efficiency (Adams 1990) (Figure 4.12). Even though many historians have suggested that early colonial farmers were somewhat backwards in their techniques and only farmed for themselves and their families, the Hollister site tells a story of intentional farming for long term investment and profit through the placement of the structures on the landscape according to their function and how much energy

certain tasks required (Anderson 2008, 496-497, Daniels 1980, 431, Hooker 1936, 10, Taylor 1979, Trumbull 1818).

Despite the fact that little archaeological evidence has been uncovered for how Hollister actually farmed this land, the diary of Thomas Minor from Stonington, Connecticut, also from the same time, provides insight into the techniques that Hollister probably used about 60 miles away. Minor (1653-1685) was a colonial farmer who wrote a diary that provides details similar to an almanac for recording weather, farming practices, and business transactions. He writes that he used manure on fields whenever possible to make the soil more fertile and burned his planting fields in March, mixing in the ashes with the soil to restore nutrients (Anderson 2008, 504). Evidence of burned phytolith material from the Hollister site suggests that Hollister practiced similar techniques in burning his fields to amend the soil nutrients (Dotzel 2018). Even though historical narratives criticize the methods of early 17th century farmers in Connecticut stating that they practiced "land butchery" and were "wasteful" of our natural resources (Scoville 1953, 178). These practices show that both Minor and Hollister were concerned with making their farms sustainable for long term and in the process adopted techniques that historians rarely attribute to English settlers such as burning fields and using manure to nourish the soil (Daniels 1980).

Historians state that specialization of agriculture in Connecticut occurred by region and town beginning in the early 18th century (Daniels 1980, 432, Taylor 1979, 92-94). Commercial farming advanced during this time and meat and dairy products became the dominant form of agriculture in Connecticut. Even though specialization in

agriculture was not prevalent before the 18th century does not mean that farmers were not growing specific crops for commercial purposes. Evidence from the botanical materials uncovered from the Hollister site shows that Hollister was mainly growing Indigenous domesticated crops such as beans and maize (Farley 2018). However, grapes, cherries, and wheat were also cultivated and most likely sold for a profit or used to make brandy, wine, and flour, which were popular commodities in Connecticut during the 17th century (Oliver 2005, Taylor 1979, 93-94). Even though there is not yet direct archaeological evidence of an apple orchard at the Hollister site, Lt. Hollister's will states that his son was to provide bushels of apples to Joanna, his widow, as long as the orchard prospered ("Estate of John Hollister, Town of Wethersfield" 1665). This indicates that Hollister also had a successful orchard and most likely sold the apples for profit or made them into cider (Oliver 2005, Taylor 1979, 93-94).

In addition to the types of crops grown, another line of evidence that supports the idea of commercial farming at the Hollister site is the size of the household cellars. These cellars measure a little over 5 meters in length and width (Figure 4.15). The exception is the middle cellar that is slightly smaller. It was common for cellars during this time to be as small as a few feet long or wide (Harper 2012, Harper, Harper and Clouette 2010). The size of these cellars at the Hollister site indicate that they were used to store agricultural or animal products over the quantity needed for the immediate household. The family probably stored commercial products such as cider, grapes, cherries, or flour that Hollister used for trade to obtain items like pottery, salt, sugar, or tools for the farm. The variety of crops that Hollister produced shows that even though intensive farming was

not yet prevalent in the 17th century, Hollister was focused on growing certain crops that were in popular demand, stored them in large cellars, and then traded or sold these products for profit to obtain materials like cloth or other items that were not produced at the farm.

Historical evidence from Minor's diary also shows that colonial farmers did not just grow crops for survival but invested time, energy, and money into growing certain crops that would provide higher profit (Anderson 2008, 499-500). Minor raised a variety of crops including maize, winter and summer wheat, rye, oats, white and gray peas, beans, hops, turnips, parsnips, cabbage and squash. He also had an orchard for apples and pears, grew flax and hemp for making cloth and rope, and owned almost every kind of domesticated livestock including cattle, horses, swine, sheep, and goats. Minor also kept honeybees. These agricultural and husbandry activities show that he was not limited to subsistence farming and probably mimic what Hollister was doing at this time. In Minor's diary, the trips he took to different towns, such as New London and Saybrook, to trade farm products are noted. These locations could be up to 20 miles away, which was a long journey in 17th century Connecticut when roads were rare and the only means of moving goods was by water or with horse or ox drawn carts (Taylor 1979). Minor intentionally planned to grow crops like apples, pears, maize, and wheat so that he could trade and sell his excess produce and realize a reasonable profit (Anderson 2008, 499-500, 504). His experience as a 17th century Connecticut farmer resembles the experiences of many other farmers who worked their land in other places nearby, even if the kinds of agricultural tasks differed (Anderson 2008, 514). Intentionally planning a variety of crops

that could be grown in quantities to provide a surplus above basic family needs reveals the 17th century roots of specialization that would later become prevalent in North America. This also shows that the generally accepted idea that early colonial farmers were only concerned with surviving is quite different than what is presented in Minor's diary and the archaeological evidence from the Hollister site (Daniels 1980, Oliver 2005, Taylor 1979, Trumbull 1818).

The spatial layout of the Hollister site and the variety of crops grown there in the 17th century, show that farmsteads in what were considered remote locations were likely much more advanced than historians have suggested. Hollister built a moderately sized farm and intentionally organized it to be as productive as possible. He also knew that products like flour, wine, brandy, and cider were in demand and deliberately cultivated these crops to provide a surplus. Minor also recorded business transactions in his dairy that show how he actively pursued market opportunities, sometimes traveling miles away to trade farm products like butter (Anderson 2008, 505). Hollister likely looked for these types of opportunities as the size of his cellars attests. These activities show that both Minor and Hollister knowingly practiced farming techniques such as using manure to nourish the soil and intentionally harvesting products that would provide a profit. These techniques do not fit the description that many historians have attributed to colonial farmers in Connecticut in the 17th century as being wasteful and negligent (Daniels 1980, Taylor 1979, Scoville 1653).

Trade Networks at the Hollister Site

Local and regional trade is a difficult activity to follow in 17th century Connecticut as opposed to large merchant operations that kept written accounts. In rural areas, transactions were more likely done face-to-face and if there were written receipts for accounting or log books, they have mostly been lost or destroyed (Hooker 1936, 8-10). Pinpointing specific trading partners can be difficult, but artifacts left behind at the Hollister site indicate that the Hollister's were connected to trading partners from all over the Colonies and Europe (Deetz 1977, 22). Trade was an important activity in the 17th century as colonists in Connecticut wanted and needed materials that only the import of goods could provide. Those items included salt, sugar, molasses, cloth, pewter, iron, glass, nails, and farming and husbandry tools (Anderson 2008, 505, Oliver 2005, 34). Some of these materials became part of the archaeological record. For instance, at the Hollister site there are numerous pottery sherds and tobacco pipe fragments that illustrate various connections to both local traders and European suppliers. These artifacts communicate that the Hollister's were not limited to local traders from Wethersfield or other nearby towns but also had connections to merchants who provided fancy imported European goods. This differs from historical narratives that describe rural 17th century Connecticut colonists as self-sustaining farmers who only participated in local trade and did not have the ability to acquire luxury items such as high-quality ceramic vessels (Daniels 1980, Hooker 1936, Oliver 2005 Taylor 1979).

Many historians have underestimated how intensely 17th century colonial farmers were involved in trade. Daniels (1980, 431) and Hooker (1936, 10) state that trade in 17th

century Connecticut was subordinate to agriculture and only occurred if there was a surplus, which did not occur often as producing enough for home consumption was sometimes challenging in itself. Artifacts and features at the Hollister site, however, show the opposite. The Hollister farm did produce a surplus, as can be inferred by the agricultural practices and the storage volume of the cellars at the Hollister site. It is therefore likely that there was trade not only to large English towns but also into the hinterlands. The presence of these trade networks is supported by Minor's diary. He took many trips to New London, about 20 miles away, to sell large amounts of butter and also recorded several expeditions to Boston to sell cattle (Anderson 2008, 505). These trading expeditions are not commonly discussed in the literature (Hooker 1936, 8-10, Oliver 2005, 34-36, Taylor 1979, 98-99, Trumbull 1818) but evidence recovered from pottery sherds and tobacco pipe fragments at the Hollister site indicate that the Hollister family was not only connected to European merchants but also to the Indigenous community. While historians have given credit to Native American trading partners, often times these relationships were exploited and revolved around specific commodities like maize, beaver skins and brass kettles (Oliver 2005, 34, Taylor 1979, 3, 10-11, Trumbull 1818, 39-40). Even though historians do not typically discuss other transactions that occurred between English settlers and the Indigenous people, artifacts at the Hollister site such as Native American pottery, indicate that the Hollister family was connected in numerous ways to the Indigenous community.

At the Hollister site, a variety of types of pottery were uncovered during excavations. The process of analyzing this pottery is helpful when interpreting how the

Hollister site was connected to trade networks. Once the material, style, and function of the vessel are analyzed, pottery sherds are able to communicate the place of manufacture (Deetz 1977, 16-17, 50-52). Identifying the place of manufacture provides evidence that the Hollister site was connected to various locations throughout the Colonies and Europe. At the Hollister site, an example of this is earthenware (Figure 4.25) and Native American pottery (Figure 4.26) that show connections with the local community and a fragment of German Rhenish stoneware (Figure 4.22) that originated from Europe. These artifacts show that despite the Hollister's rural location, they participated in trade networks with various cultures that extended all over the world. This evidence directly opposes typical historical narratives that describe 17th century Connecticut farmers as conservative entrepreneurs who only traded within their local region (Daniels 1980, Hooker 1936).

Pottery also gives insight into the socioeconomic status of the Hollister family, which is important to take into consideration because not all colonial farmers came from a certain social class (Taylor 1979, Trumbull 1818). Families with modest means could not afford costlier varieties of pottery and the purpose for which they used the pottery varied from wealthier families who participated in entertaining high society guests (Deetz 1977, 50-52). The presence of high-quality ceramic vessels at the Hollister indicates that this family was wealthier than the average farmer and most likely participated in entertaining guests. Even though it was not abnormal for farmers to be prosperous in 17th century Connecticut, historical narratives usually give the impression that many of these farmers only survived from year to year through hard work and persistence with

relatively little material reward (Anderson 2008, Taylor 1979). The Hollister site shows that this narrative is not always accurate and that this rural farmstead was successfully connected to various trade networks that provided the means to acquire luxury items.

The easiest and cheapest type of pottery to make was earthenware, which became the most widely used type of pottery during the 17th century in New England (Noël Hume 1969, 102) (Figure 5. 3). Most of these vessels were utilitarian meaning they were used for purposes like cooking and storing water (Deetz 1977, 51-52). Local potters did not produce as high-quality pottery as was manufactured in Europe until about the 18th century (Noël Hume 1969, 98-99). This resulted in many colonists purchasing vessels from Europe rather than buying them locally (Noël 1969, 98-99). Most of the vessels at the Hollister site are European in origin and support the assertion that many vessels were imported and bought from England. Some of these European ceramics are high quality pieces such as Ballarmine and German stoneware (Figure 4.22), Persian bleu delftware (Figure 4.23), and marbleized North Italian slipware (Dr. Brian Jones, personal communication, 2016) (Figure 4.24). It is possible that some of these items were brought over with Hollister when he arrived in North America, such as the marbleized North Italian slipware, which dates to an earlier time period than the Hollister site was occupied (Dr. Brian Jones, personal communication, 2016). However, many of these materials excavated from the cellars such as German stoneware and delftware were considered luxury items available only to the wealthier members of the colonial society, which we now understand included Hollister (Noël Hume 1979, 102, 105, 109, 111-112, 276-279). These types of pottery originated from all over Europe and may have come from ports

along the Connecticut coast through various merchants and traders. Even though the Hollister site was located in the countryside, some distance away from any major settlement, many different kinds of pottery from all over Europe were uncovered. This shows that even though global commercialization had not yet become prevalent during the 17th century in New England, trade networks were still in place that connected the Hollister site, a rural farmstead, to a variety of products from all over the world. Markets for elite items from as far away as Europe were not just limited to large areas of settlement at this time, but perhaps included many rural households, such as the Hollister family, all across New England.

Figure 5.2: Fragments of an earthenware jug found from the 2017 excavations at the Hollister site. This sherd was manufactured by the English and has a high-gloss glaze with a hard-red body (Dr. Brian Jones, personal communication, 2017). This type of pottery was the most widely used in 17th century New England (Noël Hume 1969, 102).

Another important type of pottery found at the Hollister site are Indigenous ceramics in the Shantok style (Herrick 2017, 151) (Figure 4.26). Large amounts of these ceramics were uncovered within the cellar excavation trenches. These vessels were probably used for daily purposes due to their utilitarian style, much like the locally produced earthenware. The Shantok style was popular throughout eastern Connecticut and in the lower Connecticut Valley from the time of the Pequot War in 1636-1637 through King Philip's War in 1675-1676 (Herrick 2017, 135, Lavin 2013, 330). This is the same time period that the Hollister's lived in the dwellings that are studied as part of this project and supports the idea that these ceramics are contemporary with the site. This means that the Hollister family was actively engaged with these communities throughout most of the site's occupation ("Amix," n.d., Case 1886, 19, 22, 24, Chapin 1853, 13, McNulty 1970, 12-13). It is rare to find historical narratives that address this type of exchange or relationship between English settlers and Native Americans. This example from the Hollister site continues to show that these types of transactions are often overlooked in historical accounts (Oliver 2005, 34, Taylor 1979, 3, 10-11, 160-166, Trumbull 1818, 39-40).

In addition to the ceramic sherds found at the Hollister site, clay tobacco pipes are also important artifacts that can be used to show the presence and activities of trade networks (Figure 5.4). Most tobacco pipes in the 17th century in the New World were manufactured in England out of kaolin clay (Burns 2007, "Clay Pipes and Their Manufacture" 1879, The London Reader 1879). Kaolin is hard, white clay, impermeable to water and used in the production of porcelain, which made it a desirable material for

pipes ("Kaolin" 2015). The process of making tobacco pipes was highly regulated in England with a formal manufacturer's organization and charter establishment in 1619 (Agbe-Davies 2015). Pipes in the 17th century were usually manufactured using a brass mold. Once the pipe was molded, the bowl was hollowed out, and a wire was pushed through the stem to the bowl to open a pathway for the smoke, creating the stem bore (Agbe-Davies 2014) (Figure 5.5). An example of this is the kaolin "William Evans" tobacco pipe found at the Hollister site (Figure 5.6). This pipe was manufactured in Bristol, England, during the mid-17th century (Fox 1998, "Kaolin Clay Trade Pipes" 2017) and provides an example of the type of English pipes that were imported to the Hollister site.

Figure 5.3: Kaolin and red clay tobacco pipe stem bores from the Hollister site, 2016 season (photo courtesy of Dr. Brian Jones, 2016).

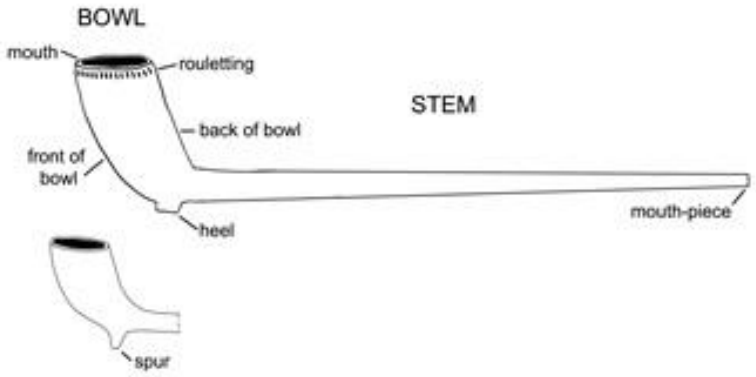


Figure 5.4: This image shows the form of clay tobacco pipes during the Colonial era. Pipes in the 17th century were usually manufactured using a brass mold. Once the pipe is molded, the bowl is hollowed out, and a wire is pushed through the stem to the bowl to open a pathway for the smoke, creating the stem bore (Agbe-Davies 2014) (http://www.cova-inc.org/pipes/history.php).

Figure 5.5: A kaolin tobacco pipe from the Hollister Site with the letters "WE" incised on the center of the bowl. These letters are a maker's mark that stands for the English manufacturer, "William Evans" (Fox 1998, "Kaolin Clay Trade Pipes" 2017).

Red clay tobacco pipes were also uncovered during excavations at the Hollister site (Figure 5.7). These pipes are unique because they are in the same mold as the English kaolin pipes but not manufactured by England (Agbe-Davies 2014, Baker 1985, Henry 1979, 18). The only difference that I recorded between the kaolin pipes and the red clay pipes at the Hollister site was a minute difference in the size of the bore stems (Appendix II). One sixty-fourths inch drill bits were used to measure all the stem bores that had been excavated and it was found that the drill bit was slightly loose within the stem bore when compared to the kaolin stem bores.

Figure 5.6: Red clay pipes were found at the Hollister site that were in the same style as the English kaolin pipes. These two pictures show fragments of a red clay tobacco pipe bowl and stem excavated from the middle cellar (N10-N12W15).

This same style of red clay pipe has been found by archaeologists at colonial sites in Maryland, Tidewater, and Virginia (Faulkner 1985, 76, Henry 1979, 18), but very few are found from New England, except for one site in Maine (Baker 1985). Scholarly articles and site reports consistently list the counts of the red clay tobacco pipes from many sites but few details (Henry 1979, 18). Baker (1985) and Henry (1979) suggest that the red clay pipes originated from a local pipe maker who was trained in the English style. This is because these pipes were produced in the same mold as the English kaolin pipes but instead made from local materials such as red clay (Baker 1985, Henry 1979, Zeilinga de Boer, 2011, 75-76). They differ from the "terra-cotta" (red clay) pipes that are normally attributed to Indigenous manufacture, which are characterized by their decorative motifs either done by hand, mold, or tool (Figure 5.8). The differences in kaolin clay and red clay used for the pipes at the Hollister site indicate that the Hollister family purchased pipes from at least two different groups. The red clay pipes allude to a local manufacturer, whereas the kaolin pipes were most likely imported from England. The presence of these two styles of pipes demonstrates that the Hollister family was part of a trade network that encompassed both local and international merchants. This shows that the Hollister site maintained all types of relationships that they used to acquire important objects that they could not manufacture themselves, contrary to what most historical narratives convey for rural farmsteads in 17th century Connecticut (Daniels 1980, Taylor 1979, Trumbull 1818).

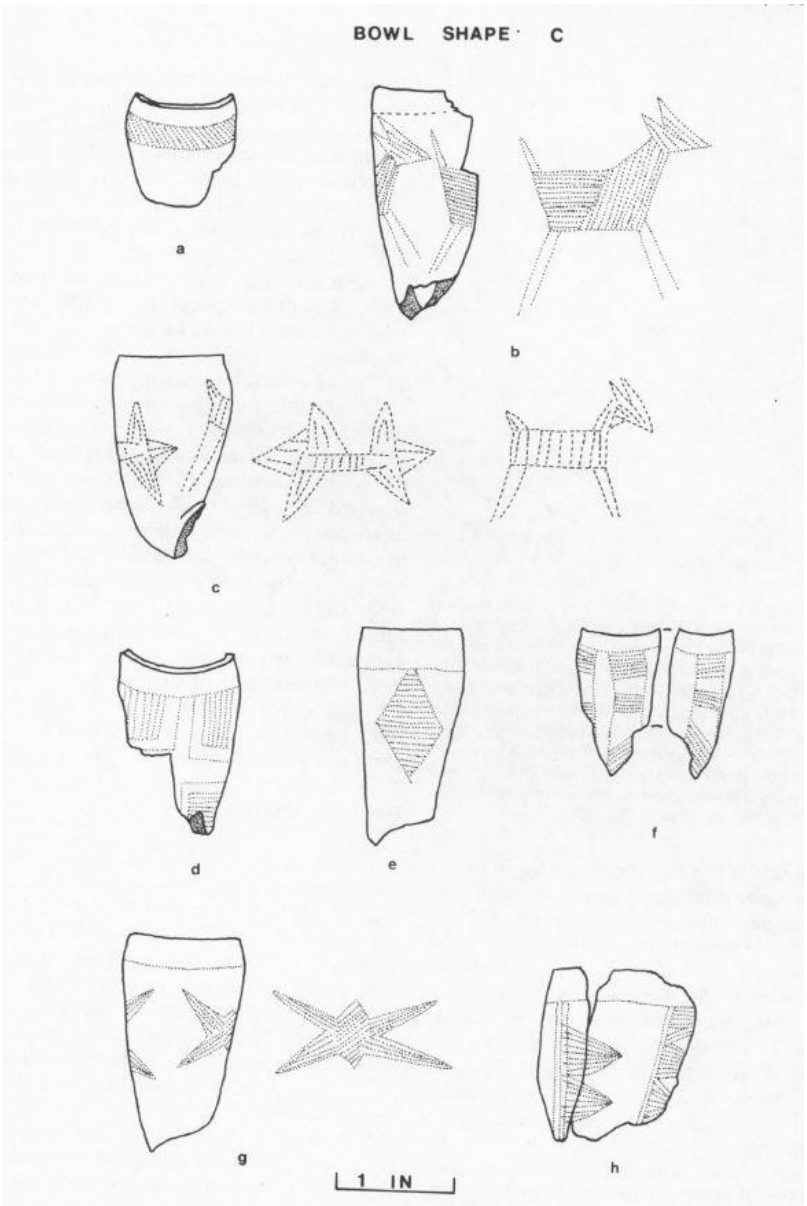


Figure 5.7: The red clay pipes uncovered from excavations at the Hollister site differ from the "terra-cotta" pipes that are normally attributed to Indigenous manufacture, which are characterized by their decorative motifs either done by hand, mold or tool (Image courtesy of Henry 1979, 24).

Clay tobacco pipes are some of the most prevalent artifacts found at English colonial sites in North America. This is interesting because they are often found in large quantities and an analysis of their shapes can be used to calculate a mean date of occupation, sometimes to a single year, for an English colonial archaeological site in

North America by using Heighton and Deagan's (1972) formula. All the intact stem bores from the 2016 and 2017 seasons (n=702) were measured in 1/64th -inch increments (6/64", 7/64", and 8/64") (Appendix II). Using the Heighton and Deagan formula the mean date of occupation for the Hollister site is 1676 (Agbe-Davies 2014, Barca 2012, McMillian 2010, Noël Hume 1969) (Appendix III), which perfectly fits with the known occupation of the site from, about 1640 to 1711.

Since the development of the of the Harrington formula, the primary focus for analyzing clay tobacco pipes has been on dating. Dating has become such an important factor when analyzing clay tobacco pipes that the majority of the time, its other characteristics go largely unnoticed or undocumented unless there is something unique in the pipe's design such as a motif or the material from which it is made (Davey 1980, Henry 1979, Luckenbach, Cox, and Kille 2002). This emphasis on dating has sometimes overshadowed the ability of clay pipes to tell stories about social history and culture during the Colonial Period such as how the Hollister's were connected to networks that were outside of their local territory. The exact route by which these pipes arrived at the Hollister site is unknown at this point, but the fact remains that someone purchased them and brought them to the Hollister site, used them up, and then discarded them. The presence of these tobacco pipes also shows that perhaps a number of people living at the Hollister farm were not just smoking tobacco but had to either grow or acquire this product and also the pipes. All of this indicates cash flow and a connection with the New England trade network. This is further evidence that the Hollister family was more

progressive in their trade relationships than historical narratives suggest for 17th century Connecticut farms (Taylor 1979).

The presence of Native American pottery, European ceramics and tobacco pipes at the Hollister site provide evidence that the Hollister family was a part of trade networks that encompassed both local and international markets. This is contradictory to many historical narratives that suggest colonial farmers were not involved in trade and were instead subsistence farmers with little surplus (Daniels 1980, 431, Hooker 1936, 10).

The Indigenous Community at the Hollister Site

Images created from GPR and magnetic data show that there are a number of geological and anthropogenic features at the Hollister site (Figures 4.2 and 4.9) that have not been excavated and remain below ground, invisible by any other means. The geological features show that this area experienced environmental changes over time that impacted where different groups of people settled (Figures 4.6. and 4.7). During the initial occupation of this area by the Native Americans this landscape was low marshland and swampy (Conyers 2018, 78). By the time the Hollister family settled here, there were low marshy places with flat, dry areas between exposed rocky moraines. When Hollister built his farmstead, he positioned it on one of these flat, dry areas. The English preferred to dig deep cellars and the Hollister family would have constructed their buildings so as to avoid high water table and flooding. This is different than the Indigenous people who relied on hunting and gathering and would have preferred living closer to the lower marshy areas where natural resources were more abundant (Conyers 2018, 78, Herrick

2017, 142-147, 160-161). This is exactly what is seen in the GPR amplitude slice maps (Figures 4.7 and 4.11) that show the colonist features on the higher, dry, flat areas of the landscape while the oval dwellings of the Indigenous people are located on small high areas near the lower lying marshy places where natural resources were available. What is most striking is that the English and the Indigenous houses were in close proximity to each other, showing likely interactions between them. The narratives in historical literature briefly touch on the cohabitation of English settlers and Indigenous peoples but often present a different perspective, which discusses how Europeans lived, but leaves out details on the Native Americans and how they might have cohabitated. There is evidence from historical records that show Europeans settling in areas that were previously cleared and cultivated by native Americans as it was much easier to build and farm in these areas (Potter and Waselkov 1994). However, the placement of the structures at the Hollister site and the historical narratives of good relations between the Hollister family and the Native Americans provides an example of how these two different cultures could have cohabitated together, perhaps peacefully. This is in opposition to historical narratives that describe separation and tension between English settlers and Indigenous groups in early 17th century Connecticut (Case 1886, Taylor 1979, 160-166, Trumbull 1818).

Excavations from the 2017 season confirmed that both the English and the Indigenous did occupy this landscape (Dr. Brian Jones, personal communication, 2018) as Shantok pottery (Figure 4.26) and other Native American artifacts, like the partially knapped piece of pink quartz (Figure 4.21), were found scattered throughout the Hollister

site in excavation trenches and shovel test pits. Two hundred and fifty sherds of Indigenous pottery were found throughout the 2016 excavation (Figure 5.9), which shows that these vessels were used regularly within the Hollister household. It cannot be determined who used these or where they were acquired, but the proximity of the Indigenous dwellings to the Hollister's buildings suggests a complex and peaceful sharing of cooking and storage vessels in perhaps a mutually beneficial way. This is an important detail as many of the colonial sites in New England do not contain this number of Native American pottery shreds indicating that positive relationships may have been developed at the Hollister site over a period of time between these two groups (Dr. Brian Jones, personal communication, 2016). The Shantok pottery style dates to the time period of 1636-1675, which perfectly overlaps the occupation of the Hollister site, about 1640-1711. All the evidence indicates that these two different peoples were cohabitating at the Hollister site for at least a few years if not longer. It is not known how long these arrangements continued, but elsewhere it is known that there was general Indigenous population decline accompanied by a deterioration of economic conditions starting with the Pequot War of 1637 and following with King Philip's war of 1675 to 1676. The results of these conflicts decreased the population of the Native Americans considerably, which in turn allowed more Europeans to colonize abandoned native settlements (Lavin 2013, Potter and Waselkov 1994, Warren 2016). Both of these events were destructive to Native peoples and resulted in a downward spiral of land loss, loss of their independence, disease and the start of racism among New England's communities, which continued for centuries (Lavin 2013, 330). While the Hollister site provides insight into completely

different types of societal interactions than documented elsewhere, it is still not known how long these presumably peaceful conditions lasted. However long this lasted, the evidence from the Hollister site identifies relationships that offer a perspective that is unheard of in historical narratives about early colonial history in Connecticut (Taylor 1979, 160-166).

Figure 5.8: This is the excavation trench (N10-12W15) that was placed within the English middle cellar at the Hollister site. Two hundred and fifty sherds of Indigenous pottery were found throughout excavations. Eight sherds located in the middle cellar appear to be part of a large ceramic vessel. This shows that Indigenous ceramics were used regularly within the Hollister household.

Another interesting anecdote regarding these interactions between the colonists and the Indigenous community is a story about a wrestling match between Hollister and

an Indian man that occurred while Lt. Hollister was attending his farm in Nayaug (Glastonbury) (Case 1886, 24, Chapin 1853, 13). Even if this story has been embellished over the years, it still indicates that Hollister had a reputation for interacting with the Indigenous peoples in this area in perhaps a competitive but still friendly way. It is not known when this interesting match took place.

The other historical document regarding Indigenous interactions is found in the archives of the Glastonbury Historical Society and describes how the Hollister family developed a beneficial relationship with an Indian girl named Amix, which included the exchange of skills and knowledge ("Amix," n.d.). This document shows that the Hollister family actively fostered a beneficial relationship between themselves and the Indigenous community that went beyond trading partners. Again, this evidence shows how different the Hollister farm was from the historical narratives that outline relationships between English settlers and Indigenous communities that were based only on exchange and little else (Oliver 2005, 34, Taylor 1979, 3, 10-11, 160-166, Trumbull 1818, 39-40).

Further evidence of the Hollister's interactions with the Indigenous people is recorded in a historical compilation of the Hollister family by Case (1886). In those records, Lt. Hollister is shown to have been involved in many different matters of state including service as a juror and a deputy and was asked to provide counsel with the Indians while he represented the town of Wethersfield until 1656 (Case 1886, 19). In 1660, Lt. Hollister was appointed tax collector for the town of Wethersfield (Case 1886, 22). This was the last position he held for the town and he passed away shortly after in 1665 ("Estate of John Hollister, Town of Wethersfield" 1665). Historical records go on to

state that in 1675, Hollister's son requested permission from the general court to hire Indian laborers to fortify his house (Case 1886, 24, Chapin 1853, 13, McNulty 1970, 12-13). This was around the same time as King Philip's war and could be a result of that conflict. These appointed positions document that the Hollister family was a prominent influence in Wethersfield and despite their social status maintained positive relationships with the Indians regardless of the discrimination that occurred among other English settlers. This is a direct contradiction to what we know of laws in the early 18th century that limited the freedom of Native Americans (Lavin 2013, 497).

Perhaps the senior Hollister's experience with the Native Americans was not as uncommon as historical narratives from elsewhere have suggested (Anderson 2008, 497, 505, Taylor 1979, 160-166). Minor's diary (Stonington, Connecticut, 1653-1685) is a primary source that helps validate these interactions elsewhere as he writes of close connections with neighboring Indian tribes such as the Pequots, Mohegans, and Narragansetts. Minor and his wife, Grace, both spoke Algonquian language dialects and he notes that Indians were frequently employed to perform miscellaneous tasks around the farm like pulling weeds, building a chimney, keeping cattle, and hunting wolves. This diary provides good evidence that other farmers in Connecticut were interacting with Indigenous peoples in much the same way as Hollister by fostering positive relationships with the local Indigenous tribes, which again shows the inadequacy of many of our historical narratives.

Except for Minor's diary, all of these previously mentioned stories are found in secondary sources (Case 1886, Hooker 1936, Taylor 1979, Trumbull 1818) and written

from a European viewpoint. This is an issue because these historical narratives have been passed down to us over the years and therefore have been written with a bias that developed in later years (Hawley 2015). The data collected from the Hollister site indicates that the Hollister family cohabitated with the Native Americans, developed mutually beneficially relationships with each other, exchanged goods and knowledge, and perhaps became friends. These interactions were much different than what most historical narratives suggest (Oliver 2005, 34, Taylor 1979, 3, 10-11, 160-166, Trumbull 1818, 39-40), showing that these narratives should be modified to present a more neutral perspective of early colonial history in Connecticut.

Conclusion

Historical documentation for the history of Connecticut during the 17th century is biased toward the European colonists (Anderson 2008, Taylor 1979, Trumbull 1818). While Native American traditions, customs, and culture are sometimes discussed, they are often presented as inferior or uncivilized. Here at the Hollister site, multiple research methods were used that show from geophysics, historical documents and artifact analysis that those narratives, at least with respect to this farmstead, are inaccurate and need to be revised.

The Hollister archaeological site provides an example of one of the earliest mid-17th century English farmsteads in Connecticut (Dr. Brian Jones, personal communication, 2016). This is important because farmsteads were the primary unit of colonization in the early 1600s and therefore become the fundamental source of

understanding characteristics of early colonialism in Connecticut, like the role of agriculture, trade, and Indigenous relationships (Groover 2008, 33).

CHAPTER SIX: CONCLUSION

Various lines of data from geophysics, historical documentation, and artifact analyses provided the ability to compare the Hollister archaeological farmstead to historical descriptions of 17th century farms in Connecticut. Interpretation of artifacts and features at the Hollister site revealed that these historical descriptions are usually presented from a European perspective that excludes other groups, specifically Native Americans, and how they may have perceived events that occurred in 17th century Connecticut (Case 1886, Coghlan and Brydon-Miller 2014, Hawley 2015, Taylor 1979, Trumbull 1818). My research indicates that the Hollister family varied from the typical descriptions of early colonial farmers discussed in the colonial Connecticut literature by producing an agricultural surplus specifically for profit, trading within multiple networks that extended into the Colonies and throughout Europe, and fostering beneficial relationships with the Indigenous community. These activities are inferred by Minor's diary, a primary source written in the same time period, but this document is rare and the only one of its kind in Connecticut (Anderson 2008). Other earlier historical narratives such as Trumbull's history of Connecticut (1818) or Case's compilation of the Hollister's family history (1886) are written from a perspective that is specifically related to Western interests and often lack documentation of events and interactions that were "seemingly unimportant" such as farming techniques, rural trade routes, and relationships between the English and the Indigenous community. Archaeological exploration of the Hollister

site revealed details about these "seemingly unimportant" activities and show that early colonization in Connecticut was much more complex and nuanced than historical narratives suggest.

Many historians state that before specialization in agriculture occurred in the 18th century, most farmers were limited to subsistence farming (Daniels 1980, Scoville 1953, Taylor 1979, Wright 1957). However, geophysical images showing the layout of the farm (Figure 4.13), botanical remains (Dotzel 2018, Farley 2018) (Appendix V), and farming techniques referenced in Minor's diary that are a good template with which to interpret the Hollister farmstead (Anderson 2008, 499-500, 504) and support the idea that the Hollister family operated more like what we would consider a commercial farming operation today than purely a subsistence farm. Interpretation of GPR and magnetic data show that the layout of the Hollister site was intentionally arranged on the landscape for efficiency (Figure 4.11). Dwellings such as the sleeping quarters, the kitchen, and wells were all clustered together on the landscape. Other structures such as outbuildings were placed near animal pens, away from the home. The arrangement of these structures shows that areas where energy-intensive activities took place were closer together (Adams 1990, Groover 2008). Examples of these activities are cooking and mending farm equipment. Placing these areas or structures close together minimized both travel and time for people and animals. Likewise, structures placed farther away from the central household were likely used for tasks that did not require high amounts of energy on a daily basis such as tending animals or crops (Adams 1990). Through the strategic placement of these

structures on the landscape, Hollister could expend his energy in an efficient manner, therefore contributing to a more successful commercial farming operation.

The diary of Thomas Minor, from the same time and region, shows that colonial farmers, such as Hollister, were also educated on some of the sustainable farming practices that would eventually became prevalent in the 18th century. Early colonial farmers are usually described as "wasteful" and irresponsible with their crops and livestock (Scoville 1953, Taylor 1979). However, Minor writes of using manure and burning his fields to restore nutrients in the soil. Similarly, burned phytolith material from the Hollister site alludes to Hollister practicing the same techniques as Minor, just 60 miles away. These types of practices are unheard of in historical writings and show that early colonial farmers were using what today would be considered responsible organic farming techniques to preserve the soil and continued to use the same land for cultivation instead of clearing new land.

In addition to the intensive farming techniques practiced by Minor and Hollister, certain crops were grown specifically to produce a surplus to sell or trade for profit. This directly contradicts some of the historical narratives that early colonial farmers in Connecticut only farmed for survival. Botanical remains from apples, cherries, grapes, and English wheat show that Hollister grew crops that were in demand to make products like brandy, wine, cider, or flour (Farley 2018, Oliver 2005, Taylor 1979, 93-94) (Appendix V).

This type of surplus production also demanded space to store farm products. Except for the middle cellar in the house cluster, the cellars present at the Hollister site

are quite large, measuring over 5 meters in length and width (Figure 4.15). This size was unusual for farmers who were only producing enough for their household needs and indicates that Hollister not only grew commercial crops but also created a space to store them for upcoming market opportunities (Harper 2012, Harper, Harper and Clouette 2010). The Hollister family likely used profits from these items to acquire products like pottery, salt, sugar and farm tools that they were unable to produce at the farm.

These activities show that even though intensive farming was not yet prevalent in 17th century Connecticut, farmers such as Hollister and the nearby Minor household were practicing farming techniques that would eventually develop into agricultural specialization in the 18th century. Perhaps this shows the beginnings of specialization in farming practices earlier than has been commonly assumed (Daniels 1980, Oliver 2005, Taylor 1979, Trumbull 1818).

Trade is another aspect of 17th century Connecticut that has often been misrepresented in many historical documents. Artifact analyses of European ceramics, Native American pottery, and clay tobacco pipes uncovered at the Hollister site show that here the family farm was not just self-sustaining but these early settlers also participated in local and European trade networks and were therefore able to acquire luxury items. The artifact types and origins indicate the presence of these trade networks that extended even into the newly settled areas of New England.

Another example of trade, in this case locally, comes from the wealth of Indigenous ceramics found at the Hollister site that were produced by local artisans. The Native American Shantok pottery style found in cellars at the Hollister site is dated to

exactly the time that the Hollister family was living in close proximity to the Indigenous community particularly at a time when the historic literature only hints at inter-group cooperation (Taylor 1979, 160-166). The Hollister family likely interacted in a number of ways with these nearby Indigenous groups, which is supported by the evidence for the exchange of goods. While the local Indigenous pottery was likely used for everyday tasks such as storage and cooking, varieties of pottery like stoneware and delftware were luxury items for 17th century colonial farmers and show the Hollister family was actively involved in trade networks that extended all throughout the Colonies and into Europe.

One more aspect of the Hollister site that is new and potentially important is the mutually beneficial relationship between the Hollister family and the Indigenous community. Much of the publicly available history written for Americans today suggests that separation and tension were common between the English settlers and Indigenous groups in 17th century Connecticut (Case 1886, Taylor 1979, Trumbull 1818). While those analyses provide details of these often violent and adversarial interactions, they were written from a European viewpoint and therefore dismiss how the Indigenous community may have cohabitated peacefully with the colonists. The houses of both groups can be seen in the GPR and magnetic maps that reveal a number of anthropogenic and geological features, now invisible below the soil, that show both an English and Native American presence (Figure 4.7). Indigenous groups resided in oval structures near marshy areas where abundant resources were located for hunting and gathering (Conyers 2018, 78, Herrick 2017, 142-147, 160-161). In contrast, the English preferred well-drained, flat areas to construct deep cellars and practice agriculture. As such, Hollister

built his dwellings on higher, drier areas of the site. These structures were within walking distance of each other and their inferred contemporaneity implies that the Hollister family and the Indigenous people cohabitated with one another, perhaps peacefully (Figures 4.7 and 4.13). There are other hypotheses that could be applicable to this situation, such as the English establishing themselves in areas that have been previously cleared or settled by Native Americans (Potter and Waselkov 1994). However, historical documentation and archaeological materials provide good evidence to support the idea that these two groups may have been cohabitating on the same landscape for a period of time.

Historical documentation provides accounts of Hollister's friendships with the Indigenous community including his active representation of the Indians and the interesting story about a wrestling match leading to friendship (Case 1886, 24, Chapin 1853, 13). Other written records also indicate friendly interactions between an Indian girl named Amix and the Hollister family through the exchange of techniques in cooking, sewing, and making pots ("Amix," n.d). Corroborating evidence from Minor's diary supports the idea that Hollister likely interacted with the Indigenous people outside of trading relationships (Anderson 2008, 497, 505). Minor wrote that he maintained close relationships with the local Native American tribes and often hired them to perform miscellaneous tasks around the farm such as weeding and hunting wolves. These interactions support the idea that Connecticut colonists and Indigenous people cohabited together, often forming beneficial relationships.

Using the theory of Post-colonialism provides a framework in which to discuss these issues because it challenges and critiques the formation of knowledge creation and

argues that the accepted "Western" version of many of our historical narratives should be reevaluated to include the "other" or non-western perspective (Coghlan and Brydon-Miller 2014). The historical documentation related to 17th century Connecticut supports this view by presenting history only from a European perspective, often leaving Indigenous groups without representation (Taylor 19179, Trumbull 1818). This is especially true when analyzing the relations of power that England maintained in the mid-17th century after the Pequot War and King Philip's War. These wars devastated the Native American population and may have been motivation for the English to settle in newly abandoned Native villages, which continued to harm Indigenous independence and their cultural values. Hawley (2015) states that "archaeology is today a major force in post-colonial studies" and that the "world" has been viewed through this one-sided ethnocentric lens of the colonizer for a long time. This perspective has been to the detriment of many non-European cultures and as a result has marginalized these groups in our North American history (Coghlan and Brydon-Miller 2014, Hawley 2015).

Since my field research in 2016, two more field seasons in 2017 and 2018 have taken place at the Hollister site under the supervision of Dr. Brian Jones, state archaeologist. Not all of the data collected from these two seasons has been analyzed, but preliminary analyses have uncovered more artifacts, such as European ceramics, the remains of a mattock used for farming tasks, red clay pipes, kaolin tobacco pipes with maker's marks from England, points and gunflint made by Native Americans, and a probable lead bale seal fragment that would have been used on bales of imported cloth. This artifact suggests that the Hollister site may have been used, at least for a while, as a

trading post (Dr. Brian Jones, personal communication 2018). These are just a few of the items that have been uncovered from the site with many more artifacts that need analysis. However, the presence of these items continues to support the hypothesis that the Hollister family was more advanced than historical narratives suggest.

The geophysical maps of the Hollister site allowed reconstruction of the landscape using anthropogenic and geological data. Mapping features of the Hollister site provided the initial evidence that English colonists and Native Americans may have lived in close proximity to each other. These data prompted strategically placed excavation units and test pits in order to gain as much information about the site as possible. Preliminary results from excavations confirmed that both the Indigenous and English features are contemporary with each other showing that this could be one of the earliest recorded sites for contact between the English and the Native Americans (Dr. Brian Jones, personal communication, 2017). This research provided insight into how past peoples used this area in a way that has not yet been done before in Connecticut. Using geophysical methods and traditional archaeology together provides a much more informed understanding of past people and how they interacted with their environment. Dr. Brian Jones, Connecticut State Archaeologist, has said that this is one of the most important sites in Connecticut to understand more about our early colonial history (personal communication, 2017). Many New England archaeologists are now looking at the Hollister site as a valuable and unique example of a 17th century farmstead in New England (Jones 2016). Other hypotheses about how this site functioned include the idea that the Indians were removed from this landscape but may have been hired as laborers

on the farm or that this may have become one of the many trading posts located along the Connecticut River. Even though additional research is needed in order to fully understand the Hollister site and the types of activities that took place there, this research provides a starting point from which to explore incomplete narratives relating to agriculture, trade, and Indigenous relationships in 17th century Connecticut. It is my hope that at sites like the Hollister site, archaeologists will use integrated research methods, particularly GPR, that will not only inform us of past cultures but also provide deeper meaning and insight into our historical narratives.

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APPENDIX I

These tables show the excavation units and shovel test pits (STPs) locations within the GPR grids and in real space within the local site grid.

Excavation units:	**Location in GPR grid:**	**Location in local site grid:**
Southern Cellar	Located in GPR grid 1 and 3	S1W14; S1W15; S1W16
Middle Cellar	Located in GPR grid 1	N10W15; N11W15; N12W15
Northern Cellar	Located in GPR grids 1,3 and 5	N15W5; N15W6; N15W7
Chimney Fall	Located in GPR Grid 8	S1W23
Shovel test pits (STPs):	**Location in GPR grid:**	**Location in local site grid:**
STP 1	Grids 1 and 3	N10E19
STP 2	Grid 3	N0E10
STP 3	Grids 1 and 3	N10E0
STP 4	Grids 1 and 3	N15W10
STP 5	Grids 1 and 3	N5E5
STP 6	Grid 3	S10E0
STP 7	Grid 3	S10E5
STP 8	Grid 3	S10W5
STP 9	Grid 3	S10W20
STP 10	Grid 3	S5E0

STP 11	Grid 3	S5E5
STP 12	Grid 3	S10W10
STP 13	Grids 1 and 3	N15E0
STP 14	Grids 1 and 3	N5E0
STP 15	Grids 1 and 3	N0E5
STP 16	Grid 3	S10W15
STP 17	Grid 3	S5W5
STP 18	Grids 1 and 3	N0W20
STP 19	Grids 1 and 3	N5W20
STP 20	Grids 1 and 3	N10W20
STP 21	Grids 1 and 3	N15W20
STP 22	Grids 1 and 3	N20W20
STP 23	Grid 3	S5E15
STP 24	Grid 3	N0W10
STP 25	Grid 3	N20W15
STP 26	Grid 3	S5W10
STP 27	Grid 3	S5W20
STP 28	Grid 3	N15W15
STP 29	Grid 3	N10W5
STP 30	Grid 3	S5W15
STP 31	Grid 3	N5W15
STP 32	Grid 3	N5W10
STP 33	Grids 1 and 3	N20W10

STP 34	Grid 3	N5W5
STP 35	Grids 1 and 3	N20W5
STP 36	Grid 3	N10W10

APPENDIX II

2016 and 2017 Hollister excavation season – Pipe fragment counts

Town#	Site#	Material	Type	Sum of Count
54	85	Historic Pipe	kaolin pipe	641
54	85	Historic Pipe	redware pipe	61
			Total	**702**

Town#	Site#	Material	Type	Bore	Sum of Count
54	85	Historic Pipe	kaolin pipe	4/64”	1
54	85	Historic Pipe	kaolin pipe	5/64”	2
54	85	Historic Pipe	kaolin pipe	6/64”	24
54	85	Historic Pipe	kaolin pipe	7/64”	112
54	85	Historic Pipe	kaolin pipe	8/64”	76
54	85	Historic Pipe	kaolin pipe	No bore diameter	426
54	85	Historic Pipe	redware pipe	7/64”	4
54	85	Historic Pipe	redware pipe	8/64”	14
54	85	Historic Pipe	redware pipe	No bore diameter	43
				Total	**702**

APPENDIX III

Heighton and Deagan's (1972) formula for dating pipe stems:

$$X = (-\log Y + 1.04435)/0.05324)$$
$$\text{date} = 1600 + 22X$$

To solve for this curve and obtain a mean date, one must follow a three-step process. First determine Y, the mean bore diameter; this is similar to the X that is solved for in both the Binford and Hanson Formulas:

> Binford's X is calculated by adding all of the bore diameters for each sixty-fourth. Then multiplying the totals by the sixty-fourth. The grand totals are divided into each other. Ex: 24 total bore stems with 6/64 measurement. 24 * 6 = 144

Kaolin pipe bore measurements		
Number of Pipes	Bore Stem Measurement	Totals for Each Calculation
1	4/64	1*4 = 4
2	5/64	2*10 = 10
24	6/64	24*6 = 144
112	7/64	112*7 = 784
76	8/64	76*8 = 608
Total		**1550**
1550 / 215 = 7.209302		

Kaolin and red clay pipe bore measurements		
Number of Pipes	Bore Stem Measurement	Totals for Each Calculation
1	4/64	1*4 = 4
2	5/64	2*10 = 10
24	6/64	24*6 = 144
116	7/64	116*7 = 812
90	8/64	90*8 = 720
Total		**1690**
1690 / 233 = 7.253219		

The Y value (mean bore diameter) is then converted to its logarithmic form:

Kaolin pipe bore measurements
Log *Y* = 0.8579

Kaolin and red clay pipe bore measurements
Log *Y* = 0.8605

Secondly, solve the first equation using the logarithmic form of Y that was determined in the first step:

Kaolin pipe bore measurements
X = -0.8579 + 1.04435 / 0.05324
X = 0.18645 / 0.05324
X = 3.502

Kaolin and red clay pipe bore measurements
X = -0.8605 + 1.04435 / 0.05324
X = 0.18385 / 0.05324
X = 3.453

The last step is to use X, which is determined by the first equation, to solve the second equation. In this formula, 1600 is the point of origin or the theoretical start of the stem-bore size and 22 is the estimated number of years between each decrease in bore diameter.

Kaolin pipe bore measurements
Date = 1600 + 22X
Date = 1600 + 22(3.50)
Date = 1600 + 77
Date = 1677

Kaolin and red clay pipe bore measurements
Date = 1600 + 22X
Date = 1600 + 22(3.45)
Date = 1600 + 75.9
Date = 1675.9
Date = 1676

The difference in dates between these two formulas is minimal. I chose to use the date with the red clay pipes as it seemed appropriate to use all the available data from which to draw my conclusion. This results in the mean date of occupation for the Hollister site at 1676.

APPENDIX IV

List of Artifacts from Hollister Site 2016 Excavations

Faunal:
oyster (abundant)
quahog (uncommon)
whelk (1 specimen)
scallop
deer
sheep
cow
pig
turtle
fish (including catfish and scaled fish)
small rodents (presumed to be mostly mice)
snake
one medium rodent (may be an intrusive woodchuck)

Botanical:
maize
beans
charcoal, some nutshell and small seeds

Ceramics:
unglazed earthenwares (very common, small fragments)
glazed earthenwares (relatively common, generally brown lead glazed)
black glazed earthenware (uncommon, possibly Midlands Blackware)
yellow glazed earthenware (uncommon, Possibly Midland Yellowware or borderware)
probable Bellarmine German Stoneware (uncommon)
probable Westerwald German Stoneware (uncommon)
North Italian slip-decorated earthenware (1 bowl fragment)
kaolin pipes (8/64" and 7/64")
red clay pipes (8/64," 7/64," and 6/64")
Native American pottery
delftware (plain white, blue hand painted, some polychrome, apothecary jar base)
Persian bleu (uncommon delftware type)

Metals:
brass scrap
brass pins (a few, one large)
lead window came
1 lead musket ball
iron fragments
iron nails and spikes (fairly common)
iron door latch (1)
iron knife (1)
iron possible hoe blade fragment
latten spoon (1)
brass kettle fragments
iron fish hook
drilled lead fragment, possible fishing weight
brass bell (possible sleigh bell part)
1 small cut coin

Glass:
beads (3 total: red long tubular, short black tubular, white round)
window glass, hex or diamond shaped (fairly common)
liquor bottle glass, mostly fragments, one complete base to a small globe and shaft bottle

Misc.:
cut mica glass pane replacement
decorated and drilled slate fragment
brick fragments (fairly common)
stone rubble from chimney stack or foundation (common, but not kept)
1 carved bone utensil handle
1 possible ivory or dense bone utensil handle fragment

APPENDIX V

All identified botanical taxa from the Hollister site (54-85), South Glastonbury, Connecticut (Farley 2018, 2).

Scientific Name	Common Name	Count	Weight (g)
Indigenous Domesticates			
Phaseolus vulgaris	Bean	6	0.28
Zea mays	Maize	36	1.77
European Domesticates			
Prunus avium	Cherry	16	0.29
Triticum aestivum	Wheat	2	0.01
Vitis vinifera	Grape	4	0.48
Farmland Weeds			
Agrustis sp.	Bentgrass	1	0.01
Chenopodium album	Goosefoot	1	0.01
Lotus sp.	Deervetch	1	0.01
Mollugo sp.	Carpetweed	1	0.01
Polygonum sp.	Knotweed	1	0.01
Spergula sp.	Spurry	1	0.01
Woodland Weeds			
Galium boreale	Bedstraw	2	0.01
Sambucus canadensis	Elderberry	1	0.01
Wetland Weeds			
Carex sp.	Sedge	1	0.01
Trees and Nutshell			
Carya ovata	Hickory	24	23.42
Castanea dentata	Chestnut	1	0.01
Cornus florida	Dogwood	1	0.07
Corylus americana	Hazelnut	2	0.02
Juglans cinerea	Butternut	1	0.03
Unidentified Charcoal			
	Unidentified Charcoal		398.14