Rediscovering New Ireland: locating 17th - 18th century Irish settlements in Cecil County, Maryland

Jack Candiotti

University of Maryland

Thesis submitted to the Department of Anthropology at the University of Maryland, College Park in partial fulfillment of the requirements for the Anthropology Honors Program 2023

Thesis Committee Members:
Stephen A. Brighton, Ph.D., Chair
Mark P. Leone, Ph.D.
Scott M. Strickland, M.S.

Abstract

There has been little scholarship on the Irish in colonial American history. Fortunately, archaeology allows for the study of groups that are not well represented in the historical record through the analysis of their material remains. To initiate the study of this topic, the aim of this research was to locate archaeological sites associated with historically attested, late 17th and early 18th century settlements of Irish emigrants in Cecil County, Maryland. Historical information and aerial remote sensing data were analyzed in Geographic Information Systems (GIS) software to locate potential sites of buried and exposed structural remains in the areas where Irish settlement was recorded to have occurred. These sites were evaluated for their likelihood to be the remains of a structure built in the time period of Irish settlement. 23 sites of potential structural remains discovered in this study and 8 sites of structural remains discovered by previous research were determined significantly likely to be associated with the Irish settlements. Further archaeological research will be required to determine whether these sites actually contain structural remains dating to the late 17th or early 18th century. Archaeological excavation of the sites that contain these structural remains will yield information about the Irish emigrants who once occupied them. The level of wealth, diet, place of origin, and other information about the late 17th and early 18th century Irish community in Cecil County could be discovered. This new knowledge would contribute to the history of the Irish in America and the local history of Cecil County.

Acknowledgements

First and foremost, I would like to thank my committee chair, Dr. Stephen Brighton, for presenting the idea for this thesis to me, for working with me to formulate the aims of this research, and for helping me through the writing process. I am grateful to Scott Strickland for the knowledge of Maryland archaeology and history he imparted on me during my internship at the Maryland Archaeological Conservation Lab, and for his suggestions to the remote sensing methodology of this study. Finally, a thank you to Dr. Mark Leone for his advice and for being part of my committee. This thesis truly would not have been possible without all of you, and I am beyond thankful to have had the opportunity to create it.

Table of Contents

List of Figures

1. Introduction

1.1 Research Context

In 1632, the Maryland colony was granted to Cecil Calvert by the English monarch, James I. The colony was centered around the northern half of the Chesapeake Bay, and its borders were as far south as the current border between Maryland and Virginia and as far north as present day Philadelphia. Cecil Calvert, and later his son, Charles, legally owned the colony and was fully in control of its governance. In 1634 settlement began in the southern region of the colony; and it remained confined to that region until 1650. During that time the colonial government was unable to prevent Dutch and Swedish settlers from occupying the land it owned on the western shore of the Delaware Bay. Its control of this northern region was so ineffective that in 1681, much of it was granted to William Penn as part of the colony of Pennsylvania.

In the years 1683 and 1684, the Maryland government sought to strengthen its control of this northern region by creating a new county in it. The county was to be called “New Ireland” and populated by Irish Catholics. It was never officially established, but it can be inferred that it was planned to be a separate county north of Cecil County, including the northern part of what is today Cecil County and land which is today part of Pennsylvania and Delaware. Cecil county had been created by the time of New Ireland’s proposal, but its northern boundaries were undefined.

The plan to create the county of New Ireland was ended in 1684 due to the incarceration of its leading proponent, George Talbot, for the murder of a royal tax collector. Though it never officially became a county, at least 75 Irish Catholic emigrants did settle in land that was planned

to be included in New Ireland between 1682 and 1684. They took up residence as tenants on two estate-sized properties named “New Connaught” and “New Munster”. The object of this study will be to discover where they settled within these properties, to inform future archaeological excavation. The next chapter will provide the background history of the area which informs the research questions framing this honors thesis.

1.2 Research Questions

The research questions of this study pertain to the geography of the New Ireland plan. The answers to them will lay the groundwork for future archaeological research. The first of these questions is: what were the borders of the two properties settled by Irish emigrants, “New Munster” and “New Connaught”? Written boundary descriptions of the properties can be found within land patents and other colonial records. Secondly, within each of the settled properties, where was the settlement concentrated? By identifying probable sites of architectural remains from the 17th and early 18th century, using aerial remote sensing and GIS methods, an informed hypothesis can be formulated in response to this question. This hypothesis will be tested by future archaeological research.

2. Historical Background

2.1 17th Century Maryland

Before the origins of the New Ireland plan can be explained, it is necessary to explain the reasons for its emergence. The plan was the product of a border dispute between Maryland and Pennsylvania, which was a result of overlapping colonial charters and the establishment of non-English colonies in the mid-Atlantic region. It was also created in response to the threat of a revolt by Protestants in the colony against the Catholic-controlled colonial government. This section will explain the political environment in which New Ireland was formed.

2.1.1 Maryland Charter Granted and First Settlement

In 1632, the proprietary charter for Maryland was granted to Cecil Calvert by king Charles I of England. The charter had been applied for by Cecil's father, George, but he died shortly before it was issued. George Calvert was influential in English politics from 1605 to 1625, and it was for his service to the crown that his son was granted the Maryland charter. The first group of Maryland settlers, roughly 150 people sailing on the ships Ark and Dove and led by Cecil's younger brother, Leonard, departed from England in 1633 and arrived at St. Clement's Island on the Potomac River in 1634. They stopped here only to celebrate the Catholic feast of annunciation, and within a few days they had chosen an area upon which to build their first settlement. This area was close by, along a tributary of the Potomac River. The land was purchased from the local Yaocomaco tribe and a fort was quickly built. The fort is referred to as the "fort at St. Mary's City", and the adjacent settlement of St. Mary's City served as the capital of the Maryland colony from when it was founded in 1634 until 1692 (Miller 2021, 2-3; St. Mary's County, Maryland).

Settlements in the next two decades were within what is today southern Maryland, along the western shore of the Chesapeake and along the Potomac and Patuxent Rivers. After a peace treaty between the proprietary government and native Susquehanna tribe was signed in 1652, the zone of settlement began to expand. The land boundaries of Maryland stipulated in the original charter were "from the promontory or headland, called Watkin's Point [the point along the Chesapeake where the current border between Maryland and Virginia is], situate upon the bay aforesaid near the river Wighco on the West, unto the main ocean on the east; and between that boundary on the south, unto that part of the bay of Delaware on the north, which lyeth under the 40th degree of north latitude from the aequinoctial, where New England is terminated." (Dozer 1976, 116). The original northern border of Maryland was the 40th parallel, which is just north of present day Philadelphia; but settlement in the northern region was very limited because most of the land there was inaccessible via the Chesapeake bay, which was the main line of travel, communication, and trade in the colony (Matthews 1908, 111-112).

2.1.2 Protestant Opposition to Catholic Rule

One of the most prominent reasons that George Calvert aspired to create a colony in the Americas was to provide a haven for English Catholics. The English government denounced the Catholic church in 1534 and since then sponsored its own Protestant church called the Church of England (Elton 1978, 135-136). The English government and people looked upon Catholics and other non-conformists of the Church of England with suspicion for fear that their loyalties belonged more to Rome than to England; and thus in the 16th and 17th century there was ongoing persecution of Catholics (Tarragó 2004, 118). George Calvert only announced his

Catholicism publicly in 1625 after he resigned from his political career, because he would have been unable to serve the king of England if it was known that he was Catholic (Brugger 1988, 4).

George Calvert did not live to see the founding of the Maryland Colony, but his son Cecil shared his intentions of creating a society free from religious persecution. The founding population of the colony included 17 English Catholic gentlemen and over 100 English Protestant commoners. Cecil instructed his brother Leonard, who led the founding expedition, to make sure the people kept their religious worship private to avoid conflict between the Catholics and Protestants. From the very beginning of the Maryland colony, a principle of religious tolerance was established (Brugger 1988, 7).

This tolerance was soon challenged by the turmoil of the English Civil War between King Charles I and the English Parliament. Catholics in England largely supported the monarch while English Protestants, among them a radical sect called the Puritans, largely supported the Parliament (Brugger 1988, 18). Maryland's colonial government also supported the monarch, and in 1644 it ordered the arrest of a merchant named Robert Ingle for treason after he declared he had authority from Parliament to seize the property of those who supported the monarchy in St. Mary's City. He was allowed to sail back to England, and returned the next year with an armed force of Parliament supporters while governor Leonard Calvert was in Virginia. Ingle and his force terrorized the people of Maryland for nearly two years: demanding that they denounce their Catholicism and King Charles in support of the Puritan Parliament and seizing or destroying the property of those who refused. In 1646, governor Leonard Calvert had gathered a

force to oppose Ingle and retook St.Mary's City; though Ingle and his forces had departed for England prior to his arrival (Brugger 1988, 19-20).

Ingle's Rebellion was not to be the last insurrection in Maryland resulting from the English Civil War, but stable government was restored for the majority of the next decade. During this time, Leonard Calvert died of disease and was replaced as governor by a Catholic named Robert Greene. Greene's governance earned him the dislike of Cecil Calvert, who had him replaced by a Protestant from Virginia named William Stone in 1648 (Brugger 1988, 20). In 1649, Stone allowed a group of Puritans from Virginia to settle at the mouth of the Severn River, the present day location of Annapolis (Brugger 1988, 20). Also in this year, his council passed the "act concerning religion". This act was created to institutionalize Cecil Calvert's intention that the Maryland colony allow freedom of religion. The act made it illegal to criticize or discriminate against anyone for their religious beliefs as long as they believed in the Christian God and Jesus Christ (Brugger 1988, 20).

In 1649, Parliament had officially won the English Civil War. It gained full control of the English government and executed the former King Charles. In 1652, Parliament sent agents to the American English colonies to confirm their allegiance. When the agents of Parliament arrived in Maryland, governor Stone was away in Virginia and had left Robert Greene as acting governor. Greene refused the Maryland government's allegiance to Parliament and declared its support of the former King Charles' son as rightful successor to the English throne (Brugger 1988, 21). Upon his return, governor Stone denounced Greene's statements to the parliamentary agents and declared his support of them. However, the Puritans that settled in Maryland were able to

convince the agents that the Maryland government was treasonous due to its protection of Catholics who supported the monarch.

In 1654 the agents of Parliament created a council of Maryland Puritans to govern Maryland (Brugger 1988, 21). One of the council's first actions was to appeal the "act concerning religion" and to outlaw Catholic worship and the appointment of Catholics to government office (Brugger 1988, 21). In England, Cecil Calvert appealed to Parliament directly for the restoration of his right to govern the Maryland colony. Parliament officially restored the Calvert governance of Maryland in 1655, but the Puritan council in Maryland refused to relinquish governance. The same year, governor William Stone led an armed force to their settlement on the Severn River to force them to submit to Calvert's authority and a battle ensued. Stone's forces suffered defeat and the Puritan council held governance for two more years (Brugger 1988, 21). In 1657, the council submitted to the Calvert government peacefully and were granted amnesty. The "act concerning religion" was reinstated soon after, restoring the rights of Maryland Catholics (Brugger 1988, 22).

Clearly, there was great opposition among the Protestants in Maryland to the colonial government's religious tolerance and governance by Catholics. This caused Cecil Calvert's son, Charles, to strengthen his and his fellow Catholics' governmental power in the decades following his appointment as governor in 1661 (Brugger 1988, 33). The Calvert Maryland government was structured into two legislative bodies: an Upper House, comprised of the governor and his appointed council members, and a Lower House, comprised of elected delegates from the general population. Governor Charles Calvert appointed his Catholic relatives and friends to the

majority of positions in the Upper House council (Kammen 1960, 296). The Lower House was majority Protestant because the majority of Maryland's population was Protestant, and they tended to elect Protestants as delegates. The Upper House overruled the legislative authority of the Lower House by never confirming laws as permanent, which allowed them to veto any law at any time (Kammen 1960, 299-302). They also purposely did not inform the Lower House and the public of which laws were in place, allowing the governors to selectively enforce them (Kammen 1960, 302); and they occasionally did not allow all members of the Lower House to attend legislative sessions (Kammen 1960, 298). A factor which enraged not only the Lower House representatives but the general public was that the sheriffs appointed by the Upper House were the subject of many complaints for over taxing and other offenses (Kammen 1960, 296-297).

This abuse of government power nearly caused rebellion. In 1676, Protestant planters in Calvert County began an open protest of the Calvert government while governor Charles Calvert was in England. They wrote a letter of complaint to English government authorities. In addition to listing grievances against Charles Calvert and the controlling Upper House council, they demanded an end to the policy of religious toleration. The Upper House council soon put down resistance and hanged two of the men involved (Brugger 1988, 36). Though the opposition to the Calvert government among the Protestant population was primarily caused by its undemocratic governance, it was emboldened by the fact that the governor and the Upper House council members were Catholic (Kammen 1960, 312).

2.1.3 Foreign Settlement of Maryland's Land on the Delaware Bay

The fact that the Maryland government at St. Mary's City did not populate or effectively control the western shore of the Delaware Bay allowed for the establishment of other settlements, which defied its land claims stipulated in the Maryland charter (Dozer 1976, 116). Between 1623 and 1632, before the Maryland charter was granted, there were a few Dutch settlements created along the Delaware bay and lower Delaware River; but these were abandoned due to unprofitability and attacks by natives (Matthews 1908, 115; Nathan 200, 11-12). In 1638, after the Maryland charter had been granted, a small group of Swedes created a settlement along the western shore of the Delaware bay. They were successful in controlling trade to and from the Delaware River, which caught the attention of the leaders of New Amsterdam, the 17th century Dutch settlement in modern day New York City. In 1646, they launched a military campaign against the Swedish settlement on the Delaware Bay to take control of the Delaware River trade route. By 1655, the Swedish settlement was under Dutch control (Matthews 1908, 117; Nathan 2000, 15).

England had claimed the mid-Atlantic seaboard by right of discovery since the voyage of Sebastian Cabot under King Henry VII in 1509, but did not attempt to maintain the area by force until 1661, nine years after the Dutch takeover of the Swedish settlement in Delaware. King Charles II issued a charter to the Duke of York, his brother, for the lands between the west bank of the Connecticut River and the eastern shore of the Delaware River and bay. The Duke of York, James the 2nd, took these areas from the Dutch by force. By September of 1664, his forces had captured Fort Casimir, the Dutch fort at what is now New Castle, Delaware. Fort Casimir was within Maryland's land on the west side of the Delaware Bay; but in spite of this, James' forces continued to occupy the fort and his colony of New York issued patents to land around the area (Matthews 1908, 121-123; Nathan 2000, 15).

2.1.4 Border Dispute with the Pennsylvania Colony

In 1681, King Charles the 2nd issued William Penn a charter for the colony of Pennsylvania. The charter stipulated that the colony be "bounded on the east by Delaware River, from twelve miles distance northward of New Castle Town, unto the three and fortieth degree of northern latitude … and on the south by a circle drawn at twelve miles distance from New Castle, northward and westward unto the beginning of the fortieth degree of northern latitude, and then by a straight line westward to the limits of longitude above mentioned." (Soderlund 1983, document #11). One year later, Penn purchased New Castle, the land within a twelve mile radius of it, and the land south of New Castle to Cape Henlopen from James the 2nd (Nathan 2000, 21).

The southern border of the Pennsylvania land grant was a line at the latitude of New Castle, even though New Castle was south of the 40th parallel, and therefore within the territory of Maryland; this geographical fact was recorded in a 1670 map of Maryland made by Augustine Herrman. The land on the Delaware River and Bay that Penn was granted by James the 2nd was also south of this latitude. Charles Calvert, the third lord Baltimore and proprietary governor of Maryland at this time, immediately sought to discuss how this dispute would be resolved. These meetings proved fruitless because Penn was uncompromising in his land claims. He was in the political favor of the king and therefore thought that the English government would support his charter over Calvert's (Nathan 2000, 21-23).

2.1.5 George Talbot and New Ireland

To help solve the border dispute and the Protestant threat to the proprietary government, George Talbot, Charles Calvert's cousin from Ireland, was brought to Maryland. He was given a large

estate, of 32,000 acres, in what is today Cecil county, by the proprietary government in exchange for his agreement to import 640 persons from Britain or Ireland to settle it. Governor Charles Calvert placed Talbot in various positions of his council between 1681 and 1684. Between 1683 and 1684, Talbot was given the power of surveyor general, first in the disputed regions between Maryland and Pennsylvania (Archives Md. 1681b, 222) and later in all of the colony of Maryland except Calvert county (Archives Md. 1681b, 175); and he was tasked with soliciting settlers from Britain and Ireland to settle the frontiers of the Maryland colony. At this time he was also the colonel and leader of the Maryland citizen militia in the northern region of the colony. During his time in these positions, Talbot led an initiative to create a new county in the region of his estate that would be populated by Irish Catholics and called "New Ireland".

2.2 New Ireland

Before beginning the history of the New Ireland plan, it is necessary to explain the ways in which New Ireland can be defined. In colonial council records, the term is used to mean a region, encompassing part of modern day Cecil county and other lands north and east of it, which were claimed by both Maryland and Pennsylvania. Also in colonial council records, New Ireland is meant to be the name of a future county, which would encompass the region previously described. In 1684 it was proclaimed by the governor's council that "in that part of this our province, on the frontieres thereof … we will and intend shall be erected into a county by the name of New Ireland" (Kilty 1808, 175-176). In colonial land patent records, New Ireland is a collection of properties, named after places in Ireland, laid out for Irish owners (Johnston 1881, 114-133; Patent Record 22, 51-161). From both colonial council records and the actions of George Talbot, the principal agent of the governor's council in the creation of New Ireland, it is

clear that the region was intended as a zone for Irish Catholic settlement. The instructions to Talbot in these records state no preference as to whether the settlers brought there should be British or Irish, but based on land patent records and later scholarly sources it is clear that Talbot chose to import only Irish Catholic settlers to the region.

2.2.1 Irish Settlers

Emigrants from Ireland were an integral part of the New Ireland plan. In 1682, Talbot contracted Edmund O'Dwyer to transport settlers to his manor. O'Dwyer was an entrepreneur from Tipperary, Ireland, with previous experience recruiting people to emigrate to the English American colonies (Polk 2017, 1). On April 4th, 1684, Talbot reported to the governor's council that he had brought 60 settlers to his manor (Johnston 1881, 114). O'Dwyer also transported an additional 15 settlers to his property of New Munster when he acquired it in 1683. This is known by the description of the patent for the New Munster property, which states that it was laid out for O'Dwyer and "15 other Irishmen" (Johnston 1881, 133).

There is no direct evidence as to where the 75 Irish emigrants transported by Edmund O'Dwyer originated from, but it is likely that most came from the south of Ireland. The Irish people affiliated with O'Dwyer in historical records are all from the south of Ireland, as was he; so it stands to reason that the relationships he used to recruit people in Ireland for emigration to the Americas were based in the south of Ireland (Polk 2017, 4). Some of the Irish emigrants could have come from Connaught, the home province of George Talbot, if they were recruited to emigrate by him personally through his existing kinship or community relations (Papenfuse 1979, 797). They were likely all Catholics because the populations of Connaught and the

southern provinces of Ireland were almost entirely Catholic in the 17th century (Ulster Historical Foundation).

The level of wealth possessed by these emigrants upon their departure is not known; but judging from contemporaneous Irish emigration, most probably came as poor indentured servants. Most Irish people who came to the Americas in the 17th century entered contracts of indentured servitude to pay for the trans-atlantic voyage (Moody, Martin, & Byrne 1991, 602). In colonial Maryland, these contracts typically lasted four or five years: during which the servant was bound to work for the master and the master was bound to provide food, clothing, and lodging for the servant. It was common for a master to give his indentured servant goods or land upon the completion of the term of service (Cook). It is not recorded that Talbot or O'Dwyer transferred any of their land without purchase, so if land was given to these Irish indentured servants it is likely that they were granted leases instead of ownership.

It was recorded in the Maryland council records that Talbot had an Irish man servant named Charles, whom he ordered to build a new house on his manor and clear land for the cultivation of corn (Archives Md. 1681b, 356). From this record it can be inferred that the Irish indentured servants on his manor were involved in agriculture and the construction of dwellings. The agriculture taking place probably also included tobacco cultivation, because in 1684 Talbot gave the governor's council 13,920 pounds of tobacco as partial payment for his estate (Johnston 1881, 114). Nearly every farmer in 17th century Maryland planted tobacco and corn. Tobacco was grown for market and corn was grown for subsistence. Wheat was not commonly cultivated

in Maryland until the 18th century because doing so required labor intensive land preparation (Silver 2001).

These settlers were crucial in Talbot's efforts on behalf of the Maryland government to defend its northern frontiers from claims of ownership by William Penn or the advance of his settlers. As previously discussed, Talbot commanded Maryland's militia, and increasing the local population would increase its force. It is historically attested that the militia built and armed a fort at the Christiana Bridge, in what is now the state of Delaware, to prevent Pennsylvanians from encroaching west into Maryland (Johnston 1881, 121). The fact that these settlers were Catholic made them loyal to the Catholic rulers of Maryland and unlikely to join the Quaker colony of Pennsylvania or any Protestant revolutionaries in Maryland.

2.2.2 New Ireland the Geographical Region

The term "New Ireland" was used in colonial council records beginning in 1683. On March 12th, 1683, Talbot was instructed by the governor and his council to settle the "Seaboard side [of what is now the Delmarva Peninsula], [the western shore of the] Delaware Bay and River up to the fortieth degree of Northern Latitude, and more especially of those parts at the Whore Kills [what is now Lewes, Delaware] by persons of British or Irish descent.", and he was given the authority of surveyor general in these areas (Archives Md. 1681b, 222). On March 19th of the same year, Talbot's authority as surveyor general was extended to include Cecil county (Archives Md. 1681b, 234), which at that time included land within modern day Cecil county and much of Kent county (Mathews 1907, 469), and Baltimore county, which at that time included land within modern day Baltimore county and modern day Harford county (Mathews 1907, 446). In the

proclamation that gave him this authority, the areas which he was previously empowered to be surveyor general are listed as “New Ireland, Delaware, and the Whore Kills” (Archives Md. 1681b, 234). From the instructions given on March 12th naming the disputed areas he was tasked with settling and their later reference on March 19th, it can be deduced that, in this instance, “New Ireland” refers to the lands immediately south of the fortieth parallel which were west of the shores of the Delaware Bay and River. Judging from the dates of these council records, it seems as though the term “New Ireland” was adopted by the council between March 12th and March 19th, 1683.

2.2.3 New Ireland Properties

In 1682, Talbot extended the boundaries of his manor, enlarging it substantially. In the title of this 1683 resurvey patent, the property is not referred to as “Susquehanna Manor”, which is what it was called in the original 1680 patent, but “New Connaught Manor”. Talbot changed the name to “New Connaught Manor” because Castleruby, the townland that he was from, is in the province of Connaught, Ireland (Papenfuse 1979, 797). In the description of the new boundaries of New Connaught Manor, the river which was first called “the Northeast River”, and is still called “the Northeast River” today, is renamed to “the River Shannon” (Johnston 1881, 114). The River Shannon is a notable river in Ireland that forms the eastern border of the province of Connaught.

This was the beginning of the process of Irish place naming in the region that Talbot intended to be the county of New Ireland. Because the boundaries of New Ireland were never formally defined in official records, Talbot probably named properties and natural features after places in

Ireland so that they would be included in New Ireland when its boundaries would be officially created. He continued this process on April 16, 1683, when he laid out the property "Bellaconell" for himself on the Elk River (Johnston 1881, 116). Bellaconell refers to his father's former estate called "Ballyconnell" in County Cavan, Ireland (Papenfuse 1979, 797). On August 29th, 1683, Talbot paid O'Dwyer for his settler transport services by laying out for him the properties "New Munster", containing 6,000 acres (Johnston 1881, 133), "Kappagh", containing 1,593 acres (Patent Record 22, 51), and "Crossayle", containing 575 acres (Patent Record 22, 161). New Munster was located north of Talbot's property Bellaconell, and both Kappagh and Crossayle were located east of these two properties. Tipperary, the county which O'Dwyer was from, is in the province of Munster, Ireland; hence the name "New Munster". Kappagh probably refers to a village in County Tyrone, Ireland, which is today known as Cappagh. Crossayle probably refers to a village in County Tipperary, Ireland, which is today known by the same name. O'Dwyer also named the stream running through his New Munster property, which is today known as "Gramie's Run", "Suir", after the river of the same name in Tipperary, Ireland (American-Irish Historical Society 1915, 40). Talbot may have laid out these Irish named properties strategically, by scattering them rather than placing them adjacent to one another, in order to roughly define the extent of New Ireland.

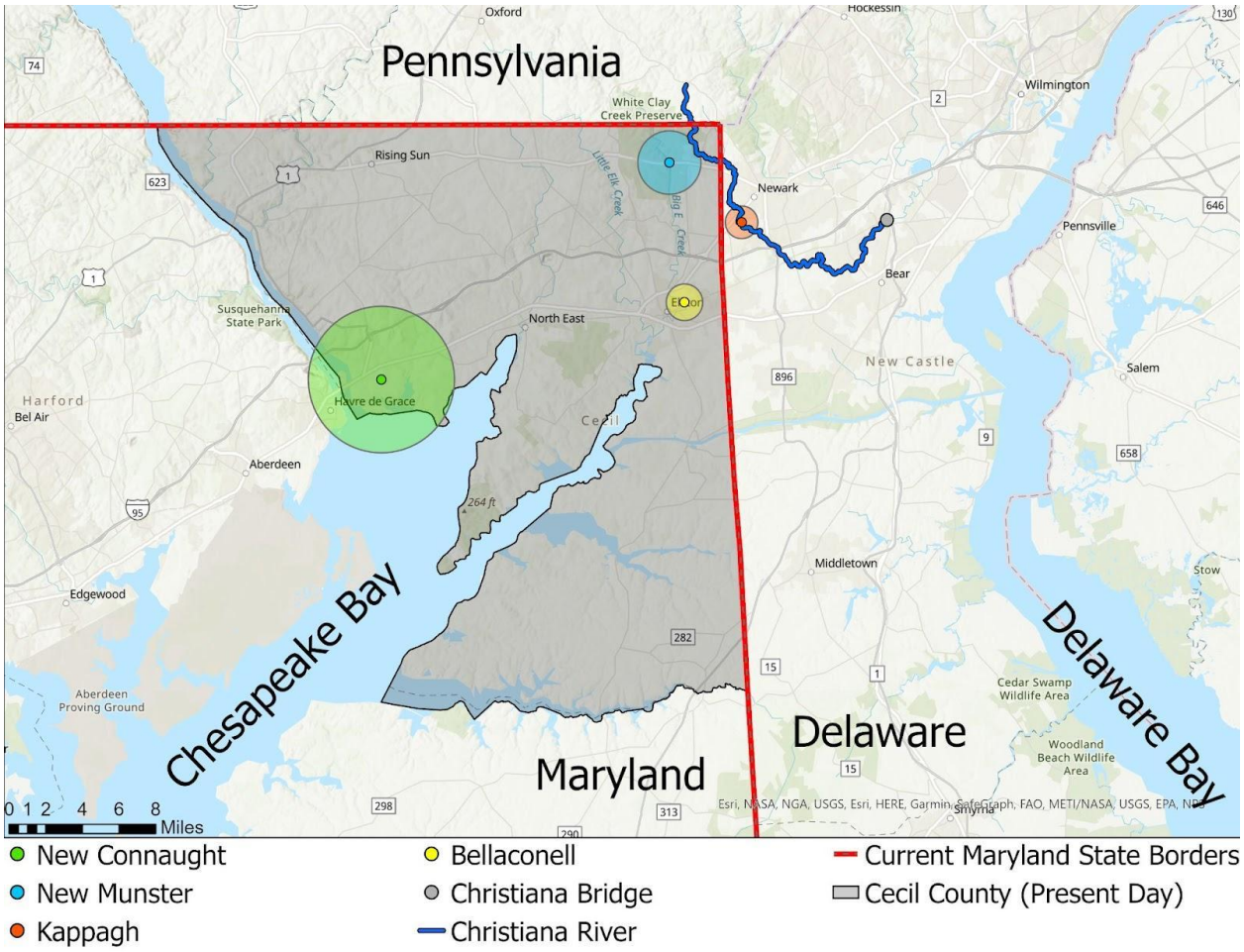


Figure 1. Each Irish named property is represented on the map by a point approximately where the property was located and a circle around each point containing the same area as the property. "New Connaught" and "New Munster" were placed at the locations of their historical markers. "Kappagh" and "Bellaconell" were placed at landmarks mentioned in their boundary descriptions. The property "Crossayle", not present in this map, was described as being located along the Christina River. It must have been located at some point along the portion of the Christiana River outlined in this map because the Christiana Bridge was defended by Maryland's militia as the eastern border of the colony in 1684, shortly after the property was surveyed (Johnston 1881, 121).

2.2.4 Failure of the County of New Ireland and its Aftermath

On April 5th of 1684, one day after Talbot announced his success in settling his manor to the council, the aforementioned proclamation stating the plan to create the county of New Ireland was issued (Kilty 1808, 125-126); but a mere four months later, in October, 1684, the plans for creating the county of New Ireland were ended after Talbot murdered a royal tax collector. As a result, his government positions were taken from him; and no one else in Maryland's colonial government made further efforts to import Irish settlers to New Ireland. George Talbot permanently departed the colony in 1687 (Johnston 1881, 123-132). Edmund O'Dwyer seems to have followed suit the next year; after he sold his properties, "New Munster", "Kappagh", and "Crossayle", in 1688, there are no further mentions of him in the records of Cecil county or the records of the governor's council (Polk 2017, 5) (Rent Rolls, 333).

As for the fate of the Irish Catholic settlers, those who settled in New Munster seem to have left by 1714, when the land was purchased by Scots-Irish settlers, because there is no mention of them in any of the property transfer deeds. The New Connaught settlers may have remained as tenants on the manor or they may have left. There certainly were tenants on the manor until the revolutionary war in 1776. This is known because the property was lost to its owners during the revolutionary war, and the land was parceled out to the tenants at the time (Maryland Survey Papers 1782).

The Presbyterian Scots-Irish settlers of New Munster included a family called the Alexanders and an affiliate of theirs named Matthias Wallace. These people, as well as other Scots-Irish, first came from the province of Ulster, Ireland to Somerset county, Maryland, in the early 1680s. They sold their land in Somerset county and went to New Castle, in what is today Delaware, by 1705. In 1714, they purchased land in New Munster from Thomas Stephenson, a land broker who owned the propert but had not settled it (Polk 2017, 6). It is known generally where in New Munster each member of this company settled from deed records (Polk 2017, figure 2). Their occupations too are known from these same deed records; among them being farmer, weaver, tanner, and carpenter (Polk 2017, 10). It is known from church records that these individuals first worshiped at the Head of Christiana church in New Castle, and later at the Rock Church in what is now Elkton, Maryland (Polk 2017, 11). Eventually, these initial settler families left for the frontier in the Carolinas; while at the same time, more Scots-Irish settlers were coming from Ulster, Ireland, to New Munster and the New Ireland area. The Scots-Irish immigration to New Ireland and other parts of the American colonies continued until the Revolutionary War (Polk 2017, 12).

The southern portion of what was meant to be the county of New Ireland, which was settled by Irish emigrants and later other Marylanders, became a part of Cecil County, Maryland. The northern and eastern portion of what was meant to be the county of New Ireland, which had not been settled by Marylanders, was settled by Pennsylvanians and Delawareans and later became part of those two states.

The name “New Ireland” persisted in northern Cecil County because of the Irish Catholic and Scots-Irish emigrants who settled there (Polk 2017, 11). Many deeds and other land transfer documents from the 18th century describe properties in northern Cecil County as “lying in New Ireland”. As late as 1792, the name “New Ireland” was still in such use that its initials were inscribed on the New Munster Stone: a stone erected to replace a poplar tree which marked the beginning of the property boundaries of the New Munster property (Touart 1981, CE-1005, 8).

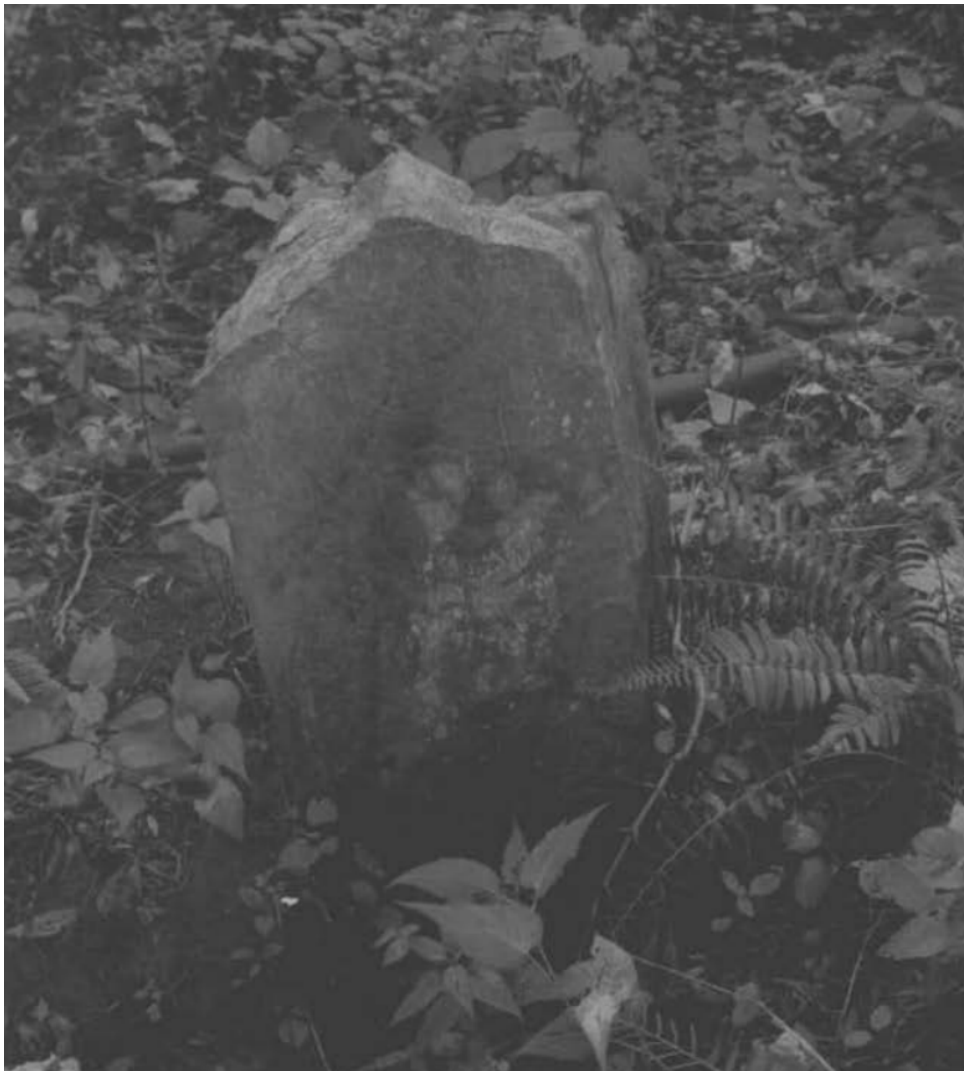


Figure 2. North face of the New Munster Stone, which bears the initials "N.M." and "N.I." standing for "New Munster" and "New Ireland" (Touart 1981, CE-1005, 20-21).

2.2.5 Architecture of the New Ireland Settlements

The structures these Irish settlers built were likely post in hole timber frame constructions (The Cecil Historical Trust, Inc. 1996, 194). Jasper Dankaert, in an account of his travels through Cecil county in 1679, describes the dwellings of the time as being minimal in scale and temporary constructions (The Cecil Historical Trust, Inc. 1996, 163). Their standard size was roughly 30 by 18 feet, which are the dimensions laid out in a 1684 instruction manual on how to build a timber frame house for the settlers of Pennsylvania (The Cecil Historical Trust, Inc. 1996, 194)

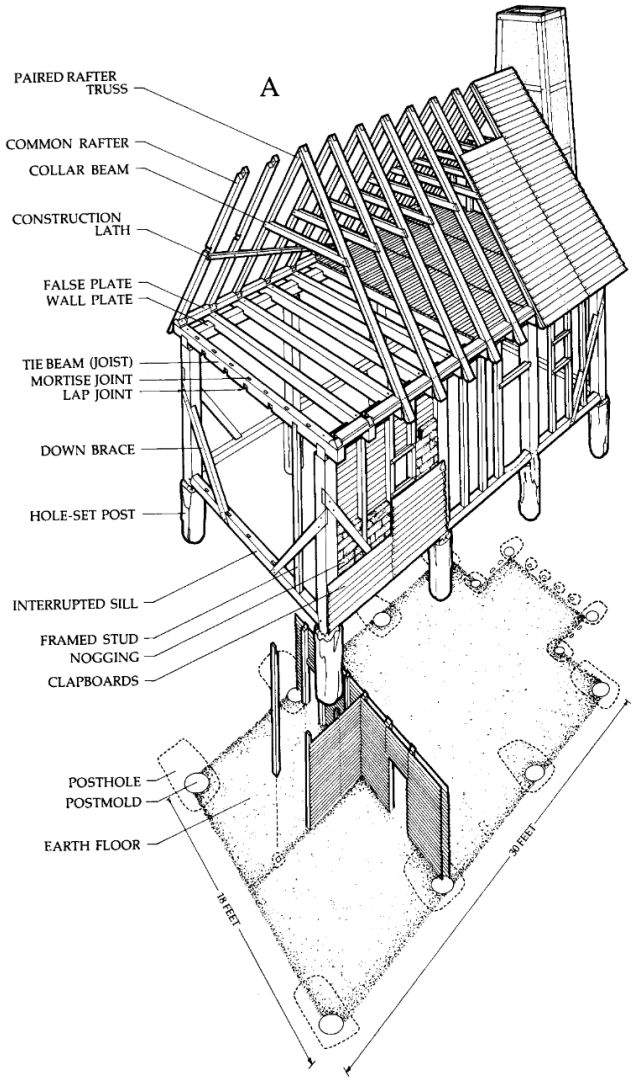


Figure 3. A reconstruction of the timber frame house described in the 1684 instruction manual with the addition of a chimney design based on archaeological evidence (Carson, Barka, Kelso, Stone, & Upton 1981, 142).

These structures were built so modestly because the settlers needed to ensure the planting of crops at the expense of permanent housing construction (The Cecil Historical Trust, Inc. 1996,

37). Subfloor storage pits are frequently associated with these types of colonial structures. Excavation of a post in hole house from the 1740's in Cecil county found a large subfloor pit within the boundaries of several post holes (Gossman-Bailey & Michael 2012, 6). Some timber frame structures had full sized basements. In a 1683 letter, William Claypool, an English merchant moving to Philadelphia, instructed his indentured servants to go there before him and build a timber framed house of 40 by 20 feet, with a cellar to keep wine and liquor cold (Carson, Barka, Kelso, Stone, & Upton 1981, 144-146). Specifically in Cecil County, many basements of timber framed houses were lined with stone because of its abundance there. The Roger Kirk house in Calvert, Maryland, is the earliest surviving example. Built in 1719, it was a timber framed house atop a basement lined with local fieldstones (The Cecil Historical Trust, Inc. 1996, 206).

Figure 4. A 1980 photograph of the stone lined basement of the Roger Kirk House, taken after it had burned down (Bourne 2012, CE-209).

It is possible that the settlers of New Ireland employed construction methods from their native country. If that were the case, their structures would not have been markedly different from typical 17th century Maryland structures. 17th century houses in Ireland were rectangular in shape and of modest size. In the first half of the 17th century, they were built with post in hole construction, sometimes over a stone foundation (Dempsey 2021). By the second half of the 17th century, timber in Ireland was in such short supply to the population that houses were constructed entirely of stone (Oram 2004, 5). It is more likely that the Irish emigrants to New Ireland would have built houses in the style of the early 17th century because they were less labor intensive to build and timber was freely available.

The structures they built were likely organized in clusters and surrounded by fencing. A variety of buildings were constructed on 17th century Maryland plantations, including dwellings, kitchens, storehouses, and tobacco houses (Smolek 1984, 4-5). 17th century plantations in Maryland were generally located near navigable bodies of water but not directly on the shore. The median distance of 17th century Maryland archaeological sites from navigable water is 660 feet, and only 11% are further than a mile inland (Smolek 1984, 8-9). They were often located on knolls adjacent to ravines because these areas had well drained soils that were conducive to agriculture (Smolek 1984, 22). These areas are also where springheads were found, which were the main source of drinking water used by 17th century Marylanders (Smolek 1984, 18-19).

3. Methods

3.1 Literature review

Several studies that used remote sensing and Geographic Information Systems (GIS) to discover new archaeological sites were reviewed to inform the methodology of this study.

GIS software is used to place data made up of pixel matrices, called rasters, and digitally generated shapes, called vectors, in relation to one another based on their location in geographical space. Remote sensing is the process of obtaining data remotely via the use of active or passive sensors. In archaeology, remote sensing can include measurements taken using ground instruments, airborne instruments, or satellite instruments. The more complex information gained from these studies was how archaeological remains may appear in remotely sensed data. What was common to all of them was the use of Geographic Information Systems (GIS) software to visualize remotely sensed data and maps. Specifically, GIS software accurately places these different layers in geographical space so that the information they hold can be designated to precise locations.

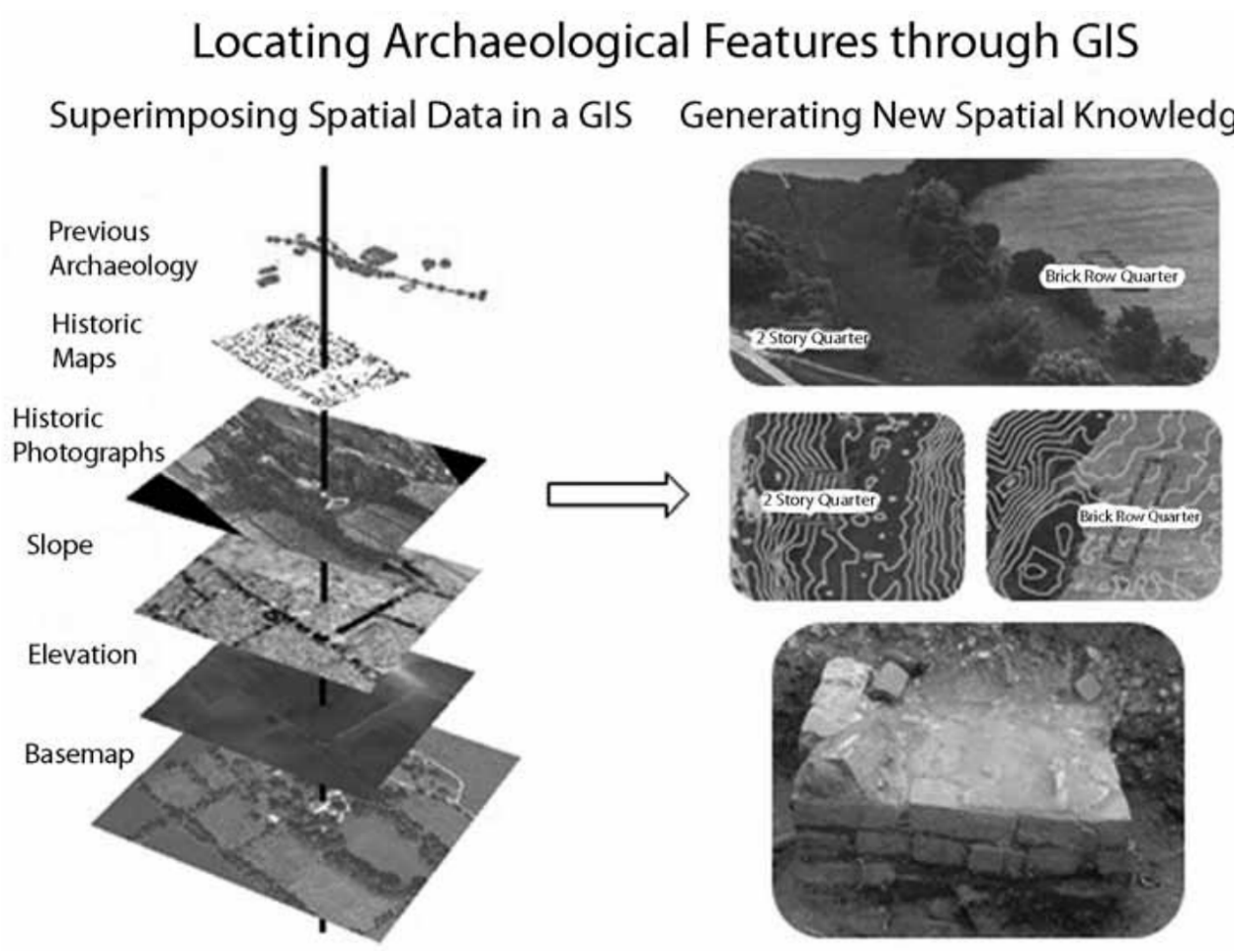


Figure 5. This graphic shows how layers are combined in GIS. These layers were used by Mark P. Leone, Amanda Tang, Benjamin A. Skolnik, and Elizabeth Pruitt to locate a slave quarter site at the Wye plantation in Talbot County, Maryland (Leone, Tang, Skolnik, & Pruitt 2013, 229).

Remotely sensed data that is available for download has already been processed to correspond accurately to geographic space. This means that when it is imported into GIS software, it will already be in the correct location and have accurate proportions. The same is not true of many maps. When many maps are imported into GIS software, they will be in a random place and have

inaccurate proportions. To assign them to the correct place and make their proportions accurate, they must be georeferenced. To inform the method of georeferencing used in this study, an online tutorial by Brad Skopyk, an associate professor of history at Binghamton University, was consulted (Skopyk 2021).

3.1.1 LiDAR

LiDAR, or Light Detection and Ranging, is a remote sensing method which maps detailed topographical data. This data is obtained through the use of high precision laser beams and therefore reveals the ground topography below tree canopies, making it useful to map manmade landscape alterations in forested areas. A study done in Connecticut identified stone foundations (which appeared as rectangular depressions in elevation), stone walls (which appeared as linear convex features in elevation), and abandoned roads and paths (which appeared as linear depressions in elevation) by analyzing 1 meter resolution LiDAR data of the study area (Johnson & Ouimet 2014, 15). Another New England based study used LiDAR data to identify similar features to those mentioned above at a forested site where historical maps indicated a farmstead would be, thus conclusively locating the abandoned farmstead (Bristow & Therien 2019). A Pennsylvania study used LiDAR data to locate abandoned charcoal hearths, which appeared as circular depressions, in a selected region of forest (Carter 2019).

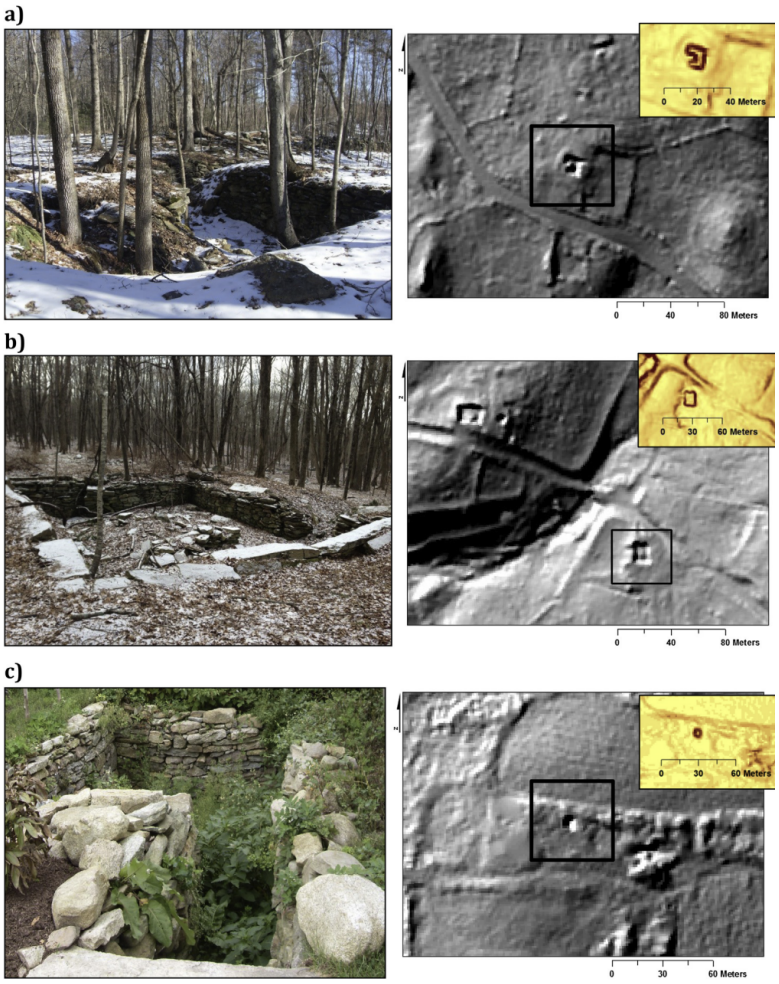


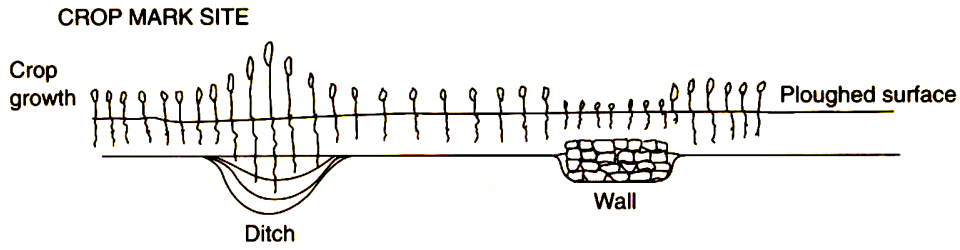
Figure 6. Two stone foundations from Connecticut (a & b), and one from Massachusetts (c), discovered in the study by Johnson and Ouimet. On the left are ground based photographs taken by the researchers and on the right are the signatures of these features in LiDAR hillshade rasters (Johnson & Ouimet 2014, 13).

3.1.2 NIR

Patterns of plant growth can indicate the presence of buried archaeological features. In locations over buried pits, which have greater depths of organic soil, vegetation will grow well; while in

locations over buried stone or brick features, which have shallower depths of organic soil, vegetation will grow poorly. These phenomena are known as crop marks; the former are called positive crop marks and the latter are called negative crop marks (Verhoeven 2012, 133). Near infrared radiation, or NIR, is a term used to describe light with a longer wavelength than red light and a shorter wavelength than infrared radiation. NIR imagery can capture subtle changes in crop growth better than visible spectrum imagery, making it useful for identifying crop marks. This is because plant leaves reflect NIR extremely well. The level of NIR reflectance is a result of the concentration of chlorophyll in the plant, which is indicative of its health (Verhoeven 2012, 134). The identification of crop marks via NIR imagery has been used to locate the foundation of a Roman temple in the town of Trea, Italy (Verhoeven 2012, 145), and archaeological anomalies corresponding to the locations of houses and platform mounds at Hollywood, a late Mississippian site located in the state of Mississippi (Giardano, Kvamme, & Clay 2006, 69). An example of extreme relevance to this study is a study that used a combination of NIR and visible light imagery, called color infrared imagery, to locate a Nanticoke village within historically known boundaries of a reservation on the eastern shore of Maryland (Davidson & Hughes 1986).

(a)



(b)

Figure 7. A diagram showing how crop marks form over buried archaeological features (a) and an example of positive crop marks in an NIR image of the Hollywood site (b). In the diagram, the

crop mark over the ditch is positive and the crop mark over the wall is negative (Drewett 1999, 38). In the image, bright areas have high reflectance in NIR and darker areas have lower reflectance in NIR. The arrows indicate positive crop mark anomalies that correspond to known locations of archaeological remains of houses and platform mounds (Adapted from Giardano, Kvamme, & Clay 2006, 69).

Vegetation indices are formulas applied to NIR and visible light imagery that make new imagery in which plant health more apparent than in NIR imagery. Specifically, the reflectance level of red and NIR for each pixel is combined in a mathematical operation which assigns a new value to the pixel. One study tested several vegetation indices to see which would be the most useful for identifying crop marks created by archaeological remains. To accomplish this, the researchers excavated and reburied a chosen area, so that it had the same archaeological signature as an ancient tomb, planted the area with barley, and then applied a multitude of vegetation indices to later satellite images of the area. They found that the Soil and Atmospheric Resistant Vegetation Index (SARVI), the Simple Ratio Vegetation Index (SRVI), and the Perpendicular Vegetation Index (PVI) were the most effective at distinguishing the mock archaeological site from the surrounding area (Agapiou, Hadjimitsis, & Alexakis 2012, 3913).

3.2 Data Acquisition

Many different sources of data were used in this study, ranging from aerial imagery in visible light and LiDAR to a variety of historic and contemporary maps. All of it was freely available on

the internet. This section will give an overview of each data source used and how it was obtained and incorporated into the two ArcGIS Pro maps.

3.2.1 LiDAR Data

The LiDAR data used in this study is publicly available on the state of Maryland's "MD iMap" website. It was collected in 2020 by Axis Geospatial LLC using airborne LiDAR sensors. Its spatial resolution was 1 meter and it covered the extent of Cecil county, MD. This data was processed into a digital elevation model (DEM) raster with hillshade visual effect and a bathymetric color ramp. It was released by MD iMap to the ArcGIS Online portal for Maryland (Maryland iMap 2020). From this portal, the raster was added as a layer to the ArcGIS Pro maps of New Munster and New Connaught.

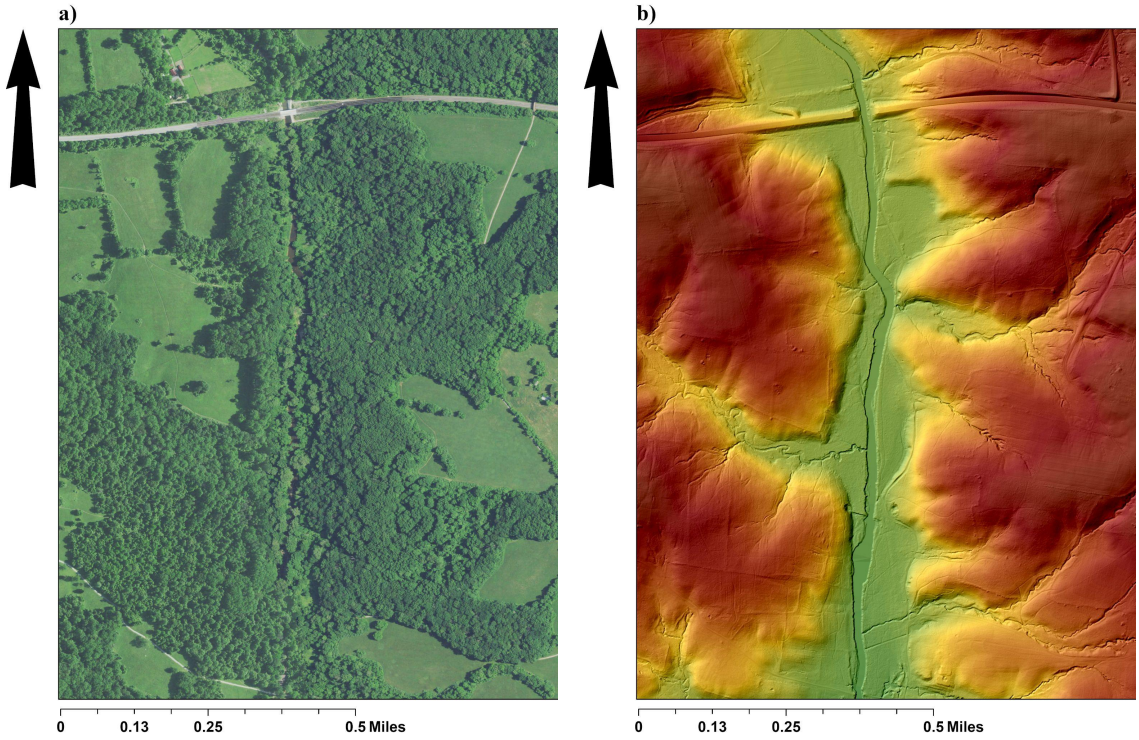


Figure 8. A view of part of the New Munster study area in true color aerial imagery (a) (National Agricultural Imagery Program [NAIP] 2021) and bathymetric hillshade LiDAR raster (b) (Maryland iMap 2020).

3.2.2 Color Infrared Aerial Imagery

The NIR data used in this study was obtained from color infrared aerial imagery captured by the National Agricultural Imagery Program (NAIP). Color infrared imagery displays surface reflectance in NIR as red, surface reflectance in red as green, and surface reflectance in green as blue.

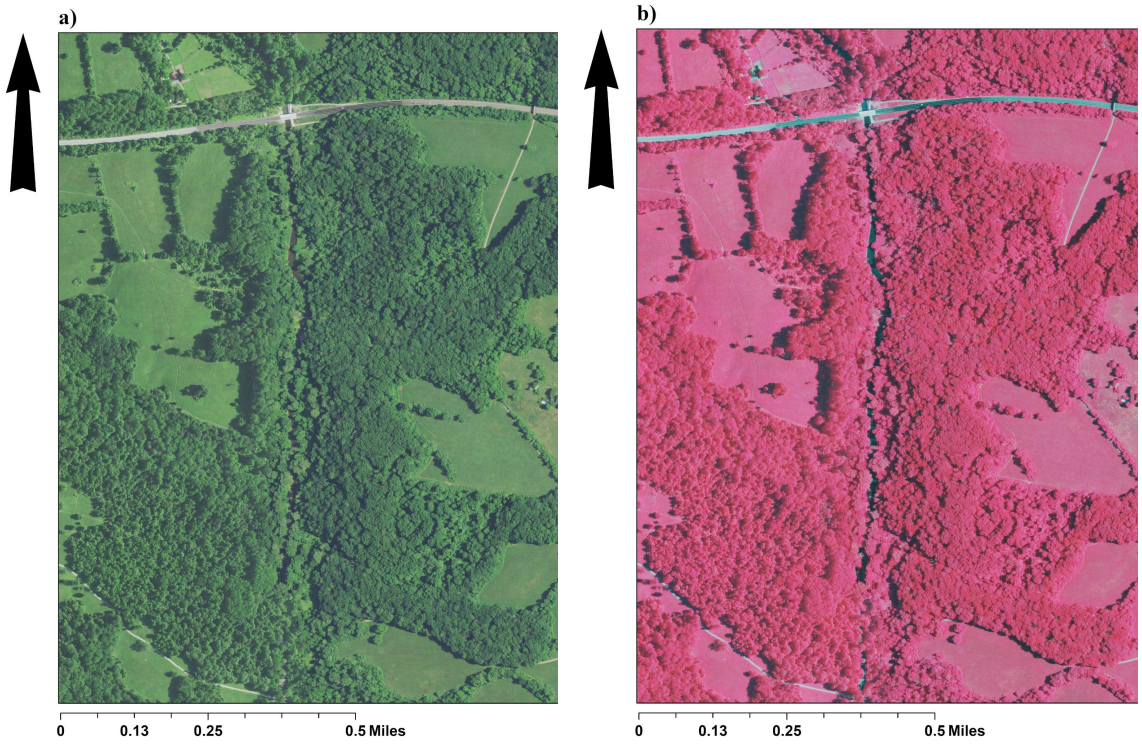


Figure 9. A view of part of the New Munster study area in true color aerial imagery (a) and color infrared aerial imagery (b) (NAIP 2021).

NAIP color infrared imagery rasters from 2018 and 2021 were obtained from a page on the website “Box” created by the U.S. Department of Agriculture (USDA). Each was added as a layer to the ArcGIS Pro maps of New Munster and New Connaught. The imagery from 2018 was captured on August 27th, and the imagery from 2021 was captured on June 6th. Both imagery rasters have a spatial resolution of 0.6 meters and cover the extent of Cecil county, MD (NAIP 2018; NAIP 2021).

3.2.3 True Color Aerial Imagery

NAIP true color aerial imagery was also obtained from the USDA’s “Box” page. True color imagery rasters from 2018 and 2021 were added as layers to the ArcGIS Pro maps of New Munster and New Connaught. The imagery from 2018 was captured on August 27th, and the imagery from 2021 was captured on June 6th. Both imagery rasters have a 0.6 meter spatial resolution and cover the extent of Cecil county, MD (NAIP 2018; NAIP 2021).

Other sets of true color aerial imagery were consulted in this study using Google Earth Pro. By using the historical imagery tool, one can see aerial images from years as early as 1995. One imagery layer that was referenced particularly often was a set of aerial images taken January 31st, 2008. The ground is exceptionally visible in this imagery layer because there are almost no leaves on the trees. It came to Google Earth Pro from the U.S. Geological Survey, and it has a spatial resolution of 0.6 meters (U.S. Geological Survey 2008)

3.2.4 Historic Property Boundaries

The boundaries of New Munster and New Connaught were recorded in their original survey documents from 1680 and 1683. These were not available online, however, so the boundary descriptions were obtained from secondary sources. A description of New Munster's boundaries is available on a page of the website of Yale University (New Ireland Established in Maryland 2015). A description of New Connaught's boundaries was written in "History of Cecil County" by George Johnston in 1881 (Johnston 1881, 112). These boundary descriptions describe property lines by length and compass direction or by natural features. They were used to create polygons of the New Munster and New Connaught boundaries in Google Earth Pro.

It was necessary to also reconstruct the early 18th century property boundaries inside New Munster, because the Scots-Irish emigrants that settled there did not purchase the whole property. New Munster was first divided in 1688, when Edmund O'Dwyer sold part of the land to Thomas Pilgrum and the rest of the land to John Toas (Polk 2017, 5). By 1718, the property was divided into 14 different parcels, 10 of which were owned by the Scots-Irish Alexanders or their affiliates (Polk 2017, 10). Written descriptions of the 1718 property boundaries within New Munster were used by the historian John F. Polk to create a map of New Munster showing these property lines (Polk 2017, 10).

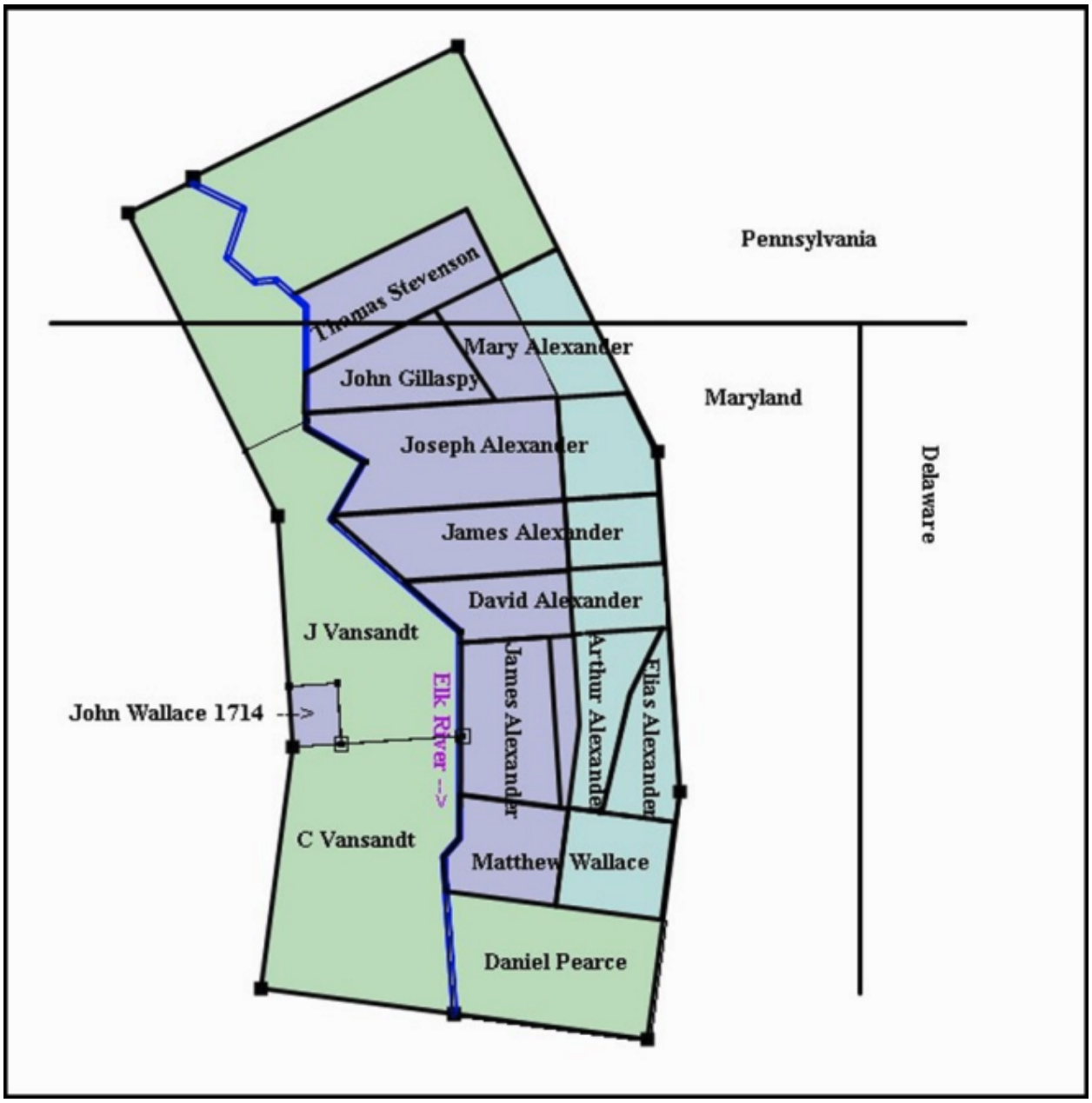


Figure 10. "Scotch-Irish 'Holdens' of New Munster, 1714-1718; blue shaded area is the 1714 parcel with boundaries based on the additional parcels conveyed in 1718 shown in gray." (Polk 2017, 10).

A screenshot image was captured of this map and imported into the ArcGIS Pro map for New Munster.

3.2.5 Historic Maps

The historic maps used in this study date from 1794, 1858, 1877, 1898, 1900, 1917, and 1942 (Griffith, Thackara, & Vallance 1794; Lake, Toudy, Worley, & Bracher 1877; Martinet 1858; U.S. Geological Survey 1898; U.S. Geological Survey 1900; U.S. Geological Survey 1900; U.S. Geological Survey 1917; U.S. Geological Survey 1942; U.S. Geological Survey 1942). All of them display roads, structures, and natural features. The map from 1794 does not display residential structures. The 1858 and 1877 maps display residential structures and names of their inhabitants. The 1898-1942 maps display residential structures but not the names of their inhabitants. The 1794 - 1877 maps were obtained from the Library of Congress website. The 1898 - 1942 maps were obtained from the USGS historical topographic map explorer website. From these websites, the maps were downloaded as TIFF files and imported into the ArcGIS Pro maps of both New Munster and New Connaught.

3.2.6 Historic Aerial Imagery

Two historical aerial image composites were used in this study. The first dates from April and May 1938. The images were taken by the state of Maryland's Department of Natural Resources for the Maryland Geological Survey. They have a spatial resolution of 4 meters (Aerial Photograph Index Maps, Cecil 1938). This imagery composite was obtained from the Maryland State Archives website as four PDF files and imported into the ArcGIS Pro maps for New Munster and New Connaught. The second aerial image composite dates from 1952. The images

were taken by the U.S. Agricultural Stabilization and Conservation Service at a spatial resolution of 6 meters (U.S. Agricultural Stabilization and Conservation Service 1952). This imagery composite was obtained from a webpage of Johns Hopkins University's Sheridan Library as a TIFF file and imported into the ArcGIS Pro maps for New Munster and New Connaught.

3.2.7 Contemporary Maps

Two contemporary maps of part of the New Munster area were used in this study. They displayed the locations of standing historic structures and ruins of historic structures. Specifically, both covered the extent of the Fair Hill Natural Resource Management Area, a property owned by the state of Maryland that includes the majority of the land that was within the former New Munster property. The first of these maps, created for the Maryland Historical Trust in 2014, shows the locations of documented historic ruins and structures. It includes an extensive legend that provides information about each of the 132 historic sites (Reed 2014, CE-1434). It was downloaded from the Maryland Historical Trust website as a PDF file and the maps it included were imported into the ArcGIS Pro map for New Munster. The second contemporary map was a trail map of the Fair Hill NRMA that included the locations of some buildings and ruins (Maryland Department of Natural Resources). This map was downloaded from the Maryland DNR website as a PDF file and imported into the ArcGIS Pro map for New Munster.

3.3 GIS Operations

To prepare the data for visual analysis, several operations were undertaken in GIS software. Boundary polygons were created for New Munster and New Connaught, a new polygon was created to define the zone of analysis for New Connaught, maps were georeferenced, and a

vegetation index was created to display crop marks. In the following sections each operation will be explained in greater detail.

3.3.1 Creating the Boundary Polygons

Google Earth Pro was used to create vector data representing the New Munster and New Connaught boundaries because its “measure” tool is better suited for recreating property lines from written descriptions than that of ArcGIS Pro. The New Munster and New Connaught property lines were described by their starting point, distance, and compass heading.
The Google Earth Pro “measure” tool includes compass heading, ground distance (a feature that adjusts distance to account for local topography), and a convenient method to save measurements as line vectors.

The boundary description of New Munster makes little reference to natural features, instead describing a sequence of lines that form an enclosed shape. These lines are described as beginning at a marked poplar tree. As previously discussed, this tree deteriorated and was replaced by the New Munster Stone (Touart 1981, CE-1005, 2). The location of the stone was approximated using written descriptions in its architectural survey file and aerial imagery. From this location, each boundary line was created, and then a polygon was created with these lines as boundaries.

The boundary description of New Connaught is almost entirely based on natural features. Its natural boundaries are the Octoraro River, the Susquehanna River, the Chesapeake Bay, and the Northeast River. The only imaginary boundary is a line drawn North West from the furthest

fountainhead of the Northeast River to the Octoraro River. It is difficult to approximate where the 17th century settlers believed the furthest fountainhead of the Northeast River was. Fortunately, there is another imaginary line which may well substitute for this line. In 1683, George Talbot drew a line by marking trees from the mouth of the Octoraro River to the mouth of Naaman's Creek, in present day Delaware. He created this line to be the northern border of the colony of Maryland (Johnston 1881, 117). The line intersected New Connaught and placed much of its northern area outside of Maryland. It can be reasonably assumed that this northern area of Talbot's New Connaught Manor was not settled if he was willing to cede it to Pennsylvania. Therefore, this line was used as the northern border of New Connaught. To create this northern border, a line was created from the mouth of the Octoraro River to the mouth of Naaman's Creek. A polygon was created which included the land bounded by the previously mentioned natural features and the recreation of Talbot's line.

The New Connaught and New Munster boundary polygons were exported from Google Earth Pro as KML files. The KML file of the New Munster boundaries was imported into the ArcGIS Pro map for New Munster, and the KML file of the New Connaught boundaries was imported into the ArcGIS Pro map for New Connaught.

3.3.2 Creating the Zone of Analysis in New Connaught

The New Connaught boundary polygon covered 47,775 acres. This much land would be impossible to search given the scale of this study. It was therefore necessary to search only the areas most likely to be settled in the 17th century. As previously discussed, research by Michael Smolek has determined that 89% of archaeological sites in Maryland dated to the 17th century

are within one mile of a navigable body of water (Smolek 1984, 8). Based on this fact, it was determined that only the land in New Connaught within 1 mile of the Susquehanna River, the Chesapeake Bay, or the Northeast River would be analyzed.

To visualize this area in the New Connaught ArcGIS Pro map, a polygon was created that encompassed it. To create this polygon, a line was created following the shoreline of New Connaught on the Susquehanna River, the Chesapeake Bay, and the Northeast River. Then, a polygon was created with boundaries 1 mile away from this line using the buffer tool. Finally, a new polygon was created where the New Connaught Boundary polygon overlapped the buffer polygon. This new polygon covered an area of 14,369 acres.

3.3.3 Georeferencing

Each of the historic maps, historic aerial image composites, and contemporary maps was georeferenced using control points and a spline operation. Georeferencing is the process by which a raster is moved and transformed based on the placement of control points. A control point is the point where a selected point on the raster being georeferenced is moved to. Using control points is essentially like pinning one map to another with the control points acting as pins. In this case, road intersections and river crossings on the maps and aerials being georeferenced were pinned to their matching features on the contemporary aerial images. Many of the historic maps are inaccurate in the relative distances placed between features. The spline operation changes the proportions of the raster being georeferenced to perfectly align the control points of both maps. By using the spline operation and many control points on these historic

maps they become more positionally accurate. Therefore, the locations of the structures they depict can be known more accurately (Skopyk 2021).

3.3.4 Vegetation Indices

A Simple Ratio Vegetation Index (SRVI) was created to detect crop marks. This vegetation index was chosen because, as previously discussed, it was proven to be one of the most effective indices for detecting archaeological crop marks. The formula for this index is surface reflectance in NIR divided by surface reflectance in red. (Agapiou, Hadjimitsis, & Alexakis 2012, 3913).

In each ArcGIS Pro map, the color infrared aerial images from 2018 and 2021 were clipped by the extent of the boundary polygons. Then, using the raster calculator tool, each clipped color infrared image was converted into a SRVI raster. A bathymetric color ramp was applied, and a percent clip was adjusted to maximize contrast in vegetated fields.

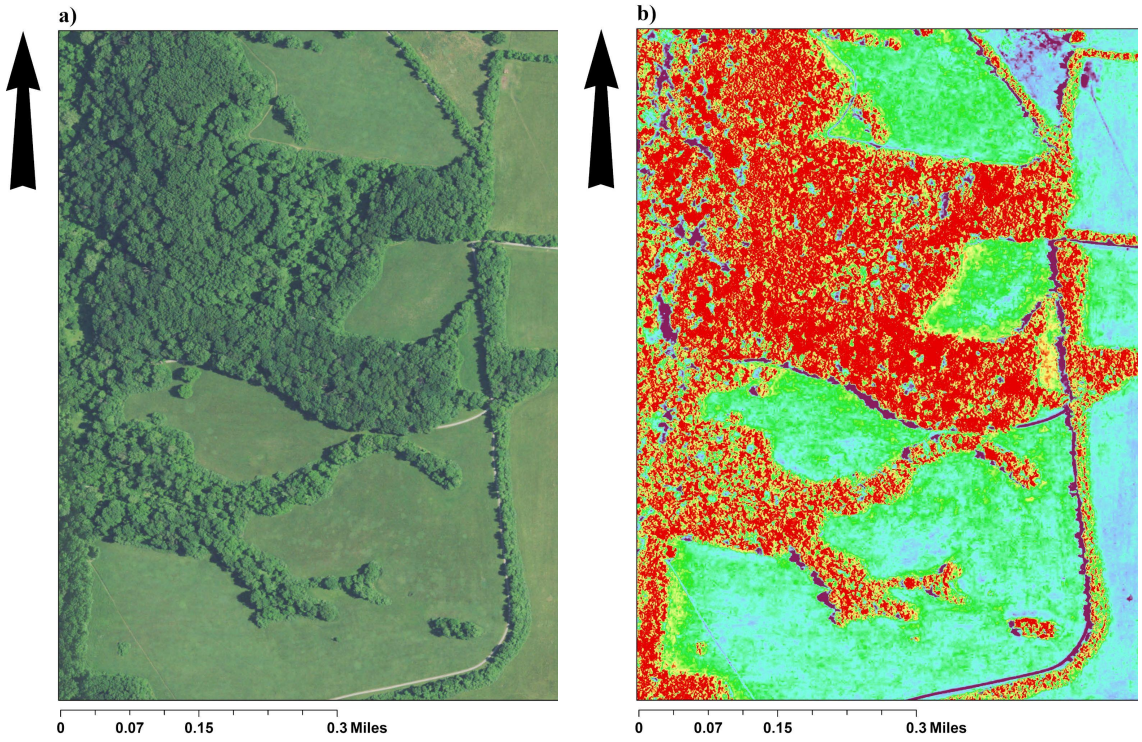


Figure 11. A field in New Munster shown in true color (a) and in SRVI with a bathymetric color ramp (b) (NAIP 2021).

3.4 Visual Analysis

The 2018 and 2021 SRVI rasters and the 2020 LiDAR raster were visually analyzed within the study area in both ArcGIS Pro maps. In the New Munster ArcGIS Pro map, these rasters were scanned within the boundary polygon of New Munster. In the New Connaught ArcGIS Pro map, these rasters were scanned within the polygon created to cover all land in New Connaught within 1 mile of navigable water. This was done to locate possible archaeological remains of 17th and early 18th century structures.

3.4.1 Anomaly Detection

In the LiDAR and SRVI rasters, anomalies appear regularly. Crop fields are not naturally uniform in their productivity, and terrain is not naturally smooth. Therefore, four criteria were used to determine if an anomaly was worth considering as a site of potential archaeological remains.

The first is if the anomaly represents an existing structure. Areas with existing structures were noted by referencing aerial imagery. Google Earth Pro winter aerial imagery was referenced when the anomaly in question was obscured by leaf cover in the NAIP aerial imagery. All anomalies representing existing structures were discounted from being possibly dated to the 17th or early 18th century.

The second is shape. If the anomaly is almost perfectly circular or almost perfectly square or rectangular, there is a greater chance that it represents the remains of a structure. House foundations and cellars would often be dug in rectangular shapes, leaving square positive crop marks if they were filled in or square depressions in the ground if they were not filled in. Subfloor pits designed to hold a barrel were circular in shape, and if filled in one would create a circular positive crop mark.

The third criteria is intensity. If a possible crop mark anomaly is significantly more or less verdant than the surrounding vegetation, there is a greater chance it represents the remains of a structure than a crop mark with only a slight difference in plant health compared to the surrounding vegetation. Similarly, if a ground depression appears to be 4 feet deeper than the

surrounding terrain, it is more likely to represent the remains of a structure than a ground depression only 1 foot deeper than the surrounding terrain.

The final criteria is size. Houses from the 17th and early 18th century were an average of 18 x 30 feet in dimensions (The Cecil Historical Trust, Inc. 1996, 194). Anomalies of a suitable shape and intensity that were much larger than this were determined to be unlikely to be the targeted archaeological remains.

3.4.2 Anomaly Evaluation

In both ArcGIS Pro maps, many anomalies meeting the above four criteria were detected in the LiDAR and SRVI rasters. Each of these anomalies was referenced with historic maps and aerials to determine an approximate date.

Those that corresponded to the location of a structure in the earliest map to depict dwellings, the 1858 map, were determined to date to any time between the mid 17th century and 1858; though it is more likely that they date to the 19th or late 18th century since timber structures were subject to destruction over time by decay and fire. Those that only corresponded to the location of a structure in any of the maps or aerial images after 1858 were determined to post date 1858.

Those that did not correspond to the location of a structure in any historic maps or aerial image were determined to pre-date 1858. They were considered more likely than those that corresponded to structures on the 1858 map to date to the 17th century or early 18th century. It is certainly possible that one of the structures on the 1858 map was built in 1682 and maintained

for 176 years. It is also possible that one of the anomalies located where there are no structures on the 1858 map represents a structure built in 1857 that burned down one month after it was finished. Though possible, these cases are exceptional; so the anomalies located where there are no structures on any historic maps were determined to be the ones most likely to represent the remains of structures built in the late 17th and early 18th century.

These anomalies were then ranked by their likelihood of representing the targeted archaeological remains based on their geographic setting. As previously discussed, the 17th century archaeological sites in Maryland have a median distance of 660 feet from the nearest navigable body of water. Additionally, even within the first mile their frequency decreases significantly as distance from navigable water increases (Smolek 1984, 8). Therefore, those anomalies closest to a navigable waterway are most likely to represent the remains of a 17th century structure. This principle was only applied to New Connaught because the closest point in New Munster to a navigable waterway, the Elk River, is over 6 miles away. If it were not historically documented that the property was settled in 1683, finding any 17th century archaeological site in New Munster would be unlikely for that reason.

The second most important factor to rank the likelihood that an anomaly represents the targeted archaeological remains is its distance from a springhead. Springheads were the primary source of water for 17th century Marylanders, and 17th century archaeological sites in Maryland show a strong correlation to the locations of springheads (Smolek 1984, 19).

Other factors that were considered were the presence of other anomalies close by, suggesting a cluster of structures, which was a typical feature of 17th century Maryland plantations (Smolek 1984, 4), and the presence of a rolling road or path from the anomaly to navigable water, which would be evidence of a ship landing for the exchange of goods (Smolek 1984, 7).

4. Results

This study investigated two research questions: “What were the boundaries of New Munster and New Connaught?”; and “Where was settlement concentrated within each of these properties?” It was necessary to answer the first question to investigate the second.

As previously discussed, the boundaries of New Munster and New Connaught were reconstructed in Google Earth Pro based on written descriptions.

Figure 12. The boundaries of New Munster (right) and New Connaught (left) displayed over a 2023 Copernicus satellite image of northern Cecil County, Maryland, in Google Earth Pro (European Space Agency 2023).

To answer the second question, LiDAR and SRVI data was analyzed visually in the entirety of New Munster and in all the area within 1 mile of navigable water in New Connaught. In both properties, anomalies likely to represent the remains of 17th or early 18th century structures were detected and evaluated.

4.1 New Munster

In the area within the New Munster boundaries, nine anomalies likely to represent the remains of 17th or early 18th century structures were discovered through visual analysis of remotely sensed data; three using LiDAR and six using the SRVI. Historical resource data was also consulted to determine that eight documented historic sites could potentially date to the 17th or early 18th century.

4.1.1 LiDAR Anomalies

Three ground depressions detected in the LiDAR raster in the New Munster area were determined to be significantly likely to represent the remains of 17th or early 18th century structures.

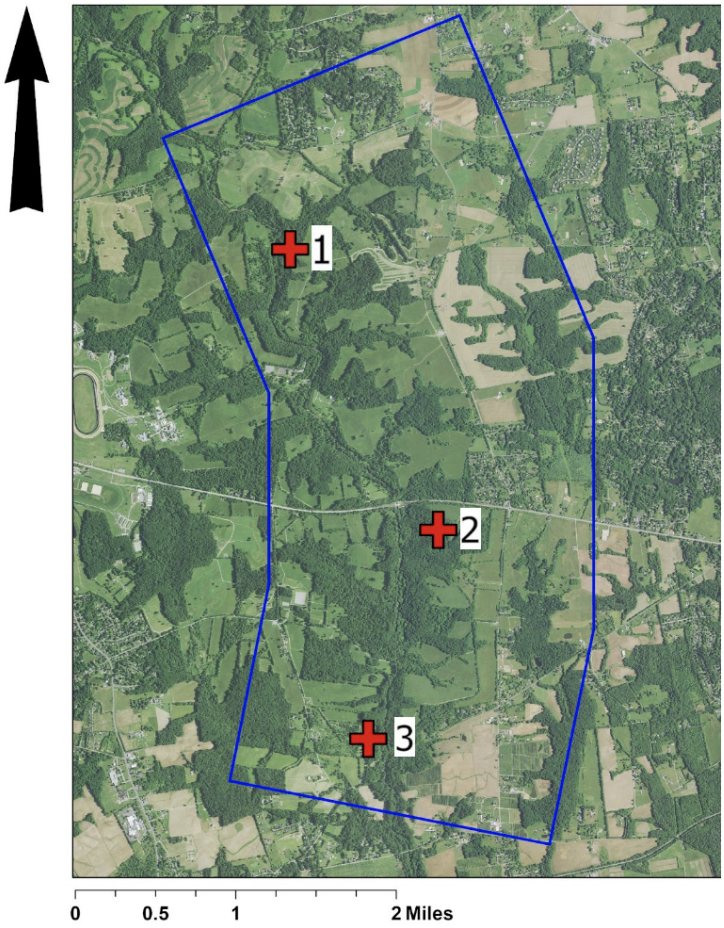


Figure 13. The three significant ground depressions within the New Munster boundary polygon shown as red crosses over the 2021 aerial image (NAIP 2021). Ground depression NM1 is furthest North, ground depression NM3 is furthest south, and ground depression NM2 is in the middle of the image.

The ground depression determined most likely to represent the remains of a 17th or early 18th century structure, NM1, is located in a forested area close to a field east of the Big Elk Creek.

It measures 43 by 30 feet and is 379 feet away from the nearest springhead. There appears to be a trail connecting it to the Big Elk Creek.

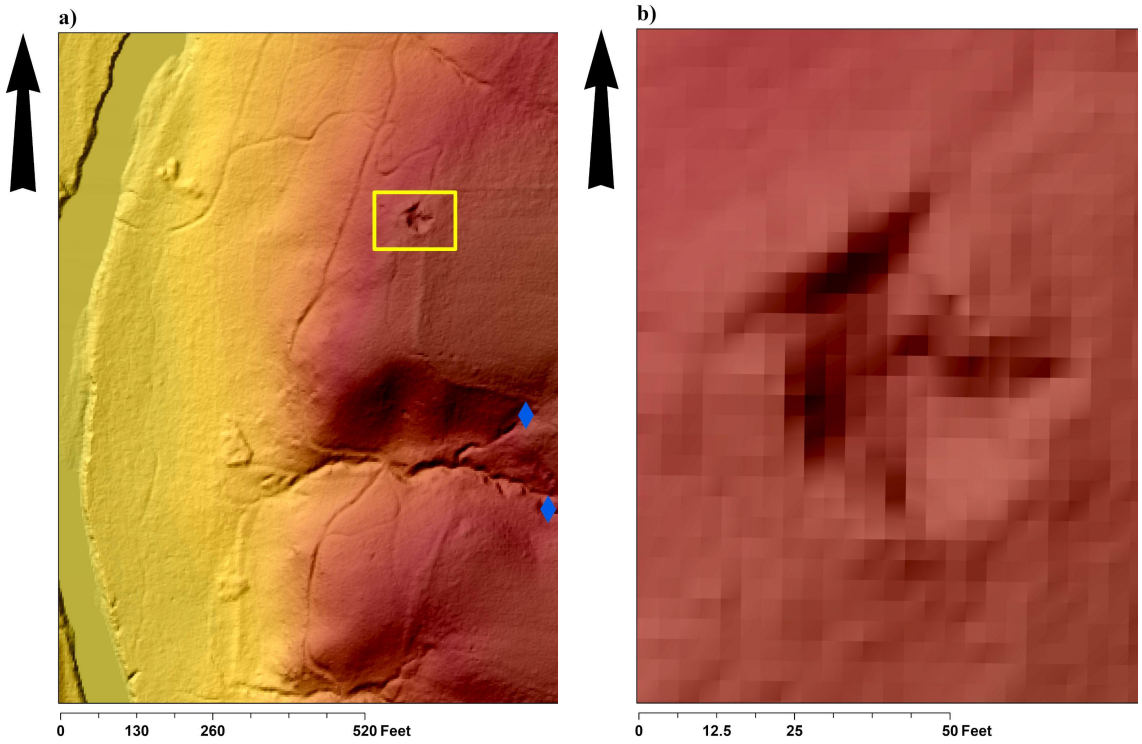


Figure 14. NM1 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM1 fits the general size of a 17th century structure. It may represent a basement that has partially caved it. This basement could be lined with field stones.

The ground depression determined to be the second most likely to represent the remains of a 17th or early 18th century structure, NM2, is located next to a stream in a forested area east of the Big Elk Creek. It measures 40 by 20 feet and is 416 feet away from the nearest springhead.

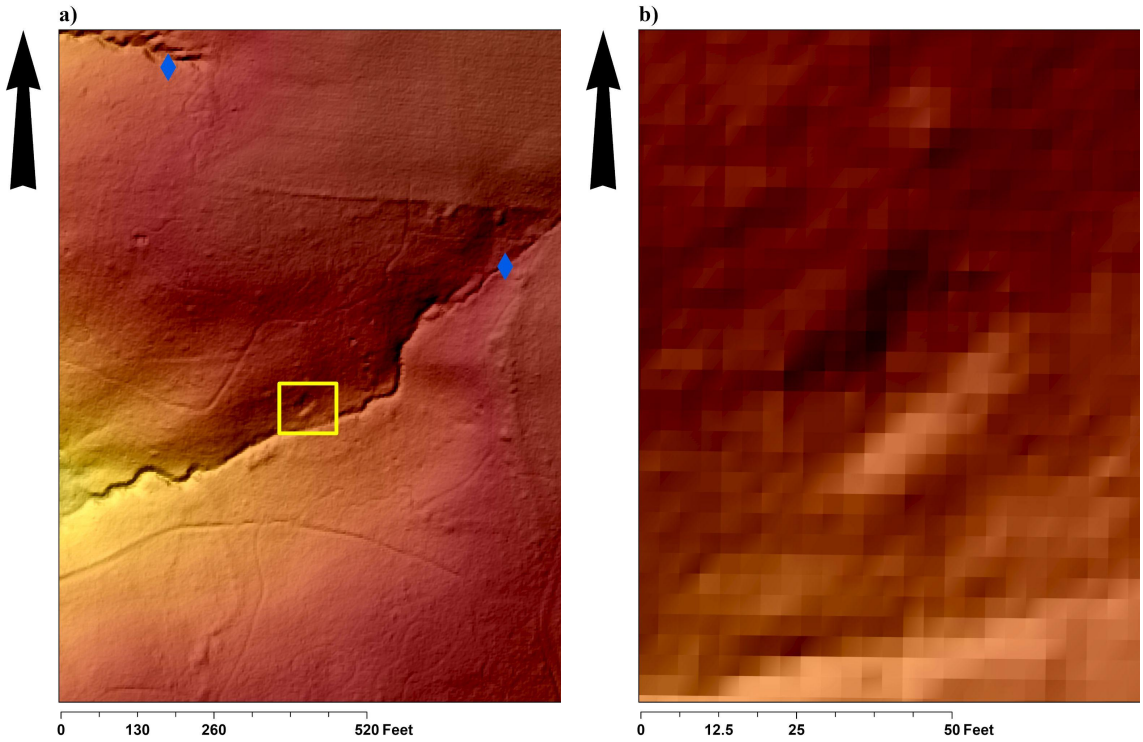


Figure 15. NM2 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM2 is the exact same size as the 1683 house built for William Claypool in Philadelphia (Carson, Barka, Kelso, Stone, & Upton 1981, 144). It is a relatively shallow footprint with distinct edges, and may represent a field stone lined basement that has been mostly filled in.

The ground depression determined to be the third most likely to represent the remains of a 17th or early 18th century structure, NM3, is located in a forested area, on the edge of a small field, west of the Big Elk Creek. It measures 45 by 20 feet. It is 620 feet away from the nearest springhead, though it is possible that the road directly south of it was built over a springhead

present in the 17th and early 18th century. There appears to be a small trail connecting it to the nearby lower elevation ground.

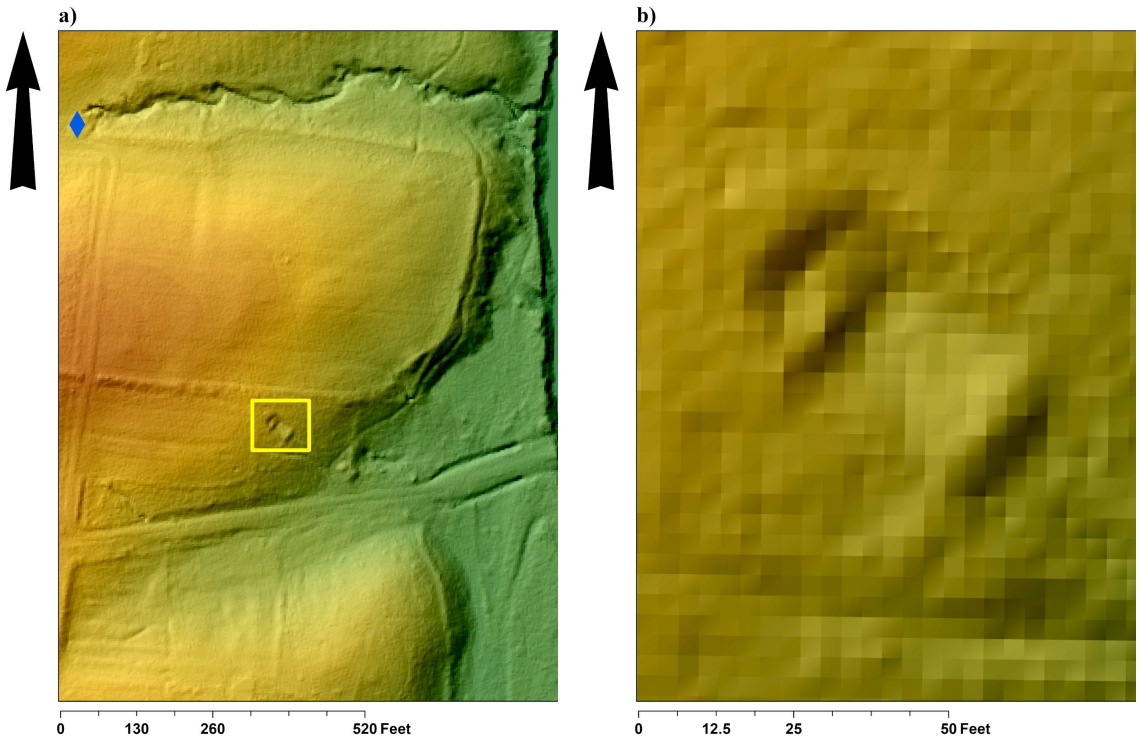


Figure 16. NM3 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM3 fits the general size of a 17th century structure. It may represent a field stone lined basement that has been partially filled in.

4.1.2 SRVI Anomalies

Six crop marks detected in the SRVI rasters of the New Munster area were determined to be significantly likely to represent the remains of 17th or early 18th century structures.

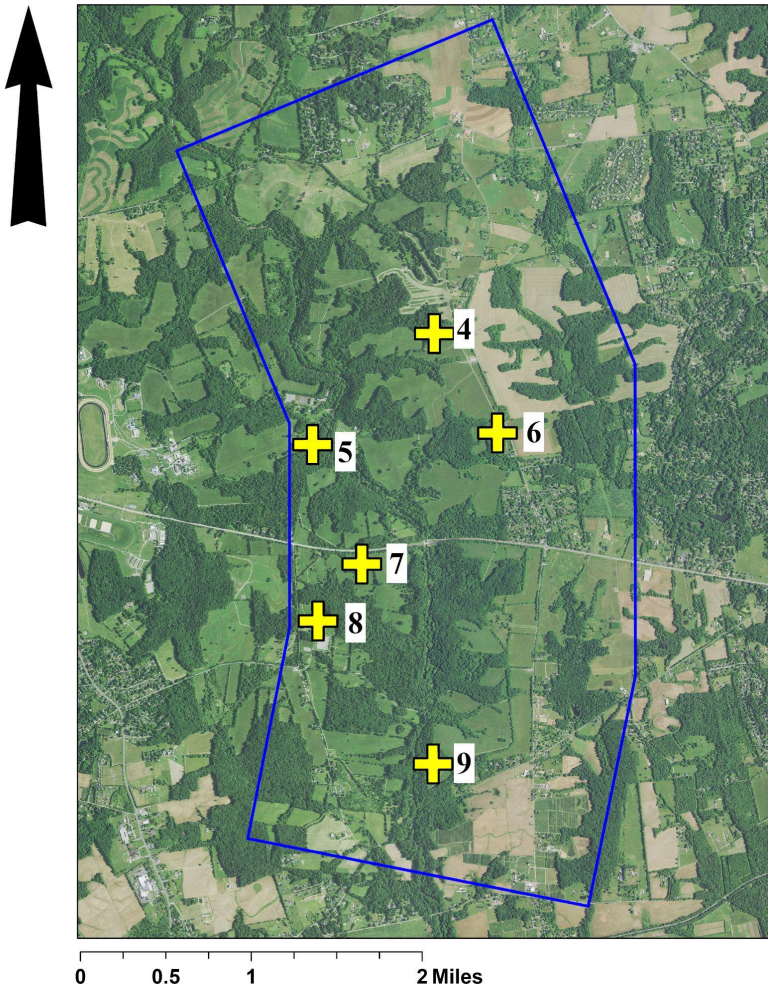


Figure 17. The six significant crop marks within the New Munster boundary polygon shown as yellow crosses over the 2021 aerial image (NAIP 2021).

In this section they will be described in order of their likelihood to represent a 17th or early 18th century structure.

NM9 is located in a field east of the Big Elk Creek. It is a square outline shaped positive crop mark measuring 35 by 35 feet. It is 276 feet away from the nearest springhead.

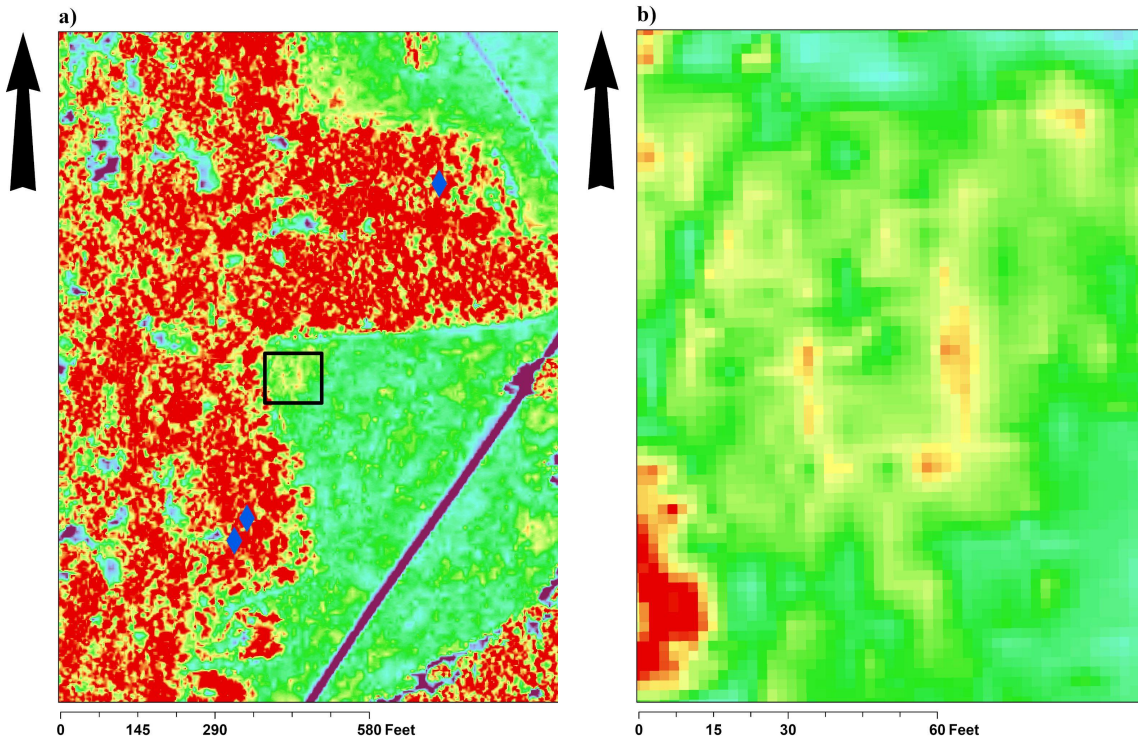


Figure 18. NM9 in wide view (a), shown inside the black rectangle, and close view (b) in the June, 2021 SRVI raster (NAIP 2021). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM9 is roughly the size of a typical 17th century structure. It may represent the post holes of an earthfast structure.

NM7 is located in a field west of the Big Elk Creek. It is a rectangular shaped positive crop mark measuring 58 by 22 feet. It is 773 feet from the nearest springhead, though there may have been one closer before the road north of it was built.

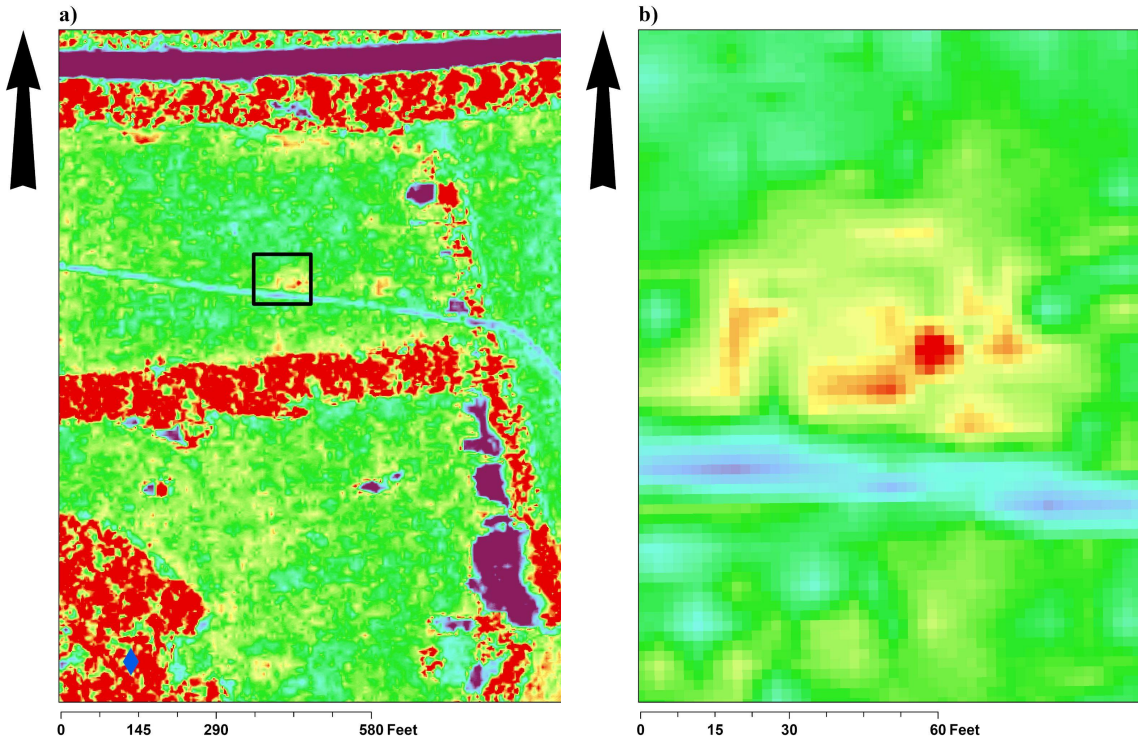


Figure 19. NM7 in wide view (a), shown inside the black rectangle, and close view (b) in the June, 2021 SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM7 is roughly the size of a typical 17th century structure. It may represent the post holes of an earthfast structure and one or more subfloor pits.

NM6 is located in a field east of the Big Elk Creek. It is a rectangular shaped negative crop mark measuring 38 by 25 feet. It is 329 feet from the nearest springhead. Notably, it appears in the SRVI rasters of both June 2021 and August 2018.

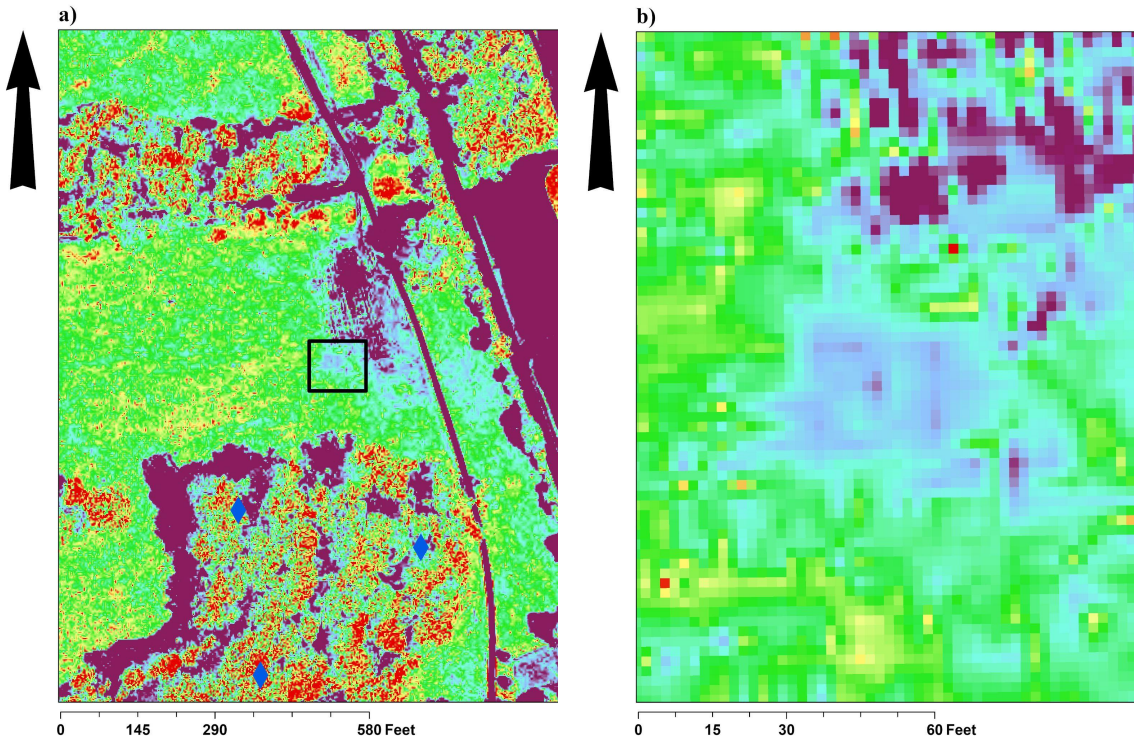


Figure 20. NM6 in wide view (a), shown inside the black rectangle, and close view (b) in the August, 2018 SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM7 is roughly the size of a typical 17th century structure. It may represent a buried stone foundation or floor.

NM4 is located in a field east of the Big Elk Creek. It is a square shaped positive crop mark measuring 52 by 53 feet. It is 499 feet from the nearest springhead.

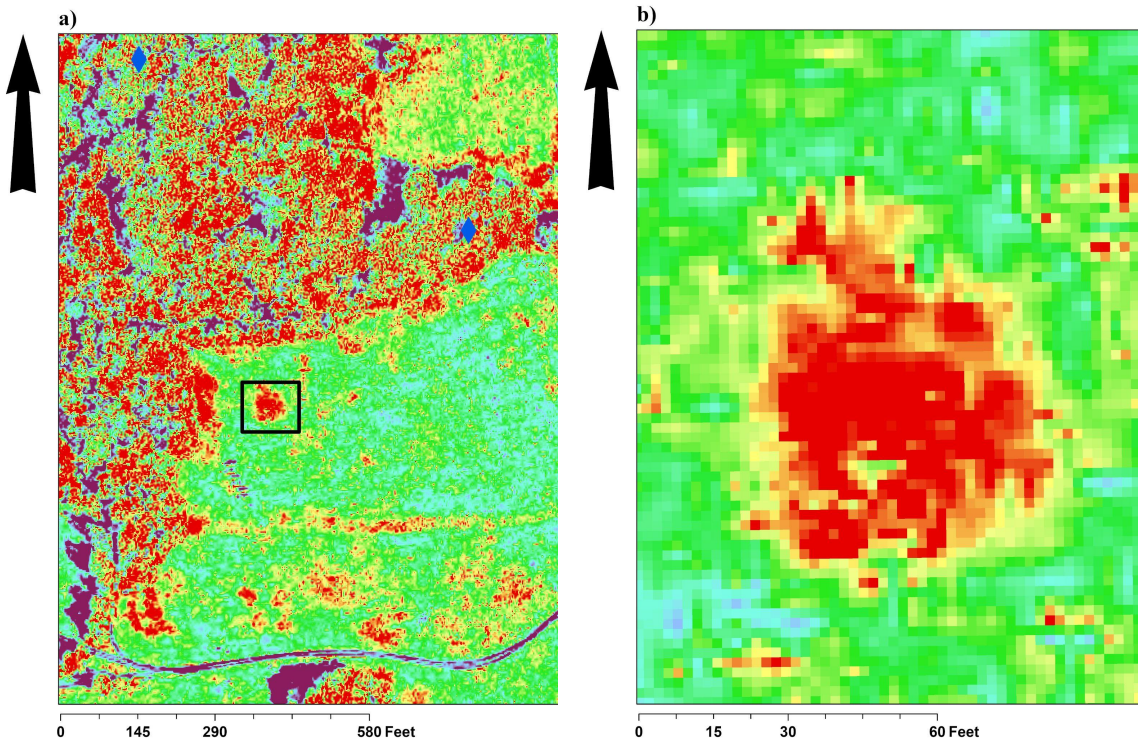


Figure 21. NM4 in wide view (a), shown inside the black rectangle, and close view (b) in the August, 2018 SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM4 is slightly larger than a typical 17th century structure. It may represent a basement or group of subfloor pits. It is located 300 feet east of the Bunting House, a historic site that will be discussed in the next section, and may be associated with that site.

NM5 is located in a field west of the Big Elk Creek. It is a square shaped positive crop mark measuring 32 by 40 feet. It is 667 feet from the nearest springhead.

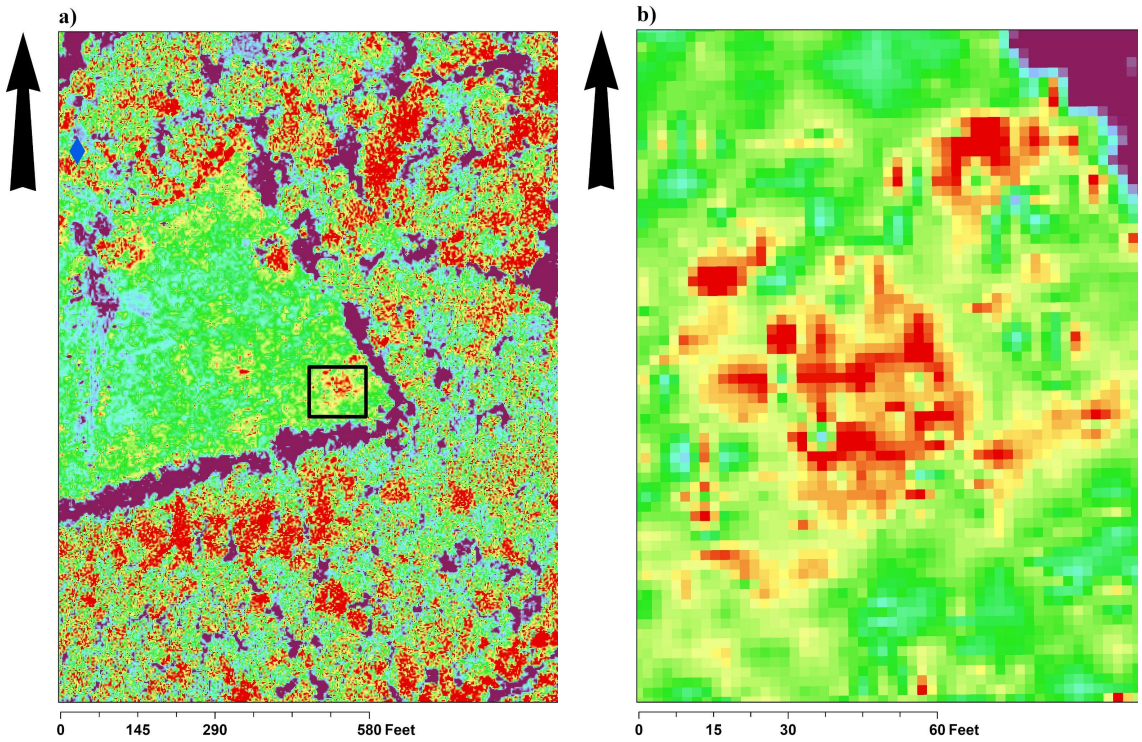


Figure 22. NM5 in wide view (a), shown inside the black rectangle, and close view (b) in the August, 2018 SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM5 is roughly the size of a typical 17th century structure. It may represent a group of subfloor pits and postholes.

NM8 is located in a field west of the Big Elk Creek. It is a round shaped positive crop mark measuring 25 by 30 feet. It is 619 feet from the nearest springhead.

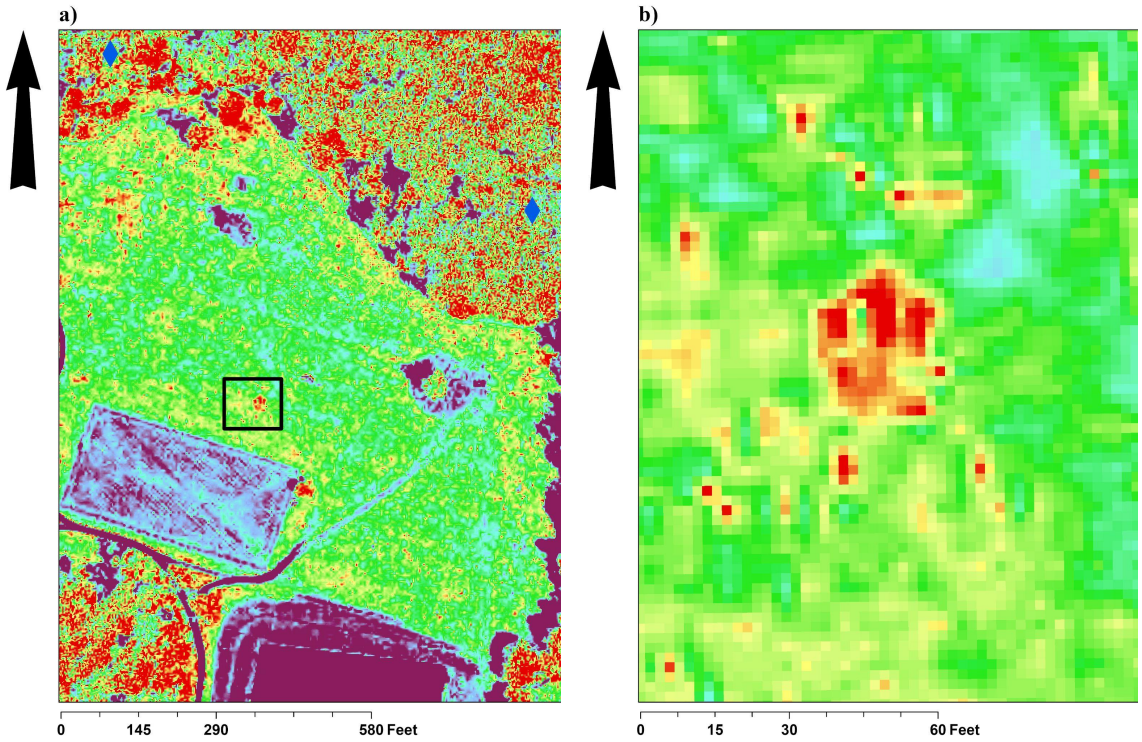


Figure 23. NM8 in wide view (a), shown inside the black rectangle, and close view (b) in the August, 2018 SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

NM8 roughly fits the size of a typical 17th century structure. It may represent a group of subfloor pits.

4.1.3 Significant Historic Sites

During the process of anomaly evaluation, many of the LiDAR anomalies in the New Munster area were found to correspond to the locations of historic ruins documented in the Maryland Historical Trust Fair Hill Historic Resource Map (Reed 2014, CE-1434). By referencing the legend of this map, information was ascertained on many of the sites. Based on this information,

eight of the sites have been determined to likely contain remnants of 17th or early 18th century structures.

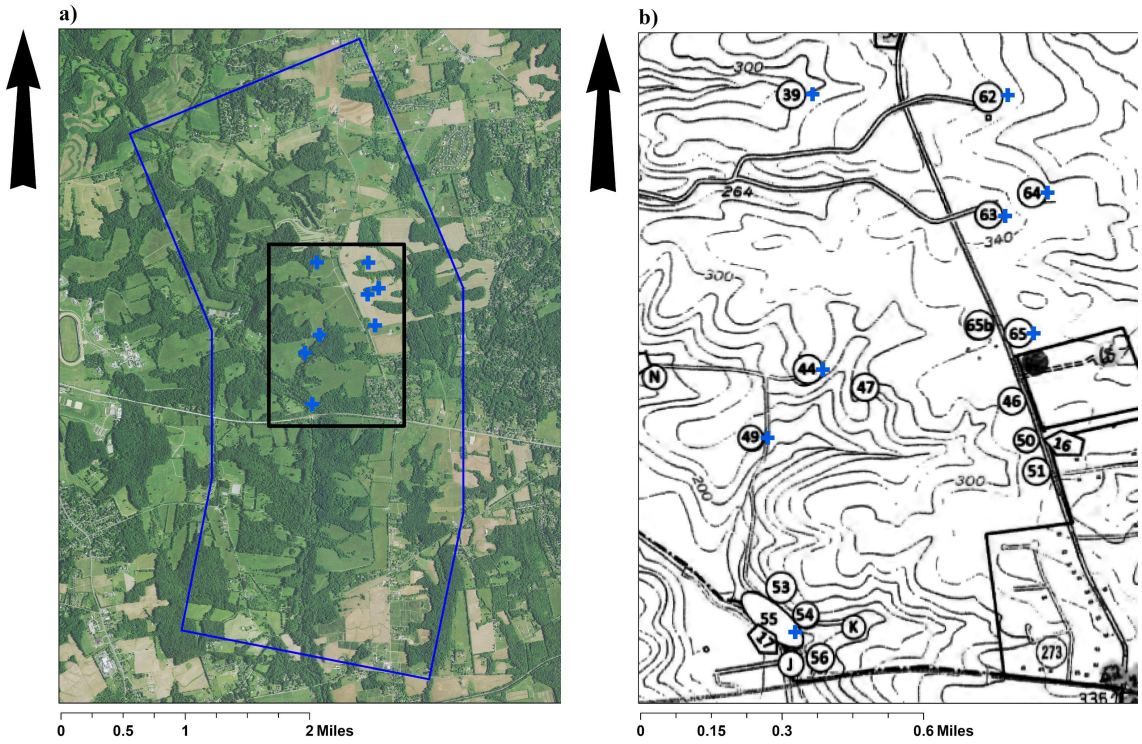


Figure 24. The eight historic sites determined most likely to contain remnants of 17th or early 18th century structures within the New Munster boundary polygon, shown as blue crosses over the 2021 aerial image (a) and the Maryland Historical Trust Fair Hill Historic Resource Map (b) (NAIP 2021) (Reed 2014, CE-1434). The spatial extent of map b is represented by the black rectangle in map a.

The Alexander Mill site, numbered 55 on the Fair Hill Historic Resource Map, contains the remains of a mill built between 1714 and 1794. On the 1794 map, it was depicted as being owned by "Alexander", a member of the Alexander family. The Alexanders settled on the New

Munster property in 1714, and they might have built a mill at this site soon after. The mill was later expanded upon and the site was called “Sentman’s Factory” in the 1858 map (Reed 2014, CE-1434, 22).

The Haller Rubble site, numbered 49 on the Fair Hill Historic Resource Map, contains a stone retaining wall: the remains of a structure built before 1858. The site was originally an Alexander property, and the house that once stood there is said to have been made of brick. A structure is shown on the site in the 1858 and 1877 maps; though it is not owned by an Alexander in either case (Reed 2014, CE-1434, 22). Because it is in close proximity to the Alexander Mill site, it is possible that an earthfast structure was built there when the mill was built and later replaced by a brick structure.

The Alexander-Bunting Farm site, numbered 39 on the Fair Hill Historic Resource Map, contains the remnants of a house, barn, and silo. The house was standing in 1976, and its architectural survey file documents that it was made up of a section built of stone and a section built of log, which could date to the early 18th century (Mazurek 1998, CE-717). The site was originally associated with the Alexander family (Reed 2014, CE-1434, 20).

The Alexander Stone House ruin, numbered 62 on the Fair Hill Historic Resource Map, was not visited by the makers of the map (Reed 2014, CE-1434, 23). Its architectural survey file documents that in 1998 the site contained the ruins of a stone house, thought to have been built in the early 19th century (Mazurek 1998, CE-729). A structure owned by Amos Alexander is depicted at the site in the 1858 map; and it is within the boundaries of one of the original 1714

Alexander parcels. For these reasons, it is possible that there was an earlier log or wooden section dating to the original settlement of New Munster, like in the case of the Alexander-Bunting Farm house, that has since deteriorated.

In the architectural survey file for the Alexander Stone House Ruin there is an earlier architectural survey file describing a different site. This site is called the Alexander Site, and in 1977 it contained the foundation walls of a frame and log farm house that had collapsed several years prior. The site was believed to be the original homestead of Joseph Alexander or his son James. The location of this site given in the architectural survey file is that it was: "on a ridge several hundred yards west of Appleton Road" and "north of Route 273" (Mazurek 1998, CE-729). One of the discovered LiDAR anomalies is in this same location. It is a rectangular ground depression measuring 31 by 25 feet. This LiDAR anomaly is in the vicinity of site number 44 on the Fair Hill Historic Resource Map, called the Hobson ruin in the legend of the map. The creators of the map note that they did not visit this site, so it is unknown where this name originated.

Site 63 was listed as an unknown potential site, and site 64 was listed as Alexander House rubble site (Reed 2014, CE-1434, 23). Two LiDAR anomalies, both representing rectangular ground depressions, are present in their locations. In the 1858 map, two structures owned by George Alexander and Jos. Alexander, are depicted in their locations. These LiDAR anomalies likely represent the foundations of these two structures. Because they were owned by Alexanders, it is possible that these structures were built in the early 18th century.

The Alexander House ruin, site 65 in the Fair Hill Historic Resource Map, is the ruin of a stone house (Reed 2014, CE-1434, 23). Its architectural survey file records that in 1977 the ruin of a log section was attached to the stone ruin. This log section ruin could date from 1714, the time when the Alexanders settled the New Munster property (Mazurek 1998, CE-714).

4.2 New Connaught

In the area within the New Munster boundaries, 14 anomalies likely to represent the remains of 17th or early 18th century structures were discovered through visual analysis of remotely sensed data; six using LiDAR and eight using the SRVI.

4.2.1 LiDAR Anomalies

Six ground depressions detected in the LiDAR raster of the New Connaught search area were determined to be significantly likely to represent the remains of 17th or early 18th century structures.

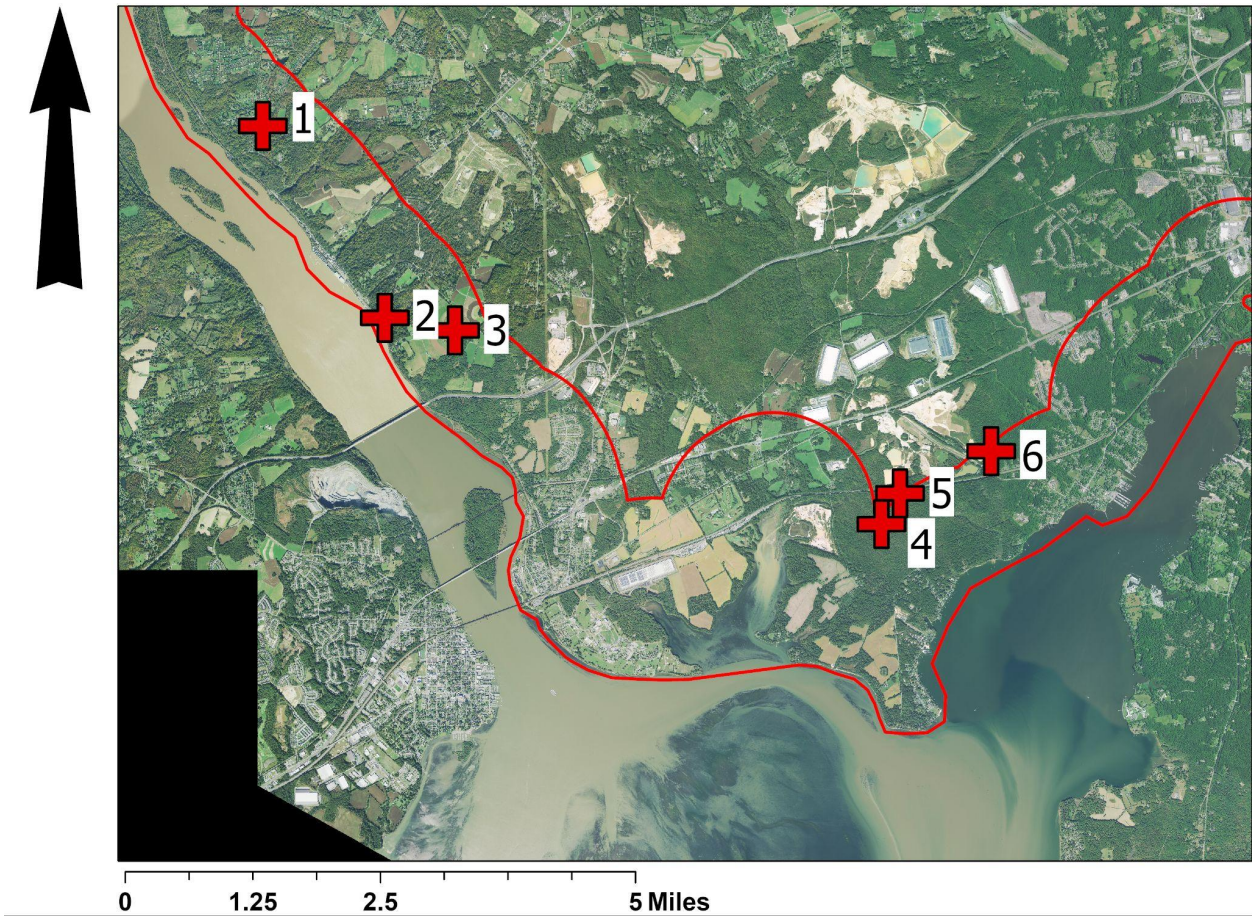


Figure 25. The six significant ground depressions within the New Connaught analysis zone polygon shown as red crosses over the 2021 aerial image (NAIP 2021).

In this section they will be described in order of their likelihood to represent a 17th or early 18th century structure.

NC2 is located in a wooded area south of Port Deposit, Maryland, on the banks of the Susquehanna River. It is a rectangular ground depression measuring 50 by 30 feet. It is 0.09

miles from navigable water and 732 feet from the nearest springhead. There is a path leading from it to the nearby stream bed.

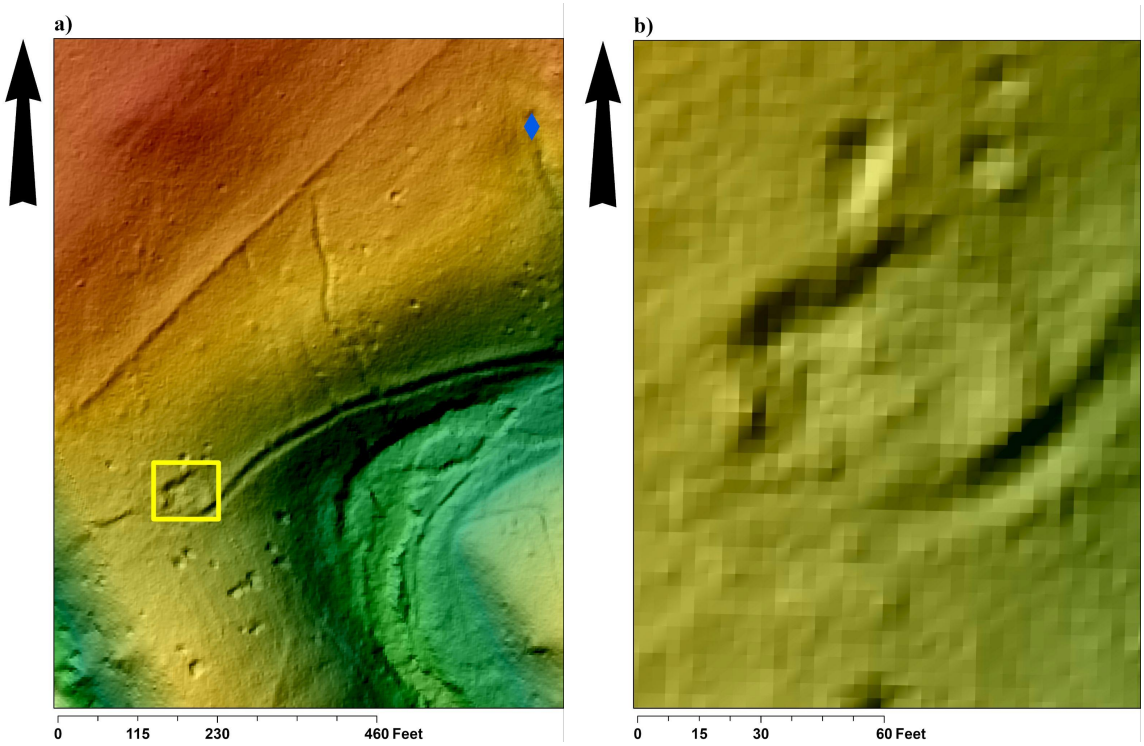


Figure 26. NC2 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC2 matches the size and shape of a typical 17th or early 18th century structure. It may represent a basement or foundation that has been partially filled in.

NC1 is located in a wooded area on the edges of modern houses in Cardiff, Maryland. It is a rectangular ground depression measuring 56 by 25 feet. It is 0.46 miles from navigable water and 898 feet from the nearest springhead.

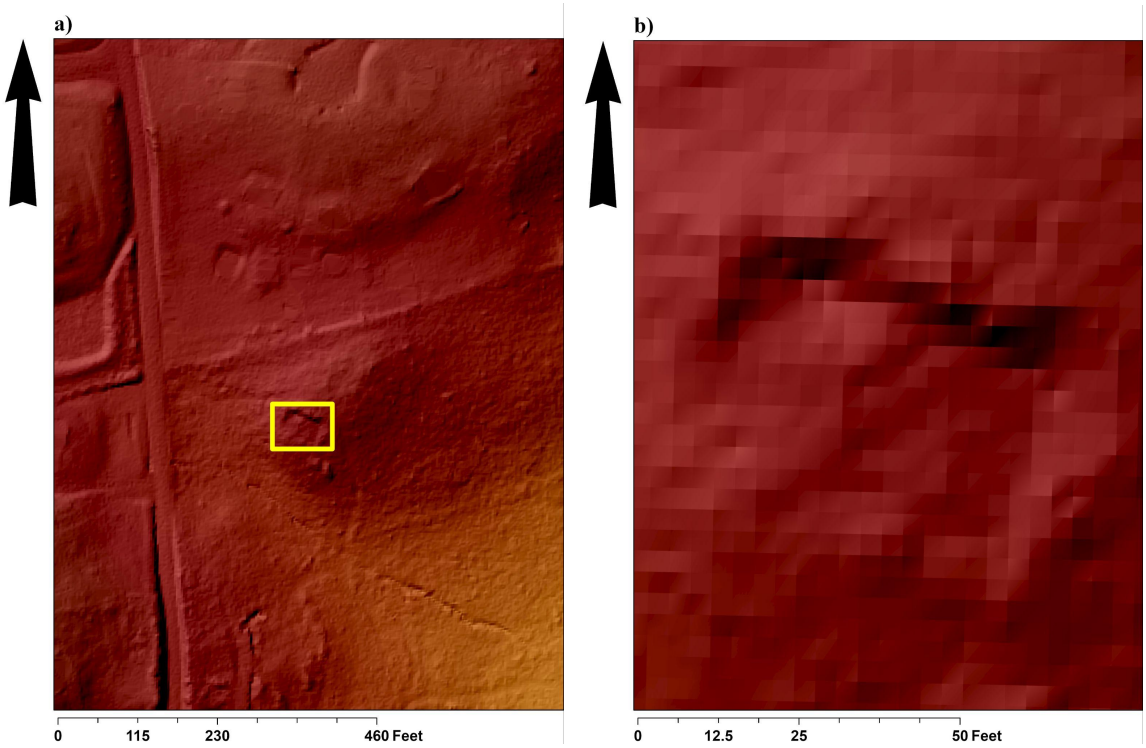


Figure 27. NC1 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC1 matches the size and shape of a typical 17th or early 18th century structure. It may represent a basement or foundation that had been partially filled in.

NC3 is located in a wooded area on the edge of a field south of Port Deposit, Maryland. It is a rectangular ground depression measuring 94 by 65 feet. It is 0.68 miles from navigable water and 989 feet from the nearest springhead. There is a linear ground depression south of it that may represent a trail or footpath.

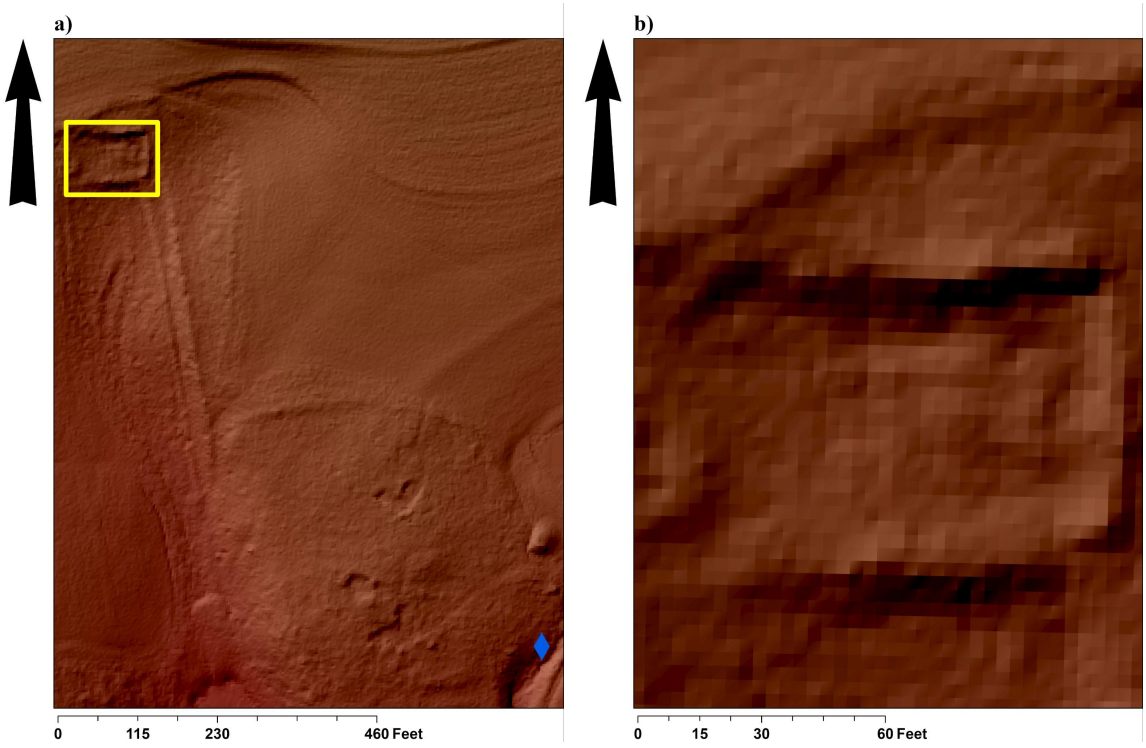


Figure 28. NC3 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC3 is slightly larger than the typical 17th or early 18th century structure. It could represent a large basement or foundation, possibly lined with stone.

NC6 is located in a wooded area west of Charlestown, Maryland. It is a rectangular ground depression measuring 42 by 26 feet. It is 0.92 miles from navigable water and 804 feet from the nearest springhead. There is a path leading from it to the nearby stream bed.

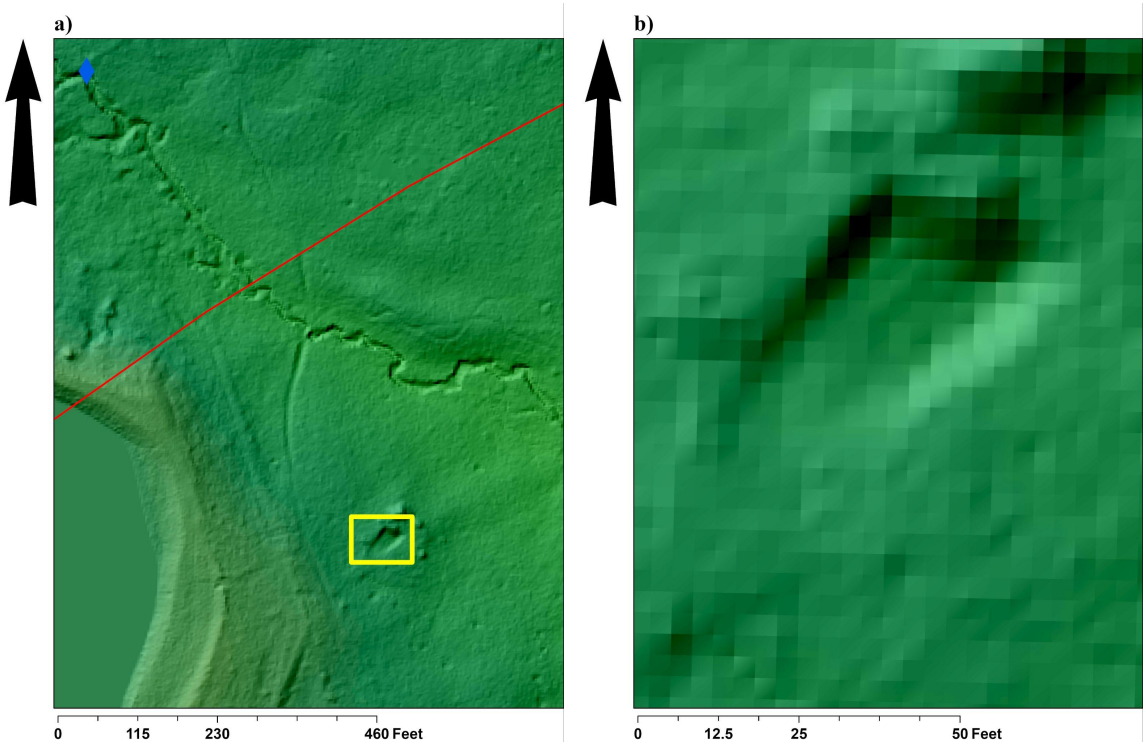


Figure 29. NC6 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC6 fits the size and shape of a typical 17th or early 18th century structure. It may represent a basement or foundation, possibly lined with stone, that has been partially filled in.

NC4 is located in a wooded area west of Charlestown, Maryland. It is an elliptical ground depression measuring 18 by 27 feet. It is 0.95 miles from navigable water and 470 feet from the nearest springhead. There is a path leading from it to a modern road 0.5 miles away.

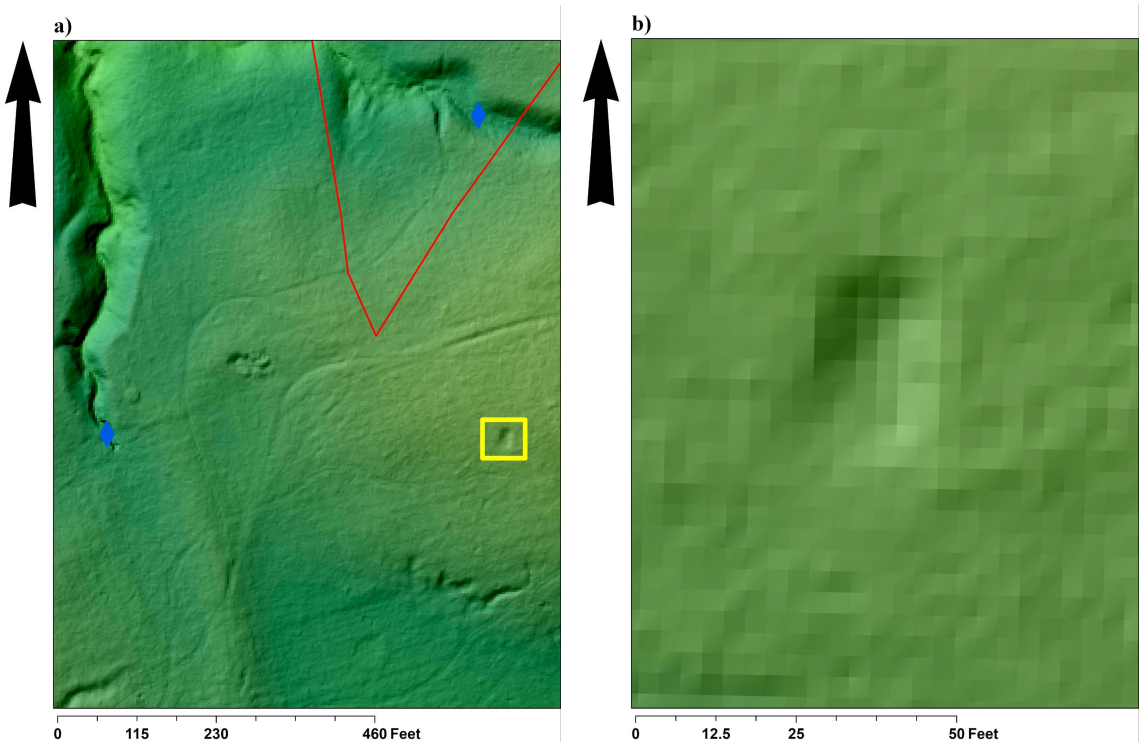


Figure 30. NC4 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC4 fits the size and shape of a typical 17th or early 18th century structure. It may represent a basement or foundation that has been almost completely filled in.

NC5 is located in a wooded area west of Charlestown, Maryland. It is a rectangular ground depression measuring 48 by 34 feet. It is 1.02 miles from navigable water and 1189 feet from the nearest springhead.

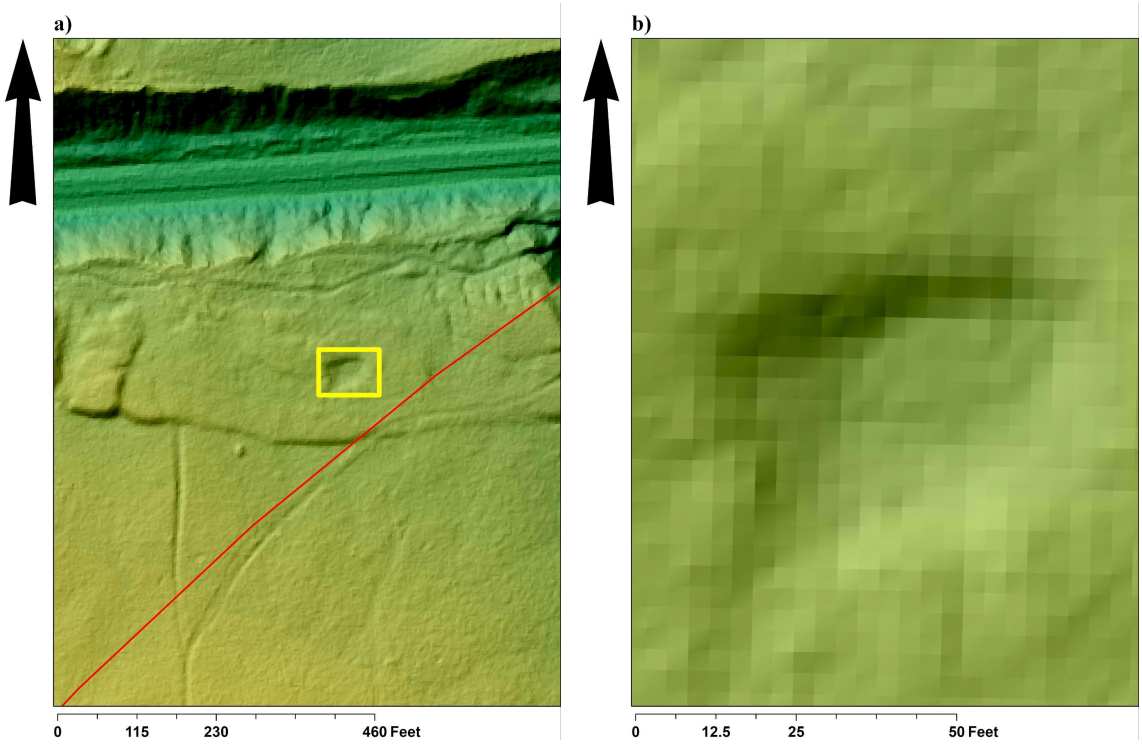


Figure 31. NC5 in wide view (a), shown inside the yellow rectangle, and close view (b) in the LiDAR raster (Maryland iMap 2020). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC5 is slightly larger than the typical 17th or early 18th century structure. It may represent a basement or foundation.

4.2.2 SRVI Anomalies

Eight crop marks detected in the SRVI rasters of the New Connaught analysis zone were determined to be significantly likely to represent the remains of 17th or early 18th century structures.

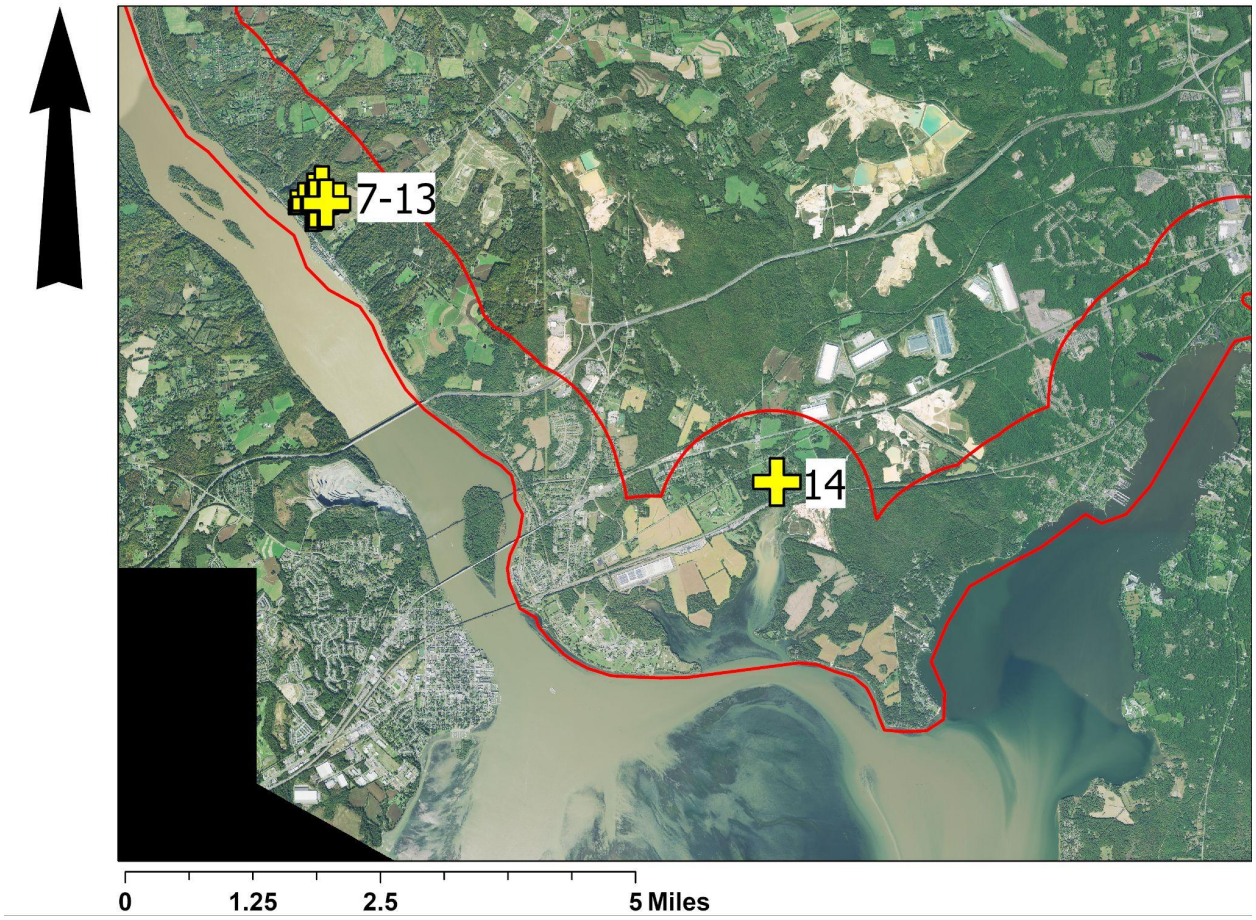
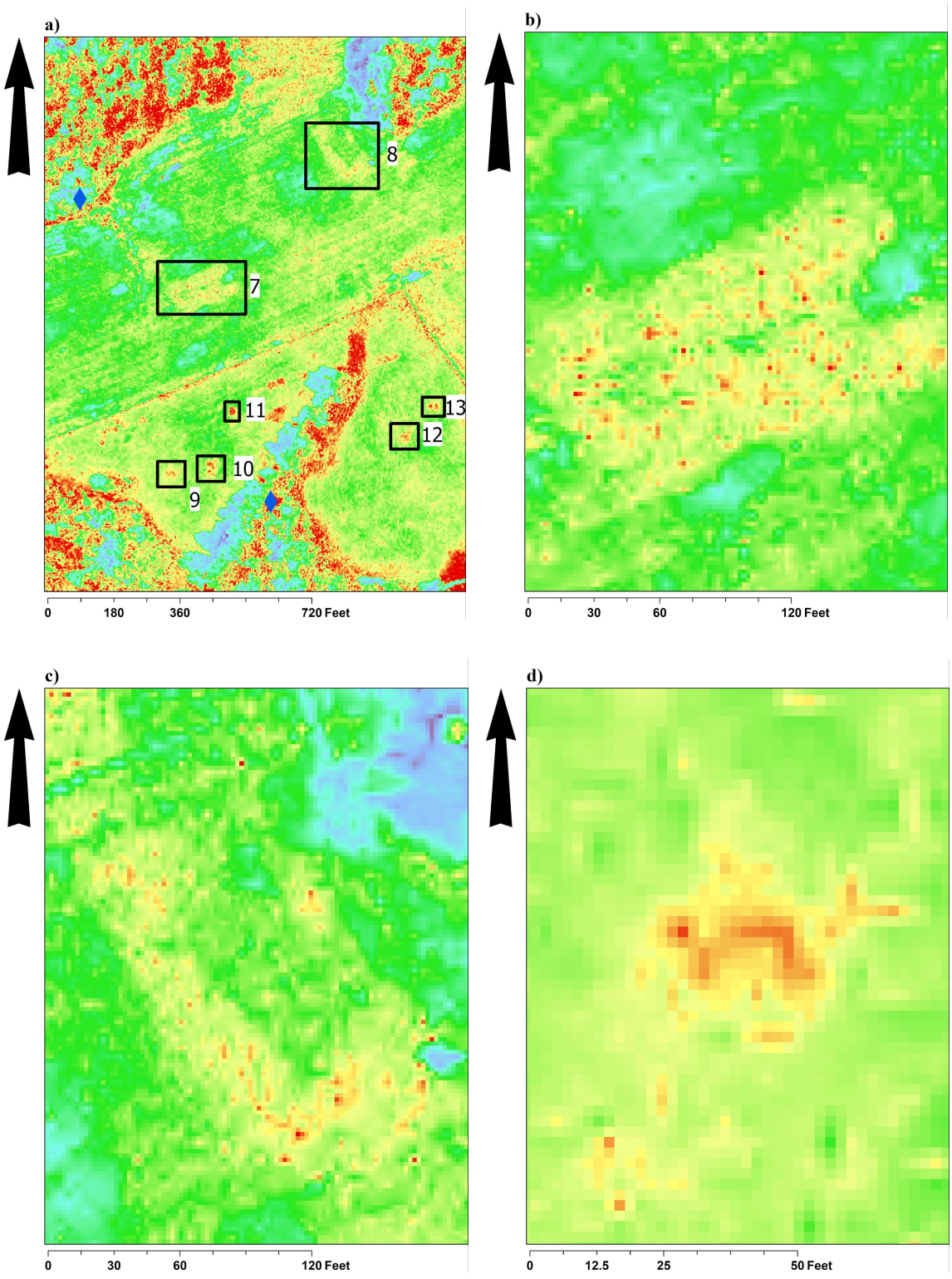


Figure 32. The eight significant crop marks within the New Connaught analysis zone polygon shown as yellow crosses over the 2021 aerial image (NAIP 2021).

They will be described in the following section.

NC7, NC8, NC9, NC10, NC11, NC12, and NC13 are all within a close vicinity of one another. They are all positive crop marks within 0.24-0.41 miles to navigable water and 181-580 feet from the nearest springhead. NC7 is rectangular in shape and measures 162 by 83 feet. NC8 is rectangular in shape and measures 168 by 92 feet. NC9 is amorphous in shape and measures 38

by 27 feet. NC 10 is rectangular in shape and measures 37 by 26 feet. NC11 is rectangular in shape and measures 23 by 16 feet. NC12 is amorphous in shape and measures 30 by 20 feet. NC13 is rectangular in shape and measures 30 by 15 feet.


a)
8
7
11
13
12
10
9
0
180
360
720 Feet
b)
0
30
60
120 Feet
c)
0
30
60
120 Feet
d)
0
12.5
25
50 Feet

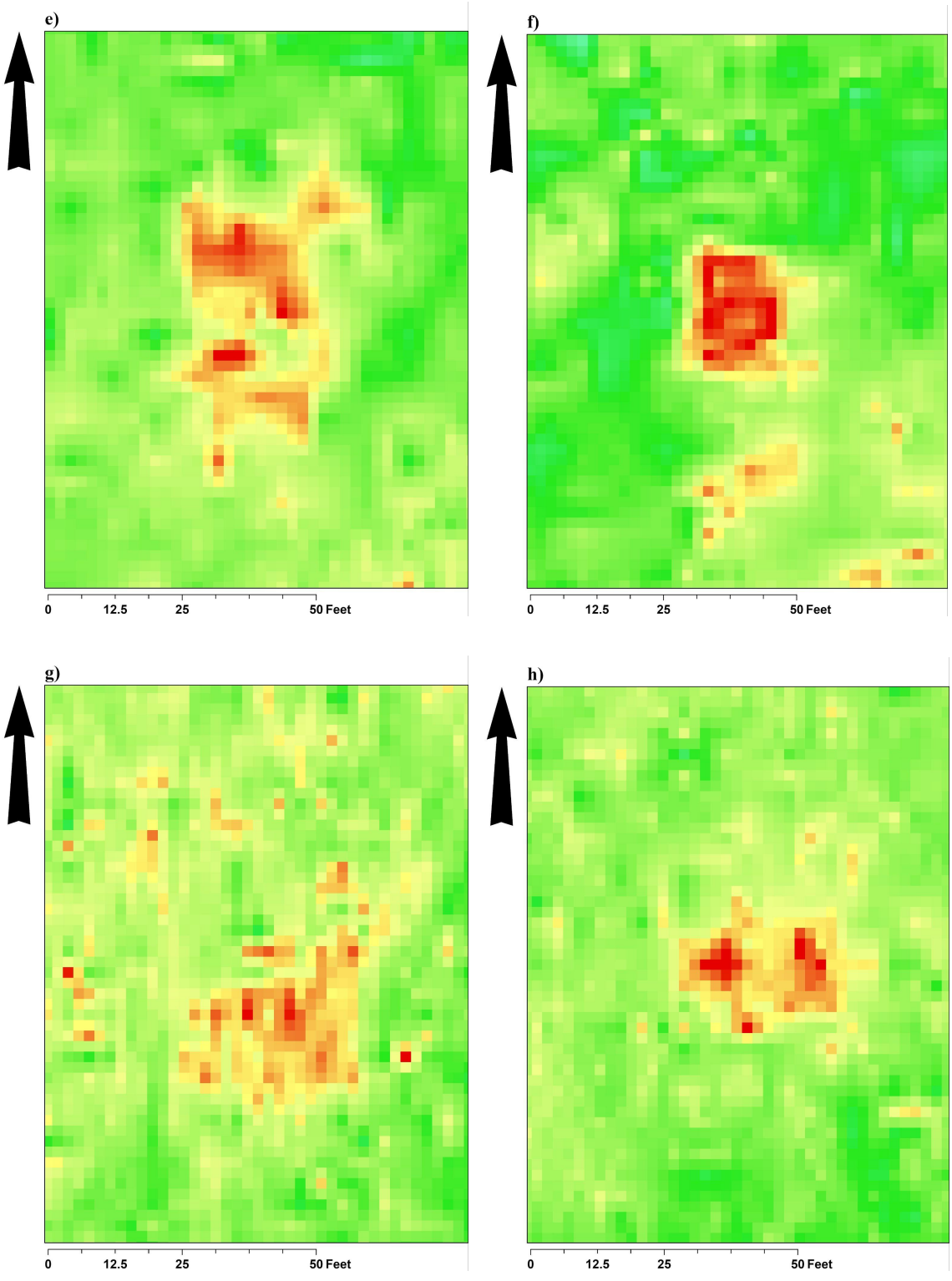

e)
f)
g)
h)
0
12.5
25
50 Feet

Figure 33. NC7 (b), NC8 (c), NC9 (d), NC10 (e), NC11 (f), NC12 (g), and NC13 (h) in wide view (a), shown inside the black rectangles, and close view (b-h) in the August, 2018, SRVI raster (NAIP 2018). Blue diamonds in the wide view image (a) represent the locations of springheads.

The crop mark from this group determined most likely to represent a 17th or early 18th century structure was NC11, then NC13, then NC10, then NC12, then NC9, then NC7, and then NC8. All but NC7 and NC8 matched the typical size and shape of a 17th or early 18th century structure. NC11 may represent a filled in basement or foundation. NC13, NC10, NC12, and NC9 may represent collections of subfloor pits and postholes. NC7 and NC8 may represent some larger features. The fact that these seven crop marks are in such close proximity suggests the possibility that they are the remains of a plantation.

NC14 is located in a field east of Perryville, Maryland. It is a rectangular, positive crop mark measuring 15 by 12 feet. It is 0.31 miles from navigable water and 553 feet from the nearest springhead.

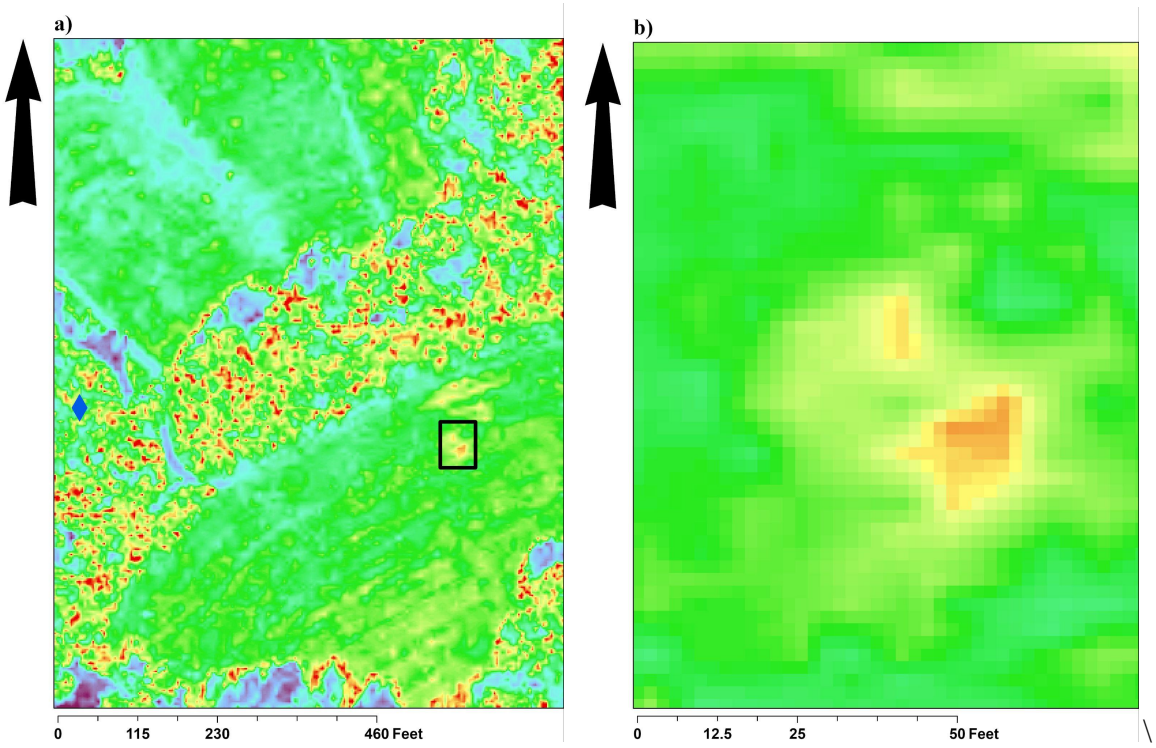


Figure 34. NC14 in wide view (a), shown inside the black rectangle, and close view (b) in the June, 2021, SRVI raster (NAIP 2021). Blue diamonds in the wide view image (a) represent the locations of springheads.

NC14 is slightly smaller than the typical 17th or early 18th century structure. It may represent a subfloor pit.

5. Discussion

In this section, the results of this study will be summarized and explored for their implications. The two sets of results correspond to the two research questions answered by this study. The limitations of this study will be discussed as well, and analyzed for any impact they may have had on the results. Finally, useful steps forward in the research of New Ireland will be discussed.

5.1 New Munster and New Connaught Boundaries

The first results of this study were the creation of the boundary polygons for New Munster and New Connaught. Now that the files have been created, these boundaries can be imported into any GIS project and displayed on a variety of maps. Before the creation of these polygons, information on the boundaries of New Munster and New Connaught existed only as written descriptions, imprecise historical markers, and non-georeferenced maps. Now, the boundaries of these two properties can be included in the assessment of archaeological sites throughout Cecil County. This will give archaeologists conducting cultural resource management surveys or excavations a fuller historical context of the area that they are excavating. The convenient visualization of these boundaries may also stimulate further research.

5.2 Anomalies and Historic Sites

A total of 23 anomalies in LiDAR and SRVI met the criteria to be likely to represent the sites of 17th or early 18th century structures. In the New Munster area, three ground depressions, detected in LiDAR, and six crop marks, detected in SRVI, met these criteria. In the New Connaught search area, six ground depressions, detected in LiDAR, and eight crop marks, detected in SRVI, met these criteria. These anomalies and their locations were all unknown

before the GIS analysis of this study. They are among many archaeological sites discovered using remote sensing and GIS; but they would be among the first 17th to early 18th century archaeological sites discovered in Cecil County, and among the first 17th to early 18th century Irish archaeological sites discovered in the Americas, if they are confirmed to be remains of the initial New Ireland settlement by archaeological excavation.

An additional eight sites of historic structure ruins in the New Munster area were determined likely to be the sites of 17th or early 18th century structures through reviews of historic maps and architectural survey files. If they are confirmed to date to this time through archaeological investigation, then a clear pattern of settlement emerges in the New Munster property. As shown in figure 24, these sites are within a close proximity of one another. Many of the sites are believed to possibly date to the early 18th century because of their association with the Alexander family, and the area where they are located is on land that the Alexanders purchased when they settled the New Munster property. This makes it likely that the Alexanders initially settled on that specific part of New Munster. They could have settled here for a variety of reasons, but one of them may be that the previous 15 Irish emigrants had already settled there and left cleared fields and structures on their departure. Four anomalies, NM1, NM2, NM4, and NM6 are within this region and are likely to be associated with this settlement if they are confirmed to be archaeological sites.

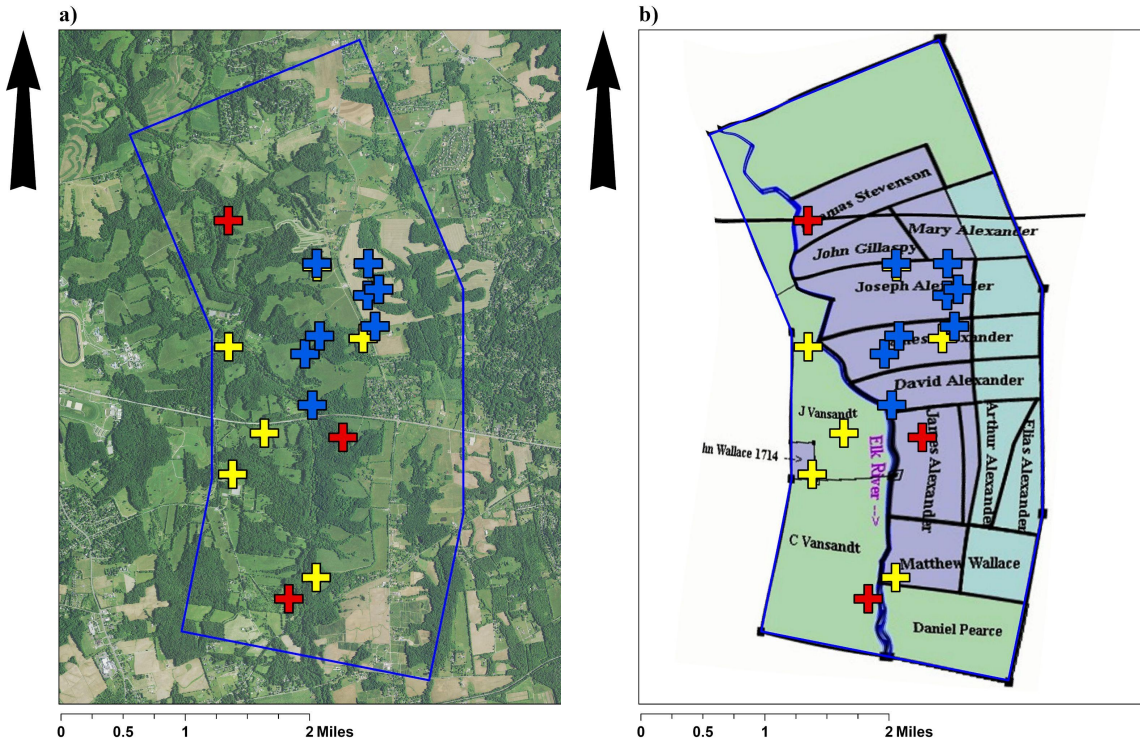


Figure 35. The 17 sites determined to be significantly likely to date to the 17th or early 18th century within the New Munster boundaries shown over the 2021 aerial image (a) and the georeferenced map of the 1714 - 1718 property divisions in New Munster (b) (Polk 2017, 10; NAIP 2021). Red crosses represent ground depressions, yellow crosses represent crop marks, and blue crosses represent known sites of historic ruins.

As for the settlement pattern of New Connaught, it appears that settlement might have been more concentrated along the western half of the property. The four ground depressions on the eastern half of the property may represent structures that were intentionally built in proximity to George Talbot's house. The location of the house is known tentatively from the 1881 account of historian George Johnston that reads "[George] Talbot had a wife, who … was at home, in the house of her

lord, on Susquehanna Manor, which there is every reason to believe was at the falls of Back Creek, now Principio Creek" (Johnston 1881, 126). The site was not included with the other anomalies of New Connaught because all anomalies discovered there in LiDAR and SRVI correspond to the locations of structures associated with industrial developments and dwellings from the 18th and 19th centuries.

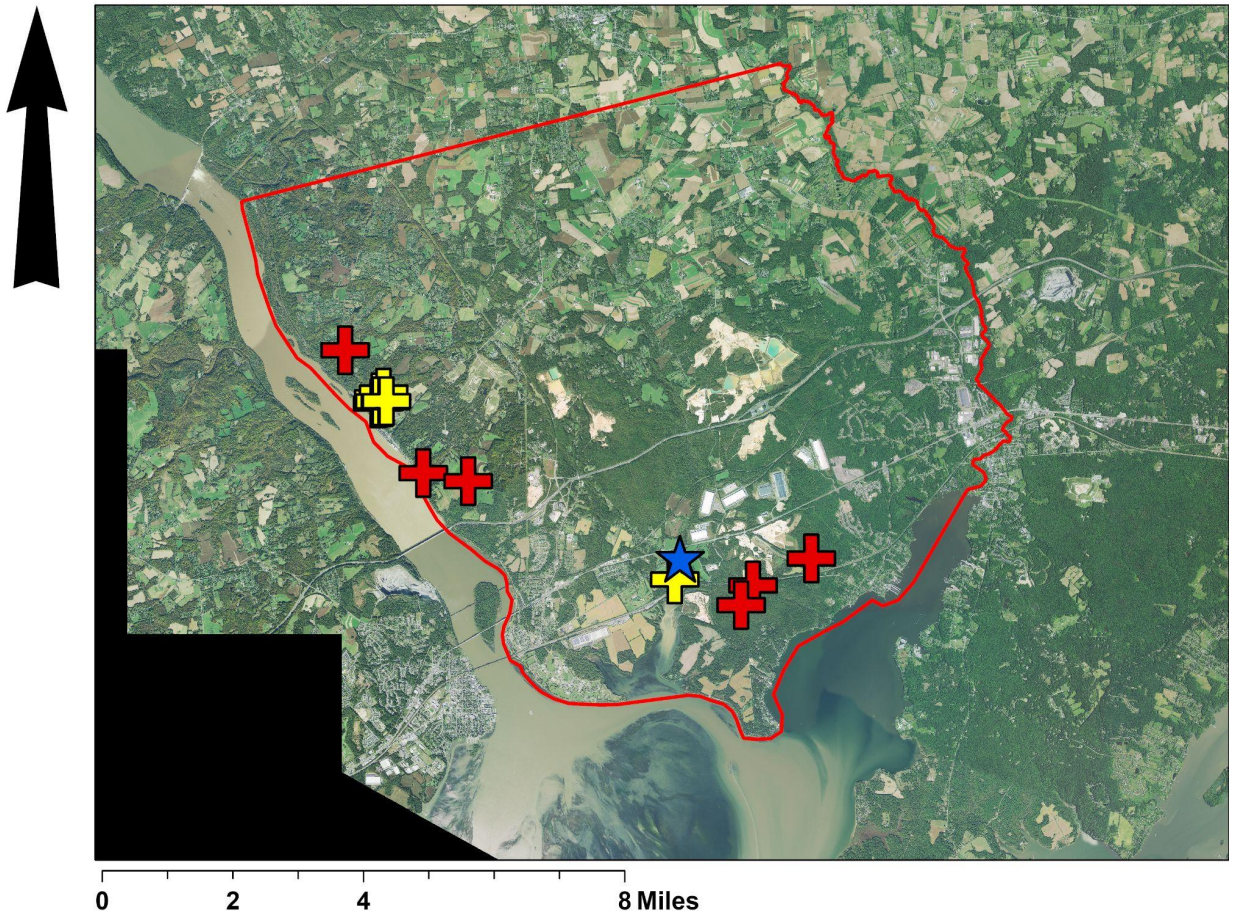


Figure 36. The 14 sites determined to be significantly likely to date to the 17th or early 18th century within the New Connaught boundaries shown over the 2021 aerial image (NAIP 2021). Red crosses represent ground depressions, yellow crosses represent crop marks, and the blue star represents the reported location of George Talbot's house in 1684 (Johnston 1881, 126).

These possible structure site locations and settlement patterns will greatly aid any archaeologist researching New Ireland. Ground surveys can now be more targeted and therefore more efficient, which will increase the likelihood that further research will be conducted. The possible site locations will also contribute to the knowledge of cultural resources in Cecil County, Maryland. They may be considered in future cultural resource surveys, and the ground depressions in New Munster could be added to the Fair Hill Historic Resource map if they are confirmed to be the foundations of historic structures.

5.3 Limitations

When designing the methodology of this study, one limitation was known in advance, and essentially inspired the full commitment to remote sensing and GIS. This limitation is the inability to physically investigate the locations of these anomalies. In an ideal case, the anomalies determined significantly likely to represent 17th or early 18th century sites would be visited by the researcher for surface artifact surveys, shovel test pit surveys, and / or magnetic susceptibility testing. However, that would have required land access permission, additional expertise, and resources that are outside the scope of an honors thesis. Because of this limitation, the full effectiveness of this study, and additional information about New Ireland, cannot be known until future research is conducted.

Another major limitation of this study was related to the reconstruction of the historic property boundaries. As previously discussed, two estimations were made in the reconstructions of the

boundaries of New Munster and New Connaught. The first estimation was the location of the New Munster Stone, a stone erected in 1792 to replace a poplar tree that marked the beginning of the boundaries of New Munster (Touart 1981, CE-1005, 2). In the Architectural survey file of the stone there are conflicting descriptions of its location that place it at different points. These different points are all within 200 yards of one another. As previously mentioned, one location was chosen because there appeared to be a large stone there in aerial images taken in January, 2008 and February, 2018. This location matched the distance of the New Munster Stone from the Big Elk Creek and an agricultural field based on the photographs of the stone included in its architectural survey file. The New Munster boundaries based on this point also align with some current property boundaries. Still, it should be noted that the boundary polygon of New Munster could be inaccurately placed by up to 200 yards.

The second estimation was the northern boundary of New Connaught. As previously discussed, the northern boundary of New Connaught is first described as a northwest line from "the furthest and uppermost source and fountainhead of North East River" to the Octoraro River (Johnston 1881, 112). In 1683, it was resurveyed and described as a northwest line from "the furthest northeast fountainhead of that [North East] stream" to the Octoraro River (Johnston 1881, 115). This discrepancy makes it difficult to place where the beginning of the northern boundary was. For this study, the land ownership boundaries are less important than the boundaries of settlement; so Talbot's Maryland border line was used as the northern boundary of New Connaught. It is possible that some of the Irish settlers in New Connaught settled north of this line and that the remains of their structures were excluded from this study

The final limitation was the effect of land development and time limitations on site discovery and settlement pattern analysis. The methods used to locate sites in this study can only locate those which have been undisturbed since the 17th or early 18th century. Thus, the analysis of possible settlement patterns is confounded by the fact that areas with modern land developments will contain no sites visible to remote sensing even though there may have been settlements there in the 17th or early 18th century. Specifically in New Connaught, the limitation of the search area to one mile from navigable water also skewed interpretation of possible settlement patterns. It is possible that there are sites likely to date to the 17th or early 18th century further inland.

5.4 Steps Forward

At a minimum, the results of this study should be added to the cultural resource management knowledge of Cecil County. Some of the ground depressions discovered could be confirmed to be historic structure remains by a simple pedestrian survey. This study will be brought to the attention of the Maryland Historical Trust. Hopefully they will furnish this study to any cultural resource management firms creating reports for new developments in Cecil County, so that none of these sites are destroyed.

Ideally, the results of this study will guide future archaeological research. That future resource could range from simple pedestrian surveys, through shovel test pit and ground based remote sensing surveys, all the way to full scale excavation. Researchers in the future should begin by investigating the anomalies considered most likely to represent the remains of 17th or early 18th century structures. To this end, this study will be brought to the attention of the Cecil County Historical Society.

There are a multitude of reasons that New Ireland sites would be worthy of archaeological research. The first is that they were a part of one of the earliest Irish settlements in American history. It is important to discover their contributions to early American culture; and archaeological investigation is well suited for this task. Another reason is that they were some of the first settlements in Cecil County. Local history is important in broader contexts and to residents of the area. Cecil County was quite an influential county in Maryland's history because of its involvement in the border dispute with Pennsylvania, it being home to the first iron furnace in Maryland, and numerous other reasons (Johnston 1881). Finally, the excavation of New Ireland settlements could shed light on how relations with the native Susquehannock tribe was in the late 17th century. A peace treaty was signed between this tribe and the Maryland Government, but it is historically attested that they maintained a fort just north of New Ireland and that George Talbot was tasked with patrolling New Ireland to keep them out of the territory (Johnston 1881). The presence of native artifacts at New Ireland sites could help explain the relationship between the Susquehannocks and the Irish settlers.

6. Conclusion

The object of this study has been to locate where the Irish emigrants of New Ireland settled, and to that end it has been as successful as it was hoped to be. Research on the historical background of New Ireland was needed to understand the context in which it was created. Further research was done with patent and colonial council records to determine exactly what it was. To summarize: in 1683-1684, the surveyor general of the colonial Maryland government, George Talbot, began a small settlement of Irish emigrants on the northern frontier of the Maryland colony to lay claim to the area ahead of the colony of Pennsylvania and build support for the Catholic ruling elite of the Maryland colonial government. With this context, it is clear that New Ireland is a historical phenomenon significant enough to warrant archaeological investigation.

To locate the settlements of New Ireland, remote sensing data and GIS methods were employed in conjunction with historical data to detect signatures in ground surface elevation and plant growth that are indicative of structural remains. Many of these signatures were detected, and they were mapped within the borders of the two principal properties, New Munster and New Connaught, to visualize patterns of settlement that these Irish emigrants may have followed. Though it was not possible to confirm whether or not the hypothesized sites of New Ireland settlement truly contain the remains of late 17th or early 18th century structures, it is sincerely hoped that this will be carried out in the future by archaeological investigation. New Ireland is deserving of such archaeological research because of its importance in Irish-American history, the history of Cecil County, and the history of the Native American Susquehannock tribe.

References

Aerial Photograph Index Maps, Cecil. 1938. Maryland State Archives - Guide to Government Records. Index Maps 95-97. http://guide.msa.maryland.gov/pages/item.aspx?ID=SE111-5

Agapiou, A., Hadjimitsis, D. G., & Alexakis, D. D. 2012. Evaluation of broadband and narrowband vegetation indices for the identification of archaeological crop marks. Remote sensing, 4(12), 3892-3919.

American-Irish Historical Society. 1915. The Journal of the American-Irish Historical Society. Vol. 14. American-Irish Historical Society..

Archives of Maryland 1681b Proceedings of the Council of Maryland, 1681–1685/6, Vol. XVII. Electronic document, http://aomol.msa.maryland.gov/000001/000017/html/am17--7.html

Bourne, M. 2012. Roger Kirk House Architectural Survey File. Maryland Historical Trust. CE-209

Bristow, R. S., & Therien, A. 2019. Discovering archaeological landscapes in parks and protected areas. North American Archaeologist, 40(2), 99–115.

Brugger, R. J. 1988. Maryland: A Middle Temperament, 1643–1980.

Carson, C., Barka, N. F., Kelso, W. M., Stone, G. W., & Upton, D. 1981. Impermanent architecture in the southern American colonies. Winterthur Portfolio, 16(2/3), 135-196.

Carter, Benjamin. 2019. Data for “Identifying Landscape Modification Using Open Data and Tools: The Charcoal Hearths of the Blue Mountain, Pennsylvania”. Journal of Open Archaeology Data.

Cook, E. M. V. Understanding Maryland Records: Indentured Servants. Maryland State Archives - Guide to Government Records. Retrieved from http://guide.msa.maryland.gov/pages/viewer.aspx?page=indenturedservants#:~:text=Indentured%20servants%20were%20persons%20obliged,could%20not%20pay%20for%20passage.

Davidson, T. E., & Hughes, R. 1986. Aerial Photography and the Search for Chicone Indian Town. Archaeology, 39(4), 58–76.

Dempsey, K. 2021. 'making a house a home': Ordinary households in later medieval Ireland 1200 - 1600 AD. Medievalists.net. Retrieved from https://www.medievalists.net/2021/10/making-a-house-a-home-ordinary-households-in-later-medieval-ireland-1200-1600-ad/

Dozer, D. M. 1976. Portrait of the Free State: A History of Maryland. Tidewater Publishers.

Drewett, P. 1999. Field archaeology: An introduction.

Elton, G. R. 1978. England under the Tudors. Routledge.

Giardano, M., Kvamme, K. L., & Clay, R. B. 2006. Remote sensing in archaeology: an explicitly North American perspective. University of Alabama Press.

Gossman-Bailey, Irene & Gall, Michael J. 2012. On the Border: Farming near the Maryland Border in 18th-19th-Century St. Georges Hundred, Delaware. Presentation to the Society for Historic Archaeology 2012 Annual Meeting, Baltimore, MD.

Griffith, D., Thackara, J. & Vallance, J. .1794. Map of the State of Maryland laid down from an actual survey of all the principal waters, public roads, and divisions of the counties therein; describing the situation of the cities, towns, villages, houses of worship and other public buildings, furnaces, forges, mills, and other remarkable places; and of the Federal Territory; as also a sketch of the State of Delaware shewing the probable connexion of the Chesapeake and Delaware Bays. [Philadelphia, J. Vallance] [Map] Retrieved from the Library of Congress, https://www.loc.gov/item/76693265/.

Johnson, K. M., & Ouimet, W. B. 2014. Rediscovering the lost archaeological landscape of southern New England using airborne light detection and ranging (LiDAR). Journal of Archaeological Science, 43, 9-20.

Johnston, G. 1881. History of Cecil County, Maryland.

Kammen, M. G. Winter, 1960. The Causes of the Maryland Revolution of 1689. Maryland Historical Magazine, LV.

Kilty, J. 1808. The Land-holder's Assistant, and Land-office Guide: Being an Exposition of Original Titles, as Derived from the Proprietary Government, and More Recently from the State, of Maryland: Designed to Explain the Manner in which Such Titles Have Been and May Be, Acquired and Completed... G. Dobbin and Murphy. Vol. 73.

Lake, G. &. S., Toudy, H. J. & Worley & Bracher. 1877. An illustrated atlas of Cecil County, Maryland. Philadelphia: Lake, Griffing & Stevenson. [Map] Retrieved from the Library of Congress, https://www.loc.gov/item/2007626860/.

Leone, M. P., Tang, A., Skolnik, B. A., & Pruitt, E. 2013. In the shade of Frederick Douglass: the archaeology of Wye House. In Reclaiming Archaeology (pp. 236-248). Routledge.

Martenet, S. J. 1858. Martenet's Map of Cecil County, Maryland: from the coast, and original surveys. [Baltimore?: S. J. Martenet] [Map] Retrieved from the Library of Congress, https://www.loc.gov/item/2002624017/.

Maryland Department of Natural Resources. Fair Hill Natural Resources Management Area: Trails and Trail Map. Maryland Department of Natural Resources.

https://dnr.maryland.gov/publiclands/Pages/central/FairHill/Trails.aspx

Maryland iMap. 2020. Maryland LiDAR Cecil County - Shaded Relief. Accessed via the Maryland iMap website. https://data.imap.maryland.gov/datasets/maryland::maryland-lidar-cecil-county-shaded-relief/about

Maryland Survey Papers (Division Plats) 1724-1920. 1782. New Connaught Manor [Susquehanna Manor]. Maryland State Archives.

Mathews, E. B. 1907. The Counties of Maryland: Their Origin, Boundaries, and Election Districts. Vol. 6. Johns Hopkins Press.

Mathews, E. B. 1908. History of the boundary dispute between the Baltimores and the Penns resulting in the original Mason and Dixon line. Report on resurvey of the Maryland-Pennsylvania boundary part of the Mason and Dixon line: Pennsylvania Dept. Internal Affairs, 103-203.

Mazurek, C. 1998. Alexander-Bunting House Architectural Survey File. Maryland Historical Trust. CE-717

Mazurek, C. 1998. Alexander Site Architectural Survey File. Maryland Historical Trust. CE-729

Mazurek, C. 1998. Appleton Road Stone House Architectural Survey File. Maryland Historical Trust. CE-714

Miller, H. 2021. Introduction to St. Mary's City history and archaeology, in H. Miller & T. Parno (ed.) Unearthing St Mary's City: fifty years of archaeology at Maryland's first capital: 1–19. Gainesville: University Press of Florida. https://doi.org/10.2307/j.ctv1k76hm5.7

Moody, T. W., Martin, F. X., & Byrne, F. J. 1991. A New History of Ireland: Volume III: Early Modern Ireland 1534-1691: Early Modern Ireland 1534-1691 (Vol. 3). OUP Oxford.

Nathan, R. E. 2000. East of the Mason-Dixon Line: a history of the Delaware boundaries. Delaware Heritage Press.

National Agriculture Imagery Program [NAIP]. 2018. Aerial imagery. Accessed via the USDA "Box" page. https://nrcs.app.box.com/v/naip/folder/70909988439

National Agriculture Imagery Program [NAIP]. 2021. Aerial imagery. Accessed via the USDA "Box" page. https://nrcs.app.box.com/v/naip/folder/153968185489

New Ireland Established in Maryland. 2015.The Gilder Lehrman Center for the Study of Slavery, Resistance, and Abolition. https://glc.yale.edu/land-commissioners-office-maryland-land-office

Oram, R. 2004. Traditional Buildings in Ireland: Home Owners Handbook. Mourne Heritage Trust.

Papenfuse, E. C. 1979. A biographical dictionary of the Maryland legislature, 1635-1789. Vol. 2. Johns Hopkins University Press.

Patent Record 21. Maryland State Archives.

Patent Record 22. Maryland State Archives.

Polk, J. F. 2017. New Munster and its Irishmen. The Inkwell, Fall 2017.

Reed, P. 2014. Fair Hill Estate Historic District Architectural Survey File. Maryland Historical Trust. CE-1434

Rent Rolls 1639-1776. Maryland State Archives. CE.

Silver, T. 2001. A Useful Arcadia European Colonists as Biotic Factors in Chesapeake Forests. In *Discovering the Chesapeake: The History of an Ecosystem*, Philip D. Curtin, Grace S. Brush, and George W. Fisher, editors, pp. 149-163. Johns Hopkins University Press, Baltimore, MD.

Skopyk, B. 2021. Georeferencing historical maps. ArcGIS StoryMaps.

https://storymaps.arcgis.com/stories/dd75d0398f7d4ded924d303161895b8b

Smolek, M. A. 1984. Soyle Light, Well-Watered, and on the River': Settlement Patterning of Maryland's Plantations. In Third Hall of Records Conference of Maryland's History.

Soderlund, J. R. (Ed.). 1983. William Penn and the founding of Pennsylvania: a documentary history. University of Pennsylvania Press.

St. Mary's County, Maryland. St. Mary's County, Maryland - Historical Chronology. (n.d.). https://msa.maryland.gov/msa/mdmanual/36loc/sm/chron/html/smchron.html

Tarragó, R. E. 2004. Bloody Bess: The Persecution of Catholics in Elizabethan England. Logos: A Journal of Catholic Thought and Culture, 7(1), 117-133.

The Cecil Historical Trust, Inc. 1996. At the head of the bay : a cultural and architectural history of Cecil County, Maryland. The Maryland Historical Press.

Touart, P. B. 1981. New Munster Stone Architectural Survey File. Maryland Historical Trust. CE-1005

Ulster Historical Foundation. Catholicism. Plantation of Ulster. https://www.ancestryireland.com/plantation-ulster/?page_id=87

U.S. Agricultural Stabilization and Conservation Service (ASCS). 1952. Cecil County index 1952. JScholarship Home. https://jscholarship.library.jhu.edu/handle/1774.2/36541

U.S. Geological Survey. 1898. Topographic Quadrangle Map, Elkton, MD, Elkton [map]. (ca. 1:62500.)

U.S. Geological Survey. 1900. Topographic Quadrangle Map, Elkton, MD, Elkton [map]. (ca. 1:62500.)

U.S. Geological Survey. 1900. Topographic Quadrangle Map, Havre De Grace, MD, Havre De Grace [map]. (ca. 1:62500.)

U.S. Geological Survey. 1917. Topographic Quadrangle Map, Elkton, MD, Elkton [map]. (ca. 1:62500.)

U.S. Geological Survey. 1942. Topographic Quadrangle Map, Elkton, MD, Elkton [map]. (ca. 1:62500.)

U.S. Geological Survey. 1942. Topographic Quadrangle Map, Havre De Grace, MD, Havre De Grace [map]. (ca. 1:62500.)

Verhoeven, G. J. 2012. Near-infrared aerial crop mark archaeology: from its historical use to current digital implementations. Journal of Archaeological Method and Theory, 19(1), 132-160.